



OpenVMS System Management Utilities
Reference Manual: A-L

The title "OpenVMS" is rendered in a large, bold, serif font. The text is superimposed on a large, textured, reddish-pink brushstroke graphic that has a rough, hand-painted appearance. The background of the page is a light cream color.

OpenVMS

OpenVMS System Management Utilities Reference Manual: A-L

Order Number: AA-PV5PA-TK

May 1993

This document describes reference information for System Management utilities used with the OpenVMS VAX and OpenVMS AXP operating systems.

Revision/Update Information: This is a new manual.
Software Version: OpenVMS AXP Version 1.5
OpenVMS VAX Version 6.0

**Digital Equipment Corporation
Maynard, Massachusetts**

May 1993

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ZK6258

This document was prepared using VAX DOCUMENT, Version 2.1.

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Preface

The *OpenVMS System Management Utilities Reference Manual: A–L* contains reference information about the utilities that are used to manage both the OpenVMS VAX and OpenVMS AXP operating systems. This manual describes each system management utility and provides examples for frequently used commands and qualifiers. In addition to system management utilities, a description and usage summary of the AUTOGEN command procedure is presented in this reference manual.

Refer to the *OpenVMS System Management Utilities Reference Manual: M–Z* for information on the system management utilities not discussed in this book.

All commands follow the standard rules of grammar as specified in the *OpenVMS DCL Dictionary*.

For information on how to use these system management utilities and AUTOGEN, please refer to the *OpenVMS System Manager's Manual*.

Intended Audience

This manual is intended for system managers and users of the system management utilities for the OpenVMS VAX and OpenVMS AXP operating systems.

Document Structure

This manual is divided into 12 parts, which are arranged alphabetically. Each part, with the exception of the section on the AUTOGEN command procedure, contains reference information for a system management utility. Table 1 shows the structure as follows:

Table 1 Manual Structure

Part	Utility
1	Access Control List Editor (ACL editor)
2	Accounting (ACCOUNTING)
3	Analyze Disk/Disk Structure (ANALYZE/DISK_STRUCTURE)
4	Audit Analysis (ANALYZE/AUDIT)
5	Authorize (AUTHORIZE)
6	AUTOGEN Command Procedure
7	Backup (BACKUP)
8	Crash Log Utility Extractor (CLUE)

(continued on next page)

Table 1 (Cont.) Manual Structure

Part	Utility
9	Error Log (ERROR LOG)
10	Install (INSTALL)
11	LAT Control Program (LATCP)
12	Log Manager Control Program (LMCP)

Associated Documents

For more information on the system management utilities, please refer to the following documents:

- *DEC Text Processing Utility Reference Manual*
- *OpenVMS AXP Guide to System Security*
- *OpenVMS DCL Dictionary*
- *OpenVMS System Manager's Manual*
- *OpenVMS System Management Utilities Reference Manual: M–Z*
- *OpenVMS Programming Concepts Manual*
- *OpenVMS Programming Interfaces: Calling a System Routine*
- *OpenVMS Record Management Services Reference Manual*
- *OpenVMS System Services Reference Manual*
- *OpenVMS User's Manual*
- *OpenVMS VAX Device Support Manual*
- *OpenVMS VAX Guide to System Security*
- *OpenVMS VAX System Dump Analyzer Utility Manual*
- *Volume Shadowing for OpenVMS*
- *VAX Hardware Handbook*

Conventions

In this manual, every use of OpenVMS AXP means the OpenVMS AXP operating system, every use of OpenVMS VAX means the OpenVMS VAX operating system, and every use of OpenVMS means both the OpenVMS AXP operating system and the OpenVMS VAX operating system.

The contents of the display examples for certain utility commands described in this manual may differ slightly from the actual output provided by these commands on your system. However, when the behavior of a command differs significantly between OpenVMS VAX and OpenVMS AXP, that behavior is described in text and rendered, as appropriate, in separate examples.

The following conventions are used to identify information specific to OpenVMS AXP or to OpenVMS VAX:



The AXP icon denotes the beginning of information specific to OpenVMS AXP.



The VAX icon denotes the beginning of information specific to OpenVMS VAX.



The diamond symbol denotes the end of a section of information specific to OpenVMS AXP or to OpenVMS VAX.

The following conventions are also used in this manual:

Ctrl/*x*

A sequence such as Ctrl/*x* indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.

PF1 *x*

A sequence such as PF1 *x* indicates that you must first press and release the key labeled PF1, then press and release another key or a pointing device button.

GOLD *x*

A sequence such as GOLD *x* indicates that you must first press and release the key defined GOLD, then press and release another key. GOLD key sequences can also have a slash (/), dash (-), or underscore (_) as a delimiter in EVE commands.

Return

In examples, a key name enclosed in a box indicates that you press a key on the keyboard. (In text, a key name is not enclosed in a box.)

...

A horizontal ellipsis in examples indicates one of the following possibilities:

- Additional optional arguments in a statement have been omitted.
- The preceding item or items can be repeated one or more times.
- Additional parameters, values, or other information can be entered.

.

.

.

A vertical ellipsis indicates the omission of items from a code example or command format; the items are omitted because they are not important to the topic being discussed.

()

In format descriptions, parentheses indicate that, if you choose more than one option, you must enclose the choices in parentheses.

[]

In format descriptions, brackets indicate optional elements. You can choose one, none, or all of the options. (Brackets are not optional, however, in the syntax of a directory name in an OpenVMS file specification, or in the syntax of a substring specification in an assignment statement.)

{ }

In format descriptions, braces surround a required choice of options; you must choose one of the options listed.

boldface text

Boldface text represents the introduction of a new term or the name of an argument, an attribute, or a reason.

Boldface text is also used to show user input in Bookreader versions of the manual.

italic text

Italic text emphasizes important information, indicates variables, and indicates complete titles of manuals. Italic text also represents information that can vary in system messages (for example, Internal error *number*), command lines (for example, /PRODUCER=*name*), and command parameters in text.

UPPERCASE TEXT

Uppercase text indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.

-

A hyphen in code examples indicates that additional arguments to the request are provided on the line that follows.

numbers

All numbers in text are assumed to be decimal, unless otherwise noted. Nondecimal radices—binary, octal, or hexadecimal—are explicitly indicated.

Access Control List Editor



ACL Editor Description

The access control list editor (ACL editor) is a screen-oriented editor used to create and maintain access control lists (ACLs). An ACL is a collection of access control entries (ACEs) that grant or deny access for specific users or groups of users of an object. (For a description of the entry and display format for ACEs, see the section ACE Formats.) ACLs enable you to control access more closely than you can by using the default user identification code (UIC) based protection.

The system does not limit the number of ACEs that an ACL can contain or the number of characters in an ACE. However, long ACLs increase the amount of time necessary to gain access to an object. In practice, memory constraints can limit the size of an ACL.

The order of ACEs in an ACL is important. ACEs granting or denying access to an object for specific users must appear before ACEs identifying broader classes of users. For example, to grant user SMITH read access to a system object and to deny all other interactive users all types of access to the object, place the ACE for user SMITH before the ACE identifying all interactive users on the system.

You can place ACLs on the following object classes:

- Capability (VAX only)
- Device
- Common event flag cluster (VAX only)
- File
- Group global section
- Logical name table
- Queue
- Resource domain (VAX only)
- Security class (VAX only)
- System global section
- Volume (VAX only)

ACL Editor Usage Summary

The access control list editor (ACL editor) creates or modifies an access control list (ACL) for a specified object.

Format

EDIT/ACL object-spec

Parameter

object-spec

Specifies the object whose access control list is to be created or edited. If an access control list does not exist, it is created.

You can specify an object from any of the following object classes:

- Capability (VAX only)
- Device
- Common event flag cluster (VAX only)
- File
- Group global section
- Logical name table
- Queue
- Resource domain (VAX only)
- Security class (VAX only)
- System global section
- Volume (VAX only)

The default object class is a file. A file must be a disk file on a Files-11 On-Disk Structure Level 2 formatted volume. For any object other than a file, you must specify the object class with the /CLASS qualifier (VAX systems only) or with the /OBJECT_TYPE qualifier.

Note that the ACL editor does not provide a default file type for files. To prevent the ACL editor from using a null file type, specify the file type on the command line. If the object is a directory, specify the .DIR file type.

Do not include wildcard characters in the object specification.

Usage Summary

You can invoke the ACL editor to create or modify an ACL for an object that you own, have control access to, or can gain access to by a privilege such as BYPASS, GRPPRV, READALL (AXP only), or SYSPRV. To invoke the ACL editor, enter the DCL command EDIT/ACL. In the command line, specify the name of the object whose ACL you want to edit. For example, to create an ACL for the file INVENTORY.DAT, enter the following command:

```
$ EDIT/ACL INVENTORY.DAT
```

VAX

On VAX systems, you can use either the EDIT/ACL command or the SET SECURITY/EDIT command to invoke the ACL editor. For more information on the SET SECURITY command, see the *Security Guide*. ♦

By default, the ACL editor creates and modifies ACLs for files. To create an ACL for an object other than a file (for example, to create an ACL for a queue), you must specify the object class when you invoke the ACL editor. For example, the following command invokes the ACL editor to create an ACL for the disk DAPR:

```
$ EDIT/ACL/OBJECT_TYPE=DEVICE DAPR
```

On OpenVMS VAX systems, the equivalent SET SECURITY command is as follows:

```
$ SET SECURITY/EDIT/CLASS=DEVICE DAPR
```

If an ACL for the object you specify already exists, the ACL editor displays the ACL. You can then use keypad editing commands to add, replace, or delete one or more ACEs in the ACL (see Section A.1) To exit from a completed editing session, press Ctrl/Z. To end an editing session without incorporating any of your edits, press the GOLD key (PF1) and then press Ctrl/Z.

For a description of keypad editing commands supplied by the ACL editor, see Appendix A. For information on how to modify the ACL editor by modifying ACL section files, see Appendix B.

Note

In addition to invoking the ACL editor directly or by entering commands at the DCL prompt (\$), you can also modify an ACL by using the callable interface to the ACL editor (the ACLEDIT\$EDIT routine). For information about how to use the ACLEDIT\$EDIT routine, see the *OpenVMS Utility Routines Manual*.

ACE Formats

This section describes the entry and display format for the following access control entries (ACEs):

- Alarm ACE for security auditing of an object
- Audit ACE for security auditing of an object (VAX only)
- Creator ACE to set the ownership access for new files created in a directory (VAX only)
- Default Protection ACE to set a default protection code through a directory structure
- Identifier ACE for object access control
- Subsystem ACE for protected subsystem access control (VAX only)

The *Security Guide* describes how to use each of these ACEs. You can also use other types of ACEs. For example, applications can use an Application ACE to store application-specific information associated with a file. For a description of the internal format used to store an ACE, see the *OpenVMS Programming Concepts Manual*.

Alarm ACE

Specifies the access criteria that cause an alarm message to be sent to all security operator terminals. On AXP systems, alarm messages are also sent to the system security audit log file. A message is sent only if ACL alarms are enabled with the DCL command SET AUDIT/ALARM/ENABLE=ACL.

VAX

On VAX systems, ACL alarms are enabled by default; however, alarms are not written to the system security audit log file. If you have existing files protected by Alarm ACEs and you want messages to be recorded in the log file, replace the Alarm ACEs with Audit ACEs. ♦

Format

(ALARM=SECURITY [,OPTIONS=attributes], ACCESS=access-type[+access-type...])

Parameters

options

Specify any of the following attributes:

Default	Indicates that an ACE is to be included in the ACL of any files created within a directory. When the entry is propagated, the Default attribute is removed from the ACE of the created file. This attribute is valid for directory files only.
---------	--

Hidden

Indicates that this ACE should be changed only by the application that adds it. Although the Hidden attribute is valid for any ACE type, its intended use is to hide Application ACEs. The ACL editor displays the ACE only to show its relative position within the ACL, not to facilitate editing of the ACE. Unless you have the SECURITY privilege, you cannot display a hidden ACE with the DCL command DIRECTORY/ACL.

On OpenVMS AXP systems, you cannot modify or delete a hidden ACE with the DCL command SET ACL. To create a hidden ACE, an application can invoke the \$CHANGE_ACL system service.

On OpenVMS VAX systems, you cannot display a hidden ACE with the DCL commands SHOW SECURITY, SHOW ACL, or DIRECTORY/SECURITY, and you cannot modify or delete a hidden ACE with the SET SECURITY command. To create a hidden ACE, an application can invoke the \$SET_SECURITY system service.

Protected

Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:

- By using the ACL editor
- By specifying the ACE explicitly when deleting it
On OpenVMS AXP systems, use the DCL command SET ACL/ACL=(ace)/DELETE to specify and delete an ACE.
On OpenVMS VAX systems, use the command SET SECURITY/ACL=(ace)/DELETE to specify and delete an ACE.
- By deleting all ACEs, both protected and unprotected
On OpenVMS AXP systems, use the DCL command SET ACL/ACL/DELETE=ALL to delete all ACEs.
On OpenVMS VAX systems, use the command SET SECURITY/ACL/DELETE=ALL to delete all ACEs.

The following commands do not delete protected ACEs:

```
SET ACL/ACL/DELETE
SET ACL/LIKE
SET ACL/DEFAULT
SET SECURITY/ACL/DELETE (VAX only)
SET SECURITY/LIKE (VAX only)
SET SECURITY/DEFAULT (VAX only)
```

ACL Editor Alarm ACE

Nopropagate	Indicates that the ACE cannot be copied by operations that usually propagate ACEs. On OpenVMS AXP systems, for example, the ACE cannot be copied by the SET ACL/LIKE or SET ACL/DEFAULT commands. On OpenVMS VAX systems, for example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY/DEFAULT commands.
None	Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.

access

Specify any access that is valid for the object class. See the *Security Guide* for a listing of valid access types. For an Alarm ACE to have any effect, you must include the keywords SUCCESS, FAILURE, or both. For example, if the auditing criterion is a failure to obtain write access to an object, specify the following Alarm ACE:

```
(ALARM=SECURITY, ACCESS=WRITE+FAILURE)
```

Audit ACE (VAX Only)

VAX

On VAX systems, specifies the access criteria that cause an audit message to be written to the system security audit log file. A message is recorded only if ACL audits are enabled with the DCL command SET AUDIT/AUDIT/ENABLE=ACL.

Format

```
(AUDIT=SECURITY [,OPTIONS=attributes], ACCESS=access-type[+access-type...])
```

Parameters

options

Specify one of the following attributes:

Default	Indicates that an ACE is to be included in the ACL of any files created within a directory. When the entry is propagated, the Default attribute is removed from the ACE of the created file. This attribute is valid for directory files only.
---------	--

ACL Editor Audit ACE (VAX Only)

Hidden	<p>Indicates that this ACE should be changed only by the application that adds it. Although the Hidden attribute is valid for any ACE type, its intended use is to hide application ACEs. The ACL editor displays the ACE only to show its relative position within the ACL, not to facilitate editing of the ACE. Unless you have the SECURITY privilege, you cannot display a hidden ACE with the DCL command DIRECTORY/ACL.</p> <p>You cannot display a hidden ACE with the DCL commands SHOW SECURITY, SHOW ACL, or DIRECTORY /SECURITY, and you cannot modify or delete a hidden ACE with the SET SECURITY command. To create a hidden ACE, an application can invoke the \$SET_SECURITY system service.</p>
Protected	<p>Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:</p> <ul style="list-style-type: none">• By using the ACL editor• By specifying the ACE explicitly when deleting it Use the DCL command SET SECURITY/ACL=(ace) /DELETE to specify and delete an ACE.• By deleting all ACEs, both protected and unprotected Use the DCL command SET SECURITY/ACL /DELETE=ALL to delete all ACEs. <p>The following commands do not delete protected ACEs:</p> <pre>SET SECURITY/ACL/DELETE SET SECURITY/LIKE SET SECURITY/DEFAULT</pre>
Nopropagate	<p>Indicates that the ACE cannot be copied by operations that usually propagate ACEs.</p> <p>For example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY/DEFAULT commands.</p>
None	<p>Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.</p>

access

Specify any access that is valid for the object class. See the *Security Guide* for a listing of valid access types. For an Audit ACE to have any effect, you must include the keywords SUCCESS, FAILURE, or both. For example, if the auditing criterion is a failure to obtain write access to an object, specify the following Audit ACE:

```
(AUDIT=SECURITY,ACCESS=WRITE+FAILURE) ♦
```

ACL Editor Creator ACE (VAX Only)

Creator ACE (VAX Only)

VAX

On VAX systems, adds an extra ACE to the ACL for a file created within the directory to which you assign the Creator ACE. The Creator ACE applies only when the following conditions exist:

- The file being created is not owned by the user identification code (UIC) of the process creating the file.
- The process creating the file does not have system privileges.

For example, both of these conditions exist when a process holding a general identifier with the Resource attribute creates a file in a directory owned by that identifier. In this situation, the system adds an extra ACE at the top of the new file's ACL. If there is a Creator ACE in the ACL for the parent directory, the system propagates the access specified in the Creator ACE to the new ACE. If a directory lacks a creator ACE, the system assigns an extra ACE with a combination of control access and ownership access. A Creator ACE with ACCESS=NONE suppresses the addition of the extra ACE.

The Creator ACE applies to directory files only.

See the *Security Guide* for more information.

Format

```
(CREATOR [,OPTIONS=attribute[+attribute...]]  
,ACCESS=access-type[+access-type...])
```

Parameters

options

Specify any of the following attributes:

Protected Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:

- By using the ACL editor
- By specifying the ACE explicitly when deleting it
Use the DCL command SET SECURITY/ACL=(ace) /DELETE to specify and delete an ACE.
- By deleting all ACEs, both protected and unprotected
Use the DCL command SET SECURITY/ACL /DELETE=ALL to delete all ACEs.

The following commands do not delete protected ACEs:

```
SET SECURITY/ACL/DELETE  
SET SECURITY/LIKE  
SET SECURITY/DEFAULT
```

Nopropagate	Indicates that the ACE cannot be copied by operations that usually propagate ACEs. For example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY/DEFAULT commands.
None	Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.

access

Specify access types that are valid for files (read, write, execute, delete, and control). ♦

Default Protection ACE

Defines a UIC-based protection to be propagated to new files throughout a directory tree. The protection code in the ACE is assigned to new files created in the directory. The Default Protection ACE applies to directory files only.

Although the system propagates the Default Protection ACE to new subdirectories, the protection code is not assigned to the subdirectories. Instead, the subdirectories receive a modified copy of the parent directory's protection code in which delete access is not granted.

An example of a Default Protection ACE is as follows:

```
(DEFAULT_PROTECTION,S:RWED,O:RWED,G,W)
```

The ACE grants read, write, execute, and delete access to users in the system (S) and owner (O) categories but no access to users in the group and world categories. For more information, see the *Security Guide*.

Format

```
(DEFAULT_PROTECTION[,OPTIONS=attribute[+attribute...]],access)
```

Parameters

options

Specify any of the following attributes:

ACL Editor Default Protection ACE

Hidden

Indicates that this ACE should be changed only by the application that adds it. Although the Hidden attribute is valid for any ACE type, its intended use is to hide Application ACEs. The ACL editor displays the ACE only to show its relative position within the ACL, not to facilitate editing of the ACE. Unless you have the SECURITY privilege, you cannot display a hidden ACE with the DCL command DIRECTORY/ACL.

On OpenVMS AXP systems, you cannot modify or delete a hidden ACE with the DCL command SET ACL. To create a hidden ACE, an application can invoke the \$CHANGE_ACL system service.

On OpenVMS VAX systems, you cannot display a hidden ACE with the DCL commands SHOW SECURITY, SHOW ACL, or DIRECTORY/SECURITY, and you cannot modify or delete a hidden ACE with the SET SECURITY command. To create a hidden ACE, an application can invoke the \$SET_SECURITY system service.

Protected

Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:

- By using the ACL editor
- By specifying the ACE explicitly when deleting it
On OpenVMS AXP systems, use the DCL command SET ACL/ACL=(ace)/DELETE to specify and delete an ACE.
On OpenVMS VAX systems, use the command SET SECURITY/ACL=(ace)/DELETE to specify and delete an ACE.
- By deleting all ACEs, both protected and unprotected
On OpenVMS AXP systems, use the DCL command SET ACL/ACL/DELETE=ALL to delete all ACEs.
On OpenVMS VAX systems, use the command SET SECURITY/ACL/DELETE=ALL to delete all ACEs.

The following commands do not delete protected ACEs:

```
SET ACL/ACL/DELETE
SET ACL/LIKE
SET ACL/DEFAULT
SET SECURITY/ACL/DELETE (VAX only)
SET SECURITY/LIKE (VAX only)
SET SECURITY/DEFAULT (VAX only)
```

Nopropagate	Indicates that the ACE cannot be copied by operations that usually propagate ACEs. On OpenVMS AXP systems, for example, the ACE cannot be copied by the SET ACL/LIKE or SET ACL/DEFAULT commands. On OpenVMS VAX systems, for example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY/DEFAULT commands.
None	Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.

access

Specify access in the format of a UIC-based protection code, which is as follows:

[category: list of access allowed (, category: list of access allowed,...)]

- User categories include system (S), owner (O), group (G), and world (W). See the *Security Guide* for a definition of these categories. Access types for files include read (R), write (W), execute (E), and delete (D). The access type is assigned to each ownership category and is separated from its access types with a colon (:).
- A null access list means no access, so when you omit an access type for a user category, that category of user is denied that type of access. To deny all access to a user category, specify the user category without any access types. Omit the colon after the user category when you deny access to a category of users.
- When you omit a user category from a protection code, the current access allowed that category of user is set to no access.

Identifier ACE

Controls the type of access allowed to a particular user or group of users. An example of an Identifier ACE is as follows:

```
(IDENTIFIER=SALES,ACCESS=READ+WRITE)
```

A system manager can use the Authorize utility (AUTHORIZE) to grant the SALES identifier to a specific group of users. Read and write access to the file INVENTORY.DAT is then granted to users who hold the SALES identifier.

For more information, see the *Security Guide*.

Format

```
(IDENTIFIER=identifier[+identifier...] [,OPTIONS=attributes[+attributes...]]  
,ACCESS=access-type[+access-type...])
```


ACL Editor Identifier ACE

Parameters

identifier

Specifies a user or groups of users whose access to an object is defined in the ACE. A system manager creates or removes identifiers and assigns users to hold these identifiers.

Types of identifiers are as follows:

UIC	Identifiers in alphanumeric format that are based on the user identification codes (UICs) and that uniquely identify each user on the system. Users with accounts on the system automatically receive a UIC identifier, for example, [GROUP1,JONES] or [JONES]. Thus, each UIC identifier specifies a particular user.
General	Identifiers defined by the security administrator in the rights list to identify groups of users on the system. A general identifier is an alphanumeric string of 1 to 31 characters, containing at least one alphabetic character. It can include the letters A to Z, dollar signs (\$), underscores (_), and the numbers 0 to 9, for example, 92SALES\$, ACCOUNT_3, or PUBLISHING.
Environmental	Identifiers describing different types of users based on their initial entry into the system. Environmental identifiers are also called system-defined identifiers. Environmental identifiers correspond directly to the login classes described in the <i>Security Guide</i> . They include batch, network, interactive, local, dialup, and remote.

For more information, see the *Security Guide*.

options

Specify any of the following attributes:

Default	Indicates that an ACE is to be included in the ACL of any files created within a directory. When the entry is propagated, the Default attribute is removed from the ACE of the created file. This attribute is valid for directory files only. Note that an Identifier ACE with the Default attribute has no effect on access.
---------	---

Hidden

Indicates that this ACE should be changed only by the application that adds it. Although the Hidden attribute is valid for any ACE type, its intended use is to hide Application ACEs. The ACL editor displays the ACE only to show its relative position within the ACL, not to facilitate editing of the ACE. Unless you have the SECURITY privilege, you cannot display a hidden ACE with the DCL command DIRECTORY/ACL.

On OpenVMS AXP systems, you cannot modify or delete a hidden ACE with the DCL command SET ACL. To create a hidden ACE, an application can invoke the \$CHANGE_ACL system service.

On OpenVMS VAX systems, you cannot display a hidden ACE with the DCL commands SHOW SECURITY, SHOW ACL, or DIRECTORY/SECURITY, and you cannot modify or delete a hidden ACE with the SET SECURITY command. To create a hidden ACE, an application can invoke the \$SET_SECURITY system service.

Protected

Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:

- By using the ACL editor
- By specifying the ACE explicitly when deleting it
On OpenVMS AXP systems, use the DCL command SET ACL/ACL=(ace)/DELETE to specify and delete an ACE.
On OpenVMS VAX systems, use the command SET SECURITY/ACL=(ace)/DELETE to specify and delete an ACE.
- By deleting all ACEs, both protected and unprotected
On OpenVMS AXP systems, use the DCL command SET ACL/ACL/DELETE=ALL to delete all ACEs.
On OpenVMS VAX systems, use the command SET SECURITY/ACL/DELETE=ALL to delete all ACEs.

The following commands do not delete protected ACEs:

```
SET ACL/ACL/DELETE
SET ACL/LIKE
SET ACL/DEFAULT
SET SECURITY/ACL/DELETE (VAX only)
SET SECURITY/LIKE (VAX only)
SET SECURITY/DEFAULT (VAX only)
```

ACL Editor Identifier ACE

Nopropagate	Indicates that the ACE cannot be copied by operations that usually propagate ACEs. On OpenVMS AXP systems, for example, the ACE cannot be copied by the SET ACL/LIKE or SET ACL/DEFAULT commands. On OpenVMS VAX systems, for example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY /DEFAULT commands.
None	Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.

access

Specify access types that are valid for the object class. See the *Security Guide* for a listing of valid access types.

Subsystem ACE (VAX Only)

VAX

On VAX systems, grants additional identifiers to a process while it is running the image to which the Subsystem ACE applies. Users with execute access to the image can access objects that are in the protected subsystem, such as data files and printers, but only when they run the subsystem images. The Subsystem ACE applies to executable images only.

An example of a Subsystem ACE is as follows:

```
(SUBSYSTEM, IDENTIFIER=ACCOUNTING)
```

Format

```
(SUBSYSTEM,[OPTIONS=attribute[+attribute...],]IDENTIFIER=identifier  
[,ATTRIBUTES=attribute[+attribute...]] [,IDENTIFIER=identifier  
[,ATTRIBUTES=attribute[+attribute...]],...])
```

Parameters

options

Specify any of the following attributes:

ACL Editor Subsystem ACE (VAX Only)

Protected	<p>Protects the ACE against casual deletion. Protected ACEs can be deleted only in the following ways:</p> <ul style="list-style-type: none">• By using the ACL editor• By specifying the ACE explicitly when deleting it Use the DCL command SET SECURITY/ACL=(ace) /DELETE to specify and delete an ACE.• By deleting all ACEs, both protected and unprotected Use the DCL command SET SECURITY/ACL /DELETE=ALL to delete all ACEs. <p>The following commands do not delete protected ACEs:</p> <pre>SET SECURITY/ACL/DELETE SET SECURITY/LIKE SET SECURITY/DEFAULT</pre>
Nopropagate	<p>Indicates that the ACE cannot be copied by operations that usually propagate ACEs.</p> <p>For example, the ACE cannot be copied by the SET SECURITY/LIKE or SET SECURITY/DEFAULT commands.</p>
None	<p>Indicates that no attributes apply to an entry. Although you can create an ACL entry with OPTIONS=None, the attribute is not displayed. Whenever you specify additional attributes with the None attribute, the other attributes take precedence. The None attribute is equivalent to omitting the field.</p>

identifier

A general identifier specifying the users or groups of users who are allowed or denied access to an object. It is an alphanumeric string of 1 through 31 characters, containing at least one alphabetic character. It can include the letters A to Z, dollar signs (\$), underscores (_), and the numbers 0 to 9. For more information, see the *Security Guide*.

A Subsystem ACE can have multiple pairs of identifiers, with special attributes assigned to the identifiers. A subsystem might require several identifiers to work properly. For example:

```
(SUBSYSTEM, IDENTIFIER=MAIL_SUBSYSTEM, ATTRIBUTE=NONE, IDENTIFIER=BLDG5, ATTRIBUTE=NONE)
```

attribute

The identifier characteristics you specify when you add identifiers to the rights list or grant identifiers to users. You can specify the following attribute:

Resource	Allows holders of the identifier to charge disk space to the identifier. Used only for file objects. ♦
----------	--

ACL Editor

ACL Editor Qualifiers

When you invoke the ACL editor, you can include qualifiers on the command line that identify the object class and the editing mode (prompt or noprompt). You can also use qualifiers to name a journaling file or to recover an ACL editing session. This section describes the qualifiers listed in Table 1-1.

Table 1-1 ACL Editor Qualifiers

Qualifier	Description
†/CLASS	Specifies the class of object whose ACL is being edited
/JOURNAL	Controls whether a journal file is created for the editing session
/MODE	Specifies the use of prompting during the editing session
/OBJECT_TYPE	Specifies the class of object whose ACL is being edited
/RECOVER	Restores an ACL from a journal file at the beginning of an editing session

†VAX specific

VAX

On VAX systems, all of the qualifiers described in this section also apply to the SET SECURITY/EDIT command. You can substitute the SET SECURITY/EDIT command wherever the EDIT/ACL command is shown; the syntax is the same for both commands.

Note that the /CLASS qualifier and the /OBJECT_TYPE qualifier are synonymous. ♦

/CLASS (VAX Only)

VAX

On VAX systems, specifies the class of the object whose ACL is being edited. Unless the object is a file, you must specify the object class.

The /CLASS qualifier and the /OBJECT_TYPE qualifier are synonymous.

Format

/CLASS =object-class

Description

To edit the ACL for an object other than a file, specify the object class with the /CLASS qualifier. Specify one of the following classes:

CAPABILITY	A system capability, such as the ability to process vector instructions. Currently, the only defined object name for the CAPABILITY class is VECTOR, which governs the ability of a subject to access a vector processor on the system. Note that you must supply the capability name as the object name parameter.
COMMON_EVENT_CLUSTER	A common event flag cluster.
DEVICE	A device, such as a disk or tape drive.
FILE	A file or a directory file. This is the default.
GROUP_GLOBAL_SECTION	A group global section.
LOGICAL_NAME_TABLE	A logical name table.
QUEUE	A batch queue or a device (printer, server, or terminal) queue.
RESOURCE_DOMAIN	A resource domain.
SECURITY_CLASS	A security class.
SYSTEM_GLOBAL_SECTION	A system global section.
VOLUME	A disk or tape volume.

Examples

1. `$ EDIT/ACL/CLASS=DEVICE WORK1`

The command in this example specifies that the object WORK1 is a device.

2. `$ EDIT/ACL/CLASS=QUEUE FAST_BATCH`

The command in this example creates an ACL for the FAST_BATCH queue. Note that if you create an ACL for a generic queue, you must create identical ACLs for all execution queues to which jobs can be directed. ♦

/JOURNAL

Controls whether a journal file is created for the editing session.

Format

`/JOURNAL [=file-spec]`

`/NOJOURNAL`

Description

By default, the ACL editor keeps a journal file containing a copy of modifications made during an editing session. The journal file is given the name of the object and a .TJL file type. If you specify a different name for the file, do not include any wildcard characters.

To prevent the ACL editor from creating a journal file, specify `/NOJOURNAL`.

If your editing session ends abnormally, you can recover the changes made during the aborted session by invoking the ACL editor with the `/RECOVER` qualifier.

ACL Editor /JOURNAL

Example

```
$ EDIT/ACL/JOURNAL=COMMONACL.SAV MECH1117.DAT
```

With this command, you create a journal file named COMMONACL.SAV. The file contains a copy of the ACL and the editing commands used to create the ACL for the file MECH1117.DAT.

If the editing session is interrupted, you can recover your edits by specifying the name COMMONACL.SAV with the /RECOVER qualifier.

```
$ EDIT/ACL/CLASS=RESOURCE/JOURNAL=ZERO_RESOURCE.TJL [0]
```

If you edit an ACL for the resource domain [0], the ACL editor attempts to create the file [0].TJL on the default device and fails. To create an ACL for the resource [0], you must specify a different name for the journal file (as shown in this example) or suppress the creation of a journal file with the /NOJOURNAL qualifier.

/MODE

Specifies the use of prompting during the editing session.

Format

```
/MODE =option
```

Description

By default, the ACL editor prompts you for each ACE and provides values for some of the fields within an ACE (/MODE=PROMPT). To disable prompting, specify /MODE=NOPROMPT on the command line.

Example

```
$ EDIT/ACL/MODE=NOPROMPT WEATHERTBL.DAT
```

With this command, you initiate an ACL editing session to create an ACL for the file WEATHERTBL.DAT. The /MODE=NOPROMPT qualifier specifies that no assistance is required in entering the ACL entries.

/OBJECT_TYPE

Specifies the class of the object whose ACL is being edited. Unless the object is a file, you must specify the object class.

VAX

On VAX systems, use the /CLASS qualifier instead of the /OBJECT_TYPE qualifier.♦

Format

```
/OBJECT_TYPE =object-class
```

Description

To edit the ACL for an object other than a file, specify the object class with the /OBJECT_TYPE qualifier. Specify one of the following classes:

DEVICE	A device, such as a disk or tape drive.
FILE	A file or a directory file. This is the default.
GROUP_GLOBAL_SECTION	A group global section.
LOGICAL_NAME_TABLE	A logical name table.
QUEUE	A batch queue or a device (printer, server, or terminal) queue.
SYSTEM_GLOBAL_SECTION	A system global section.

Examples

1. \$ EDIT/ACL/OBJECT_TYPE=DEVICE WORK1

The command in this example specifies that the object WORK1 is a device.

2. \$ EDIT/ACL/OBJECT_TYPE=QUEUE FAST_BATCH

The command in this example creates an ACL for the FAST_BATCH queue. Note that if you create an ACL for a generic queue, you must create identical ACLs for all execution queues to which jobs can be directed.

/RECOVER

Restores an ACL from a journal file at the beginning of an editing session.

Format

/RECOVER [=file-spec]

/NORECOVER

Description

The /RECOVER qualifier specifies that the ACL editor must restore the ACL from a journal file. The ACL editor restores the ACL to the state it was in when the last ACL editing session ended abnormally.

By default the journal file is given the name of the object and a .TJL file type. If you specify a more meaningful name for the journal file when you invoke the ACL editor (by using /JOURNAL), specify that file name with the /RECOVER qualifier.

Example

```
$ EDIT/ACL/JOURNAL=SAVEACL MYFILE.DAT
.
.
.
User creates ACL until system crashes
.
.
.
$ EDIT/ACL/JOURNAL=SAVEACL/RECOVER=SAVEACL MYFILE.DAT
```


ACL Editor /RECOVER

```
.  
. .  
ACL is restored and user proceeds with editing until done  
. .  
^Z  
$
```

The first command in this example starts the ACL editing session and specifies that the ACL editor must save the journal file SAVEACL.TJL if the session ends abnormally. The session proceeds until it is aborted by a system crash.

The next command restores the lost session with the journal file SAVEACL.TJL. To end the session, press Ctrl/Z. The ACL editor saves the edits and deletes the journal file.





ACCOUNTING Description

The Accounting utility (ACCOUNTING) produces reports of system resource use.

You can use ACCOUNTING qualifiers to:

- Produce a number of report formats
- Choose how the reports are organized
- Choose on which resources you want reports

You can use the reports to learn more about how the system is used and how it performs.

ACCOUNTING Usage Summary

Produces reports of resource use.

Format

ACCOUNTING [filespec[,...]]

Parameter

filespec[,...]

Specifies the accounting files you want to process.

Each file specification can include the percent (%) and asterisk (*) wildcard characters. If it does not include the device or directory, your current default device or directory is used. If it does not include the file name or file type, the values ACCOUNTNG and DAT are used respectively.

If you do not specify a file, the command processes the file SYS\$MANAGER:ACCOUNTNG.DAT.

Usage Summary

Use this DCL command to run the Accounting utility:

\$ ACCOUNTING [filespec[,...]]

You are returned to DCL level when the command has finished processing the specified accounting files.

By default, the command directs its output to the current SYS\$OUTPUT device. If you want to direct the output to a file, use the /OUTPUT qualifier.

Requires READ access to the accounting files you specify, and to the directories containing them.

ACCOUNTING Qualifiers

This section describes and provides examples of each ACCOUNTING qualifier. Table 2-1 summarizes the ACCOUNTING qualifiers.

Table 2-1 ACCOUNTING Qualifiers

Qualifier	Description
/ACCOUNT	Selects or rejects records for the specified account names
/ADDRESS	Selects or rejects records for DECnet for OpenVMS requests made by the specified nodes
/BEFORE	Selects all records time-stamped before the specified time
/BINARY	Copies the selected records to a new file in binary format
/BRIEF	Produces a brief report of the selected records
/ENTRY	Selects or rejects records for print and batch jobs with the specified queue entry numbers
/FULL	Produces a full report of the selected records
/IDENT	Selects or rejects records for the specified processes
/IMAGE	Selects or rejects records for the specified images
/JOB	Selects or rejects records for print and batch jobs with the specified job names
/LOG	Outputs informational messages
/NODE	Selects or rejects records for DECnet for OpenVMS requests made by the specified nodes
/OUTPUT	Specifies the output file
/OWNER	Selects or rejects records for subprocesses created by the specified processes
/PRIORITY	Selects or rejects records for the specified priority
/PROCESS	Selects or rejects records for the specified types of process
/QUEUE	Selects or rejects records for print or batch jobs executed by the specified queues
/REJECTED	Copies the rejected records to a new file
/REMOTE_ID	Selects or rejects records for DECnet for OpenVMS requests made by the specified remote IDs
/REPORT	Specifies the resources that you want to summarize in a summary report
/SINCE	Selects all records time-stamped at or after the specified time
/SORT	Sorts the selected records
/STATUS	Selects or rejects records with the specified final exit status codes
/SUMMARY	Produces a summary report of the selected records
/TERMINAL	Selects or rejects records for interactive sessions at the specified terminals
/TITLE	Specifies the title shown on the first line of a summary report

(continued on next page)

ACCOUNTING

Table 2-1 (Cont.) ACCOUNTING Qualifiers

Qualifier	Description
/TYPE	Selects or rejects the specified types of record
/UIC	Selects or rejects records for the specified UICs
/USER	Selects or rejects records for the specified user names

/ACCOUNT

Selects or rejects records for the specified account names.

Format

/ACCOUNT=(*[-]account[,...]*)

Description

The /ACCOUNT qualifier uses the value of the account field to select records for processing. This field is present in all records except file backward link and file forward link records.

The /ACCOUNT qualifier selects only records that have the specified values in the account field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

Table 2-2 shows the values stored in the account field of login failure and system initialization records.

Table 2-2 Special Account Field Values

Value	Description
<batch>	Batch job login failure
<det>	Detached process login failure
<login>	Interactive login failure
<net>	Network login failure
<start>	System startup

Note that when you specify these account field values as qualifier values, you must enclose them in quotes. Like all DCL commands, the ACCOUNTING command converts strings to uppercase unless they are enclosed in quotes.

Examples

1. \$ ACCOUNTING /ACCOUNT=(SALES, QA)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for the account names SALES and QA.

2. \$ ACCOUNTING /ACCOUNT=(-SALES, QA) /FULL

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a full report of all records *except* for the account names SALES and QA.

/ADDRESS

Selects or rejects records for DECnet for OpenVMS requests made by the specified nodes.

Format

/ADDRESS=([-]node_address[,...])

Description

The /ADDRESS qualifier uses the value of the remote node address field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about DECnet for OpenVMS requests, it contains the address of the node that made the request.

The /ADDRESS qualifier selects only records with the specified values in the remote node address field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /NODE and /REMOTE_ID qualifiers, which select or reject records for DECnet for OpenVMS requests made by specified node names and remote IDs respectively.

Example

\$ ACCOUNTING /ADDRESS=19656

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for DECnet for OpenVMS requests made by the node with the address 19656.

/BEFORE

Selects all records time-stamped before the specified time.

Format

/BEFORE[=time]

Description

All records in an accounting file are time-stamped with the time the record was logged in the file.

The /BEFORE qualifier selects only the records time-stamped before the specified time. You can specify an absolute time, a delta time, or a combination of the two. If you omit the time, 00:00 hours on the current day is used.

ACCOUNTING /BEFORE

See also the /SINCE qualifier, which selects records time-stamped at or after a specified time.

Example

```
$ ACCOUNTING /SINCE=1-NOV-1994 /BEFORE=1-DEC-1994
```

This example produces a brief report of all records time-stamped in the file SYS\$MANAGER:ACCOUNTNG.DAT during November 1994.

/BINARY

Copies the selected records to a new file in binary format.

Format

```
/BINARY
```

Description

The /BINARY qualifier specifies that records are output in binary format to the file specified by the /OUTPUT qualifier. Use the Accounting utility to process this file later.

See also the /BRIEF, /FULL, and /SUMMARY qualifiers, which process the selected records to produce a report.

You cannot use the /BINARY qualifier with the /BRIEF, /FULL, or /SUMMARY qualifiers.

Examples

```
1. $ ACCOUNTING /USER=SMITH /BINARY /OUTPUT=MYDISK:[ACCOUNTING]MYACC.DAT
```

This example creates the file MYDISK:[ACCOUNTING]MYACC.DAT. It processes the file SYS\$MANAGER:ACCOUNTNG.DAT, copying all records for the user SMITH to the new file in binary format.

```
2. $ ACCOUNTING /TYPE=PRINT -  
  _$ /BINARY /OUTPUT=PRINT_INFO.DAT /REJECTED=NOT_PRINT_INFO.DAT
```

This example creates two files in the default directory, PRINT_INFO.DAT and NOT_PRINT_INFO.DAT. It processes the file SYS\$MANAGER:ACCOUNTNG.DAT, copying print records to PRINT_INFO.DAT and other records to NOT_PRINT_INFO.DAT. These records are in binary format.

/BRIEF

Produces a brief report of the selected records.

Format

/BRIEF (default)

Description

The /BRIEF qualifier is the default. It produces a brief report of the selected records. The report is directed to the current SYS\$OUTPUT device, unless you use the /OUTPUT qualifier to write it to a file.

Each line of a brief report corresponds to a record in the accounting file. It does not show resources used, but gives the information shown in Table 2-3 about each record in the accounting file.

Table 2-3 Information in a Brief Accounting Report

Column	Description
Date/Time	When the record was logged in the accounting file.
Type	The type of the record (see Table 2-5 for details of the different types of record).
Subtype	For records of type IMAGE, this is the name of the image (the file name portion of its file specification). For records of type PROCESS, it is the type of the process (BATCH, DETACHED, INTERACTIVE, NETWORK, or SUBPROCESS).
User name	The user name. For login failures where the user did not give a valid user name, this is shown as <login>.
ID	The process identification (PID). For print jobs, this is the PID of the process that submitted the job.
Source	The terminal associated with an interactive process or, for DECnet for OpenVMS requests, the name of the node that issued the request.
Status	The final exit status code, expressed as a hexadecimal value.

To translate the final exit status code into the equivalent message text, use the F\$MESSAGE lexical function, and precede the status code with %X, as in this example:

```
$ MESSAGE = F$MESSAGE(%X00000001)
$ SHOW SYMBOL MESSAGE
MESSAGE = "%SYSTEM-S-NORMAL, normal successful completion"
```

See also the /BINARY qualifier, which copies the selected records to a file, and the /FULL and /SUMMARY qualifiers, which produce full and summary reports of the selected records.

You cannot use the /BRIEF qualifier with the /BINARY, /FULL, or /SUMMARY qualifiers.

ACCOUNTING /BRIEF

Example

```
$ ACCOUNTING
```

This example produces a brief report of all records in the file
SYS\$MANAGER:ACCOUNTNG.DAT.

This is an example of the report that is produced.

Date / Time	Type	Subtype	Username	ID	Source	Status
7-SEP-1994 17:20:08	FILE	BL		00000000		00000000
7-SEP-1994 17:22:05	PROCESS	DETACHED	JONES	516000E1		02DBA002
7-SEP-1994 17:22:10	PROCESS	INTERACTIVE	JONES	516000DD	TWA10:	00000001
7-SEP-1994 17:22:16	PROCESS	INTERACTIVE	JONES	51600104	TWA11:	0001C0F4
7-SEP-1994 17:22:20	PROCESS	DETACHED	JONES	51600103		12DB821C
8-SEP-1994 01:06:36	PROCESS	SUBPROCESS	SYSTEM	51600106		10000001
8-SEP-1994 03:09:59	PROCESS	BATCH	SYSTEM	5160010F		10030001
8-SEP-1994 09:13:15	LOGFAIL			51600105		00D3803C
8-SEP-1994 09:14:40	IMAGE	LOGINOUT	JONES	51600110		00000000
8-SEP-1994 09:28:57	PROCESS	SUBPROCESS	SMITH	51600119		10000001
8-SEP-1994 09:50:18	PROCESS	SUBPROCESS	SMITH	5160011A		00000001

/ENTRY

Selects or rejects records for print and batch jobs with the specified queue entry numbers.

Format

```
/ENTRY=( [-]entry_number[,...])
```

Description

The /ENTRY qualifier uses the value of the queue entry number field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about print or batch jobs, it contains the unique entry number assigned to the job in the print or batch queue.

The /ENTRY qualifier selects only records that have the specified values in the queue entry number field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /JOB and /QUEUE qualifiers, which select or reject records for print and batch jobs with specified job and queue names.

Examples

1. \$ ACCOUNTING /ENTRY=(211,212,213)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for print or batch jobs with a queue entry number of 211, 212, or 213.

2. \$ ACCOUNTING /ENTRY=(-25,50)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records except those for print or batch jobs with a queue entry number of 25 or 50.

/FULL

Produces a full report of the selected records.

Format

/FULL

Description

The /FULL qualifier produces a full report of the selected records. The report is directed to the current SYS\$OUTPUT device, unless you use the /OUTPUT qualifier to write it to a file.

Full reports display one screen of information for each selected record. The information displayed, and the way that it is laid out, depend on the type of the record and the data it contains.

The first line shows the event that caused the record to be logged in the accounting file. For example, for a record that was logged when an interactive process terminated, the first line shows INTERACTIVE Process Termination.

For subprocesses, the Owner ID field shows the PID of the parent process.

For records that contain information about DECnet for OpenVMS requests, the three Remote fields identify the remote user and remote node.

The Processor time field shows the total CPU time used. This includes any vector CPU time used. The Vector CPU time field is shown only if vector CPU time has been used.

Vector CPU time is the time that the process was scheduled on a vector-present CPU while that process was a vector consumer. Note that:

- When a process is a vector consumer, it accrues vector CPU time when it is scheduled, even if it does not issue any vector instructions.
- Processes that are scalar consumers or marginal vector consumers do not accrue vector CPU time, even when they are scheduled on vector-present CPUs.

The privilege is shown as two hexadecimal numbers that represent the first and last 32 bits of the 64-bit privilege mask. To translate the privilege bit mask into privileges, refer to the definitions of the symbols that begin PRV\$_ in the \$PRVDEF macro in the STARLET library. For example, the \$PRVDEF macro defines the PRV\$_READALL symbol to equate to 35. This means that READALL privilege is represented by bit 35 set in the privilege mask.

If you are processing only one file and you are displaying it on your screen, when you do not want to look at any more records, press Ctrl/Z to return to the DCL prompt.

ACCOUNTING /FULL

See also the /BINARY qualifier, which copies the selected records to a file, and the /BRIEF and /SUMMARY qualifiers, which produce brief and summary reports of the selected records.

You cannot use the /FULL qualifier with the /BINARY, /BRIEF, or /SUMMARY qualifiers.

Examples

1. \$ ACCOUNTING /FULL

This example displays a full report of all the records in the file SYS\$MANAGER:ACCOUNTNG.DAT. This example screen shows a record that was logged when an interactive process terminated. The interactive process was created when the user JONES at the node HQ222 entered a SET HOST command to connect to the local node.

```
INTERACTIVE Process Termination
-----
Username:      FISH      UIC:          [DOC,FISH]
Account:      DOC       Finish time:   23-APR-1994 15:21:23.83
Process ID:   20A0029B   Start time:   23-APR-1994 15:19:08.28
Owner ID:    00000000   Elapsed time: 0 00:02:15.55
Terminal name: RTA2:    Processor time: 0 00:00:04.14
Remote node addr: 63576 Priority:      4
Remote node name: HQ222 Privilege <31-00>: 00108000
Remote ID:    JONES   Privilege <63-32>: 00000000
Queue entry: 00000000 Final status code: 00000001
Queue name:
Job name:
Final status text: %SYSTEM-S-NORMAL, normal successful completion

Page faults:    2043    Direct IO:      159
Page fault reads: 68    Buffered IO:    228
Peak working set: 852    Volumes mounted: 0
Peak page file: 5512    Images executed: 10
Vector CPU time: 0 00:00:0.54

Press RETURN for Next Record >
```

2. \$ ACCOUNTING /FULL /OUTPUT=MYACC

This example creates the output file MYACC.LIS in the default directory. It processes the file SYS\$MANAGER:ACCOUNTNG.DAT, writing a full report of all records to the new output file.

/IDENT

Selects or rejects records for the specified processes.

Format

/IDENT=(([-]pid[,...])

Description

The /IDENT qualifier uses the value of the process identification (PID) field to select records for processing. This field is present in all records except file backward link and file forward link records. For print job records, it contains the PID of the process that submitted the job.

The /IDENT qualifier selects only records that have the specified values in the PID field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /OWNER qualifier, which selects or rejects records for subprocesses created by specified processes.

Examples

1. \$ ACCOUNTING /IDENT=(25634,045A6B)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for processes with a PID of 25634 or 045A6B.

2. \$ ACCOUNTING /IDENT=(-25634,045A6B)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records except those for processes with a PID of 25634 or 045A6B.

/IMAGE

Selects or rejects records for the specified images.

Format

/IMAGE=(*[-]*image_name[,...])

Description

The /IMAGE qualifier uses the value of the image name field to select records for processing. This field is present only in records of type IMAGE, and contains the name of the image.

Note that the system does not track records of type IMAGE by default. To enable the tracking of IMAGE records, use the SET ACCOUNTING command.

The /IMAGE qualifier selects only records that have the specified values in the image name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

Each image name is a string that gives the file name portion of the image file specification. Do not include the device, directory, or file type.

ACCOUNTING /IMAGE

Examples

1. \$ ACCOUNTING /IMAGE=DIRECTORY

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for the DIRECTORY.EXE image.

2. \$ ACCOUNTING /IMAGE=-DIRECTORY

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records except those for the DIRECTORY.EXE image.

/JOB

Selects or rejects records for print and batch jobs with the specified job names.

Format

/JOB=(*[-]*job_name[,...])

Description

The /JOB qualifier uses the value of the job name field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about print and batch jobs, it contains the name of the job.

The /JOB qualifier selects only records that have the specified values in the job name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /QUEUE and /ENTRY qualifiers, which select or reject records for print and batch jobs with specified queue names and queue entry numbers.

Examples

1. \$ ACCOUNTING /JOB=(MYJOB1,MYJOB2)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for print or batch jobs named MYJOB1 or MYJOB2.

2. \$ ACCOUNTING /JOB=(-MYJOB1,MYJOB2) /FULL

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a full report of all records except those for print or batch jobs named MYJOB1 or MYJOB2.

/LOG

Outputs informational messages.

Format

/LOG

Description

The /LOG qualifier outputs these informational messages to the current SYS\$OUTPUT device:

- For each file processed, the name of the file and the number of records selected and rejected from that file
- If you use the /SORT qualifier, the total number of records merged in the sort (this is the total number of records selected from all the files that were processed)
- If you process more than one file, the total number of files that were processed, and the total number of records selected and rejected

Example

```
$ ACCOUNTING MYFILE1.DAT,MYFILE2.DAT /TYPE=PRINT /SORT=USER /OUTPUT=OUTFILE
%ACC-I-INPUT, SYSSYSROOT:[SYSMGR]MYFILE1.DAT;7, 297 selected, 16460 rejected
%ACC-I-INPUT, SYSSYSROOT:[SYSMGR]MYFILE2.DAT;13,302 selected, 16388 rejected
%ACC-I-MERGE, 599 records to be merged
%ACC-I-TOTAL, 599 selected, 32848 rejected, 2 input files
```

This example processes two accounting files. It writes a brief report of all the records for print jobs, sorted in user name order, to an output file and displays informational messages that tell you which files were processed and how many records were selected and rejected.

/NODE

Selects or rejects records for DECnet for OpenVMS requests made by the specified nodes.

Format

/NODE=[(-)]node_name[,...]

Description

The /NODE qualifier uses the value of the remote node name field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about DECnet for OpenVMS requests, it contains the name of the node that made the request.

The /NODE qualifier selects only records that have the specified values in the remote node name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

ACCOUNTING /NODE

Do not include the double colon (::) after the name of the node.

See also the /ADDRESS and /REMOTE_ID qualifiers, which select or reject records for DECnet for OpenVMS requests made by specified node addresses and remote IDs respectively.

Examples

1. \$ ACCOUNTING /NODE=HQ291 /FULL

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a full report of all records for DECnet for OpenVMS requests made by the node HQ291.

2. \$ ACCOUNTING /NODE=(-HQ222,HQ223)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records except those for DECnet for OpenVMS requests made by the nodes HQ222 or HQ223.

/OUTPUT

Specifies the output file.

Requires READ and WRITE access to the directory in which the output file is created.

Format

/OUTPUT[=filespec]

Description

The /OUTPUT qualifier creates the specified output file and writes the report or copies the selected records to that file.

If you omit the /OUTPUT qualifier, or you use the /OUTPUT qualifier and omit the file specification, the report or selected records are output to the current SYS\$OUTPUT device.

If the file specification does not include the device or directory name, your current default device or directory is used. If you omit the file name, the file name of the first input file is used (the first file listed in the parameter to the ACCOUNTING command). If you omit the file type, the default file type is .LIS if you are producing reports, and .DAT if you are copying records.

Examples

1. \$ ACCOUNTING MYFILE1.DAT,MYFILE2.DAT /SORT=USER /BINARY /OUTPUT=.NEW

This example creates the output file MYFILE1.NEW in the default directory. It processes two accounting files, MYFILE1.DAT and MYFILE2.DAT, sorting their records in user name order, then copies these records to the new output file.

2. \$ ACCOUNTING MYFILE1.NEW /FULL /OUTPUT=MYDISK:[ACCOUNTING]STAT

This example creates the output file MYDISK:[ACCOUNTING]STAT.LIS, and writes a full report of all the records in MYFILE1.NEW to the new output file.

/OWNER

Selects or rejects records for subprocesses created by the specified processes.

Format

/OWNER=(*[-]*owner_pid[,...])

Description

The /OWNER qualifier uses the value of the process owner field to select records for processing. This field is present in all records except file backward link and file forward link records. For a subprocess, this field contains the process identification (PID) of the process that created it.

The /OWNER qualifier selects only records that have the specified values in the process owner field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /IDENT qualifier, which selects or rejects records for specified processes.

Example

```
$ ACCOUNTING /OWNER=(25634,045A6B)
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for subprocesses created by processes with a PID of 25634 or 045A6B.

/PRIORITY

Selects or rejects records for the specified priority.

Format

/PRIORITY=(*[-]*priority[,...])

Description

The /PRIORITY qualifier uses the value of the priority field to select records for processing. This field is present in all records except file backward link and file forward link records. For print and batch job records, this field contains the priority of the job in the print or batch queue. For other records, it contains the base process priority.

The /PRIORITY qualifier selects only records that have the specified values in the priority field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

ACCOUNTING /PRIORITY

Example

```
$ ACCOUNTING /PRIORITY=3
```

This example processes the file `SY$MANAGER:ACCOUNTNG.DAT`. It produces a brief report of all records for processes with a base priority of 3 and for print and batch jobs with a queue priority of 3.

/PROCESS

Selects or rejects records for the specified types of process.

Format

```
/PROCESS=([-]process_type[,...])
```

Keyword

process_type[,...]

Specifies which types of process you want to select or reject. This table shows the keywords available.

Keyword	Type of Process
BATCH	Batch process
DETACHED	Detached process
INTERACTIVE	Interactive process
NETWORK	Network process
SUBPROCESS	Subprocess of any of the other process types

Description

The `/PROCESS` qualifier uses the value of the process type field to select records for processing. This field is present only in records of type `IMAGE` and type `PROCESS`. For records of type `IMAGE`, this field contains the type of the process in which the image was executed.

The `/PROCESS` qualifier selects only records that match the specified types of process. If you precede the list with a minus sign, it selects all records *except* those for the specified types of process.

See also the `/TYPE` qualifier, which selects or rejects specified types of record.

Example

```
$ ACCOUNTING /TYPE=IMAGE /PROCESS=INTERACTIVE /FULL
```

This example processes the file `SY$MANAGER:ACCOUNTNG.DAT`. It produces a full report of the resources used by images running in interactive processes.

/QUEUE

Selects or rejects records for print or batch jobs executed by the specified queues.

Format

/QUEUE=(*[-]*queue_name[,...])

Description

The /QUEUE qualifier uses the value of the queue name field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about print or batch jobs, it contains the name of the queue that executed the job.

The /QUEUE qualifier selects only records that have the specified values in the queue name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /JOB and /ENTRY qualifiers, which select or reject records for print and batch jobs with specified job names and queue entry numbers respectively.

Example

```
$ ACCOUNTING /QUEUE=SYS$MYNODE_BATCH
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for jobs executed by the SYS\$MYNODE_BATCH queue.

/REJECTED

Copies the rejected records to a new file.

Requires READ and WRITE access to the directory in which the specified file is created.

Format

/REJECTED=filespec

Description

The /REJECTED qualifier creates the specified file, then copies the records that do not match your selection criteria to this file in binary format. Use the Accounting utility to process this file later.

If the file specification does not include the device or directory name, your current default device or directory is used. If you omit the file name, the file name of the first input file is used (the first file listed in the parameter to the ACCOUNTING command). If you omit the file type, REJ is used.

ACCOUNTING /REJECTED

Example

```
$ ACCOUNTING /TYPE=PRINT /BINARY /OUTPUT=PRINT_INFO.DAT -  
_ $ /REJECTED=NOT_PRINT_INFO.DAT
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It creates two files, PRINT_INFO.DAT and NOT_PRINT_INFO.DAT, in the default directory. It copies print job records to PRINT_INFO.DAT and all other records to NOT_PRINT_INFO.DAT.

/REMOTE_ID

Selects or rejects records for DECnet for OpenVMS requests made by the specified remote IDs.

Format

```
/REMOTE_ID=( [-]remote_id[,...])
```

Description

The /REMOTE_ID qualifier uses the value of the remote ID field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about DECnet for OpenVMS requests, this field contains a string that identifies the user who made the request. If the remote process was on an OpenVMS node, this is the user name of the user at the remote node.

The /REMOTE_ID qualifier selects only records that have the specified values in the remote ID field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See also the /NODE and /ADDRESS qualifiers, which select or reject records for DECnet for OpenVMS requests made by nodes with specified names and addresses respectively.

Example

```
$ ACCOUNTING /NODE=HQ223 /REMOTE_ID=SMITH /FULL
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a full report of all the records for DECnet for OpenVMS requests made by user SMITH at the node HQ223.

/REPORT

Specifies the resources that you want to summarize in a summary report.

Format

```
/REPORT[=(resource[,...])]
```

Keyword

resource[,...]

Specifies the resources that you want to summarize in the report. Table 2–4 shows the keywords available.

Table 2–4 Resources You Can Summarize in a Summary Report

Keyword	Description	How Summarized
BUFFERED_IO **	Number of buffered I/Os	Total
DIRECT_IO **	Number of direct I/Os	Total
ELAPSED * **	Elapsed time	Total
EXECUTION **	Number of images run by the process	Total
FAULTS **	Number of hard and soft page faults	Total
GETS *	Number of GETs from the file that was printed	Total
PAGE_FILE **	Page file usage	Maximum
PAGE_READS **	Number of hard page faults	Total
PAGES *	Number of pages printed	Total
PROCESSOR **	Total CPU time used	Total
QIOS *	Number of QIOs to the printer	Total
RECORDS	Number of accounting file records processed	Total
VECTOR_PROCESSOR **	Vector CPU time used (see the description of the /FULL qualifier for further details)	Total
VOLUMES **	Number of volumes mounted	Total
WORKING_SET **	Working set size	Maximum

* Present in records of type PRINT

** Present in records of type IMAGE, LOGFAIL, PROCESS, and SYSINIT

The RECORDS keyword is the default if you omit either the keywords or the /REPORT qualifier. It gives the total number of records for each summary key value.

Description

The /REPORT qualifier specifies the resources that you want to summarize in a summary report. The resources are summarized, either as totals or maximum values, for each summary key value specified by the /SUMMARY qualifier.

When a record is processed that does not contain the specified resource field, a default value of 0 is used. For example, if you use the PAGES keyword to summarize the total pages printed, the value of 0 is used for each record that is not of type PRINT.

ACCOUNTING /REPORT

Note that the resource usage data stored in records of type IMAGE is a subset of the data stored in records of type PROCESS. For example, the CPU time stored in a record of type PROCESS includes the CPU time used by the images executed by that process. To make sure that you do not count the same resource data twice when you are summarizing process resources by totals, use the /TYPE qualifier to exclude records of type IMAGE.

You cannot use the /REPORT qualifier without the /SUMMARY qualifier.

Examples

1. `$ ACCOUNTING /SUMMARY=IMAGE /REPORT=(RECORDS,PROCESSOR)`

This example processes the file `SYS$MANAGER:ACCOUNTNG.DAT`. It produces a summary report that shows for each image the number of times it was executed and the total CPU time consumed.

2. `$ ACCOUNTING /TYPE=-IMAGE /SUMMARY=USER /REPORT=EXECUTION`

This example processes the file `SYS$MANAGER:ACCOUNTNG.DAT`. It produces a summary report that shows the total number of images executed by each user. Notice the use of the /TYPE qualifier to exclude records of type IMAGE to avoid double counting.

/SINCE

Selects all records time-stamped at or after the specified time.

Format

`/SINCE[=time]`

Description

All records in an accounting file are time-stamped with the time the record was logged in the file.

The /SINCE qualifier selects only the records time-stamped at or after the specified time. You can specify an absolute time, delta time, or a combination of the two. If you omit the time, 00:00 hours on the current day is used.

See also the /BEFORE qualifier, which selects records time-stamped before a specified time.

Example

```
$ ACCOUNTING /SINCE=5-NOV-1994
```

This example produces a brief report of all records time-stamped at or after 5-NOV-1994 in the file `SYS$MANAGER:ACCOUNTNG.DAT`.

/SORT

Sorts the selected records.

Format

/SORT=[([-]sort_field[,...])]

Keyword

sort_field[,...]

Specifies the sort key.

This table shows the keywords available. You can specify up to ten sort fields.

Keyword	Sorts on this Field
ACCOUNT	Account
ADDRESS	Address of the node that made the DECnet for OpenVMS request
BUFFERED_IO	Number of buffered I/Os
DIRECT_IO	Number of direct I/Os
ELAPSED	Elapsed time
ENTRY	Print or batch job queue entry number
EXECUTION	Number of images run by the process
FAULTS	Number of hard and soft page faults
FINISHED	Time record was logged in the accounting file
GETS	Number of GETs from the file that was printed
IDENT	Process identification (PID)
IMAGE	Image name (sorts only on file name portion of the image file specification)
JOB	Name of print or batch job
NODE	Name of the node that made the DECnet for OpenVMS request
OWNER	PID of parent process
PAGE_FILE	Peak page file usage
PAGE_READS	Number of hard page faults
PAGES	Number of pages printed
PRIORITY	Base process priority, or print or batch queue priority
PROCESS	Type of process
PROCESSOR	Total CPU time used
QIOS	Number of QIOs to the printer
QUEUE	Name of print or batch queue
QUEUED	Time print job was queued
STARTED	Start time
STATUS	Final exit status code

ACCOUNTING /SORT

Keyword	Sorts on this Field
TERMINAL	Terminal name
TYPE	Type of record
UIC	User identification code
USER	User name at local node
VECTOR_PROCESSOR	Vector CPU time (see the description of the /FULL qualifier for further details)
VOLUMES	Number of volumes mounted
WORKING_SET	Peak working set size

For each keyword, see the description of the corresponding Accounting utility qualifier or Table 2-5 for details of the types of record in which the corresponding field is present.

Description

The /SORT qualifier merges the selected records from each input file (each file listed in the parameter to the ACCOUNTING command) and sorts them using the specified sort key. The records are sorted according to the value of the first sort field in the list, and when two or more records have the same value in this field, they are sorted by the value of the second sort field in the list, and so on.

The records are sorted in ascending order of the sort field value. If the keyword is preceded by a minus sign, the records are sorted in descending order.

When you use the /SORT qualifier, records are rejected if they do not contain the sort field. For example, /SORT=IMAGE rejects all records that are not of type IMAGE, because the image name field is only present in records of type IMAGE. Similarly, /SORT=PAGES rejects all records except those for print jobs.

You cannot use the /SORT qualifier with the /SUMMARY qualifier.

Examples

1. \$ ACCOUNTING /TYPE=PRINT /SORT=USER

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all the records for print jobs and displays them in user name order.

The following is an example of the report that is produced:

Date / Time	Type	Subtype	Username	ID	Source	Status
14-SEP-1994 09:53:05	PRINT		BROWN	20A00193		00040001
13-SEP-1994 13:36:04	PRINT		BROWN	20A00442		00000001
13-SEP-1994 12:42:37	PRINT		BROWN	20A00442		00000001
13-SEP-1994 14:43:56	PRINT		DECNET_MAIL	20A00456		00000001
14-SEP-1994 19:39:01	PRINT		DECNET_MAIL	20A00265		00000001
14-SEP-1994 20:09:03	PRINT		DECNET_MAIL	20A00127		00000001
14-SEP-1994 20:34:45	PRINT		DECNET_MAIL	20A00127		00000001
14-SEP-1994 11:23:34	PRINT		FISH	20A0032E		00040001
14-SEP-1994 16:43:16	PRINT		JONES	20A00070		00040001
14-SEP-1994 09:30:21	PRINT		SMITH	20A00530		00040001

```
2. $ ACCOUNTING MYFILE1.DAT,MYFILE2.DAT /SORT=IMAGE -  
   _$ /FULL /REJECTED=NON_IMAGE.DAT
```

This example processes two files, MYFILE1.DAT and MYFILE2.DAT, to produce a full report of records of type IMAGE, sorted in image name order. It creates the file NON_IMAGE.DAT, and copies all records except those of type IMAGE to that file. Notice that no selection qualifiers are used, and so all records are selected for processing. When the records are sorted, records that do not contain an image name are rejected.

/STATUS

Selects or rejects records with the specified final exit status codes.

Format

```
/STATUS=[(-]status_code[,...])
```

Description

The /STATUS qualifier uses the value of the final status code field to select records for processing. This field is present in all records except records of type USER, file backward link records, and file forward link records.

The /STATUS qualifier selects only records that have the specified values in the final status code field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

See the description of the /BRIEF qualifier for details of how to convert a final exit status code to the equivalent message text.

Example

```
$ ACCOUNTING /STATUS=10D38064
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records with a final exit status code of 10D38064.

/SUMMARY

Produces a summary report of the selected records.

Format

```
/SUMMARY[=(summary_item[,...])]
```

Keyword

summary_item[,...]

Specifies the summary key. This table shows the keywords available:

ACCOUNTING /SUMMARY

Keyword	Description
ACCOUNT	Account
DATE	Date
DAY	Day of month (1–31)
HOUR	Hour of day (0–23)
IMAGE	Image name (file name portion of image file specification)
JOB	Name of print or batch job
MONTH	Month of year (1–12)
NODE	Name of the node that issued the DECnet for OpenVMS request
PROCESS	Process type
QUEUE	Print or batch job queue name
TERMINAL	Terminal name
TYPE	Record type
UIC	User identification code
USER	User name
WEEKDAY	Day of week (0=Sunday, 1=Monday, and so on)
YEAR	Year

If you omit these keywords, the user name is used as the summary key.

Description

The /SUMMARY qualifier produces a summary report of the selected records. The report is directed to the current SYS\$OUTPUT device, unless you use the /OUTPUT qualifier to write it to a file.

Summary reports give statistical summaries of the resources specified by the /REPORT qualifier for each value of the summary key specified by the /SUMMARY qualifier. If you omit the /REPORT qualifier, the summary report gives the total number of records processed for each summary key value.

The first line of the summary report shows the time span of the data processed (when the first and last records processed were logged in the input files), with a title in the middle. You can use the /TITLE qualifier to specify your own title.

The next few lines of the report are column headings. There is one column for each summary_item, then one column for each resource specified by the /REPORT qualifier. The columns are laid out in the same left-to-right sequence as the equivalent keywords in the /SUMMARY and /REPORT qualifiers.

The rest of the report uses one line for each summary key value. It gives a summary of the resources associated with that summary key value. The data is sorted in ascending order of the summary key value.

See also the /BINARY qualifier, which copies the selected records to a file, and the /BRIEF and /FULL qualifiers, which produce brief and full reports of the selected records.

You cannot use the /SUMMARY qualifier with the /BINARY, /BRIEF, or /FULL qualifiers.

Examples

1. \$ ACCOUNTING /TYPE=PRINT /SUMMARY=USER /REPORT=(PAGES,RECORDS)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It processes all the print job records and produces a summary report that shows, for each user, the total number of pages printed and the number of records that were added together to produce this total. This is an example of the report that is produced:

From: 12-SEP-1994 15:55 VMS Accounting Report To: 15-SEP-1994 15:17

Username	Pages Printed	Total Records
BROWN	115	2
CROW	3	1
CUTHBERT	20	4
FOSTER	46	1
SMITH	50	3
WHITE	50	7

2. \$ ACCOUNTING /SUMMARY=IMAGE /REPORT=(PROCESSOR,RECORDS)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a summary report that shows the total CPU time used by each image. This is an example of the report that is produced:

From: 12-SEP-1994 15:55 VMS Accounting Report To: 15-SEP-1994 15:17

Image name	Processor Time	Total Records
	0 00:09:09.83	51
ACC	0 00:01:36.72	99
AUTHORIZE	0 00:00:04.17	8
CDU	0 00:00:33.25	21
COPY	0 00:00:05.97	30
DELETE	0 00:00:02.79	12
DIRECTORY	0 00:00:09.67	38
DUMP	0 00:00:04.51	3
EDT	0 00:00:05.85	7
LOGINOUT	0 00:04:03.48	75
NETSERVER	0 00:00:00.63	23
SHOW	0 00:00:04.80	22

/TERMINAL

Selects or rejects records for interactive sessions at the specified terminals.

Format

/TERMINAL=([-]terminal_name[,...])

ACCOUNTING /TERMINAL

Description

The `/TERMINAL` qualifier uses the value of the terminal name field to select records for processing. This field is present in all records except file backward link and file forward link records. For records that contain information about interactive sessions, this field contains the name of the terminal associated with the session.

The `/TERMINAL` qualifier selects only records that have the specified values in the terminal name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

Give the terminal name as the standard device name and include the colon (:).

Example

```
$ ACCOUNTING /TERMINAL=TTB3:
```

This example processes the file `SYS$MANAGER:ACCOUNTNG.DAT`. It produces a brief report of all records for interactive sessions at the terminal `TTB3`.

/TITLE

Specifies the title shown on the first line of a summary report.

Format

```
/TITLE=title
```

Description

The `/TITLE` qualifier specifies the title shown in the center of the first line of summary reports. The title is truncated if it is too long. For reports displayed on your screen, the title is truncated if it is longer than $(W - 56)$ characters, where W is the width (in characters) of your screen.

Example

```
$ ACCOUNTING /SUMMARY=IMAGE /TITLE="June Accounting Report"
```

This example processes the file `SYS$MANAGER:ACCOUNTNG.DAT`. It produces a summary report that shows the number of times each image was executed. The title "June Accounting Report" appears at the top of the report.

/TYPE

Selects or rejects the specified types of record.

Format

```
/TYPE={[-]record_type[,...]}
```

Keyword

record_type[,...]

Specifies the types of record that you want to select or reject. Table 2–5 shows the keywords available.

Table 2–5 Types of Record in an Accounting File

Keyword	Type of Record	Description of Record
FILE	FILE_BL	File backward link. This is the first record in the accounting file. It is logged when the file is created, and contains the name of the previous accounting file.
	FILE_FL	File forward link. This is the last record in the file. It is logged when the file is closed, and contains the name of the next accounting file.
IMAGE	IMAGE	Image termination. It contains details of the resources used by the image.
LOGFAIL	LOGFAIL	Failed attempt to log in. It contains details of the resources used by the login attempt.
PRINT	PRINT	Print job termination. It contains details of the resources used by the print job.
PROCESS	PROCESS	Process termination. It contains details of the resources used by the process. Note that this includes the resources used by the images executed by that process.
SYSINIT	SYSINIT	System booted. It contains details of resources used to boot the system.
UNKNOWN		Record not recognized as one of the other types in this table.
USER	USER	Record logged by a program calling the \$SNDJBC system service to send an accounting message.

Description

All records in an accounting file contain a type field that contains the type of the record.

The /TYPE qualifier selects the specified types of record. If you precede the list with a minus sign, it selects all records *except* those specified.

See also the /PROCESS qualifier, which selects or rejects records for particular types of process.

Examples

1. \$ ACCOUNTING /TYPE=PRINT

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for print jobs.

ACCOUNTING /TYPE

2. \$ ACCOUNTING /TYPE=-PRINT

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records except those for print jobs.

/UIC

Selects or rejects records for the specified UICs.

Format

/UIC=(*[-*uic[,...])

Description

The /UIC qualifier uses the value of the UIC field to select records for processing. This field is present in all records except file backward link and file forward link records. It contains the value [SYSTEM] for login failure records where the user did not give a valid user name.

The /UIC qualifier selects only records that have the specified values in the UIC field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

You can specify the UIC in numeric or alphanumeric format, and can use the asterisk (*) wildcard character.

Example

```
$ ACCOUNTING /UIC=( [ 360, * ], [ ADMIN, COTTON ] )
```

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for users in group number 360 or users whose UIC is [ADMIN,COTTON].

/USER

Selects or rejects records for the specified user names.

Format

/USER=(*[-*user name[,...])

Description

The /USER qualifier uses the value of the user name field to select records for processing. This field is present in all records except file backward link and file forward link records. It contains the value <login> for login failure records where the user did not give a valid user name.

The /USER qualifier selects only records that have the specified values in the user name field. If you precede the values with a minus sign, it selects all records *except* those with the specified values.

Examples

1. \$ ACCOUNTING /USER=SMITH

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all records for the user SMITH.

2. \$ ACCOUNTING /USER=(-SMITH,JONES)

This example processes the file SYS\$MANAGER:ACCOUNTNG.DAT. It produces a brief report of all the records except those for the users SMITH and JONES.

Analyze/Disk_Structure Utility





ANALYZE/DISK_STRUCTURE Description

Use the Analyze/Disk_Structure utility (ANALYZE/DISK_STRUCTURE) on a regular basis to check disks for inconsistencies and errors, and to recover lost files. ANALYZE/DISK_STRUCTURE detects problems on On-Disk Structure (ODS) Level 1 or 2 Files–11 disks that were caused by hardware errors, system errors, and user errors.

By using ANALYZE/DISK_STRUCTURE to identify and delete **lost files** and files marked for deletion, you can reclaim disk space.

ANALYZE/DISK_STRUCTURE performs the verification of a volume or volume set in eight distinct stages. During these stages, ANALYZE/DISK_STRUCTURE collects information used in reporting errors or performing repairs. However, ANALYZE/DISK_STRUCTURE repairs volumes only when you specify the /REPAIR qualifier. For a complete description of each of the eight stages, and an annotated example of an ANALYZE/DISK_STRUCTURE session, refer to Appendix D.

3.1 Error Reporting and Repair

You can invoke the Analyze/Disk_Structure utility to operate in any of the following three modes:

- Error reporting with no repairs
- Error reporting with repairs
- User-controlled selective repairs

By default, ANALYZE/DISK_STRUCTURE reports errors, but does not make repairs. For example, use the following command to report all errors on device DBA1:

```
$ ANALYZE/DISK_STRUCTURE DBA1:
```

When you issue this command, ANALYZE/DISK_STRUCTURE runs through eight stages of data collection, then, by default, prints a list of all errors and lost files to your terminal. One type of problem that ANALYZE/DISK_STRUCTURE locates is an invalid directory backlink; a backlink is a pointer to the directory in which a file resides. If your disk has a file with an invalid directory backlink, ANALYZE/DISK_STRUCTURE displays the following message and the file specification to which the error applies:

```
%VERIFY-I-BACKLINK, incorrect directory back link [SYSEXE]SYSBOOT.EXE;1
```

To instruct ANALYZE/DISK_STRUCTURE to repair the errors that it detects, use the /REPAIR qualifier. For example, the following command reports and repairs all errors on the DBA1 device:

```
$ ANALYZE/DISK_STRUCTURE DBA1:/REPAIR
```

If you want to select which errors ANALYZE/DISK_STRUCTURE repairs, use both the /REPAIR and /CONFIRM qualifiers:

```
$ ANALYZE/DISK_STRUCTURE DBA1:/REPAIR/CONFIRM
```

ANALYZE/DISK_STRUCTURE Description

When you issue this command, ANALYZE/DISK_STRUCTURE displays a description of each error and prompts you for confirmation before making a repair. For example, the previous command might produce the following messages and prompts:

```
%VERIFY-I-BACKLINK, incorrect directory back link [SYS0]SYSMAINT.DIR;1
```

```
Repair this error? (Y or N): Y
```

```
%VERIFY-I-BACKLINK, incorrect directory back link  
[SYSEXE]SYSBOOT.EXE;1]
```

```
Repair this error? (Y or N): N
```

Consider running ANALYZE/DISK_STRUCTURE twice for each volume. First, invoke the utility to report all errors. Evaluate the errors and decide on an appropriate action. Then invoke the utility again with the /REPAIR qualifier to repair all errors, or with the /REPAIR and /CONFIRM qualifiers to repair selected errors.

For message descriptions, use the online Help Message (MSGHLP) utility or refer to the OpenVMS system messages documentation.

3.1.1 Recovering Lost Files

A lost file is a file that is not linked to a directory. Under normal circumstances, files do not become lost. However, files occasionally become lost because of disk corruption, hardware problems, or user error. For example, in cleaning up files and directories, you might inadvertently delete directories that still point to files. When you delete a directory file (a file with the file type .DIR) without first deleting its subordinate files, the files referred to by that directory become lost files. Though lost, these files remain on the disk and consume space.

When you run ANALYZE/DISK_STRUCTURE specifying the /REPAIR qualifier, the utility places lost files in SYSLOST.DIR.

For example, to report and repair all errors and lost files found on the device DDA0, issue the following command:

```
$ ANALYZE/DISK_STRUCTURE/REPAIR/CONFIRM DDA0:
```

If it discovers lost files on your disk, ANALYZE/DISK_STRUCTURE issues messages similar to those that follow:

```
%VERIFY-W-LOSTHEADER, file (16,1,1) [X.X;1  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (17,1,1) [Y.Y;1  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (18,1,1) [Z.Z;1  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (19,1,1) [X.X;2  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (20,1,1) [Y.Y;2  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (21,1,1) [Z.;1  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (22,1,1) [Z.;2  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (23,1,1) LOGIN.COM;163  
not found in a directory  
%VERIFY-W-LOSTHEADER, file (24,1,1) MANYACL.COM;1  
not found in a directory
```

All lost files in this example are automatically moved to SYSLOST.DIR.

ANALYZE/DISK_STRUCTURE Description

3.1.2 ANALYZE/DISK_STRUCTURE Output

By default, the Analyze/Disk_Structure utility directs all output to your terminal. If you prefer, you can use the /LIST qualifier to generate a file containing the following information for each file on the disk:

- File identification (FID)
- File name
- Owner
- Errors associated with the file

To generate a disk usage accounting file, use the /USAGE qualifier. The first record of the file, called the identification record, contains a summary of disk and volume characteristics. The identification record is followed by a series of summary records; one summary record is created for each file on the disk. A summary record contains the owner, size, and name of the file.

For more information on the disk usage accounting file, see Appendix E.

ANALYZE/DISK_STRUCTURE Usage Summary

The Analyze/Disk_Structure utility checks the readability and validity of Files-11 Structure Level 1 and Structure Level 2 disk volumes, and reports errors and inconsistencies.

You can detect most classes of errors by invoking the utility once and using its defaults.

Format

ANALYZE/DISK_STRUCTURE device-name:[/qualifier]

Parameter

device-name

Specifies the disk volume or volume set to be verified. If you specify a volume set, all volumes of the volume set must be mounted as Files-11 volumes. For information on the Mount utility, refer to the *OpenVMS System Management Utilities Reference Manual: M-Z*.

Usage Summary

Use the following command to invoke the utility:

ANALYZE/DISK_STRUCTURE device-name: /qualifiers

To terminate an ANALYZE/DISK_STRUCTURE session, press Ctrl/C or Ctrl/Y while the utility executes. You cannot resume a session by using the DCL command CONTINUE.

By default, ANALYZE/DISK_STRUCTURE directs all output to your terminal. Use the /USAGE or /LIST qualifiers to direct output to a file.

To repair a disk effectively, you must have read, write, and delete access to all files on the disk. To effectively scan a disk (/NOREPAIR), you must have read access to all files on the disk.

For a complete explanation of file access, see the *Security Guide*.

You can safely use ANALYZE/DISK_STRUCTURE on a disk that is concurrently being used for other file operations. If you specify /REPAIR, the utility locks the volume before performing any operations; this blocks volume modification. Because other users cannot create, delete, extend, or truncate files, repair operations are unimpeded and the volume is left in a consistent state.

If you specify /NOREPAIR, the volume is not locked; the utility does not attempt to write to the disk. However, if users perform file operations while you run the utility, you may receive error messages that incorrectly indicate file damage. To avoid this problem, Digital recommends that you run ANALYZE/DISK_STRUCTURE when the disk is in a quiescent state.

ANALYZE/DISK_STRUCTURE Qualifiers

This section describes and provides examples of each Analyze/Disk_Structure qualifier. Table 3-1 summarizes the qualifiers.

Table 3-1 Analyze/Disk_Structure Qualifiers

Qualifier	Description
/[NO]CONFIRM	Determines whether the Analyze/Disk_Structure utility prompts you to confirm each repair
/[NO]LIST[=filespec]	Determines whether the Analyze/Disk_Structure utility produces a listing of the index file
/[NO]OUTPUT[=filespec]	Specifies the output file to which the Analyze/Disk_Structure utility writes the disk structure errors
/[NO]READ_CHECK	Determines whether the Analyze/Disk_Structure utility performs a read check of all allocated blocks on the specified disk
/RECORD_ATTRIBUTES	Determines whether the Analyze/Disk_Structure utility repairs files containing erroneous settings in the record attributes section of their associated file attribute block (FAT)
/[NO]REPAIR	Determines whether the Analyze/Disk_Structure utility repairs errors that are detected in the file structure of the specified device
/USAGE[=filespec]	Specifies that a disk usage accounting file should be produced, in addition to the other specified functions of the Analyze/Disk_Structure utility

/[NO]CONFIRM

Determines whether the Analyze/Disk_Structure utility prompts you to confirm each repair. If you respond with Y or YES, the utility performs the repair. Otherwise, the repair is not performed.

Format

```
/[NO]CONFIRM
```

Description

You can only use the /CONFIRM qualifier with the /REPAIR qualifier. The default is /NOCONFIRM.

Example

```
$ ANALYZE/DISK_STRUCTURE DBA0:/REPAIR/CONFIRM
%VERIFY-I-BACKLINK, incorrect directory back link [SYS0]SYSMAINT.DIR;1
Repair this error? (Y or N): Y
%VERIFY-I-BACKLINK, incorrect directory back link [SYSEXE]SYSBOOT.EXE;1
Repair this error? (Y or N): N
```

The command in this example causes the Analyze/Disk_Structure utility to prompt you for confirmation before performing the indicated repair operation.

ANALYZE/DISK_STRUCTURE /[NO]LIST[=filespec]

/[NO]LIST[=filespec]

Determines whether the Analyze/Disk_Structure utility produces a listing of the index file.

Format

```
/LIST[=filespec]  
/NOLIST
```

Description

If you specify /LIST, the utility produces a file that contains a listing of all file identifications (FIDs), file names, and file owners. If you omit the file specification, the default is SYS\$OUTPUT. If you include a file specification without a file type, the default type is .LIS. You cannot use wildcard characters in the file specification.

The default is /NOLIST.

Example

```
$ ANALYZE/DISK_STRUCTURE DLA2:/LIST=INDEX  
$ TYPE INDEX  
Listing of index file on DLA2:  
31-DEC-1988 20:54:42.22  
  
(00000001,00001,001) INDEXF.SYS;1  
                        [1,1]  
(00000002,00002,001) BITMAP.SYS;1  
                        [1,1]  
(00000003,00003,001) BADBLK.SYS;1  
                        [1,1]  
(00000004,00004,001) 000000.DIR;1  
                        [1,1]  
(00000005,00005,001) CORIMG.SYS;1  
                        [1,1]  
.  
.  
.  
$
```

In this example, ANALYZE/DISK_STRUCTURE did not find errors on the device DLA2. Because the file INDEX was specified without a file type, the system assumes a default file type of .LIS. The subsequent TYPE command displays the contents of the file INDEX.LIS.

/[NO]OUTPUT

Specifies the output file to which the Analyze/Disk_Structure utility is to write the disk structure errors.

Format

`/[NO]OUTPUT[=filespec]`

Description

Specifies the output file for the disk structure errors. If you omit the `/OUTPUT` file specification, output is directed to `SYS$OUTPUT`. If `/NOOUTPUT` is specified, no disk structure errors are displayed. If the `/CONFIRM` qualifier is specified, output is forced to `SYS$OUTPUT` regardless of whether this qualifier is used.

/[NO]READ_CHECK

Determines whether the Analyze/Disk_Structure utility performs a read check of all allocated blocks on the specified disk. When the Analyze/Disk_Structure utility performs a read check, it reads the disk twice; this ensures that it reads the disk correctly. The default is `/NOREAD_CHECK`.

Format

`/[NO]READ_CHECK`

Example

```
$ ANALYZE/DISK_STRUCTURE DMA1:/READ_CHECK
```

The command in this example directs `ANALYZE/DISK_STRUCTURE` to perform a read check on all allocated blocks on the device `DMA1`.

/RECORD_ATTRIBUTES

Determines whether the Analyze/Disk_Structure utility repairs files containing erroneous settings in the record attributes section of their associated file attribute block (FAT).

Format

`/RECORD_ATTRIBUTES`

Description

The `/RECORD_ATTRIBUTES` qualifier may be used with the `/REPAIR` qualifier. If attribute repair is enabled during the repair phase, erroneous bits will be cleared from a file's record attributes. This action may not correctly set a file's record attributes as it is beyond the scope of this utility to determine their correct values.

It is recommended that system managers do not perform an attribute repair; instead they should notify the owners of the files about the inconsistencies and have the owners reset the files' attributes using the `SET FILE/RECORD_ATTRIBUTES=({record-attributes})` command.

ANALYZE/DISK_STRUCTURE /RECORD_ATTRIBUTES

Example

```
$ ANALYZE/DISK_SYS$SYSDEVICE:
%ANALDISK-I-BAD_RECATTR, file (2930,1,1) [USER]ATTRIBUTES.DAT;13
file record format: Variable
inconsistent file attributes: Bit 5
%ANALDISK-I-BAD_RECATTR, file (2931,1,1) [USER]ATTRIBUTES.DAT;14
file record format: Variable
inconsistent file attributes: FORTRAN carriage control, Bit 5
%ANALDISK-I-BAD_RECATTR, file (2932,1,1) [USER]ATTRIBUTES.DAT;15
file record format: Variable
inconsistent file attributes: Implied carriage control, Bit 5
%ANALDISK-I-BAD_RECATTR, file (2933,1,1) [USER]ATTRIBUTES.DAT;16
file record format: Variable
inconsistent file attributes: Non-spanned, Bit 5
%ANALDISK-I-BAD_RECATTR, file (2934,1,1) [USER]ATTRIBUTES.DAT;17
file record format: Variable
inconsistent file attributes: FORTRAN carriage control,
Non-spanned, Bit 5
```

/[NO]REPAIR

Determines whether the Analyze/Disk_Structure utility repairs errors that are detected in the file structure of the specified device.

Format

```
/[NO]REPAIR
```

Description

The Analyze/Disk_Structure utility does not perform any repair operation unless you specify the /REPAIR qualifier. The file structure is software write-locked during a repair operation. The default is /NOREPAIR.

Example

```
$ ANALYZE/DISK_STRUCTURE DBA1:/REPAIR
```

The command in this example causes ANALYZE/DISK_STRUCTURE to perform a repair on all errors found in the file structure of device DBA1.

/USAGE[=filespec]

Specifies that a disk usage accounting file should be produced, in addition to the other specified functions of the Analyze/Disk_Structure utility.

Format

```
/USAGE[=filespec]
```

ANALYZE/DISK_STRUCTURE /USAGE[=filespec]

Description

If all or part of the file specification is omitted, ANALYZE/DISK_STRUCTURE assumes a default file specification of USAGE.DAT. The file is placed in the current default directory.

Example

```
$ ANALYZE/DISK_STRUCTURE DBA1:/USAGE  
$ DIRECTORY USĀGE
```

```
Directory DISK$DEFAULT:[ACCOUNT]
```

```
USAGE.DAT;3
```

```
Total of 1 file.
```

The first command in this example causes ANALYZE/DISK_STRUCTURE to produce a disk usage accounting file. Because a file specification was not provided in the command line, ANALYZE/DISK_STRUCTURE uses both the default file name and directory [ACCOUNT]USAGE.DAT. The DIRECTORY command instructs the system to display all default information.



ANALYZE/AUDIT Description

The Audit Analysis utility (ANALYZE/AUDIT) is a system management tool that enables system managers or site security administrators to produce reports from security audit log files. Collecting security audit messages is useful only if you develop and implement a procedure to periodically review the audit log file for suspicious activity. Use ANALYZE/AUDIT to examine the data in security audit log files or security archive files. This utility replaces the SECAUDIT.COM command procedure that was included in versions of the VAX VMS operating system prior to Version 5.2.

The ANALYZE/AUDIT command's different qualifiers allow you to specify the type of information the utility extracts from the security audit log file. The utility can produce an audit report in a variety of formats and direct a report to a file or a terminal.

A description of the format of the auditing messages written to the security auditing file appears in Appendix F (VAX systems) and Appendix G (AXP systems).

For more information on how to use ANALYZE/AUDIT, see the *Security Guide*.

ANALYZE/AUDIT Usage Summary

The Audit Analysis utility (ANALYZE/AUDIT) processes event messages in security audit log files to produce reports of security-related events on the system.

Format

ANALYZE/AUDIT [file-spec[,...]]

Parameter

file-spec[,...]

Specifies one or more security audit log files as input to ANALYZE/AUDIT. If you specify more than one file name, separate the names with commas.

If you omit the **file-spec** parameter, the utility searches for the default audit log file:

SECURITY.AUDIT\$JOURNAL (VAX only)
SECURITY_AUDIT.AUDIT\$JOURNAL (AXP only)

The default audit log file is created in the SYS\$COMMON:[SYSMGR] directory. To use the file, specify SYS\$MANAGER on the ANALYZE/AUDIT command line. If you do not specify a directory, the utility searches for the file in the current directory.

You can include wildcard characters, such as the asterisk (*) or percent sign (%), in the file specification.

The audit log file can be located in any directory. To display the current location, use the DCL command SHOW AUDIT/ALL.

Usage Summary

Use the DCL command ANALYZE/AUDIT to analyze security audit log files or security archive files. An ANALYZE/AUDIT command line can specify the name of one or more log files, as follows:

ANALYZE/AUDIT [file-spec,...]

You can also use the ANALYZE/AUDIT command to extract security event messages from security archive files or from binary files (created with previous ANALYZE/AUDIT commands).

Each ANALYZE/AUDIT request runs until the log file is completely processed. You can interrupt the processing to modify the display or to change position in the report if you activate command mode by pressing Ctrl/C. To terminate an ANALYZE/AUDIT request before completion, press Ctrl/Z.

You can direct ANALYZE/AUDIT output to any supported terminal device or to a disk or tape file by specifying the file specification as an argument to the /OUTPUT qualifier. By default, the output is directed to SYS\$OUTPUT.

Use of ANALYZE/AUDIT requires no special privileges other than access to the files specified in the command line.

ANALYZE/AUDIT Qualifiers

This section describes ANALYZE/AUDIT and provides examples of each qualifier. Table 4–1 summarizes the ANALYZE/AUDIT qualifiers.

Table 4–1 ANALYZE/AUDIT Qualifiers

Qualifier	Description
/BEFORE	Controls whether records dated earlier than the specified time are selected
/BINARY	Controls whether output is a binary file
/BRIEF	Controls whether a brief, single-line record format is used in ASCII displays
/EVENT_TYPE	Selects the classes of events to be extracted from the security log file
/FULL	Controls whether a full format is used in ASCII displays
/IGNORE	Excludes records from the report that match the specified criteria
/INTERACTIVE	Controls whether interactive command mode is enabled when the Audit Analysis utility is invoked
/OUTPUT	Specifies where to direct output from the Audit Analysis utility
/PAUSE	Specifies the length of time each record is displayed in a full format display
/SELECT	Specifies the criteria for selecting records
/SINCE	Indicates that the utility must operate on records dated with the specified time or after the specified time
/SUMMARY	Specifies that a summary of the selected records be produced after all records are processed

/BEFORE

Controls whether records dated earlier than the specified time are selected.

Format

```
/BEFORE[=time]
/NOBEFORE
```

Keyword

time

Specifies the time used to select records. Records dated earlier than the specified time are selected. You can specify an absolute time, delta time, or a combination of the two. Observe the syntax rules for date and time described in the *OpenVMS User's Manual*.

ANALYZE/AUDIT /BEFORE

Description

By default, all records in the security audit log file may be examined. You must specify **/BEFORE** to exclude records created after a specific point in time.

Examples

1. \$ ANALYZE/AUDIT /BEFORE=25-NOV-1993 -
_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects all records dated earlier than November 25, 1993.

2. \$ ANALYZE/AUDIT /BEFORE=14:00/SINCE=12:00 -
_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects all records generated between noon and 2 P.M. today.

/BINARY

Controls whether output is a binary file.

Format

/BINARY

/NOBINARY

Keywords

None.

Description

When **/BINARY** is used, the output file specified by using the **/OUTPUT** qualifier contains image copies of the selected input records. If you specify **/NOBINARY** or omit the qualifier, the output file contains ASCII records.

By default, if you specify **/BINARY** and do not include the **/OUTPUT** qualifier, an output file named **AUDIT.AUDIT\$JOURNAL** is created.

The **/BINARY**, **/BRIEF**, and **/FULL** qualifiers cannot be used in combination.

Example

- ```
$ ANALYZE/AUDIT /BINARY/SINCE=TODAY/OUTPUT=25DEC94.AUDIT -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example selects all audit records generated today and writes the records in binary format to **25DEC94.AUDIT**.

---

**/BRIEF**

Controls whether a brief, single-line record format is used in ASCII displays.

**Format**

/BRIEF (default)

**Keywords**

None.

**Description**

By default, records are displayed in the brief format. You must specify /FULL to have the full contents of each selected audit event record displayed.

The /BINARY, /BRIEF, and /FULL qualifiers cannot be used in combination.

**Example**

```
$ ANALYZE/AUDIT /OUTPUT=AUDIT.LIS -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example produces an ASCII file in brief format by default. The report is written to the AUDIT.LIS file.

---

**/EVENT\_TYPE (AXP Only)**

**AXP**

On AXP systems, selects the classes of events to be extracted from the security log file.

If you omit the qualifier or specify the ALL keyword, the event type is not used to select records.

**Format**

/EVENT\_TYPE=(event-type[,...])

**Keyword**

**event type[,...]**

Specifies the classes of events used to select records. You can specify any of the following event types:

|             |                                                                    |
|-------------|--------------------------------------------------------------------|
| [NO]ACCESS  | Access to files and global sections                                |
| [NO]ALL     | All event types                                                    |
| [NO]AUDIT   | Use of the SET AUDIT command                                       |
| [NO]BREAKIN | Break-in detection                                                 |
| [NO]INSTALL | Modification of the known file list with Install utility (INSTALL) |
| [NO]LOGFAIL | Unsuccessful login attempt                                         |

## ANALYZE/AUDIT /EVENT\_TYPE (AXP Only)

|              |                                                                     |
|--------------|---------------------------------------------------------------------|
| [NO]LOGIN    | Successful login                                                    |
| [NO]LOGOUT   | Successful logout                                                   |
| [NO]MOUNT    | Execution of DCL commands MOUNT or DISMOUNT                         |
| [NO]NETUAF   | Modification of the network proxy authorization file (NETPROXY.DAT) |
| [NO]RIGHTSDB | Modification of the rights database (RIGHTSLIST.DAT)                |
| [NO]SYSUAF   | Modification of the system user authorization file (SYSUAF.DAT)     |

Specifying the negated form of an event class (for example, NOLOGFAIL) excludes the specified event class from the audit report.

### Examples

1. \$ ANALYZE/AUDIT/EVENT\_TYPE=LOGFAIL -  
\_ \$ SYS\$MANAGER:SECURITY\_AUDIT.AUDIT\$JOURNAL

The command in this AXP system example extracts all records of unsuccessful login attempts, which match the LOGFAIL class, and compiles a brief report.

2. \$ ANALYZE/AUDIT/EVENT\_TYPE=(NOLOGIN,NOLOGOUT) -  
\_ \$ SYS\$MANAGER:SECURITY\_AUDIT.AUDIT\$JOURNAL

The command in this AXP system example builds a report in brief format of all audit records except those in the LOGIN and LOGOUT event classes. ♦

---

## /EVENT\_TYPE (VAX Only)

### VAX

On VAX systems, selects the classes of events to be extracted from the security log file. If you omit the qualifier or specify the ALL keyword, the utility includes all enabled event classes in the report.

### Format

/EVENT\_TYPE=(event-type[,...])

### Keyword

#### event type[,...]

Specifies the classes of events used to select records. You can specify any of the following event types:

|                   |                                                                                 |
|-------------------|---------------------------------------------------------------------------------|
| [NO]ACCESS        | Access to an object, such as a file                                             |
| [NO]ALL           | All event types                                                                 |
| [NO]AUDIT         | Use of the SET AUDIT command                                                    |
| [NO]AUTHORIZATION | Change to the authorization database (SYSUAF.DAT, NETPROXY.DAT, RIGHTSLIST.DAT) |
| [NO]BREAKIN       | Break-in detection                                                              |

## ANALYZE/AUDIT /EVENT\_TYPE (VAX Only)

|                |                                                                                                                                                                                   |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| [NO]CONNECTION | Establishment of a network connection through OpenVMS System Management utility (SYSMAN), DECnet, DECwindows, or interprocess communication (IPC) software                        |
| [NO]CREATE     | Creation of an object                                                                                                                                                             |
| [NO]DEACCESS   | Completion of access to an object                                                                                                                                                 |
| [NO]DELETE     | Deletion of an object                                                                                                                                                             |
| [NO]INSTALL    | Modification of the known file list with the Install utility (INSTALL)                                                                                                            |
| [NO]LOGFAIL    | Unsuccessful login attempt                                                                                                                                                        |
| [NO]LOGIN      | Successful login                                                                                                                                                                  |
| [NO]LOGOUT     | Successful logout                                                                                                                                                                 |
| [NO]MOUNT      | Execution of DCL commands MOUNT or DISMOUNT                                                                                                                                       |
| [NO]NCP        | Modification of the DECnet network configuration databases                                                                                                                        |
| [NO]NETPROXY   | Modification of the network proxy authorization file (NETPROXY.DAT)                                                                                                               |
| [NO]PRIVILEGE  | Privilege auditing                                                                                                                                                                |
| [NO]PROCESS    | Use of one or more of the process control system services: \$CREPRC, \$DELPRC, \$SCHDWK, \$CANWAK, \$WAKE, \$SUSPND, \$RESUME, \$GRANTID, \$REVOKID, \$GETJPI, \$FORCEX, \$SETPRI |
| [NO]RIGHTSDB   | Modification of the rights database (RIGHTSLIST.DAT)                                                                                                                              |
| [NO]SYSGEN     | Modification of system parameters through the System Generation utility (SYSGEN)                                                                                                  |
| [NO]SYSUAF     | Modification of the system user authorization file (SYSUAF.DAT)                                                                                                                   |
| [NO]TIME       | Change in system or cluster time                                                                                                                                                  |

Specifying the negated form of an event class (for example, NOLOGFAIL) excludes the specified event class from the audit report.

### Examples

1. \$ ANALYZE/AUDIT/EVENT\_TYPE=LOGFAIL -  
\_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example extracts all records of unsuccessful login attempts, which match the LOGFAIL class, and compiles a brief report.

2. \$ ANALYZE/AUDIT/EVENT\_TYPE=(NOLOGIN,NOLOGOUT) -  
\_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example builds a report in brief format of all audit records except those in the LOGIN and LOGOUT event classes. ♦

## **ANALYZE/AUDIT /FULL**

---

### **/FULL**

Controls whether a full format is used in ASCII displays. If you specify `/NOFULL` or omit the qualifier, records are displayed in the brief format.

### **Format**

`/FULL`

`/NOFULL` (default)

### **Keywords**

None.

### **Description**

By default, records are displayed in the brief format. You must specify `/FULL` (or enter command mode by pressing Ctrl/C) to have the full contents of each selected record displayed.

The `/BINARY`, `/BRIEF`, and `/FULL` qualifiers cannot be used in combination.

### **Example**

```
$ ANALYZE/AUDIT /FULL -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example displays the full contents of each selected record.

---

## **/IGNORE**

Excludes records from the report that match the specified criteria.

### **Format**

`/IGNORE=criteria[,...]`

### **Keyword**

**criteria[,...]**

Specifies that all records are selected except those matching any of the specified exclusion criteria. See the `/SELECT` qualifier description for a list of the possible criteria to use with the `/IGNORE` qualifier.

### **Description**

Use the `/IGNORE` qualifier to exclude specific groups of audit records from the audit report. When more than one keyword from the list of possible exclusion criteria are specified, records that meet any of these criteria are excluded by default.

## Example

```
$ ANALYZE/AUDIT/IGNORE=(SYSTEM=NAME=WIPER, USERNAME=MILANT) -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example excludes from the audit analysis report all records in the audit log file generated from node WIPER or from user MILANT (on any node).

---

## /INTERACTIVE

Controls whether interactive command mode is enabled when the Audit Analysis utility is invoked.

### Format

```
/INTERACTIVE (default)
/NOINTERACTIVE
```

### Keywords

None.

### Description

Interactive command mode, which is enabled by default, allows you to interrupt the audit report being displayed on the terminal and to enter commands either to modify the criteria used to select records for the report or to reposition the display.

To interrupt a full or brief audit report, press Ctrl/C and enter commands at the COMMAND> prompt. As soon as you enter command mode, the utility displays the current record in full format. Note that the record might not match the selection or exclusion criteria specified in the previous ANALYZE/AUDIT command.

Enter the CONTINUE command to leave interactive command mode and to resume display of the audit report. Enter the EXIT command to terminate the session. See the ANALYZE/AUDIT Commands section for a description of each interactive command.

To disable interactive mode, specify /NOINTERACTIVE. In this mode, the utility displays audit records one at a time and prompts you to advance the display by pressing the Return key.

### Examples

```
1. $ ANALYZE/AUDIT/FULL -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example produces a full format display of the selected records. New records are displayed every 3 seconds. (See the /PAUSE qualifier description to find how to modify the duration of each record display.) Press Ctrl/C to interrupt the display and to enter interactive commands.



## **ANALYZE/AUDIT /INTERACTIVE**

2. `$ ANALYZE/AUDIT/FULL/NOINTERACTIVE -`  
`_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL`

The command in this VAX system example invokes the utility in noninteractive mode. It displays the first record selected and prompts you to press the Return key to display each additional selected record. Control returns to the DCL command level when all selected records have been displayed.

---

## **/OUTPUT**

Specifies where to direct output from the Audit Analysis utility (ANALYZE/AUDIT). If you omit the qualifier, the report is sent to SYS\$OUTPUT.

### **Format**

`/OUTPUT[=file-spec]`  
`/NOOUTPUT`

### **Keyword**

**file-spec[,...]**

Specifies the name of the file that is to contain the selected records. If you omit the device and directory specification, the utility uses the current device and directory specification. If you omit the file name and type, the default file name AUDIT.LIS is used. If the output is binary (/BINARY) and you omit the /OUTPUT qualifier, the binary information is written to the file AUDIT.AUDIT\$JOURNAL.

### **Example**

```
$ ANALYZE/AUDIT /BINARY/OUTPUT=BIN122588.DAT -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example selects audit records from the system audit log file and writes them to the binary file BIN122588.DAT.

---

## **/PAUSE**

Specifies the length of time each record is displayed in a full-format display.

### **Format**

`/PAUSE=seconds`

### **Keyword**

**seconds**

Specifies the duration (in seconds) of the full-screen display. A value of 0 specifies that the system should not pause before displaying the next record. By default, the utility displays a record for 3 seconds.

## Description

The /PAUSE qualifier can be used only with full-format (/FULL) displays to specify the length of time each record is displayed. By default, each record is displayed for a period of 3 seconds. A value of 0 results in a continuous display of audit records.

## Example

```
$ ANALYZE/AUDIT /FULL/PAUSE=1 -
_ $ SYS$MANAGER:SECURITY.AUDIT$JOURNAL
```

The command in this VAX system example displays a selected record in full format every second. You can interrupt the display and enter interactive commands at any time by pressing Ctrl/C. (See the ANALYZE/AUDIT Commands section for more information.)

## /SELECT (AXP Only)

**AXP**

On AXP systems, specifies the criteria for selecting records.

### Format

/SELECT=criteria[,...]

/NOSELECT

### Keyword

#### **criteria[,...]**

Specifies the criteria for selecting records.

If you omit the /SELECT qualifier, all event records selected through the /EVENT\_TYPE qualifier are extracted from the audit log file and included in the report.

You can specify any of the following criteria:

#### **ACCESS=(type,...)**

Specifies the type of object access upon which the selection is based. Valid access types are read, write, execute, delete, and control.

#### **ACCOUNT=(name,...)**

Specifies the account name upon which selection is based. You can use wildcards, such as an asterisk (\*) or percent sign (%), to represent all or part of the name.

#### **DISMOUNT\_FLAGS=(flag-name,...)**

Identifies the names of the volume dismounting flags to be used in selecting records. Specify one or more of the following flag names: Abort, Cluster, Nounload, and Unit.

#### **HOLDER=keyword(...)**

Specifies the characteristics of the identifier holder to be used when selecting event records. Choose from the following keywords:

## **ANALYZE/AUDIT /SELECT (AXP Only)**

**NAME=**username Specifies the name of the holder. You can represent all or part of the name with a wildcard.

**OWNER=**uic Specifies the user identification code (UIC) of the holder.

### **IDENTIFIER=keyword(,...)**

Identifies which attributes of an identifier should be used when selecting event records. Choose from the following keywords:

**ATTRIBUTES=**name Specifies the name of the particular attribute. Valid attribute names are Dynamic and Resource.

**NAME=**identifier Specifies the original name of the identifier. You can represent all or part of the name with a wildcard.

**NEW\_NAME=**identifier Specifies the new name of the identifier. You can represent all or part of the name with a wildcard.

**VALUE=**value Specifies the original value of the identifier.

**NEW\_VALUE=**value Specifies the new value of the identifier.

### **IMAGE\_NAME=(image-name,...)**

Identifies the name of the image to be used when selecting event records. You can represent all or part of the image name with a wildcard.

### **LOCAL=(characteristic,...)**

Specifies the characteristics of the local (proxy) account to be used when selecting event records. Characteristics include the following:

**USERNAME=**username Specifies the name of the local account. You can represent all or part of the name with a wildcard.

### **LOGICAL\_NAME=(logical-name,...)**

Specifies the logical name of the mounted (or dismounted) volume upon which selection is based. You can represent all or part of the logical name with a wildcard.

### **MOUNT\_FLAGS=(flag-name,...)**

Specifies the names of the volume mounting flags upon which selection is based. Possible flag names include the following:

**CACHE=(NONE,WRITETHROUGH)**  
**CLUSTER**  
**DATACHECK=(READ,WRITE)**  
**FOREIGN**  
**GROUP**  
**INITIALIZATION=(ALLOCATE,CONTINUATION)**  
**INTERCHANGE**  
**MESSAGE**  
**NOASSIST**  
**NOAUTO**  
**NODISKQ**  
**NOHDR3**

NOLABEL  
NOWRITE

OVERRIDE=(options[,...])
 

|   |                                                                                    |   |
|---|------------------------------------------------------------------------------------|---|
| { | ACCESSIBILITY<br>EXPIRATION<br>IDENTIFICATION<br>LOCK<br>OWNER_IDENTIFIER<br>SETID | } |
|---|------------------------------------------------------------------------------------|---|

SHARE  
SYSTEM

**OBJECT=keyword(...)**

Specifies which characteristics of an object should be used when selecting event records. Choose any of the following keywords:

**NAME=object-name** Specifies the name of the object. You can represent all or part of the name with a wildcard. If you do not use a wildcard, specify the full object name (for example, `BOSTON$DUA0:[RWOODS]MEMO.MEM;1`).

**OWNER=value** Specifies the UIC or general identifier of the object.

**TYPE=type** Specifies the general object class (type of object). The available classes are as follows:

- System\_global\_section
- Group\_global\_section

Only audit records generated on an AXP system or a VAX system running a version of the operating system prior to Version 6.0 will contain the TYPE criteria.

**PARENT=keyword(...)**

Specifies which characteristics of the parent process are used when selecting event records generated by a subprocess. Choose from the following keywords:

**IDENTIFICATION=value** Specifies the process identification (PID) of the parent process.

**NAME=process-name** Specifies the name of the parent process. You can represent all or part of the name with a wildcard.

**OWNER=value** Specifies the owner (identifier value) of the parent process.

**USERNAME=username** Specifies the user name of the parent process. You can represent all or part of the name with a wildcard.

**PRIVILEGES\_USED=(privilege-name,...)**

Specifies the privileges of the process to be used when selecting event records.

Specify any of the system privileges, as described in the *Security Guide*.

Also include the STATUS keyword in the selection criteria so the report can demonstrate whether the privilege was involved in a successful or an unsuccessful operation.

## **ANALYZE/AUDIT /SELECT (AXP Only)**

### **PROCESS=(characteristic,...)**

Specifies the characteristics of the process to be used when selecting event records. Choose from the following characteristics:

|                              |                                                                                               |
|------------------------------|-----------------------------------------------------------------------------------------------|
| <b>IDENTIFICATION=</b> value | Specifies the PID of the process.                                                             |
| <b>NAME=</b> process-name    | Specifies the name of the process. You can represent all or part of the name with a wildcard. |

### **REMOTE=keyword(...)**

Specifies that some characteristic of the network request is to be used when selecting event records. Choose from the following keywords:

|                              |                                                                                                        |
|------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>IDENTIFICATION=</b> value | Specifies the DECnet node address.                                                                     |
| <b>NODENAME=</b> node-name   | Specifies the DECnet node name. You can represent all or part of the name with a wildcard.             |
| <b>USERNAME=</b> username    | Specifies the remote user name. You can represent all or part of the remote user name with a wildcard. |

### **STATUS=(type,...)**

Specifies the type of success status to be used in selecting event records.

|                    |                                         |
|--------------------|-----------------------------------------|
| <b>SUCCESSFUL</b>  | Specifies a generic success class.      |
| <b>FAILURE</b>     | Specifies a generic failure class.      |
| <b>CODE=</b> value | Specifies a specific completion status. |

### **SYSTEM=keyword(...)**

Specifies the characteristics of the system to be used when selecting event records. Choose from the following keywords:

|                              |                                                     |
|------------------------------|-----------------------------------------------------|
| <b>IDENTIFICATION=</b> value | Specifies the numeric identification of the system. |
| <b>NAME=</b> nodename        | Specifies the node name of the system.              |

### **TERMINAL=(device-name,...)**

Specifies the name of the terminal to be used when selecting event records. You can represent all or part of the terminal name with a wildcard.

### **USERNAME=(username,...)**

Specifies the user name to be used when selecting event records. You can represent all or part of the user name with a wildcard.

### **VOLUME\_NAME=(volume-name,...)**

Specifies the name of the mounted (or dismounted) volume to be used when selecting event records. You can represent all or part of the volume name with a wildcard.

### **VOLUME\_SET\_NAME=(volume-set-name,...)**

Specifies the name of the mounted (or dismounted) volume set to be used when selecting event records. You can represent all or part of the volume set name with a wildcard.

## Examples

1. \$ ANALYZE/AUDIT /FULL/SELECT=USERNAME=JOHNSON -  
\_ \$ SYS\$MANAGER:SECURITY\_AUDIT.AUDIT\$JOURNAL

The command in this AXP system example selects all records written to the security audit log file that were generated by user JOHNSON.

2. \$ ANALYZE/AUDIT/FULL/SELECT=PRIVILEGES\_USED=(SYSPRV,-  
\_ \$ BYPASS) SYS\$MANAGER:SECURITY\_AUDIT.AUDIT\$JOURNAL

The command in this AXP system example selects all records written to the security audit log file that were generated by events through the use of both SYSPRV and BYPASS privileges. ♦

---

## /SELECT (VAX Only )



On VAX systems, specifies the criteria for selecting records.

### Format

/SELECT=criteria[,...]

/NOSELECT

### Keyword

#### **criteria[,...]**

Specifies the criteria for selecting records. For each specified criterion, ANALYZE/AUDIT has two selection requirements:

- The packet corresponding to the criterion must be present in the record.
- One of the specified values must match the value in that packet.

For example, if you specify the criteria (USER=(PUTTERMAN,WU),SYSTEM=DBASE), ANALYZE/AUDIT selects an event record containing the SYSTEM=DBASE packet and a USER packet with either the PUTTERMAN value or the WU value.

If you omit the /SELECT qualifier, all event records selected through the /EVENT\_TYPE qualifier are extracted from the audit log file and included in the report.

You can specify any of the following criteria:

#### **ACCESS=(type,...)**

Specifies the type of object access upon which the selection is based. Access is object-specific and includes the following types:

|           |          |        |
|-----------|----------|--------|
| Associate | Execute  | Read   |
| Control   | Lock     | Submit |
| Create    | Logical  | Use    |
| Delete    | Manage   | Write  |
|           | Physical |        |

The *Security Guide* describes each of these types.

## **ANALYZE/AUDIT /SELECT (VAX Only )**

### **ACCOUNT=(name,...)**

Specifies the account name upon which selection is based. You can use wildcards, such as an asterisk (\*) or percent sign (%), to represent all or part of the name.

### **ALARM\_NAME=(alarm-name,...)**

Specifies the alarm journal name on which selection is based. You can use wildcards to represent all or part of the alarm name.

### **ASSOCIATION\_NAME=(IPC-name,...)**

Specifies the name of the interprocess communication (IPC) association.

### **AUDIT\_NAME=(journal-name,...)**

Specifies the audit journal name on which selection is based. You can use wildcards to represent all or part of the audit journal name.

### **COMMAND\_LINE=(command,...)**

Specifies the command line that the user entered.

### **CONNECTION\_IDENTIFICATION=(IPC-name,...)**

Specifies the name for the interprocess communication (IPC) connection.

### **DECNET\_LINK\_IDENTIFICATION=(value,...)**

Specifies the number of the DECnet logical link.

### **DECNET\_OBJECT\_NAME=(object-name,...)**

Specifies the name of the DECnet object.

### **DECNET\_OBJECT\_NUMBER=(value,...)**

Specifies the number of the DECnet object.

### **DEFAULT\_USERNAME=(username,...)**

Specifies the default local user name for incoming network proxy requests.

### **DEVICE\_NAME=(device-name,...)**

Specifies the name of a device in audit records that have a **DEVICE\_NAME** packet. Note that this does not select the device name when it occurs in other packet types, such as in a file name or in the **TARGET\_DEVICE\_NAME** packet.

### **DIRECTORY\_ENTRY=(directory,...)**

Specifies the directory entry associated with file system operation.

### **DIRECTORY\_NAME=(directory,...)**

Specifies the name of the directory file.

### **DISMOUNT\_FLAGS=(flag-name,...)**

Identifies the names of the volume dismounting flags to be used in selecting records. Specify one or more of the following flag names: Abort, Cluster, Nounload, and Unit.

### **EVENT\_CLUSTER\_NAME=(event-flag-cluster-name,...)**

Specifies the name of the event flag cluster.

### **FACILITY=(facility-name,...)**

Specifies that only events audited by the named facility be selected. Provide a name or a number but, in either case, the facility has to be defined through the logical **AUDSERV\$FACILITY\_NAME** as a decimal number; the system uses the number 0.

**FIELD\_NAME=(field-name,...)**

Specifies the name of the field that was modified. ANALYZE/AUDIT uses the FIELD\_NAME criterion with packets containing the original data and the new data (specified by the NEW\_DATA criterion).

**FLAGS=(flag-name,...)**

Identifies the names of the audit event flags associated with the audited event. These names should be used in selecting records. Specify one or more of the following flags: ACL, Alarm, Audit, Flush, Foreign, Internal, and Mandatory. (For a description of these flags, see Table F-3.)

**HOLDER=keyword(...)**

Specifies the characteristics of the identifier holder to be used when selecting event records. Choose from the following keywords:

|               |                                                                                              |
|---------------|----------------------------------------------------------------------------------------------|
| NAME=username | Specifies the name of the holder. You can represent all or part of the name with a wildcard. |
| OWNER=uic     | Specifies the user identification code (UIC) of the holder.                                  |

**IDENTIFIER=keyword(...)**

Identifies which attributes of an identifier should be used when selecting event records. Choose from the following keywords:

|                     |                                                                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ATTRIBUTES=name     | Specifies the name of the particular attribute. Valid attribute names are as follows: Dynamic, Holder_Hidden, Name_Hidden, No_Access, Resource, and Subsystem. |
| NAME=identifier     | Specifies the original name of the identifier. You can represent all or part of the name with a wildcard.                                                      |
| NEW_NAME=identifier | Specifies the new name of the identifier. You can represent all or part of the name with a wildcard.                                                           |
| NEW_ATTRIBUTES=name | Specifies the name of the new attribute. Valid attribute names are Dynamic, Holder_Hidden, Name_Hidden, No_Access, Resource, and Subsystem.                    |
| VALUE=value         | Specifies the original value of the identifier.                                                                                                                |
| NEW_VALUE=value     | Specifies the new value of the identifier.                                                                                                                     |

**IDENTIFIERS\_MISSING=(identifier,...)**

Specifies the identifiers missing in a failure to access an object.

**IDENTIFIERS\_USED=(identifier,...)**

Specifies the identifiers used to gain access to an object. An event record matches if the specified list is a subset of the identifiers recorded in the event record.

**IMAGE\_NAME=(image-name,...)**

Identifies the name of the image to be used when selecting event records. You can represent all or part of the image name with a wildcard.



## **ANALYZE/AUDIT /SELECT (VAX Only )**

### **INSTALL=keyword(...)**

Specifies that installation event packets are to be considered when selecting event records. Choose from the following keywords:

**FILE=filename** Specifies the name of the installed file. You can represent all or part of the name with a wildcard.

Note that on AXP systems and versions of VAX systems prior to Version 6.0, audit log files record the installed file name within an object name packet. To select the installed file, you must use the expression **OBJECT=(NAME=filename)** instead of **FILE=filename**.

**FLAGS=flag-name** Specifies the names of the flags, which correspond to qualifiers of the Install utility (INSTALL); for example, OPEN corresponds to /OPEN.

**PRIVILEGES=privilege-name** Specifies the names of the privileges with which the file was installed.

### **LNM\_PARENT\_NAME=(table-name,...)**

Specifies the name of the parent logical name table.

### **LNM\_TABLE\_NAME=(table-name,...)**

Specifies the name of the logical name table.

### **LOCAL=(characteristic,...)**

Specifies the characteristics of the local (proxy) account to be used when selecting event records. The following characteristic is supported:

**USERNAME=username** Specifies the name of the local account. You can represent all or part of the name with a wildcard.

### **LOGICAL\_NAME=(logical-name,...)**

Specifies the logical name of the mounted (or dismounted) volume upon which selection is based. You can represent all or part of the logical name with a wildcard.

### **MAILBOX\_UNIT=(number,...)**

Specifies the number of the mailbox unit.

### **MOUNT\_FLAGS=(flag-name,...)**

Specifies the names of the volume mounting flags upon which selection is based. Possible flag names include the following:

**CACHE=(NONE,WRITETHROUGH)**  
**CLUSTER**  
**DATACHECK=(READ,WRITE)**  
**FOREIGN**  
**GROUP**  
**INITIALIZATION=(ALLOCATE,CONTINUATION)**  
**INTERCHANGE**  
**MESSAGE**  
**NOASSIST**

NOAUTO  
NODISKQ  
NOHDR3  
NOLABEL  
NOWRITE

**OVERRIDE=(options[,...])** { ACCESSIBILITY  
                                  EXPIRATION  
                                  IDENTIFICATION  
                                  LOCK  
                                  OWNER\_IDENTIFIER  
                                  SETID }

SHARE  
SYSTEM

**NEW\_DATA=(value,...)**

Specifies the value to use after the event occurs. Use this criterion with the FIELD\_NAME criterion.)

**NEW\_IMAGE\_NAME=(image-name,...)**

Specifies the name of the image to be activated in the newly created process, as supplied to the \$CREPRC system service.

**NEW\_OWNER=(uic,...)**

Specifies the user identification code (UIC) to be assigned to the created process, as supplied to the \$CREPRC system service.

**OBJECT=keyword(...)**

Specifies which characteristics of an object should be used when selecting event records. Choose any of the following keywords:

**CLASS=class-name**

Specifies the general object class as one of the following:

Capability  
Device  
Event\_cluster  
File  
Group\_global\_section  
Logical\_name\_table  
Queue  
Resource\_domain  
Security\_class  
System\_global\_section  
Volume

You must enter the full class name (for example, CLASS=logical\_name\_table) or use wildcard characters to supply a portion of the class name (for example, CLASS=log\*).

## **ANALYZE/AUDIT /SELECT (VAX Only )**

|                                                |                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                | This keyword supersedes the TYPE keyword used in earlier versions of the operating system. However, the TYPE keyword is still required to select audit records generated on AXP systems and on VAX systems running a version of VMS prior to Version 6.0.                                                                                   |
| NAME=object-name                               | Specifies the name of the object. You can represent all or part of the name with a wildcard. If you do not use a wildcard, specify the full object name (for example, _BOSTON\$DUA0:[RWOODS]MEMO.MEM;1).                                                                                                                                    |
| OWNER=value                                    | Specifies the UIC or general identifier of the object.                                                                                                                                                                                                                                                                                      |
| TYPE=type                                      | Specifies the general object class (type of object). The available classes are as follows:<br>Capability<br>Device<br>File<br>Group_global_section<br>Logical_name_table<br>Queue<br>System_global_section                                                                                                                                  |
| <b>PARENT=keyword(...)</b>                     | Specifies which characteristics of the parent process are used when selecting event records generated by a subprocess. Choose from the following keywords:                                                                                                                                                                                  |
| IDENTIFICATION=value                           | Specifies the process identification (PID) of the parent process.                                                                                                                                                                                                                                                                           |
| NAME=process-name                              | Specifies the name of the parent process. You can represent all or part of the name with a wildcard.                                                                                                                                                                                                                                        |
| OWNER=value                                    | Specifies the owner (identifier value) of the parent process.                                                                                                                                                                                                                                                                               |
| USERNAME=username                              | Specifies the user name of the parent process. You can represent all or part of the name with a wildcard.                                                                                                                                                                                                                                   |
| <b>PASSWORD=(password,...)</b>                 | Specifies the password used when the system detected a break-in attempt.                                                                                                                                                                                                                                                                    |
| <b>PRIVILEGES_MISSING=(privilege-name,...)</b> | Specifies privileges the caller needed to perform the operation successfully. Specify any of the system privileges, as described in the <i>Security Guide</i> .                                                                                                                                                                             |
| <b>PRIVILEGES_USED=(privilege-name,...)</b>    | Specifies the privileges of the process to be used when selecting event records. Specify any of the system privileges, as described in the <i>Security Guide</i> . Also include the STATUS keyword in the selection criteria so the report can demonstrate whether the privilege was involved in a successful or an unsuccessful operation. |

**PROCESS=(characteristic,...)**

Specifies the characteristics of the process to be used when selecting event records. Choose from the following characteristics:

|                      |                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------|
| IDENTIFICATION=value | Specifies the PID of the process.                                                             |
| NAME=process-name    | Specifies the name of the process. You can represent all or part of the name with a wildcard. |

**REMOTE=keyword(...)**

Specifies that some characteristic of the network request is to be used when selecting event records. Choose from the following keywords:

|                           |                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| ASSOCIATION_NAME=IPC-name | Specifies the interprocess communication (IPC) association name.                                       |
| LINK_IDENTIFICATION=value | Specifies the number of the DECnet logical link.                                                       |
| IDENTIFICATION=value      | Specifies the DECnet node address.                                                                     |
| NODENAME=node-name        | Specifies the DECnet node name. You can represent all or part of the name with a wildcard.             |
| USERNAME=username         | Specifies the remote user name. You can represent all or part of the remote user name with a wildcard. |

**REQUEST\_NUMBER=(value,...)**

Specifies the request number associated with the DCL command REQUEST /REPLY.

**SECTION\_NAME=(global-section-name,...)**

Specifies the name of the global section.

**SNAPSHOT\_BOOTFILE=(filename,...)**

Specifies the name of the file containing a snapshot of the system.

**SNAPSHOT\_SAVE\_FILENAME=(filename,...)**

Specifies the name of the system snapshot file for a save operation that is in progress.

**STATUS=type(...)**

Specifies the type of success status to be used when selecting event records. Choose from the following status types:

|                  |                                         |
|------------------|-----------------------------------------|
| SUCCESSFUL       | Specifies any success status.           |
| FAILURE          | Specifies any failure status.           |
| CODE=(value,...) | Specifies a specific completion status. |

**SUBJECT\_OWNER=(uic,...)**

Specifies the owner (UIC) of the process causing the event.

**SYSTEM=keyword(...)**

Specifies the characteristics of the system to be used when selecting event records. Choose from the following keywords:

## **ANALYZE/AUDIT /SELECT (VAX Only )**

- IDENTIFICATION=**value Specifies the numeric identification of the system.
- NAME=**nodename Specifies the node name of the system.
- SYSTEM\_SERVICE\_NAME=(**service-name,...)  
Specifies the name of the system service associated with the event.
- TARGET\_DEVICE\_NAME=(**device-name,...)  
Specifies the target device name used by a process control system service.
- TARGET\_PROCESS\_IDENTIFICATION=(**value,...)  
Specifies the target process identifier (PID) used by a process control system service.
- TARGET\_PROCESS\_NAME=(**process-name,...)  
Specifies the target process name used by a process control system service.
- TARGET\_PROCESS\_OWNER=(**uic,...)  
Specifies the target process owner (UIC) used by a process control system service.
- TARGET\_USERNAME=(**username,...)  
Specifies the target user name used by a process control system service.
- TERMINAL=(**device-name,...)  
Specifies the name of the terminal to be used when selecting event records. You can represent all or part of the terminal name with a wildcard.
- TRANSPORT\_NAME=(**transport-name,...)  
Specifies the name of the transport: interprocess communication (IPC), DECnet, or System Management Integrator (SMI), which handles requests from the System Management utility.
- UAF\_ADD=(**record-name,...)  
Specifies the name of the authorization record being added.
- UAF\_COPY=(**record-name,...)  
Specifies the original and new names of the authorization record being copied.
- UAF\_DELETE=(**record-name,...)  
Specifies the name of the authorization record being removed.
- UAF\_MODIFY=(**record-name,...)  
Specifies the name of the authorization record being modified.
- UAF\_RENAME=(**record-name,...)  
Specifies the name of the authorization record being renamed.
- UAF\_SOURCE=(**record-name,...)  
Specifies the user name of the source record for an Authorize utility (AUTHORIZE) copy operation.
- USERNAME=(**username,...)  
Specifies the user name to be used when selecting event records. You can represent all or part of the user name with a wildcard.

## ANALYZE/AUDIT /SELECT (VAX Only)

### VOLUME\_NAME=(volume-name,...)

Specifies the name of the mounted (or dismounted) volume to be used when selecting event records. You can represent all or part of the volume name with a wildcard.

### VOLUME\_SET\_NAME=(volume-set-name,...)

Specifies the name of the mounted (or dismounted) volume set to be used when selecting event records. You can represent all or part of the volume set name with a wildcard.

## Examples

1. \$ ANALYZE/AUDIT /FULL/SELECT=USERNAME=JOHNSON -  
\_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects all records written to the security audit log file that were generated by user JOHNSON.

2. \$ ANALYZE/AUDIT/FULL/SELECT=PRIVILEGES USED=(SYSPRV,-  
\_ \$ BYPASS) SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects all records written to the security audit log file that were generated by events through the use of either SYSPRV or BYPASS privilege.

3. \$ ANALYZE/AUDIT/FULL/EVENT=SYSUAF/SELECT= -  
\_ \$IMAGE="( \*[SYS\*SYSEXE]SETP0.EXE", "[SYS\*SYSEXE]LOGINOUT.EXE" ) -  
\_ \$SYS\$MANAGER:SECURITY

The command in this example selects all records written to the security audit log file that involve password changes.

The following is a VAX system example command procedure that you could run at midnight to select all SYSUAF, AUDIT, and BREAKIN events (excluding password changes) and mail the result to the system manager:

```
$! DAILY_AUDIT.COM
$
$ mail_list = "SYSTEM"
$ audsrv$noselect = %X003080A0
$ audit_events = "SYSUAF,BREAKIN,AUDIT"
$
$ analyze /audit /full -
/event=('audit events') -
/output=audit.tmp -
/ignore=image="(*[SYS*SYSEXE]SETP0.EXE", "[SYS*SYSEXE]LOGINOUT.EXE") -
sys$manager:SECURITY.AUDIT$JOURNAL
$
$ status = $status
$ if (status.and.%XFFFFFFF) .eq. audsrv$noselect then goto no_records
$ if .not. status then goto error_analyze
$ if f$file("audit.tmp","eof") .eq. 0 then goto no_records
$ mail /subject="'audit_events' listing from '$time()' -
audit.tmp 'mail_list'
$ goto new_log
$
$ no_records:
$ mail /subject="No interesting security events" nl: 'mail_list'
$
$ new_log:
$ if f$search("audit.tmp") .nes. "" then delete audit.tmp;*
$ set audit /server=new_log
```

## ANALYZE/AUDIT /SELECT (VAX Only)

```
$ rename sys$manager:SECURITY.AUDIT$JOURNAL;-1 -
 sys$common:[sysmgr]'f$element(0," ",f$edit(f$time()),"TRIM")'
$ exit
$
$ error analyze:
$ mail/subj="Error analyzing auditing information" nl: 'mail_list'
$ exit ◆
```

---

### /SINCE

Indicates the utility must operate on records dated with the specified time or after the specified time.

#### Format

```
/SINCE[=time]
/NOSINCE
```

#### Keyword

##### time

Specifies the time used to select records. Records dated the same or later than the specified time are selected. You can specify an absolute time, a delta time, or a combination of the two. Observe the syntax rules for date and time described in the *OpenVMS User's Manual*.

If you specify /SINCE without the time, the utility uses the beginning of the current day.

#### Examples

1. \$ ANALYZE/AUDIT /SINCE=25-JUL-1994 -  
 \_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects records dated later than July 25, 1994.

2. \$ ANALYZE/AUDIT /SINCE=25-JUL-1994:15:00 -  
 \_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example selects records written after 3 P.M. on July 25, 1994.

---

### /SUMMARY

Specifies that a summary of the selected records be produced after all records are processed.

You can use the /SUMMARY qualifier alone or in combination with the /BRIEF, the /BINARY, or the /FULL qualifier.

**Format**

/SUMMARY=presentation  
/NOSUMMARY

**Keyword**

**presentation**

Specifies the presentation of the summary. If you do not specify a presentation criterion, ANALYZE/AUDIT summarizes the number of audits.

You can specify either of the following presentations:

**COUNT**

Lists the total number of audit messages for each class of security event that have been extracted from the security audit log file. This is the default.

**PLOT**

Displays a plot showing the class of the audit event, the time of day when the audit was generated, and the name of the system where the audit was generated.

**Examples**

1. \$ ANALYZE/AUDIT/SUMMARY SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example generates a summary report of all records processed.

**AXP**

On AXP systems, the display is as follows:

|                       |       |                        |       |
|-----------------------|-------|------------------------|-------|
| Total records read:   | 10831 | Records selected:      | 10831 |
| Record buffer size:   | 512   | Format buffer size:    | 128   |
| Server messages:      | 0     | Customer messages:     | 0     |
| Digital CSS messages: | 0     | Layered prod messages: | 0     |
| Audit changes:        | 169   | Installed db changes:  | 322   |
| Login failures:       | 246   | Breakin attempts:      | 0     |
| Successful logins:    | 1719  | Successful logouts:    | 951   |
| System UAF changes:   | 33    | Network UAF changes:   | 0     |
| Rights db changes:    | 3     | Object accesses:       | 6976  |
| Volume (dis)mounts:   | 412 ♦ |                        |       |

**VAX**

On VAX systems, the display is as follows:

|                       |       |                         |      |
|-----------------------|-------|-------------------------|------|
| Total records read:   | 9701  | Records selected:       | 9701 |
| Record buffer size:   | 1031  | Object creates:         | 1278 |
| Successful logins:    | 542   | Object accesses:        | 3761 |
| Successful logouts:   | 531   | Object deaccesses:      | 2901 |
| Login failures:       | 35    | Object deletes:         | 301  |
| Breakin attempts:     | 2     | Volume (dis)mounts:     | 50   |
| System UAF changes:   | 10    | System time changes:    | 0    |
| Rights db changes:    | 8     | Server messages:        | 0    |
| Netproxy changes:     | 5     | Connections:            | 0    |
| Audit changes:        | 7     | Process control audits: | 0    |
| Installed db changes: | 50    | Privilege audits:       | 91   |
| Sysgen changes:       | 9     |                         |      |
| NCP command lines:    | 120 ♦ |                         |      |



# ANALYZE/AUDIT /SUMMARY

2. \$ ANALYZE/AUDIT/FULL/EVENT\_TYPE=(BREAKIN,LOGFAIL)/SUMMARY-  
\_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

The command in this VAX system example generates a full format listing of all logged audit messages that match the break-in or log failure event classes. A summary report is included at the end of the listing.

3. \$ ANALYZE/AUDIT/FULL/EVENT\_TYPE=(BREAKIN,LOGFAIL)/SUMMARY=PLOT -  
\_ \$ SYS\$MANAGER:SECURITY.AUDIT\$JOURNAL

This command generates a histogram that you can display on a character-cell terminal.

| Date   | 0000 | 0100 | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | 2100 | 2200 | 2300 |     |  |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|--|
| 6-JAN  |      |      |      | 129  | 928  | 772  | 757  | 397  | 27   | 56   | 440  | 891  | 148  | 561  | 253  | 321  | 86   | 91   | 117  | 71   | 37   |      | 5    | 21   | 5   |  |
| 7-JAN  | 6    | 89   | 16   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| 11-JAN |      |      |      |      |      |      |      |      |      |      |      | 117  | 184  | 93   | 141  | 68   |      |      |      |      |      |      |      |      |     |  |
| 13-JAN |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 64   | 630  |      |      |      |      |      |      |      |     |  |
| 14-JAN |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 108  | 239  | 354  | 659  | 16   | 105  | 161  | 160  | 165  | 147 |  |
| 15-JAN | 138  | 128  | 14   |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 180  | 176  | 63   | 27   | 28   | 15   | 43   |     |  |
| 16-JAN | 12   | 17   | 25   | 17   | 168  | 182  | 200  | 167  | 156  | 104  | 97   | 212  | 208  | 219  | 154  | 241  | 199  | 211  | 43   | 108  | 88   | 5    |      |      | 5   |  |
| 17-JAN | 109  | 70   | 11   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| 18-JAN |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 522  | 4    | 15   | 11   | 15   | 9    | 5    |     |  |
| 19-JAN |      | 5    | 9    | 17   |      | 5    | 27   | 46   | 134  | 209  | 466  | 417  | 97   | 223  | 240  | 660  | 789  | 246  | 494  | 273  | 213  | 333  | 232  | 273  |     |  |
| 20-JAN | 386  | 701  | 23   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |  |
| 21-JAN |      |      | 37   | 35   | 28   | 32   | 47   | 38   | 70   | 81   | 90   | 115  | 155  |      |      |      |      |      |      |      |      |      |      |      |     |  |

ZK-5912A-GE

**ANALYZE/AUDIT Commands**

This section describes the interactive commands available with the Audit Analysis utility (ANALYZE/AUDIT). The qualifiers for this section follow the standard rules of DCL grammar.

The utility runs interactively by default; you disable the feature with the /NOINTERACTIVE qualifier to the ANALYZE/AUDIT command. To enter interactive commands, press Ctrl/C at any time during the processing of a full or brief interactive display. At the COMMAND> prompt, you can enter any of the commands listed in this section. Use the CONTINUE command to resume processing of the event records, or use the EXIT command to terminate the session.

---

**CONTINUE**

Resumes processing of event records.

**Format**

CONTINUE

**Parameters**

None.

**Qualifiers**

None.

**Example**

```
COMMAND> DISPLAY/SINCE=25-JUN-1994/SELECT=USERNAME=JOHNSON
COMMAND> CONTINUE
```

The first command in this example selects only event records generated by user JOHNSON after June 25, 1994. The second command in the example displays a report based on the new selection criteria.

---

**DISPLAY**

Changes the criteria used to select event records.

**Format**

DISPLAY

**Parameters**

None.

For a more complete description of any one of the following qualifiers, refer to the description of the qualifier in the preceding Analyze/Audit Qualifiers section.

# ANALYZE/AUDIT DISPLAY

## Qualifiers

### **/BEFORE=time**

Controls whether only those records dated earlier than the specified time are selected.

### **/BRIEF**

Controls whether a brief (one-line-per-record) format is used in ASCII displays.

### **/EVENT\_TYPE=event-type[,...]**

Controls whether only those records matching the specified event type are selected.

### **/FULL**

Controls whether a full format for each record is used in ASCII displays.

### **/IGNORE=criteria[,...]**

Controls whether records matching the specified criteria are excluded. If you specify **/IGNORE** two or more times, the criteria are combined. To specify a new set of exclusion criteria, include the **/REMOVE** qualifier with the **/IGNORE** qualifier.

### **/PAUSE=seconds**

For full-format displays (**/FULL**), specifies the length of time each record is displayed.

### **/REMOVE**

Controls whether the criteria specified by the **/IGNORE** and the **/SELECT** qualifiers are no longer to be used to select event records to be displayed.

### **/SELECT=criteria[,...]**

Controls whether only those records matching the specified criteria are selected. If you specify **/SELECT** two or more times, the criteria are combined. To specify a new set of selection criteria, include the **/REMOVE** qualifier with the **/SELECT** qualifier.

### **/SINCE[=time]**

Controls whether only those records dated the same or later than the specified time are selected.

## Examples

1. 

```
COMMAND> DISPLAY/EVENT_TYPE=SYSUAF
COMMAND> CONTINUE
```

The first command in this example selects records that were generated as a result of a modification to the system user authorization file (SYSUAF). The second command displays the selected records.

```
2. COMMAND> DISPLAY/SELECT=USERNAME=CRICK
 COMMAND> CONTINUE
 .
 .
 .
 Ctrl/C
 COMMAND> DISPLAY/SELECT=USERNAME=WATSON
 COMMAND> CONTINUE
```

The first DISPLAY command in this example selects records that were generated by user CRICK. The second command displays the selected records. The next DISPLAY command selects records that were generated by user WATSON. The last command in the example displays all records generated by users CRICK and WATSON.

---

## EXIT

Terminates the session.

### Format

EXIT

### Parameters

None.

### Qualifiers

None.

---

## HELP

Provides online help information for using ANALYZE/AUDIT commands.

### Format

HELP [topic]

### Parameter

**topic**

Specifies the command for which help information is to be displayed. If you omit the keyword, HELP displays a list of available help topics and prompts you for a particular keyword.

### Qualifiers

None.

### Example

```
COMMAND> HELP DISPLAY
```

The command in this example displays help information about the DISPLAY command.

## ANALYZE/AUDIT LIST

---

### LIST

Changes the criteria used to select event records. The LIST command is synonymous with the DISPLAY command.

#### Format

LIST

#### Parameters

None.

#### Qualifiers

See the description of the DISPLAY command.

#### Example

```
COMMAND> LIST/EVENT_TYPE=SYSUAF
COMMAND> CONTINUE
```

The first command in this example selects records that were generated as a result of a modification to the system user authorization file (SYSUAF). The second command displays the selected records.

---

## NEXT FILE

Controls whether the current security audit log file is closed and the next log file opened. The command is useful when you supply a wildcard file specification to the ANALYZE/AUDIT command; for example \*.AUDIT\$JOURNAL. If there are no other audit log files to open, the audit analysis session is terminated and control returns to DCL.

#### Format

NEXT FILE

#### Parameters

None.

#### Qualifiers

None.

---

**NEXT RECORD**

Controls whether the next audit record is displayed. The NEXT RECORD command is synonymous with the POSITION command.

**Format**

NEXT RECORD

**Parameters**

None.

**Qualifiers**

None.

---

**POSITION**

Moves the full-format display forward or backward the specified number of event records.

**Format**

POSITION number

**Parameter**

**number**

For positive numbers, displays the record that is the specified number of records after the current record. For negative numbers, displays the record that is the specified number of records before the current record.

**Qualifiers**

None.

**Examples**

1. COMMAND> POSITION 100

The command in this example moves the display forward 100 event records.

2. COMMAND> POSITION -100

The command in this example moves the display back 100 event records.

## ANALYZE/AUDIT SHOW

---

### SHOW

Displays information about the selection or exclusion criteria currently being used to select event records.

### Format

SHOW option[,...]

### Parameter

#### **option[,...]**

Displays information about selection or exclusion criteria currently being used to select records. Specify one or more of the following options:

|                    |                                                            |
|--------------------|------------------------------------------------------------|
| ALL                | Displays all criteria being used to select event records.  |
| EXCLUSION_CRITERIA | Displays the criteria being used to exclude event records. |
| SELECTION_CRITERIA | Displays the criteria being used to select event records.  |

### Qualifiers

None.

### Example

```
COMMAND> SHOW SELECTION_CRITERIA
```

The command in this example displays the selection criteria currently in use to select records.

---

**Authorize Utility**







---

## AUTHORIZE Description

The Authorize utility (AUTHORIZE) is a system management tool used to control access to the system and to allocate resources to users. AUTHORIZE creates new records or modifies existing records in the following files:

- System user authorization file (SYSUAF.DAT)  
You can use AUTHORIZE to assign values to various **fields** within each SYSUAF record. The values you assign identify the user and the user's work environment, and control use of system resources.
- Network proxy authorization file (NETPROXY.DAT)
- Rights database file (RIGHTSLIST.DAT)

These three files store system authorization information. By default, they are owned by the system (UIC of [SYSTEM]) and are created with the following protection:

```
SYSUAF.DAT S:RWED, O:RWED, G, W
NETPROXY.DAT S:RWED, O:RWED, G:RWE, W
RIGHTSLIST.DAT S:RWED, O:RWED, G:RWE, W:R (AXP only)
RIGHTSLIST.DAT S:RWED, O:RWED, G:R, W: (VAX only)
```

To use AUTHORIZE, you must have write access to all three of these files (in other words, you must have an account with the UIC of [SYSTEM] or the SYSPRV privilege).

**VAX**

On VAX systems, note that you must have read access to the RIGHTSLIST.DAT file (or sufficient privileges) to display the rights identifiers held by other users. ♦

Because certain images (such as MAIL and SET) require access to the system UAF and are normally installed with the SYSPRV privilege, ensure that you always grant system access to SYSUAF.DAT.

When you install a new system, the software distribution kit provides the following records in the system user authorization file in SYS\$SYSTEM:

```
DEFAULT
FIELD
SYSTEM
SYSTEST
SYSTEST_CLIG
```

If the SYSUAF.DAT becomes corrupted or is accidentally deleted, you can use the template file SYSUAF.TEMPLATE in the SYS\$SYSTEM directory to recreate the file, as follows:

```
$ SET DEFAULT SYS$SYSTEM
$ COPY SYSUAF.TEMPLATE SYSUAF.DAT
```

The file SYSUAF.TEMPLATE contains records that are identical to those defined when the system was installed.

As an emergency backup for the system SYSUAF file, you can create a private copy of SYSUAF.DAT. To affect future logins, copy a private version of SYSUAF.DAT to the appropriate directory, as shown in the following example:

```
$ COPY MYSYSUAF.DAT SYS$COMMON:[SYSEXE]:SYSUAF.DAT-
_ $ /PROTECTION=(S:RWED,O:RWED,G,W)
```

---

## AUTHORIZE Usage Summary

The Authorize utility (AUTHORIZE) is a system management tool that allows you to control access to the system and to allocate resources to users.

### Format

RUN SYS\$SYSTEM:AUTHORIZE

#### Parameters

None.

### Usage Summary

To invoke AUTHORIZE, set your default device and directory to SYS\$SYSTEM and enter RUN AUTHORIZE at the DCL command prompt. At the UAF> prompt, you can enter any of the AUTHORIZE commands described in the following section.

To exit from AUTHORIZE, enter the EXIT command at the UAF> prompt or press Ctrl/Z.

If you move the SYSUAF.DAT file, be sure the logical name SYSUAF is defined and points to an existing file. If AUTHORIZE is unable to locate the SYSUAF.DAT file, it displays the following error message:

```
%UAF-E-NAOFIL, unable to open SYSUAF.DAT
-RMS-E-FNF, file not found
Do you want to create a new file?
```

A response of YES results in creation of a new SYSUAF file containing a SYSTEM record and a DEFAULT record. These records are initialized with the same values set when the system was installed.

---

## AUTHORIZE Commands

This section describes the AUTHORIZE commands and provides examples of their use. You can abbreviate any command, keyword, or qualifier as long as the abbreviation is not ambiguous. The asterisk (\*) and the percent sign (%) can be used as wildcard characters to specify user names, node names, and UICs.

AUTHORIZE commands fall into the following four categories:

- Commands that allow you to manage user authorization records. By specifying appropriate qualifiers, you can use these commands to act upon individual fields of SYSUAF records. You can identify the user and the user's work environment and control use of system resources.
- Commands that build and maintain the network proxy authorization file (NETPROXY.DAT).
- Commands that create and maintain the rights database (RIGHTSLIST.DAT).
- Commands that perform general utility functions or modify the system password.

Table 5-1 summarizes the AUTHORIZE commands according to these categories.

**Table 5-1 AUTHORIZE Command Summary**

| Command                                                        | Description                                                                                                                                         |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Managing System Resources and User Accounts with SYSUAF</b> |                                                                                                                                                     |
| ADD                                                            | Adds a user record to the SYSUAF and corresponding identifiers to the rights database.                                                              |
| COPY                                                           | Creates a new SYSUAF record that duplicates an existing record.                                                                                     |
| DEFAULT                                                        | Modifies the default SYSUAF record.                                                                                                                 |
| LIST                                                           | Writes reports for selected UAF records to a listing file, SYSUAF.LIS.                                                                              |
| MODIFY                                                         | Changes values in a SYSUAF user record. Qualifiers not specified in the command remain unchanged.                                                   |
| REMOVE                                                         | Deletes a SYSUAF user record and corresponding identifiers in the rights database. The DEFAULT and SYSTEM records cannot be deleted.                |
| RENAME                                                         | Changes the user name of the SYSUAF record (and, if specified, the corresponding identifier) while retaining the characteristics of the old record. |
| SHOW                                                           | Displays reports for selected SYSUAF records.                                                                                                       |

(continued on next page)

# AUTHORIZE

**Table 5-1 (Cont.) AUTHORIZE Command Summary**

| <b>Command</b>                                    | <b>Description</b>                                                                                   |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Managing Network Proxies with NETPROXY.DAT</b> |                                                                                                      |
| ADD/PROXY                                         | Adds proxy access for the specified user.                                                            |
| CREATE/PROXY                                      | Creates a network proxy authorization file.                                                          |
| LIST/PROXY                                        | Creates a listing file of all proxy accounts and all remote users with proxy access to the accounts. |
| MODIFY/PROXY                                      | Modifies proxy access for the specified user.                                                        |
| REMOVE/PROXY                                      | Deletes proxy access for the specified user.                                                         |
| SHOW/PROXY                                        | Displays proxy access allowed for the specified user.                                                |
| <b>Managing Identifiers with RIGHTSLIST.DAT</b>   |                                                                                                      |
| ADD/IDENTIFIER                                    | Adds an identifier name to the rights database.                                                      |
| CREATE/RIGHTS                                     | Creates a new rights database file.                                                                  |
| GRANT/IDENTIFIER                                  | Grants an identifier name to a UIC identifier.                                                       |
| LIST/IDENTIFIER                                   | Creates a listing file of identifier names and values.                                               |
| LIST/RIGHTS                                       | Creates a listing file of all identifiers held by the specified user.                                |
| MODIFY/IDENTIFIER                                 | Modifies the named identifier in the rights database.                                                |
| REMOVE/IDENTIFIER                                 | Removes an identifier from the rights database.                                                      |
| RENAME/IDENTIFIER                                 | Renames an identifier in the rights database.                                                        |
| REVOKE/IDENTIFIER                                 | Revokes an identifier name from a UIC identifier.                                                    |
| SHOW/IDENTIFIER                                   | Displays identifier names and values on the current output device.                                   |
| SHOW/RIGHTS                                       | Displays on the current output device the names of all identifiers held by the specified user.       |
| <b>General Commands</b>                           |                                                                                                      |
| EXIT                                              | Returns the user to DCL command level.                                                               |
| HELP                                              | Displays HELP text for AUTHORIZE commands.                                                           |
| MODIFY/SYSTEM_PASSWORD                            | Sets the system password (equivalent to the DCL command SET PASSWORD/SYSTEM).                        |

## ADD

Adds a user record to the SYSUAF and corresponding identifiers to the rights database.

## Format

ADD newusername

**Parameter**

**newusername**

Specifies the name of the user record to be included in the SYSUAF. The **newusername** parameter is a string of 1 to 12 alphanumeric characters and can contain underscores. Although dollar signs are permitted, they are usually reserved for system names.

Avoid using fully numeric user names (for example, 89560312). A fully numeric user name cannot receive a corresponding identifier because fully numeric identifiers are not permitted.

**Qualifiers**

**/ACCESS[=(range[,...])]**

Specifies hours of access for all modes of access. The syntax for specifying the range is:

**/[NO]ACCESS=( [PRIMARY], [n-m], [n], [,...], [SECONDARY], [n-m], [n], [,...])**

Specify hours as integers from 0 to 23, inclusive. You can specify single hours (n) or ranges of hours (n-m). If the ending hour of a range is earlier than the starting hour, the range extends from the starting hour through midnight to the ending hour. The first set of hours after the keyword **PRIMARY** specifies hours on primary days; the second set of hours after the keyword **SECONDARY** specifies hours on secondary days. Note that hours are *inclusive*; that is, if you grant access during a given hour, access extends to the end of that hour.

By default, a user has full access every day. See the DCL command **SET DAY** in the *OpenVMS DCL Dictionary* for information on overriding the defaults for primary and secondary day types.

All the list elements are optional. Unless you specify hours for a day type, access is permitted for the entire day. By specifying an access time, you prevent access at all other times. Adding **NO** to the qualifier denies the user access to the system for the specified period of time.

**Examples:**

|                                                   |                                                                                                                     |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>/ACCESS</b>                                    | Allows unrestricted access                                                                                          |
| <b>/NOACCESS=SECONDARY</b>                        | Allows access on primary days only                                                                                  |
| <b>/ACCESS=(9-17)</b>                             | Allows access from 9 A.M. to 5:59 P.M. on all days                                                                  |
| <b>/NOACCESS=(PRIMARY, 9-17, SECONDARY, 18-8)</b> | Disallows access between 9 A.M. to 5:59 P.M. on primary days but allows access during these hours on secondary days |

To specify access hours for specific types of access, see the **/BATCH**, **/DIALUP**, **/INTERACTIVE**, **/LOCAL**, **/NETWORK**, and **/REMOTE** qualifiers.

**/ACCOUNT=account-name**

Specifies the default name for the account (for example, a billing name or number). The name can be a string of 1 to 8 alphanumeric characters. By default, **AUTHORIZE** does not assign an account name.

**/ADD\_IDENTIFIER (default)**

**/NOADD\_IDENTIFIER**

Adds identifiers for the user name and account name to the rights database.

## AUTHORIZE ADD

### **/ALGORITHM=keyword=type [=value]**

Sets the password encryption algorithm for a user. The keyword VMS refers to the algorithm used in the operating system version that is running on your system, whereas a customer algorithm is one that is added through the \$HASH\_PASSWORD system service by a customer site, by a layered product, or by a third party. The customer algorithm is identified in \$HASH\_PASSWORD by an integer in the range of 128 to 255. It must correspond with the number used in the AUTHORIZE command MODIFY/ALGORITHM. By default, passwords are encrypted with the VMS algorithm for the current version of the operating system.

| <b>Keyword</b> | <b>Function</b>                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------|
| BOTH           | Set the algorithm for primary and secondary passwords.                                                                          |
| CURRENT        | Set the algorithm for the primary, secondary, both, or no passwords, depending on account status. CURRENT is the default value. |
| PRIMARY        | Set the algorithm for the primary password only.                                                                                |
| SECONDARY      | Set the algorithm for the secondary password only.                                                                              |

The following table lists password encryption algorithms:

| <b>Type</b> | <b>Definition</b>                                                                         |
|-------------|-------------------------------------------------------------------------------------------|
| VMS         | The algorithm used in the version of the operating system that is running on your system. |
| CUSTOMER    | A numeric value in the range of 128 to 255 that identifies a customer algorithm.          |

The following example selects the VMS algorithm for Sontag's primary password:

```
UAF> MODIFY SONTAG/ALGORITHM=PRIMARY=VMS
```

If you select a site-specific algorithm, you must give a value to identify the algorithm, as follows:

```
UAF> MODIFY SONTAG/ALGORITHM=CURRENT=CUSTOMER=128
```

### **/ASTLM=value**

Specifies the AST queue limit, which is the total number of asynchronous system trap (AST) operations and scheduled wake-up requests that the user can have queued at one time. The default is 40 on VAX systems and 250 on AXP systems.

### **/BATCH[=(range[,...])]**

Specifies the hours of access permitted for batch jobs. For a description of the range specification, see the /ACCESS qualifier. By default, a user can submit batch jobs any time.

### **/BIOLM=value**

Specifies a buffered I/O count limit for the BIOLM field of the UAF record. The buffered I/O count limit is the maximum number of buffered I/O operations, such as terminal I/O, that can be outstanding at one time. The default is 40 on VAX systems and 150 on AXP systems.

**/BYTLM=value**

Specifies the buffered I/O byte limit for the BYTLM field of the UAF record. The buffered I/O byte limit is the maximum number of bytes of nonpaged system dynamic memory that a user's job can consume at one time. Nonpaged dynamic memory is used for operations such as I/O buffering, mailboxes, and file-access windows. The default is 32768 on VAX systems and 64000 on AXP systems.

**/CLI=cli-name**

Specifies the name of the default command language interpreter (CLI) for the CLI field of the UAF record. The cli-name is a string of 1 to 31 alphanumeric characters and should be either DCL or MCR. The default is DCL.

**/CLITABLES=filespec**

Specifies user-defined CLI tables for the account. The filespec can contain 1 to 31 characters. The default is SYS\$LIBRARY:DCLTABLES.

**/CPUTIME=time**

Specifies the maximum process CPU time for the CPU field of the UAF record. The maximum process CPU time is the maximum amount of CPU time a user's process can take per session. You must specify a delta time value. For a discussion of delta time values, see the *OpenVMS User's Manual*. The default is 0, which means an infinite amount of time.

**/DEFPRIVILEGES=([NO]privname[,...])**

Specifies default privileges for the user; that is, those enabled at login time. A NO prefix removes a privilege from the user. By specifying the keyword [NO]ALL with the /DEFPRIVILEGES qualifier, you can disable or enable all user privileges. The default privileges are TMPMBX and NETMBX.

**/DEVICE=device-name**

Specifies the name of the user's default device at login. The device-name is a string of 1 to 31 alphanumeric characters. If you omit the colon from the device-name value, AUTHORIZE appends a colon. The default device is SYS\$SYSDISK.

If you specify a logical name as the device-name (for example, DISK1: for DUA1:), you must make an entry for the logical name in the LNM\$SYSTEM\_TABLE in executive mode by using the DCL command DEFINE/SYSTEM/EXEC.

**/DIALUP[=(range[,...])]**

Specifies hours of access permitted for dialup logins. For a description of the range specification, see the /ACCESS qualifier. The default is full access.

**/DIOLM=value**

Specifies the direct I/O count limit for the DIOLM field of the UAF record. The direct I/O count limit is the maximum number of direct I/O operations (usually disk) that can be outstanding at one time. The default is 40 on VAX systems and 150 on AXP systems.

**/DIRECTORY=directory-name**

Specifies the default directory name for the DIRECTORY field of the UAF record. The directory name can be 1 to 39 alphanumeric characters. If you do not enclose the directory name in brackets, AUTHORIZE adds the brackets for you. The default directory name is [USER].



## AUTHORIZE ADD

### **/ENQLM=value**

Specifies the lock queue limit for the ENQLM field of the UAF record. The lock queue limit is the maximum number of locks that can be queued by the user at one time. The default is 200 on VAX systems and 2000 on AXP systems.

### **/EXPIRATION=time (default)**

#### **/NOEXPIRATION**

Specifies the expiration date and time of the account. The /NOEXPIRATION qualifier removes the expiration date on the account or resets the expiration time for expired accounts. The default expiration time period is 90 days for nonprivileged users.

### **/FILLM=value**

Specifies the open file limit for the FILLM field of the UAF record. The open file limit is the maximum number of files that can be open at one time, including active network logical links. The default is 300 on VAX systems and 100 on AXP systems.

### **/FLAGS=([NO]option[,...])**

Specifies login flags for the user. The prefix NO clears the flag. The options are as follows:

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AUDIT     | Enables or disables mandatory security auditing for a specific user. By default, the system does not audit the activities of specific users (NOAUDIT).                                                                                                                                                                                                                                                                                                                                                                   |
| AUTOLOGIN | Restricts the user to the automatic login mechanism when logging in to an account. When set, the flag disables login by any terminal that requires entry of a user name and password. The default is to require a user name and password (NOAUTOLOGIN).                                                                                                                                                                                                                                                                  |
| CAPTIVE   | Prevents the user from changing any defaults at login, for example, /CLI, /DISK, /COMMAND, or /LGICMD. It prevents the user from escaping the captive login command procedure specified by the /LGICMD qualifier and gaining access to the DCL command level. The CAPTIVE flag also establishes an environment where Ctrl/Y interrupts are initially turned off; however, command procedures can still turn on Ctrl /Y interrupts with the DCL command SET CONTROL=Y. By default, an account is not captive (NOCAPTIVE). |
| DEFCLI    | Restricts the user to the default command interpreter by prohibiting the use of the /CLI qualifier at login; the MCR command can still be used. By default, a user can choose a CLI (NODEFCLI).                                                                                                                                                                                                                                                                                                                          |

## AUTHORIZE ADD

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISCTLY             | Establishes an environment where Ctrl/Y interrupts are initially turned off and are invalid until a SET CONTROL_Y is encountered. This could happen in SYLOGIN.COM or in a procedure called by SYLOGIN.COM. Once a SET CONTROL_Y is executed (which requires no privilege), a user can enter a Ctrl/Y and reach the DCL prompt (\$). If the intent of DISCTLY is to force execution of the login command files, then SYLOGIN.COM should issue the DCL command SET CONTROL_Y to turn on Ctrl/Y interrupts before exiting. By default, Ctrl/Y is enabled (NODISCTLY). |
| DISFORCE_PWD_CHANGE | Removes the requirement that a user must change an expired password at login. By default, a person can use an expired password only once (NODISFORCE_PWD_CHANGE) and then is forced to change the password after logging in. If the user does not select a new password, the user is locked out of the system.                                                                                                                                                                                                                                                      |
| DISIMAGE            | Prevents the user from executing RUN, MCR, and foreign commands. By default, a user can execute RUN, MCR, and foreign commands (NODISIMAGE).                                                                                                                                                                                                                                                                                                                                                                                                                        |
| DISMAIL             | Disables mail delivery to the user. By default, mail delivery is enabled (NODISMAIL).                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DISNEWMAIL          | Suppresses announcements of new mail at login. By default, the system announces new mail (NODISNEWMAIL).                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| DISPWDDIC           | Disables automatic screening of new passwords against a system dictionary. By default, passwords are automatically screened (NODISPWDDIC).                                                                                                                                                                                                                                                                                                                                                                                                                          |
| DISPWDHIS           | Disables automatic checking of new passwords against a list of the user's old passwords. By default, the system screens new passwords (NODISPWDHIS).                                                                                                                                                                                                                                                                                                                                                                                                                |
| DISRECONNECT        | Disables automatic reconnection to an existing process when a terminal connection has been interrupted. By default, automatic reconnection is enabled (NODISRECONNECT).                                                                                                                                                                                                                                                                                                                                                                                             |
| DISREPORT           | Suppresses reports of the last login time, login failures, and other security reports. By default, login information is displayed (NODISREPORT).                                                                                                                                                                                                                                                                                                                                                                                                                    |
| DISUSER             | Disables the account so the user cannot log in. For example, the DEFAULT account is disabled. By default, an account is enabled (NODISUSER).                                                                                                                                                                                                                                                                                                                                                                                                                        |

## AUTHORIZE ADD

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DISWELCOME   | Suppresses the welcome message (an informational message displayed during a local login). This message usually indicates the version number of the operating system that is running and the name of the node on which the user is logged in. By default, a system login message appears (NODISWELCOME).                                                                                                                                                                                                                                                                                                                                                       |
| GENPWD       | Restricts the user to generated passwords. By default, users choose their own passwords (NOGENPWD).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| LOCKPWD      | Prevents the user from changing the password for the account. By default, users can change their passwords (NOLOCKPWD).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| PWD_EXPIRED  | Marks a password as expired. The user cannot log in if this flag is set. The LOGINOUT.EXE image sets the flag when both of the following conditions exist: a user logs in with the DISFORCE_PWD_CHANGE flag set, and the user's password expires. A system manager can clear this flag. By default, passwords are not expired after login (NOPWD_EXPIRED).                                                                                                                                                                                                                                                                                                    |
| PWD2_EXPIRED | Marks a secondary password as expired. Users cannot log in if this flag is set. The LOGINOUT.EXE image sets the flag when both of the following conditions exist: a user logs in with the DISFORCE_PWD_CHANGE flag set, and the user's password expires. A system manager can clear this flag. By default, passwords are not set to expire after login (NOPWD2_EXPIRED).                                                                                                                                                                                                                                                                                      |
| RESTRICTED   | Prevents the user from changing any defaults at login (for example, by specifying /DISK, /COMMAND, or /LGICMD) and prohibits user specification of a CLI with the /CLI qualifier. The RESTRICTED flag establishes an environment where Ctrl/Y interrupts are initially turned off; however, command procedures can still turn on Ctrl/Y interrupts with the DCL command SET CONTROL_Y. Typically, this flag is used to prevent an applications user from having unrestricted access to the CLI. By default, a user can change defaults (NORESTRICTED).<br><br>This flag provides compatibility with CAPTIVE accounts in OpenVMS systems prior to Version 5.2. |

**/GENERATE\_PASSWORD[=keyword]**

**/NOGENERATE\_PASSWORD (default)**

Invokes the password generator to create user passwords. Generated passwords can consist of 1 to 10 characters. Specify one of the following keywords:

|                  |                                                                                                                                             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BOTH</b>      | Generate primary and secondary passwords.                                                                                                   |
| <b>CURRENT</b>   | Do whatever the <b>DEFAULT</b> account does (for example, generate primary, secondary, both, or no passwords). This is the default keyword. |
| <b>PRIMARY</b>   | Generate primary password only.                                                                                                             |
| <b>SECONDARY</b> | Generate secondary password only.                                                                                                           |

When you modify a password, the new password expires automatically; it is valid only once (unless you specify **/NOPWDEXPIRED**). On login, users are forced to change their passwords (unless you specify **/FLAGS=DISFORCE\_PWD\_CHANGE**).

Note that the **/GENERATE\_PASSWORD** and **/PASSWORD** qualifiers are mutually exclusive.

**/INTERACTIVE[ =(range[,...])]**

**/NOINTERACTIVE**

Specifies the hours of access for interactive logins. For a description of the range specification, see the **/ACCESS** qualifier. By default, there are no access restrictions on interactive logins.

**/JTQUOTA=value**

Specifies the initial byte quota with which the jobwide logical name table is to be created. By default, the value is 4096 on VAX systems and 4096 on AXP systems.

**/LGICMD=filespec**

Specifies the name of the default login command file. The file name defaults to the device specified for **/DEVICE**, the directory specified for **/DIRECTORY**, a file name of **LOGIN**, and a file type of **.COM**. If you select the defaults for all these values, the file name is **SYS\$SYSTEM:[USER]LOGIN.COM**.

**/LOCAL[=(range[,...])]**

Specifies hours of access for interactive logins from local terminals. For a description of the range specification, see the **/ACCESS** qualifier. By default, there are no access restrictions on local logins.

**/MAXACCTJOBS=value**

Specifies the maximum number of batch, interactive, and detached processes that can be active at one time for all users of the same account. By default, a user has a maximum of 0, which represents an unlimited number.

**/MAXDETACH=value**

Specifies the maximum number of detached processes with the cited user name that can be active at one time. To prevent the user from creating detached processes, specify the keyword **NONE**. By default, a user has a value of 0, which represents an unlimited number.

**/MAXJOBS=value**

Specifies the maximum number of processes (interactive, batch, detached, and network) with the cited user name that can be active simultaneously. The first four network jobs are not counted. By default, a user has a maximum value of 0, which represents an unlimited number.

## AUTHORIZE ADD

### **/MODIFY\_IDENTIFIER (default)**

### **/NOMODIFY\_IDENTIFIER**

Specifies whether the identifier associated with the user is to be modified in the rights database. This qualifier applies only when you modify the UIC or user name in the UAF record. By default, the associated identifiers are modified.

### **/NETWORK[=(range[,...])]**

Specifies hours of access for network batch jobs. For a description of how to specify the range, see the /ACCESS qualifier. By default, there are no access restrictions on network logins.

### **/OWNER=owner-name**

Specifies the name of the owner of the account. You can use this name for billing purposes or similar applications. The owner name is 1 to 31 characters. There is no default owner name.

### **/PASSWORD=(password1[,password2])**

### **/NOPASSWORD**

Specifies up to two passwords for login. Passwords can be from 0 to 32 characters in length and can include alphanumeric characters, dollar signs, and underscores. Avoid using the word *password* as the actual password. Use the /PASSWORD qualifier as follows:

- To set only the first password and clear the second, specify /PASSWORD=password.
- To set both the first and second password, specify /PASSWORD=(password1, password2).
- To change the first password without affecting the second, specify /PASSWORD=(password, "").
- To change the second password without affecting the first, specify /PASSWORD=("", password).
- To set both passwords to null, specify /NOPASSWORD.

When you modify a password, the new password expires automatically; it is valid only once (unless you specify /NOPWDEXPIRED). On login, the user is forced to change the password (unless you specify /FLAGS=DISFORCE\_PWD\_CHANGE).

Note that the /GENERATE\_PASSWORD and /PASSWORD qualifiers are mutually exclusive.

By default, the ADD command assigns the password USER. When you create a new UAF record with the COPY or RENAME command, you must specify a password. Avoid using the word *password* as the actual password.

### **/PGFLQUOTA=value**

Specifies the paging file limit. This is the maximum number of pages that the person's process can use in the system paging file. By default, the value is 32768 pages on VAX systems and 50000 pagelets on AXP systems.

### **/PRCLM=value**

Specifies the subprocess creation limit. This is the maximum number of subprocesses that can exist at one time for the specified user's process. By default, the value is 2 on VAX systems and 8 on AXP systems.

**/PRIMEDAYS=(*[NO]*day[,...])**

Defines the primary and secondary days of the week for logging in. Specify the days as a list separated by commas, and enclose the list in parentheses. To specify a secondary day, prefix the day with NO (for example, NOFRIDAY). To specify a primary day, omit the NO prefix.

By default, primary days are Monday through Friday and secondary days are Saturday and Sunday. If you omit a day from the list, AUTHORIZE uses the default value. (For example, if you omit Monday from the list, AUTHORIZE defines Monday as a primary day.)

Use the primary and secondary day definitions in conjunction with such qualifiers as /ACCESS, /INTERACTIVE, and /BATCH.

**/PRIORITY=value**

Specifies the default base priority. The value is an integer in the range of 0 to 31. By default, the value is set to 4 for timesharing users.

**/PRIVILEGES=(*[NO]*privname[,...])**

Specifies which privileges the user is authorized to hold, although these privileges are not necessarily enabled at login. (The /DEFPRIVILEGES qualifier determines which ones are enabled.) A NO prefix removes the privilege from the user. The keyword NOALL disables all user privileges. There are many privileges available with varying degrees of power and potential system impact (see the *Security Guide* for a detailed discussion). By default, a user holds TMPMBX and NETMBX privileges.

**/PWDEXPIRED (default)**

**/NOPWDEXPIRED**

Specifies the password is valid for only one login. Users must change their passwords immediately after login or be locked out of the system. For a week prior to expiration, the system warns users of the upcoming password expiration. They can either specify a new password during the week with the DCL command SET PASSWORD or wait until expiration and be forced to change. By default, a user has to change a password when first logging in to an account.

**/PWDLIFETIME=time (default)**

**/NOPWDLIFETIME**

Specifies the length of time a password is valid. Specify a delta time value in the form [ddd-] [hh:mm:ss.cc]. For example, for a lifetime of 120 days, 0 hours, and 0 seconds, specify /PWDLIFETIME="120-". For a lifetime of 120 days 12 hours, 30 minutes and 30 seconds, specify /PWDLIFETIME="120-12:30:30". If a period longer than the specified time elapses before the user logs in, the system displays a warning message. The password is marked as expired.

To prevent a password from expiring, specify the time as NONE. By default, a password expires in 90 days.

**/PWDMINIMUM=value**

Specifies the minimum password length in characters. Note that this value is enforced only by the DCL command SET PASSWORD. It does not prevent you from entering a password shorter than the minimum length when you use AUTHORIZE to create or modify an account. By default, a password must have at least 6 characters. The value specified by the /PWDMINIMUM qualifier conflicts with the value used by the /GENERATE\_PASSWORD qualifier or the DCL command SET PASSWORD/GENERATE, the operating system chooses the lesser value. The maximum value for generated passwords is 10.

## **AUTHORIZE ADD**

### **/REMOTE[=(range[,...])]**

Specifies hours during which access is permitted for interactive logins from network remote terminals (with the DCL command SET HOST). For a description of the range specification, see the /ACCESS qualifier. By default, remote logins have no access restrictions.

### **/SHRFILLM=value**

Specifies the maximum number of shared files that the user can have open at one time. By default, the system assigns a value of 0, which represents an infinite number.

### **/TQELM**

Specifies the total number of entries in the timer queue plus the number of temporary common event flag clusters that the user can have at one time. By default, a user can have 10.

### **/UIC=value**

Specifies the user identification code (UIC). The UIC value is a group number in the range from 1 to 37776 (octal) and a member number in the range from 0 to 17776 (octal), which are separated by a comma and enclosed in brackets. Digital reserves group 1 and groups 300-377 for its own use.

Each user must have a unique UIC. By default, the UIC value is [200,200].

### **/WSDEFAULT=value**

Specifies the default working set size. This represents the initial limit to the number of physical pages the process can use. (The user can alter the default quantity up to WSQUOTA with the DCL command SET WORKING\_SET.) By default, a user has 256 pages on VAX systems and 2000 pagelets on AXP systems.

### **/WSEXTENT=value**

Specifies the working set maximum. This represents the maximum amount of physical memory allowed to the process. The system provides memory to a process beyond its working set quota only when it has excess free pages. The additional memory is recalled by the system if needed. The value is an integer equal to or greater than WSQUOTA. By default, the value is 1024 pages on VAX systems and 16384 pagelets on AXP systems.

### **/WSQUOTA=value**

Specifies the working set quota. This is the maximum amount of physical memory a user process can lock into its working set. It also represents the maximum amount of swap space that the system reserves for this process and the maximum amount of physical memory that the system allows the process to consume if the systemwide memory demand is significant.

## **Description**

When you do not specify a value for a field, AUTHORIZE uses values from the DEFAULT record (excluding the default password, which is always USER). The DEFAULT account serves as a template for creating user records in the system user authorization file.

**AXP**

On AXP systems, the DEFAULT account is as follows:

```

Username: DEFAULT Owner:
Account: UIC: [200,200] ([FIELD,USERP])
CLI: DCL Tables: DCLTABLES
Default: SYS$SYSDEVICE:[USER]
LGICMD: LOGIN
Flags: DisUser
Primary days: Mon Tue Wed Thu Fri
Secondary days: Sat Sun
No access restrictions
Expiration: (none) Pwdminimum: 6 Login Fails: 0
Pwdlifetime: 90 00:00 Pwdchange: (pre-expired)
Last Login: (none) (interactive), (none) (non-interactive)
Maxjobs: 0 Fillm: 100 Bytln: 64000
Maxacctjobs: 0 Shrfillm: 0 Pbytln: 0
Maxdetach: 0 BIoIm: 150 JtQuota: 4096
Prclm: 8 DIoIm: 150 WSdef: 2000
Prio: 4 ASTlm: 250 WSquo: 4000
Queprio: 0 TQElm: 10 WSextent: 16384
CPU: (none) Enqlm: 2000 Pgflquo: 50000
Authorized Privileges:
 TMPMBX NETMBX
Default Privileges:
 TMPMBX NETMBX ♦

```

**VAX**

On VAX systems, the DEFAULT account is as follows:

```

Username: DEFAULT Owner:
Account: UIC: [200,200] ([DEFAULT])
CLI: DCL Tables: DCLTABLES
Default: SYS$SYSDEVICE:[USER]
LGICMD: LOGIN
Flags: DisUser
Primary days: Mon Tue Wed Thu Fri
Secondary days: Sat Sun
No access restrictions
Expiration: (none) Pwdminimum: 6 Login Fails: 0
Pwdlifetime: 90 00:00 Pwdchange: (pre-expired)
Last Login: (none) (interactive), (none) (non-interactive)
Maxjobs: 0 Fillm: 300 Bytln: 32768
Maxacctjobs: 0 Shrfillm: 0 Pbytln: 0
Maxdetach: 0 BIoIm: 40 JtQuota: 4096
Prclm: 2 DIoIm: 40 WSdef: 256
Prio: 4 ASTlm: 40 WSquo: 512
Queprio: 0 TQElm: 10 WSextent: 1024
CPU: (none) Enqlm: 200 Pgflquo: 32768
Authorized Privileges:
 TMPMBX NETMBX
Default Privileges:
 TMPMBX NETMBX ♦

```

When you add a new account, specify values for fields that you want to be different. Typically, you do not need to change the default values for limits<sup>1</sup>, priority, privileges, or the command interpreter. As a result, you enter only the password, UIC, directory, owner, account, and device.

<sup>1</sup> Note that limits are also set by system parameters. To be effective, the limits you set through AUTHORIZE must be within the minimum limits determined by the corresponding system parameters (particularly those beginning with the PQL prefix).



## AUTHORIZE ADD

When you add a record to the UAF, create a directory for the new user. Specify the device name, directory name, and UIC in the UAF record. The following DCL command creates a directory for user ROBIN:

```
$ CREATE/DIRECTORY SYS$USER:[ROBIN] /OWNER_UIC=[ROBIN]
```

---

### Note

---

When you add a new record to the UAF and a rights database exists, an identifier with the user name is added to the rights database automatically (unless you specify the /NOADD\_IDENTIFIER qualifier). Similarly, when you specify an account name (other than the user name) that does not yet have an identifier, AUTHORIZE creates a group identifier in the rights database.

---

## Examples

1. UAF> ADD ROBIN /PASSWORD=SP0152/UIC=[014,006] -  
\_ /DEVICE=SYS\$USER/DIRECTORY=[ROBIN]/OWNER="JOSEPH ROBIN" /ACCOUNT=INV  
%UAF-I-ADDMSG, user record successfully added  
%UAF-I-RDBADDMSGU, identifier ROBIN value: [000014,000006] added to  
RIGHTSLIST.DAT  
%UAF-I-RDBADDMSGU, identifier INV value: [000014,177777] added to  
RIGHTSLIST.DAT

This example illustrates the typical ADD command and qualifiers. The record that results from this command appears in the description of the SHOW command.

2. UAF> ADD WELCH /PASSWORD=SP0158/UIC=[014,051] -  
\_ /DEVICE=SYS\$USER/DIRECTORY=[WELCH]/OWNER="ROB WELCH"/FLAGS=DISUSER -  
\_ /ACCOUNT=INV/LGICMD=SECUREIN  
%UAF-I-ADDMSG, user record successfully added  
%UAF-I-RDBADDMSGU, identifier WELCH value: [000014,000051] added to  
RIGHTSLIST.DAT  
UAF> MODIFY WELCH/FLAGS=(RESTRICTED,DISNEWMAIL,DISWELCOME,NODISUSER)-  
\_ /NODIALUP=SECONDARY/NETWORK=PRIMARY/CLITABLES=DCLTABLES -  
\_ /NOACCESS=(PRIMARY, 9-16, SECONDARY, 18-8)  
%UAF-I-MDFYMSG, user records updated

The commands in this example add a record for a restricted account. Because of the number of qualifiers required, a MODIFY command is used in conjunction with the ADD command. This helps to minimize the possibility of typing errors.

In the ADD command line, setting the DISUSER flag prevents the user from logging in until all the account parameters are set up. In the MODIFY command line, the DISUSER flag is disabled (by specifying NODISUSER) to allow access to the account.

The record that results from these commands and an explanation of the restrictions the record imposes appear in the description of the SHOW command.

---

## **ADD/IDENTIFIER**

Adds an identifier to the rights database.

### **Format**

ADD/IDENTIFIER [id-name]

### **Parameter**

#### **id-name**

Specifies the name of the identifier to be added to the rights database. If you omit the name, you must specify the /USER qualifier. The identifier name is a string of 1 to 31 alphanumeric characters. The name can contain underscores and dollar signs. It must contain at least one nonnumeric character.

### **Qualifiers**

#### **/ATTRIBUTES=(keyword[,...])**

Specifies attributes to be associated with the new identifier. The following are valid keywords:

|                |                                                                                                                                                                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DYNAMIC        | Allows unprivileged holders of the identifier to remove and to restore the identifier from the process rights list by using the DCL command SET RIGHTS_LIST.                                                                                                                             |
| †HOLDER_HIDDEN | Prevents people from getting a list of users who hold an identifier, unless they own the identifier themselves.                                                                                                                                                                          |
| †NAME_HIDDEN   | Allows holders of an identifier to have it translated, either from binary to ASCII or from ASCII to binary, but prevents unauthorized users from translating the identifier.                                                                                                             |
| †NO_ACCESS     | Makes any access rights of the identifier null and void. If a user is granted an identifier with the No Access attribute, that identifier has no effect on the user's access rights to objects. This attribute is a modifier for an identifier with the Resource or Subsystem attribute. |
| RESOURCE       | Allows holders of an identifier to charge disk space to the identifier. Used only for file objects.                                                                                                                                                                                      |
| †SUBSYSTEM     | Allows holders of the identifier to create and maintain protected subsystems by assigning the Subsystem ACE to the application images in the subsystem. Used only for file objects.                                                                                                      |

---

†VAX specific

By default, none of these attributes is associated with the new identifier.

#### **/USER=user-spec**

Scans the UAF record for the specified user and creates the corresponding identifier. Specify **user-spec** by user name or UIC. You can use the asterisk wildcard to specify multiple user names or UICs. Full use of the asterisk and percent wildcards is permitted for user names; UICs must be in the form [\*,\*],

## AUTHORIZE ADD/IDENTIFIER

[n,\*], [\* ,n], or [n,n]. A wildcard user name specification (\*) creates identifiers alphabetically by user name; a wildcard UIC specification ([\* ,\*]) creates them in numerical order by UIC.

### **/VALUE=value-specifier**

Specifies the value to be attached to the identifier. The following are valid formats for the *value-specifier*:

- IDENTIFIER:n** An integer value in the range of 65,536 to 268,435,455. You can also specify the value in hexadecimal (precede the value with %X) or octal (precede the value with %O).  
The system displays this type of identifier in hexadecimal. To differentiate general identifiers from UIC identifiers, the system adds %X80000000 to the value you specify.
- UIC:uic** A UIC value in standard UIC format consists of a member name and, optionally, a group name enclosed in brackets. For example, [GROUP1,JONES] or [360,031].  
In numeric UICs, the group number is an octal number in the range of 1 to 37776; the member number is an octal number in the range of 0 to 177776. You can omit leading zeros when you are specifying group and member numbers.  
Regardless of the UIC format you use, the system translates a UIC to a 32-bit numeric value.  
Alphanumeric UICs are not allowed.

Typically, system managers add identifiers as UIC values to represent system users; the system applies identifiers in integer format to system resources.

## Examples

1. UAF> ADD/IDENTIFIER/VALUE=UIC:[300,011] INVENTORY  
%UAF-I-RDBADMSGU, identifier INVENTORY value: [000300,000011] added to RIGHTSLLIST.DAT

The command in this example adds an identifier named INVENTORY to the rights database. By default, the identifier is not marked as a resource.

2. UAF> ADD/IDENTIFIER/ATTRIBUTES=(RESOURCE) -  
/VALUE=IDENTIFIER:%X80011 PAYROLL  
%UAF-I-RDBADMSGU, identifier PAYROLL value: %X80080011 added to RIGHTSLLIST.DAT

This command adds the identifier PAYROLL and marks it as a resource. To differentiate identifiers with integer values from identifiers with UIC values, %X80000000 is added to the specified code.

---

## **ADD/PROXY**

Adds an entry to the network proxy authorization file, NETPROXY.DAT, and signals DECnet to update its volatile database. Proxy additions take effect immediately on all nodes in a cluster that share the proxy database.

### **Format**

ADD/PROXY node::remote-user local-user[,...]

### **Parameters**

#### **node**

Specifies a DECnet node name of 1 to 6 alphanumeric characters. If you provide an asterisk (\*), the specified remote user on all nodes is served by the account defined as *local-user*.

#### **remote-user**

Specifies the user name of a user at a remote node. If you specify an asterisk, all users at the specified node are served by the local user.

For nonOpenVMS systems that implement DECnet Phase IV+, specifies the UIC of a user at a remote node. You can specify a wildcard asterisk in the group and member fields of the UIC.

#### **local-user**

Specifies the user names of 1 to 16 users on the local node. If you specify an asterisk, a local-user name equal to remote-user name will be used.

### **Positional Qualifier**

#### **/DEFAULT**

Establishes the specified user name as the default proxy account. The remote user can request proxy access to an authorized account other than the default proxy account by specifying the name of the proxy account in the access control string of the network operation.

### **Description**

The ADD/PROXY command adds an entry to the network proxy authorization file, NETPROXY.DAT, and signals DECnet to update its volatile database. Proxy additions take effect immediately on all nodes in a cluster that share the proxy database.

You can grant a remote user access to one default proxy account and up to 15 other local accounts. To access proxy accounts other than the default proxy account, remote users specify the requested account name in an access control string. To change the default proxy account, use the AUTHORIZE command MODIFY/PROXY.

Proxy login is an effective way to avoid specifying (and, possibly, revealing) passwords in command lines. However, you must use caution in granting access powers to remote users. While logged in to the local system, remote users can apply the full DCL command set (with the exception of SET HOST). A remote user receives the default privileges of the local user and, therefore, becomes the owner of the local user's files when executing any DCL commands.

## AUTHORIZE ADD/PROXY

To avoid potential security compromises, Digital recommends that you create proxy accounts on the local node that are less privileged than a user's normal account on the remote node. By adding an extension such as `_N`, you can identify the account as belonging to a remote user, while distinguishing it from a native account with the same name on the local node. For example, the following command creates a `JONES_N` proxy account on the local node that allows the user `JONES` to access the account from the remote node `SAMPLE`:

```
UAF> ADD/PROXY SAMPLE::JONES JONES N/DEFAULT
%UAF-I-NAFADDMMSG, record successfully added to NETPROXY.DAT
```

For more information on creating proxy accounts, see the *Security Guide*.

### Examples

1. 

```
UAF> ADD/PROXY SAMPLE::WALTER ROBIN/DEFAULT
%UAF-I-NAFADDMMSG, record successfully added to NETPROXY.DAT
```

Specifies that user `WALTER` on remote node `SAMPLE` has proxy access to user `ROBIN`'s account on local node `AXEL`. Through proxy login, `WALTER` receives the default privileges of user `ROBIN` when he accesses node `AXEL` remotely.

2. 

```
UAF> ADD/PROXY MISHA::* MARCO/DEFAULT, OSCAR
%UAF-I-NAFADDMMSG, record successfully added to NETPROXY.DAT
```

Specifies that any user on the remote node `MISHA` can, by default, use the `MARCO` account on the local node for DECnet tasks such as remote file access. Remote users can also access the `OSCAR` proxy account by specifying the user name `OSCAR` in the access control string.

3. 

```
UAF> ADD/PROXY MISHA::MARCO */DEFAULT
%UAF-I-NAFADDMMSG, record successfully added to NETPROXY.DAT
```

Specifies that user `MARCO` on the remote node `MISHA` can use only the `MARCO` account on the local node for remote file access.

---

## COPY

Creates a new `SYSUAF` record that duplicates an existing `UAF` record.

### Format

```
COPY oldusername newusername
```

### Parameters

**oldusername**

Name of an existing user record to serve as a template for the new record.

**newusername**

Name for the new user record. The user name is a string of 1 to 12 alphanumeric characters.

## Qualifiers

Excluding the /MODIFY\_IDENTIFIER qualifier, all the qualifiers listed under the ADD command apply to the COPY command.

## Description

The COPY command creates a new SYSUAF record that duplicates an existing SYSUAF record. The command requires the /PASSWORD qualifier. If you do not specify additional qualifiers to the COPY command, the fields in the record you create are the same as those in the record being copied.

---

### Note

---

AUTHORIZE now sets the salt value associated with a new user's account password to a random value whenever a new account is created. Prior to OpenVMS VAX Version 6.0, the COPY command did not always set the salt value for new accounts.

---

For example, you could add a record for a new user named Thomas Sparrow that is identical to that of Joseph Robin (but presumably different from the default record), as follows:

```
UAF> COPY ROBIN SPARROW /PASSWORD=SP0152
```

However, to add a record for Thomas Sparrow that differs from Joseph Robin's in the UIC, directory name, password, and owner, specify the following command:

```
UAF> COPY ROBIN SPARROW /UIC=[200,13]/DIRECTORY=[SPARROW] -
_/PASSWORD=THOMAS/OWNER="THOMAS SPARROW"
```

You can also use the COPY command to create a set of template records to meet the specific needs of various user groups. For example, if you have programmers, administrators, and data entry personnel working on the same system, you can create records such as PROGRAMMER, ADMINISTRATOR, and DATA\_ENTRY, each tailored to the needs of a particular group. To add an account for a new user in one of these groups, copy the appropriate template record and specify a new user name, password, UIC, directory, and owner.

If you omit the /PASSWORD qualifier when you create an account, AUTHORIZE displays the following error message:

```
%UAF-W-DEFPWD, copied or renamed records must receive new password
```

To specify a password for the account, use the MODIFY command with the /PASSWORD qualifier.

## Examples

1. UAF> COPY ROBIN SPARROW /PASSWORD=SP0152  
%UAF-I-COPMSG, user record copied  
%UAF-E-RDBADDERRU, unable to add SPARROW value: [000014,00006] to  
RIGHTSLIST.DAT -SYSTEM-F-DUPIDENT, duplicate identifier

The command in this example adds a record for Thomas Sparrow that is identical, except for the password, to that of Joseph Robin. Note that because there is no change in the UIC value, no identifier is added to RIGHTSLIST.DAT. AUTHORIZE issues a "duplicate identifier" error message.

## AUTHORIZE COPY

2. UAF> COPY ROBIN SPARROW /UIC=[200,13]/DIRECTORY=[SPARROW] -  
\_ /PASSWORD=THOMAS/OWNER="THOMAS SPARROW"  
%UAF-I-COPMSG, user record copied  
%UAF-I-RDBADDMMSGU, identifier SPARROW value: [000200,000013] added to  
RIGHTSLIST.DAT

The command in this example adds a record for Thomas Sparrow that is the same as Joseph Robin's except for the UIC, directory name, password, and owner. Note that you could use a similar command to copy a template record when adding a record for a new user in a particular user group.

---

## CREATE/PROXY

Creates and initializes the network proxy authorization file, NETPROXY.DAT.

### Format

CREATE/PROXY

### Parameters

None.

### Qualifiers

None.

### Description

NETPROXY.DAT is created with no records and is assigned the following protection:

(S:RWED,O:RWED,G,W)

If NETPROXY.DAT already exists, AUTHORIZE reports the following error message:

```
%UAF-W-NAFAEX, NETPROXY.DAT already exists
```

To create a new file, you must either delete or rename the old one.

### Example

```
UAF> CREATE/PROXY
UAF>
```

The command in this example creates and initializes the network proxy authorization file.

---

## **CREATE/RIGHTS**

Creates and initializes the rights database, RIGHTSLIST.DAT.

### **Format**

CREATE/RIGHTS

### **Parameters**

None.

### **Qualifiers**

None.

### **Description**

RIGHTSLIST.DAT is created with no records and is assigned the following protection:

(S:RWED,O:RWED,G:RWE,W:R) (AXP Only)

(S:RWED,O:RWED,G:R,W:) (VAX Only)

Note that the file is created only if the file does not already exist.

### **Example**

```
UAF> CREATE/RIGHTS
%UAF-E-RDBCREERR, unable to create RIGHTSLIST.DAT
-RMS-E-FEX, file already exists, not superseded
```

You can use the command in this example to create and initialize a new rights database. Note, however, that RIGHTSLIST.DAT is created automatically during the installation process. Thus, you must delete or rename the existing file before creating a new one. For more information on rights database management, refer to the *Security Guide*.

---

## **DEFAULT**

Modifies the SYSUAF's DEFAULT record.

### **Format**

DEFAULT

### **Parameters**

None.



# AUTHORIZE DEFAULT

## Qualifiers

See the qualifiers listed under the ADD command.

## Description

Modify the DEFAULT record when qualifiers normally assigned to a new user differ from the Digital-supplied values. The following qualifiers most often need modification:

- /CLI—If the command interpreter is MCR.
- /DEVICE—If most users have the same default device.
- /LGICMD—When automation of initial housekeeping chores at login time is desired through a specific login command file. The system automates the execution of login command file in the following way:

First the system checks whether the logical name SYS\$SYLOGIN has been defined. If it has, the name is translated (in most cases to SYLOGIN.COM), and the named command file is executed. (This command file can call other login command files.) However, when it completes, the system makes another check. If the user's LGICMD field in the UAF specifies a command file, that file is executed. If LGICMD is blank, the user's file LOGIN.COM is executed automatically if the command interpreter is DCL. (In this case, all users must name their login command files LOGIN.COM.) If the command interpreter is MCR, the user's file LOGIN.COM is executed automatically.

Thus, the login protocol generally consists of a systemwide login command file followed by a user-specific login command file.

- /PRIVILEGES—When users are given different privileges than those supplied by Digital.
- Quota qualifiers—When the default quotas are insufficient or inappropriate for mainstream work.

## Example

```
UAF> DEFAULT /DEVICE=SYS$USER/LGICMD=SYS$MANAGER:SECURELGN -
UAF> /PRIVILEGES=(TMPMBX,GRPNAM,GROUP)
%UAF-I-MDFYMSG, user record(s) updated
```

The command in this example modifies the DEFAULT record, changing the default device, default login command file, and default privileges.

---

## EXIT

Enables you to exit from AUTHORIZE and return to DCL command level. You can also return to command level by pressing Ctrl/Z.

## Format

EXIT

**Parameters**

None.

**Qualifiers**

None.

**GRANT/IDENTIFIER**

Assigns the specified identifier to the user and documents the user as a holder of the identifier in the rights database.

**Format**

GRANT/IDENTIFIER id-name user-spec

**Parameters**

**id-name**

Specifies the identifier name. The identifier name is a string of 1 to 31 alphanumeric characters that can contain underscores and dollar signs. The name must contain at least one nonnumeric character.

**user-spec**

Specifies the UIC identifier that uniquely identifies the user on the system. This type of identifier appears in alphanumeric format. For example: [GROUP1,JONES].

**Qualifier**

**/ATTRIBUTES=(keyword[,...])**

Specifies attributes to be associated with the identifier. The following are valid keywords:

|                |                                                                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DYNAMIC        | Allows unprivileged holders of the identifier to remove and to restore the identifier from the process rights list by using the DCL command SET RIGHTS_LIST.                 |
| †HOLDER_HIDDEN | Prevents people from getting a list of users who hold an identifier, unless they own the identifier themselves.                                                              |
| †NAME_HIDDEN   | Allows holders of an identifier to have it translated, either from binary to ASCII or from ASCII to binary, but prevents unauthorized users from translating the identifier. |

†VAX specific

# AUTHORIZE GRANT/IDENTIFIER

|            |                                                                                                                                                                                                                                                                                          |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| †NO_ACCESS | Makes any access rights of the identifier null and void. If a user is granted an identifier with the No Access attribute, that identifier has no effect on the user's access rights to objects. This attribute is a modifier for an identifier with the Resource or Subsystem attribute. |
| RESOURCE   | Allows holders of an identifier to charge disk space to the identifier. Used only for file objects.                                                                                                                                                                                      |
| †SUBSYSTEM | Allows holders of the identifier to create and maintain protected subsystems by assigning the Subsystem ACE to the application images in the subsystem. Used only for file objects.                                                                                                      |

---

†VAX specific

To remove an attribute from the identifier, add a NO prefix to the attribute keyword. For example, to remove the Resource attribute, specify /ATTRIBUTES=NORESOURCE.

## Example

```
UAF> GRANT/IDENTIFIER INVENTORY [300,015]
%UAF-I-GRANTMSG, identifier INVENTORY granted to CRAMER
```

The command in this example grants the identifier INVENTORY to a user with the UIC [300,015]. The user Cramer becomes the holder of the identifier and any resources associated with it. The following command produces the same result:

```
UAF> GRANT/IDENTIFIER INVENTORY CRAMER
```

---

## HELP

Displays information concerning the use of AUTHORIZE, including formats and explanations of commands, parameters, and qualifiers.

## Format

```
HELP [keyword[,...]]
```

## Parameter

**keyword[,...]**

Specifies one or more keywords that refer to the topic, command, qualifier, or parameter on which you want information from the AUTHORIZE HELP command.

## Qualifiers

None.

## Description

If you do not specify a keyword, HELP displays information on the topics and commands for which help is available. It then prompts you with "Topic?". You can supply a topic or a command name, or press Return. When you specify a command name and qualifiers, you get detailed information about that command. If you respond by pressing Return, you exit from help. You can also exit from help by pressing Ctrl/Z.

If the command you request accepts qualifiers, the display of the help information on the command is followed by the prompt "Subtopic?". Respond to this prompt with a qualifier name, or press Return. If you respond by pressing Return, HELP prompts with "Topic?". If you want to exit from help directly from this level, press Ctrl/Z.

## Examples

1. UAF> HELP ADD

The HELP command in this example displays information about the ADD command:

ADD

Adds a user record to the SYSUAF and corresponding identifiers to the rights database.

Format

ADD newusername

Additional information available:

| Parameter          | Qualifiers                                        |
|--------------------|---------------------------------------------------|
| /ACCESS            | /ACCOUNT /ADD_IDENTIFIER /ALGORITHM /ASTLM /BATCH |
| /BIOLM             | /BYTLM /CLI /CLITABLES /CPUTIME /DEFPRIVILEGES    |
| /DEVICE            | /DIALUP /DIOLM /DIRECTORY /ENQLM /EXPIRATION      |
| /FILLM             | /FLAGS /GENERATE_PASSWORD /INTERACTIVE /JTQUOTA   |
| /LGICMD            | /LOCAL /MAXACCTJOBS /MAXDETACH /MAXJOBS           |
| /MODIFY_IDENTIFIER | /NETWORK /OWNER /PASSWORD /PGFLQUOTA /PRCLM       |
| /PRIMEDAYS         | /PRIORITY /PRIVILEGES /PWDEXPIRED                 |
| /PWDLIFETIME       | /PDMINIMUM /REMOTE /SHRFILLM /TQELM               |
| /UIC               | /WSDEFAULT /WSEXTENT /WSQUOTA                     |
| Examples           | /IDENTIFIER /PROXY                                |

ADD Subtopic?

2. UAF> HELP MODIFY/WSDEFAULT

The command in this example displays information about the /WSDEFAULT qualifier:

MODIFY

/WSDEFAULT=value

Specifies the default working set size. This represents the initial limit to the number of physical pages the process can use. (The user can alter the default quantity up to WSQUOTA with the DCL command SET WORKING\_SET.) The minimum value is 50 pages (on VAX systems) and 150 pagelets (on AXP systems). By default, a user has 150 pages (on VAX systems) and 150 pagelets (on AXP systems).

# AUTHORIZE LIST

---

## LIST

Writes reports for selected UAF records to a listing file, SYSUAF.LIS.

## Format

LIST [user-spec]

## Parameter

### user-spec

Specifies the user name or UIC of the requested UAF record. Without the user-spec parameter, AUTHORIZE lists the user records of all users. The asterisk and percent sign wildcards are permitted in the user name.

## Qualifiers

### /BRIEF

Specifies that a brief report be written to SYSUAF.LIS. The /BRIEF qualifier is the default qualifier.

### /FULL

Specifies that a full report be written to SYSUAF.LIS, including identifiers held by the user.

## Description

The LIST command creates a listing file of reports for selected UAF records. Print the listing file, SYSUAF.LIS, with the DCL command PRINT.

Specification of a user name results in a single-user report. Specification of the asterisk wildcard character following the LIST command results in reports for all users in ascending sequence by user name. Specification of a UIC results in reports for all users with that UIC. (Digital recommends that you assign each user a unique UIC, but if users share a UIC, the report will show all users with that UIC.) You can use the asterisk wildcard character to specify the UIC.

Table 5-2 shows how to specify a UIC with the LIST command and use the asterisk wildcard character with the UIC specification to produce various types of reports.

**Table 5-2 UIC Specification with the LIST Command**

| Command            | Description                                                                             |
|--------------------|-----------------------------------------------------------------------------------------|
| LIST [14,6]        | Lists a full report for the user (or users) with member number 6 in group 14.           |
| LIST [14,*] /BRIEF | Lists a brief report for all users in group 14, in ascending sequence by member number. |
| LIST [*,6] /BRIEF  | Lists a brief report for all users with a member number of 6.                           |

(continued on next page)

**Table 5-2 (Cont.) UIC Specification with the LIST Command**

| Command           | Description                                                       |
|-------------------|-------------------------------------------------------------------|
| LIST [*,*] /BRIEF | Lists a brief report for all users, in ascending sequence by UIC. |

Although you must provide separate UICs for each user, the LIST command reports users with the same UIC in the order in which they were added to the SYSUAF. Full reports list the details of the limits, privileges, login flags, and command interpreter. Brief reports do not include the limits, login flags, or command interpreter, nor do they summarize the privileges. AUTHORIZE never displays the password for an account.

See the SHOW command for examples of brief and full reports.

## Examples

1. UAF> LIST ROBIN/FULL  
%UAF-I-LSTMSG1, writing listing file  
%UAF-I-LSTMSG2, listing file SYSUAF.LIS complete

This command lists a full report for the user record ROBIN.

2. UAF> LIST \*  
%UAF-I-LSTMSG1, writing listing file  
%UAF-I-LSTMSG2, listing file SYSUAF.LIS complete

This command results in brief reports for all users in ascending sequence by user name. Note, however, that this is the same result you would produce had you omitted the asterisk wildcard.

3. UAF> LIST [300.\*]  
%UAF-I-LSTMSG1, writing listing file  
%UAF-I-LSTMSG2, listing file SYSUAF.LIS complete

This command lists a brief report for all user records with a group UIC of 300.

---

## LIST/IDENTIFIER

Creates a listing file (RIGHTSLIST.LIS) in which identifier names, attributes, values, and holders are written.

### Format

LIST/IDENTIFIER [id-name]

### Parameter

#### id-name

Specifies an identifier name. You can specify the asterisk wildcard character (\*) to list all identifiers. If you omit the identifier name, you must specify /USER or /VALUE.

# AUTHORIZE LIST/IDENTIFIER

## Qualifiers

### **/BRIEF**

Specifies a brief listing in which only the identifier name, value and attributes appear.

### **/FULL**

Specifies a full listing, in which the names of the identifier's holders are displayed along with the identifier's name, value, and attributes. The /FULL qualifier specifies the default listing format.

### **/USER=user-spec**

Specifies one or more users whose identifiers are to be listed. **User-spec** can be a user name or UIC. You can use the asterisk wildcard to specify multiple user names or UICs. UICs must be in the form [\*,\*], [n,\*], [\*,n], or [n,n]. A wildcard user name specification (\*) lists identifiers alphabetically by user name; a wildcard UIC specification ([\*,\*]) lists them numerically by UIC.

### **/VALUE=value-specifier**

Specifies the value of the identifier to be listed. The following are valid formats for the value-specifier:

|              |                                                                                                                                                                                                                                                                                  |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IDENTIFIER:n | An integer value in the range 65,536 to 268,435,455. You can also specify the value in hexadecimal (precede the value with %X) or octal (precede the value with %O).<br>To differentiate general identifiers from UIC identifiers, %X80000000 is added to the value you specify. |
| UIC:uic      | A UIC value in the standard UIC format.                                                                                                                                                                                                                                          |

## Description

The LIST/IDENTIFIER command creates a listing file in which identifier names, attributes, values, and holders are displayed in various formats depending on the qualifiers specified. Two of these formats are illustrated in the description of the SHOW/IDENTIFIER command.

Print the listing file named RIGHTSLIST.LIS with the DCL command PRINT.

## Examples

1. UAF> LIST/IDENTIFIER INVENTORY  
%UAF-I-LSTMSG1, writing listing file  
%UAF-I-RLSTMSG, listing file RIGHTSLIST.LIS complete

The command in this example generates a full listing for the identifier INVENTORY, including its value (in hexadecimal), holders, and attributes.

2. UAF> LIST/IDENTIFIER/USER=ANDERSON  
%UAF-I-LSTMSG1, writing listing file  
%UAF-I-RLSTMSG, listing file RIGHTSLIST.LIS complete

This command lists an identifier associated with the user ANDERSON, along with its value and attributes. Note, however, that this is the same result you would produce had you specified ANDERSON's UIC with the following forms of the command:

```
UAF> LIST/IDENTIFIER/USER=[300,015]
UAF> LIST/IDENTIFIER/VALUE=UIC:[300,015]
```

---

## **LIST/PROXY**

Creates a listing file of the network proxy database entries.

### **Format**

LIST/PROXY

### **Parameters**

None.

### **Qualifiers**

None.

### **Description**

Use the DCL command PRINT to print the listing file, NETPROXY.LIS. The output assumes the same format as that of the SHOW/PROXY command. For an example of the output format, see the description of the SHOW/PROXY command.

### **Example**

```
UAF> LIST/PROXY
%UAF-I-LSTMSG1, writing listing file
%UAF-I-NETLSTMSG, listing file NETPROXY.LIS complete
```

The command in this example creates a listing file of all the entries in the network proxy database.

---

## **LIST/RIGHTS**

Lists identifiers held by the specified identifier or, if /USER is specified, all identifiers held by the specified users.

### **Format**

LIST/RIGHTS [id-name]

### **Parameter**

#### **id-name**

Specifies the name of the identifier associated with the user. If you omit the identifier name, you must specify the /USER qualifier.



## AUTHORIZE LIST/RIGHTS

### Qualifier

#### **/USER=user-spec**

Specifies a user whose identifiers are to be listed. **User-spec** can be a user name or UIC. You can use the asterisk wildcard to specify multiple UICs or all user names. UICs must be in the form [\*,\*], [n,\*], [\*,n], or [n,n]. A wildcard user name specification (\*) or wildcard UIC specification ([\*,\*]) lists all identifiers held by users. The wildcard user name specification lists holders' user names alphabetically; the wildcard UIC specification lists them in the numerical order of their UICs.

### Description

Use the DCL command PRINT to print the listing file (RIGHTSLIST.LIS) produced by the LIST/RIGHTS command. For an example of the output format, see the description of the SHOW/RIGHTS command.

### Example

```
UAF> LIST/RIGHTS PAYROLL
%UAF-I-LSTMSG1, writing listing file
%UAF-I-RLSTMSG, listing file RIGHTSLIST.LIS complete
```

The command in this example lists identifiers held by PAYROLL, providing PAYROLL is the name of a UIC format identifier.

---

## MODIFY

Changes values in a SYSUAF user record. Qualifiers not specified in the command remain unchanged.

### Format

```
MODIFY username /qualifier[,...]
```

### Parameter

#### **username**

Specifies the name of a user in the SYSUAF. The asterisk and percent sign wild card characters are permitted in the user name. When you specify a single asterisk for the user name, you modify the records of all users.

### Qualifiers

See the qualifiers listed under the ADD command.

### Description

The MODIFY command changes values in a SYSUAF user record. Most values not in the command remain unchanged. If the UIC is changed, the value of the corresponding identifier is also changed.

Modifications to the user record are not retroactive; thus, any changes to quota values apply to the next process that is created but not to the current one.

## Examples

1. UAF> MODIFY ROBIN /PASSWORD=SP0172  
%UAF-I-MDFYMSG, user record(s) updated

The command in this example changes the password for user ROBIN without altering any other values in the record.

2. UAF> MODIFY ROBIN/FLAGS=RESTRICTED  
%UAF-I-MDFYMSG, user record(s) updated

The command in this example modifies the UAF record for user ROBIN by adding the login flag RESTRICTED.

---

## MODIFY/IDENTIFIER

Modifies an identifier name, its associated value, or its attributes in the rights database.

### Format

MODIFY/IDENTIFIER id-name

### Parameter

#### id-name

Specifies the name of an identifier to be modified.

### Qualifiers

#### /ATTRIBUTES=(keyword[,...])

Specifies attributes to be associated with the modified identifier. The following are valid keywords:

#### DYNAMIC

Allows unprivileged holders of the identifier to remove and to restore the identifier from the process rights list by using the DCL command SET RIGHTS\_LIST.

#### †HOLDER\_HIDDEN

Prevents people from getting a list of users who hold an identifier, unless they own the identifier themselves.

#### †NAME\_HIDDEN

Allows holders of an identifier to have it translated, either from binary to ASCII or from ASCII to binary, but prevents unauthorized users from translating the identifier.

#### †NO\_ACCESS

Makes any access rights of the identifier null and void. If a user is granted an identifier with the No Access attribute, that identifier has no effect on the user's access rights to objects. This attribute is a modifier for an identifier with the Resource or Subsystem attribute.

---

†VAX specific

## AUTHORIZE MODIFY/IDENTIFIER

|            |                                                                                                                                                                                     |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RESOURCE   | Allows holders of an identifier to charge disk space to the identifier. Used only for file objects.                                                                                 |
| †SUBSYSTEM | Allows holders of the identifier to create and maintain protected subsystems by assigning the Subsystem ACE to the application images in the subsystem. Used only for file objects. |

---

†VAX specific

To remove an attribute from the identifier, add a NO prefix to the attribute keyword. For example, to remove the Resource attribute, specify /ATTRIBUTES=NORESOURCE.

---

### Note

---

If you specify the NORESOURCE keyword and do not name any holder (that is, if you do not use the /HOLDER qualifier), all holders lose the right to charge resources.

---

#### **/HOLDER=username**

Specifies the holder of an identifier whose attributes are to be modified. The /HOLDER qualifier is used only in conjunction with the /ATTRIBUTES qualifier.

If you specify /HOLDER, the /NAME and /VALUE qualifiers are ignored.

#### **/NAME=new-id-name**

Specifies a new identifier name to be associated with the identifier.

#### **/VALUE=value-specifier**

Specifies a new identifier value. Note that an identifier value cannot be modified from a UIC to a non-UIC format or vice versa. The following are valid formats for the value-specifier:

IDENTIFIER:n                   An integer value in the range of 65,536 to 268,435,455. You can also specify the value in hexadecimal (precede the value with %X) or octal (precede the value with %O).

To differentiate general identifiers from UIC identifiers, %X80000000 is added to the value you specify.

UIC:uic                         A UIC value in the standard UIC format.

## Description

The MODIFY/IDENTIFIER command changes identifier names, associated values, and attributes in the rights database. Values not specified in the command remain unchanged.

## Examples

1. UAF> MODIFY/IDENTIFIER OLD\_ID /NAME=NEW\_ID  
%UAF-I-RDBMDFYMSG, identifier OLD\_ID modified

The command in this example changes the name of the OLD\_ID identifier to NEW\_ID.

## AUTHORIZE MODIFY/IDENTIFIER

2. UAF> MODIFY/IDENTIFIER/VALUE=UIC:[300,21] ACCOUNTING  
%UAF-I-RDBMDFYMSG, identifier ACCOUNTING modified

The command in this example changes the old UIC value of the identifier ACCOUNTING to a new value.

3. UAF> MODIFY/IDENTIFIER/ATTRIBUTES=NORESOURCE-  
UAF> /HOLDER=CRAMER ACCOUNTING  
%UAF-I-RDBMDFYMSG, identifier ACCOUNTING modified

The command in this example associates the attribute NORESOURCE with the identifier ACCOUNTING in CRAMER's holder record. The identifier ACCOUNTING is not changed.

---

## MODIFY/PROXY

Modifies an entry in the network proxy authorization file (NETPROXY.DAT) to specify a different local account as the default proxy account for the remote user or to specify that there is no default proxy account for the remote user.

### Format

```
MODIFY/PROXY node::remote-user
```

### Parameters

#### node

Specifies a node name (1 to 6 alphanumeric characters). If you specify an asterisk, the specified remote user on all nodes is served by the local user.

#### remote-user

Specifies the user name of a user at a remote node. If you specify an asterisk, all users at the specified node are served by the local user.

For nonOpenVMS systems that implement DECnet Phase IV+, specifies the UIC of a user at a remote node. You can specify a wildcard asterisk in the group and member fields of the UIC.

### Qualifier

```
/DEFAULT[=local-user]
```

```
/NODEFAULT
```

Designates the default user name on the local node through which proxy access from the remote user is directed. If /NODEFAULT is specified, removes the default designation.

### Description

Use the MODIFY/PROXY command to specify a different local account as the default proxy account for the remote user or to specify that there is no default proxy account for the remote user. Whenever you modify user entries, AUTHORIZE signals DECnet to update its volatile database. Proxy modifications take effect immediately on all nodes in a cluster that share the proxy database.

## AUTHORIZE MODIFY/PROXY

The first command in the following example grants remote user STIR::YETTA proxy access to the PROXY1 and PROXY2 local accounts. The default proxy account is PROXY1. The second command is used to change the default proxy account to PROXY2.

```
UAF> ADD/PROXY STIR::YETTA PROXY1/DEFAULT, PROXY2
.
.
.
UAF> MODIFY/PROXY STIR::YETTA /DEFAULT=PROXY2
```

The next example shows the command used to remove the default proxy designation.

```
UAF> MODIFY/PROXY STIR::YETTA /NODEFAULT
```

If you remove the default proxy designation as shown in the last command, remote user STIR::YETTA must include the name of the proxy account (PROXY1 or PROXY2) in the access control string of each network operation to gain proxy access to the local system.

If no default proxy account is specified either in the network proxy database or in the access control string of the DCL command, the system attempts to perform the network operation using the default DECnet account.

### Example

```
UAF> MODIFY/PROXY MISHA::MARCO /DEFAULT=JOHNSON
%UAF-I-NAFADMSG, record successfully modified in NETPROXY.DAT
```

The command in this example changes the default proxy account for user MARCO on the remote node MISHA to the JOHNSON account.

---

## MODIFY/SYSTEM\_PASSWORD

Changes the system password in the same manner as the DCL command SET PASSWORD/SYSTEM.

### Format

```
MODIFY/SYSTEM_PASSWORD=system-password
```

### Parameter

**system-password**  
Specifies the new system password.

### Qualifiers

None.

### Description

For a detailed description of the effects of this command, refer to the discussion of the SET PASSWORD/SYSTEM command in the *Security Guide*.

## Example

```
UAF> MODIFY/SYSTEM_PASSWORD=ABRACADABRA
UAF>
```

This command changes the system password to ABRACADABRA.

---

## REMOVE

Deletes a SYSUAF user record and corresponding identifiers in the rights database. The DEFAULT and SYSTEM records cannot be deleted.

### Format

```
REMOVE username
```

### Parameter

**username**

Specifies the name of a user in the SYSUAF.

### Qualifier

**/REMOVE\_IDENTIFIER (default)**

**/NOREMOVE\_IDENTIFIER**

Specifies whether the user name and account name identifiers should be removed from the rights database when a record is removed from the UAF. If there are two UAF records with the same UIC, the user name identifier is removed only when the second record is deleted. Similarly, the account name identifier is removed only if there are no remaining UAF records with the same group as the deleted record.

### Description

If you remove a SYSUAF record for a user who also appears as a local user in the network user authorization file (NETPROXY.DAT), every network authorization record for that user is also removed.

## Example

```
UAF> REMOVE ROBIN
%UAF-I-REMSG, record removed from SYSUAF.DAT
%UAF-I-RDBREMSGU, identifier ROBIN value: [000014,000006] removed from
RIGHTSLIST.DAT
```

The command in this example deletes the record for user ROBIN from the SYSUAF and ROBIN's UIC identifier from RIGHTSLIST.DAT.

## AUTHORIZE REMOVE/IDENTIFIER

---

### REMOVE/IDENTIFIER

Removes an identifier from the rights database.

#### Format

```
REMOVE/IDENTIFIER id-name
```

#### Parameter

**id-name**

Specifies the name of an identifier in the rights database.

#### Qualifiers

None.

#### Example

```
UAF> REMOVE/IDENTIFIER Q1SALES
%UAF-I-RDBREMSGU, identifier Q1SALES value %X80010024 removed from
RIGHTSLIST.DAT
```

The command in this example removes the identifier Q1SALES from the rights database. All of its holder records are removed with it.

---

### REMOVE/PROXY

Deletes network proxy access for the specified remote user.

#### Format

```
REMOVE/PROXY node::remote-user [local-user,...]
```

#### Parameters

**node**

Specifies the name of a network node in the network proxy authorization file.

**remote-user**

Specifies the user name or UIC of a user on a remote node. The asterisk wildcard character is permitted in the remote-user specification.

**local-user**

Specifies the user name of from 1 to 16 users on the local node. If no local user is specified, proxy access to all local accounts is removed.

#### Qualifiers

None.

## Example

```
UAF> REMOVE/PROXY MISHA::MARCO
%UAF-I-NAFDONEMSG, record removed from NETPROXY.DAT
```

The command in this example deletes the record for MISHA::MARCO from the network proxy authorization file, removing all proxy access to the local node for user MARCO on node MISHA.

---

## RENAME

Changes the user name of the SYSUAF record (and, if specified, the corresponding identifier) while retaining the characteristics of the old record.

### Format

```
RENAME oldusername newusername
```

### Parameters

**oldusername**

Specifies the current user name in the SYSUAF.

**newusername**

Specifies the new name for the user. It can contain 1 to 12 alphanumeric characters and underscores. Although dollar signs are permitted, they are usually reserved for system names.

### Qualifiers

**/GENERATE\_PASSWORD[=keyword]**

**/NOGENERATE\_PASSWORD (default)**

Invokes the password generator to create user passwords. Generated passwords can consist of 1 to 10 characters. Specify one of the following keywords:

|                  |                                                                                                                                      |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>BOTH</b>      | Generate primary and secondary passwords.                                                                                            |
| <b>CURRENT</b>   | Do whatever the DEFAULT account does (for example, generate primary, secondary, both, or no passwords). This is the default keyword. |
| <b>PRIMARY</b>   | Generate primary password only.                                                                                                      |
| <b>SECONDARY</b> | Generate secondary password only.                                                                                                    |

When you modify a password, the new password expires automatically; it is valid only once (unless you specify /NOPWDEXPIRED). On login, users are forced to change their passwords (unless you specify /FLAGS=DISFORCE\_PWD\_CHANGE).

Note that the /GENERATE\_PASSWORD and /PASSWORD qualifiers are mutually exclusive.

**/MODIFY\_IDENTIFIER (default)**

**/NOMODIFY\_IDENTIFIER**

Specifies whether the identifier associated with the user is to be modified in the rights database. This qualifier applies only when you modify the UIC or user name in the UAF record. By default, the associated identifiers are modified.



## AUTHORIZE RENAME

**/PASSWORD=(password1[,password2])  
/NOPASSWORD**

Specifies up to two passwords for login. Passwords can be from 0 to 32 characters in length and can include alphanumeric characters, dollar signs, and underscores. Avoid using the word *password* as the actual password. Use the /PASSWORD qualifier as follows:

- To set only the first password and clear the second, specify /PASSWORD=password.
- To set both the first and second password, specify /PASSWORD=(password1, password2).
- To change the first password without affecting the second, specify /PASSWORD=(password, "").
- To change the second password without affecting the first, specify /PASSWORD=("", password).
- To set both passwords to null, specify /NOPASSWORD.

When you modify a password, the new password expires automatically; it is valid only once (unless you specify /NOPWDEXPIRED). On login, the user is forced to change the password (unless you specify /FLAGS=DISFORCE\_PWD\_CHANGE).

Note that the /GENERATE\_PASSWORD and /PASSWORD qualifiers are mutually exclusive.

When you create a new UAF record with the RENAME command, you must specify a password.

### Description

The RENAME command renames a SYSUAF record. It changes the user name of the SYSUAF record (and, if specified, the corresponding identifier) while retaining the characteristics of the old record. Retention of these characteristics can be particularly helpful when a user's name changes.

Note that because password verification includes the user name as well as the password, an attempted login will fail when the user whose name has been changed attempts to log in with an old password. (Only null passwords can be effectively transferred from one user record to another by the RENAME command.) Make it a practice to include a new password when you use the RENAME command, and notify the user of the change. If you omit the /PASSWORD qualifier, you receive a warning message reminding you that the old password must be changed.

The user's network authorization records are automatically changed to the new name.

### Examples

1. UAF> RENAME HAWKES KRAMERDOVE/PASSWORD=MARANNKRA  
%UAF-I-PRACREN, proxies to HAWKES renamed  
%UAF-I-RENSMSG, user record renamed  
%UAF-I-RDBMDFYMSG, identifier HAWKES modified

The command in this example changes the name of the account Hawkes to Kramerdove, modifies the user name identifier for the account, and renames all proxies to the account.

```
2. UAF> RENAME HAWKES KRAMERDOVE
 %UAF-I-PRACREN, proxies to HAWKES renamed
 %UAF-I-RENMSG, user record renamed
 %UAF-W-DEFPWD, Warning: copied or renamed records must receive
 new password
 %UAF-I-RDBMDFYMSG, identifier HAWKES modified
```

This example shows the warning message that the system displays if you fail to specify a new password with the RENAME command.

---

## RENAME/IDENTIFIER

Renames an identifier in the rights database.

### Format

RENAME/IDENTIFIER current-id-name new-id-name

### Parameters

**current-id-name**

Specifies the name of an identifier to be renamed.

**new-id-name**

Specifies the new name for the identifier.

### Qualifiers

None.

### Description

The RENAME/IDENTIFIER command is functionally equivalent to the following AUTHORIZE command:

```
MODIFY/IDENTIFIER/NAME=new-id-name current-id-name
```

### Example

```
UAF> RENAME/IDENTIFIER Q1SALES Q2SALES
%UAF-I-RDBMDFYMSG, identifier Q1SALES modified
```

The command in this example renames the identifier Q1SALES to Q2SALES.

---

## REVOKE/IDENTIFIER

Takes an identifier away from a user.

### Format

REVOKE/IDENTIFIER id-name user-spec

# AUTHORIZE REVOKE/IDENTIFIER

## Parameters

### **id-name**

Specifies the identifier name. The identifier name is a string of 1 to 31 alphanumeric characters. The name can contain underscores and dollar signs. It must contain at least one nonnumeric character.

### **user-spec**

Specifies the UIC identifier that uniquely identifies the user on the system. This type of identifier appears in alphanumeric format, not numeric format; for example, [GROUP1,JONES].

## Description

The REVOKE/IDENTIFIER command edits RIGHTSLLIST.DAT, removing the user's name from the list of those who hold a given identifier. The change does not affect the process rights list of any current processes.

## Example

```
UAF> REVOKE/IDENTIFIER INVENTORY CRAMER
%UAF-I-REVOKEMSG, identifier INVENTORY revoked from CRAMER
```

The command in this example revokes the identifier INVENTORY from the user Cramer. Cramer loses the identifier and any resources associated with it.

Note that because rights identifiers are stored in numeric format, it is not necessary to change records for users holding a renamed identifier.

---

## SHOW

Displays reports for selected UAF records on the current SYS\$OUTPUT device.

## Format

```
SHOW user-spec
```

## Parameter

### **user-spec**

Specifies the user name or UIC of the requested UAF record. If you omit the user-spec parameter, the UAF records of all users are listed. The asterisk (\*) and percent sign (%) wildcard characters are permitted in the user name.

## Qualifiers

### **/BRIEF**

Specifies that a brief report be displayed. In the report, the Directory field displays one of the following items:

- Disuser—The account has been disabled.
- Expired—The account has expired.
- A device and directory name—The login device and directory for the account (for example, DOCD\$:[SMITH]).

If you omit the /BRIEF qualifier, AUTHORIZE displays a full report.

**/FULL**

Specifies that a full report be displayed, including identifiers held by the user. Full reports include the details of the limits, privileges, login flags, and the command interpreter as well as the identifiers held by the user. The password is not listed.

**Description**

The SHOW command produces reports on user authorization records. You can select the reports to be displayed, as follows:

- To display a single-user report, specify a user name.
- To display reports for all users in ascending sequence by user name, specify an asterisk ( \* ) wildcard character.
- To display reports for all users with a common UIC, specify the UIC. Users with the same UIC are listed in the order in which they were added to the SYSUAF.

You can also use the asterisk wildcard character to specify all or part of the UIC, as shown in the following examples:

| Command            | Description                                                                                |
|--------------------|--------------------------------------------------------------------------------------------|
| SHOW [14,*] /BRIEF | Displays a brief report for all users in group 14, in ascending sequence by member number. |
| SHOW [* ,6] /BRIEF | Displays a brief report for all users with a member number of 6.                           |
| SHOW [* ,*] /BRIEF | Displays a brief report for all users, in ascending sequence by UIC.                       |

**Example**

```
UAF> SHOW ROBIN
```

The command in this VAX system example displays a full report for the user ROBIN. The display corresponds to the first example in the description of the ADD command. Most defaults are in effect.

# AUTHORIZE SHOW

```

Username: ROBIN Owner: JOSEPH ROBIN
Account: VMS UIC: [14,6] ([INV,ROBIN])
CLI: DCL Tables: DCLTABLES
Default: SYS$USER:[ROBIN]
LGICMD:
Login Flags:
Primary days: Mon Tue Wed Thu Fri
Secondary days: Sat Sun
No access restrictions
Expiration: (none) Pwdminimum: 6 Login Fails: 0
Pwdlifetime: (none) Pwdchange: 15-APR-1994 14:08
Last Login: (none) (interactive), (none) (non-interactive)
Maxjobs: 0 Fillm: 300 Byt1m: 32768
Maxacctjobs: 0 Shrfillm: 0 Pbyt1m: 0
Maxdetach: 0 BI01m: 40 JTquota: 4096
Prclm: 2 DI01m: 40 WSdef: 256
Prio: 4 AST1m: 40 WSquo: 512
Queprio: 0 TQElm: 10 WSextent: 1024
CPU: (none) Enqlm: 200 Pgflquo: 32768
Authorized Privileges:
 TMPMBX NETMBX
Default Privileges:
 TMPMBX NETMBX
Identifier Value Attributes
CLASS_CA101 %X80010032 NORESOURCE NODYNAMIC
CLASS_PY102 %X80010049 NORESOURCE NODYNAMIC

```

---

### Note

---

The quotas Pbyt1m and Queprio are placeholders only.

---

UAF> SHOW [360,\*] /BRIEF

The command in this example displays a brief report for every user with a group UIC of 360.

| Owner       | Username | UIC       | Account | Privs Pri | Default        | Directory |
|-------------|----------|-----------|---------|-----------|----------------|-----------|
| JOHN JAMES  | JAMES    | [360,201] | USER    | Normal 4  | DOCD\$:[JAMES] |           |
| SUSY JONES  | JONES    | [360,203] | DOC     | Devour 4  | DOCD\$:[JONES] |           |
| CLIFF BROWN | BROWN    | [360,021] | DOC     | All 4     | disuser        |           |
| JOY CARTER  | CARTER   | [360,005] | DOCSEC  | Group 4   | expired        |           |

UAF> SHOW WELCH

This command displays a full report for the restricted user WELCH. This VAX-specific display corresponds to the second example in the description of the ADD command.

## AUTHORIZE SHOW

```
Username: WELCH Owner: ROB WELCH
Account: INV UIC: [14,51] ([14,51])
CLI: DCL Tables: DCLTABLES
Default: SYS$USER:[WELCH]
LGICMD: SECUREIN
Login Flags: Captive Diswelcome Disnewmail Restricted
Primary days: Mon Tue Wed Thu Fri
Secondary days: Sat Sun
Primary 00000000001111111112222 Secondary 00000000001111111112222
Day Hours 012345678901234567890123 Day Hours 012345678901234567890123
Network: ----- No access ----- ##### Full access #####
Batch: #####-----##### -----#####-----
Local: #####-----##### -----#####-----
Dialup: ##### Full access ##### ----- No access -----
Remote: #####-----##### -----#####-----
Expiration: (none) Pwdminimum: 6 Login Fails: 0
Pwldlifetime: (none) Pwdchange: (pre-expired)
Last Login: (none) (interactive), (none) (non-interactive)
Maxjobs: 0 Fillm: 300 Byt1m: 32768
Maxacctjobs: 0 Shrfillm: 0 Pbyt1m: 0
Maxdetach: 0 BI01m: 40 JTquota: 4096
Prclm: 2 DI01m: 40 WSdef: 256
Prio: 4 AST1m: 40 WSquo: 512
Queprio: 4 TQElm: 10 WSextent: 1024
CPU: (none) Enqlm: 200 Pgflquo: 32768
Authorized Privileges:
TMPMBX NETMBX
Default Privileges:
TMPMBX NETMBX
```

Note that WELCH is a captive user who does not receive announcements of new mail or the welcome message when logging in. His login command file, SECUREIN.COM, is presumably a captive command file that controls all of his operations. (Such a command file never exits, but performs operations for its user and logs him out when appropriate.) The CAPTIVE flag prevents WELCH from escaping control of the command file by using Ctrl/Y or other means. Furthermore, he is restricted to logging in between the hours of 5:00 P.M. and 8:59 A.M. on weekdays and 9:00 A.M. and 5:59 P.M. on weekends. Although he is allowed to use dial-up lines at all times during the week, he is not allowed to log in over the network. On weekends he is further restricted so that he cannot dial in at any time or use the DCL command SET HOST between the hours of 6:00 P.M. and 8:59 A.M.

---

## SHOW/IDENTIFIER

Displays information about an identifier, such as its name, value, attributes, and holders, on the current SYS\$OUTPUT device.

### Format

```
SHOW/IDENTIFIER [id-name]
```

### Parameter

#### id-name

Specifies an identifier name. The identifier name is a string of 1 to 31 alphanumeric characters. The name can contain underscores and dollar signs. It must contain at least one nonnumeric character. If you omit the identifier name, you must specify /USER or /VALUE.

# AUTHORIZE SHOW/IDENTIFIER

## Qualifiers

### **/BRIEF**

Specifies a brief listing in which only the identifier name, value, and attributes are displayed. The default format is /BRIEF.

### **/FULL**

Specifies a full listing in which the names of the identifier's holders are displayed along with the identifier's name, value, and attributes.

### **/USER=user-spec**

Specifies one or more users whose identifiers are to be displayed. User-spec can be a user name or a UIC. You can use the asterisk wildcard to specify multiple UICs or all user names. UICs must be in the form [\*,\*], [n,\*], [\*,n], or [n,n]. A wildcard user name specification (\*) displays identifiers alphabetically by user name; a wildcard UIC specification ([\*,\*]) displays them numerically by UIC.

### **/VALUE=value-specifier**

Specifies the value of the identifier to be listed. The following are valid formats for the value-specifier:

|              |                                                                                                                                                                                                                                                                                     |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IDENTIFIER:n | An integer value in the range of 65,536 to 268,435,455. You can also specify the value in hexadecimal (precede the value with %X) or octal (precede the value with %O).<br>To differentiate general identifiers from UIC identifiers, %X80000000 is added to the value you specify. |
| UIC:uic      | A UIC value in the standard UIC format.                                                                                                                                                                                                                                             |

## Description

The SHOW/IDENTIFIER command displays identifier names, values, attributes, and holders in various formats depending on the qualifiers specified. Two of these formats are illustrated in the following examples.

## Examples

1. UAF> SHOW/IDENTIFIER/FULL INVENTORY

The command in this example would produce output similar to the following:

| Name      | Value                | Attributes           |
|-----------|----------------------|----------------------|
| INVENTORY | %X80010006           | NORESOURCE NODYNAMIC |
| Holder    | Attributes           |                      |
| ANDERSON  | NORESOURCE NODYNAMIC |                      |
| BROWN     | NORESOURCE NODYNAMIC |                      |
| CRAMER    | NORESOURCE NODYNAMIC |                      |

2. UAF> SHOW/IDENTIFIER/USER=ANDERSON

This command displays the identifier associated with the user ANDERSON, as follows:

| Name     | Value           | Attributes           |
|----------|-----------------|----------------------|
| ANDERSON | [000300,000015] | NORESOURCE NODYNAMIC |

## AUTHORIZE SHOW/IDENTIFIER

The identifier is shown, along with its value and attributes. Note, however, that this is the same result you would produce had you specified ANDERSON's UIC with the following forms of the command:

```
UAF> SHOW/IDENTIFIER/USER=[300,015]
```

```
UAF> SHOW/IDENTIFIER/VALUE=UIC:[300,015]
```

---

### SHOW/PROXY

Displays all authorized proxy access for the specified remote user.

#### Format

```
SHOW/PROXY node::remote-user
```

#### Parameters

##### node

Specifies the name of a network node in the network proxy authorization file. The asterisk wildcard is permitted in the node specification.

##### remote-user

Specifies the user name or UIC of a user on a remote node. The asterisk wildcard is permitted in the remote-user specification.

#### Qualifiers

None.

#### Example

```
UAF> SHOW/PROXY SAMPLE::[200,100]
```

Default proxies are flagged with an \*

```
SAMPLE::[200,100]
```

```
MARCO *
```

```
PROXY3
```

```
PROXY2
```

The command in this example displays all authorized proxy access for the user on node SAMPLE with a UIC of [200,100]. The default proxy account can be changed from MARCO to PROXY2 or PROXY3 with the MODIFY/PROXY command.

---

### SHOW/RIGHTS

Displays the identifiers held by the specified identifiers or, if /USER is specified, all identifiers held by the specified users.

#### Format

```
SHOW/RIGHTS [id-name]
```



# AUTHORIZE SHOW/RIGHTS

## Parameter

### id-name

Specifies the name of the identifier associated with the user. If you omit the identifier name, you must specify the /USER qualifier.

## Qualifier

### /USER=user-spec

Specifies one or more users whose identifiers are to be listed. User-spec can be a user name or a UIC. You can use the asterisk wildcard to specify multiple UICs or all user names. UICs must be in the form [\*,\*], [n,\*], [\*,n], or [n,n]. A wildcard user name specification (\*) or wildcard UIC specification ([\*,\*]) displays all identifiers held by users. The wildcard user name specification displays holders' user names alphabetically; the wildcard UIC specification displays them in the numerical order of their UICs.

## Description

Output displayed from the SHOW/RIGHTS command is identical to that written to RIGHTS.LIS when you use the LIST/RIGHTS command.

## Example

```
UAF> SHOW/RIGHTS ANDERSON
```

This command displays all identifiers held by the user ANDERSON. For example:

| Name      | Value      | Attributes           |
|-----------|------------|----------------------|
| INVENTORY | %X80010006 | NORESOURCE NODYNAMIC |
| PAYROLL   | %X80010022 | NORESOURCE NODYNAMIC |

Note that the following formats of the command produce the same result:

```
SHOW/RIGHTS/USER=ANDERSON
```

```
SHOW/RIGHTS/USER=[300,015]
```

---

**AUTOGEN Command Procedure**



---

## AUTOGEN Description

The AUTOGEN command procedure (SYS\$UPDATE:AUTOGEN.COM) sets appropriate values for system parameters and sizes for system page, swap, and dump files. AUTOGEN runs automatically when you install or upgrade the operating system. In addition, you can use AUTOGEN whenever you want to reset system parameter values, system file sizes, or both. The new values and file sizes take effect the next time the system is booted. For a list and description of all system parameters, see the *OpenVMS System Management Utilities Reference Manual: M-Z*.

AUTOGEN executes in phases with each phase performing a separate task. You control which tasks AUTOGEN performs by specifying a start phase and an end phase when you invoke AUTOGEN. For more information on the AUTOGEN phases, see Section 6.3.

You can add commands to the file SYS\$SYSTEM:MODPARAMS.DAT to control the system parameter values and file sizes that AUTOGEN sets. AUTOGEN uses the information in this file to determine final values for system parameters or page, swap or dump file sizes. For more information, see the chapter about managing system parameters in the *OpenVMS System Manager's Manual*.

AUTOGEN can improve system performance by using dynamic information, called **feedback**, gathered from the running system. You control how AUTOGEN uses feedback by specifying an execution mode when you invoke AUTOGEN. To direct AUTOGEN to use feedback to make its calculations, you run AUTOGEN in **feedback mode**. After a period of time, you might want to execute AUTOGEN in feedback mode to further refine system parameter settings. For more information about AUTOGEN feedback, see Section 6.2.

### 6.1 When to Run AUTOGEN

Digital recommends that you run AUTOGEN in the following circumstances:

- During a new installation or upgrade.
- Whenever your work load changes significantly.
- When you add an optional (layered) software product. Certain layered products might require you to execute AUTOGEN to adjust parameter values and page and swap file sizes. (For information on using AUTOGEN to modify page and swap files, see the chapter on managing page, swap, and dump files in the *OpenVMS System Manager's Manual*.) See the specific product documentation for installation requirements.
- When you install images with the /SHARED attribute. The GBLSECTIONS and GBLPAGES parameters might need to be increased to accommodate additional use of global pages and global sections.
- During normal operation, as part of a batch-oriented command procedure that runs AUTOGEN on a regular basis and automatically sends a report to an appropriate MAIL account. The recommended procedure is described in the chapter on managing system parameters in the *OpenVMS System Manager's Manual*.

After a new operating system installation or upgrade, examine the results of calculations that AUTOGEN made to determine whether AUTOGEN has set system parameter values that are appropriate for your workload requirements.

## AUTOGEN Description

Table 6–1 lists the system parameters affected by AUTOGEN calculations. In addition to these system parameters, AUTOGEN calculations also affect the size of page, swap and dump files. Table 6–2 lists the system parameters affected by AUTOGEN feedback.

**Table 6–1 System Parameters Affected by AUTOGEN Calculations**

|                  |                |                 |
|------------------|----------------|-----------------|
| ACP_DINDXCACHE   | ACP_DIRCACHE   | ACP_HDRCACHE    |
| ACP_MAPCACHE     | ACP_QUOCACHE   | ACP_SWAPFLGS    |
| ACP_SYSACC       | BALSETCNT      | BORROWLIM       |
| DUMPSTYLE        | EXPECTED_VOTES | FREEGOAL        |
| FREELIM          | GBLPAGES       | GBLSECTIONS     |
| ‡GH_RSRVPGCNT    | GROWLIM        | ‡ITB_ENTRIES    |
| LNMSHASH TBL     | LOCKDIRWT      | LOCKIDTBL       |
| †LOCKIDTBL_MAX   | MAXPROCESSCNT  | MPW_HILIMIT     |
| ‡MPW_THRESH      | MPW_LOLIMIT    | MPW_LOWAITLIMIT |
| MPW_WAITLIMIT    | MSCP_BUFFER    | MSCP_LOAD       |
| NISCS_PORT_SERV  | NPAGEDYN       | NPAGEVIR        |
| PAGEDYN          | PASTDGBUF      | PFCDEFAULT      |
| †PHYSICALPAGES   | PIXSCAN        | PQL_DWSDEFAULT  |
| PQL_DWSEXTENT    | PQL_DWSQUOTA   | PQL_MWSDEFAULT  |
| PQL_MWSEXTENT    | PQL_MWSQUOTA   | RESHASH TBL     |
| SCSCONNCNT       | SCSBUFFCNT     | †SCSRESPCNT     |
| †SHADOW_MAX_COPY | †SPTREQ        | ‡SWPOUTPGCNT    |
| SYSMWCNT         | †VAXCLUSTER    | VIRTUALPAGECNT  |
| VOTES            | WSDEC          | ‡WSINC          |
| WSMAX            | ZERO_LIST_HI   |                 |

†VAX specific  
‡AXP specific

## 6.2 Feedback

AUTOGEN feedback minimizes the need for you to modify parameter values or system file sizes. Feedback allows AUTOGEN to automatically size the operating system based on your actual work load. **Sizing** is the process of matching the allocation of system resources (memory and disk space) with the workload requirements of your site.

Feedback is information about how various resources are used by the system's work load. This information is continuously collected by the operating system executive. Because the system collects feedback when exception events occur, feedback collection does not affect system performance.

You control how AUTOGEN uses feedback by specifying an execution mode when you invoke AUTOGEN. When run in feedback mode, AUTOGEN analyzes this information and adjusts any related parameter values. For information on controlling AUTOGEN's use of feedback, see Section 6.4.

AUTOGEN collects feedback during the SAVPARAMS phase by executing the image SYS\$SYSTEM:AGEN\$FEEDBACK.EXE. AUTOGEN writes feedback information to the file SYS\$SYSTEM:AGEN\$FEEDBACK.DAT. This file is then read during the GETDATA phase. For more information on AUTOGEN phases, see Section 6.3.

Table 6–2 lists the system parameters affected by AUTOGEN feedback. In addition to these system parameters, feedback also affects the size of page and swap files.

**Table 6–2 System Parameters Affected by AUTOGEN Feedback**

|                |                |               |
|----------------|----------------|---------------|
| ACP_DINDXCACHE | ACP_DIRCACHE   | ACP_HDRCACHE  |
| ACP_MAPCACHE   | GBLPAGES       | GBLSECTIONS   |
| LOCKIDTBL      | †LOCKIDTBL_MAX | LNMSHASHTBL   |
| ‡GH_RSRVPGCNT  | ‡ITB_ENTRIES   | MAXPROCESSCNT |
| MSCP_BUFFER    | NPAGEDYN       | PAGEDYN       |
| RESHASHTBL     | SCSBUFFCNT     | SCSCONNCNT    |
| †SCSRESPCNT    |                |               |
| †VAX specific  |                |               |
| ‡AXP specific  |                |               |

### 6.3 Phases

AUTOGEN executes in phases. You control which tasks AUTOGEN performs by specifying a **start phase** and an **end phase** when you invoke AUTOGEN. Table 6–3 lists the phases AUTOGEN can execute in order.

**Table 6–3 AUTOGEN Phases**

| Phase     | Description                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SAVPARAMS | Saves dynamic feedback from the running system.                                                                                                             |
| GETDATA   | Collects all data to be used in AUTOGEN calculations.                                                                                                       |
| GENPARAMS | Generates new system parameters; creates the installed image list.                                                                                          |
| TESTFILES | Displays the system page, swap, and dump file sizes calculated by AUTOGEN (cannot be used as a start phase).                                                |
| GENFILES  | Generates new system page, swap, and dump files if appropriate (cannot be used as a start phase).                                                           |
| SETPARAMS | Runs SYSMAN to set the new system parameters in the default parameter file, saves the original parameters, and generates a new parameter file, AUTOGEN.PAR. |
| SHUTDOWN  | Prepares the system to await a manual reboot.                                                                                                               |
| REBOOT    | Automatically shuts down and reboots the system.                                                                                                            |
| HELP      | Displays help information to the screen.                                                                                                                    |

The following sections describe each phase in detail.

## AUTOGEN Description

### 6.3.1 SAVPARAMS

The SAVPARAMS phase records feedback in the file AGEN\$FEEDBACK.DAT, which can be used in subsequent AUTOGEN phases. If you specify NOFEEDBACK as the *execution-mode* parameter, the information collected is not used.

The SAVPARAMS phase is valid as a start phase and end-phase. SAVPARAMS requires the SYSPRV and CMKRNL privileges.

---

#### Note

---

You can specify the SAVE\_FEEDBACK option during an interactive orderly shutdown with SYS\$SYSTEM:SHUTDOWN.COM. Entering this option in response to the prompt "Shutdown options." records feedback collected since the system was last booted. Using the SAVE\_FEEDBACK option creates a new version of SYS\$SYSTEM:AGEN\$FEEDBACK.DAT. Run AUTOGEN from the GETDATA phase after the system reboots to use this new version of the feedback.

---

### 6.3.2 GETDATA

The GETDATA phase collects the following information required for AUTOGEN calculations and places it in the file PARAMS.DAT:

- Hardware configuration data
- Digital-supplied data from VMSPARAMS.DAT
- Feedback from AGEN\$FEEDBACK.DAT (if run in feedback mode)
- User-supplied data from MODPARAMS.DAT

The GETDATA phase also attempts to configure devices on the system, by executing the following:

- The command procedure SYS\$MANAGER:SYCONFIG.COM. (For more information on this procedure, see the chapter on managing devices in the *OpenVMS System Manager's Manual*.)
- The SYSGEN command AUTOCONFIGURE ALL (unless the symbol STARTUP\$AUTOCONFIGURE\_ALL is set to 0 in SYCONFIG.COM).

The GETDATA phase is valid as a start phase and an end phase. GETDATA requires the SYSPRV and CMKRNL privileges.

### 6.3.3 GENPARAMS

In the GENPARAMS phase, AUTOGEN calculates the parameter values based on data stored in PARAMS.DAT and produces SETPARAMS.DAT as output. AUTOGEN checks to see if feedback is included, and if so, uses it in the calculations unless the NOFEEDBACK execution mode was specified when AUTOGEN was invoked. Also during this phase, AUTOGEN generates the known image file list (VMSIMAGES.DAT).

The GENPARAMS phase is valid as a start phase and an end phase. GENPARAMS requires the SYSPRV and OPER privileges.

## 6.3.4 TESTFILES

The TESTFILES phase displays system page, swap, and dump file sizes calculated by AUTOGEN. (This phase does not change the file sizes.)

File sizes for all currently installed primary and secondary page and swap files are displayed. The information is directed to SYS\$OUTPUT and the AGEN\$PARAMS.REPORT file by default.

Specify the TESTFILES phase to display AUTOGEN's file size calculations; to generate new sized files, specify the GENFILES phase. You cannot specify both of these phases when invoking AUTOGEN. Digital recommends you use TESTFILES to display the file size changes before actually generating new sized files on your system.

The TESTFILES phase is valid only as an end phase. TESTFILES requires the SYSPRV privilege.

## 6.3.5 GENFILES

The GENFILES phase generates the new page, swap, and dump files on the system. This phase changes the file sizes based on AUTOGEN's calculations.

The GENFILES phase does not modify a file if the calculated size change is within ten percent of the existing file size. The following files are affected: PAGEFILE.SYS, SWAPFILE.SYS, SYSDUMP.DMP, and all other currently installed page and swap files. For more information, see the chapter on managing page, swap and dump files in the *OpenVMS System Manager's Manual*.

GENFILES is valid only as an end phase. GENFILES requires the SYSPRV privilege.

## 6.3.6 SETPARAMS

The SETPARAMS phase uses as its input the SETPARAMS.DAT file created during the GENPARAMS phase. In this phase, AUTOGEN runs SYSMAN to update the system parameter values in the default parameter file.

**VAX**

On VAX systems, the default parameter file is SYS\$SYSTEM:VAXVMSSYS.PAR. AUTOGEN saves the current system parameters in the file SYS\$SYSTEM:VAXVMSSYS.OLD before updating these parameters in SYS\$SYSTEM:VAXVMSSYS.PAR. The new values are also saved in SYS\$SYSTEM:AUTOGEN.PAR. ♦

**AXP**

On AXP systems, SYS\$SYSTEM:ALPHAVMSSYS.PAR is the default parameter file. AUTOGEN saves the current system parameters in the file SYS\$SYSTEM:ALPHAVMSSYS.OLD before updating these parameters in SYS\$SYSTEM:ALPHAVMSSYS.PAR. The new values are also saved in SYS\$SYSTEM:AUTOGEN.PAR. ♦

The SETPARAMS phase is valid as a start phase and an end phase. SETPARAMS requires the SYSPRV and OPER privileges.

## 6.3.7 SHUTDOWN

SHUTDOWN shuts down the system and awaits a manual reboot. To use the new system parameter values generated in the SETPARAMS phase, specify either SHUTDOWN or REBOOT as the end phase. You can define the logical name AGEN\$SHUTDOWN\_TIME (using the DCL command DEFINE) to specify the number of minutes before shutdown occurs.

SHUTDOWN requires the SETPRV privilege.



## AUTOGEN Description

### 6.3.8 REBOOT

REBOOT automatically shuts down and reboots the system thus installing the new parameter values. To install the new system parameter values generated in the SETPARAMS phase, specify either SHUTDOWN or REBOOT as the end phase. You can define the logical name AGEN\$SHUTDOWN\_TIME (using the DCL command DEFINE) to specify the number of minutes before shutdown occurs.

REBOOT requires the SETPRV privilege.

### 6.3.9 HELP

HELP displays help information about AUTOGEN to the screen. The HELP phase is only valid as the start phase command line parameter. When you specify HELP for the start phase, the end phase and execution mode parameters are ignored.

## 6.4 Execution Modes

You specify an execution mode when you invoke AUTOGEN to control how AUTOGEN uses feedback. Table 6–4 lists the execution-mode options.

**Table 6–4 AUTOGEN Execution Modes**

| Option         | Description                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FEEDBACK       | Specifies that AUTOGEN run in feedback mode, using dynamic feedback collected during the SAVPARAMS phase to make its calculations.                                                                                                                                                                                                                                    |
| NOFEEDBACK     | Specifies that AUTOGEN not use feedback in the calculations. The feedback from the SAVPARAMS phase is ignored. Use NOFEEDBACK mode for the initial system installation or upgrade. NOFEEDBACK supersedes the execution-mode option INITIAL, which was used in a previous version of the operating system.                                                             |
| CHECK_FEEDBACK | Specifies that AUTOGEN use feedback in its calculations as long as the feedback is valid. If feedback is suspect, AUTOGEN does not use feedback in the calculations, but continues through the specified end phase.                                                                                                                                                   |
| Blank          | If you do not specify an execution mode, AUTOGEN uses feedback in the calculations by default. However, if AUTOGEN determines that the feedback might be suspect, it performs the calculations, issues the feedback report, and stops before modifying any parameters or system files, even if you specified an end phase of GENFILES, SETPARAMS, SHUTDOWN or REBOOT. |

## 6.5 Files Used by AUTOGEN

Table 6-5 lists the files AUTOGEN uses during each phase.

**Table 6-5 Files Used by AUTOGEN**

| AUTOGEN Phase | Input Files <sup>1</sup>                             | Output Files <sup>1</sup>                                                                                    |
|---------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| SAVPARAMS     | None                                                 | AGEN\$FEEDBACK.DAT                                                                                           |
| GETDATA       | MODPARAMS.DAT<br>VMSPARAMS.DAT<br>AGEN\$FEEDBACK.DAT | PARAMS.DAT                                                                                                   |
| GENPARAMS     | PARAMS.DAT                                           | SETPARAMS.DAT<br>VMSIMAGES.DAT<br>AGEN\$PARAMS.REPORT                                                        |
| TESTFILES     | PARAMS.DAT                                           | SYS\$OUTPUT                                                                                                  |
| GENFILES      | PARAMS.DAT                                           | PAGEFILE.SYS<br>SWAPFILE.SYS<br>(and secondary page<br>and swap files)<br>SYSDUMP.DMP<br>AGEN\$PARAMS.REPORT |
| SETPARAMS     | SETPARAMS.DAT                                        | †VAXVMSSYS.PAR<br>‡ALPHAVMSSYS.PAR<br>AUTOGEN.PAR<br>†VAXVMSSYS.OLD<br>‡ALPHAVMSSYS.OLD                      |
| SHUTDOWN      | None                                                 | None                                                                                                         |
| REBOOT        | None                                                 | None                                                                                                         |

<sup>1</sup>All files except VMSIMAGES.DAT, which contains the installed image list, reside in the SYS\$SYSTEM directory. VMSIMAGES.DAT resides in the SYS\$MANAGER directory.

†VAX specific

‡AXP specific

---

## AUTOGEN Usage Summary

The AUTOGEN command procedure runs automatically when your system is installed or upgraded to set appropriate values for system parameters and sizes for system page, swap, and dump files.

Execute AUTOGEN to reset system parameter values and system file sizes. The new values and file sizes take effect the next time the system is booted.

To invoke AUTOGEN enter a command in the following format at the DCL command prompt:

### Format

```
@SYS$UPDATE:AUTOGEN [start-phase] [end-phase] [execution-mode]
```

#### Parameters

##### start-phase

Specify the phase where AUTOGEN is to begin executing. Table 6-3 lists the options for the *end-phase* parameter.

The phase specified for *start-phase* must either precede or be identical to the phase specified for *end-phase*, according to the sequence shown in Table 6-3. If you do not supply an option for the *start-phase* parameter, enter a null argument (that is, ""). If you do not specify a start phase, GENPARAMS is the default.

##### end-phase

Specify the phase where AUTOGEN is to complete executing. Table 6-3 lists the options for the *end-phase* parameter. If you do not specify an end phase, the end phase has the same value as the start phase by default.

##### execution-mode

Specify one of the following execution-mode options to control how AUTOGEN uses feedback:

- FEEDBACK
- NOFEEDBACK
- CHECK\_FEEDBACK
- Blank

Table 6-4 describes each execution-mode option.





---

## BACKUP Description

The Backup utility (BACKUP) helps you prevent data loss or corruption by creating copies of your files, directories, and disks. In case of a problem—for example, a disk drive failure—you can restore the backup copy and continue your work with minimal disruption.

When you save files with BACKUP, it writes the files to a special file called a **save set**. Save sets are written in a format that only BACKUP can interpret. (A save set stored on a Files-11 disk is a standard VMS file, however, and can be copied, renamed, deleted, or backed up. A save set stored on magnetic tape should only be processed with the BACKUP command; do not use the DCL command COPY to copy a magnetic tape save set to disk.)

Use BACKUP to perform the following tasks:

- Save disk files to a BACKUP save set.
- Restore files to disk from a BACKUP save set.
- Copy disk files to disk files.
- Compare disk files created by BACKUP or files in a BACKUP save set with disk files .
- List information about the files in a BACKUP save set.
- Create and list journal files that record the results of BACKUP save operations.

For specific information about performing these tasks, see the *OpenVMS System Manager's Manual*.

---

### Note

---

Some layered products have their own special backup procedures. For more information, see the layered product documentation.

---

Using BACKUP also eliminates disk fragmentation. Fragmentation can occur as you create and extend files on a disk. If the file system cannot store files in contiguous blocks, it stores them in noncontiguous pieces. Eventually, the disk can become severely fragmented and system performance suffers. To eliminate fragmentation, perform an image backup of the disk and restore the backup copy. When you restore the image backup, BACKUP places the files on the disk contiguously.

Besides backing up your own files, directories, and disks, remember to back up your VMS system disk. Depending on the policy at your site, individuals may be responsible for backing up their system disks, or an operator or system manager may perform the backup (as would likely be the case in a large, clustered computer system). To back up a system disk, use a special version of the VMS Backup utility called standalone BACKUP. Standalone BACKUP is described in the *OpenVMS System Manager's Manual*.

## BACKUP Description

There are several types of backup operations:

- An **image backup** (also called a full backup) saves a copy of all the files on a disk (or volume) to a save set. The first backup that you do on a disk must be an image backup; you cannot perform an incremental backup first.
- An **image restore** initializes the output disk and restores an entire volume.
- An **image copy** operation initializes the output disk and copies an entire volume; the image backup is a logical duplicate of the contents of the disk.
- An **image compare** operation compares the contents of entire volumes.

---

### Note

---

Because an image copy or backup operation processes all files on the input volume, you cannot specify file-selection qualifiers for these operations. You can, however, restore files and directories selectively from an image save set.

---

If the output volume of an image operation is a disk, BACKUP stores all files on the output volume contiguously, eliminating disk fragmentation and creating contiguous free blocks of disk space.

- An **incremental backup** saves only those files that have been created or modified since the most recent backup that was performed using the /RECORD qualifier. (The /RECORD qualifier records the date and time that the files are backed up.)
- An **incremental restore** operation restores an incremental save set. Specify the command qualifier /INCREMENTAL in an incremental restore operation.
- A **file** operation processes individual files or directories.
- A **selective** operation process files or volumes selectively, according to criteria such as version number, file type, UIC, date and time of creation, expiration date, or modification date.

Perform selective save operations by using wildcard characters and input file-selection qualifiers (for example, /BACKUP, /BEFORE, /BY\_OWNER (/OWNER\_UIC), /CREATED, /EXCLUDE, /EXPIRED, /MODIFIED, and /SINCE).

- A **physical** operation copies, saves, restores, or compares an entire volume in terms of logical blocks, ignoring any file structure.

The following sections describe the BACKUP command line format.

## 7.1 BACKUP Command Line Format

To perform BACKUP operations, enter the DCL command BACKUP in the following format:

BACKUP input-specifier output-specifier

BACKUP evaluates the input and output specifiers to determine which type of operation to perform. BACKUP also uses the input specifier to locate the input and directs output to the output specifier.

## 7.2 BACKUP Input and Output Specifiers

BACKUP can process several different types of input and output. Depending on the type of operation being executed, input and output specifiers can be standard VMS file specifications, BACKUP save-set specifications, or device specifications. Device specifications can refer to disk or magnetic tape volumes.

You can specify any valid VMS file specification as BACKUP input or output specifiers; however, BACKUP does not allow node names in BACKUP file specifications. You can use wildcard characters, and you can list multiple file specifications as input to a single BACKUP operation.

A BACKUP save-set specification is the file specification of a BACKUP save set. When you use BACKUP to save files or volumes, it writes your files to a save set. You can specify the save set as input to other BACKUP operations. When specifying a save set, follow the rules for specifying a VMS file. The *OpenVMS User's Manual* describes valid specifications for disk files; the *OpenVMS System Manager's Manual* explains the rules for specifying magnetic tape files. There is no default file type for a save-set specification, although it is customary to use BCK or SAV.

The save-set name can be any valid VMS file name and type. However, when you create a save set on magnetic tape, the save-set name has the following restrictions:

- The entire save-set name cannot exceed 17 characters, including the period delimiter.
- You cannot specify a version number.
- You cannot specify a directory name.

Device specifications used as BACKUP input or output specifiers follow the conventions for specifying devices outlined in the *OpenVMS User's Manual*.

By default, BACKUP treats an input or output specifier referring to a Files-11 disk as a file specification. Therefore, to identify a save set on a Files-11 volume, you must include the /SAVE\_SET qualifier with the specifier (see /SAVE\_SET). BACKUP treats input and output specifiers referring to magnetic tape as save sets.

---

**Note**

---

You cannot specify a save set for both the input and output specifier of a BACKUP command. For this reason, you cannot perform a BACKUP operation from one magnetic tape to another.

---

Table 7-1 shows input and output specifiers for each type of BACKUP operation.

**Table 7-1 BACKUP Input and Output by Operation Type**

| Operation    | Format                                 |
|--------------|----------------------------------------|
| Save         | BACKUP file-spec save-set-spec         |
| Save (image) | BACKUP/IMAGE device-spec save-set-spec |

(continued on next page)



## BACKUP Description

**Table 7–1 (Cont.) BACKUP Input and Output by Operation Type**

| Operation                    | Format                                                                                               |
|------------------------------|------------------------------------------------------------------------------------------------------|
| Save (physical to disk)      | BACKUP/PHYSICAL device-spec device-spec                                                              |
| Save (physical to tape)      | BACKUP/PHYSICAL device-spec save-set-spec                                                            |
| Restore                      | BACKUP save-set-spec file-spec                                                                       |
| Restore (image)              | BACKUP/IMAGE save-set-spec device-spec                                                               |
| Restore (physical from disk) | BACKUP/PHYSICAL save-set-spec device-spec                                                            |
| Restore (physical from tape) | BACKUP/PHYSICAL save-set-spec device-spec                                                            |
| Copy                         | BACKUP file-spec file-spec                                                                           |
| Copy (image)                 | BACKUP/IMAGE device-spec device-spec                                                                 |
| Compare                      | BACKUP/COMPARE file-spec file-spec<br>BACKUP/COMPARE save-set-spec file-spec                         |
| Compare (image)              | BACKUP/COMPARE/IMAGE save-set-spec device-spec<br>BACKUP/COMPARE/IMAGE device-spec device-spec       |
| Compare (physical)           | BACKUP/COMPARE/PHYSICAL device-spec device-spec<br>BACKUP/COMPARE/PHYSICAL save-set-spec device-spec |
| List <sup>1</sup>            | BACKUP/LIST[=file-spec] save-set-spec<br>BACKUP/LIST[=file-spec] device-spec                         |
| Create Journal               | BACKUP/JOURNAL[=file-spec] file-spec save-set-spec                                                   |
| List Journal                 | BACKUP/JOURNAL[=file-spec]/LIST[=file-spec]                                                          |

<sup>1</sup>Can also be used in conjunction with any other operation listed here.

### 7.2.1 Input and Output Specifier Element Lists

An **element list** is a list of arguments specified with a command or qualifier. The arguments, or elements, in the list are separated by commas. Element lists relating to input or output specifiers are allowed only in the following circumstances:

- If an input specifier refers to a Files–11 disk, you can construct lists from standard VMS file specifications, as follows:

```
$ BACKUP
 _From: DUA0:[DATA]A.DAT,B.DAT,[PROGRAMS]TEST.EXE
 _To: MSA0:TEST.SAV/LABEL=DLY101
```

- If an input specifier or an output specifier refers to a BACKUP save set on magnetic tape or sequential disk, you can specify more than one device name to be used in the operation. This allows you to process multivolume save sets efficiently by specifying the order in which devices will be used. The first volume is processed until it is full. The second (or subsequent) volume is processed while the media in the first (or previous) volume is being changed. However, the save-set name must appear with the first element in the list and must not appear in subsequent elements in the list.

In the following example, BACKUP first saves data to a tape in drive MSA0, then to a tape in drive MSA1. When the tape in drive MSA1 is full, BACKUP saves data to a fresh tape in MSA0.

```
$ BACKUP
 _From: DUA0:[DATA]*.* ,DUA0:[PROGRAMS]*.*
 _To: MSA0:TEST.SAV,MSA1:/LABEL=WKLY01
```

- If you are performing an image operation on a volume set, you can specify element lists in the input and output specifiers. In the following example, BACKUP first restores the save set TEST.SAV from the tape in drive MSA0, and then continues to restore the save set from the tape in drive MSA1. BACKUP first restores this save set to DUA0. When DUA0 is full, BACKUP continues the restore operation to DUA1.

```
$ BACKUP/IMAGE
 _From: MSA0:TEST.SAV,MSA1:
 _To: DUA0:[DATA...],DUA1:
```

### 7.2.2 BACKUP Qualifiers

You can also affect BACKUP operations by specifying qualifiers. BACKUP has five types of qualifiers:

- **Command qualifiers** allow you to modify the default action of a BACKUP command. You can place command qualifiers anywhere in the command line. Command qualifiers act upon every file in the input or output specifier.
- **Input file-selection qualifiers** select files from the input specifier. Place them immediately after the input specifier.
- **Input save-set qualifiers** affect the way BACKUP handles an input save set during a restore operation. Place them immediately after the input specifier.
- **Output file qualifiers** change the way output files are restored. Place them immediately after the output specifier.
- **Output save-set qualifiers** affect the way BACKUP processes an output save set during a save operation. Place them immediately after the output specifier.

---

#### Note

---

You cannot use input and output qualifiers in image operations.

---

It is important to understand the differences between the types of qualifiers. The position of qualifiers in the BACKUP command line affects the results of the command. Although command qualifiers can be placed anywhere in the command line, input- and output-specifier qualifiers are position-dependent. That is, input-specifier qualifiers must be placed immediately after the input specifier, and output-specifier qualifiers must be placed immediately after the output specifier.

Additionally, several BACKUP qualifiers are both input-specifier qualifiers and output-specifier qualifiers. To achieve the results you want from a BACKUP command, ensure that you place position-dependent qualifiers correctly. For example, use the /SAVE\_SET qualifier as an output save-set qualifier in a BACKUP save operation and as an input save-set qualifier in a BACKUP restore operation.

Appendix H contains more information about valid combinations of BACKUP qualifiers.

## BACKUP Description

### 7.2.3 Using Wildcard Characters with BACKUP

BACKUP allows you to use wildcard characters in file specifications to represent directories, file names, file types, and version numbers. Omitted file names, file types, or version numbers are assumed to be the asterisk wildcard character. For instance, if you omit the version number, BACKUP processes all versions. (For introductory information on wildcard characters, refer to the *OpenVMS User's Manual*.)

You can use any valid DCL wildcard character with input specifiers that are Files-11 media or with the /SELECT and /EXCLUDE qualifiers. Note, however, that the symbols denoting the latest versions of files (;) and relative versions of files (;-n) are processed as the asterisk wildcard character (;\*) when they are used with the /EXCLUDE and /SELECT qualifiers.

You cannot use wildcard characters in BACKUP save-set specifications unless the save sets are input specifiers on tape.

#### Using Wildcard Characters to Represent Directories

Table 7-2 lists the types of directory wildcards allowed for output specifiers that are Files-11 media.

**Table 7-2 Wildcards for Files-11 Output Specifiers**

| Directory Wildcard | Result                                                                                                                           |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| omitted            | If a directory name is omitted, BACKUP restores file to the current default directory [ ].                                       |
| [* ... ]           | BACKUP restores files to the directory from which they were saved.                                                               |
| [directory]        | BACKUP restores files to the named directory.                                                                                    |
| [directory ... ]   | The wildcard characters used in the specification of the input files determine the directory to which BACKUP restores the files. |

#### Note

If you specify directory wildcard characters incorrectly and your directories contain many levels of subdirectories, you risk losing the lower level subdirectories in BACKUP operations because VMS directory trees can have only eight levels.

The following example uses the directory wildcard format [directory ... ] for both the input and the output specifiers:

```
$ BACKUP [OSCAR...] [JOE.RECEIVED...]
```

In this example, BACKUP creates a directory named [JOE.RECEIVED] (if it does not already exist) as well as subdirectories that correspond to the subdirectories of [OSCAR]. BACKUP copies all files from the directory [OSCAR] and its subdirectories to [JOE.RECEIVED] and its subdirectories. If [OSCAR] has eight levels of directories, however, BACKUP is unable to create a corresponding ninth-level subdirectory to [JOE.RECEIVED]; the eighth-level subdirectory to [OSCAR] is not copied.

## BACKUP Description

If you use the asterisk wildcard character (\*) to represent subdirectories in the input specifier of a copy operation, BACKUP creates subdirectories to the directory specified in the output specifier that correspond to the subdirectories in the input specifier. BACKUP then copies all files from the lowest level subdirectory in the input specifier to the lowest level subdirectory in the output specifier. In the following example, the asterisk represents subdirectories named MONDAY and TUESDAY:

```
$ BACKUP [SAM.WORK.*.WEDNESDAY] [JAMES...]
```

In this example, BACKUP creates a subdirectory named [JAMES.MONDAY.TUESDAY.WEDNESDAY]. In doing so, BACKUP copies the file MONDAY.DIR to [JAMES], copies the file TUESDAY.DIR to [JAMES.MONDAY], and copies the file WEDNESDAY.DIR to [JAMES.MONDAY.TUESDAY]. Then BACKUP copies all files from [SAM.WORK.MONDAY.TUESDAY.WEDNESDAY] to [JAMES.MONDAY.TUESDAY.WEDNESDAY].

In a restore operation, the input specifier defaults to [\* ... ] if the input save-set qualifier /SELECT is not used; this is important if you use the form [directory ... ] in the output specifier. The function of the wildcard [\* ... ] is to carry over the entire directory name from the first level on and to place it before the ellipsis in the output specifier. Thus, if the save set in the following example contains the directory tree [SAVE ... ], the restored directory tree will be [WORK.SAVE ... ]:

```
$ BACKUP MTA0:SAVE.BCK [WORK...]
```

Note that the result will be the same, even if your output specifier has the same name as the directory in the input specifier, as shown in the following example:

```
$ BACKUP MTA0:SAVE.BCK [SAVE...]
```

The preceding command restores the directory tree [SAVE ... ] to a directory tree named [SAVE.SAVE ... ].

The following command restores the directory tree [SAVE ... ] to a directory tree named [WORK ... ]:

```
$ BACKUP MTA0:SAVE.BCK/SELECT=[SAVE...] [WORK...]
```

There are two ways to retain the original directory name when you restore files. You must either use the form [\* ... ] for the output specifier, or you must specify the input save-set qualifier /SELECT. The following example uses the form [\* ... ] in the output specifier to restore the directory tree [SAVE ... ] in save set SAVE.BCK to the directory tree [SAVE ... ]:

```
$ BACKUP MTA0:SAVE.BCK [*...]
```

The input save-set qualifier /SELECT causes only the ellipsis portion of the selected file specification to be carried over to the directory tree named in the output specifier [directory ... ]. The following command restores [SAVE ... ] to [SAVE ... ]:

```
$ BACKUP MTA0:SAVE.BCK/SELECT=[SAVE...] [SAVE...]
```

---

## BACKUP Usage Summary

By duplicating files or volumes of files, the Backup utility (BACKUP) protects data from loss or corruption.

BACKUP is intended for use primarily by system managers and operators to protect public media. However, anyone can use BACKUP to make personal BACKUP copies and to transport files between VMS systems.

Standalone BACKUP is a version of the Backup utility that is bootstrapped into main memory instead of running under the control of the VMS operating system. Standalone BACKUP uses a subset of BACKUP qualifiers to perform image and physical BACKUP operations.

### Format

BACKUP input-specifier output-specifier

#### Parameters

##### input specifier

Specifies the input for the BACKUP operation. The input specifier can be a standard VMS file specification, a BACKUP save-set specification, or a device name. If the input specifier is a save-set specification on disk, it must include the input save-set qualifier `/SAVE_SET`.

DECnet node names are allowed only in save-set specifications.

Wildcards are permitted in standard VMS file specifications and in save-set specifications if they are on magnetic tape.

##### output specifier

Specifies the output for the BACKUP operation. The output specifier, like the input specifier, can be either a standard VMS file specification, a BACKUP save-set specification, or a device name. If the output specifier is a save set on disk, it must include the output save-set qualifier `/SAVE_SET`.

DECnet node names are allowed only in save-set specifications.

You can use wildcard characters if the output specifier is a Files-11 volume. You cannot use wildcard characters if the output specifier is a BACKUP save set or a volume created by a BACKUP/PHYSICAL or BACKUP/IMAGE operation. Refer to Section 7.2.3 for restrictions on the use of wildcard characters in BACKUP commands.

### Usage Summary

To invoke online BACKUP, enter an appropriate BACKUP command at the DCL prompt. For instructions on invoking standalone BACKUP, refer to the *OpenVMS System Manager's Manual*.

When you enter a BACKUP command, BACKUP evaluates the input and output specifier and qualifiers to determine the type of operation to perform. BACKUP uses the input specifier to locate the input to the utility and directs output to the output specifier, which can be a file or a save set on disk or a save set on magnetic tape.

## BACKUP Usage Summary

After executing the command, BACKUP returns to DCL command level. If you want to halt the execution of a BACKUP command prematurely, press Ctrl/Y. If BACKUP is creating a file when you press Ctrl/Y, the file is closed immediately and only partially created.

You need the user privilege TMPMBX to send messages to operator terminals when using BACKUP in batch mode. If you are performing a save operation to a volume set of sequential disks, you must have the user privilege PHY\_IO or LOG\_IO to write to a continuation volume. The use of several BACKUP qualifiers also requires privileges; these are noted in the appropriate qualifier descriptions.

---

## BACKUP Qualifiers

This section describes and provides examples of each BACKUP qualifier. Make sure that you understand how the position of BACKUP qualifiers affects BACKUP operations. See Section 7.1 for information on the BACKUP command line format. Table 7-3 summarizes the BACKUP qualifiers.

**Table 7-3 BACKUP Qualifier Summary**

| Qualifier     | Description                                                                                                                                                                                                                                                                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /ASSIST       | Allows operator or user intervention if a request to mount a magnetic tape fails during a BACKUP operation.                                                                                                                                                                                                                                   |
| /BACKUP       | Selects files according to the BACKUP date written in the file header record by the BACKUP/RECORD command.                                                                                                                                                                                                                                    |
| /BEFORE       | Selects files dated earlier than the date and time you specify.                                                                                                                                                                                                                                                                               |
| /BLOCK_SIZE   | Specifies the output block size in bytes for data records in a BACKUP save set.                                                                                                                                                                                                                                                               |
| /BRIEF        | Causes the /LIST qualifier to display the file specification, size (in blocks), and creation date for each file in the save set.                                                                                                                                                                                                              |
| /BUFFER_COUNT | This qualifier is obsolete and has no effect.                                                                                                                                                                                                                                                                                                 |
| /BY_OWNER     | As an input file-selection qualifier, /BY_OWNER causes BACKUP to process files owned by the specified UIC.<br>As an output file qualifier, /BY_OWNER redefines the owner user identification code (UIC) for restored files.<br>As an output save-set qualifier, /BY_OWNER specifies the owner user identification code (UIC) of the save set. |
| /COMMENT      | Places the string that you supply into the BACKUP summary record of the output save set.                                                                                                                                                                                                                                                      |
| /COMPARE      | Causes BACKUP to compare the contents of the first parameter with the contents of the second parameter.                                                                                                                                                                                                                                       |
| /CONFIRM      | Displays prompts on your terminal for confirmation before processing each file.                                                                                                                                                                                                                                                               |
| /CRC          | As an input save-set qualifier, /CRC checks the software cyclic redundancy check (CRC) encoded in the save set's data blocks.<br>As an output save-set qualifier, /CRC specifies that the CRC is to be computed and stored in the data blocks of the output save set.                                                                         |
| /CREATED      | Selects files according to the value of the creation date field in each file header record.                                                                                                                                                                                                                                                   |
| /DELETE       | Specifies that a BACKUP save or copy operation is to delete the selected input files from the input volume after all files have been successfully processed.                                                                                                                                                                                  |
| /DENSITY      | Specifies the recording density of the output magnetic tape in bits per inch (bits/in).                                                                                                                                                                                                                                                       |
| /EXACT_ORDER  | Specifies the exact order of tape volume labels that you want to use in a BACKUP operation.                                                                                                                                                                                                                                                   |
| /EXCLUDE      | Excludes files from processing that otherwise meet the selection criteria for a save or copy operation.                                                                                                                                                                                                                                       |

(continued on next page)

**Table 7-3 (Cont.) BACKUP Qualifier Summary**

| Qualifier                  | Description                                                                                                                                                                                                                                                                                                                    |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>/EXPIRED</code>      | Selects files according to the value of the expiration date field in each file header record.                                                                                                                                                                                                                                  |
| <code>/FAST</code>         | Processes the input specifier using a fast file scan to reduce processing time.                                                                                                                                                                                                                                                |
| <code>/FULL</code>         | Displays the information produced by the <code>/LIST</code> command qualifier in a format similar to that displayed by the DCL command <code>DIRECTORY/FULL</code> .                                                                                                                                                           |
| <code>/GROUP_SIZE</code>   | Defines the number of blocks BACKUP places in each redundancy group.                                                                                                                                                                                                                                                           |
| <code>/IGNORE</code>       | Specifies that a BACKUP save or copy operation will override restrictions placed on files or will not perform tape label processing checks.                                                                                                                                                                                    |
| <code>/IMAGE</code>        | Directs BACKUP to process an entire volume or volume set.                                                                                                                                                                                                                                                                      |
| <code>/INCREMENTAL</code>  | Allows you to restore a disk volume from a series of incremental save sets.                                                                                                                                                                                                                                                    |
| <code>/INITIALIZE</code>   | Initializes an output disk volume, making its entire previous contents unavailable.                                                                                                                                                                                                                                            |
| <code>/INTERCHANGE</code>  | Directs BACKUP to process files in a manner suitable for data interchange (software distribution) by excluding information that would prevent other utilities or sites from reading the BACKUP save set.                                                                                                                       |
| <code>/JOURNAL</code>      | Specifies that a BACKUP save operation is to create, or append information to, a BACKUP journal file.                                                                                                                                                                                                                          |
| <code>/LABEL</code>        | Specifies the 1- to 6- character volume labels for the magnetic tapes to which the save set is written.                                                                                                                                                                                                                        |
| <code>/LIST</code>         | Lists information about a BACKUP save set and about the files in a save set.                                                                                                                                                                                                                                                   |
| <code>/LOG</code>          | Displays the file specification of each file processed during the operation on <code>SYS\$OUTPUT</code> .                                                                                                                                                                                                                      |
| <code>/MEDIA_FORMAT</code> | Controls whether data records are automatically compacted and blocked together.                                                                                                                                                                                                                                                |
| <code>/MODIFIED</code>     | Selects files according to the value of the modified date field (the date the file was last modified) in each file header record.                                                                                                                                                                                              |
| <code>/NEW_VERSION</code>  | Creates a new version of a file if a file with an identical specification already exists at the location to which the file is being restored or copied.                                                                                                                                                                        |
| <code>/OVERLAY</code>      | Writes over an existing file when an identically named file is encountered during the restore operation.                                                                                                                                                                                                                       |
| <code>/OWNER_UIC</code>    | The <code>/OWNER_UIC</code> qualifier has been superseded by the <code>/BY_OWNER</code> qualifier. Digital recommends that you substitute <code>/BY_OWNER</code> for <code>OWNER_UIC</code> in command procedures and operator instructions. See the description of the <code>/BY_OWNER</code> qualifier for more information. |
| <code>/PHYSICAL</code>     | Specifies that a BACKUP operation is to ignore any file structure on the input volume and to process the volume in terms of logical blocks.                                                                                                                                                                                    |

(continued on next page)



# BACKUP

**Table 7-3 (Cont.) BACKUP Qualifier Summary**

| Qualifier        | Description                                                                                                                                                                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| /PROTECTION      | When you create a save set on disk, this qualifier defines the protection to be applied to an output save set. When you create a save set on magnetic tape, this qualifier defines the protection to be applied to the magnetic tape volume.                              |
| /RECORD          | Records the current date and time in the BACKUP date field of each file header record once a file is successfully saved or copied.                                                                                                                                        |
| /RELEASE_TAPE    | Dismounts and unloads a tape after a BACKUP save operation either writes and verifies the save set, or reaches the end of the tape.                                                                                                                                       |
| /REPLACE         | Replaces a file on the output specifier with an identically named file from the input specifier.                                                                                                                                                                          |
| /REWIND          | As an input save-set qualifier, /REWIND rewinds the input tape reel to the beginning-of-tape marker before reading the input volume.<br>As an output save-set qualifier, /REWIND rewinds the output tape to the beginning-of-tape marker and initializes the output tape. |
| /SAVE_SET        | As an input save-set qualifier, /SAVE_SET directs BACKUP to treat the input file as a BACKUP save set.<br>As an output save-set qualifier, /SAVE_SET directs BACKUP to treat the output file as a BACKUP save set.                                                        |
| /SELECT          | Selects the specified files for processing.                                                                                                                                                                                                                               |
| /SINCE           | Selects files dated equal to or later than the specified date and time.                                                                                                                                                                                                   |
| /TAPE_EXPIRATION | Writes a file expiration date other than the current date to the file header label of the save set.                                                                                                                                                                       |
| /TRUNCATE        | Controls whether a copy or restore operation truncates a sequential output file at the end-of-file (EOF) when creating it.                                                                                                                                                |
| /VERIFY          | Specifies that the contents of the output specifier be compared with the contents of the input specifier after a save, restore, or copy operation is completed.                                                                                                           |
| /VOLUME          | Indicates that a specific disk volume in a disk volume set is to be processed.                                                                                                                                                                                            |

---

## /ASSIST

### Command Qualifier

Allows operator or user intervention during a BACKUP operation if a magnetic tape mount request fails or if an operation requires another volume.

### Format

**/[NO]ASSIST** input-specifier output-specifier

## Description

The /ASSIST qualifier causes BACKUP to send messages to operator terminals when a failure occurs during a BACKUP mount request or when an operation requires another volume. BACKUP sends messages to operator terminals enabled to receive TAPES and CENTRAL messages. (See the description of the REPLY command in the *OpenVMS DCL Dictionary* for information about enabling and disabling operator terminals.) If a failure occurs, the operator can either abort the operation or correct the error condition and allow the operation to continue.

If no operator terminal is enabled to receive TAPES and CENTRAL messages and to respond to a mount assist request, a message is displayed informing the user of the situation. If a volume is placed in the requested drive, no additional operator response is necessary. Any operator reply to a mount request is written to SYS\$OUTPUT. When BACKUP is run interactively, SYS\$OUTPUT is the user's terminal. When BACKUP is run in batch mode, SYS\$OUTPUT is the batch job log file.

If you specify /NOASSIST, mount messages appear on your terminal and are not sent to the operator.

The default is /ASSIST. The /NOASSIST qualifier has no effect if the logical name SYS\$COMMAND points to a device that is not a terminal (as is the case when you run BACKUP in a batch job). Specifying /NOASSIST when BACKUP is run in batch mode has no effect.

## Example

```
$ BACKUP/NOASSIST [PAYROLL]*.*;* MTA1:PAYROLL.BCK/LABEL=WKY101
```

This command mounts the volume labeled WKY101 on the MTA1 tape drive and copies all files in the [PAYROLL] directory to a save set named PAYROLL.BCK. The /NOASSIST qualifier directs BACKUP to send mount messages to your terminal rather than to the operator terminal. The WKY101 label indicates that WKY101 is a weekly BACKUP tape in group 1, volume number 01. (If the volume label of the tape is not WKY101, you can direct BACKUP to write the save set to the tape by choosing the OVERWRITE option at the BACKUP> prompt.)

---

## /BACKUP

### Input File-Selection Qualifier

Selects files according to the BACKUP date written in the file header record by the BACKUP/RECORD command.

### Format

input-specifier/**BEFORE**=time/**BACKUP** output-specifier

input-specifier/**SINCE**=time/**BACKUP** output-specifier

## BACKUP /BACKUP

### Description

The /BACKUP qualifier is valid with Files-11 Structure Level 2 volumes only and must be used with either the /BEFORE or /SINCE qualifier. You cannot use /BACKUP with the /CREATED, /MODIFIED, or /EXPIRED qualifiers in an image operation or in a physical operation.

The /BACKUP qualifier selects files by comparing the date and time recorded in the BACKUP field of the file header record with the date and time specified with the /BEFORE or /SINCE qualifier. The date and time recorded in the file header record is the date and time the file was last saved or copied using the /RECORD command qualifier.

When you use /BACKUP with /BEFORE, files with a BACKUP date prior to the specified date or time are selected. Files with no BACKUP date (/RECORD was not specified when the file was saved or copied) are also selected.

When you use /BACKUP with /SINCE, files with a BACKUP date equal to or later than the specified date or time are selected. Files with no BACKUP date (/RECORD was not specified when the file was saved or copied) are also selected.

### Examples

1. \$ BACKUP/RECORD  
\_From: [PAYROLL]\*.\*;/BEFORE=01-SEP-1993/BACKUP  
\_To: MTA1:SEP01.BCK

In this command, the /BACKUP qualifier combined with the /BEFORE qualifier saves all versions of all files in the directory [PAYROLL] that have a BACKUP date written before September 1, 1993. The command qualifier /RECORD writes the date and time of the save operation to the file header record of each saved file.

2. \$ BACKUP/RECORD [ACCOUNTS...]/SINCE=YESTERDAY/BACKUP MTA1:ACC.BCK

In this command, the /BACKUP qualifier combined with the /SINCE qualifier saves all files in all subdirectories of [ACCOUNTS] that have a BACKUP date written since yesterday (24 hours before midnight last night). The command qualifier /RECORD writes the date and time of the save operation to the file header record of each saved file.

---

## /BEFORE

### Input File-Selection Qualifier

Selects files dated earlier than the date and time you specify.

### Format

input-specifier/**BEFORE**=time output-specifier

## Description

The /BEFORE qualifier selects files by comparing the date and time in the specified field of each file header record with the date and time you specify in the command line. The following list shows the other input file-selection qualifiers you can use with /BEFORE and their functions. Use these other qualifiers only one at a time in your command line.

|           |                                                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------|
| /BACKUP   | Selects files last saved or copied by BACKUP/RECORD before the date specified. Also selects files with no BACKUP date.                 |
| /CREATED  | Selects files created before the date specified.                                                                                       |
| /EXPIRED  | Selects files that have expired as of the date specified.                                                                              |
| /MODIFIED | Selects files last modified before the date specified. If you specify /BEFORE without another qualifier, /MODIFIED is used by default. |

Specify the date and time as a delta time or as an absolute time using the format [dd-mmm-yyyy[:]][hh:mm:ss.cc]. You can also use one of the following reserved words to specify the date and time:

|           |                                                                                                                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------|
| BACKUP    | The BACKUP date of the file written by a previous BACKUP /RECORD operation (available only on Files-11 Structure Level 2 volumes) |
| TODAY     | The current day, month, and year at 00:00:00.0 o'clock                                                                            |
| TOMORROW  | 24 hours after midnight last night                                                                                                |
| YESTERDAY | 24 hours before midnight last night                                                                                               |

The /BEFORE qualifier is not valid in incremental restore operations.

## Example

```
$ BACKUP [POLICIES]*.*;/BEFORE=TODAY/EXPIRED DMA1:OLDPOL.BCK/SAVE_SET
```

This command saves all files in the directory [POLICIES] that have expiration dates preceding today's date.

---

## /BLOCK\_SIZE

### Output Save-Set Qualifier

Specifies the output block size in bytes for data records in a BACKUP save set.

### Format

input-specifier output-save-set-spec/**BLOCK\_SIZE**=n

### Description

You can specify a block size between 2048 and 65,535 bytes. BACKUP may adjust this value according to the constraints of the BACKUP format. Although BACKUP may adjust the block size you specify, it does not adjust the block size over the maximum of 65,535.

## BACKUP /BLOCK\_SIZE

If you specify /BLOCK\_SIZE in a magnetic tape save operation, BACKUP ignores any block size defined by the /BLOCK\_SIZE qualifier to the DCL command MOUNT.

If the block size is set to a large value for a save set on magnetic tape, it is possible for the magnetic tape to run off its reel or for a large number of write errors to be logged. If this occurs, avoid using large block sizes. If the problem recurs with the same magnetic tape, avoid using that tape for future BACKUP operations.

The default block size for magnetic tape is 8192 bytes; the default for disk is 32,256 bytes.

### Example

```
$ BACKUP/RECORD DRA2:[LEE...]/SINCE=BACKUP MTA0:SAVEWORK.BCK/BLOCK_SIZE=10000
```

This command saves a directory tree on DRA2 to a magnetic tape mounted on drive MTA0. The input file-selection qualifier /SINCE=BACKUP instructs BACKUP to process only those files in the specified directory tree that have been modified since the last BACKUP/RECORD operation. The output save-set qualifier /BLOCK\_SIZE directs BACKUP to assign a block size of 10,240 (BACKUP rounds the specified block size of 10,000 up to the next multiple of 512).

---

## /BRIEF

### Command Qualifier

Lists the file specification, size, and creation date for each file in the save set. (The size listed is the actual size of the file saved, rather than the number of blocks allocated to the file.) The /BRIEF qualifier is valid only with the /LIST qualifier and is the default format for BACKUP listings. Specify the /FULL qualifier to list the information in a format similar to that displayed by the DCL command DIRECTORY/FULL.

### Format

```
/LIST/BRIEF save-set-spec
```

### Example

```
$ BACKUP/LIST/BRIEF DBA2:[SAVE]23MAR93.BCK/SAVE_SET
```

Listing of save set(s)

```
Save set: 23MAR93.BCK
Written by: MOROCI
UIC: [000200,000200]
Date: 23-MAR-1993 14:18:16.96
Command: BACKUP [SAVE] DBA2:[SAVE]23MAR93.BCK/SAVE_SET
Operating system: VAX/VMS version 5.5
```

```
BACKUP version: V5.5
CPU ID register: 08000000
Node name: _SUZI::
Written on: _DBA2:
Block size: 32,256
Group size: 10
Buffer count: 3

[SAVE]INFO.TXT;4 5 4-FEB-1993 13:12
[SAVE]LAST.DAT;1 1 18-JAN-1993 14:11
[SAVE]WORK.DAT;3 33 1-JAN-1993 10:02

Total of 3 files, 39 blocks
End of save set
```

This command lists the BACKUP summary information and the file name, size, and creation date for each file in the save set. Note that the input save-set qualifier /SAVE\_SET is required to identify the input specifier as a save set on a Files-11 medium.

---

## **/BUFFER\_COUNT**

### **Command Qualifier**

This qualifier is obsolete. You can still specify the /BUFFER\_COUNT qualifier, although it has no effect. (This ensures that command procedures containing this qualifier will still operate correctly.) Digital recommends that you remove the /BUFFER\_COUNT qualifier from command procedures.

---

## **/BY\_OWNER**

### **Input File-Selection Qualifier**

Selects files for processing according to the user identification code (UIC).

### **Format**

input-specifier/**BY\_OWNER**[=[uic]] output-specifier

### **Description**

If you specify /BY\_OWNER without a UIC, BACKUP selects all files whose UIC matches that of the current process.

Specify either a numeric UIC as octal numbers or an alphanumeric UIC in the form [g,m]. Wildcards are permitted. Note that the brackets are required.

[g,m]

**g** An octal number in the range 0 to 37776 representing the group number or an alphanumeric group name

**m** An octal number in the range 0 to 177776 representing the member number or an alphanumeric member name

If you do not specify /BY\_OWNER, BACKUP processes all files specified by the input specifier.

## BACKUP /BY\_OWNER

### Examples

1. \$ BACKUP [SNOW...]/BY\_OWNER MT\$DRIVE:SNOW.BCK/LABEL=TAPE01

In this example, BACKUP mounts the tape with the label TAPE01 on drive MT\$DRIVE and saves all files in the directory and subdirectories of [SNOW] with the UIC of the current default process to the save set SNOW.BCK.

2. \$ BACKUP [SUNDANCE]/BY\_OWNER=[727,46] DBA1:STABLE.BCK/SAVE\_SET

In this example, all files in the directory [SUNDANCE] with an owner UIC of [727,46] are saved to the sequential-disk save set STABLE.BCK on DBA1.

---

## /BY\_OWNER

### Output File Qualifier

Redefines the owner user identification code (UIC) for restored files.

### Format

input-specifier output-specifier/**BY\_OWNER**[=option]

### Description

The following are available options:

|          |                                                                                                                                                                                                                                                                                                                                     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DEFAULT  | Sets the owner UIC to the user's current default UIC. This option is the default if you do not specify the /BY_OWNER qualifier, except in image and incremental restore operations, when ORIGINAL is the default option.                                                                                                            |
| ORIGINAL | Retains the owner UIC of the file being restored. This option is the default if you specify the /BY_OWNER qualifier with no option. This option is also the default for incremental restore operations. To use this option, the UIC must be yours, or you must have the SYSPRV user privilege or be the owner of the output volume. |
| PARENT   | Sets the owner UIC to the owner UIC of the directory to which the file is being restored or copied. To use this option, the parent UIC must be yours, or you must have the SYSPRV user privilege or be the owner of the output volume.                                                                                              |
| [uic]    | Sets the owner UIC to the UIC specified. Use the [g,m] format (as described in the input file-selection qualifier /BY_OWNER). To use this option, the UIC must be yours, or you must have the SYSPRV user privilege or be the owner of the output volume.                                                                           |

In restore operations where the command qualifier /IMAGE or /INCREMENTAL is specified, the default is /BY\_OWNER=ORIGINAL.

## Example

```
$ BACKUP DBA2:ACCOUNTS.BCK/SAVE_SET [CLEAVER...]/BY_OWNER=PARENT
```

In this example, the sequential-disk save set ACCOUNTS.BCK is restored to the directory tree [CLEAVER...], assigning each restored file the owner UIC of the [CLEAVER] directory.

---

## /BY\_OWNER

### Output Save-Set Qualifier

Specifies the owner user identification code (UIC) of the save set.

### Format

input-specifier output-save-set-spec/**BY\_OWNER**=uic

### Description

If the **/BY\_OWNER** qualifier is omitted, the UIC of the current process is used. To use this qualifier on Files-11 save sets, you need the user privilege SYSPRV, or the UIC must be your own.

Specify either a numeric UIC as octal numbers or an alphanumeric UIC in the form [g,m]. Wildcards are permitted. Note that the brackets are required.

[g,m]

g An octal number in the range 0 to 37776 representing the group number or alphanumeric group name

m An octal number in the range 0 to 17776 representing the member number or alphanumeric member name

## Example

```
$ BACKUP [CLEAVER...] MFA2:ACCOUNTS.BCK/BY_OWNER=[301,310]/LABEL=TAPE01
```

In this example, BACKUP mounts the tape with the label TAPE01 on drive MFA2. Next, BACKUP saves the directory tree [CLEAVER...] to a save set named ACCOUNTS.BCK. The output save-set qualifier **/BY\_OWNER** assigns an owner UIC of [301,310] to the save set.

---

## /COMMENT

### Output Save-Set Qualifier

Places a comment in an output save set. If the comment string is longer than one word or if it contains nonalphanumeric characters, you must enclose it in quotation marks ( " "). A comment can contain up to 1024 characters.



## BACKUP /COMMENT

### Format

input-specifier output-save-set-spec /COMMENT=string

### Example

```
$ BACKUP [REMARKS] DMA1:20JULREM.BCK/SAVE_SET -
$ /COMMENT="Remote operations for July 20, 1993"
$ BACKUP/LIST DMA1:20JULREM.BCK/SAVE_SET
Listing of save set

Save set: 20JULREM.BCK
Written by: WALRUS
UIC: [360,054]
Date: 20-JUL-1993 15:22:06.62
Command: BACKUP [REMARKS] DMA1:20JULREM.BCK/SAVE_SET/COMMENT=Remote
 operations for July 20, 1993
Operating system: VMS Version V5.5

BACKUP version: V5.5
CPU ID register: 0138084C
Node name: ABBEY::
Written on: ABBEY$DMA1:
Block size: 32256
Group size: 10
Buffer count: 3

[REMARKS]BAC.RES;1 2 20-JUL-1993 14:13
[REMARKS]COM.LIS;1 1 20-JUL-1993 14:04
[REMARKS]DTP.DIR;1 1 20-JUL-1993 14:18
.
.
.
Total of 40 files, 535 blocks
End of save set
```

The first BACKUP command saves the directory [REMARKS] to a sequential-disk save set and records a comment. The BACKUP/LIST command displays the contents of the newly created save set. Note that the /SAVE\_SET qualifier is required when creating a save set on disk.

---

## /COMPARE

### Command Qualifier

Compares the save set, device, file, or files specified by the first parameter with the contents of the Files-11 device, file, or files specified by the second parameter and displays an error message if it finds a difference.

### Format

```
/COMPARE file-spec file-spec
/COMPARE save-set-spec file-spec
/IMAGE/COMPARE device-spec device-spec
/PHYSICAL/COMPARE device-spec device-spec
```

## Description

In a BACKUP compare operation, the first parameter can be a Files-11 file or a wildcard character representing a set of files, a BACKUP save set on disk or magnetic tape, a tape device, or a disk device. The second parameter must be a Files-11 disk file, a wildcard character representing a set of files or a Files-11 disk device, unless you specify the command qualifier /PHYSICAL. When you specify /PHYSICAL, and the first parameter specifies a disk device, both disks in the compare operation must be mounted with the /FOREIGN qualifier.

BACKUP displays the following error message if it encounters a difference between files it compares:

```
%BACKUP-E-VERIFYERR, verification error for ...
```

Use the /COMPARE qualifier to compare a save set with original files or to compare files or volumes copied using BACKUP with original files. Because BACKUP processes files by blocks, comparing files not produced by BACKUP is likely to cause mismatch errors in files that are apparently identical.

If you do not specify a version number with the file specification, the default is ;\* (the asterisk wildcard character), which processes all versions of the file.

Both parameters in a compare operation are input specifiers.

If you are comparing two entire Files-11 volumes, use an image compare operation, as follows:

```
$ BACKUP/IMAGE/COMPARE DBA1: DBA2:
```

You cannot use the command qualifier /DELETE or /RECORD in compare operations.

Do not perform compare operations on files that were restored or copied using the output file qualifier /NEW\_VERSION because this qualifier causes version numbers to change.

## Examples

1. \$ BACKUP/COMPARE JAZZ.DAT BLUES.DAT

This example compares two Files-11 files. Because no version number is specified, BACKUP compares all versions of each file.

2. \$ BACKUP/COMPARE/IMAGE MTA0:SWING.BCK DBA2:

This example compares an image save set stored on magnetic tape and a Files-11 volume.

---

## /CONFIRM

### Input File-Selection Qualifier

Displays prompts on your terminal for confirmation before processing each file. If you want the file to be processed, enter Y or YES and press Return.

## BACKUP /CONFIRM

### Format

input-specifier/**CONFIRM** output-specifier

### Example

```
$ BACKUP *.LIS/CONFIRM/LOG DLA2:LIST.BCK/SAVE SET
DISK$DEFAULT:[WONDER]CRE.LIS;1, copy? (Y or N): Y
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]CRE.LIS;1
DISK$DEFAULT:[WONDER]CRETIME.LIS;1, copy? (Y or N): Y
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]CRETIME.LIS;1
DISK$DEFAULT:[WONDER]EXC.LIS;1, copy? (Y or N): Y
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]EXC.LIS;1
DISK$DEFAULT:[WONDER]REB.LIS;1, copy? (Y or N): N
DISK$DEFAULT:[WONDER]SETREB.LIS;1, copy? (Y or N): Y
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]SETREB.LIS;1
DISK$DEFAULT:[WONDER]VERS.LIS;1, copy? (Y or N): N
.
.
.
$
```

This command locates all files with a file type of .LIS and prompts for confirmation before saving each file to LIST.BCK on DLA2. The command qualifier /LOG displays information about each file as it is processed. Note that you must use the output save-set qualifier SAVE\_SET when creating a save set on disk.

---

## /CRC

### Input Save-Set Qualifier

Specifies that the software cyclic redundancy check (CRC) is to be performed.

### Format

input-save-set-spec/[**NO**]CRC output-specifier

### Description

The default is /CRC. To disable CRC checking, specify /NOCRC; note that use of /NOCRC reduces processing time but increases the risk of data loss.

### Example

```
$ BACKUP MTA2:928SAVE.BCK/NOCRC []
```

This command restores the save set 928SAVE.BCK to the current default directory, indicated by ([]); the input save-set qualifier /NOCRC disables CRC.

---

**/CRC****Output Save-Set Qualifier**

Specifies whether the software cyclic redundancy check (CRC) is to be computed and stored in the data blocks of the output save set.

**Format**

input-specifier output-save-set-spec/[**NO**]CRC

**Description**

The default is /CRC. To disable checking, use /NOCRC; note that use of /NOCRC reduces processing time but increases the risk of data loss.

**Example**

```
$ BACKUP/RECORD []/SINCE=BACKUP MTA2:928SAVE.BCK/NOCRC
```

This command saves all files in the current default directory that have been created or modified since the last BACKUP/RECORD operation to the save set 928SAVE.BCK; the output save-set qualifier /NOCRC disables cyclic redundancy checking.

---

**/CREATED****Input File-Selection Qualifier**

Selects files according to the value of the creation date field in each file header record.

**Format**

input-specifier/**BEFORE**=time/**CREATED** output-specifier

input-specifier/**SINCE**=time/**CREATED** output-specifier

**Description**

You must use either the /BEFORE qualifier or the /SINCE qualifier with /CREATED. The date and time you specify with /BEFORE or /SINCE determine which files should be processed.

You cannot use /CREATED with the /BACKUP, /MODIFIED, or /EXPIRED qualifiers.

**Example**

```
$ BACKUP *.SDML/SINCE=YESTERDAY/CREATED DLA2:[SAVEDIR]/SAVE_SET
```

The command in this example saves all files with a file type of .SDML created since yesterday (24 hours before midnight last night).

## BACKUP /DELETE

---

### /DELETE

#### Command Qualifier

Specifies that a BACKUP save or copy operation is to delete the selected input files from the input volume after all files have been successfully processed.

#### Format

/DELETE file-spec save-set-spec

#### Description

The /DELETE qualifier is valid only when used in a BACKUP save or copy operation. You must have sufficient privilege to delete files; if you do not, files protected against deletion are not deleted. If you use the command qualifier /VERIFY with /DELETE, files that fail verification are not deleted.

You cannot use /DELETE with the /RECORD or /COMPARE command qualifiers.

#### Examples

1. \$ BACKUP/DELETE BOP.DAT MTA0:BOP.BCK/LABEL=DANCE

In this example, the file BOP.DAT will be deleted after the save set BOP.BCK is successfully created on MTA0.

2. \$ BACKUP/VERIFY/DELETE RAY.DAT,JOE.DAT,ELLA.DAT MTA0:OSCAR.BCK/LABEL=FRIEND

The BACKUP command deletes the selected list of files in this example after saving them to OSCAR.BCK on MTA0 and comparing the output save set with the input files. If BACKUP detects a difference between the contents of the output save set and the input file, the input file is not deleted.

---

### /DENSITY

#### Output Save-Set Qualifier

Specifies the recording density of the output magnetic tape in bits per inch (bits/in). You must specify the output save-set qualifier /REWIND with /DENSITY.

#### Format

input-specifier output-save-set-spec/DENSITY=n

#### Description

The value that you specify must be supported by your magnetic tape hardware. If you omit this qualifier, the default density is the current density on the output tape drive.

The /DENSITY qualifier is incompatible with the output save-set qualifier /NOREWIND. You must specify the output save-set qualifier /REWIND to initialize the magnetic tape when using the /DENSITY qualifier. When you specify /DENSITY/REWIND, BACKUP rewinds the tape to the beginning-of-tape.

Then BACKUP initializes the tape with the new density, removing access to all data that previously resided on the tape.

## Example

```
$ BACKUP *.PAS MTA2:SAVEPAS.BCK/DENSITY=1600/REWIND/LABEL=PASCAL
```

The magnetic tape on drive MTA2 is initialized. All files with a file type of .PAS in the current default directory are saved to the save set SAVEPAS.BCK. The /DENSITY qualifier sets the recording density to 1600 bits/in.

---

## /EXACT\_ORDER

### Output Save-Set Qualifier

Depending on the other qualifiers you specify on the command line, the /EXACT\_ORDER qualifier allows you to do the following:

- Specify the exact order of tape volume labels that you want to use in a BACKUP operation.
- Preserve the existing volume label on a tape.
- Prevent previous volumes of a multivolume save operation from being overwritten.

## Format

input-specifier output-save-set-spec/**EXACT\_ORDER**

## Description

The /EXACT\_ORDER qualifier allows you to do the following:

- Specify the exact order of tape volume labels that you want to use in a BACKUP operation. You must use the /LABEL=(label1,label2,...) qualifier to specify the order of the labels. BACKUP continues the operation as long as the label of the tape in the drive matches the corresponding label on the command line. If you do not specify enough labels on the command line to complete the operation, BACKUP prompts you to enter a label for the tape in the drive.
- Preserve the existing volume label on a tape. If you do not use the /LABEL qualifier on the command line and the tape has an ANSI label, BACKUP uses the existing label.
- Prevent previous volumes of a multivolume save operation from being overwritten. BACKUP keeps track of the volume labels you have already used in the operation. If you accidentally mount one of the previous volumes, BACKUP displays the following error message:

```
%BACKUP-W-MOUNTERR, volume 1 on MKB100: was not mounted because
its label does not match the one requested
Volume with label TAPE1 was already used in this save operation
specify option (QUIT or NEW tape)
BACKUP>
```

## BACKUP /EXACT\_ORDER

Note the following restrictions when you use the /EXACT\_ORDER output qualifier:

- If you use the /EXACT\_ORDER qualifier, you cannot specify a label longer than six characters on the command line. If you specify a label longer than six characters, BACKUP displays the following error message:  

```
%BACKUP-F-INVQUAVAL, value 'label_name' invalid for /LABEL qualifier
```
- You cannot use the /IGNORE=LABEL\_PROCESSING qualifier with the /EXACT\_ORDER qualifier.
- You cannot use /REWIND as an output qualifier with the /EXACT\_ORDER qualifier.
- If you use the /LABEL qualifier with the /EXACT\_ORDER qualifier, you cannot specify duplicate labels.

### Examples

1. 

```
$ BACKUP/IMAGE/RECORD/VERIFY/NOASSIST
_From: DKA100:
_To: MKB100:MAR11.SAV/LABEL=(TAPE1,TAPE2,TAPE3)/EXACT_ORDER
```

This example uses the /EXACT\_ORDER qualifier to specify the exact order of labels for the BACKUP operation. Note that if you specify the /ASSIST qualifier, BACKUP would display messages on the operator terminal. BACKUP does the following:

- a. Compares the volume label of the tape in MKB100: with the first label that you specified on the command line (TAPE1). If the labels match exactly, BACKUP begins the save operation. If the labels do not match or if the tape does not have an ANSI label, BACKUP displays the following message:

```
%BACKUP-W-MOUNTERR, volume 1 on MKB100: was not mounted because
its label does not match the one requested
%BACKUP-W-EXLABEER, volume label processing failed because
volume TAPE4 is out of order, Volume label TAPE1 was expected
specify option (QUIT, NEW tape, OVERWRITE tape, USE loaded tape)
BACKUP> OVERWRITE
```

Depending on the option you specify, you can quit the backup operation (QUIT), dismount the old tape and mount a new one (NEW), overwrite the label and the data on the tape (OVERWRITE), or write the data to the tape using the loaded tape's label (USE).

- b. When the operation fills the first tape, it displays the following message:  

```
%BACKUP-I-RESUME, resuming operation on volume 2
%BACKUP-I-READYWRITE, mount volume TAPE2 on MKB100: for writing
Respond with YES when ready:
```
- c. When you load the second tape and enter YES, BACKUP compares the label of the second tape with the second label you specified on the command line (TAPE2) just as it did in step 1a.
- d. Assuming the volume labels match, BACKUP continues processing until it completes the operation or runs out of volume labels. If you do not specify enough labels on the command line to complete the operation, BACKUP prompts you to enter a label for the tape in the drive as follows:

## BACKUP /EXACT\_ORDER

```
%BACKUP-W-MOUNTERR, volume 4 on MKB100: was not mounted because
the label was not specified
specify EXACT_ORDER label (up to 6 characters)
BACKUP>
```

BACKUP then compares the label on the tape with label you specify as described previously.

2. \$ BACKUP/IMAGE/RECORD/VERIFY/NOASSIST  
From: DKA100:[TEST]  
To: MKB100:MAR11.SAV/EXACT\_ORDER

Because this example does not use the /LABEL qualifier, BACKUP uses the existing label on the tape. If the tape does not have an ANSI label, and it is the first tape in the operation, BACKUP displays the following error message:

```
%BACKUP-F-NOTANSI, tape is not valid ANSI format
```

If the tape does not have an ANSI label, and is not the first tape in the operation, BACKUP displays the following error message prompting you to specify a label:

```
%BACKUP-W-MOUNTERR, volume 2 on MKB100: was not mounted because
the label was not specified
specify EXACT_ORDER label (up to 6 characters)
BACKUP>
```

---

### Note

BACKUP checks to make sure you specify a valid label. If the label is not valid (for example, longer than six characters), BACKUP displays an error message. In previous versions of the OpenVMS operating system, BACKUP truncated long volume labels.

---

---

## /EXCLUDE

### Input File-Selection Qualifier

Excludes files that otherwise meet the selection criteria for a save or copy operation. The excluded files are not processed.

### Format

input-specifier/**EXCLUDE**=(file-spec[...]) output-specifier

### Description

If you specify more than one file, separate the file specifications with commas and enclose the list in parentheses. Do not use a device specification when defining the files to be excluded. You can use most standard wildcard characters, but you cannot use wildcard characters denoting latest versions of files (;) or relative versions of files (;-n).

Note that BACKUP does not apply temporary file specification defaults within the list. Each file specification independently takes its defaults from the file specification [000000 . . . ]\*.\*.\*.



## **BACKUP /EXCLUDE**

If you specify directory files (files with the file type `.DIR`), your command is processed but the directory files are not excluded (they are processed). `BACKUP` uses directory files to facilitate incremental restore operations.

You cannot use the `/EXCLUDE` qualifier in image restore operations.

### **Example**

```
$ BACKUP
_From: DRA2:[CONTRACTS]/BEFORE=TODAY/EXCLUDE=(*.OBJ,*.MAI)
_To: MFA0:CONTRACT.BCK/LABEL=DLY102
```

All files in the directory `[CONTRACTS]` that have a modification date prior to today (the current day, month, and year at 00:00:00.0 o'clock) are saved to the save set `CONTRACT.BCK` on drive `MFA0`, except for those with a file type of `.OBJ` or `.MAI`.

---

## **/EXPIRED**

### **Input File-Selection Qualifier**

Selects files according to the value of the expiration date field in each file header record.

### **Format**

input-specifier/**BEFORE**=time **/EXPIRED** output-specifier

input-specifier/**SINCE**=time **/EXPIRED** output-specifier

### **Description**

You must use the input file-selection qualifier `/BEFORE` or `/SINCE` with `/EXPIRED`. The date and time you specify to `/BEFORE` or `/SINCE` determines which files are processed.

You cannot use `/EXPIRED` with the input file-selection qualifiers `/BACKUP`, `/MODIFIED`, or `/CREATED`.

### **Example**

```
$ BACKUP [CONTRACTS]/BEFORE=TOMORROW/EXPIRED MTA1:30DEC.BCK/LABEL=WK04
```

This command saves all files in the directory `[CONTRACTS]` that have an expiration date prior to tomorrow (24 hours after midnight last night) to a save set named `30DEC.BCK`.

---

**/FAST****Command Qualifier**

Processes the input specifier using a fast file scan to reduce processing time. The input specifier must be a Files-11 disk.

**Format**

`/FAST input-specifier output-specifier`

**Description**

The fast file scan reads the index file on the Files-11 disk specified by the input specifier and creates a table of files that match the qualifiers you specified.

To perform a fast file scan, you need write access to the INDEXF.SYS file on the input medium, or the input medium must be write-locked. This requirement is necessary because BACKUP opens the index file to synchronize with the file system, whether or not any update is made.

A fast file scan is most useful when the input specifier includes most of the files on the volume, and file-selection qualifiers (such as those that pertain to date or owner) specify a relatively small set of the files named. Because image operations implicitly use the fast file scan, the /FAST qualifier is ignored if used with the command qualifier /IMAGE.

You cannot use /FAST in restore operations.

**Example**

```
$ BACKUP/FAST
 From: DBA1:[*...]/MODIFIED/SINCE=TODAY
 To: MTA0:13NOVBAK.BCK,MTA1:/LABEL=WK201
```

In this example, all files on the disk DBA1 that have been modified today are saved to a multireel tape save set named 13NOVBAK.BCK. The /FAST qualifier is used to reduce processing time.

---

**/FULL****Command Qualifier**

Lists the file information produced by the command qualifier /LIST in the format provided by the DCL command DIRECTORY/FULL.

**Format**

`/LIST/FULL input-specifier [output-specifier]`

# BACKUP /FULL

## Description

The /FULL qualifier is valid only with the command qualifier /LIST.

If you do not specify /FULL with /LIST, the /LIST qualifier uses the default command qualifier /BRIEF and lists only the file specification, size, and creation date of each file. When you specify /FULL, the list includes more information from the file header records, such as the BACKUP date, date of last modification, number of blocks allocated to the file, file protection and organization, and record attributes.

## Example

```
$ BACKUP/LIST/FULL MTA1:ROCK.BCK
Listing of save set(s)

Save set: ROCK.BCK
Written by: RINGO
UIC: [000200,000300]
Date: 20-AUG-1993 15:39:38.89
Command: BACKUP [.STONES] MTA0:ROCK.BCK/LABEL=BACKUP

Operating system: VAX/VMS version 5.5

BACKUP version: V5.5
CPU ID register: 08000000
Node name: SUZI:
Written on: MTA0:
Block size: 8192
Group size: 10
Buffer count: 30

[RINGO.STONES]GRAPHITE.DAT;1
 Size: 1/1 Created: 18-AUG-1993 14:10
 Owner: [000200,000200] Revised: 18-AUG-1993 14:10 (2)
 File ID: (91,7,1) Expires: [None specified]
 Backup: [No backup done]
File protection: System:RWED, Owner:RWED, Group:RE, World:
File organization: Sequential
File attributes: Allocation = 1, Extend = 0
 Global Buffer Count = 0
Record format: Variable length, maximum 255 bytes
Record attributes: Carriage return

[RINGO.STONES]GRANITE.DAT;1
 Size: 1/1 Created: 18-AUG-1993 14:11
 Owner: [000200,000200] Revised: 18-AUG-1993 14:11 (2)
 File ID: (92,9,1) Expires: [None specified]
 Backup: [No backup done]
File protection: System:RWED, Owner:RWED, Group:RE, World:
File organization: Sequential
File attributes: Allocation = 1, Extend = 0
 Global Buffer Count = 0
Record format: Variable length, maximum 255 bytes
Record attributes: Carriage return

.
.
.
Total of 4 files, 16 blocks
End of save set
```

The command in this example lists the files in save set MTA1:ROCK.BCK in full format.

## **/GROUP\_SIZE**

### **Output Save-Set Qualifier**

Defines the number of blocks BACKUP places in each redundancy group.

### **Format**

input-specifier output-save-set-spec/**GROUP\_SIZE**=n

### **Description**

BACKUP writes redundant information to output save sets to protect against data loss. Using the redundant information, BACKUP can correct one *uncorrectable* read error in each redundancy group. The **/GROUP\_SIZE** qualifier specifies the number of output blocks written to each redundancy group. The value of *n* can be 0 to 100. The default value is 10.

If you define a value of 0 for **/GROUP\_SIZE**, no redundancy groups are created for the save set.

### **Example**

```
$ BACKUP/RECORD DBA1:[*...]/SINCE=BACKUP TAPE:SAVEWORK.BCK/GROUP_SIZE=5
```

This BACKUP command saves all files in the current default directory tree that have been modified since the last BACKUP/RECORD operation; the **/GROUP\_SIZE** defines the redundancy group size as 5 blocks.

---

## **/IGNORE=option**

### **Command Qualifier**

Specifies that a BACKUP save or copy operation will override restrictions placed on files or will not perform tape label processing checks.

### **Format**

**/IGNORE=option** input-specifier output-specifier

### **Description**

The **/IGNORE=option** qualifier has four options:

#### **ACCESSIBILITY**

Processes files on a tape that is protected by a volume accessibility character, or on a tape created by HSC Backup. The option applies only to tapes. It affects the first tape mounted and all subsequent tapes in the save set.

## BACKUP /IGNORE=option

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INTERLOCK        | Processes files that otherwise could not be processed due to file access conflicts. Use this option to save or copy files currently open for writing. Note that no synchronization is made with the process writing the file, so the file data that is copied might be inconsistent with the input file, depending on the circumstances (for example, if another user is editing the file, the contents might change). When a file open for writing is processed, BACKUP issues the following message:<br><br>%BACKUP-W-<br>ACCONFLICT, 'filename' is open for write by another user.<br>The INTERLOCK option is especially useful if you have files that are open so much of the time that they might not otherwise be saved. The use of this option requires the user privilege SYSPRV, a system UIC, or ownership of the volume. |
| LABEL_PROCESSING | Saves or copies the contents of files to the specified magnetic tape volume regardless of the information contained in the volume header record. BACKUP does not verify the volume label or expiration date before writing information to the tape volume. Note that you cannot use this option with the /EXACT_ORDER qualifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| NOBACKUP         | Saves or copies both the file header record and the contents of files marked with the NOBACKUP flag by the /NOBACKUP qualifier of the DCL command SET FILE. If you do not specify this option, BACKUP saves only the file header record of files marked with the NOBACKUP flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### Examples

1. \$ BACKUP/IGNORE=INTERLOCK  
    From: DUA0:[SUSAN...]  
    To: MTA0:SONGBIRD.BCK/LABEL=TAPE01

This command saves an entire directory tree and the files in all subdirectories, including any files that are open.

2. \$ BACKUP/IGNORE=LABEL\_PROCESSING \*.\*;\* MFA1:MYFILES.BCK/REWIND

This command rewinds the tape in drive MFA1 to the beginning-of-tape marker, initializes the tape, and creates a save set containing all files in the user's current directory. The command qualifier /IGNORE=LABEL\_PROCESSING specifies that no tape label processing checks are done before BACKUP initializes the tape. When the tape is initialized, access to data that previously resided on the tape is lost.

```
3. $ INITIALIZE/LABEL=VOLUME ACCESSIBILITY:"K" MUA1: 29JUN
 $ BACKUP/IGNORE=(ACCESSIBILITY)
 From: DUA0:[BOOKS...]
 To: MUA1:BACKUP.SAV /LABEL=29JUN
```

The INITIALIZE command in this example initializes the tape with an accessibility character (K) and a volume label (29JUN). The BACKUP command mounts the tape, regardless of the accessibility, and performs the BACKUP operation. For more information on tape protection, refer to the *OpenVMS System Manager's Manual*.

---

## **/IMAGE**

### **Command Qualifier**

Directs BACKUP to process an entire volume or volume set.

### **Format**

**/IMAGE** input-specifier output-specifier

### **Description**

To use the **/IMAGE** qualifier, you need write access to the volume index file (INDEXF.SYS) and the bit map file (BITMAP.SYS), or the input medium must be write-locked. BACKUP opens the index file to synchronize with the file system (no update is made). Finally, you must have read access to all files on the input medium.

---

#### **Note**

---

The input and output devices in an image operation must be different except in an image save operation when the output device is a Files-11 disk save set.

---

If the output volume is a disk, all files on the output volume are stored contiguously. Contiguous storage of files eliminates disk fragmentation and creates contiguous free blocks of disk space.

Because all files on the input volume are processed, you cannot use input file-selection qualifiers in image copy or save operations. You can, however, restore files and directories selectively from an image save set.

When performing image operations on volume sets (more than one volume), the number of volumes specified by the output specifier must be equal to the number of volumes in the input volume set.

In an image save or copy operation, BACKUP attempts to save or copy all files on the input disk volume including files marked for deletion and lost files (files without a directory entry). However, there are two types of files that a BACKUP image operation does not save or copy by default. These are files that are flagged as NOBACKUP by the DCL command SET FILE/NOBACKUP and files that are open for write access by another user at the time of the image save operation. If you want these files to be included, specify the command qualifier **/IGNORE** in the BACKUP command line. The command qualifier **/IGNORE=NOBACKUP** directs BACKUP to save or copy files flagged as NOBACKUP. The command

## BACKUP /IMAGE

qualifier /IGNORE=INTERLOCK directs BACKUP to save or copy files open for write access by another user.

An image restore or copy operation initializes the output volume or volume set. The initialization data comes from the save-volume summary record of the input volume unless the command qualifier /NOINITIALIZE is specified. Specifying /NOINITIALIZE directs BACKUP to initialize the output volume using volume initialization data that already exists on the output volume.

In image restore and copy operations, every file is restored or copied. The output volume must be mounted using the /FOREIGN qualifier. The new volume is a functionally equivalent copy of the input volume; however, file placement will change. Files are stored contiguously on the output volume.

You cannot change the structure level of the output volume in an image restore or copy operation.

### Examples

1. \$ MOUNT/FOREIGN DMA1:  
%MOUNT-I-MOUNTED, mounted on NODE\$DMA1:  
\$ BACKUP/IMAGE/LOG DLA2: DMA1:  
%BACKUP-S-CREATED, created DMA1:[000000]000000.DIR;1  
%BACKUP-S-CREATED, created DMA1:[000000]BACKUP.SYS;1  
%BACKUP-S-CREATED, created DMA1:[000000]CONTIN.SYS;1  
%BACKUP-S-CREATED, created DMA1:[000000]CORING.SYS;1  
%BACKUP-S-CREATED, created DMA1:[000000]ELLA.DIR;1  
%BACKUP-S-CREATED, created DMA1:[ELLA]SCAT.DAT;1  
%BACKUP-S-CREATED, created DMA1:[000000]JOE.DIR;1  
%BACKUP-S-CREATED, created DMA1:[JOE]STRINGS.DAT;1  
%BACKUP-S-CREATED, created DMA1:[000000]OSCAR.DIR;1  
%BACKUP-S-CREATED, created DMA1:[OSCAR]KEYS.DAT;1  
%BACKUP-S-CREATED, created DMA1:[000000]VOLSET.SYS;1  
.  
.  
.  
\$

The MOUNT command prepares the target disk for the image copy operation. The command qualifier /LOG directs BACKUP to display information about each file copied on your terminal. The BACKUP command initializes DMA1 and copies the disk volume DLA2 to DMA1. All files on DMA1 are stored contiguously.

2. \$ BACKUP/IMAGE DBA2: MTA0:ET.BCK,MTA1:

This command saves an entire disk volume to a multivolume save set named ET.BCK using two magnetic tape drives.

3. \$ MOUNT/FOREIGN DBA1:  
%MOUNT-I-MOUNTED, mounted on NODE\$DBA1:  
\$ BACKUP/IMAGE WORKDISK DBA1:28SEP.BCK/SAVE\_SET

The MOUNT command prepares the target disk for the image save operation. The BACKUP command performs an image save operation to a Files-11 save set named 28SEP.BCK.

## **/INCREMENTAL**

### **Command Qualifier**

Allows you to restore an incremental save set.

### **Format**

```
/INCREMENTAL save-set-spec disk-device-name
```

### **Description**

Use **/INCREMENTAL** only in restore operations that restore incremental save sets. When you use **/INCREMENTAL**, the output specifier must specify a device only; file specifications are not allowed. Also, input save-set qualifiers are not allowed in incremental restore operations.

You can create incremental save sets with the command qualifier **/RECORD** and the file-selection qualifier **/SINCE=BACKUP** or **/SINCE=date**. Most sites perform daily incremental save operations to keep copies of files created or modified that day, and periodic full backups to keep a copy of all files on the disk volume. (Digital recommends that you use the command qualifier **/IMAGE** to perform full backups.)

If a disk volume is lost, corrupted, or destroyed, its contents can be recreated by performing the following tasks:

1. Restore the latest full backup using the command qualifiers **/IMAGE** and **/RECORD**.
2. Restore any incremental save sets since the last full backup, in reverse chronological order, using the **/INCREMENTAL** qualifier.

After you restore the save sets in this order, the output disk volume contains the same files it contained when the most recent incremental save operation was performed.

When the **/INCREMENTAL** qualifier is used, the **/BY\_OWNER=ORIGINAL** qualifier is assumed; therefore, you do not need to specify **/BY\_OWNER** unless you want to change the original UICs. The **/INCREMENTAL** qualifier can be used only on Files-11 Structure Level 2 volumes.

### **Example**

If you have been performing a combination of full backups and incremental save operations on a public volume, and the public volume is lost, corrupted, or destroyed, use a procedure like the following to create a new copy of the public volume. First, restore the volume from the latest full backup with an image restore operation. Note that the **/RECORD** qualifier is necessary to perform the operation correctly.



## BACKUP /INCREMENTAL

```
$ MOUNT/FOREIGN DRA0:
%MOUNT-I-MOUNTED, mounted on DRA0:
$ BACKUP/IMAGE/RECORD MTA0:FULLJUN93,MTA1 DRA0:
%BACKUP-I-RESUME, resuming operation on volume 2
%BACKUP-I-RESUME, resuming operation on volume 3
%BACKUP-I-RESUME, resuming operation on volume 4
.
.
.
$ DISMOUNT/NOUNLOAD DRA0:
```

Next, mount the disk as a file-structured volume and restore the incremental save sets in reverse chronological order. Finally, restore the weekly incremental save sets. The /INCREMENTAL qualifier must be used where shown in the following example to obtain the correct results:

```
$ MOUNT DRA0: PUBLIC
%MOUNT-I-MOUNTED, PUBLIC mounted on DRA0:
$ BACKUP/INCREMENTAL MTA0:INCD17JUN DRA0:
$ BACKUP/INCREMENTAL MTA0:INCD16JUN DRA0:
$ BACKUP/INCREMENTAL MTA0:INCD15JUN DRA0:
$ BACKUP/INCREMENTAL MTA0:INCW14JUN DRA0:
$ BACKUP/INCREMENTAL MTA0:INCW7JUN DRA0:
```

Note that BACKUP restores the volume correctly regardless of the order in which the incremental save sets are applied; using reverse chronological order is most efficient.

---

## /INITIALIZE

### Command Qualifier

Initializes an output disk volume, making its entire previous contents unavailable.

### Format

```
[/NO]INITIALIZE input-specifier output-specifier
```

### Description

The /[/NO]INITIALIZE qualifier is valid only when used with the command qualifier /IMAGE during restore or copy operations or when saving files to a sequential-disk save set.

When used with the command qualifier /IMAGE in a restore or copy operation, the /INITIALIZE qualifier directs BACKUP to initialize the output volume using volume initialization data from the save-volume summary record on the input volume.

The /NOINITIALIZE qualifier directs BACKUP to reinitialize the output volume using the existing initialization data on that volume; the output volume must have been previously initialized as a Files-11 volume. When the output volume is initialized, existing data on the volume is lost. The structure level of the output volume must be the same as the structure level of the save set being restored.

For image restore and copy operations on Files-11 volumes, the default is /INITIALIZE.

If you use the /INITIALIZE qualifier when creating sequential-disk save sets, BACKUP initializes the first output volume in the sequential-disk save set, as well as subsequent volumes. By default, BACKUP does not initialize the first volume of a sequential-disk save set but does initialize subsequent volumes of a multivolume sequential-disk save set.

## Examples

1. \$ BACKUP/IMAGE/NOINITIALIZE DBA0: DBA2:

This command causes the output volume DBA2 to be reinitialized using the volume initialization data that exists on DBA2. The contents of DBA0 are then copied to DBA2.

2. \$ BACKUP/IMAGE/INITIALIZE DBA2:OLDFILES.BCK/SAVE\_SET DBA6:

This command directs BACKUP to initialize the output volume DBA6 using volume initialization parameters in the save-volume summary record on DBA2. The image save set OLDFILES.BCK is then restored to DBA6.

---

## /INTERCHANGE

### Command Qualifier

Directs BACKUP to process files in a manner suitable for data interchange (software distribution) by excluding information that would prevent other utilities or sites from reading the BACKUP save set.

### Format

/INTERCHANGE input-specifier output-specifier

### Description

The effects of the /INTERCHANGE qualifier are as follows:

- Directories not selected as files are not copied.
- Access control lists are not copied.
- Block size on magnetic tape is limited to 8192 bytes.
- Normal error recovery is used to write magnetic tapes so that there are no bad records on the resulting magnetic tape.

### Example

```
$ BACKUP/RECORD/INTERCHANGE [ACCOUNTS]/SINCE=BACKUP MFA0:SAVACC.BCK
```

The command in this example saves all files in the directory [ACCOUNTS] that have been modified since the last BACKUP/RECORD operation. The /INTERCHANGE qualifier ensures that the processed files are suitable for data interchange.

## BACKUP /JOURNAL

---

### /JOURNAL

#### Command Qualifier

Specifies that a BACKUP save operation is to create a BACKUP journal file or append information to a BACKUP journal file. Lists the contents of a BACKUP journal file when combined with the command qualifier /LIST.

#### Format

```
/JOURNAL[=file-spec] input-specifier output-specifier
```

```
/JOURNAL[=file-spec]/LIST[=file-spec]
```

#### Description

A BACKUP journal file contains records of BACKUP save operations and the file specifications of saved files. Use the command qualifier /JOURNAL[=file-spec] in a BACKUP save operation to create a journal file.

If you do not include a file specification with the command qualifier /JOURNAL, the name of the BACKUP journal file defaults to SYS\$DISK:[ ]BACKUP.BJL. You can specify another file name, however. (The file specification of a journal file cannot include a node name; the default file type for a journal file is .BJL.) If the specified journal file does not exist, it is created; if the journal file does exist, the new journal information is appended to the existing journal file.

Start a new version of a journal file by creating a zero-length file using the DCL command CREATE or a text editor.

To list the contents of a BACKUP journal file, use the /JOURNAL=[file-spec] qualifier with the /LIST qualifier, but do not specify an input or output specifier. By default, the list is displayed on SYS\$OUTPUT, but it is written to an output file if you specify a file with /LIST.

When listing a journal file, you can use the file-selection qualifiers /BEFORE, /SINCE, and /EXCLUDE to search for specific files. (In this context, the /BEFORE and /SINCE qualifiers refer to the time when the save set was created, not the time when the files in the save set were created.) Also, by specifying a file in a multivolume save set, you can search the journal file to find which volume the file is in. You can then mount that volume and restore the file.

Journal files are not created for physical save operations (save operations performed with the command qualifier /PHYSICAL).

#### Examples

1. \$ BACKUP/JOURNAL=LAR.BJL [LARRY]\*.\*;\* MFA0:YET.BCK

This command saves all versions of all files in the directory [LARRY] to the save set YET.BCK on MFA0. The /JOURNAL qualifier creates a record of the saved files in a journal file named LAR.BJL in the current default directory.

# BACKUP /JOURNAL

2. \$ BACKUP/LIST/JOURNAL=ARCH.BJL/SELECT=[SMITH.PROGS]/SINCE=5-OCT-1993

Listing of BACKUP journal

Journal file DB1:[SYSMGR]:ARCH.BJL;1 ON 7-OCT-1993 00:45:43.01

Save set WKLY.BCK, created on 6-OCT-1993 00:01:34.54

Volume number 1, volume label WKL101

[SMITH.PROGS]REMINDER.FOR;46

[SMITH.PROGS]RUNTHIS.FOR;4

[SMITH.PROGS]TIMER.PAS;5

.  
.  
.

This example displays all files in the directory [SMITH.PROGS] that were saved after October 5, 1993, and listed in the BACKUP journal file ARCH.BJL.

3. \$ BACKUP/JOURNAL/LOG/IMAGE DRA2: MTA0:3OCT.FUL

%BACKUP-S-COPIED, copied DRA2:[COLLINS]ALPHA.DAT;4

%BACKUP-S-COPIED, copied DRA2:[COLLINS]EDTINI.EDT;5

.  
.  
.

%BACKUP-I-RESUME, resuming operation on volume 2

%BACKUP-I-READYWRITE, mount volume 2 on \_MTA0: for writing

Press return when ready: Return

%BACKUP-S-COPIED, copied DRA2:[LANE]MAIL.MAI;1

%BACKUP-S-COPIED, copied DRA2:[LANE]MEMO.RNO;5

.  
.  
.

\$ BACKUP/JOURNAL/LIST

Listing of BACKUP journal

Journal file DB2:[SYSMGR]BACKUP.BJL;1 on 3-OCT-1993 00:40:56.36

Save set 3OCT.FUL created on 3-OCT-1993 00:40:56.36

Volume number 1, volume label 3OCT01

[COLLINS]ALPHA.DAT;4

[COLLINS]EDTINI.EDT;5

[COLLINS]LOGIN.COM;46

[COLLINS]LOGIN.COM;45

[COLLINS]MAIL.MAI;1

[COLLINS.MAR]GETJPI.EXE;9

[COLLINS.MAR]GETJPI.LIS;14

.  
.  
.

[LANE]LES.MAI;1

.  
.  
.

Save set 3OCT.FUL created on 3-OCT-1993 00:40:56.36

Volume number 2, volume label 3OCT02

[LANE]MAIL.MAI;1

[LANE]MEMO.RNO;5

[LANE]MEMO.RNO;4

.  
.  
.

[WALTERS.VI]KD.RNO;52

End of BACKUP journal

## BACKUP /JOURNAL

This example shows how to create a BACKUP journal file and list the contents of the BACKUP journal file.

---

### /LABEL

#### Output Save-Set Qualifier

Specifies the volume labels for the magnetic tapes to which the save set is written.

#### Format

input-specifier output-save-set-spec/**LABEL**=(string[,...])

#### Description

Use the label qualifier to specify the one- to six-character volume labels for the magnetic tapes to which the save set is written.

You can specify either a single label or a list of labels with the /LABEL qualifier. If you do not specify the /LABEL qualifier, BACKUP uses the first six characters of the save-set name as the volume label of the first tape. If you specify a label that is longer than six characters, BACKUP truncates the label to six characters.

If the save set continues to another tape, and you did not specify a volume label for the tape, BACKUP uses the first four characters of the previous tape's volume label followed by the volume number of the tape. For example, if the first tape in a save set is labeled AAAABB, the second tape in a save set is labeled AAAA02, and the third tape is labeled AAAA03.

Before writing a save set to magnetic tape, BACKUP compares the label specified in the command line to the volume label of the tape. (If the tape has no volume label and you specified the output save-set qualifier /REWIND, BACKUP writes the label you specified to the volume header record of the tape.) If the volume label has fewer than six characters, BACKUP pads the volume label with the blank character to six characters.

The first four characters of the volume label must either exactly match the first four characters of the label specified in the BACKUP command line, or the first four characters of the volume label must end with one or more underscore characters. If the first four characters of the volume label end with one or more underscore characters, and the label specified in the command line matches the part of the volume label that appears before the underscore characters, BACKUP accepts the match. (For example, the volume label ABN\_ matches the command line label ABN but does not match the command line label ABNE.) If either the fifth or the sixth character of the volume label is in the range 0 to 9, BACKUP does not compare these characters with corresponding characters in the label specified in the BACKUP command line. Otherwise, the fifth and sixth characters in the volume label must match the corresponding characters in the label specified in the BACKUP command line exactly.

The following table illustrates volume labels that match labels specified in the BACKUP command line:

| Label Specified in the Command Line | Matching Volume Labels |
|-------------------------------------|------------------------|
| MAR                                 | MAR, MAR_, MAR_nn      |
| MAR_                                | MAR_, MAR_nn           |
| MARK                                | MARK, MARKnn           |
| MARKER                              | MARKER, MARKnn         |

If the label you specify matches the tape's volume label, the BACKUP save operation proceeds. If you specify more than one label with the /LABEL qualifier, the BACKUP save operation succeeds if any of the labels you specify match the tape's volume label. For example, if the tape's volume label is MA1686, the save operation will succeed if you specify the the following list of labels with the /LABEL qualifier:

```
/LABEL=(MA1684,MA1685,MA1686)
```

If the label you specified does not match the tape's volume label, BACKUP displays the following messages and prompt on your terminal if you specified the command qualifier /NOASSIST, or on the operator terminal if you did not specify /NOASSIST:

```
%BACKUP-W-MOUNTERR, volume 'number' on 'device' was not mounted because
its label does not match the one requested
Specify option (QUIT, NEW tape or OVERWRITE tape)
BACKUP>
```

Specify QUIT to abort the BACKUP operation and unload the magnetic tape. Specify NEW to direct BACKUP to prompt for a new tape. Specify OVERWRITE to direct BACKUP to ignore the label mismatch, mount the tape, initialize the tape if you specified the output save-set qualifier /REWIND, and write the save set to the tape.

You can specify the command qualifier /IGNORE=LABEL\_PROCESSING to prevent BACKUP from verifying the volume label of the tape. You can also use the /EXACT\_ORDER qualifier to specify the exact order of tape volume labels that you want to use in a BACKUP operation.

## Examples

1. \$ BACKUP [PAYROLL] MTA0:30NOV.BCK/LABEL=PAY

This command causes BACKUP to check the volume label of the tape mounted on drive MTA0. If the volume label is PAY, BACKUP saves the directory [PAYROLL] to a save set named 30NOV.BCK.

2. \$ BACKUP DDA1: MTA0:PLAYS.BCK,MTA1,MTA2/REWIND/LABEL=(ACT1,ACT2,ACT3)

This example assumes that the three tapes have no volume labels. This command saves all files on the disk named DDA1 to the save set PLAYS.BCK. The first tape in the save set is labeled ACT1, the second is labeled ACT2, and the third is labeled ACT3.

# BACKUP /LIST

---

## /LIST

### Command Qualifier

Lists information about a BACKUP save set and about the files in a save set. You can display the list on your terminal or write it to a file.

### Format

/LIST[=file-spec] save-set-spec

### Description

Use the /LIST qualifier by itself or in conjunction with any other operation (save, restore, copy, compare, or journal). If /LIST is specified by itself (not with a save, restore, copy, compare or journal operation), the input specifier must refer to a save set, and the output specifier must be omitted.

Before you can list the contents of a save set, the media containing the save set must be inserted into an appropriate drive. If the save set is stored on a disk, the disk must be mounted as a Files-11 volume or as a foreign volume. BACKUP mounts magnetic tapes automatically as part of the list operation.

By default, the list information is displayed on your terminal; however, you can specify a file to which the list information can be written.

When you use the /LIST qualifier with standalone BACKUP and you direct output to a file (/LIST=file-spec), the file specification must refer to either a terminal or a printer.

You can use either the command qualifier /BRIEF or /FULL with the /LIST qualifier. The /BRIEF qualifier directs BACKUP to list each file's size in blocks and its creation date. The /FULL qualifier directs BACKUP to list additional information about each file in the same format as the information provided by the DCL command DIRECTORY/FULL. The default is /BRIEF.

Do not use the command qualifier /LOG with /LIST when the output for /LIST is directed to the terminal; if you do, you will receive confusing output.

### Example

```
$ BACKUP/LIST DBA2:[SAVE]23MAR93.BCK/SAVE_SET
Listing of save set(s)
Save set: 23MAR93.BCK
Written by: MOROCI
UIC: [000200,000200]
Date: 23-MAR-1993 14:18:16.96
Command: BACKUP [SAVE] DBA2:[SAVE]23MAR93.BCK/SAVE_SET
Operating system: VAX/VMS version 5.5
BACKUP version: V5.5
CPU ID register: 08000000
Node name: _SUZI::
Written on: _DBA2:
Block size: 32,256
Group size: 10
Buffer count: 3
```

## BACKUP /LIST

```
[SAVE]LAST.DAT;1 1 18-JAN-1993 14:11
[SAVE]INFO.TXT;4 5 4-FEB-1993 13:12
[SAVE]WORK.DAT;3 33 1-JAN-1993 10:02
```

Total of 3 files, 39 blocks  
End of save set

This command lists the BACKUP summary information and the file name, size, and creation date for each file in the save set. Note that the /SAVE\_SET qualifier is required to identify the input specifier as a save set on a Files-11 disk.

---

### /LOG

#### Command Qualifier

Determines whether the file specification of each file processed is displayed on SYS\$OUTPUT during the operation. The default is /NOLOG.

#### Format

[/NO]LOG input-specifier output-specifier

#### Example

```
$ BACKUP/LOG [SAVE]23MAR93.BCK/SAVE SET DBA2:[PLI.WORK]
%BACKUP-S-CREATED, created DBA2:[PLI.WORK]ANOTHER.DAT;1
%BACKUP-S-CREATED, created DBA2:[PLI.WORK]LAST.DAT;1
%BACKUP-S-CREATED, created DBA2:[PLI.WORK]THAT.DAT;1
%BACKUP-S-CREATED, created DBA2:[PLI.WORK]THIS.DAT;2
.
.
.
```

In this example, the file specifications of the files restored to the directory named [PLI.WORK] on DBA2 are logged to SYS\$OUTPUT.

---

### /MEDIA\_FORMAT=[NO]COMPACTION

#### Output Save-Set Qualifier

Controls whether data records are automatically compacted and blocked together. Data compaction and record blocking increase the amount of data that can be stored on a single tape cartridge.

The compaction ratio depends on the data and the tape drive you use. For more information, see the documentation supplied with your tape drive.

#### Format

input-specifier output-save-set-spec /MEDIA\_FORMAT=[NO]COMPACTION



## BACKUP /MEDIA\_FORMAT=[NO]COMPACTION

### Description

The /MEDIA\_FORMAT qualifier can only be used with tape drives that support data compaction.

Once data compaction has been selected for a tape cartridge, compaction is used for the entire cartridge until you initialize the cartridge with the /MEDIA\_FORMAT=NOCOMPACTION qualifier.

### Example

```
$ BACKUP WORK$:[TESTFILES...]*.*;* MUA0:TEST.SAV -
_$/MEDIA_FORMAT=COMPACTION /REWIND
```

This command saves all files in the directory [TESTFILES] and its subdirectories in a save set named TEST.SAV using a TA90E tape drive. The /MEDIA\_FORMAT=COMPACTION qualifier specifies that the tape drive automatically compacts and blocks together data records on the tape.

---

## /MODIFIED

### Input File-Selection Qualifier

Selects files according to the value of the modified date field (the date the file was last modified) in each file header record.

### Format

input-specifier/**BEFORE**=time /**MODIFIED** output-specifier

input-specifier /**SINCE**=time /**MODIFIED** output-specifier

### Description

You must use the /MODIFIED qualifier with either of the input file-selection qualifiers /BEFORE or /SINCE. The date and time you specify with /BEFORE or /SINCE determines which files are processed.

You cannot use /MODIFIED with the input file-selection qualifiers /BACKUP, /CREATED, or /EXPIRED.

### Example

```
$ BACKUP [SUNDANCE...]/BEFORE=TODAY/MODIFIED MF1:MOD.BCK
```

This command saves all files in the directory tree [SUNDANCE] whose modification dates precede today (00:00:00.0 o'clock of the current day, month, and year).

## **/NEW\_VERSION**

### **Output File Qualifier**

Creates a new version of a file if a file with an identical specification already exists at the location to which the file is being restored or copied.

### **Format**

input-specifier output-specifier/**NEW\_VERSION**

### **Description**

If **BACKUP** attempts to copy or restore a file when a file with an identical directory name, file name, type, and equal or higher version number already exists, a new file is created with the same name and type and a version number one higher than the highest existing version.

If you do not use **/NEW\_VERSION**, **/REPLACE**, or **/OVERLAY**, and the version number of the file being restored is equal to or less than the version number of the existing file, **BACKUP** reports an error in copying or restoring the file.

Note that when copying or restoring files using the **/NEW\_VERSION** qualifier, files are processed in decreasing version number order and are created in ascending order. The result is that the version numbers are inverted.

Because this qualifier causes version numbers to change, using it with the **/VERIFY** qualifier will cause unpredictable results. Digital recommends that you do not use the **/NEW\_VERSION** qualifier with the **/VERIFY** qualifier.

### **Example**

```
$ BACKUP MTA1:NOV30REC.BCK/SELECT=*.DAT [RECORDS...]/NEW_VERSION
```

This example restores all files with the file type of **.DAT** from the magnetic tape save set **NOV30REC.BCK** to the directory **[RECORDS]**. The **/NEW\_VERSION** qualifier instructs **BACKUP** to restore each file with the file type **.DAT** regardless of whether a file with the same file specification already exists.

---

## **/OVERLAY**

### **Output File Qualifier**

Writes the input file over a file with an identical specification at the output location.

### **Format**

input-specifier output-specifier/**OVERLAY**

## BACKUP /OVERLAY

### Description

If BACKUP attempts to copy or restore a file when a file with an identical directory name, file name, type, and version number already exists, the new version of the file is written over the existing version. The file identification of the new version is the same as the file identification of the file that is overwritten.

The physical location of the file on disk does not change. If /OVERLAY is specified, and the new file is larger than the one already present, BACKUP allocates more blocks on the disk and extends the file.

When you do not use /OVERLAY, /REPLACE, or /NEW\_VERSION, and the version number of the file being restored is identical to the version number of the existing file, BACKUP reports an error in copying or restoring the file.

### Example

```
$ BACKUP DRA1:MAR30SAV.BCK/SAVE_SET [RECORDS...]/OVERLAY
```

The sequential-disk save set MAR30SAV.BCK is restored to the directory tree [RECORDS...]. If a file from the save set has a specification that is identical to a file that already exists in [RECORDS...], the /OVERLAY qualifier directs BACKUP to write over the existing version.

---

## /OWNER\_UIC

The /OWNER\_UIC qualifier has been superseded by /BY\_OWNER. Digital recommends that you substitute /BY\_OWNER for /OWNER\_UIC in command procedures and operator instructions. See the description of /BY\_OWNER for more information.

---

## /PHYSICAL

### Command Qualifier

Specifies that a BACKUP operation is to ignore any file structure on the input volume and to process the volume in terms of logical blocks.

### Format

```
/PHYSICAL input-specifier output-specifier
```

### Description

In a physical operation, BACKUP saves, restores, copies, or compares the entire volume in terms of logical blocks.

The input and output specifiers for physical volumes must be device names, and they cannot be the same device. Also, the following qualifiers are ignored if specified with the /PHYSICAL qualifier: /DELETE, /IMAGE, /INCREMENTAL, /JOURNAL, and /RECORD.

## BACKUP /PHYSICAL

For physical copy operations between disks, the output disk must be the same type of device as the input disk; for example, a BACKUP/PHYSICAL operation cannot be performed between an RP05 input disk and an RP06 output disk. The output disk must not have a bad block in any location that corresponds to a good block on the input disk. (This restriction does not apply to RA series disks.)

For physical save operations between disks, the output disk must be the same type of disk as the input disk or a larger capacity disk. The output disk must not have a bad block in any location that corresponds to a good block on the input disk. (This restriction does not apply to RA series disks.)

For physical restore operations between disks, the output disk must be the same type of device as the disk from which the save set was created. The output disk must not have a bad block in any location that corresponds to a good block on the disk from which the save set was created. (This restriction does not apply to RA series disks.)

An output disk of a physical operation must be mounted using the DCL command MOUNT/FOREIGN. An input disk of a physical operation must either be mounted using the DCL command MOUNT/FOREIGN, or the user must have the user privilege LOG\_IO or PHY\_IO.

You can perform physical save and restore operations using magnetic tapes. BACKUP mounts magnetic tapes automatically as foreign devices.

A save set written using the /PHYSICAL qualifier can only be read as a physical save set; conversely, a file-structured save set can only be read with file-structured restore or compare operations.

---

### Note

---

BACKUP/PHYSICAL does not copy the first track (track 0) of RX01 and RX02 diskettes; Digital does not support track 0.

---

## Examples

1. \$ MOUNT/FOREIGN DYAO:  
\$ MOUNT/FOREIGN DYA1:  
\$ BACKUP/PHYSICAL DYAO: DYA1:

This example mounts RX02 diskettes in DYAO and DYA1 as foreign devices and copies the contents of the diskette mounted in DYAO to the diskette mounted in DYA1.

2. \$ MOUNT/FOREIGN DBA1:  
\$ BACKUP/PHYSICAL MTA0:28SEP.BCK DBA1:

This command restores a physical save set named 28SEP.BCK to DBA1.

## BACKUP /PROTECTION

---

### /PROTECTION

#### Output Save-Set Qualifier

When you create a save set on disk, this qualifier defines the protection to be applied to an output save set. When you create a save set on magnetic tape, this qualifier defines the protection to be applied to the magnetic tape volume. (All save sets created subsequently on the tape will receive this same protection until the tape is initialized.)

#### Format

input-specifier output-save-set-spec/**PROTECTION**[=(code)]

#### Description

Because the file system treats a BACKUP save set as a single file, it is crucial that you protect save sets adequately. If you do not specify adequate protection, anyone who has access to a save set can access any file in the save set.

The protection code indicates the type of access (read, write, execute, and delete) available to the four categories of users (system, owner, group, and world). For more information on specifying protection codes, see the *OpenVMS User's Manual*.

If the save set is written to either a Files-11 disk or a sequential disk and /PROTECTION is not specified, BACKUP applies the process default protection to the save set. If /PROTECTION is specified, any protection categories not specified default to your default process protection.

Protection information is written to the volume header record of a magnetic tape, and applies to all save sets stored on the tape. Therefore, you must specify the output save-set qualifier /REWIND in order to specify the /PROTECTION qualifier for a magnetic tape. (If you do not specify /REWIND with /PROTECTION, the protection information, if any, in the volume header record is not changed.) If the save set is written to magnetic tape and /PROTECTION is not specified, BACKUP applies **no** protection to the tape. If you specify /PROTECTION, any protection categories that you do not specify default to your default process protection.

In order to initialize a magnetic tape volume that was previously initialized with the /PROTECTION qualifier, you must own the volume (your UIC matches the UIC of the volume) or have the VOLPRO privilege.

#### Example

```
$ BACKUP
 From: [CLEAVER...]
 To: MFA2:ACCOUNTS.BCK/BY_OWNER=[301,310]/REWIND/LABEL=BANK01-
 $ /PROTECTION=(S:RWE,O:RWED,G:RE,W)
```

This command saves the directory tree [CLEAVER...] to a save set named ACCOUNTS.BCK on the magnetic tape labeled BANK01. The output save-set qualifier /REWIND directs BACKUP to rewind the tape and initialize it before performing the save operation. The output save-set qualifier /BY\_OWNER assigns an owner UIC of [301,310] to the magnetic tape. The /PROTECTION qualifier assigns the owner of the magnetic tape read, write, execute, and delete access. SYSTEM users are assigned read, write, and execute access; GROUP

users are assigned read and execute access; and WORLD users are assigned no access.

---

## **/RECORD**

### **Command Qualifier**

Records the current date and time in the BACKUP date field of each file header record once a file is successfully saved or copied.

### **Format**

`/RECORD input-specifier output-specifier`

### **Description**

The `/RECORD` qualifier can be used only on Files-11 Structure Level 2 volumes. The user privilege SYSPRV is required to use the `/RECORD` qualifier on files other than those owned by your UIC.

When you use `/RECORD` in a copy or save operation, BACKUP writes the date and time that the copy or save set was created in the BACKUP date field of each file header record.

When you use `/RECORD` to perform incremental save operations on a disk volume, do not allow other users to use `/RECORD` in their BACKUP operations on the same disk volume. If other users specify `/RECORD`, the dates in the BACKUP date fields of file header records will change. This makes it impossible for you to save all files created or modified since you last performed a save operation.

If you use the command qualifier `/VERIFY` with `/RECORD`, files that fail verification are not recorded.

If `/RECORD` is not specified, the BACKUP date field of each processed file is not changed.

You cannot use the `/RECORD` qualifier with the command qualifier `/DELETE` or `/COMPARE`.

### **Example**

```
$ BACKUP/RECORD DBA1:[*...]/SINCE=BACKUP MTA0:13MAY.BCK
```

This command saves all files on DBA1 that have been created or modified since the last save operation and records the current date and time in each file header record.

## BACKUP /RELEASE\_TAPE

---

### /RELEASE\_TAPE

#### Command Qualifier

Dismounts and unloads a tape after a BACKUP save operation writes a save set to the tape.

#### Format

/RELEASE\_TAPE input-specifier output-specifier

#### Description

By using the /RELEASE\_TAPE qualifier in conjunction with either the /DELETE or /RECORD qualifiers, you can make a tape drive available for other operations before the BACKUP command completes. You can also use the /RELEASE\_TAPE qualifier without the /DELETE or /RECORD qualifiers, in which case the /RELEASE\_TAPE qualifier dismounts and unloads the tape in the drive after the BACKUP command completes.

You cannot use the /RECORD and /DELETE qualifiers in the same BACKUP command.

#### Examples

1. \$ BACKUP/IMAGE/RECORD/RELEASE\_TAPE DUA1: MUA0:BACK.BCK

The command in this example backs up the disk DUA1 to the save set BACK.BCK. By using the /RELEASE\_TAPE and /RECORD qualifiers, BACKUP dismounts and unloads the tape in MUA0 (making it available for other operations) before it performs the action of the /RECORD qualifier.

2. \$ ALLOCATE MUA0: TAPE  
\$ BACKUP/DELETE/RELEASE\_TAPE/LOG DUA1:[MAIN...] MUA0:MAIN.BCK  
.  
.  
.  
\$ DEALLOCATE TAPE

The commands in this example back up some directories on a disk named DUA1, and then delete the files that have been backed up. The /RELEASE\_TAPE qualifier dismounts and unloads the tape (making it available for other operations) before the /DELETE qualifier performs its action. The tape remains allocated until you enter the DEALLOCATE command.

---

## /REPLACE

#### Output File Qualifier

Replaces a file on the output specifier with an identically named file from the input specifier.

**Format**

input-specifier output-specifier/**REPLACE**

**Description**

When you use **/REPLACE** in a copy or restore operation, and an identically named file exists in both the input and output specifiers, **BACKUP** does the following:

- Copies or restores a new version of the file with the same directory specification, file name, type, and version number
- Deletes the copy of the file that previously existed on the output disk

In this way, the previous copy of the file is replaced with the restored version. Note that the version number is not incremented because the old copy of the file is deleted. If you want to keep the versions from both the input and the output specifiers, use the output file qualifier **/NEW\_VERSION**.

If you do not use **/REPLACE**, **/OVERLAY**, or **/NEW\_VERSION**, and the version number of the file being restored is identical to the version number of the existing file, **BACKUP** reports an error and does not restore the file.

**Example**

```
$ BACKUP MUA0:SAVEWORK.BCK/SELECT=[LEE...] DUA0:[LEE...]/REPLACE
```

The command in this example restores the directory tree [LEE...] (and all files in the directory tree) from a magnetic tape save set to disk. The input save-set qualifier **/SELECT** specifies the directory tree to be selected from the save set, and the output file qualifier **/REPLACE** instructs **BACKUP** to first create a new version of an input file if there is a file on the output medium with the same file specification and then to delete the file that originally existed on the output medium.

---

**/REWIND (input save-set qualifier)****Input Save-Set Qualifier**

Rewinds the input tape reel to the beginning-of-tape marker before reading the input volume.

**Format**

input-save-set-spec/[**NO**]REWIND output-specifier

**Description**

The **/[NO]REWIND** qualifier is for magnetic tape volumes only.

The **/REWIND** qualifier directs **BACKUP** to rewind the input magnetic tape to the beginning-of-tape marker before reading the input volume. Then **BACKUP** locates the input save set. In this way, **BACKUP** can find the input save set if it is located before the current tape position.



## **BACKUP /REWIND (input save-set qualifier)**

The /NOREWIND qualifier indicates that BACKUP should not rewind the input volume before processing the command. Instead, BACKUP proceeds toward the logical end-of-tape (the end of the last save set stored on the tape). Therefore, if the specified save set is located before the current position of the tape, BACKUP is unable to find it.

The default is /NOREWIND. You must specify /REWIND to rewind the tape.

### **Example**

```
$ BACKUP MFA1:CONTRACTS.BCK/REWIND DBA2:[*...]/BY_OWNER=ORIGINAL
```

In this example, the save set CONTRACTS.BCK is restored to the disk volume mounted on DBA2. The /REWIND qualifier rewinds the magnetic tape to the beginning-of-tape marker before reading the input volume to search for CONTRACTS.BCK. The output file qualifier /BY\_OWNER restores the original owner UICs.

---

## **/REWIND (output save-set qualifier)**

### **Output Save-Set Qualifier**

Rewinds the output tape to the beginning-of-tape marker and initializes the output tape. The /NOREWIND qualifier causes the tape to wind forward to the logical end-of-tape (the end of the last save set stored on the tape) and to begin writing the save set there.

### **Format**

input-specifier output-save-set-spec/[NO]REWIND

### **Description**

The /[NO]REWIND qualifier is for magnetic tape volumes only.

If you specify /REWIND, BACKUP rewinds to the beginning of the magnetic tape and searches the volume header record for a volume label. If the volume header record contains no volume label, BACKUP writes the label specified in the BACKUP command to the volume header record, initializes the tape, and creates the save set on the tape.

If no label is specified explicitly in the command line, BACKUP uses the first six characters of the save-set name as the volume label of the first tape in a multivolume save set and the first four characters of the save-set name followed by the volume number of the tape as the volume label of subsequent tapes. You can also specify a label or list of labels explicitly with the /LABEL qualifier. If you do not specify enough labels with the /LABEL qualifier, BACKUP uses the first four characters of the final label in the list followed by the volume number of the tape as the volume label of subsequent tapes.

If BACKUP finds a volume label on the tape, it compares the volume label with the label you specified in the BACKUP command line (either explicitly with the /LABEL qualifier or implicitly through the save-set name) and ensures that the tape is expired.

## BACKUP /REWIND (output save-set qualifier)

If the volume label is fewer than six characters long, BACKUP pads the volume label with the blank character to six characters. The first four characters of the volume label must either match the first four characters of the label specified in the BACKUP command line exactly, or the first four characters of the volume label must end with one or more underscore characters. If the first four characters of the volume label end with one or more underscore characters, and the label specified in the command line matches the part of the volume label that appears before the underscore characters, BACKUP accepts the match. (For example, the volume label ABN\_ matches the command line label ABN but does not match the command line label ABNE.) If either the fifth or sixth character of the volume label is in the range 0 to 9, BACKUP does not compare these characters with corresponding characters in the label specified in the BACKUP command line. Otherwise, the fifth and sixth characters in the volume label must match the corresponding characters in the label specified in the BACKUP command line exactly. The following table illustrates volume labels that match labels specified in the BACKUP command line:

| Label Specified in the Command Line | Matching Volume Labels |
|-------------------------------------|------------------------|
| MAR                                 | MAR, MAR_, MAR_nn      |
| MAR_                                | MAR_, MAR_nn           |
| MARK                                | MARK, MARKnn           |
| MARKER                              | MARKER, MARKnn         |

You can specify more than one label with the /LABEL qualifier. If any label specified in the BACKUP command line matches the volume label of the tape and the tape is expired, BACKUP overwrites the volume label of the tape with the same volume label.

By overwriting the tape's volume label, BACKUP initializes the tape, removing access to any data that previously resided on the tape and preparing the tape to receive new data. During the initialization process, BACKUP writes the values specified with the output save-set qualifiers /TAPE\_EXPIRATION, /PROTECTION, and /BY\_OWNER to the volume header record. (If these qualifiers are not specified, the default tape expiration date is today, the default protection is none, and the owner UIC of the tape is the UIC of the current process.) After initializing the tape, BACKUP writes the save set to the tape.

If the label in the BACKUP command line did not match the volume label of the tape, BACKUP displays the following message and prompt on your terminal if you specified the command qualifier /NOASSIST, or on the operator terminal if you did not specify /NOASSIST:

```
%BACKUP-W-MOUNTERR, volume 'number' on 'device' was not mounted because
its label does not match the one requested
Specify option (QUIT, NEW tape or OVERWRITE tape)
BACKUP>
```

If you enter QUIT at the BACKUP> prompt, BACKUP aborts, unloads the magnetic tape, and issues the following message:

```
%BACKUP-F-ABORT, operator requested abort on fatal error
```

## BACKUP /REWIND (output save-set qualifier)

If you enter **NEW** at the **BACKUP>** prompt, **BACKUP** unloads the magnetic tape and issues the following prompt for a new tape:

```
%BACKUP-I-READYWRITE, mount volume 'volume-number' on _'device-name': for writing
Enter "YES" when ready:
```

If you enter **OVERWRITE** at the **BACKUP>** prompt, **BACKUP** overwrites the old volume label with the new volume label. (**OVERWRITE** instructs **BACKUP** to ignore the fact that either the tape has not expired or that the labels do not match.) By overwriting the tape's volume label, **BACKUP** initializes the tape, removing access to any data that previously resided on the tape and preparing the tape to receive new data.

During the initialization process, **BACKUP** writes the values specified with the output save-set qualifiers **/TAPE\_EXPIRATION**, **/PROTECTION**, and **/BY\_OWNER** to the volume header record. After initializing the tape, **BACKUP** writes the save set to the tape.

If the tape is not expired, **BACKUP** displays the following message and prompt on your terminal if you specified the command qualifier **/NOASSIST**, or on the operator terminal if you did not specify **/NOASSIST**:

```
%BACKUP-W-MOUNTERR, volume 'number' on 'device' was not mounted because
its expiration date is in the future
Specify option (QUIT, NEW tape or OVERWRITE tape)
BACKUP>
```

Always specify **/REWIND** when the output tape has a non-ANSI or non-ISO label or when the output tape has never been initialized.

The **/NOREWIND** qualifier directs **BACKUP** to compare the volume label of the tape with the label you specified in the **BACKUP** command before performing the save operation. You can specify a label explicitly with the **/LABEL** qualifier; otherwise, **BACKUP** uses the first six characters of the save-set name as the volume label. If the volume label does not match the label you specified, **BACKUP** displays the following message and prompt on your terminal if you specified the command qualifier **/NOASSIST**, or on the operator terminal if you did not specify **/NOASSIST**:

```
%BACKUP-W-MOUNTERR, volume 'number' on 'device' was not mounted because
its label does not match the one requested
Specify option (QUIT, NEW tape or OVERWRITE tape)
BACKUP>
```

If you choose the **OVERWRITE** option, **BACKUP** ignores the fact that the volume labels do not match. If the labels match, or if you choose the **OVERWRITE** option, **BACKUP** winds the tape forward to the logical end-of-tape (the end of the last save set stored on the tape) and writes the save set to the tape. If the logical end-of-tape is also the physical end of the tape, **BACKUP** requests a new tape. Because **BACKUP** searches for the end of data on the tape, you cannot write a new save set to a tape if it ends with a save set that is continued onto another tape.

Although the **/NOREWIND** qualifier does not initialize the first tape in a multivolume save set, **BACKUP** initializes subsequent tapes in a multivolume save set. **BACKUP** ensures that the tape is expired and that the tape labels match before initializing subsequent volumes in a multivolume save set.

The default is **/NOREWIND**. You must specify **/REWIND** to rewind and initialize a magnetic tape volume. Note that you cannot use the **/REWIND** qualifier with the **/EXACT\_ORDER** qualifier.

## BACKUP /REWIND (output save-set qualifier)

### Example

```
$ BACKUP
 _From: *.RNO
 _To: MTA0:DSRSAVE.BCK/REWIND/LABEL=DSR01/TAPE_EXPIRATION=29-JUN-1993
```

The command in this example initializes a new magnetic tape and writes the volume label DSR01 and a tape expiration date of June 29, 1993 to the tape's volume header record. Then this command saves all files in the current default directory with a file type of .RNO to the magnetic tape save set named DSRSAVE.BCK.

---

### /SAVE\_SET

#### Input Save-Set Qualifier

Directs BACKUP to treat the input file as a BACKUP save set. You must specify /SAVE\_SET when the input specifier refers to a BACKUP save set on disk.

#### Format

input-save-set-spec/**SAVE\_SET** output-specifier

#### Description

The /SAVE\_SET qualifier allows you to refer to a BACKUP save set on a local Files-11 disk, a remote Files-11 disk, or a sequential disk. If you do not specify /SAVE\_SET, an input specifier that refers to a disk is treated as a Files-11 file. An input specifier that refers to tape is always treated as a BACKUP save set.

#### Examples

1. \$ BACKUP DBA2:[BACKUP]1212MAR3.BCK/SAVE\_SET DBA1:[\*...]

This command restores a save set named 1212MAR3.BCK from DBA2 to DBA1.

2. \$ BACKUP/LIST DBA2:[SAVE]23MAR93.BCK/SAVE\_SET

This command lists the BACKUP summary information and the file name, size, and creation date for each file in the save set named 23MAR93.BCK. The /SAVE\_SET qualifier is required to identify the input specifier as a save set on a disk.

3. \$ BACKUP/LOG DBA2:[SAVE]23MAR93.BCK/SAVE\_SET DBA3:[PLI.WORK]

This command restores the directory that was listed in Example 2. File specifications are logged to SYS\$OUTPUT as the files are restored.

## BACKUP /SAVE\_SET

---

### /SAVE\_SET

#### Output Save-Set Qualifier

Directs BACKUP to treat the output file as a BACKUP save set. You must specify the /SAVE\_SET qualifier when the output specifier refers to a BACKUP save set on disk.

#### Format

input-specifier output-save-set-spec/**SAVE\_SET**

#### Description

The /SAVE\_SET qualifier allows you to create a BACKUP save set on a local Files-11 disk, a remote Files-11 disk, or a sequential disk. If you do not specify /SAVE\_SET, an output specifier that refers to disk is treated as a Files-11 file. An output specifier that refers to tape is always treated as a BACKUP save set.

#### Examples

1. \$ BACKUP [HILL] DBA1:[BACKUP]SEP28.BCK/**SAVE\_SET**  
This command saves the directory [HILL] to a save set named SEP28.BCK on a Files-11 disk.
2. \$ BACKUP DBA2:[PLI.WORK]\*.\*; [SAVE]23MAR93.BCK/**SAVE\_SET**  
This command saves the highest numbered version of each file in directory [PLI.WORK] in a save set named 23MAR93.BCK on the same disk.
3. \$ BACKUP  
    \_From: [  
    \_To: MILO"FRANKIE THISISMINE"::DUA0:[FRANKIE]MYDIR.BCK/**SAVE\_SET**  
This command saves all files in the current default directory to a network save set named MYDIR.BCK on node MILO.
4. \$ MOUNT/FOREIGN DBA0:  
    \$ BACKUP [SIMS] DBA0:SIMS.BCK/**SAVE\_SET**  
This command saves all files in the directory [SIMS] to a sequential-disk save set named SIMS.BCK.

---

### /SELECT

#### Input Save-Set Qualifier

Selects the specified files for processing.

#### Format

input-save-set-spec/**SELECT**=(file-spec[,...]) output-specifier

## Description

If you specify more than one file, separate the file specifications with commas and enclose the list in parentheses. Do not use a device specification when you define the files to be selected. You can use most standard wildcard characters, but you cannot use wildcard characters denoting latest version of files (;) and relative versions of files (;-n).

Note that BACKUP does not apply temporary file specification defaults within the list. Each file specification independently takes its defaults from the file specification [000000 ... ]\*.\*;.\*.

## Example

```
$ BACKUP DBA1:JUL20.BCK/SAVE_SET/SELECT=[SNOW]BALL.PAS [WINTER.GAME]BALL.PAS
```

This command selects a file named [SNOW]BALL.PAS from a sequential-disk save set and restores it to the directory [WINTER.GAME] on the current default device.

## /SINCE

### Input File-Selection Qualifier

Selects files dated equal to or later than the specified date and time.

## Format

input-specifier/**SINCE**=time output-specifier

## Description

The /SINCE qualifier selects files by comparing the date and time in the specified field of each file header record with the date and time you specify in the command line. The following table shows the input file-selection qualifiers you can use with /SINCE and their functions. Use only one of these qualifiers at a time in your command line.

| Qualifier | Function                                                                                                                             |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|
| /BACKUP   | Selects files last saved or copied by BACKUP/RECORD since the date specified. Also selects files with no BACKUP date.                |
| /CREATED  | Selects files created since the date specified.                                                                                      |
| /EXPIRED  | Selects files that have expired since the date specified.                                                                            |
| /MODIFIED | Selects files last modified since the date specified. If you specify /SINCE without another qualifier, /MODIFIED is used by default. |

Specify the date and time as a delta time or as an absolute time using the format [dd-mmm-yyyy[:]][hh:mm:ss.cc]. You can also use one of the following reserved words to specify the date and time:

## BACKUP /SINCE

|           |                                                                                    |
|-----------|------------------------------------------------------------------------------------|
| BACKUP    | The BACKUP/RECORD operation (available only on Files-11 Structure Level 2 volumes) |
| TODAY     | The current day, month, and year at 00:00:00.0 o'clock                             |
| TOMORROW  | 24 hours after midnight last night                                                 |
| YESTERDAY | 24 hours before midnight last night                                                |

### Example

```
$ BACKUP [PLI.WORK]/SINCE=YESTERDAY/MODIFIED [PLI.SAV]
```

This command copies selected files in the directory [PLI.WORK] to the directory [PLI.SAV]. Only those files that have been modified since 24 hours preceding midnight last night are processed. Even though it is used in this example, the /MODIFIED qualifier is not required because its action is the default when the /SINCE qualifier is specified.

---

## /TAPE\_EXPIRATION

### Output Save-Set Qualifier

Writes a file expiration date other than the current date to the file header label of the save set.

### Format

```
input-specifier output-save-set-spec/TAPE_EXPIRATION[=date]
```

### Description

When you specify the output save-set qualifier /REWIND during a save operation to magnetic tape, BACKUP checks that the expiration date of the *first* file on the tape has expired before initializing the tape. Initializing the tape removes access to data previously stored on the tape.

Digital recommends that you specify an expiration date whenever you create a BACKUP save set on magnetic tape using /REWIND. Daily BACKUP tapes should expire in seven days, weekly BACKUP tapes should expire in one month, and monthly BACKUP tapes should expire in one year.

Specify the date in the following format:

```
dd:mmm:yyyy
```

where:

dd is the date.

mmm is a 3-letter abbreviation of the month.

yyyy is the year.

BACKUP writes the expiration date into the file's HDR1 ANSI label on the tape. If you do not use the /TAPE\_EXPIRATION qualifier, BACKUP uses today's date as the expiration date.

## Example

```
$ BACKUP DBA1:
_To: MTA0:13SEPBAK.BCK/REWIND/TAPE_EXPIRATION=20-SEP-1993/LABEL=SEPW02
```

In this example, the save set file 13SEPBAK.BCK receives an expiration date of September 20, 1993. Because this command includes the /REWIND qualifier, 13NOVBAK.BCK is the first file on the tape and its expiration date indicates that the tape expires after seven days.

---

## /TRUNCATE

### Command Qualifier

Controls whether a copy or restore operation truncates a sequential output file at the end-of-file (EOF) when creating it.

### Format

```
[/NO]TRUNCATE input-specifier output-specifier
```

### Description

By default, a copy or restore operation uses the allocation of the input file to determine the size of the output file. Specify /TRUNCATE if you want the output files to be truncated at the end-of-file (EOF).

## Example

```
$ DIRECTORY/SIZE [FRANKIE]ORIGINAL.DAT
Directory DMA0:[FRANKIE]
ORIGINAL.DAT 35
Total of 1 file, 35 blocks
$ COPY ORIGINAL.DAT EXTENDED.DAT/ALLOCATION=500
$ BACKUP [FRANKIE]EXTENDED.DAT MFA0:20JUL.BCK/LABEL=WKLY03
$ BACKUP/TRUNCATE MFA0:20JUL.BCK/LABEL=WKLY03 DMA0:[FRANKIE]
```

This sequence of commands does the following:

- Determines that the file ORIGINAL.DAT is 35 blocks long.
- Copies ORIGINAL.DAT to EXTENDED.DAT, allocating 500 blocks for EXTENDED.DAT.
- Saves the file EXTENDED.DAT to a save set named 20JUL.BCK on MFA0. BACKUP writes the file allocation size in the file header record of the saved file but saves only 35 blocks in the save set.
- Restores the save set file on MFA0 to a volume mounted on DMA0 and truncates the output files at the EOF. The restored file is 35 blocks long.



# BACKUP /VERIFY

---

## /VERIFY

### Command Qualifier

Specifies that the contents of the output specifier be compared with the contents of the input specifier after a save, restore, or copy operation is completed.

### Format

`/VERIFY input-specifier output-specifier`

### Description

The `/VERIFY` qualifier is different from the command qualifier `/COMPARE`. Unlike the `/VERIFY` qualifier, the command qualifier `/COMPARE` cannot be used in a save, restore, copy, or list operation. The `/VERIFY` qualifier directs `BACKUP` to perform the copy, save, or restore operation first and then to perform the compare operation.

On file-structured copy operations, each file is compared after it is copied. On physical copy operations, the volume is compared after it is copied. For a save or restore operation, the verification is performed in a separate pass and is preceded by the following informational message:

```
%BACKUP-I-STARTVERIFY, starting verification pass
```

If a file does not compare successfully, `BACKUP` displays the following error message:

```
%BACKUP-E-VERIFYERR, verification error for block 'block-number'
of 'disk:[directory]file_name.file_type;version_number'
```

The `/VERIFY` qualifier does not work on a restore or copy operation when the `/NEW_VERSION` output file qualifier is also used. Because the `/NEW_VERSION` qualifier reassigns output file versions, it is not possible to correctly associate the created output files with the input files from which they were copied.

### Example

```
$ BACKUP/VERIFY/LOG *.LIS MFA0:LIST.BCK
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]CRE.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]CRETIME.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]EXC.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]NOREB.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]REB.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]SETREB.LIS;1
%BACKUP-S-COPIED, copied DISK$DEFAULT:[WONDER]VERS.LIS;1

%BACKUP-I-STARTVERIFY, starting verification pass
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]CRE.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]CRETIME.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]EXC.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]NOREB.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]REB.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]SETREB.LIS;1
%BACKUP-S-COMPARED, compared DISK$DEFAULT:[WONDER]VERS.LIS;1
```

This example creates a magnetic tape save set on MFA0 and starts the verification pass after the save operation is completed. The `/LOG` qualifier displays the file names as they are processed.

---

**/VOLUME****Command Qualifier**

Indicates that a specific disk volume in a disk volume set is to be processed. The /VOLUME qualifier is valid only when used with the /IMAGE qualifier.

**Format**

/IMAGE/VOLUME=*n* input-specifier output-specifier

**Description**

The /VOLUME qualifier allows you to perform an image save, restore, or copy operation using one more disk drive than the number of disks in the input volume set. When you use /VOLUME, you must write-lock the entire input volume set.

When you perform an image copy or save operation with the /VOLUME qualifier, all disks in the input volume set must be mounted. Mount the volumes of the target volume set one at a time. Enter a separate BACKUP command for each disk in the input volume set. A save set created with the /VOLUME qualifier must be restored using the /VOLUME qualifier.

You can restore any image save set with the /VOLUME qualifier. All disks in the output volume set must be mounted. Mount the disks in the input volume set one at a time. You cannot use the command qualifier /NOINITIALIZE in the restore operation with the command qualifier /VOLUME.

In a compare operation that uses the /VOLUME qualifier to compare two disk volume sets, all disks in both volume sets must be mounted. In a selected-volume compare operation between a save set on tape and a disk volume set, all disks in the disk volume set must be mounted.

**Example**

```
$ BACKUP/IMAGE/VOLUME=3 DISK$PUBLIC DRA1:
```

This command creates a functionally equivalent copy of the third volume of a volume set named DISK\$PUBLIC to DRA1. The disk mounted in DRA1 becomes the third volume of the image-copy volume set.

## BACKUP Examples

Table 7–4 shows BACKUP command formats for save operations and some of the qualifiers you can use with a save operation.

**Table 7–4 Save Operation Quick Reference**

| Command Action                                                                     | Command Format and Example                                                                                                                                                      |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Saves a file to a save set on magnetic tape                                        | BACKUP file-spec save-set-specifier/LABEL=label<br>\$ BACKUP STRATDAT1.DAT MTA0:STRATDAT1.BCK<br>/LABEL=TAPE01                                                                  |
| Saves the most recent versions of files in a directory to magnetic tape            | BACKUP [directory]*.*; save-set-specifier/LABEL=label<br>\$ BACKUP [LYKINS...]*.*; MTA0:1409MAR17.BCK<br>/LABEL=WKY102                                                          |
| Saves a disk volume to a save set on magnetic tape                                 | BACKUP/IMAGE ddcu: save-set-specifier/LABEL=label<br>\$ BACKUP/IMAGE DBA1: MTA0:930FEB4.BCK<br>/LABEL=MTH101                                                                    |
| Saves a disk volume to a multivolume save set on more than one magnetic tape drive | BACKUP/IMAGE ddcu: save-set-specifier,ddcu: . . .<br>/LABEL=(label1, . . . )<br>\$ BACKUP/IMAGE DBA1: MTA0:17MAR.BCK,MTA1:/ -<br>_ \$ LABEL=(WKY101,WKY102)                     |
| Saves a list of files to a save set on magnetic tape                               | BACKUP file-spec,file-spec,... save-set-specifier/LABEL=label<br>\$ BACKUP DBA1:[LYKINS...]*.PAS,DMA0:[DAKOTA...]*.PAS -<br>_ \$ MTA0:PAS17MAR.BCK/LABEL=TAPE01                 |
| Saves a disk volume for incremental backups for the first time                     | BACKUP/RECORD/IMAGE/LOG ddcu: save-set-specifier<br>/LABEL=label<br>\$ BACKUP/RECORD/IMAGE/LOG DBA1: MTA0:925FEB4.BCK<br>/ -<br>_ \$ LABEL=DLY101                               |
| Saves a disk volume for incremental backups (not the first time)                   | BACKUP/RECORD/FAST/LOG ddcu:[*...]/SINCE=BACKUP<br>save-set-specifier/LABEL=label<br>\$ BACKUP/RECORD/FAST/LOG DBA1:[*...]/SINCE=BACKUP -<br>_ \$ MTA0:928FEB4.BCK/LABEL=DLY101 |
| Saves an unstructured disk volume                                                  | BACKUP/PHYSICAL ddcu: save-set-specifier/LABEL=label<br>\$ BACKUP/PHYSICAL DMA1: MTA0:935FEB4.BCK<br>/LABEL=MTH101                                                              |

(continued on next page)

**Table 7–4 (Cont.) Save Operation Quick Reference**

| Command Action                                                                                                                        | Command Format and Example                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Saves a directory to a save set on a Files–11 disk                                                                                    | BACKUP [directory] save-set-specifier/SAVE_SET<br>\$ BACKUP [LYKINS] DBA2:[BACKUP]1609FEB3.BCK/SAVE_SET                                        |
| Saves a directory tree to a save set on magnetic tape                                                                                 | BACKUP [directory...] save-set-specifier/LABEL=label<br>\$ BACKUP [LYKINS...] MTA0:1612FEB3.BCK/LABEL=TAPE01                                   |
| Saves a directory tree to a save set on magnetic tape and creates a listing file                                                      | BACKUP/LIST=file-spec [directory...] save-set-specifier<br>/LABEL=label<br>\$ BACKUP/LIST=8SEP.LOG [LYKINS...] MTA0:8SEP.BCK<br>/LABEL=WKL101  |
| Saves a directory tree to a save set on magnetic tape using data compaction to increase the amount of data stored on a tape cartridge | BACKUP [directory...] save-set-specifier/MEDIA_FORMAT=COMPACTION<br>\$ BACKUP [TESTFILES...]*.*;* MUA0:TEST.SAV/MEDIA_FORMAT=COMPACTION/REWIND |

Table 7–5 shows BACKUP command formats for restore operations and some of the qualifiers you can use with restore operations. In the examples in this table, it is assumed that save sets already exist on the magnetic tape and disk.

**Table 7–5 Restore Operation Quick Reference**

| Command Action                                                                  | Command Format and Example                                                                                                                         |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Restores from save set on disk to Files–11 disk with original UICs              | BACKUP save-set-specifier/SAVE_SET ddcu:[*...]/BY_OWNER=ORIGINAL<br>\$ BACKUP DBA2:[BACKUP]FEB2.BCK/SAVE_SET DBA1:[*...]-<br>_\$/BY_OWNER=ORIGINAL |
| Restores from a save set on magnetic tape to a Files–11 disk with original UICs | BACKUP save-set-specifier ddcu:[*...]/BY_OWNER=ORIGINAL<br>\$ BACKUP MTA0:1618FEB2.BCK DBA1:[*...]/BY_OWNER=ORIGINAL                               |
| Restores a selected file in a save set on magnetic tape to a Files–11 disk      | BACKUP save-set-specifier/SELECT=file-spec file-spec<br>\$ BACKUP MTA0:FEB2.BCK/SELECT=[POUDRE]UPLIFT.PAS<br>-<br>_ \$ DBA1:[GEO.PAS]UPLIFT.PAS    |

(continued on next page)

## BACKUP Examples

**Table 7–5 (Cont.) Restore Operation Quick Reference**

| Command Action                                                                                                | Command Format and Example                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Restores files with a specific UIC to a Files–11 disk                                                         | <pre>BACKUP save-set-specifier/BY_OWNER=[uic] file-spec \$ BACKUP MTA0:1641FEB2.BCK/BY_OWNER=[360,052] - _ \$ DBA1:[LYKINS...]</pre>                                                                                                         |
| Restores files to a Files–11 disk with a new UIC                                                              | <pre>BACKUP save-set-specifier file-spec/BY_OWNER=[uic] \$ BACKUP MTA0:1641FEB2.BCK - _ \$ DBA1:[TESTS...]/BY_OWNER=[100,150]</pre>                                                                                                          |
| Restores files to a Files–11 disk; if file exists, creates new version                                        | <pre>BACKUP save-set-specifier file-spec/NEW_VERSION \$ BACKUP MTA0:1641FEB2.BCK DBA1:[LYKINS...]/NEW_ VERSION</pre>                                                                                                                         |
| Restores files to a Files–11 disk; if file exists, replaces with new version                                  | <pre>BACKUP save-set-specifier file-spec/REPLACE \$ BACKUP MTA0:1641FEB2.BCK DBA1:[LYKINS...]/REPLACE</pre>                                                                                                                                  |
| Restores files to a Files–11 disk selecting certain files                                                     | <pre>BACKUP save-set-specifier/SELECT=file-spec file-spec \$ BACKUP MTA0:1641FEB2.BCK/SELECT=[LYKINS.PAS] - _ \$ DBA1:[LYKINS...]</pre>                                                                                                      |
| Restores a directory tree, placing files in a different subtree                                               | <pre>BACKUP save-set-specifier/SELECT=[directory...] [directory2...] \$ BACKUP MTA0:1641FEB2.BCK/SELECT=[FIELD...] - _ \$ DBA1:[LYKINS.NEWDATA...]</pre>                                                                                     |
| Restores a Files–11 volume from a physical save set                                                           | <pre>BACKUP/PHYSICAL save-set-specifier ddcu: \$ BACKUP/PHYSICAL MTA0:26MAR.BCK DMA3:</pre>                                                                                                                                                  |
| Restores a Files–11 volume from an image save set                                                             | <pre>BACKUP/IMAGE save-set-specifier ddcu: \$ BACKUP/IMAGE MTA0:17AUG.BCK DRA3:</pre>                                                                                                                                                        |
| Restores a Files–11 volume, maintaining the initialization parameters specified in the DCL command INITIALIZE | <pre>INITIALIZE ddcu: volume-name/new-parameters MOUNT/FOREIGN ddcu: BACKUP/IMAGE save-set-specifier ddcu:NOINITIALIZE \$ INITIALIZE DBA1: UTTLPACK/CLUSTER=5 \$ MOUNT/FOREIGN DBA1: \$ BACKUP/IMAGE MTA0:17AUG.BCK DBA1:/NOINITIALIZE</pre> |

Table 7–6 shows BACKUP command formats for copy operations, including some of the qualifiers you can use with a copy operation.

**Table 7–6 Copy Operation Quick Reference**

| Command Action                                                            | Command Format and Example                                                      |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Copies a directory tree to another directory tree                         | BACKUP [directory...] [directory...]<br>\$ BACKUP [DAKOTA...] [SUNDANCE...]     |
| Copies a file to another file                                             | BACKUP file-spec file-spec<br>\$ BACKUP LOGIN.COM [.SAVE]OLDLOGIN.COM           |
| Copies a disk volume to another disk volume                               | BACKUP/IMAGE ddcu: ddcu:<br>\$ BACKUP/IMAGE DBA1: DBA2:                         |
| Copies a disk volume to another disk volume using the /PHYSICAL qualifier | BACKUP/PHYSICAL ddcu: ddcu:<br>\$ BACKUP/PHYSICAL DYA1: DYA2:                   |
| Copies two disk volume sets using the /IMAGE qualifier                    | BACKUP/IMAGE volume-set-name ddcu:,ddcu:<br>\$ BACKUP/IMAGE USER\$: DBA1:,DBA2: |

Table 7–7 shows BACKUP command formats for compare operations, including some of the qualifiers you can use with a compare operation.

**Table 7–7 Compare Operation Quick Reference**

| Command Action                                               | Command Format and Example                                                                                                                         |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Compares two Files–11 files                                  | BACKUP/COMPARE file-spec file-spec<br>\$ BACKUP/COMPARE UPLIFT.EXE;3 UPLIFT.EXE;2                                                                  |
| Compares a selected file from a save set and a Files–11 file | BACKUP/COMPARE save-set-specifier/select=file-spec file-spec<br>\$ BACKUP/COMPARE MTA0:FEB2.BCK<br>/SELECT=[POUDRE]UPLIFT.PAS -<br>_ \$ UPLIFT.PAS |
| Compares an image save set and Files–11 files                | BACKUP/COMPARE/IMAGE save-set-specifier ddcu:<br>\$ BACKUP/COMPARE/IMAGE MTA0:12OCT.BCK DRA3:                                                      |

Table 7–8 shows BACKUP command formats for a list operation, including some of the qualifiers you can use with a list operation.

## BACKUP Examples

**Table 7-8 List Operation Quick Reference**

| <b>Command Action</b>                           | <b>Command Format and Example</b>                                                                                                                        |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lists the files in a save set at the terminal   | BACKUP/LIST save-set-specifier<br>\$ BACKUP/LIST MTA0:1618FEB2.BCK                                                                                       |
| Lists the files in a save set, writes to a file | BACKUP/LIST=file-spec save-set-specifier<br>\$ BACKUP/LIST=NEWLIST.LIS MTA0:1618FEB2.BCK                                                                 |
| Lists the files in a save set in full format    | BACKUP/LIST/FULL save-set-specifier<br>\$ BACKUP/LIST/FULL MTA0:1618FEB2.BCK                                                                             |
| Lists selected files in a journal file          | BACKUP/LIST/JOURNAL=journal-name/selection-qualifiers<br>\$ BACKUP/LIST/JOURNAL=SYS\$MANAGER:INCBACKUP -<br>_\$/SELECT=[LYKINS.WORK...]/SINCE=1-JAN-1993 |

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**Crash Log Utility Extractor (CLUE) (VAX Only)**





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## CLUE Description



The Crash Log Utility Extractor (CLUE) is a tool available on VAX systems that you can use to display the contents of a **crash history file**. The crash history file, which is created and updated by CLUE, contains key parameters from crash dump files. Unlike crash dumps, which are overwritten with each system failure (crash) and are therefore typically available only for the most recent failure, the crash history file is a permanent record of system failures. By examining the contents of the crash history file with the CLUE/DISPLAY command, you can understand and resolve the issues responsible for some crashes and you can also obtain other useful data.

---

## CLUE Usage Summary

When a system fails, physical memory is copied to the crash dump file, and CLUE automatically appends the relevant parameters to a file named CLUE\$OUTPUT:CLUE\$HISTORY.DATA. You can use CLUE to display and examine the data in this file.

### Format

CLUE /DISPLAY

#### Parameters

None.

### Usage Summary

Before you run CLUE, define the CLUE command (either interactively or in a procedure such as a login command procedure), as follows:

```
$ CLUE ::= $CLUE
```

To invoke CLUE, enter the CLUE/DISPLAY command. To terminate CLUE, enter the EXIT command at the CLUE\_DISPLAY> prompt or press Ctrl/Z.

Note that you can also issue CLUE/DISPLAY commands directly from DCL, as in the following example:

```
$ CLUE/DISPLAY = DIR/TYPE=INVEXCEPTN/SINCE=21-NOV-1994/OUT=CLUE.LIS
```

---

## CLUE Commands

This section describes and provides examples of the CLUE /DISPLAY commands. You can abbreviate any command, keyword, or qualifier as long as the abbreviation is not ambiguous. The asterisk and the percent sign can be used as wildcard characters in the specification of user names, node names, and UICs.

Table 8–1 lists the commands described in this section.

**Table 8–1 CLUE Commands**

| Command   | Description                                                          |
|-----------|----------------------------------------------------------------------|
| DELETE    | Deletes an entry from the crash history file                         |
| DIRECTORY | Displays a list of entries from the crash history file               |
| EXIT      | Exits from CLUE                                                      |
| EXTRACT   | Extracts data from an entry in the crash history file to a file      |
| HELP      | Provides online help for CLUE/DISPLAY commands                       |
| SHOW      | Displays specific information for an entry in the crash history file |

---

### DELETE

Deletes an entry from the list and writes the remaining entries to a binary file.

#### Format

```
DELETE n
```

#### Parameter

**n**

The number of the entry that you want to delete from the crash history file. The number of the entry corresponds to the entry number shown by the DIRECTORY command.

#### Description

Entries in the CLUE.BIN file can be permanently removed using the DELETE command. This command deletes the specified entry and writes the remaining entries to an output file. When an entry is deleted from the crash history file, a new history file (with a higher version number) is created.

#### Example

```
CLUE_DISPLAY> DELETE 4
```

Deletes the fourth entry in the list.

## CLUE (VAX Only) DIRECTORY

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### DIRECTORY

Displays a brief summary of each entry in crash history file.

#### Format

DIRECTORY

#### Qualifiers

##### **/MODULE=**

Lists all failures that correspond to the specified module (that is, failures that start with the specified string).

##### **/OFFSET=**

Lists all failures that correspond to the specified offset (that is, failures that start with the specified string).

##### **/SINCE=**

Lists all failures that have occurred since the specified date. If the **/SINCE** qualifier is used and no date is specified, all failures that have occurred on the current day are listed.

##### **/TYPE=**

Lists all failures that correspond to the specified type (that is, failures that start with the specified string).

#### Description

The **DIRECTORY** command lists the record entries in the crash history file, beginning with the most recent entry. Six headings are displayed for each entry:

- Entry number
- Date and time of crash
- Type
- Process
- Module
- Offset

You can use one or more qualifiers for the **DIRECTORY** command to limit the crash entries that are displayed. You can also use more than one qualifier in the same command line. For example, the command **DIRECTORY/SINCE=18-APR-1993/MODULE=NETACP** lists only those crash entries that have taken place since April 18, 1993, and for which the module is **NETACP**.

## Examples

1. CLUE\_DISPLAY> DIRECTORY

| #    | Time                    | Type       | Process name | Module | Offset |
|------|-------------------------|------------|--------------|--------|--------|
| ==== | =====                   | =====      | =====        | =====  | =====  |
| 1    | 11-JUL-1994 09:07:45.78 | INVEXCEPTN | batman       | NETACP | 14B9   |
| 2    | 01-JAN-1994 11:32:55.23 | SSRVEXCEPT | startrek     | SYSLOA | 10A8   |
| 3    | 15-MAY-1993 07:26:12.34 | BADFID     | evolushun    | NONE   | NONE   |
| 4    | 22-APR-1993 10:45:20.60 | INVEXCEPTN | aprocess     | IOBUF  | 015D   |

This example lists all entries in the crash history file.

2. CLUE\_DISPLAY> DIRECTORY /MODULE=SYSLOA

| #    | Time                    | Type       | Process name | Module | Offset |
|------|-------------------------|------------|--------------|--------|--------|
| ==== | =====                   | =====      | =====        | =====  | =====  |
| 2    | 01-JAN-1994 11:32:55.23 | SSRVEXCEPT | startrek     | SYSLOA | 10A8   |

This example lists only those entries for which the module is SYSLOA.

---

## EXIT

Exits from CLUE.

## Format

EXIT

## Description

This command exits from CLUE and returns you to the DCL level.

## Example

```
CLUE_DISPLAY> EXIT
$
```

This example exits from CLUE.

---

## EXTRACT

Extracts all of the data from an entry in the crash history file to either an ASCII or a binary file.

## Format

EXTRACT n

## Parameter

**n**  
The number of the entry that you want to extract to a file. The number of the entry corresponds to the entry number shown by the DIRECTORY command.

## CLUE (VAX Only) EXTRACT

### Qualifiers

**/BINARY=filename.bin**

The /BINARY qualifier writes the output to a binary file.

**/OUTPUT=filename.txt**

The /OUTPUT qualifier writes the output to an ASCII file. The /OUTPUT qualifier is the default.

### Description

Use the EXTRACT command to save record entries from the crash history file to an ASCII or a binary file. If no qualifier is used, entry is written to a text file with the name CLUE\$HISTORY.TXT.

### Example

```
CLUE_DISPLAY> EXTRACT 3 /OUTPUT=15MAYCRASH.TXT
```

This command writes the data from entry number 3 in the crash history file to an ASCII file named 15MAYCRASH.TXT.

---

## HELP

Provides online help for CLUE commands.

### Format

```
HELP [command]
```

### Parameter

**command**

The command for which you want help.

### Example

```
CLUE_DISPLAY> HELP DIRECTORY
```

This command provides online help for the DIRECTORY command in CLUE.

---

## SHOW

Displays specific information for an entry in the crash history file.

### Format

```
SHOW info_type n
```

## Parameters

### **info\_type**

You must choose one of the following information types:

- **CRASH**—displays information similar to the **SHOW CRASH** command in the System Dump Analyzer (SDA) utility.
- **STACK**—displays information similar to the **SHOW STACK** command in SDA.
- **EXEC**—displays information similar to the **SHOW EXEC** and **SHOW DEVICE** commands in SDA.
- **ISTREAM**—displays the instruction stream around the failing PC.
- **SUMMARY**—displays the active processes on the system, similar to the **SHOW SUMMARY/IMAGE** command in SDA.
- **ALL**—displays all the information from the preceding types.

For more information about SDA commands, see the *OpenVMS VAX System Dump Analyzer Utility Manual*.

### **n**

The number of the entry for which you want to display information. The number of the entry corresponds to the entry number shown by the **DIRECTORY** command.

## Description

This command lets you see all the data associated with a particular failure. This information is split into several sections; you can choose to see either individual sections or all of the information.

If the crash number is not specified, information for the most recent entry in the crash history file is displayed. You must, however, specify one of the keywords for *info\_type*.

If you request a specific entry from the crash history list (using the **SHOW n** command), the display will include some parameters that are useful only to Digital Services.

## Examples

1. **CLUE\_DISPLAY> SHOW ISTREAM 4**  
Instructions around the failing PC:  

```
80A9F841 RSB
80A9F842 BUG_CHECK #019C
80A9F846 BUG_CHECK #019C
80A9F84A PUSHL R4
80A9F84C MOVL R5,R4
80A9F84F BEQL 00002C88
```



## CLUE (VAX Only) SHOW

```
80A9F851 JSB @#-7FFFCC48
80A9F857 MOVL (SP)+,R4
80A9F85A RSB
80A9F85B BUG_CHECK #019C
PC->80A9F85F BUG_CHECK #019C => CLUSTRLOA + 09B6F
80A9F863 MOVL #00,R1
80A9F866 MOVB #01,R0
80A9F869 RSB
80A9F86A INCL 00002301
80A9F86E TSTW 000022FF
80A9F872 BLSS 00002CA5
```

This example displays instruction stream information around the failing PC from the crash history file for entry number 4.

### 2. CLUE\_DISPLAY> SHOW CRASH 4

```
Time of system crash: 21-MAR-1993 15:21:33.72
Version of system: VAX/VMS VERSION V5.5
System Version Major ID/Minor ID: 1/0
VAXcluster node: HERMES, a VAX 6000-420
Crash CPU ID/Primary CPU ID: 03/01
Bitmask of CPUs active/available: 0000000A/0000000A
CPU bugcheck codes: CPU 03 INCONSTATE
 1 other CPUEXIT

Current Process name: OPCOM
Current IPL: 8
CPU database address: 801AA000
```

#### General registers:

```
R0 = 80A9F85B R1 = 00000002 R2 = 80A15B08 R3 = 00010008
R4 = 80A15AD0 R5 = 00000000 R6 = 00000001 R7 = 00000042
R8 = 00022520 R9 = 00020F18 R10 = 00021000 R11 = 00020EC0
.
.
.
```

This example displays information about the state of the system at the time of the failure. The actual output from this command may contain significantly more information than is shown in this example. ♦





---

## ERROR LOG Description

The Error Log utility (ERROR LOG) is a system management tool that selectively reports the contents of one or more error log files. The operating system automatically writes messages to the latest version of an error log file named `SY$ERRORLOG:ERRLOG.SYS` as the following events occur:

- Errors—Device errors, device timeouts, machine checks, bus errors, memory errors (hard or soft error correcting code (ECC) errors), asynchronous write errors, undefined interrupts, and bugchecks
- Volume changes—Volume mounts and dismounts
- System events—Cold startups, warm startups, system failure (crash) startups, messages from the Send Message to Error Logger (`$SENDERR`) system

You can use ERROR LOG with most system-supported hardware, such as adapters, disks, tapes, CPUs, and memories, but not all communications devices (for example, the DEQNA). Some synchronous communications devices are supported.

---

## ERROR LOG Usage Summary

You can use ERROR LOG to process one or more types of error log entries for inclusion in a report. ERROR LOG generates six types of optional formatted output: full (default), brief, summary, register dump of device entries, binary copy of selected entries, and binary copy of rejected entries.

The Error Log utility (ERROR LOG) selectively reports the contents of an error log file.

### Format

```
ANALYZE/ERROR_LOG [/qualifier(s)] [file-spec[,...]]
```

#### Parameters

##### **/qualifier(s)**

The function to be performed by the ANALYZE/ERROR\_LOG command.

##### **file-spec[,...]**

Specifies one or more files that contain binary error information to be interpreted for the error log report. You can include wildcard characters in the file specification. If you omit the file specification, the default file is SYS\$ERRORLOG:ERRLOG.SYS (see the *OpenVMS System Manager's Manual* for information on maintaining this file).

See the *OpenVMS User's Manual* for details on file specifications.

### Usage Summary

To invoke ERROR LOG, enter the following DCL command:

```
ANALYZE/ERROR_LOG [/qualifier(s)] [file-spec][,...]
```

ERROR LOG does not prompt you. To exit from ERROR LOG, press Ctrl/C. You also exit the utility when end-of-file (EOF) is detected. To direct output, use the /OUTPUT, /BINARY, and /REJECTED qualifiers with the ANALYZE/ERROR\_LOG command.

You must have SYSPRV privilege to run ERROR LOG; however, only read access is required to access the file ERRORLOG.SYS. (It is not necessary to rename the file ERRORLOG.SYS to ERRORLOG.OLD before using ERROR LOG.) Do not use the /BINARY qualifier with the /FULL, /BRIEF, /OUTPUT, /REGISTER\_DUMP, or /SUMMARY qualifiers.

---

## ERROR LOG Qualifiers

The qualifiers for the ANALYZE/ERROR\_LOG command are described in this section. Table 9-1 lists the qualifiers as follows:

**Table 9-1 ERROR LOG Qualifiers**

| Qualifier      | Description                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| /BEFORE        | Specifies that only those entries dated earlier than the stated date and time are to be selected for the error report                                |
| /BINARY        | Controls whether the binary error log records are converted to ASCII text or copied to the specified output file                                     |
| /BRIEF         | Generates a brief report                                                                                                                             |
| /ENTRY         | Generates an error log report that includes the specified entry range or starts at the specified entry number                                        |
| /EXCLUDE       | Excludes errors generated by the specified device class, device name, or error log entry type from the error log report                              |
| /FULL          | Generates a full report (default), which provides all available information for an error log entry                                                   |
| /INCLUDE       | Includes errors generated by the specified device class, device name, or error log entry type in the error log report                                |
| /LOG           | Controls whether informational messages that specify the number of entries selected and rejected for each input file are sent to SYS\$OUTPUT         |
| /NODE          | Generates a report consisting of error log entries for specific nodes in a VAXcluster system                                                         |
| /OUTPUT        | Specifies the output file for the error log report                                                                                                   |
| /REGISTER_DUMP | Used in conjunction with the /INCLUDE qualifier to generate, in a hexadecimal longword format, a report that consists of device register information |
| /REJECTED      | Allows you to specify the name of a file that will contain binary records for rejected entries                                                       |
| /SID_REGISTER  | Generates a report consisting of error log entries that occurred on the specified CPU (VAX only)                                                     |
| /SINCE         | Specifies that only those entries dated later than the stated date and time are to be selected for the report                                        |
| /STATISTICS    | Generates run-time statistical information                                                                                                           |
| /SUMMARY       | Generates an error log report that consists of a statistical summary (VAX only)                                                                      |

---

## ERROR LOG /BEFORE

---

### /BEFORE

Specifies that only those entries dated earlier than the stated date and time are to be selected for the error report.

#### Format

/BEFORE [=date-time]

#### Parameter

##### date-time

Limits the error report to those entries dated earlier than the specified time.

#### Description

You can specify an absolute time, a delta time, or a combination of absolute and delta times. See the *OpenVMS User's Manual* for details on specifying times.

If you omit the /BEFORE qualifier or specify /BEFORE without a date or time, all entries are processed.

#### Example

```
$ ANALYZE/ERROR_LOG/BEFORE=19-APR-1994:10:00 ERRLOG.OLD;5
```

In this example, the error log report generated for ERRLOG.OLD;5 contains entries that were logged before 10:00 A.M. on April 19, 1994.

---

### /BINARY

Controls whether the binary error log records are converted to ASCII text or copied to the specified output file.

#### Format

/BINARY [=file-spec]

/NOBINARY

#### Parameter

##### file-spec

Specifies the output file selected to contain image copies of the input records.

#### Description

The /BINARY qualifier creates a binary file that contains copies of the original binary error log entry if the command line also specifies an interval (/SINCE, /BEFORE, or /ENTRY qualifier) or a filter (/INCLUDE or /EXCLUDE qualifier). If no interval or filter is specified, all error log entries are copied.

If you specify `/BINARY=file-spec`, the selected output file contains image copies of the binary input records (the records are not translated to ASCII). If you omit the device or directory specification, the current device and the default directory are used. If you omit the file name, the file name of the input file is used. If you omit the file type, the default file type is `.DAT`.

Do not use `/BINARY` with the `/FULL`, `/BRIEF`, `/OUTPUT`, `/REGISTER_DUMP`, or `/SUMMARY` qualifiers. These qualifiers generate an ASCII report; `/BINARY` generates a binary file.

### Example

```
$ ANALYZE/ERROR_LOG/INCLUDE=DBA1/BINARY=DBA1_ERR.DAT
ERRLOG.OLD;5
```

In this example, the output file `DBA1_ERR.DAT` contains image copies of the entries that apply to `DBA1`.

---

### **/BRIEF**

Generates a brief report.

### Format

`/BRIEF`

### Description

Do not use `/BRIEF` with the `/BINARY` qualifier.

The Example section shows the format of a typical brief error log report.

### Example

```
$ ANALYZE/ERROR_LOG/BRIEF ERRLOG.OLD;97
```

In this example, the error log report generated from `ERRLOG.OLD;97` contains minimal information.

---

### **/ENTRY**

Generates an error log report that includes the specified entry range or starts at the specified entry number.

### Format

`/ENTRY [(START:decimal-value[,END:decimal-value])]`

### Parameter

**(START:decimal-value[,END:decimal-value])**

Specifies the range of entries to be included in the error log report.



## ERROR LOG /ENTRY

### Description

If you specify /ENTRY without the entry range or omit the qualifier, the entry range defaults to START:1,END:end-of-file.

### Example

```
$ ANALYZE/ERROR_LOG/ENTRY=(START:1,END:18) ERRLOG.SYS
```

In this example, the entry range for the error log report generated from file ERRLOG.SYS is limited to entry numbers 1 to 18.

---

## /EXCLUDE

Excludes errors generated by the specified device class, device name, or error log entry type from the error log report.

### Format

$$/EXCLUDE=( \left\{ \begin{array}{l} \text{device-class} \\ \text{device-name} \\ \text{entry-type} \end{array} \right\} [,...] )$$

### Parameters

**device-class**

**device-name**

**entry-type**

Specifies one or more keywords denoting the device class, device name, or error log entry type. If you specify more than one keyword, you must specify a comma-separated list of values that is enclosed in parentheses.

#### Device Class Keywords

ADAPTER  
BUSES  
CACHE  
DISKS  
INFORMATIONAL  
LINE\_PRINTER  
REALTIME  
SYNC\_COMMUNICATIONS  
TAPES  
VECTOR  
WORKSTATION

#### Examples of Device Name Constructs

|                        |                             |
|------------------------|-----------------------------|
| DB                     | Group of devices            |
| DBA1                   | Specific device/unit number |
| (DBA1,HSC1\$DUA1,DYA0) | List of devices             |
| (DB,DR,XF)             | List of device groups       |

**Entry-Type Keywords**

|                       |                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ATTENTIONS            | Exclude device attention entries from the report.                                                                                                                                                                                                                                                                                                                                          |
| BUGCHECKS             | Exclude all types of bugcheck entries from the report.                                                                                                                                                                                                                                                                                                                                     |
| CONFIGURATION         | Exclude system configuration entries from the report.                                                                                                                                                                                                                                                                                                                                      |
| CONTROL_ENTRIES       | Exclude control entries from the report. Control entries include the following entry types: <ul style="list-style-type: none"><li>• System power failure restarts</li><li>• Time stamps</li><li>• System startups</li><li>• \$SNDERR messages (system service to send messages to error log)</li><li>• Operator messages</li><li>• Network messages</li><li>• ERRLOG.SYS created</li></ul> |
| CPU_ENTRIES           | Exclude CPU-related entries from the report. CPU entries include the following entry types: <ul style="list-style-type: none"><li>• SBI alerts/faults</li><li>• Undefined interrupts</li><li>• MBA/UBA adapter errors</li><li>• Asynchronous write errors</li><li>• UBA errors</li></ul>                                                                                                   |
| DEVICE_ERRORS         | Exclude device error entries from the report.                                                                                                                                                                                                                                                                                                                                              |
| ENVIRONMENTAL_ENTRIES | Exclude environmental entries from the report.                                                                                                                                                                                                                                                                                                                                             |
| MACHINE_CHECKS        | Exclude machine check entries from the report.                                                                                                                                                                                                                                                                                                                                             |
| MEMORY                | Exclude memory errors from the report.                                                                                                                                                                                                                                                                                                                                                     |
| SNAPSHOT_ENTRIES      | Exclude snapshot entries from the report.                                                                                                                                                                                                                                                                                                                                                  |
| SYNDROME              | Exclude console-generated entries that describe a symptom set used by Digital Services personnel to identify problems.                                                                                                                                                                                                                                                                     |
| TIMEOUTS              | Exclude device timeout entries from the report.                                                                                                                                                                                                                                                                                                                                            |
| UNKNOWN_ENTRIES       | Exclude any entry that had either an unknown entry type or an unknown device type or class.                                                                                                                                                                                                                                                                                                |
| UNSOLICITED_MSCP      | Exclude unsolicited MSCP entries from the output report.                                                                                                                                                                                                                                                                                                                                   |
| VOLUME_CHANGES        | Exclude volume mount and dismount entries from the report.                                                                                                                                                                                                                                                                                                                                 |

## ERROR LOG /EXCLUDE

### Description

You can specify one or more devices by device class, device name, or one or more keywords that identify entry types.

Unless you specify the UNKNOWN\_ENTRIES keyword to explicitly exclude from a report any entries from unsupported (unknown) devices, any unknown device is reported.

Any known information for the entry is translated; the remaining information is output in hexadecimal longwords.

If you specify a device class keyword or a device name construct with both the /INCLUDE and /EXCLUDE qualifiers, the /INCLUDE qualifier takes precedence.

The BUSES keyword also excludes error log entries for the BI bus. The DEVICE\_ERRORS keyword also excludes entries for the BI adapter.

### Examples

1. \$ ANALYZE/ERROR\_LOG/EXCLUDE=MTA0

In this example, the error log entries for the device MTA0 are excluded from the error log report for the file ERRLOG.SYS.

2. \$ ANALYZE/ERROR\_LOG/EXCLUDE=(MTA0,DRA5) ERRLOG.OLD

In this example, the devices MTA0 and DRA5 are excluded from the error log report for the file ERRLOG.OLD.

3. \$ ANALYZE/ERROR\_LOG/EXCLUDE=(DISKS,BUGCHECKS)

In this example, all disk devices and all bugcheck entries are excluded from the error log report for the file ERRLOG.SYS.

4. \$ ANALYZE/ERROR\_LOG/EXCLUDE=TAPES/INCLUDE=MTA0

In this example, the device MTA0 is included in the error log report for the file ERRLOG.SYS. All other magnetic tape devices are excluded from the report.

5. \$ ANALYZE/ERROR\_LOG/EXCLUDE=(DISK,VOLUME\_CHANGES)

In this example, entries for disk volume information are excluded from the error log report for the file ERRLOG.SYS.

6. \$ ANALYZE/ERROR\_LOG/EXCLUDE=(DISK,VOLUME\_CHANGES,DEVICE\_ERROR)

In this example, entries for volume and device error information on disks are excluded from the error log report for the file ERRLOG.SYS.

7. \$  
ANALYZE/ERROR\_LOG/EXCLUDE=(DISK,VOLUME\_CHANGES,DEVICE\_ERROR,BUGCHECK)

In this example, entries for volume and device error information on disks, and bugcheck errors are excluded from the error log report for the file ERRLOG.SYS.

---

## /FULL

Generates a full report, which provides all available information for an error log entry. This is the default report format.

### Format

/[NO]FULL

### Description

Do not use /FULL with the /BINARY qualifier.

### Examples

1. \$ ANALYZE/ERROR\_LOG/FULL ERRLOG.OLD;72

The command in this example produces a full report.

2. \$ ANALYZE/ERROR\_LOG ERRLOG.OLD;72

The command in this example produces a full report. The default report type is /FULL; it is not necessary to specify it in the command line.

---

## /INCLUDE

Includes errors generated by the specified device class, device name, or error log entry type in the error log report.

### Format

$$/INCLUDE=( \left\{ \begin{array}{l} \text{device-class} \\ \text{device-name} \\ \text{entry-type} \end{array} \right\} [,...])$$

### Parameters

**device-class**

**device-name**

**entry-type**

Specifies one or more keywords denoting the device class, device name, or entry type. If you specify more than one keyword, you must specify a comma-separated list of values that is enclosed in parentheses.

#### Device Class Keywords

ADAPTER

BUSES

CACHE

DISKS

INFORMATIONAL

LINE\_PRINTER

REALTIME

SYNC\_COMMUNICATIONS

## ERROR LOG /INCLUDE

TAPES  
VECTOR  
WORKSTATION

### Examples of Device Name Constructs

|                        |                             |
|------------------------|-----------------------------|
| DB                     | Group of devices            |
| DBA1                   | Specific device/unit number |
| (DBA1,HSC1\$DUA1,DYA0) | List of devices             |
| (DB,DR,XF)             | List of device groups       |

### Entry-Type Keywords

|                       |                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ATTENTIONS            | Include device attention entries in the report.                                                                                                                                                                                                                                                                                                                                          |
| BUGCHECKS             | Include all types of bugcheck errors in the report.                                                                                                                                                                                                                                                                                                                                      |
| CONFIGURATION         | Include system configuration entries in the report.                                                                                                                                                                                                                                                                                                                                      |
| CONTROL_ENTRIES       | Include control entries in the report. Control entries include the following entry types: <ul style="list-style-type: none"><li>• System power failure restarts</li><li>• Time stamps</li><li>• System startups</li><li>• \$SNDErr messages (system service to send messages to error log)</li><li>• Operator messages</li><li>• Network messages</li><li>• ERRLOG.SYS created</li></ul> |
| CPU_ENTRIES           | Include CPU-related entries in the report. CPU entries include the following entry types: <ul style="list-style-type: none"><li>• SBI alerts/faults</li><li>• Undefined interrupts</li><li>• MBA/UBA adapter errors</li><li>• Asynchronous write errors</li><li>• UBA errors</li></ul>                                                                                                   |
| DEVICE_ERRORS         | Include device errors in the report.                                                                                                                                                                                                                                                                                                                                                     |
| ENVIRONMENTAL_ENTRIES | Include environmental entries in the report.                                                                                                                                                                                                                                                                                                                                             |
| MACHINE_CHECKS        | Include machine check errors in the report.                                                                                                                                                                                                                                                                                                                                              |
| MEMORY                | Include memory errors in the report.                                                                                                                                                                                                                                                                                                                                                     |
| SNAPSHOT_ENTRIES      | Include snapshot entries in the report.                                                                                                                                                                                                                                                                                                                                                  |
| SYNDROME              | Include console-generated entries that describe a symptom set used by Digital Services personnel to identify problems.                                                                                                                                                                                                                                                                   |
| TIMEOUTS              | Include device timeout errors in the report.                                                                                                                                                                                                                                                                                                                                             |

|                  |                                                                                             |
|------------------|---------------------------------------------------------------------------------------------|
| UNKNOWN_ENTRIES  | Include any entry that had either an unknown entry type or an unknown device type or class. |
| UNSOLICITED_MSCP | Include unsolicited MSCP entries in the output report.                                      |
| VOLUME_CHANGES   | Include volume mount and dismount entries in the report.                                    |

## Description

You can specify one or more devices by device class, device name, or one or more keywords that identify entry types.

Use the UNKNOWN\_ENTRIES keyword to obtain a report that contains the contents of the device registers logged by unsupported devices.

Any known information for the entry is translated; the remaining information is output in hexadecimal longwords.

If you specify a device class keyword or a device name construct with both the /INCLUDE and /EXCLUDE qualifiers, the /INCLUDE qualifier takes precedence.

The BUSES keyword also includes error log entries for the BI bus. The DEVICE\_ERRORS keyword also includes entries for the BI adapter.

## Examples

1. \$ ANALYZE/ERROR\_LOG/INCLUDE=MTA0

In this example, the report consists of error log entries for the device MTA0, which are in the default error log file ERRLOG.SYS.

2. \$ ANALYZE/ERROR\_LOG/INCLUDE=MTA0/EXCLUDE=TAPES

In this example, the device MTA0 is included in the error log report for the file ERRLOG.SYS. All other magnetic tape devices are excluded from the report.

3. \$ ANALYZE/ERROR\_LOG/INCLUDE=(MTA0,VOL)

In this example, the report consists of error log entries and volume mounts and dismounts for the device MTA0, which are in the default error log file ERRLOG.SYS.

4. \$ ANALYZE/ERROR\_LOG/INCLUDE=(DISK,VOLUME\_CHANGES)

In this example, the report consists of error log entries for disk volume information, which are in the default error log file ERRLOG.SYS.

5. \$ ANALYZE/ERROR\_LOG/INCLUDE=(DISK,VOLUME\_CHANGES,DEVICE\_ERROR)

In this example, the report consists of error log entries for volume and device error information on disks, which are in the default error log file ERRLOG.SYS.

## ERROR LOG /INCLUDE

6. \$  
ANALYZE/ERROR\_LOG/INCLUDE=(DISK,VOLUME\_CHANGES,DEVICE\_ERROR,BUGCHECK)

In this example, the report consists of error log entries for volume and device error information on disks, and bugcheck errors. These entries are in the default error log file ERRLOG.SYS.

---

## /LOG

Controls whether informational messages that specify the number of entries selected and rejected for each input file are sent to SYS\$OUTPUT. By default, these messages are not displayed.

### Format

/[NO]LOG

### Example

```
$ ANALYZE/ERROR_LOG/LOG ERRLOG.OLD;5
```

In this example, informational messages generated about ERRLOG.OLD;5 are sent to SYS\$OUTPUT.

---

## /NODE

Generates a report consisting of error log entries for specific nodes in a VAXcluster system.

### Format

/NODE=(node-name[,...])

### Parameter

#### node-name

Specifies the names of one or more VAXcluster members. Names cannot exceed six characters. If more than one node name is entered, you must specify a comma-separated list of node names that is enclosed in parentheses.

### Example

```
$ ANALYZE/ERROR_LOG/NODE=(ORANGE,NASSAU)
SYS$SYSROOT:[SY5*.SYSERR]ERRLOG.SYS
```

In this example, the VAXcluster system consists of members BROOME, NASSAU, ORANGE, and PUTNAM. The output contains only those entries that were logged for nodes NASSAU and ORANGE.

## /OUTPUT

Specifies the output file for the error log report.

### Format

/OUTPUT [=file-spec]

### Parameter

#### **file-spec**

The output file selected for the error log report. See the *OpenVMS User's Manual* for details on specifying files.

### Description

If you omit the /OUTPUT qualifier, output is directed to SYS\$OUTPUT. If you specify /OUTPUT=file-spec, the selected output file contains the error log report. If you omit the device or directory specification, the current device and default directory are used. If you omit the file name, the file name of the input file is used. If you omit the file type, the default file type is .LIS.

Do not use /OUTPUT with the /BINARY qualifier.

### Example

```
$ ANALYZE/ERROR_LOG/OUTPUT=ERROR_LOG.LIS ERRLOG.OLD;72
```

In this example, the output file ERROR\_LOG.LIS contains entries generated from ERRLOG.OLD;72.

---

## /REGISTER\_DUMP

Used in conjunction with the /INCLUDE qualifier to generate, in a hexadecimal longword format, a report that consists of device register information.

### Format

/REGISTER\_DUMP

### Description

Use the /REGISTER\_DUMP qualifier to get a report that lists the hexadecimal contents of the device registers for the device specified by the /INCLUDE qualifier. The /INCLUDE qualifier must be used with the /REGISTER\_DUMP qualifier.

The /REGISTER\_DUMP qualifier reports register contents for memory, device error, and device timeout entries. There is no translation of any of the device register information.

Do not use /REGISTER\_DUMP with the /BINARY qualifier.



## ERROR LOG /REGISTER\_DUMP

### Example

```
$ ANALYZE/ERROR_LOG/INCLUDE=DB/REGISTER_DUMP ERRLOG.OLD;72
```

In this example, the output is in the format of a REGISTER\_DUMP report containing entries that apply only to the DB device.

---

## /REJECTED

Allows you to specify the name of a file that will contain binary records for rejected entries.

### Format

```
/REJECTED [=file-spec]
```

### Parameter

#### **file-spec**

Specifies the name of the file that is to contain the rejected entries.

### Description

The /REJECTED qualifier creates a binary file that contains copies of the original binary error log entry. If the error log entry is rejected because the command line also specifies an interval (/SINCE, /BEFORE, or /ENTRY qualifier) or a filter (/INCLUDE or /EXCLUDE qualifier), the entry is written to the specified file.

Rejected entries are those entries that are not translated because they fall into one of the following categories:

- All entries specified with the /EXCLUDE qualifier
- All entries not specified with the /INCLUDE qualifier
- Any entry that does not occur within the period specified by the /SINCE and /BEFORE qualifiers
- Any entry that is not in the range of entries specified by the /ENTRY qualifier

If you specify /REJECTED=file-spec, the output file contains image copies of the rejected records. If you omit the device or directory specification, the current device and default directory are used. If you omit the file name, the file name of the input file is used. If you omit the file type, the default file type is .REJ.

### Example

```
$ ANALYZE/ERROR_LOG/INCLUDE=MTA0/REJECTED=REAL_ERRS.DAT
ERRLOG.OLD;5
```

In this example, the output file REAL\_ERRS.DAT contains image copies of all entries from ERRLOG.OLD;5, with the exception of those entries that apply to the MTA0 device.

## /SID\_REGISTER (VAX Only)



On VAX systems, generates a report consisting of error log entries that occurred on the specified CPU.

### Format

/SID\_REGISTER=(hexadecimal-value[,...])

### Parameter

#### hexadecimal-value

Specifies a value obtained from the system ID register. Use the \$GETSYI system service to obtain this value, which is unique to each system. The *OpenVMS System Services Reference Manual* describes the \$GETSYI system service.

In a VAXcluster environment, you can specify a hexadecimal value for each member. If you specify more than one hexadecimal value, you must specify a comma-separated list of values that is enclosed in parentheses.

### Example

```
$ ANALYZE/ERROR_LOG/SID_REGISTER=02006148 ERRLOG.OLD;72
```

In this example, the output consists of only those entries that were logged for the system with an ID of 02006148 (hexadecimal). ♦

---

## /SINCE

Specifies that only those entries dated later than the stated date and time are to be selected for the report.

### Format

/SINCE [=date-time]

### Parameter

#### date-time

Limits the error report to those entries dated later than the specified time.

### Description

Only absolute date and time specifications are valid. See the *OpenVMS User's Manual* for details on specifying times.

If you omit the /SINCE qualifier, all entries are processed. If you specify /SINCE without a date and time, the default is TODAY.

### Example

```
$ ANALYZE/ERROR_LOG/SINCE=19-APR-1994:15:00 ERRLOG.OLD;56
```

In this example, the error log report generated from ERRLOG.OLD;56 contains entries that have been logged since 15:00 on April 19, 1994.

## ERROR LOG /STATISTICS

---

### /STATISTICS

Generates run-time statistical information.

#### Format

/STATISTICS

#### Description

Use the /STATISTICS qualifier to generate a report that consists of the page faults, buffered I/O, direct I/O, and CPU time used in the execution of the ANALYZE/ERROR\_LOG command.

#### Example

```
$ ANALYZE/ERROR_LOG/STATISTICS ERRLOG.OLD;4
```

In this example, the output generated by this command consists of a full report of all entries in ERRLOG.OLD;4 and the run-time statistics for the execution of the command.

---

### /SUMMARY (VAX Only)



On VAX systems, generates an error log report that consists of a statistical summary.

The Examples section shows the format of several error log summary reports.

#### Format

/SUMMARY [=summary-type-keyword[,...]]

/NOSUMMARY

#### Parameters

##### Keywords

|           |                                                                    |
|-----------|--------------------------------------------------------------------|
| DEVICE    | Include the device summary section in the report.                  |
| ENTRY     | Include the summary of entries logged section in the report.       |
| HISTOGRAM | Include the processed entries hour of day histogram in the report. |
| MEMORY    | Include the summary of memory errors section in the report.        |
| VOLUME    | Include the volume label section in the report.                    |

## Description

Select the type of summary by specifying one or more keywords.

---

**Note**

---

If you specify /SUMMARY without a summary type, the report contains all of the preceding summary types listed. If you want only a summary report, specify both the /NOFULL and the /SUMMARY qualifiers in the command line.

---

Do not attempt to correlate the error counts reported by the DCL command SHOW ERROR and the /SUMMARY qualifier. A discrepancy in these figures could be due to several system events and would be difficult to track.

If the DEVICE keyword is specified, device entries are correlated with device mount information in an attempt to identify the volume that was mounted at the time the entry was logged. This correlation helps to determine whether errors can be attributed generically to the device or specifically to a given volume. However, no correlation can be made under the following conditions:

- The device is not file-structured.
- Volume information is not available. Either of the following conditions can result in volume information not being available:
  - The device entry is contained in an error log file created after the mount information was logged (SYS\$ERRORLOG:ERRLOG.SYS was renamed).
  - Volume shadowing is enabled. (Mount information pertains to the virtual device, while device entry information pertains to the physical device.)

In these instances, device entries are charged against a null volume name.

UCB ERROR COUNT and UCB OPERATION COUNT fields reflect the UCB information according to the time of the most recent entry for the given volume.

Do not use the /BINARY qualifier with /SUMMARY.

## Examples

1. \$ ANALYZE/ERROR\_LOG/SUMMARY ERRLOG.OLD;5

The output generated by the command in this example includes a full report and a summary report of all entries in ERRLOG.OLD;5.

2. \$ ANALYZE/ERROR\_LOG/NOFULL/SUMMARY ERRLOG.OLD;5

The output generated by the command in this example consists of a summary report of all entries in ERRLOG.OLD;5.

3. \$ ANALYZE/ERROR\_LOG/SUMMARY=(ENTRY,DEVICE)

The output generated by the command in this example includes the Entry and Device sections of the summary report from the default input file ERRLOG.SYS.

## **ERROR LOG /SUMMARY (VAX Only)**

4. `$ ANALYZE/ERROR_LOG/INCLUDE=DBA4/NOFULL/SUMMARY ERRLOG.OLD;5`

The output generated by the command in this example includes the summary report. The report contains the entries that apply to the DBA4 device: device error, device timeout, and device attention. ♦

ERROR LOG Examples

Sample Error Log Report

An error log report entry contains two sections: identification and device-dependent data. The identification section consists of the first four lines and is generated for all reports. The device-dependent data section, which follows the identification section, contains information on the selected error log entries.

The first line of the identification section gives the error entry number. This number can be used to refer to a particular error log entry in an error log file. The second line contains the error sequence number and the system identification value. The error sequence number is a value assigned by the operating system to an error log entry to help determine if error log entries are being lost. This sequence number value is reset to zero only when the system is rebooted. The third and fourth lines of this section specify the type of error log entry being reported, the date and time the entry was made, the processor type and revision level, and the system serial number.

The first line of the device-dependent data section identifies the device or subsystem on which the error occurred. The remainder of this section consists of hardware information, which shows the contents of the device registers, and software information, which shows the contents of the I/O database at the time of the error.

The *OpenVMS System Manager's Manual* contains additional information on error log reports, including descriptions of error log entries. These descriptions specify the action recommended for specific entries.

The following output report is an example of the report generated by device errors, device attention, and device timeouts from a disk on the system.

```

V M S SYSTEM ERROR REPORT COMPILED 3-SEP-1993
15:49:10

 PAGE
26.
***** ENTRY 904.

ERROR SEQUENCE 709. LOGGED ON: CPU TYPE 00000002
DATE/TIME 20-AUG-1993 15:21:10.79 SYS_TYPE
00000003
SYSTEM UPTIME: 1 DAYS 01:35:47
SCS NODE: LSR3 VMS T1.0-FT3

DEVICE ERROR SYS_TYPE = 03
RZ57 SUB-SYSTEM, UNIT _LSR3$DKA0:
 HW REVISION 30303035 HW REVISION = 5000
 ERROR TYPE 03 COMMAND TRANSMISSION FAILURE
 SCSI ID 00 SCSI ID = 0.
 SCSI LUN 00 SCSI LUN = 0.
 SCSI SUBLUN 00 SCSI SUBLUN = 0.
 PORT STATUS 00000054 %SYSTEM-F-CTRLERR, FATAL CONTROLLER
 ERROR

```

## ERROR LOG Examples

```

SCSI CMD 00000000
 0000
 TEST UNIT RDY
SCSI STATUS FF
 NO STATUS RECEIVED
UCB$B_ERTCNT 0F
 15. RETRIES REMAINING
UCB$B_ERTMAX 00
 0. RETRIES ALLOWABLE
ORB$L_OWNER 00000000
 OWNER UIC [000,000]
UCB$L_CHAR 1CC54008
 DIRECTORY STRUCTURED
 FILE ORIENTED
 SHARABLE
 AVAILABLE
 ERROR LOGGING
 ALLOCATED
 CAPABLE OF INPUT
 CAPABLE OF OUTPUT
 RANDOM ACCESS
UCB$L_STS 56544552
 INTERRUPT EXPECTED
 ONLINE
 TIMED OUT
 BUSY
 DEALLOCATE AT DISMOUNT
 "MOUNT VERIFICATION" IN-PROGRESS
UCB$L_OPCNT 00000000
 0. QIO'S THIS UNIT
UCB$W_ERRCNT 0001
 1. ERRORS THIS UNIT
V M S SYSTEM ERROR REPORT COMPILED 3-SEP-1993
15:49:10
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27.
IRP$L_BCNT 00000000
 TRANSFER SIZE 0. BYTE(S)
IRP$L_BOFF 00000000
 TRANSFER PAGE ALIGNED
IRP$L_PID 00010042
 REQUESTOR "PID"
IRP$Q_IOSB 0000014E
 430A0002
 IOSB, 0. BYTE(S) TRANSFERRED

```

### Time Stamp, Volume Mount, and Volume Dismount Entries Examples

The following are entry examples of a system time stamp, volume mount, and volume dismount. The time-stamp entry contains only an identification section, which is logged by the operating system at 10-minute intervals. If no other error log entries are made during the 10-minute period, the previous time stamp is overwritten with the current time stamp.

The mount volume entry contains an identification section followed by a device-dependent data section. The device-dependent data section shows the name of the device the volume is mounted on, the volume label (if the volume has a label), and the I/O operations and error counts for the device.

The dismount volume entry contains, in addition to the data provided in the volume mount entry, the I/O operations and error counts for the device on which the volume was mounted.

## ERROR LOG Examples

```
***** ENTRY 93. *****
ERROR SEQUENCE 421. LOGGED ON SID 01380101

TIME STAMP, 4-MAR-93 11:10:08.79
 KA780 REV# 7. SERIAL# 7.
***** ENTRY 94. *****
ERROR SEQUENCE 422. LOGGED ON SID 01380101

MOUNT VOLUME, 4-MAR-93 11:14:12.51
 KA780 REV# 7. SERIAL# 7.

 UNIT _DMA0:, VOLUME LABEL "TEST"

 656. QIO OPERATIONS THIS UNIT, 1. ERRORS THIS UNIT
***** ENTRY 95. *****
ERROR SEQUENCE 423. LOGGED ON SID 01380101

DISMOUNT VOLUME, 4-MAR-93 11:14:41.30
 KA780 REV# 7. SERIAL# 7.

 UNIT _DMA0:, VOLUME LABEL "TEST"

 697. QIO OPERATIONS THIS UNIT, 1. ERRORS THIS UNIT
 41. QIO OPERATIONS THIS VOLUME, 0. ERRORS THIS VOLUME
```

### Machine Check Entries Examples

The following are examples of machine check error reports. Each report consists of three sections: the identification section, the program counter and summary code section, and an error-dependent section.

The program counter and summary code section of the report displays the contents of the program counter, the processor status longword, and the summary code. The contents of the processor status longword and the summary code are described in the text on the right side of the report.

The error-dependent section consists of CPU-dependent information that was logged as a result of the machine check.

```
***** ENTRY 2.

ERROR SEQUENCE 2. LOGGED ON: CPU_TYPE 00000002
DATE/TIME 4-SEP-1993 09:39:51.19 SYS_TYPE
00000002
SYSTEM UPTIME: 90 DAYS 00:01:25
SCS NODE: COBRA6 VMS X5DN-FT4
MACHINE CHECK SYS TYPE = 02
KERNEL EVENT HEADER
 FRAME REVISION 0000
 SCB VECTOR 0670
 1ST MOST PRB FRU 00 FIELD NOT VALID
 2ND MOST PRB FRU 00 FIELD NOT VALID
 SEVERITY 0000 FIELD NOT VALID
 CPU ID 0000
 ERROR COUNT 0001
 THRESHOLD 0000
 FAIL CODE 0000
 ERR FIELD LOW 00000005
 00000008

 CPU_0 BUS COMMAND NO-ACK
 CPU_0 BUS READ PARITY ERROR
 CPU_CYCLE ABORTED WITH HARD ERROR
```



# ERROR LOG Examples

ERR FIELD HIGH 00000000  
00000000  
RETRY/BYTE CNT 00000250  
00000000

BYTE COUNT = 00000250(X)  
CAN'T RETRY

PALTEMP0 00000001  
00000000  
PALTEMP1 000000BE  
00000000  
PALTEMP2 00000004  
001FC0F8  
PALTEMP3 00000000  
00000000  
PALTEMP4 805C3FC0  
FFFFFFFF  
PALTEMP5 00000000  
00000000  
PALTEMP6 84FDE000  
FFFFFFFF  
PALTEMP7 00004200  
00000000  
PALTEMP8 00000400  
00000000  
PALTEMP9 00000003  
00000000  
PALTEMP10 29CB0233  
00000003  
PALTEMP11 00000000  
00000000  
PALTEMP12 00000001

V M S  
10:37:03

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2.

PALTEMP13 00000000  
8042F4C0  
FFFFFFFF  
PALTEMP14 00000000  
00000000  
PALTEMP15 00000000  
00000000  
PALTEMP16 0000C000  
00000000  
PALTEMP17 00000000  
00000000  
PALTEMP18 BEBC2000  
00000000  
PALTEMP19 7FFBF924  
00000000  
PALTEMP20 00002041  
00000000  
PALTEMP21 40000000  
00000002  
PALTEMP22 00000000  
00000000  
PALTEMP23 00000000  
00000000  
PALTEMP24 805C0000  
FFFFFFFF  
PALTEMP25 00000000  
00000000  
PALTEMP26 7FF96000  
00000000

# ERROR LOG Examples

PALTEMP27 00000000  
00000000  
PALTEMP28 00D7C000  
00000000  
PALTEMP29 00000000  
00000002  
PALTEMP30 002F6000  
00000000  
PALTEMP31 00D62080  
00000000  
EXCP ADDR REG 0000815E  
00000000

Not PALmode instruction  
EXCEPTION PC = 0000000000002057(X)

EXCP SUM REG 00000000  
00000000  
EXCP MASK REG 00000000  
00000000  
ICCS REG 00000004  
001FC0F8  
PAL BASE 00008000  
00000000

PAL BASE PA = 000008000(X)

HW INTR EN REG FFFFDCF0  
00000001

CRD ERROR INT. ENABLE  
HARDWARE INT. ENABLED ON PIN 3  
SYSTEM ERROR REPORT COMPILED 8-SEP-1993

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3.

HARDWARE INT. ENABLED ON PIN 4  
HARDWARE INT. ENABLED ON PIN 5  
PC1 INT. DISABLED  
PC0 INT. DISABLED  
HARDWARE INT. ENABLED ON PIN 0  
HARDWARE INT. ENABLED ON PIN 1  
HARDWARE INT. ENABLED ON PIN 2  
SLU INT. DISABLED  
SOFTWARE INT. LEVEL 1 ENABLED  
SOFTWARE INT. LEVEL 2 ENABLED  
SOFTWARE INT. LEVEL 3 ENABLED  
SOFTWARE INT. LEVEL 4 ENABLED  
SOFTWARE INT. LEVEL 5 ENABLED  
SOFTWARE INT. LEVEL 6 ENABLED  
SOFTWARE INT. LEVEL 7 ENABLED  
SOFTWARE INT. LEVEL 8 ENABLED  
SOFTWARE INT. LEVEL 9 ENABLED  
SOFTWARE INT. LEVEL 10 ENABLED  
SOFTWARE INT. LEVEL 11 ENABLED  
SOFTWARE INT. LEVEL 12 ENABLED  
SOFTWARE INT. LEVEL 13 ENABLED  
SOFTWARE INT. LEVEL 14 ENABLED  
SOFTWARE INT. LEVEL 15 ENABLED  
KERNAL MODE AST INT. ENABLED  
EXEC. MODE AST INT. ENABLED  
SUPER. MODE AST INT. ENABLED  
USER MODE AST INT. ENABLED

# ERROR LOG Examples

HW INTR REQ REG 00000702  
00000000

HW INTR. REQ  
PC1 INTR REQ.  
PC0 INTR REQ.  
CPU INTR REQ. on pin 0

MEM MGMT ER/DTB 00005110  
00000000

Integer Reg. used is R = 11(X)  
OP code = 28(X)

D-CACHE STA REG 000002E0  
00000000

D-CACHE ADD REG FFFFFFFF  
00000007

ABOX CTL REG 0000040E  
00000000

MCHECK ENABLED for UNCOR. ERR  
CRD INTR. ENABLE  
ICACHE STREAM BUFFER ENABLED  
DCACHE ENABLED

BIU STATUS REG 00002041  
00000000

Hard Error  
Dcache fill error  
READ\_BLOCK

BIU ADD REG 40000000  
00000002

BIU CTL REG 30006337  
0000000C

V M S  
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SYSTEM ERROR REPORT

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4.

External Cache Enable  
ECC Checking  
Output Enable of Cache RAMs  
BCache Read Speed in cycles = 4(X)  
BCache Write Speed in cycles = 4(X)

ECC SYNDROMES 00000000  
00000000

FILL ADDR REG 00006120  
00000000

MACHINE CHK VA 00006190  
00000000

B-CACHE TAG REG 12491412  
14480005

TAG Control P  
TAG Control V  
B-Cache TAG = 48A0(X)

CSR0 400001C1  
400001C1

BCC 400001C1

CSR1 00000000

BCCE 00000000

CSR2 00000000

BCCEA 00000000

CSR3 00000900

BCUE 00000900

CSR4 00D40A2D

BCUEA 00D40A2D

# ERROR LOG Examples

CSR5 0011D4B4  
DTER 0011D4B4  
CSR6 00007F28  
CBCTL 00007F28  
98004082  
CSR7 98004082  
CBE 9C001042  
CSR8 90000003  
CBEAL 90000003  
CSR9 FF200083  
CBEAH FF200083  
CSR10 00000000  
PMBX 00000000  
CSR11 00000000  
IPIR 00000000  
CSR12 00000004  
SIC 00000001  
CSR13 000C1388  
ADLK 000C1388  
CSR14 00104B7B  
MADRL 00104B6B

V M S SYSTEM ERROR REPORT COMPILED 8-SEP-1993  
10:37:04

\*\*\*\*\* ENTRY 6. \*\*\*\*\*  
ERROR SEQUENCE 3. LOGGED ON SID 03003700

MACHINE CHECK, 6-MAR-1993 10:11:34.70  
KA730 REV# 0. MIC# 55.

EXCEPTION PC 80038DC0  
ERROR PSL 01C00000

INTERRUPT PRIORITY LEVEL = 00.  
PREVIOUS MODE = USER  
CURRENT MODE = EXECUTIVE

SUMMARY CODE 00000007  
1ST PARAMETER 00166200

UNCORRECTABLE ECC ERROR

\*\*\*\*\* ENTRY 60. \*\*\*\*\*  
ERROR SEQUENCE 4872. LOGGED ON SID 02006148

MACHINE CHECK, 6-MAR-1993 03:50:08.28  
KA750 REV# 72. MIC# 97.

EXCEPTION PC 80006173  
ERROR PSL 00C80009

C-BIT  
N-BIT  
INTERRUPT PRIORITY LEVEL = 08.  
PREVIOUS MODE = USER  
CURRENT MODE = KERNEL

# ERROR LOG Examples

|                                       |          |                                 |
|---------------------------------------|----------|---------------------------------|
| SUMMARY CODE                          | 00000002 | TRANSLATION BUFFER OR BUS ERROR |
| VA LAST REF                           | 800A079E |                                 |
| PC AT ERROR                           | 80006178 |                                 |
| MDR                                   | 8009F38C |                                 |
| SMR                                   | 00000008 |                                 |
|                                       |          | CPU MODE = KERNEL               |
|                                       |          | VIRTUAL                         |
|                                       |          | READ                            |
| RLTO                                  | 00000000 |                                 |
| TBER                                  | 00000007 |                                 |
|                                       |          | TB G0 DATA ERROR                |
|                                       |          | TB G1 DATA ERROR                |
|                                       |          | TB G0 TAG ERROR                 |
| CAER                                  | 00000000 |                                 |
| BER                                   | 00000000 |                                 |
| MCESR                                 | 00000004 |                                 |
|                                       |          | OPERAND REFERENCE               |
|                                       |          | TB PARITY ERROR                 |
| ***** ENTRY                           |          | 84. *****                       |
| ERROR SEQUENCE 4949.                  |          | LOGGED ON SID 01388525          |
| MACHINE CHECK, 6-MAR-1993 15:09:11.31 |          |                                 |
| KA780 REV# 7. SERIAL# 1317.           |          |                                 |
| EXCEPTION PC                          | 00004890 |                                 |
| ERROR PSL                             | 03C00000 |                                 |
|                                       |          | INTERRUPT PRIORITY LEVEL = 00.  |
|                                       |          | PREVIOUS MODE = USER            |
|                                       |          | CURRENT MODE = USER             |
| SUMMARY CODE                          | 00000000 |                                 |
|                                       |          | CP READ TIMEOUT                 |
|                                       |          | - OR ERROR CONFIRMATION FAULT   |
| CES                                   | 00010084 |                                 |
|                                       |          | SUPERVISOR AST PENDING          |
|                                       |          | ALU C31                         |
|                                       |          | NESTED ERROR                    |
| MICRO PC                              | 00000200 |                                 |
| VA/VIBA                               | 7FF735D4 |                                 |
| D REGISTER                            | FFFFC284 |                                 |
| TBER0                                 | 0000DC81 |                                 |
|                                       |          | ENABLE MEMORY MANAGEMENT        |
|                                       |          | TB HIT GROUP 1                  |
|                                       |          | MICRO CODE "MCT" FIELD = 07     |
|                                       |          | MICRO CODE "ADS"                |
|                                       |          | MICRO CODE "FS"                 |
| TBER1                                 | 00000040 |                                 |
|                                       |          | LAST TB WRITE PULSE TO GROUP 1  |
| SBITA                                 | E00B83F5 |                                 |
|                                       |          | TIMEOUT CONSOLE ADDR = 002E0FD4 |
|                                       |          | PROTECTION CHECKED REFERENCE    |
|                                       |          | TIMEOUT REFERENCE IN USER MODE  |
| CACHE PE REG                          | 00004000 |                                 |
|                                       |          | CP ERROR                        |
| SBIER                                 | 00001802 |                                 |
|                                       |          | SBI NOT BUSY                    |
|                                       |          | WAITING FOR READ DATA TIMEOUT   |
|                                       |          | CPU TIMEOUT                     |

## ERROR LOG Examples

```

***** ENTRY 82. *****
ERROR SEQUENCE 1077. LOGGED ON SID 04FFFFFF
MACHINE CHECK 30-MAR-1993 20:55:17.41
 KA86 REV# 255. SERIAL# 4095. MFG PLANT 7.
 EHMSTS 40000802
 VMS ERROR CODE = EBOX
 MICRO TRAP VECTOR = 08 (X)
 EHM ENTERED
 EVMQSAV 00000004
 VIRTUAL ADDRESS FOR EBOX PORT
 _ REQUESTS
 EBCS 00000800
 ECS PARITY ERROR
 EDPSR 00000000
 CSLINT 04183D1F
 C BUS ADDRESS = 1F (X)
 C BUS DATA = 3D (X)
 INTERRUPT PRIORITY REQUEST = 8.
 INTERNAL SOURCE
 I/O ADAPTER = 0.
 INTERVAL TIMER
 IBESR 00004000
 UOP SEL = IBOX REGISTER SELECT
 UTPR <2:0> = EBOX PORT
 ENABLE ETRAP
 EBXWD1 00000004
 TOP OF "SP STACK"
 _ CONTENT IS ONE OF THE LAST
 _ LONGWORDS WRITTEN TO MBOX
 EBXWD2 7FF593D0
 TOP OF "SP STACK" MINUS ONE
 _ CONTENT IS ONE OF THE LAST
 _ LONGWORDS WRITTEN TO MBOX
 VASAV 7FF593F8
 VIRTUAL ADDRESS FOR OP FETCH
 _ PORT REQUEST ADDRESS
 _ CALCULATION FOR OPERAND
 _ PRE-FETCH AND RESULT DELIVERY
 VIBASAV 0000E7FF
 VIRTUAL ADDRESS OF NEXT IBUF
 _ PORT REQUEST TO FILL IBUFFER
 ESASAV 0000E7F2
 PC OF INSTRUCTION DURING EBOX
 _ EXECUTION AND RESULT STORAGE
 ISASAV 0000E7F2
 PC OF INSTRUCTION WHICH VA
 _ CALCULATION UNIT IS DOING ADDRESS
 _ CALCULATION OR OPERAND PRE-FETCH
 _ OR IS PASSING OPERAND DATA
 CPC 0000E7F4
 PC OF INSTRUCTION IN
 _ DECODE UNIT
 MSTAT1 84006004
 C0 TAG MISS
 BLOCK HIT
 ABUS ADAPTER = 0.
 WORD COUNT = 0.
 CYCLE TYPE = READ REGISTER
 DEST CP = EBOX
 MSTAT2 00004F00
 DIAGNOSTIC STATUS FROM SBIA
 _ RD COM/MSK <3:0> = F (X)
 _ RD DAT L/S <1:0> = 0 (X)
 _ ABUS BAD DATA CODE
 _ PAMM DATA = ARRAY #0., SLOT #1.

```

## ERROR LOG Examples

```

MDECC 00066200 (* DATA NOT VALID *)
MERG 04000100 MEMORY MANAGEMENT ENABLE
CSHCTL 00000003 CACHE 0 ENABLE
 CACHE 1 ENABLE
MEAR 0000007C PHYSICAL ADDRESS IN PA LATCH
 AT TIME OF ERROR = 0000007C
MEDR 0000001F DATA WORD USED DURING ERROR
FBXERR FFFFFFFF (* DATA NOT VALID *)
CSES 1BD73E01 CS CODE = EBOX CONTROL STORE PARITY
ERROR
 CS SYNDROME = 3E (X)
 CS ADDRESS = 1BD7 (X)
ERROR PC 0000E7F2
ERROR PSL 03C00004
 Z-BIT
 INTERRUPT PRIORITY LEVEL = 00.
 PREVIOUS MODE = USER
 CURRENT MODE = USER
IOA ES 00000000 (* DATA NOT VALID *)

```

AN/ER/INC=MACH ERR:ERRLOG.SYS\_31MAR1990/ENT=S=82/OUT=DP.

### Memory Error Entries Example

Memory error log entries consist of two types: fatal and nonfatal. A nonfatal memory error indicates that a single bit has failed within a memory location, and that the ECC (error code correctable) was able to compensate for the error and correct the data. A fatal error indicates that multiple bits were erroneous, and that the ECC could not correct the data.

Both the fatal and nonfatal memory entries are similar in their format. The memory error log reports can be divided into two logical areas of information. The first section of a memory error log report is the identification area. The second section contains memory controller-specific information. This data represents the information contained within the memory controller registers at the time of the memory error. Bit-to-text translation of the registers is performed and then listed on the right side of the report.

```

***** ENTRY 7. *****
ERROR SEQUENCE 4. LOGGED ON SID 03003700
MEMORY ERROR, 6-MAR-1993 10:11:34.70
 KA730 REV# 0. MIC# 55.
CSR0 00166200 ERROR SYNDROME = 7F
 CORRECTED ERROR, BIT #31.
 ARRAY #1. IN ERROR
CSR1 18000000 MEMORY MAPPING ENABLE
 ENABLE "CRD" REPORTING
CSR2 8100000F MEMORY SIZE = 2048.K
 64K RAMS PRESENT

```

## ERROR LOG Examples

```
***** ENTRY 91. *****
ERROR SEQUENCE 342. LOGGED ON SID 0138207A
FATAL MEMORY ERROR, 4-MAR-88 08:16:45.20
 KA780 REV# 7. SERIAL# 122.
CONTROLLER AT TR #5.
 PRTCFNG 00000040 ADAPTER IS MULTI-PORT MEMORY
 PORT NUMBER = 0.
 PRTCR 00000003 MASTER INTERRUPT ENABLE
 PORT INTERFACE INTERRUPT ENABLE
 RAM COUNT 0.
 PCSR 07870003 ERROR INTERRUPT ENABLE
 IVDTCR 01870001 INVALIDATE CACHE DEVICE ID = 0.
 8. ARRAY BOARD(S) PRESENT
 MEMORY BASE ADDRESS = 6144.K
 AER 16A70005 ERROR SYNDROME = 05
 RDS ERROR
 ARRAY #6. IN ERROR
 ARRAY BANK #1. IN ERROR
 ERROR LOG REQUEST
 CSR0 0000C2C8 MEMORY CONTAINS VALID DATA
 PORT #2. POWERED DOWN
 PORT #3. POWERED DOWN
 ERROR INTERRUPT FROM PORT #1.
 PORT #2. OFFLINE
 PORT #3. OFFLINE
 CSR1 0000380A PORT #0. CONNECTED TO AN SBI
 PORT #1. CONNECTED TO AN SBI
 PORT #2. NOT PRESENT
 PORT #3. NOT PRESENT
 INVALIDATION MAP PRESENT
 PORT #0. INVALIDATION ACK RECEIVED
 PORT #1. INVALIDATION ACK RECEIVED
 MAT 0000C000
```

### Nonfatal and User Bugchecks Entry Example

The following is an example of a fatal bugcheck. Nonfatal and user bugcheck reports have the same format. These reports consist of three sections: identification, bugcheck reason and process information, and system register information.



# ERROR LOG Examples

```
V M S SYSTEM ERROR REPORT COMPILED 3-SEP-1993
16:17:03

 PAGE
1.
***** ENTRY 25.

ERROR SEQUENCE 15. LOGGED ON: CPU_TYPE 00000002
DATE/TIME 22-JUL-1993 13:43:48.96 SYS_TYPE
00000003
SYSTEM UPTIME: 90 DAYS 00:07:26
SCS NODE: LSR3 VMS T1.0-FT3

FATAL BUGCHECK SYS_TYPE = 03

OPERATOR, Operator requested system shutdown

PROCESS NAME Aut
PROCESS ID 00010004
ERROR PC 00000000 000304A0

Process Status = 08000000 00001F03, SW = 03, Previous Mode = USER
System State = 00, Current Mode = KERNEL
VMM = 00 IPL = 31, SP Alignment = 8
STACK POINTERS
KSP 00000000 7FF95F08 ESP 00000000 7FF9A000 SSP 00000000 7FFA04C0
USP 00000000 7FE63B80

GENERAL REGISTERS
R0 00000000 00000001 R1 00000000 00000000 R2 FFFFFFFF 805ED100
R3 00000000 00000001 R4 00000000 00000001 R5 00000000 00000001
R6 00000000 00000000 R7 00000000 00000000 R8 00000000 7FFA05F8
R9 00000000 7FFA0800 R10 00000000 00000000 R11 00000000 7FFBE3E0
R12 00000000 00000004 R13 00000000 00010100 R14 00000000 02080061
R15 FFFFFFFF 80403C30 R16 00000000 00000474 R17 00000000 00004000
R18 00000000 00000000 R19 00000000 00000000 R20 FFFFFFFF 805C04B6
R21 00000000 00800000 R22 FFFFFFFF 804308E8 R23 88000000 E4000003
R24 00000000 00000000 R25 00000000 00000001 R26 00000000 00000002
R27 00000000 00000002 R28 00000000 00030440 FP 00000000 7FF95F10
SP 00000000 7FF95F08 PC 00000000 000304A0 PS 08000000 00001F03

SYSTEM REGISTERS
PTBR 00000000 000005D3
 Page Table Base Register
PCBB 00000000 00B98080
 Privileged Context Block Base
PRBR FFFFFFFF 805C0000
 Processor Base Register
SCBB 00000002 00000000
 System Control Block Base
SISR 00000000 0000017B
 Software Interrupt Summary Register
ASN 00000000 00000000
 Address Space Number
ASTSR_ASTEN 00000000 0000003F
 AST Summary/AST Enable
AT 00000000 0000000F
 Absolute Time
```

# ERROR LOG Examples

## Unknown Entries Examples

The following are sample reports for error log entries of unknown type. Each report has an identification section and an error log record section. The error log record section contains two types of records: interpretable and noninterpretable. If ERROR LOG can interpret the fields of the record, the utility gives the name of the field, its contents, and interprets what the field is. If the utility cannot interpret the fields of a record, it gives the longword value of the field and its contents in hexadecimal format.

```
***** ENTRY 95. *****
ERROR SEQUENCE 2. LOGGED ON SID 03003600
```

```
"UNKNOWN DEVICE" ENTRY, 4-MAR-88 10:12:12.44
 KA730 REV# 0. MIC# 54.
```

### ERROR LOG RECORD

|                  |                                              |                               |
|------------------|----------------------------------------------|-------------------------------|
| ERF\$L_SID       | 03003600                                     | SYSTEM ID REGISTER            |
| ERL\$W_ENTRY     | 0062                                         | ERROR ENTRY TYPE              |
| EXE\$GQ_SYSTIME  | C9764980                                     | 64 BIT TIME WHEN ERROR LOGGED |
| ERL\$GL_SEQUENCE | 0002                                         | UNIQUE ERROR SEQUENCE = 2.    |
| UCB\$W_STS       | 0110                                         | DEVICE STATUS                 |
| UCB\$B_DEVCLASS  | 42                                           | DEVICE CLASS = 66.            |
| UCB\$B_DEVTYPE   | 42                                           | DEVICE TYPE = 66.             |
| UCB\$W_UNIT      | 0000                                         | PHYSICAL UNIT NUMBER = 0.     |
| UCB\$W_ERRCNT    | 0001                                         | UNIT ERROR COUNT = 1.         |
| UCB\$L_OPCNT     | 00000001                                     | UNIT OPERATION COUNT = 1.     |
| ORB\$L_OWNER     | 00010004                                     | OWNER UIC = [001,004]         |
| UCB\$L_DEVCHAR   | 0C440007                                     | DEVICE CHARACTERISTICS        |
| UCB\$B_SLAVE     | 00                                           | DEVICE SLAVE CONTROLLER = 0.  |
| DDB\$T_NAME      | 41515403<br>00000000<br>00000000<br>00000000 |                               |
| LONGWORD 1.      | 00000008                                     | /.TQA...../                   |
| LONGWORD 2.      | 00000007                                     |                               |
| LONGWORD 3.      | 00000502                                     |                               |
| LONGWORD 4.      | 04000000                                     |                               |
| LONGWORD 5.      | 00010000                                     |                               |
| LONGWORD 6.      | 00000000                                     |                               |
| LONGWORD 7.      | 00000080                                     |                               |
| LONGWORD 8.      | 00000000                                     |                               |
| LONGWORD 9.      | 00000000                                     |                               |

## ERROR LOG Examples

```
***** ENTRY 161. *****
ERROR SEQUENCE 213. LOGGED ON SID 070001FF
```

```
"UNKNOWN ENTRY", 4-MAR-88 11:35:15.73
 UVAX1 REV# 255. MIC# 1.
```

### ERROR LOG RECORD

```
ERF$$_SID 070001FF
ERL$$_ENTRY 0008
EXE$$_SYTIME 89953F20
 008C3E2A
ERL$$_SEQUENCE 00D5
LONGWORD 1. 00000001
LONGWORD 2. 00410001

SYSTEM ID REGISTER
ERROR ENTRY TYPE
64 BIT TIME WHEN ERROR LOGGED
UNIQUE ERROR SEQUENCE = 213.
/.../
/..A./
```

### Example of a Brief Report

The following is an example of a report generated with the /BRIEF qualifier.

```
V A X / V M S SYSTEM ERROR REPORT COMPILED 25-AUG-1990 09:42
 PAGE 1.
```

```
***** ENTRY 1. *****
ERROR SEQUENCE 11. LOGGED ON: SID 08000000
DATA/TIME 18-JUL-1990 22:53:41.57 SYS_TYPE 00000000
```

DEVICE ERROR KA630

RD32 SUB-SYSTEM, UNIT \_RICHIE\$DUA0:

```
DMA ADDRESS 000000

DSECT CHEAD DHEAD CCYL DCYL SCNT
06 14 14 9C 9C 01

RTCNT CSTAT MODE DSTAT TERM ISTAT
F0 08 C0 B2 BD 28

CMD
56
```

### Summary Report Examples

The following are examples of summary reports generated with the /SUMMARY qualifier using the DEVICE, ENTRY, HISTOGRAM, MEMORY, and VOLUME keywords.

#### Sample Device Summary Report (/SUMMARY=DEVICE)

DEVICE SUMMARY LOGGED BY SID 0484F00B

|                | ERRORS |        | TIMEOUTS |        | UCB ERROR<br>COUNT | UCB OPERATION<br>COUNT |
|----------------|--------|--------|----------|--------|--------------------|------------------------|
|                | [HARD] | [SOFT] | [HARD]   | [SOFT] |                    |                        |
| _HSC001\$DUA1: |        |        |          |        |                    |                        |
| "              |        |        |          |        |                    |                        |
| "WORK_1A"      | 2.     | 0.     | 0.       | 0.     | 25.                | 1027.                  |
| "WORK_1B"      | 3.     | 0.     | 0.       | 0.     | 3.                 | 35.                    |
|                | 4.     | 0.     | 0.       | 0.     | 2.                 | 243.                   |
| TOTALS         | 9.     | 0.     | 0.       | 0.     | 2.                 | 243.                   |

## ERROR LOG Examples

### Sample Entry Summary Report (/SUMMARY=ENTRY)

SUMMARY OF ALL ENTRIES LOGGED BY SID 0484F00B

|                    |       |
|--------------------|-------|
| MACHINE CHECK      | 9.    |
| SBIA ERROR         | 10.   |
| SYSTEM START-UP    | 7.    |
| ERRLOG.SYS CREATED | 3.    |
| FATAL BUGCHECK     | 6.    |
| TIME-STAMP         | 223.  |
| VOLUME MOUNT       | 678.  |
| VOLUME DISMOUNT    | 194.  |
| DEVICE ATTENTION   | 19.   |
| ERL\$LOGSTATUS     | 7.    |
| ERL\$LOGMESSAGE    | 1254. |
| ERL\$LOGMSCP       | 431.  |

|                        |                         |
|------------------------|-------------------------|
| DATE OF EARLIEST ENTRY | 1-AUG-1990 09:54:51.52  |
| DATE OF LATEST ENTRY   | 27-AUG-1990 12:11:29.26 |

### Sample Histogram Summary Report (/SUMMARY=HISTOGRAM)

PROCESSED ENTRIES HOUR-OF-DAY HISTOGRAM LOGGED BY SID 0484F00B

|       |      |       |
|-------|------|-------|
| 00:00 | 449. | ***** |
| 01:00 | 47.  | ***** |
| 02:00 | 35.  | ***** |
| 03:00 | 19.  | ***** |
| 04:00 | 33.  | ***** |
| 05:00 | 25.  | ***** |
| 06:00 | 51.  | ***** |
| 07:00 | 110. | ***** |
| 08:00 | 77.  | ***** |
| 09:00 | 111. | ***** |
| 10:00 | 124. | ***** |
| 11:00 | 113. | ***** |
| 12:00 | 197. | ***** |
| 13:00 | 119. | ***** |
| 14:00 | 34.  | ***** |
| 15:00 | 52.  | ***** |
| 16:00 | 70.  | ***** |
| 17:00 | 195. | ***** |
| 18:00 | 171. | ***** |
| 19:00 | 108. | ***** |
| 20:00 | 169. | ***** |
| 21:00 | 139. | ***** |
| 22:00 | 39.  | ***** |
| 23:00 | 354. | ***** |

**Sample Memory Summary Report (/SUMMARY=MEMORY)** The format of memory summary reports varies slightly across the range of CPU/memory subsystem configurations.

SUMMARY OF MEMORY ERRORS LOGGED BY SID 0484F00B

| ARRAY# | BIT#    | WORD<br>COUNT | CORRECTED<br>ERRORS | UNCORRECTED<br>ERRORS |
|--------|---------|---------------|---------------------|-----------------------|
| 02.    | 12.     | 00.           | 173.                |                       |
| 02.    | DBL BIT | 00.           |                     | 2.                    |
| 04.    | 04.     | 00.           | 3.                  |                       |

# ERROR LOG Examples

## Sample Volume Summary Report (/SUMMARY=VOLUME)

VOLUME LABEL(S) LOGGED BY SID 0484F00B

|                | QIO(S) | ERROR(S) | MOUNT(S) |
|----------------|--------|----------|----------|
| "WORK_1A"      |        |          |          |
| _HSC001\$DUA1: | 51.    | 3.       | 1.       |
| _HSC001\$DUA2: | 65.    | 0.       | 2.       |
|                | -----  | -----    | -----    |
| TOTALS         | 116.   | 3.       | 3.       |

**10**

---

**Install Utility**





---

## INSTALL Description

The Install utility (INSTALL) improves the performance of executable and shareable images, especially those that run frequently, usually run concurrently with several processes, or require special privileges.

The system defines installed images on internal data structures called **known file lists**. Each entry in the known file list identifies the installed file name and the attributes with which the file was installed. A separate known file list exists for all installed images whose device, directory, and file type are identical. For example, all installed images with the file name DISK\$VOLUME:[MAIN]filename.EXE would be on one known file list, and all installed images with the file name DISK\$VOLUME:[TEST]filename.EXE would be on another known file list.

Known file lists last only while the system is operating. If the system is shut down or fails for any reason, you must reinstall all known images after the system is rebooted. For this reason, the site-independent startup command procedure, SYS\$SYSTEM:STARTUP.COM, includes a series of INSTALL commands that install certain system programs as **known images**. You are encouraged to include additional INSTALL commands for selected images in the site-specific command procedure SYS\$MANAGER:SYSTARTUP\_VMS.COM.



---

## INSTALL Usage Summary

Use the Install utility (INSTALL) to enhance the performance of selected executable and shareable images, to assign enhanced privileges to images, and to support user-written system services. The system stores the name and attributes of installed images on known file lists.

### Format

INSTALL [command]

#### Parameter

##### command

Specifies an INSTALL command. This parameter is optional. If no command is specified, the utility displays its prompt and waits for command input.

### Usage Summary

To invoke INSTALL, enter the DCL command INSTALL at the DCL prompt as follows:

```
$ INSTALL
```

The utility responds with the following prompt:

```
INSTALL>
```

You can then perform INSTALL operations by entering the appropriate INSTALL commands. Alternatively, you can enter a single INSTALL command on the same line as the command that invokes the utility, for example:

```
$ INSTALL LIST/FULL SYS$SYSTEM:LOGINOUT
```

To exit from the Install utility, enter the EXIT command at the INSTALL> prompt or press Ctrl/Z. Either method returns control to the DCL command level.

The Install utility requires that you have the CMKRNL privilege to invoke it. It requires the SYSGBL privilege to create system global sections and the PRMGBL privilege to create permanent global sections.

## INSTALL Commands

This section describes and provides examples of the INSTALL commands. Table 10–1 summarizes the INSTALL command functions.

**Table 10–1 INSTALL Command Summary**

| Command | Function                                                                                                                          |
|---------|-----------------------------------------------------------------------------------------------------------------------------------|
| ADD     | Installs the specified image as a known file entry                                                                                |
| CREATE  | Installs the specified image as a known file entry (identical to ADD command)                                                     |
| DELETE  | Deletes a known file entry                                                                                                        |
| EXIT    | Exits from INSTALL                                                                                                                |
| HELP    | Describes how to use INSTALL                                                                                                      |
| LIST    | Displays a description of each specified known file entry, global sections, and the addresses of known file entry data structures |
| PURGE   | Deletes all known file entries installed without the /NOPURGE qualifier                                                           |
| REMOVE  | Deletes a known file entry (identical to DELETE command)                                                                          |
| REPLACE | Associates a known file entry with the latest version of the image file or modifies the attributes of an installed image          |

---

### ADD

Installs the specified image file as a known image.

### Format

ADD file-spec

### Parameter

#### file-spec

Names the file specification of an image to be installed as a known image. The file specification must name an existing executable or shareable image. If you omit the device and directory specification, the default SYS\$SYSTEM is used. The default file type is .EXE.

The highest existing version of the file is used by default. However, you can specify another version of the file as the known version of the image. Even if other versions of the file exist, the version that you specify will be the version that satisfies all known file lookups for the image.

### Qualifiers

#### /ACCOUNTING

#### /NOACCOUNTING (default)

Enables image-level accounting for selected images even if image accounting is disabled on the local node (by using the DCL command SET ACCOUNTING /DISABLE=IMAGE). When image accounting is enabled on the local node, it logs all images, and the /NOACCOUNTING qualifier has no effect.

## INSTALL ADD

### **/EXECUTE\_ONLY**

### **/NOEXECUTE\_ONLY**

The **/EXECUTE\_ONLY** qualifier is only meaningful to main programs. It allows the image to activate shareable images to which the user has **EXECUTE** access but has no **READ** access. All shareable images referenced by the program must be installed, and OpenVMS RMS uses trusted logical names (those created for use in **EXEC** or **KERNEL** mode).

You cannot specify this qualifier for an executable image linked with the **/TRACEBACK** qualifier.

### **/HEADER\_RESIDENT**

### **/NOHEADER\_RESIDENT**

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if **/OPEN** is not specified.

### **/LOG**

### **/NOLOG**

Lists the newly added known file entry along with any associated global sections created by the installation.

### **/OPEN**

### **/NOOPEN**

Installs the file as a permanently open known image.

### **/PRIVILEGED[=(priv-name[,...])]**

### **/NOPRIVILEGED[=(priv-name[,...])]**

Installs the file as a known image with the privileges specified. Then, if the image is not located on the system volume, the image is made permanently open even if **/OPEN** is not specified.

The **/PRIVILEGED** qualifier applies only to executable images.

You cannot specify this qualifier for an executable image linked with the **/TRACEBACK** qualifier.

You can specify one or more of the privilege names in Table 10-2.

**Table 10-2 Privileges for Installed Images**

---

|          |            |         |
|----------|------------|---------|
| ACNT     | ALLSPOOL   | ALTPRI  |
| †AUDIT   | BUGCHK     | BYPASS  |
| CMEXEC   | CMKRNL     | DETACH  |
| DIAGNOSE | †DOWNGRADE | EXQUOTA |
| GROUP    | GRPNAM     | GRPPRV  |
| †IMPORT  | LOG_IO     | MOUNT   |
| NETMBX   | OPER       | PFNMAP  |
| PHY_IO   | PRMCEB     | PRMGBL  |
| PRMMBX   | PSWAPM     | READALL |

---

†VAX specific

(continued on next page)

**Table 10–2 (Cont.) Privileges for Installed Images**

|          |        |        |
|----------|--------|--------|
| SECURITY | SETPRV | SHARE  |
| SHMEM    | SYSGBL | SYSLCK |
| SYSNAM   | SYSPRV | TMPMBX |
| †UPGRADE | VOLPRO | WORLD  |

†VAX specific

**/PROTECTED  
/NOPROTECTED**

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from EXEC or KERNEL mode. The /PROTECTED qualifier together with the /SHARE qualifier are used to implement user-written services, which become privileged shareable images.

**/PURGE  
/NOPURGE**

Specifies that the image can be removed by a purge operation; if you do not specify /PURGE, you can remove the image only by a delete or remove operation. The /NOPURGE qualifier is the default form of the qualifier.

**/RESIDENT**

**AXP**

On AXP systems, causes the image code sections to be placed in the granularity hints code region and optionally compresses the image data sections, which remain located in process space. The image must be linked using the /SHARE and the /SECTION\_BINDING=CODE qualifiers. ♦

**/SHARED  
/NOSHARED**

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if /OPEN is not specified.

**/WRITABLE  
/NOWRITABLE**

Installs the file as a writable known image as long as you also specify the /SHARED qualifier. The /WRITABLE qualifier is automatically negated if the /NOSHARED qualifier is specified.

**Examples**

1. `INSTALL> ADD/OPEN/SHARED WRKD$:[MAIN]STATSHR`

The command in this example installs the image file STATSHR as a permanently open, shared known image.

2. `INSTALL> ADD/OPEN/PRIVILEGED=(GROUP,GRPNAM) GRPCOMM`

The command in this example installs the image file GRPCOMM as a permanently open, known image with the privileges GROUP and GRPNAM.

Any process running GRPCOMM receives the GROUP and GRPNAM privileges for the duration of the execution of GRPCOMM. The full name of GRPCOMM is assumed to be SYS\$SYSTEM:GRPCOMM.EXE.

## INSTALL ADD

3. INSTALL> ADD/LOG GRPCOMM

The command in this example installs the image file GRPCOMM as a known image and then displays the newly added known file entry.

---

## CREATE

Installs the specified image file as a known image. The CREATE command is identical to the ADD command.

### Format

CREATE file-spec

### Parameter

#### **file-spec**

Names the file specification of an image to be installed as a known image. The file specification must name an existing executable or shareable image. If you omit the device and directory specification, the default SYS\$SYSTEM is used. The default file type is .EXE.

The highest existing version of the file is used by default. However, you can specify another version of the file as the known version of the image. Even if other versions of the file exist, the version that you specify will be the version that satisfies all known file lookups for the image.

### Qualifiers

#### **/ACCOUNTING**

#### **/NOACCOUNTING (default)**

Enables image-level accounting for selected images even if image accounting is disabled on the local node (by using the DCL command SET ACCOUNTING /DISABLE=IMAGE). When image accounting is enabled on the local node, it logs all images, and the /NOACCOUNTING qualifier has no effect.

#### **/EXECUTE\_ONLY**

#### **/NOEXECUTE\_ONLY**

The /EXECUTE\_ONLY qualifier is meaningful only to main programs. It allows the image to activate shareable images to which the user has EXECUTE access but has no READ access. All shareable images referenced by the program must be installed, and OpenVMS RMS uses trusted logical names (those created for use in EXEC or KERNEL mode).

You cannot specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

#### **/HEADER\_RESIDENT**

#### **/NOHEADER\_RESIDENT**

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if /OPEN is not specified.

**/LOG****/NOLOG**

Lists the newly created known file entry along with any associated global sections created by the installation.

**/OPEN****/NOOPEN**

Installs the file as a permanently open known image.

**/PRIVILEGED[=(priv-name[,...])]****/NOPRIVILEGED[=(priv-name[,...])]**

Installs the file as a known image with the privileges specified. Then, if the image is not located on the system volume, the image is made permanently open even if /OPEN is not specified. For a complete listing of privileges, see the ADD command.

The /PRIVILEGED qualifier applies only to executable images.

You cannot specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

**/PROTECTED****/NOPROTECTED**

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from EXEC or KERNEL mode. The /PROTECTED qualifier together with the /SHARE qualifier are used to implement user-written services, which become privileged shareable images.

**/PURGE****/NOPURGE**

Specifies that the image can be removed by a purge operation; if you do not specify /PURGE, you can remove the image only by a delete or remove operation. The /NOPURGE qualifier is the default form of the qualifier.

**/RESIDENT**

On AXP systems, causes the image code sections to be placed in the granularity hint code region and optionally compresses the image data sections, which remain located in process space. The image must be linked using the /SHARE and the /SECTION\_BINDING=CODE qualifiers. ♦

**/SHARED****/NOSHARED**

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if /OPEN is not specified.

**/WRITABLE****/NOWRITABLE**

Installs the file as a writable known image as long as you also specify the /SHARED qualifier. The /WRITABLE qualifier is automatically negated if the /NOSHARED qualifier is specified.

**AXP**

## INSTALL CREATE

### Examples

1. `INSTALL> CREATE/OPEN/SHARED WRKD$:[MAIN]STATSHR`

The command in this example installs the image file `STATSHR` as a permanently open shared known image.

2. `INSTALL> CREATE/OPEN/PRIVILEGED=(GROUP,GRPNAM) GRPCOMM`

The command in this example installs the image file `GRPCOMM` as a permanently open known image with the privileges `GROUP` and `GRPNAM`.

Any process running `GRPCOMM` receives the `GROUP` and `GRPNAM` privileges for the duration of the execution of `GRPCOMM`. The full name of `GRPCOMM` is assumed to be `SYS$SYSTEM:GRPCOMM.EXE`.

3. `INSTALL> CREATE/LOG GRPCOMM`

The command in this example installs the image file `GRPCOMM` as a known image and then displays the newly created known file entry.

---

## DELETE

Deletes a known image.

### Format

`DELETE file-spec`

### Parameter

#### **file-spec**

Names the file specification of an image installed as a known image.

### Qualifiers

None.

### Description

The `DELETE` command deletes an entry from the known image file list. The image's entry on the known file list and any global sections created for the image are deleted. The image file remains unaffected. Writable global sections are written back to disk upon their removal as known images.

If a process is accessing global sections when the `DELETE` command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are marked for deletion.

The `DELETE` command is identical to the `REMOVE` command.

## Example

```
INSTALL> DELETE WRKD$: [MAIN]STATSHR
```

The command in this example deletes the entry for the image STATSHR from the known file list.

---

## EXIT

Terminates INSTALL and returns control to the DCL command level. You can also exit from INSTALL by pressing Ctrl/Z.

## Format

EXIT

## Parameters

None.

## Qualifiers

None.

---

## HELP

Displays information about how to use INSTALL.

## Format

HELP [command]

## Parameter

### **command**

Specifies the name of a command for which help information is to be displayed. If you omit a command name, a list of commands is displayed and you are prompted for a command name.

## Examples

1. INSTALL> HELP

The command in this example displays a list of INSTALL topics and a Topic? prompt. Any topic from the list can be entered at the prompt.



# INSTALL HELP

## 2. INSTALL> HELP LIST

### LIST

For display of a one-line description of the specified known image, or if no file is specified, then for all known images. Use with /FULL to obtain a multiline description.

Format: LIST [file-spec] /qualifier

| QUALIFIER COMBINATION | BEHAVIOR                                |
|-----------------------|-----------------------------------------|
| LIST [file-spec]      | List the known file entry for file-spec |
| LIST                  | List all entries                        |

Additional information available:

Qualifiers  
/FULL      /GLOBAL      /STRUCTURE      /SUMMARY

The command in this example displays help information on the LIST command.

---

## LIST

Displays a description of each specified known image, or if no file is specified, all known images.

### Format

LIST [file-spec]

### Parameter

#### file-spec

Names the file specification of an image installed as a known image. If you omit the file specification, INSTALL displays all known file entries.

### Qualifiers

#### /FULL

Displays a multiline description of the specified known image, including the number of accesses, the number of concurrent accesses, and the number of global sections created. The /FULL qualifier with the /GLOBAL qualifier shows information on global sections, plus the current owner and protection codes and access control entries.

#### /GLOBAL

Lists global sections for any specified shared image, or if you omit the file specification, lists all global sections.

#### /STRUCTURE

Lists addresses of known file entry data structures.

#### /SUMMARY

Used with the /GLOBAL qualifier, displays the global section and global page usage on the system for local and shared memory global sections.

## Description

You can use the LIST command with the /FULL qualifier to display information that is useful in tuning the known file database. For example, a high entry-access count for an image may indicate that system performance could benefit if the image were installed /OPEN. Similarly, high entry-access counts for an image may indicate that installing the image /SHARED—that is, with global sections—could improve performance. For a description of global sections and global pages, including information on how to estimate the size of installed images, see the *OpenVMS System Services Reference Manual*.

## Examples

1. INSTALL> LIST

The command in this example displays a single-line description of all known images. The description includes the file specification of the known image and its attributes.

```

SYS$DISK:<SYS0.SYSCOMMON.SYSEXE>.EXE
 ANALIMDMP;1 ① Prv ②
 AUTHORIZE;1 Prv
 CDU;1 Open Hdr Prv
 DCL;1 Open Hdr Shar Lnkbl
 FAL;1 Open Hdr Shar
 INSTALL;1 Prv
 LOGINOUT;1 Open Hdr Shar Prv
 MAIL;1 Open Hdr Shar
 MAIL_SERVER;1 Open Hdr Shar Prv
 REQUEST;1 Prv
 SET;1 Open Hdr Shar Prv
 SETAUDIT;1 Prv
 SETPO;1 Open Hdr Shar Prv
 SETRIGHTS;1 Prv
 SHOW;1 Open Hdr Shar Prv
 SHWCLSTR;1 Open Hdr Shar Prv
 SUBMIT;1 Open Hdr Shar Prv
 SYSMAN;1 Prv

SYS$DISK:<SYS0.SYSCOMMON.SYSLIB>.EXE
 ANALIMDMPshr;1 Prv
 CONVshr;1
 DCLTABLES;1 Open Hdr Shar Lnkbl
 .
 .
 .
 LIBOTS;1 Open Hdr Shar Lnkbl Resid
 LIBRTL;1 Open Hdr Shar Lnkbl Resid
 MAILshr;1 Open Hdr Shar Lnkbl
 .
 .
 .

```

① File specification of the known image

② Attribute of known image, as follows:

# INSTALL LIST

| Attribute     | Meaning                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------------------------|
| ACNT          | Image accounting is enabled for the image (/ACCOUNTING).                                                         |
| †CMODE        | Image is in compatibility mode, set by the VAX-11 RSX Linker.                                                    |
| HDR           | Image header is permanently resident (/HEADER_RESIDENT).                                                         |
| LNKBL         | Image is not executable; it is a shareable (linkable) image set by the OpenVMS Linker.                           |
| NOPURG        | Image cannot be removed by a purge operation; it can only be removed by a delete or remove operation (/NOPURGE). |
| OPEN          | Image is permanently open (/OPEN).                                                                               |
| PROT          | Image contains protected code (/PROTECTED).                                                                      |
| PRV           | Image has privileges (/PRIVILEGE=).                                                                              |
| ‡RESID        | Image is resident (/RESIDENT).                                                                                   |
| SHAR          | Image is shared (/SHARED).                                                                                       |
| †SHM          | Image has global sections installed in shared memory (/SHARED).                                                  |
| WRT           | Image is writable (/WRITABLE).                                                                                   |
| XONLY         | Only execute access to image is allowed (/EXECUTE_ONLY).                                                         |
| <hr/>         |                                                                                                                  |
| †VAX specific |                                                                                                                  |
| ‡AXP specific |                                                                                                                  |

## AXP

### 2. INSTALL> LIST/RESIDENT

The command in this AXP example displays a single-line description of all resident images. The description includes the location in memory and the size of the code sections.

System Resident Sections

SYS\$DISK:<SYS0.SYSCOMMON.SYSLIB>.EXE

|             | Base VA  | End VA   | Length    |
|-------------|----------|----------|-----------|
| DISMNTSHR;1 | 80180000 | 80183000 | 00003000  |
| INIT\$SHR;1 | 80184000 | 80184600 | 00000600  |
|             | 80186000 | 8018FA00 | 00009A00  |
|             | 80190000 | 80190600 | 00000600  |
| LIBOTS;1    | 8022A000 | 80230C00 | 00006C00  |
| LIBRTL;1    | 801C0000 | 80229600 | 00069600  |
| MOUNTSHR;1  | 80192000 | 80198400 | 00006400  |
|             | 8019A000 | 801BCC00 | 00022C00  |
|             | 801BE000 | 801BF400 | 00001400◆ |

3. INSTALL> LIST/FULL LOGINOUT

The command in this example displays a multiline description of the known image LOGINOUT.

```

SYS$DISK:<SYS0.SYSCOMMON.SYSEXE>.EXE

 LOGINOUT;3 Open Hdr Shar Priv
 Entry access count = 44 ❶
 Current / Maximum shared = 3 / 5 ❷
 Global section count = 2 ❸
 Privileges = CMKRNL SYSNAM TMPMBX EXQUOTA SYSPRV ❹

```

- ❶ Number of times known file entry has been accessed by this node since it became known.
- ❷ First number indicates the current count of concurrent accesses of the known file. The second number indicates the highest count of concurrent accesses of the file since it was installed. This number appears only if the image is installed with the /OPEN qualifier.
- ❸ Number of global sections created for the known file; appears only if the image is installed with the /SHARED qualifier.
- ❹ Translation of the privilege mask; appears only if the image is installed with privileges.

4. INSTALL> LIST/GLOBAL

The command in this example displays all global sections for shared images.

```

 System Global Sections ❶

LBRSHR_004 ❷ (01000001) ❸ WRT ❹ PRM ❺ SYS ❻ Pagcnt/Refcnt=1/0❼
CRFSHR_003 (010003E8) WRT PRM SYS Pagcnt/Refcnt=1/1
.
.
.
27 Global Sections Used, 828/3268 Global Pages Used/Unused ❸

```

- ❶ Display of global sections in memory.
- ❷ Name of global section.
- ❸ Version number (in hexadecimal) of global section; for shareable images only, the high-order byte (01 in CRFSHR\_003) contains major identification, and low-order bytes (0003E8 in CRFSHR\_003) contain minor identification determined by the programmer at link time. For executable images, the number is a known unique value determined by the system.
- ❹ Global section is writable.
- ❺ Global section is permanent; TMP indicates a temporary global section, which would be created by a program other than the Install utility.
- ❻ Global section is systemwide; GRP and a group number indicate a groupwide section, which would be created by a program other than Install.
- ❼ Number of pages (VAX) or pagelets (AXP) in the section and number of page table entries currently mapped to this global section. See the *OpenVMS System Services Reference Manual* for a detailed discussion.

## INSTALL LIST

- ⑧ Number of global sections created, number of global pages used, and number of global pages unused in local memory. Note that, because of arithmetic rounding, the number of global sections created will sometimes be greater than the SYSGEN parameter GBLSECTIONS. When the size of the system header is being computed, the values of the GBLSECTIONS and SYSMWCNT parameters are combined with the size of the fixed part of the process header. The result is rounded up to the next page boundary. This rounding process sometimes adds space to the global section table, depending on the values of the two SYSGEN parameters and the amount of system paging that preceded the running of INSTALL to create all of the global sections.

### 5. INSTALL> LIST/GLOBAL/FULL

The command in this example displays a complete listing of global sections for shared images. The /FULL qualifier adds owner and protection codes to the display.

```
System Global Sections
NM_MAILSHR_003 (741A6919) PRM SYS Pagecnt/Refcnt=10/0
NM_MAILSHR_002 (741A6919) PRM SYS Pagecnt/Refcnt=1/0
NM_MAILSHR_001 (741A6919) PRM SYS Pagecnt/Refcnt=11/0
 Owner: [1,4] ①
 Protection: S:RWED,O:RWED,G:RWED,W:RE ②
.
.
.
```

① UIC of the owner of the global section

② Type of access allowed for the image

---

## PURGE

Deletes all known file entries for images installed without the /NOPURGE qualifier.

### Format

PURGE

### Parameters

None.

### Qualifiers

None.

### Description

The PURGE command deletes all known file entries for images installed without the /NOPURGE qualifier.

If a process is accessing global sections when the PURGE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are marked for deletion.

### Example

```
INSTALL> PURGE
```

The command in this example deletes all images except those installed with the /NOPURGE qualifier. The image files remain unaffected. Writable global sections are written back to disk upon their removal as known images.

---

## REMOVE

Removes an entry from the known image file list. The REMOVE command is identical to the DELETE command.

### Format

```
REMOVE file-spec
```

### Parameter

**file-spec**

Names the file specification of the known image file entry.

### Qualifiers

None.

### Description

The REMOVE command deletes an entry that appears in the known image file list. The image's entry on the known file list and any global sections for the image are deleted. The image file remains unaffected. Writable global sections are written back to disk upon their removal as known images.

If a process is accessing global sections when the REMOVE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are marked for deletion.

### Example

```
INSTALL> REMOVE GRPCOMM
```

The command in this example deletes the entry for the known image GRPCOMM from the known image file list.

# INSTALL REPLACE

---

## REPLACE

Associates a known image with the latest version of the image file, or modifies the attributes of an installed image.

### Format

REPLACE file-spec

### Parameter

#### **file-spec**

Names the file specification of an image installed as a known image.

### Qualifiers

#### **/ACCOUNTING**

#### **/NOACCOUNTING (default)**

Enables image-level accounting for selected images even if image accounting is disabled on the local node (by using the DCL command SET ACCOUNTING /DISABLE=IMAGE). When image accounting is enabled on the local node, it logs all images, and the /NOACCOUNTING qualifier has no effect.

#### **/EXECUTE\_ONLY**

#### **/NOEXECUTE\_ONLY**

The /EXECUTE\_ONLY qualifier is meaningful only to main programs. It allows the image to activate shareable images to which the user has EXECUTE access but has no READ access. All shareable images referenced by the program must be installed, and OpenVMS RMS uses trusted logical names, those created for use in EXEC or KERNEL mode.

You cannot specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

#### **/HEADER\_RESIDENT**

#### **/NOHEADER\_RESIDENT**

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if /OPEN is not specified.

#### **/LOG**

#### **/NOLOG**

Lists the newly created known file entry along with any associated global sections created by the installation.

#### **/OPEN**

#### **/NOOPEN**

Installs the file as a permanently open known image.

#### **/PRIVILEGED[=(priv-name[,...])]**

#### **/NOPRIVILEGED[=(priv-name[,...])]**

Installs the file as a known image with the privileges specified. Then, if the image is not located on the system volume, the image is made permanently open even if /OPEN is not specified. For a complete listing of privileges, see the ADD command.

The `/PRIVILEGED` qualifier applies only to executable images.

You cannot specify this qualifier for an executable image linked with the `/TRACEBACK` qualifier.

**/PROTECTED  
/NOPROTECTED**

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from `EXEC` or `KERNEL` mode. The `/PROTECTED` qualifier together with the `/SHARE` qualifier are used to implement user-written services, which become privileged shareable images.

**/PURGE  
/NOPURGE**

Specifies that the image can be removed by a purge operation; if you do not specify `/PURGE`, it can be removed only by a delete or remove operation. The `/NOPURGE` qualifier is the default form of the qualifier.

**/RESIDENT**

On AXP systems, causes the image code sections to be placed in the granularity hint code region and optionally compresses the image data sections, which remain located in process space. The image must be linked using the `/SHARE` and the `/SECTION_BINDING=CODE` qualifiers. ♦

**AXP****/SHARED  
/NOSHARED**

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if `/OPEN` is not specified.

**/WRITABLE  
/NOWRITABLE**

Installs the file as a writable known image as long as you also specify the `/SHARED` qualifier. The `/WRITABLE` qualifier is automatically negated if the `/NOSHARED` qualifier is specified.

**Description**

The `REPLACE` command updates a known file to the latest version found in the specified directory.

You can use the `REPLACE` command to modify the attributes of currently installed images. Either specify new qualifiers, or change the value of qualifiers used when installing the image with the `ADD` (or `CREATE`) command. If you specify no qualifiers, the new image retains the same attributes as the old one. If the old image was installed with the `/SHARED` qualifier, the global sections are recreated, probably with new identifiers.

If a process is accessing global sections when the `REPLACE` command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are marked for deletion.



## **INSTALL REPLACE**

### **Example**

```
INSTALL> REPLACE GRPCOMM /ACCOUNTING/NOOPEN
```

The command in this example replaces the known image GRPCOMM with the latest version of the image, while enabling image accounting and removing the OPEN attribute from this version.

The full name of the file specification is assumed to be  
SYS\$SYSTEM:GRPCOMM.EXE.

---

**LAT Control Program (LATCP) Utility**



---

## LATCP Description

The LAT Control Program (LATCP) utility is used to configure and control the LAT software on OpenVMS systems. You can use LATCP to:

- Specify operational characteristics for your node and its services
- Turn the state of the LAT port driver (LTDRIIVER) on and off
- Display the status of LAT services and service nodes in the network
- Display the status of links created on your LAT node
- Display the status of your LAT node
- Show and zero LAT counters
- Create, delete, and manage LAT ports
- Recall previously entered LATCP commands so that you can execute them again without having to retype them
- Create subprocesses so that you can execute DCL commands without exiting from LATCP

---

## LATCP Usage Summary

LATCP allows you to control the LAT software on a node and to obtain information from it. For example, you can use LATCP to create services on the local node, to associate a port on the local node with a service or device on a remote terminal server, and to display information about services offered on the local node or on other nodes in the network.

When you use LATCP commands to change LAT characteristics (such as creating a service and associating a port with a service), the changes take effect immediately. However, when the LAT port driver stops, these characteristics are lost. If you want these characteristics to be present the next time you start the LAT port driver, edit LAT\$SYSTARTUP.COM by modifying or adding commands to set these characteristics. Then, invoke LAT\$STARTUP.COM to start the LAT port driver. (See the *OpenVMS System Manager's Manual* for more information.)

### Format

RUN SYS\$SYSTEM:LATCP

| Command Qualifiers | Defaults |
|--------------------|----------|
| None.              | None.    |

**Parameters**  
None.

### Usage Summary

To invoke LATCP, enter RUN SYS\$SYSTEM:LATCP at the DCL command prompt. At the LATCP> prompt, you can enter any of the LATCP commands described in the following section.

To exit from LATCP, enter the EXIT command at the LATCP> prompt or press Ctrl/Z.

---

## LATCP Commands

This section describes and provides examples of the following LATCP commands:

**Table 11–1 Summary of LATCP Commands**

| Command        | Function                                                                                                                                    |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| ATTACH         | Transfers control from your current process to the specified process.                                                                       |
| CREATE LINK    | Creates LAT data links.                                                                                                                     |
| CREATE PORT    | Creates an application port or dedicated port.                                                                                              |
| CREATE SERVICE | Creates a service on a service node.                                                                                                        |
| DEFINE/KEY     | Assigns a command string to a function key on your keypad.                                                                                  |
| DELETE LINK    | Deletes a LAT data link from a node.                                                                                                        |
| DELETE PORT    | Deletes an application port or dedicated port.                                                                                              |
| DELETE SERVICE | Deletes a service on a service node.                                                                                                        |
| EXIT           | Returns the user to DCL command level.                                                                                                      |
| HELP           | Displays help text for LATCP commands.                                                                                                      |
| RECALL         | Recalls LATCP commands that you entered previously so that you can execute them again.                                                      |
| REFRESH        | Refreshes your display screen, for example, after your display has been overwritten by output from some other source.                       |
| SET LINK       | Modifies characteristics of LAT data links.                                                                                                 |
| SET NODE       | Specifies LAT characteristics for a node.                                                                                                   |
| SET PORT       | Maps a logical port on a node to either a remote device on a terminal server or a special application service on a remote LAT service node. |
| SET SERVICE    | Changes service characteristics.                                                                                                            |
| SHOW LINK      | Displays the characteristics of links on your node.                                                                                         |
| SHOW NODE      | Displays the characteristics of nodes.                                                                                                      |
| SHOW PORT      | Displays port characteristics.                                                                                                              |
| SHOW SERVICE   | Displays characteristics of LAT services known to your node.                                                                                |
| SPAWN          | Creates a subprocess.                                                                                                                       |
| ZERO COUNTERS  | Resets the node counters, service counters, and link counters maintained by your node.                                                      |

---

### ATTACH

Transfers control from your current process to the specified process. The LATCP ATTACH command is similar to the DCL ATTACH command. For example, from the DCL command level you can enter the DCL SPAWN command to create a LATCP subprocess without ending your DCL session, execute several LATCP commands at the LATCP prompt, then use the ATTACH command to return to DCL.

# LATCP ATTACH

## Format

ATTACH [process-name]

## Parameter

### **process-name**

Specifies the name of a parent process or spawned subprocess to which control passes. The process must already exist, be part of your current job, and share the same input stream as your current process.

Process names can contain from 1 to 15 alphanumeric characters. If a connection to the specified process cannot be made, LATCP displays an error message.

If you specify the /PID qualifier, do not use the process name parameter. If you omit the /PID qualifier, you must use the process name parameter.

To display processes, use the DCL SHOW SYSTEM command.

## Qualifier

### **/PID=pid**

Specifies the process identification (PID) of the process that will have terminal control. When you specify a PID, you can omit the leading zeros. If you specify a PID, do not use the process name parameter. If you omit the PID qualifier, you must use the process name parameter.

## Description

The ATTACH command allows you to connect your input stream to another process. You can use ATTACH to change control from one process to another. For example, you can use ATTACH to change control from LATCP to the DCL command level (see the following example). While you are at the DCL command level, LATCP remains in a hibernation state until you use ATTACH to return to it.

You cannot use this command if you are logged in to a captive account. (A captive account is an account set up to restrict user access to the system. You cannot access the DCL command level from a captive account.) You cannot specify both a process name and the /PID qualifier.

## Example

```
$ SET PROCESS/NAME="TOP LEVEL"
$ SPAWN RUN SYS$SYSTEM:LATCP
LATCP> SHOW NODE/ALL
.
.
.
LATCP> ATTACH "TOP_LEVEL"
$
```

In this example, the user enters the DCL SPAWN command to create a LATCP subprocess and uses LATCP to display the status of all nodes known to the local node. After using LATCP, the user enters the ATTACH command to return to the DCL command level.

---

## CREATE LINK

Creates the LAT data links, which are connections to LAN devices, such as Ethernet or FDDI (fiber distributed data interconnect) controllers, that you want your node to use. You must have OPER privilege to use this command.

### Format

```
CREATE LINK link-name
```

### Parameter

#### **link-name**

Specifies a name for a LAT data link. A link name can have up to 16 ASCII characters. The characters allowed are as follows:

- Alphanumeric characters: A—Z, a—z, 0—9
- A subset of the international character set: ASCII codes 192—253
- Punctuation characters: dollar sign (\$), hyphen (-), period (.), and underscore (\_)

You can create a maximum of eight links on your local node. Use the SHOW LINK command for a list of the link names that are defined for your node.

### Qualifiers

#### **/DECNET**

#### **/NODECNET**

Directs LAT protocol to use the DECnet data link address (/DECNET) or the hardware address (/NODECNET) when starting the LAN controller. If you do not specify the /DECNET or /NODECNET qualifier, the default is that the LAT protocol will use the DECnet data link address.

#### **/DEVICE=device-name**

Specifies the LAN controller device name for a LAT data link (for example, XEB0:). Only one LAT data link can be associated with a LAN controller. If you enter the CREATE LINK command without the /DEVICE qualifier, LATCP attempts to find an available controller by using a list of possible LAT data link device names. Digital advises that you specify a default device name by defining the LAT\$DEVICE logical name.

#### **/LOG**

#### **/NOLOG**

Specifies whether LATCP displays a message confirming that the link was created. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

#### **/STATE=option**

Specifies whether the link will be available for use. There are two options for STATE:

- ON Specifies that the created link will be available for use with the LAT protocol running.



## LATCP CREATE LINK

**OFF** Specifies that the created link will not be available for use.

If you do not specify the `/STATE=option` qualifier, the default is that the created link will be available for use (ON).

### Description

The `CREATE LINK` command creates a link, or connection, for an OpenVMS node and a local area network (LAN) device (for example, an Ethernet or FDDI controller) and assigns a name to that link. An OpenVMS node can have eight LAN links. Each link must operate on a separate LAN controller and have its own LAN hardware.

If you do not explicitly create a link with this command before entering the `SET NODE/STATE=ON` command, LATCP automatically creates a link for you. LATCP names the link `LAT$LINK` and assigns it to the first available LAN controller or `LAT$DEVICE`, if defined. To establish additional links, use the `CREATE LINK` command.

Whenever you create a link, specify the LAN controller device name.

Use the `SET LINK` command to modify link characteristics.

### Example

```
LATCP> CREATE LINK NETWORK_A /DEVICE=XEB0: /STATE=ON
```

The `CREATE LINK` command in this example creates an Ethernet link named `NETWORK_A`. It specifies the Ethernet controller device `XEB0` for that link. The link will be available for use.

---

## CREATE PORT

Creates a logical port on your local node that connects with a remote device on a terminal server. Alternatively, this command creates a logical port on your local node that connects with a specific service. The service can be offered by a terminal server or associated with one or more dedicated ports on a remote LAT service node.

You must have OPER privilege to use this command.

### Format

```
CREATE PORT [port-name]
```

### Parameter

#### **port-name**

Specifies the port name in the form `LTA $n$ :`, where  $n$  is a unique number from 1 through 9999. If the port you specify already exists, LATCP returns the following error message:

```
%LAT-W-CMDERROR, error reported by command executor
-SYSTEM-F-DUPLNAM, duplicate name
```

If you do not specify the port name, you must specify the /LOGICAL qualifier.

---

**Note**

---

Digital recommends that you assign a logical name when creating a port, instead of specifying a specific LTA device.

---

## Qualifiers

### **/APPLICATION**

Specifies that a logical port on your node is an application port. It can be used to connect to a remote device (typically a printer) on a terminal server or to a dedicated port on another LAT service node. If you do not specify either the /APPLICATION or /DEDICATED qualifier, the default port type is APPLICATION.

### **/DEDICATED**

Specifies that a logical port on your local node is dedicated to an application service. When users on a terminal server (or on another node that supports outgoing connections) request a connection to this service name, they are connected to the dedicated port. See the *OpenVMS I/O User's Reference Manual* for a description of programming an application service.

After creating a dedicated port on a node, use the SET PORT /SERVICE command to map this port to a service. If you do not specify either /DEDICATED or /APPLICATION, the default port type will be APPLICATION.

### **/LOG**

### **/NOLOG**

Specifies whether LATCP displays a message confirming that the port was created. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

### **/LOGICAL=(NAME=logical-name[,TABLE=table][,MODE=mode])**

Specifies a logical name to be associated with the actual name of the created port. You must specify a logical name if you do not specify a port name.

---

**Note**

---

If you have sufficient privileges to create a port, but lack the privilege to assign a logical name, the port will still be created.

---

You can specify one of the following options for the TABLE keyword:

|         |                                                                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GROUP   | Places the logical name in the group logical name table. You must have GRPNAM or SYSPRV privilege to place the logical name in the group logical name table. |
| JOB     | Places the logical name in the jobwide logical name table.                                                                                                   |
| PROCESS | Places the logical name in the process logical name table. This is the default.                                                                              |

## LATCP CREATE PORT

**SYSTEM** Places the logical name in the system logical name table. You must have **SYSNAM** or **SYSPRV** privilege to place a name in the system logical name table.

You can also specify the name of a specific table. For example, you could specify **LN\$PROCESS**, which would be the equivalent of specifying **PROCESS**.

There are also several options for the **MODE** keyword, as follows:

**EXECUTIVE** Creates an executive mode logical name. You must have **SYSNAM** privilege to create an executive mode logical name.

**SUPERVISOR** Creates a supervisor mode logical name.

**USER** Creates a user mode logical name.

The access mode associated with the logical name is determined by maximizing the access mode of the caller with the access mode specified by the **MODE** keyword: the mode with the lower privilege is used.

You cannot specify an access mode with a privilege higher than that of the table containing the logical name. However, if your process has **SYSNAM** privilege, then the specified access mode is associated with the logical name regardless of the access mode of the caller.

If you omit the **MODE** keyword, the access mode of the caller is associated with the logical name.

### Description

The **CREATE PORT** command creates a logical LAT port for your local node. You can set up the port as an application port that is later mapped to a remote printer (or other device) on a server, or you can set up the port to be mapped to a dedicated port on a remote LAT service node. See Example 1.

Alternatively, you can set up the port as a dedicated port for a special service on a LAT service node. See Example 2.

After creating a port, use the **SET PORT** command to associate (map) the port with a queue or a service. (See the discussion that follows Example 1.) Ordinarily, you create and set ports in the LAT site-specific startup procedure, **LAT\$SYSTARTUP.COM**. See the *OpenVMS System Manager's Manual* for more details.

---

#### Note

---

When using the **CREATE PORT** command to create an application port (for example, **CREATE PORT LTA5001: /APPLICATION**), you might receive an error message similar to the following:

```
%LAT-W-CMDERROR, error reported by command executor
-SYSTEM-F-DUPLNAM, duplicate name
```

This error occurs because the LAT application port that you are trying to create has already been created by some other application. That other application could be LATCP itself because LATCP's port, **LATCP\$MGMT\_PORT**, is used to communicate with **LTDRIVER**.

You can avoid creating duplicate ports in two ways:

- Use the **SET NODE/DEVICE\_SEED** command to move the lower boundary of the device unit number range beyond the LTA devices that you are intending to use as application ports. (By default, LTA

## LATCP CREATE PORT

device units that originate from the \$ASSIGN system service to LTA0: have unit numbers that fall within a range from 1 through 9999.) For example, if you know that all LTA devices from LTA7000: onward are not used as application ports, you could enter the following commands:

```
LATCP> SET NODE/DEVICE SEED=7000
LATCP> CREATE PORT LTA5001:/APPLICATION
.
.
.
LATCP> CREATE PORT LTA5010:/APPLICATION
```

For more information, see the description of the /DEVICE\_SEED qualifier in the SET NODE reference section.

- Execute the LATCP command SET NODE/STATE=ON (either interactively or in a program) before any LTA application or dedicated ports are created. Because every LATCP management port (LATCP\$MGMT\_PORT) that was created by the previous LATCP invocation is deleted, there will be no conflict with LAT application ports or dedicated ports that are created anew.

For more information, see the description of the /STATE qualifier in the SET NODE reference section.

---

### Examples

1. LATCP> CREATE PORT LTA22: /APPLICATION

The CREATE PORT command in this example creates an application port named LTA22: on a service node. You can associate the port with a specific printer on a terminal server (use the SET PORT /NODE /PORT command) or with a set of printers on a terminal server (use the SET PORT /NODE /SERVICE command). Or, you can associate the port with a dedicated port on a remote service node. In this case, use the SET PORT /NODE /SERVICE command, where the /SERVICE qualifier specifies an application service associated with a dedicated port on the remote node. See the examples for the SET PORT command.

2. LATCP> CREATE PORT LTA21: /DEDICATED

The CREATE PORT command in this example creates the LTA21: port. It will be used as a dedicated port that offers a specific service rather than a general timesharing service.

3. LATCP> CREATE PORT /LOG /APPLICATION -  
\_LATCP> /LOGICAL=(NAME=MAIL\_PORT, TABLE=PROCESS, MODE=SUPERVISOR)

The CREATE PORT command in this example creates an application port. It assigns the name of the new port to the specified logical name (MAIL\_PORT). The logical is created as a supervisor mode logical name in the LNM\$PROCESS\_TABLE logical name table. LATCP displays a confirmation message.

## LATCP CREATE SERVICE

---

### CREATE SERVICE

Creates a service on a service node. You must have OPER privilege to use this command.

#### Format

```
CREATE SERVICE [service-name]
```

#### Parameter

##### **service-name**

Specifies a LAT service name. By default, a service name is the name of the local node you defined with the SET NODE command.

The service name can be from 1 to 16 ASCII characters in length. The characters allowed are as follows:

- Alphanumeric characters: A—Z, a—z, 0—9
- A subset of the international character set: ASCII codes 192—253
- Punctuation characters: dollar sign (\$), hyphen (-), period (.), and underscore (\_)

#### Qualifiers

##### **/APPLICATION**

Specifies that the created service is an application service. An application service offers a specific application on the service node rather than a general interactive service. You can define a dedicated port for the service by using the CREATE PORT and SET PORT commands.

##### **/IDENTIFICATION[="identification-string"]**

Describes and identifies a service. Service nodes include the identification string in service announcements. A service node announces its services at regular intervals established with the SET NODE command. Entering the LATCP SHOW NODE command or the DECserver SHOW NODE command generates a display that includes this identification string. By default, the identification string is a translation of SYS\$ANNOUNCE.

You cannot specify more than 64 ASCII characters in an identification string (a SYS\$ANNOUNCE longer than that will be truncated to the first 64 characters). Enclose the string in quotation marks (").

##### **/LOG**

##### **/NOLOG**

Specifies whether LATCP displays a message confirming that the service was created. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

##### **/STATIC\_RATING=rating**

##### **/NOSTATIC\_RATING**

Enables or disables dynamic service ratings. A dynamic service rating means that a LAT algorithm calculates the availability of a service dynamically, based on the overall level of activity of the node that offers the service, the amount of memory, and the processor type. When a terminal server or node requests a connection

## LATCP CREATE SERVICE

to a service that is offered on two or more service nodes, the requesting node selects the service node with the highest (most favorable) service rating. This selection process is called **load balancing**. The dynamic service rating, which is the default, is usually adequate for efficient load balancing on the LAT network.

When you use the `/STATIC_RATING` qualifier, you disable dynamic service ratings so that you can specify a static (fixed) rating. Use the static rating to direct users away from or toward your node temporarily. Static ratings range from 0 to 255. Specify a low value to make the local service node less likely to be used; specify a high value to make the local service node more likely to be used.

If you do not specify either the `/STATIC_RATING` or `/NOSTATIC_RATING` qualifier, the default is that the LAT software uses the dynamic service rating.

### Description

The `CREATE SERVICE` command creates a service that a service node offers to terminal servers (and nodes that support outgoing connections) on the LAT network. The service can be a general timesharing service that offers all the resources of the service node, or it can be an application service that offers a specific application on the service node. The number of services that you can create with the `CREATE SERVICE` command depends on the availability and capability of specific resources.

The following table lists the maximum number of services your node can offer and still be recognized by the DECserver terminal server, depending on the model number.

| DECserver Terminal Server | Maximum Number of Services Offered by Node |
|---------------------------|--------------------------------------------|
| Model 100                 | 8                                          |
| Model 200                 | 64                                         |
| Model 300                 | 64                                         |
| Model 90TL                | 64                                         |
| Model 700                 | 64                                         |
| Model 500                 | 127                                        |

#### Note

If you create more than the maximum number of services supported by a specific DECserver model, that server will not recognize your node.

To create an application service, use the `/APPLICATION` qualifier. In addition, define a dedicated port by using the `CREATE PORT` and `SET PORT` commands. Most often, a system manager creates services in `LAT$SYSTARTUP.COM`, the site-specific LAT configuration procedure. (See the *OpenVMS System Manager's Manual* for further information on creating an application service. The *OpenVMS I/O User's Reference Manual* shows how to program an application service.)

Several service nodes can share one service name. A shared service name is especially useful in a cluster environment because it allows the cluster to be known by a single cluster name. When a user logs in, the terminal server connects to the least busy node offering that service.

## LATCP CREATE SERVICE

You can modify the service characteristics with the SET SERVICE command.

### Examples

1. LATCP> CREATE SERVICE/STATIC\_RATING=195 SALES

The CREATE SERVICE command in this example creates the service SALES on a service node. This command assigns a static rating of 195 so terminal servers (and nodes that support outgoing connections) can assess the availability of services on the node.

2. LATCP> CREATE SERVICE/APPLICATION GRAPHICS

This command creates the service GRAPHICS on the local node. Use the CREATE PORT/DEDICATED and SET PORT/SERVICE=GRAPHICS commands to create a port that is dedicated to this service.

---

## DEFINE/KEY

Assigns a command string to a function key. For example, you can assign the LATCP SHOW NODE command to a function key.

### Format

DEFINE/KEY key-name equivalence-string

### Parameters

#### key-name

Specifies the name of the function key that you want to define. Valid key names are as follows:

| Key Name    | LK201 Keyboard    | VT100-Type        | VT52-Type  |
|-------------|-------------------|-------------------|------------|
| PF1         | PF1               | PF1               | Blue       |
| PF2         | PF2               | PF2               | Red        |
| PF3         | PF3               | PF3               | Black      |
| PF4         | PF4               | PF4               |            |
| KP0-KP9     | Keypad 0-9        | Keypad 0-9        | Keypad 0-9 |
| PERIOD      | Keypad period (.) | Keypad period (.) |            |
| COMMA       | Keypad comma (,)  | Keypad comma (,)  |            |
| MINUS       | Keypad minus (-)  | Keypad minus (-)  |            |
| Enter       | Enter             | Enter             | Enter      |
| FIND        | Find              | -                 | -          |
| INSERT_HERE | Insert Here       | -                 | -          |
| REMOVE      | Remove            | -                 | -          |
| SELECT      | Select            | -                 | -          |
| PREV_SCREEN | Prev Screen       | -                 | -          |
| NEXT_SCREEN | Next Screen       | -                 | -          |

| Key Name | LK201 Keyboard | VT100-Type | VT52-Type |
|----------|----------------|------------|-----------|
| HELP     | Help           | –          | –         |
| DO       | Do             | –          | –         |
| F6-F20   | F6-F20         | –          | –         |

**equivalence-string**

Specifies the command string that you want assigned to the function key. To preserve spaces and lowercase characters, enclose the string in quotation marks (").

**Qualifiers**

**/ECHO**

**/NOECHO**

Specifies whether LATCP displays the command string on your screen when you press the key. If you do not specify the /ECHO or /NOECHO qualifier, the default is that the command string will be displayed. You cannot use /NOECHO with the /NOTERMINATE qualifier.

**/IF\_STATE=state-name**

Specifies the state that must be set (for example, the GOLD state) for the key definition to work. Lets you assign alternative meanings to keys when the specified state is set. See the discussion of the /SET\_STATE qualifier. If you omit the /IF\_STATE qualifier, LATCP uses the current state. The state name is an alphanumeric string. States are established with the /SET\_STATE qualifier.

**/LOCK\_STATE**

**/NOLOCK\_STATE**

Specifies that the state set by the /SET\_STATE qualifier remain in effect until explicitly changed. If you use the /NOLOCK\_STATE qualifier, the state set by /SET\_STATE remains in effect only for the next definable key that you press or for the next read-terminating character (such as Return or Ctrl/Z) that you type.

You can specify the /LOCK\_STATE qualifier only with the /SET\_STATE qualifier. If you do not specify the /LOCK\_STATE or /NOLOCK\_STATE qualifier, the default is that the state set by the /SET\_STATE qualifier remains in effect until explicitly changed.

**/LOG**

**/NOLOG**

Specifies whether LATCP displays a message confirming that the command was executed. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

**/SET\_STATE=state-name**

Causes the specified state to be set when you press the defined key. The state name can be any alphanumeric string (for example, GOLD). Use the DEFINE /KEY/IF\_STATE=state-name command to associate new meanings for keys when the specified state is set. See the example for the DEFINE/KEY command.

If you omit the /SET\_STATE qualifier, the current state that was locked remains in effect.



## LATCP DEFINE/KEY

### **/TERMINATE** **/NOTERMINATE**

Specifies whether the command string will be terminated (processed) when you press the function key. The default is **/NOTERMINATE**, which allows you to press other keys before the command string is processed. Pressing Return has the same effect as using **/TERMINATE**.

The **/NOTERMINATE** qualifier allows you to create key definitions that insert text into command lines, after prompts, or into other text that you are typing.

### **Description**

The **DEFINE/KEY** command assigns a command string to a function key so that when you press that key, the command is executed.

### **Example**

```
LATCP> DEFINE/KEY PF4 "SHOW NODE " /NOTERMINATE/SET STATE=GOLD
LATCP> DEFINE/KEY PF4 "/ALL"/IF_STATE=GOLD/TERMINATE
```

The first **DEFINE/KEY** command in this example assigns the **SHOW NODE** command to function key PF4. To process the **SHOW NODE** command, you must press Return after pressing PF4. Note the space after the word **NODE** in the first **DEFINE/KEY** command. This space allows you to enter a node name after pressing PF4. When you press Return, the **SHOW NODE** command is processed. If the space is omitted, LATCP does not recognize the command (**SHOW NODE**). The state is set to **GOLD**; that state will be in effect for the next key that you press.

The second **DEFINE/KEY** command defines the use of the PF4 key when the keypad is in the **GOLD** state. When you press PF4 twice, the **SHOW NODE/ALL** command is processed.

---

## **DELETE LINK**

Deletes a logical link from a node. You must have **OPER** privilege to use this command.

### **Format**

```
DELETE LINK link-name
```

### **Parameter**

#### **link-name**

Specifies the name of the link that you want to delete.

Use the **SHOW LINK** command for a list of the links that are defined for your node.

### **Qualifiers**

**/LOG**

**/NOLOG**

Specifies whether LATCP displays a message confirming that the link was deleted. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

**Description**

The DELETE LINK command stops any active sessions on the link and then deletes the link from your node.

**Example**

```
LATCP> DELETE LINK NETWORK_A /LOG
```

The DELETE LINK command in this example deletes the link NETWORK\_A. The link was created with the CREATE LINK command.

---

**DELETE PORT**

Deletes a logical port from a node. You must have OPER privilege to use this command.

**Format**

```
DELETE PORT port-name
```

**Parameter**

**port-name**

Specifies the name of the application port or the dedicated port that you want to delete. An application port connects to a remote device on a terminal server, whereas a dedicated port connects to a special service.

Use the SHOW PORT command for a list of the application ports and the dedicated ports that are defined for your service node. You cannot use the DELETE PORT command to delete an interactive or forward LAT port.

**Qualifiers**

**/LOG**

**/NOLOG**

Specifies whether LATCP displays a message confirming that the port was deleted. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

**Description**

The DELETE PORT command stops any active session on the port and then deletes the port from your service node.

**Example**

```
LATCP> DELETE PORT LTA27:
```

The DELETE PORT command in this example deletes the LTA27: application port. The port was created with the CREATE PORT command.

## LATCP DELETE SERVICE

---

### DELETE SERVICE

Deletes a service that your service node currently offers. You must have OPER privilege to use this command.

#### Format

```
DELETE SERVICE service-name
```

#### Parameter

**service-name**

Specifies the name of the service, as displayed by the SHOW SERVICE command.

#### Qualifiers

**/LOG**

**/NOLOG**

Specifies whether LATCP displays a message confirming that the service was deleted. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

#### Description

The DELETE SERVICE command removes a service from a service node. The service is no longer available to terminal server users and is no longer multicast in the configuration messages sent by your service node. Existing connections to the service node are not affected.

#### Example

```
LATCP> DELETE SERVICE SALES
```

The DELETE SERVICE command in this example removes the service SALES from your service node. The service is no longer available to server users.

---

## EXIT

Stops execution of LATCP and returns control to the DCL command level. You can also enter Ctrl/Z at any time to exit.

#### Format

```
EXIT
```

#### Parameters

None.

#### Example

```
LATCP> EXIT
```

The EXIT command in this example exits the LATCP program and returns control to the DCL command level.

## HELP

Provides online help information for using the LATCP commands.

### Format

HELP [command-name...]

### Parameter

#### **command-name**

The name of a LATCP command or LATCP command and command keyword. If you enter the HELP command with a command name only, such as HELP SET, LATCP displays a list of all of the command keywords used with the SET command.

### Description

The HELP command is an online reference for LATCP commands. After you view an initial help display, press Return. The help display stops and the LATCP prompt is displayed. If you do not specify a command name, the HELP command displays general information on the commands for which help is available. Supplying a command name obtains syntax information for that command.

### Example

```
LATCP> HELP SET PORT
```

In this example, the HELP SET PORT command produces a description of the SET PORT command and shows the command format.

---

## RECALL

Displays previously entered LATCP commands on the screen so that you can execute them again.

### Format

RECALL [command-specifier]

### Parameter

#### **command-specifier**

Specifies the number or the first several characters of the LATCP command you want to recall. Command numbers can range from 1 to 20. The most recently entered command is number 1.

Use the /ALL qualifier to display all the commands in the RECALL buffer, along with their command number so that you can determine the number of the command that you want to recall.

If you do not include the command specifier or the /ALL qualifier when entering the RECALL command, LATCP displays the last command.

## LATCP RECALL

### Qualifiers

#### **/ALL**

Specifies that LATCP display all the commands in the RECALL buffer. LATCP displays the number of each command.

### Description

When you enter a LATCP command, LATCP stores it in a RECALL buffer for later use with the RECALL command. The RECALL command itself is never stored in the RECALL buffer.

When you use the RECALL command, LATCP displays the recalled command but does not process it. If you want the command processed as it appears, press Return. You can use the command line editing facility to make minor changes in the command line and then press Return to process the revised version of the command.

### Examples

1. LATCP> RECALL 2

In this example, the RECALL command recalls the second-to-last command you entered.

2. LATCP> RECALL SET

In this example, the RECALL command recalls the last SET command you entered.

---

## REFRESH

Refreshes the display screen so that any output from some other source (such as a broadcast message) is erased from the screen.

### Format

REFRESH

### Description

Use the REFRESH command to refresh your display screen after output from other sources has overwritten the display screen. For example, if a broadcast message from a terminal server user is displayed on your screen, use the REFRESH screen to erase the broadcast message from the display. By default, you can refresh your screen by pressing Ctrl/W at the LATCP prompt.

### Example

LATCP> REFRESH

In this example, the REFRESH command refreshes the display on your screen.

---

## SET LINK

Changes the characteristics of LAT data links. You must have OPER privilege to use this command.

### Format

SET LINK link-name

### Parameter

#### link-name

Specifies the name for a LAT data link. A link name can have up to 16 ASCII characters. The characters allowed are as follows:

- Alphanumeric characters: A—Z, a—z, 0—9
- A subset of the international character set: ASCII codes 192—253
- Punctuation characters: dollar sign (\$), hyphen (-), period (.), and underscore (\_)

The SHOW LINK command displays the names of the links defined for a node.

### Qualifiers

#### /LOG

#### /NOLOG

Specifies whether LATCP displays a message confirming that the link's characteristics were modified. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

#### /STATE=option

Specifies availability of the link for use. There are two options for STATE:

- |     |                                                                                  |
|-----|----------------------------------------------------------------------------------|
| ON  | Specifies that the link will be available for use with the LAT protocol running. |
| OFF | Specifies that the link will not be available for use.                           |

If you do not specify the /STATE=option qualifier, the default is that the link will be available (ON).

### Description

The SET LINK command allows you to change the characteristics for a LAT data link, which must have been created previously in one of the following ways:

- Interactively entering the CREATE LINK command
- Using the SET NODE/STATE=ON command to create a default link named LAT\$LINK (if no other links are created when that command executes)
- Running a program that creates links

## LATCP SET LINK

### Example

```
LATCP> SET LINK NETWORK_A /LOG /STATE=ON
```

The SET LINK command in this example directs LATCP to start the controller for link NETWORK\_A and then to display a confirmation message.

---

## SET NODE

Specifies the LAT characteristics of your local node. You must have OPER privilege to use this command.

### Format

```
SET NODE [node-name]
```

### Parameter

#### **node-name**

Specifies a node name for your local node. By default, the node name is the translation of SYS\$NODE. A LAT node name should be the same as the DECnet node name. If the node is not running DECnet but will be in the future, Digital recommends that you define SYS\$NODE and use it for both DECnet and LAT node names.

A LAT node name can be from 1 to 16 ASCII characters. The characters allowed are as follows:

- Alphanumeric characters: A—Z, a—z, 0—9
- A subset of the international character set: ASCII codes 192—253
- Punctuation characters: dollar sign (\$), hyphen (-), period (.), and underscore (\_)

### Qualifiers

#### **/CIRCUIT\_TIMER[=msecs]**

Allows you to control the interval in milliseconds (msecs) between messages sent from the local node to other service nodes or terminal servers while connections to those nodes are active. Use this qualifier only if your node allows outgoing connections (/CONNECTIONS=OUTGOING\_ONLY or /CONNECTIONS=BOTH).

A low value for the interval decreases the response time for the port but increases the demand on service nodes. Set the circuit timer in the range of 10 to 1000 msecs.

The default value of 80 msecs gives a generally acceptable response time while creating a moderately low overhead on the service nodes. You cannot change this parameter when there are active or pending LAT connections.

#### **/CONNECTIONS=option**

Allows you to specify the type of connections permissible on the local node. There are four options for CONNECTIONS:

|               |                                                                                                                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INCOMING_ONLY | Specifies that the local node permit incoming connections only.                                                                                                                                       |
| OUTGOING_ONLY | Specifies that the local node permit outgoing connections only. Specify this on systems that can tolerate the overhead associated with outgoing connections, such as standalone systems.              |
| BOTH          | Specifies that the local node permit both incoming and outgoing connections. Specify this on systems that can tolerate the overhead associated with outgoing connections, such as standalone systems. |
| NONE          | Specifies that the local node disallow both incoming and outgoing connections.                                                                                                                        |

If you do not specify the /CONNECTIONS=option qualifier, the default is that the node will permit incoming connections only.

**/CPU\_RATING=cpu-power**  
**/NOCPU\_RATING**

The /CPU\_RATING qualifier assigns your local node a rating that represents the power of your node's CPU (central processing unit) relative to other CPUs in the LAN. The value of *cpu-power* can range from 1 (for a CPU with the lowest power) to 100 (for a CPU with the highest power).

The local node's LAT driver uses this value to calculate the dynamic service rating for each service offered on the local node. When a terminal server or node requests a connection to a service that is offered on the local node and one or more other service nodes, the requesting node selects the service node with the highest (most favorable) service rating. This selection process is called **load balancing**.

Specify the /CPU\_RATING qualifier to influence the service ratings calculated for services on your node. If you specify a high value for *cpu-power*, the LAT driver will calculate a relatively high service rating for services on your node (service ratings as high as 255 are possible). If you specify a low value, the LAT driver will calculate relatively low service ratings; connections will most likely be made to the same service that is offered on other nodes. In either case, the LAT driver can calculate a greater range of values for dynamic service ratings (the entire range from 0 to 255). Consequently, the ratings will more accurately reflect the availability of the service node.

By default, the LAT driver calculates a dynamic rating based on the estimated CPU power of the local node. If you do not modify the default by specifying the /CPU\_RATING qualifier, or if you specify the /NOCPU\_RATING qualifier, services offered on the local node will generally have lower ratings than services offered on nodes having more powerful CPUs. Other factors involved in the rating calculation, such as available memory and current CPU usage, can further reduce the ratings for local services.

For example, if your local node has low CPU power (relative to the range of CPU powers available with your processors) but is the most powerful CPU that is usually available in the LAN, you can assign a high value to the /CPU\_RATING qualifier. Then, higher service ratings will be given to the services offered on your node. If you do not specify the /CPU\_RATING qualifier, the service ratings calculated for your local node might be far below the maximum possible value of 255.



## LATCP SET NODE

If you do not specify either the `/CPU_RATING=cpu-power` or `/NOCPU_RATING` qualifier, the default is that no CPU rating will be used (the LAT driver will instead base the rating on the estimated CPU power of the local node). A value of 0 indicates no CPU rating.

### **`/DEVICE_SEED[=value]`**

Sets the default starting number (within a range from 1 through 9999) for the unit numbers that will be assigned to new LTA devices. Note that when ports are created by assigning a channel to LTA0: with the \$ASSIGN system service, the channel numbers fall in this same range.

The default device seed value is approximately half of the maximum unit number (which you set by using the `/UNIT_NUMBER_MAXIMUM` qualifier). Interactive LAT ports, and those created with the `CREATE PORT/LOGICAL` command, are assigned unit numbers beginning with the specified device seed value and continuing up to the maximum unit number. When the maximum unit number is reached, the port is assigned the next available unit number beginning at the bottom of the range (LTA1:).

Note that each time you specify the `/UNIT_NUMBER_MAXIMUM` qualifier, the device seed value is reset to approximately half of the newly specified maximum unit number.

### **`/FORWARD_SESSION_LIMIT[=value]`**

Controls the number of sessions (a value within a range from 16 through 255) allowed on each outgoing connection. By default, 16 sessions are allowed on an outgoing connection, which means that 16 individual processes can direct the DCL command, `SET HOST/LAT`, to the same remote node.

You must increase the value for the `/FORWARD_SESSION_LIMIT` qualifier if a user on your system enters the DCL command, `SET HOST/LAT`, and receives an error message indicating that the session limit for the LAT circuit has been reached (`%LAT-F-VCSESLIM`). Note, however, that you can change this value only when no connections exist.

### **`/GROUPS=option[,...]`**

Gives the listed groups access to services offered on your local node or prevents the listed groups from accessing services offered on your local node, depending on the options used.

A network manager organizes terminal server nodes into groups based on the number of terminal server nodes in the LAT network. Groups subdivide the LAT network, limiting the number of terminal server nodes that can connect with a given service node.

There can be as many as 256 groups, numbered 0 through 255. By default, all terminal server nodes and nodes supporting outgoing connections belong to group 0. If you enter one group code, you can omit the parentheses. Use the `SHOW NODE` command for a list of the groups enabled for your service node.

There are several options for the `/GROUPS` qualifier. For each option described, there are two ways to specify more than one group:

- List them separated by commas
- Specify a range

The available options are as follows:

|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>ENABLE=group-code[,...]</code>                               | Gives the listed groups access to your service node.                                                                                                                                                                                                                                                                                                                                        |
| <code>DISABLE=group-code[,...]</code>                              | Prevents the listed groups from accessing your service node. The listed groups had been enabled previously for access to your node.                                                                                                                                                                                                                                                         |
| <code>ENABLE=group-code[,...],<br/>DISABLE=group-code[,...]</code> | This option lets you enable certain groups and disable other groups in one command line: gives access to the groups listed with the <code>ENABLE</code> option and removes access from the groups listed with the <code>DISABLE</code> option. Enclose both <code>ENABLE</code> and <code>DISABLE</code> in parentheses; for example, <code>/GROUP=(ENABLE=(10,12),DISABLE=(1-30))</code> . |

Example 2 shows how to specify the `/GROUPS` qualifier with the `SET NODE` command.

### **`/IDENTIFICATION[="identification-string"]`**

Describes and identifies a node. Service nodes include the identification string in service announcements. A service node announces its services at regular intervals established with the `SET NODE` command. Entering the `LATCP SHOW NODE` command or the `DECserver SHOW NODE` command generates a display that includes this identification string. By default, the identification string is the translation of `SYS$ANNOUNCE`.

You cannot specify more than 64 ASCII characters in an identification string (a `SYS$ANNOUNCE` longer than that will be truncated to the first 64 characters). Enclose the string in quotation marks (").

### **`/KEEPALIVE_TIMER[=secs]`**

Allows you to control the maximum interval between idle run messages sent by your local node to another service node to which it has a LAT connection. The interval is in seconds. Your node sends these messages when no other traffic is being generated over the virtual circuit. If the service node acknowledges these messages, your node will continue to monitor the status of the circuit. If your node does not receive acknowledgment, it responds as if the circuit is down.

Use this qualifier only if your node allows outgoing connections (`/CONNECTIONS=OUTGOING_ONLY` or `/CONNECTIONS=BOTH`).

The default value is 20. Digital recommends this value for normal LAN environments. For a heavily loaded LAN, consider using a higher value. Set the timer in the range of 10 to 255. For applications that require quick notification and possible failover of a service node failure, use a lower value. You cannot change this value if there are active or pending connections.

### **`/LOG`**

### **`/NOLOG`**

Specifies whether `LATCP` displays a message confirming that the node's characteristics were modified. If you do not specify the `/LOG` or `/NOLOG` qualifier, the default is that no message will be displayed.

## LATCP SET NODE

### **/MULTICAST\_TIMER[=secs]**

Specifies the time, in seconds, between multicast messages sent by a service node. A multicast message announces the services offered by a service node. The minimum value is 10 seconds; the maximum is 180 seconds. The default value is 60.

### **/NODE\_LIMIT=value**

#### **/NONODE\_LIMIT**

Specifies the maximum number of service nodes that your local node can store in its service and node database. Use this qualifier only if your node allows outgoing connections (/CONNECTIONS=OUTGOING\_ONLY or /CONNECTIONS=BOTH).

When the database reaches the node limit, no more nodes are added to the database when your local node receives service announcement messages. You can ensure that the node limit is not reached by using the /USER\_GROUPS qualifier to restrict access from the local node to other service nodes on the network.

If you do not specify either the /NODE\_LIMIT=value or /NONODE\_LIMIT qualifier, the default is no limit. A value of 0 indicates no limit.

### **/RETRANSMIT\_LIMIT[=count]**

Specifies the number of times your local node repeats transmission of a message to a service node after a transmission fails. If the transmission is still unsuccessful after these attempts, the virtual circuit between your local node and the service node terminates, along with all sessions associated with the virtual circuit.

Use this qualifier only if your node allows outgoing connections (/CONNECTIONS=OUTGOING\_ONLY or /CONNECTIONS=BOTH).

Specify a value in the range of 4 to 120. The default is 8. The value you choose depends on the type of physical link used for your network, as well as the amount of traffic on the network. See your network manager for a suggested value. You cannot change this value if there are active or pending connections.

### **/SERVICE\_RESPONDER**

#### **/NOSERVICE\_RESPONDER**

Specifies whether your system responds to special LAT multicast messages that request service information. Some terminal servers do not have their own service and node database. When a user on such a terminal server requests a connection to a service, the server sends a LAT multicast message requesting names of nodes that offer the requested service. **Service responder** nodes reply with the requested information.

If you specify /SERVICE\_RESPONDER, your system responds to the special LAT multicast messages. (If you specify /NOSERVICE\_RESPONDER, your system does not respond to those messages.) Digital recommends that you set up only one or two nodes in the LAN as service responder nodes. The nodes should have the largest databases in the LAN. Use this option only if your node allows outgoing connections (/CONNECTIONS=OUTGOING\_ONLY or /CONNECTIONS=BOTH).

If you do not specify either the /SERVICE\_RESPONDER or /NOSERVICE\_RESPONDER qualifier, the default is that your system will not respond to the special LAT multicast messages.

**/SESSION\_LIMIT=option**

Specifies the maximum number of simultaneous sessions across all local-access ports. This limit does not affect the use of dedicated and application ports. It affects interactive port creation only, limiting the amount of resources consumed by interactive users creating new sessions.

There are several options for the /SESSION\_LIMIT qualifier:

|                               |                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| INCOMING=value                | Sets the session limit for incoming connections only. The default is no limit (a value of 0).                                                           |
| OUTGOING=value                | Sets the session limit for outgoing connections only. The default is no limit (a value of 0).                                                           |
| INCOMING=value,OUTGOING=value | Sets the limit for both outgoing and incoming connections. Enclose both options in parentheses; for example, /SESSION_LIMIT=(INCOMING=20, OUTGOING=25). |

- A high limit allows users to have more sessions but increases memory utilization on your local node.
- A low limit decreases memory utilization on your local node but limits user access to services on the network.

If the limit is reached, interactive users cannot create new sessions. In this case, you need to increase the session limit or disconnect any connections that are no longer being used.

Specify a value in the range of 0 to 255. Specifying 0 leaves no limit on the number of sessions that can be created. To prevent sessions from being created, use the /CONNECTIONS qualifier.

If you do not specify the /SESSION\_LIMIT qualifier, the default is that there will be no limit on the number of incoming and outgoing sessions.

**/STATE=option**

Specifies whether LAT connections are allowed. There are three options for STATE:

|    |                                                                                                                                                                                                                                                                                                       |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ON | Starts the LAT port driver (and LAT protocol software) on your node.<br>Digital strongly recommends that the LATCP command SET NODE/STATE=ON be executed before any LTA application or dedicated ports are created (use the format provided in SYS\$MANAGER:LAT\$SYSTARTUP:TEMPLATE) for two reasons: |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## LATCP SET NODE

- It ensures that LTDRIVER will delete any leftover LTA devices that have a reference count of 0 and are explicitly marked for deletion (using the \$DASSGN system service or the LATCP DELETE PORT command, for example). Because every LATCP management port (LATCP\$MGMT\_PORT) that was created by the previous LATCP invocation is deleted, there will be no conflicts with LAT application ports or dedicated ports that are created anew.
  - The deletion of leftover LTA devices with a reference count of 0 minimizes the use of nonpaged pool memory.
- OFF** Stops the LAT port driver (and LAT protocol software) on your node. Any existing LAT connections are aborted. Any characteristics that you changed or set with LATCP are lost. To start the LAT protocol on your node again, invoke LAT\$STARTUP.COM. (See the *OpenVMS System Manager's Manual* for more information.) The LAT characteristics defined in LAT\$SYSTARTUP.COM will take effect.
- SHUT** Specifies that new LAT connections cannot be created on your local node, but existing connections may continue. The LAT protocol continues running only until the last active session disconnects, (after which LTDRIVER will stop). At that time, your node changes to the OFF state.

---

### Caution

---

If you stop the LAT software by specifying either the SET NODE /STATE=OFF or SET NODE/STATE=SHUT command, the LAT print symbiont (LATSYP) will shut down all print queues that it is processing. The system will then generate an OPCOM message indicating that the print queues are stopped. You must manually restart those print queues.

---

If you do not specify the /STATE=option qualifier, the default is that the LAT port driver and LAT protocol software on your node will be started (ON).

### /UNIT\_NUMBER\_MAXIMUM=value

Specifies the maximum unit number for a LAT device. For example, if you specify 140, then LTA140: will be the device with the highest unit number. Specify a value that is high enough to accommodate all devices that may be in use simultaneously. When the number of devices in use exceeds the value you specify, the system gives certain LAT devices unit numbers that exceed your maximum.

Note the following as well:

- When LATCP reaches the maximum unit number, it will continue to implicitly create LTA devices beginning with the lowest available unit number.
- You cannot use the System Generation (SYSGEN) utility to set the maximum unit number for a LAT device.

The range of maximum unit numbers is 99 through 9999. The default is 9999. Note that each time you specify the /UNIT\_NUMBER\_MAXIMUM qualifier, the LTA device seed value is reset to approximately half of the newly specified maximum unit number.

**/USER\_GROUPS=option[,...]**

Restricts access (from the local node) to service nodes in the network that belong to the specified groups. Your local node can access only those service nodes associated with the user groups specified. The /USER\_GROUPS qualifier also serves to limit the number of nodes stored in your node's node database. (The local node only stores information about the nodes and services that belong to at least one of the specified user groups.) By default, all LAT service nodes belong to group 0.

This qualifier affects your local node when outgoing connections are enabled (/CONNECTIONS=OUTGOING\_ONLY or /CONNECTIONS=BOTH).

Use the SHOW NODE command for a list of the user groups (service groups) enabled for your node.

There are several options for the /USER\_GROUPS qualifier. For each option described here, there are two ways to specify more than one group:

- List them separated by commas
- Specify a range

The available options are as follows:

|                                                      |                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENABLE=group-code[,...]                              | Gives your node access to the listed user groups.                                                                                                                                                                                                                                                                                                  |
| DISABLE=group-code[,...]                             | Prevents your node from accessing the listed groups. The listed groups were enabled previously.                                                                                                                                                                                                                                                    |
| ENABLE=group-code[,...],<br>DISABLE=group-code[,...] | This option lets you enable certain groups and disable other groups in one command line: gives your node access to the groups listed with the ENABLE option and prevents your node from accessing the groups listed with the DISABLE option. Enclose both ENABLE and DISABLE in parentheses; for example, /GROUP=(ENABLE=(10,12), DISABLE=(1-30)). |

**Description**

The SET NODE command, which is typically executed in the site-specific LAT configuration command procedure, LAT\$SYSTARTUP.COM, allows you to specify such characteristics as:

- Node name
- Node identification
- Service and user groups
- Timing of service announcements
- The maximum number of LAT sessions allowed simultaneously on the node
- The maximum number of outgoing sessions and incoming interactive sessions

## LATCP SET NODE

Because LATCP commands change characteristics dynamically (that is, the commands take effect immediately), you can use the SET NODE command any time the LAT port driver is active. These changes remain in effect until the LAT port driver stops. To make sure the changes take effect when you start the LAT port driver again, edit LAT\$SYSTARTUP.COM to include these changes. Start the LAT port driver by invoking LAT\$SYSTARTUP.COM. (See the *OpenVMS System Manager's Manual*.) The *OpenVMS System Manager's Manual* contains additional information about the LAT network in general and service nodes in particular.

---

### Note

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The SET NODE command must be executed first (after LTDRIVER is loaded and the LATACP is started) to ensure that other management commands execute properly thereafter.

---

## Examples

1. LATCP> SET NODE DUKE /IDENT="NODE DUKE, SALES VMSCLUSTER"

The SET NODE command in this example specifies node name DUKE for your local node. The identification string "NODE DUKE, SALES VMSCLUSTER" is multicast from node DUKE.

2. LATCP> SET NODE /MULTICAST\_TIMER=50 /GROUPS=(ENABLE=(1-3,8,11),DISABLE=5)

The SET NODE command in this example causes your local node to send multicast messages every 50 seconds to announce DUKE's services to terminal servers. The command also enables groups 1, 2, 3, 8, and 11 for access to the local node, and it disables group 5 from accessing the local node. Group 5 had been previously enabled.

3. LATCP> SET NODE /CONNECTIONS=BOTH /USER\_GROUPS=(ENABLE=(24,121-127),DISABLE=0)

The SET NODE command in this example sets up your local node to allow both incoming and outgoing connections. Users on your local node can access those service nodes belonging to user groups 24 and 121 through 127. Users cannot access service nodes in user group 0.

4. LATCP> SET NODE /CIRCUIT\_TIMER=80 /KEEPALIVE\_TIMER=20 -  
LATCP> /RETRANSMIT\_LIMIT=20 /CONNECTIONS=BOTH /MULTICAST\_TIMER=60-  
LATCP> /GROUPS=(DISABLE=0,ENABLE=73) /SESSION\_LIMIT=(OUTGOING=10,INCOMING=0)

The SET NODE command in this example sets many characteristics at once for node DUKE.

---

## SET PORT

Associates a logical port on the local node with a remote port on a terminal server that supports a device. Alternatively, it associates a logical port on the local node with a specific service. The service can be offered by a terminal server or associated with one or more dedicated ports on a remote LAT service node.

You must have OPER privilege to use this command.

### Format

SET PORT port-name

### Parameter

#### port-name

Specifies the name of the port. A port name must be in the form *LTA**n*., where *n* is a unique number from 1 through 9999.

### Qualifiers

#### /APPLICATION

Specifies that a port on the local node is an application port, logically associated with a port on a terminal server or a dedicated port on another LAT service node. The terminal server port supports a device (for example, a printer). If the port is used to support a printer, the print queue is established in a startup command procedure. See the *OpenVMS System Manager's Manual* for a description of configuring remote printers on a terminal server

If you do not specify either the /APPLICATION or /DEDICATED qualifier, the default port type is APPLICATION.

To create a port, use one of the following methods:

- Interactively enter the CREATE PORT command
- Run a program that creates ports

#### /DEDICATED

Specifies that a logical port on your local node is dedicated to an application service. The /DEDICATED qualifier requires the /SERVICE qualifier.

To set up an application service for a logical port on a LAT service node:

1. Create the service by specifying the CREATE SERVICE/APPLICATION command and then define the dedicated port by specifying the CREATE PORT/DEDICATED command. You can include these commands in LAT\$SYSTARTUP.COM.
2. Associate the dedicated ports with the service by specifying the SET PORT /DEDICATED/SERVICE command.
3. Start the application program. Within the program, allocate dedicated ports with the same name as those defined in LAT\$SYSTARTUP.COM.



## LATCP SET PORT

### **/LOG**

### **/NOLOG**

Specifies whether LATCP displays a message confirming that the port's characteristics were modified. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

### **/NODE=remote-node-name**

Specifies the name of a terminal server (or a remote node that supports outgoing connections) to be logically associated with the specified application port on your node. The server supports a remote device. Note that you can set up an application port on your local node and associate the port with a dedicated port on a remote LAT service node. The remote port is dedicated to an application service.

### **/PASSWORD=remote-password**

Specifies the password required to access a remote service that is logically associated with the specified application port.

### **/PORT=remote-port-name**

Specifies the name of the remote port on a terminal server that supports a remote device, or specifies the name of a remote port dedicated to an application service on a remote LAT service node. In either case, the remote port is logically associated with the specified application port on your local node.

### **/QUEUED**

### **/NOQUEUED**

Specifies queued or nonqueued access to the server port. A queued or nonqueued request is accepted by a terminal server if a remote port is free. If the remote port is busy and queuing is enabled on the terminal server, then the server queues the remote request. If you do not want your remote requests to be queued on the server, specify /NOQUEUED.

If you do not specify either the /QUEUED or /NOQUEUED qualifier, the default is that there will be queued access to the server port.

### **/SERVICE=service-name**

Specifies either of the following:

- The name of the remote service offered at a terminal server port that will be associated with the specified application port (/APPLICATION) on the local node
- A service name for an application program being offered on a dedicated port (/DEDICATED) on a LAT service node

To specify the name of a remote service offered at a terminal server port, use the /NODE and /SERVICE qualifiers. To specify a particular port for a service, use the /NODE, /PORT, and /SERVICE qualifiers. Ask the terminal server manager for these names.

To name a service for a particular application program to be offered locally on a dedicated port, use the /DEDICATED and /SERVICE qualifiers. (The service must have been created with the CREATE SERVICE command.) Assign only one service to a dedicated port, but note that several ports can have the same service assigned.

## Description

The SET PORT command associates an application port on your local node with a port or service on a terminal server. When you associate an application port with a service on a terminal server, you allow access to any of the ports (printers) represented by that service. See Example 1 and Example 2. The application port must have been created with the CREATE PORT/APPLICATION command.

The SET PORT command can also associate a dedicated port on the local node with an application service offered locally. The service must already exist. See Example 3. Use the /DEDICATED and /SERVICE qualifiers with the SET PORT command.

The SET PORT command can also associate an application port on your local node with an application service associated with one or more dedicated ports on a remote LAT service node. This service is offered to users on terminal servers or on nodes that support outgoing connections. See Example 4. The dedicated port must have been created with the CREATE PORT/DEDICATED command.

## Examples

See the examples for the SHOW PORT command for displays that reflect the changes made by the following SET PORT command examples.

1. LATCP> SET PORT LTA22: /APPLICATION /NODE=TS33EW /PORT=LN02

The SET PORT command in this example sets up port LTA22: as an application port to be associated with the port named LN02 on the terminal server named TS33EW. This command associates port LTA22: with a specific printer on the server. In the next example, the SET PORT command associates a port with a set of printers (designated by the service name PRINTER) on a terminal server.

2. LATCP> SET PORT LTA19: /APPLICATION /NODE=TLAT1 /SERVICE=PRINTER /QUEUED

The SET PORT command in this example shows how to associate a local logical port with a service (several printers) on a terminal server. The command associates the application port LTA19: with the service PRINTER on terminal server TLAT1. The service PRINTER can be associated with one or more ports on TLAT1. The /QUEUED qualifier specifies that the server offering the service PRINTER can queue the remote connection request if all ports offering the service are in use. See the description of print operations in the *OpenVMS System Manager's Manual* for information on setting up print queues.

3. LATCP> SET PORT LTA21: /DEDICATED /SERVICE=GRAPHICS

The SET PORT command in this example specifies that the application port LTA21: on the local service node offers the service GRAPHICS to users on terminal servers or on nodes that support outgoing connections. GRAPHICS is a particular utility or application program.

## LATCP SET PORT

4. LATCP> SET PORT MAIL\_PORT /SERVICE=MAIL/NODE=RMNODE

The SET PORT command in this example associates the port whose logical name is MAIL\_PORT with the dedicated service MAIL on remote node RMNODE. The port logically named MAIL\_PORT was created with the CREATE PORT command (see Example 3 in the discussion of the CREATE PORT command). The logical name could also have been created with an OpenVMS DCL ASSIGN or DEFINE command. On node RMNODE, a port must be dedicated to the service MAIL by using the SET PORT port-name /DEDICATED/SERVICE=MAIL command.

---

## SET SERVICE

Dynamically changes the characteristics of a locally offered service. You must have OPER privilege to use this command.

### Format

```
SET SERVICE [service-name]
```

### Parameter

#### **service-name**

Specifies the service whose characteristics are to be modified. If a service name is omitted, the default service name is the name of the local node you defined by using the SET NODE command.

### Qualifiers

#### **/APPLICATION**

Sets up the service as an application service. An application service offers a specific application on the service node rather than all of the resources on the service node. Define a dedicated port for the service by using the CREATE PORT and SET PORT commands.

#### **/IDENTIFICATION[="identification-string"]**

Describes and identifies a service. Service nodes include the identification string in service announcements. A service node announces its services at regular intervals established with the SET NODE command. Entering the LATCP SHOW NODE command or the DECserver SHOW NODE command generates a display that includes this identification string.

By default, the identification string is the translation of SYS\$ANNOUNCE. A service node announces its services at regular intervals established with the SET NODE command.

You cannot specify more than 64 ASCII characters in an identification string (a SYS\$ANNOUNCE longer than that will be truncated to the first 64 characters). Enclose the string in quotation marks (").

#### **/LOG**

#### **/NOLOG**

Specifies whether or not LATCP displays a message confirming that the command was executed. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

**/STATIC\_RATING=rating**  
**/NOSTATIC\_RATING**

Enables or disables dynamic service ratings. A dynamic service rating means that a LAT algorithm calculates the availability of a service dynamically, based on the overall level of activity of the node that offers the service, the amount of memory, and the processor type. When a terminal server or node requests a connection to a service that is offered on two or more service nodes, the requesting node selects the service node with the highest (most favorable) service rating. This selection process is called load balancing.

When you use the /STATIC\_RATING qualifier, you disable dynamic service ratings so that you can specify a static rating. Use the static rating to direct users away from or toward your node temporarily. Static ratings range from 0 to 255. Specify a low value to make your node less likely to be used; specify a high value to make the node more likely to be used.

If you do not specify either the /STATIC\_RATING or /NOSTATIC\_RATING qualifier, the default is that the LAT software uses the dynamic service rating.

## Description

The SET SERVICE command dynamically changes the characteristics of a service that you created previously (by interactively entering the CREATE SERVICE command or by running a program that created services).

## Example

```
LATCP> SET SERVICE SALES /IDENT="SALES FORCE TIMESHARING SERVICES"
```

The SET SERVICE command in this example specifies a new identification string, "SALES FORCE TIMESHARING SERVICES", for the service SALES. This string is announced with the service SALES in the multicast messages sent by a service node.

---

## SHOW LINK

Displays the status and LAT characteristics of links on the local node.

## Format

```
SHOW LINK [link-name]
```

## Parameter

### link-name

Specifies the name for a LAT data link. A link name can have up to 16 ASCII characters.

If you do not specify a link name, LATCP displays information about all links currently defined for the node.

# LATCP SHOW LINK

## Qualifiers

### **/BRIEF**

Displays the device name and state of the link. This is the default display.

### **/COUNTERS**

Displays the device counters kept for the link. The numbers displayed represent the values recorded since the last time the counters were reset (when the node first started or when the ZERO COUNTERS command was used).

Do not use the /BRIEF or /FULL qualifier with this qualifier.

Table 11-2 lists and describes counters common to both CSMA/CD (carrier sense, multiple access with collision detect) and FDDI (fiber distributed data interface) links.

**Table 11-2 Counters Common to CSMA/CD and FDDI Links**

| <b>Counter</b>              | <b>Description</b>                                                                                                                                                        |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Messages received           | The total number of messages received over the link.                                                                                                                      |
| Multicast messages received | The total number of multicast messages received over the link.                                                                                                            |
| Bytes received              | The total number of bytes of information received over the link.                                                                                                          |
| Multicast bytes received    | The total number of multicast bytes received over the link.                                                                                                               |
| System buffer unavailable   | The total number of times no system buffer was available for an incoming frame.                                                                                           |
| Unrecognized destination    | The total number of times a frame was discarded because there was no portal with the protocol enabled. This count includes frames received for the physical address only. |
| Messages sent               | The total number of messages sent over the link.                                                                                                                          |
| Multicast messages sent     | The total number of multicast messages sent over the link.                                                                                                                |
| Bytes sent                  | The total number of bytes of information sent over the link.                                                                                                              |
| Multicast bytes sent        | The total number of bytes of multicast messages sent over the link.                                                                                                       |
| User buffer unavailable     | The total number of times no user buffer was available for an incoming frame that passed all filtering.                                                                   |

(continued on next page)

**Table 11-2 (Cont.) Counters Common to CSMA/CD and FDDI Links**

| Counter      | Description                                                                                                                                                                                                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data overrun | The total number of bytes lost on the link's device because the local node's input buffers were full. A nonzero value can indicate noisy lines, a bad device, a busy or poorly tuned system (not enough resources allocated), or a hardware problem with another device on the LAN connection. |

Table 11-3 lists and describes receive errors common to both CSMA/CD and FDDI links. These errors, which are included in the display generated by the SHOW LINK/COUNTERS command, are represented by flags that indicate the error has occurred.

**Table 11-3 Receive Errors Common to CSMA/CD and FDDI Links**

| Flag               | Description                                                  |
|--------------------|--------------------------------------------------------------|
| Block check error  | CRC error in packet(s) received.                             |
| Framing error      | Received frame(s) ended incorrectly.                         |
| Frame too long     | Frame(s) received longer than length limits.                 |
| Frame status error | CRC error on ring noticed by local FDDI station (FDDI only). |
| Frame length error | Frame length too short (FDDI only).                          |

Table 11-4 lists and describes transmit errors common to both CSMA/CD and FDDI links. These errors, which are included in the display generated by the SHOW LINK/COUNTERS command, are represented by flags that indicate the error has occurred.

**Table 11-4 Transmit Errors Common to CSMA/CD and FDDI Links**

| Flag                    | Description                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------------------|
| Excessive collisions    | Frame(s) failed to transmit because the collision limit of 16 was reached (CSMA/CD only).       |
| Carrier check failures  | Indicates transceiver problem or short circuit in cable.                                        |
| Short circuit           | Short circuit in cable.                                                                         |
| Open circuit            | Open circuit in cable.                                                                          |
| Frame too long          | Frame(s) too long. Indicates a transmission problem in one of the portals using the link.       |
| Remote failure to defer | A remote station failed to defer frame(s) transmission. Could indicate a misconfigured network. |

(continued on next page)

LATCP  
SHOW LINK

Table 11-4 (Cont.) Transmit Errors Common to CSMA/CD and FDDI Links

| Flag              | Description                                                                  |
|-------------------|------------------------------------------------------------------------------|
| Transmit underrun | Transmission of a frame was too slow. Indicates a hardware controller error. |
| Transmit failure  | Frame(s) failed to transmit.                                                 |

Table 11-5 lists and describes link counters specific to CSMA/CD only.

Table 11-5 CSMA/CD Counters

| Counter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmit CDC failure  | The total number of carrier detect check errors, that is, the number of times the local node failed to detect that another Ethernet station was already transmitting when the local node began transmitting.                                                                                                                                                                                                                                                                                                                              |
| Messages transmitted: | <p><b>Single collision</b>—The total number of times a frame was successfully transmitted on the second attempt after a normal collision on the first attempt.</p> <p><b>Multiple collision</b>—The total number of times a frame was successfully transmitted on the third or later attempt after normal collisions on previous attempts.</p> <p><b>Initially deferred</b>—The total number of times a frame transmission was deferred on its first attempt. This counter is used to measure Ethernet contention with no collisions.</p> |

Table 11-6 lists and describes link counters specific to FDDI only.

Table 11-6 FDDI Counters

| Counter                        | Description                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Ring initializations initiated | The total number of times a ring reinitialization was initiated by the link.                                                            |
| Ring initializations received  | The total number of times a ring reinitialization was initiated by some other link.                                                     |
| Directed beacons received      | The number of times the link detected the directed beacon process. Each invocation of the directed beacon process is counted only once. |

(continued on next page)

**Table 11-6 (Cont.) FDDI Counters**

| <b>Counter</b>                  | <b>Description</b>                                                                                                |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Connections completed           | The number of times the station successfully connected to the concentrator.                                       |
| Duplicate tokens detected       | The number of times a duplicate token was detected on the link.                                                   |
| Ring purge errors               | The number of times the ring purger received a token while still in the ring purge state.                         |
| LCT rejects                     | Link Confidence Test rejects. Indicates a problem with communication between station and concentrator.            |
| Elasticity buffer errors        | Elasticity buffer function errors. Indicates a station on the ring with a transmit clock out of tolerance.        |
| MAC error count                 | The number of times the MAC (Media Access Control) changed the E indicator in a frame from R to S.                |
| Traces initiated                | The number of times the PC-trace process was initiated by the link.                                               |
| Traces received                 | The number of times the link was requested to perform the PC-trace process.                                       |
| Ring beacons initiated          | The number of times the ring beacon process was initiated by the link.                                            |
| Link errors                     | The number of times the Link Error Monitor (LEM) detected an error in a received message. Slow counts are normal. |
| Duplicate address test failures | The number of times the link address was a duplicate.                                                             |
| FCI strip errors                | The number of times a Frame Content Independent Strip operation was terminated by receipt of a token.             |
| LEM rejects                     | The number of times excessive LEM errors were encountered.                                                        |
| MAC frame count                 | The total number of frames (other than tokens) seen by the link.                                                  |
| MAC lost count                  | The total number of times a frame (other than a token) was improperly terminated.                                 |

**/FULL**

Displays the device name, state, and datalink address of the link and indicates whether the DECnet address is enabled.



# LATCP SHOW LINK

## Description

Displays information about the specified link or all links if you do not specify a link. Depending on the qualifier you use with the SHOW LINK command, you can display a link's device name, state, LAT datalink address, DECnet address, or counters.

## Examples

1. LATCP> SHOW LINK/FULL NETWORK\_A

The SHOW LINK command in this example produces the following display of information about link NETWORK\_A:

```
Link Name: NETWORK_A Datalink Address: 08-00-2B-10-12-E3
Device Name: ESA7: DECnet Address: Disabled
Link State: On
```

The display in this example gives the device name of link NETWORK\_A and the device's hardware address. The link is in the On state.

2. LATCP> SHOW LINK LINK\_A/COUNTERS

The SHOW LINK command in this example produces the following display of counters for link LINK\_A:

```
Link Name: LINK_A
Device Name: _ETA5:

Seconds Since Zeroed: 65535
Messages Received: 18582254
Multicast Msgs Received: 15096805
Bytes Received: 1994694325
Multicast Bytes Received: 1528077909
System Buffer Unavailable: 8724
Unrecognized Destination: 0

Messages Sent: 3550507
Multicast Msgs Sent: 413178
Bytes Sent: 290838585
Multicast Bytes Sent: 32637472
User Buffer Unavailable: 6269
Data Overrun: 0

Receive Errors -
Block Check Error: No
Framing Error: No
Frame Too Long: No
Frame Status Error: No
Frame Length Error: Yes

Transmit Errors -
Excessive Collisions: No
Carrier Check Failure: No
Short Circuit: No
Open Circuit: No
Frame Too Long: No
Remote Failure To Defer: No
Transmit Underrun: No
Transmit Failure: No
```

### CSMACD Specific Counters

```

Transmit CDC Failure: 0

Messages Transmitted -
Single Collision: 43731
Multiple Collisions: 73252
Initially Deferred: 164508
```

## SHOW NODE

Displays the status and LAT characteristics of a node.

### Format

SHOW NODE [node-name]

### Parameter

#### **node-name**

Specifies the name of the node for which information is displayed. If you do not specify a node name, LATCP displays information about the local node.

### Qualifiers

#### **/ALL**

Displays information about all nodes known to your local node. When you use this qualifier, specify the /FULL or /BRIEF qualifier as well. If you do not specify either the /FULL or /BRIEF qualifier, the default display will contain the node status and identification string (the display generated by the /BRIEF qualifier).

#### **/BRIEF**

Displays the node status and identification string. This is the default display if you specify the /ALL qualifier.

#### **/COUNTERS**

Displays the counters kept for the node. Do not use the /BRIEF or /FULL qualifier with this qualifier. Table 11-7 lists and describes the counters displayed with SHOW NODE/COUNTERS.

**Table 11-7 LAT Node Counters**

| Counter              | Description                                                                                                                                                                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Messages received    | The total number of LAT messages received by the local node. If you specify a remote node with the SHOW NODE command, the number of LAT messages received from that remote node.                                                                                |
| Messages transmitted | The total number of LAT messages transmitted by the local node. If you specify a remote node with the SHOW NODE command, the number of LAT messages transmitted to that remote node.                                                                            |
| Slots received       | The total number of LAT slots received by the local node. If you specify a remote node with the SHOW NODE command, the number of slots received from that remote node. A slot is a message segment that contains information corresponding to a single session. |

(continued on next page)

**LATCP  
SHOW NODE**

**Table 11-7 (Cont.) LAT Node Counters**

| <b>Counter</b>              | <b>Description</b>                                                                                                                                                                                                                        |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slots transmitted           | The total number of LAT slots transmitted by the local node. If you specify a remote node with the SHOW NODE command, the number of slots transmitted to that remote node.                                                                |
| Bytes received              | The total number of bytes of LAT information received by the local node. If you specify a remote node with the SHOW NODE command, the number of bytes received from that remote node.                                                     |
| Bytes transmitted           | The total number of bytes of LAT information transmitted by the local node. If you specify a remote node with the SHOW NODE command, the number of bytes transmitted to that remote node.                                                 |
| Multicast bytes received    | The total number of LAT multicast bytes received by the local node.                                                                                                                                                                       |
| Multicast bytes sent        | The total number of LAT multicast bytes sent by the local node.                                                                                                                                                                           |
| Multicast messages received | The total number of LAT multicast messages received by the local node.                                                                                                                                                                    |
| Multicast messages sent     | The total number of LAT multicast messages sent by the local node.                                                                                                                                                                        |
| No transmit buffer          | The total number of times no buffer was available on the local node for transmission.                                                                                                                                                     |
| Multicast messages lost     | The total number of times LTDRIVER failed to process an inbound multicast message because of failed communication with the LATACP.                                                                                                        |
| Multicast send failures     | The total number of times LTDRIVER failed to send a multicast message because of failed communication with the LATACP.                                                                                                                    |
| Controller errors           | The total number of times LTDRIVER failed to communicate with the data link controller driver.                                                                                                                                            |
| Last controller error       | The most recent controller error.                                                                                                                                                                                                         |
| Multiple node addresses     | The total number of times that a node announced itself with a physical address different from that in a previous announcement.                                                                                                            |
| Duplicates received         | The total number of duplicate messages received by the local node. If you specify a remote node with the SHOW NODE command, the number of duplicate messages received from that remote node. This counter can indicate a system slowdown. |

(continued on next page)

**Table 11-7 (Cont.) LAT Node Counters**

| Counter                   | Description                                                                                                                                                                                                                                                                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Messages retransmitted    | The total number of LAT messages that the local node retransmitted because they were not acknowledged by terminal servers (or nodes that support outgoing connections). If you specify a remote node with the SHOW NODE command, the number of messages retransmitted to that remote node.                                                         |
| Illegal messages received | The total number of invalidly formatted LAT messages received by the local node. If you specify a remote node with the SHOW NODE command, the number of invalidly formatted messages the local node received from that remote node. Illegal messages are grouped into several types of protocol errors, which are listed at the end of this table. |
| Illegal slots received    | The total number of invalidly formatted LAT slots received by the local node. If you specify a remote node with the SHOW NODE command, the number of invalidly formatted slots the local node received from that remote node.                                                                                                                      |
| Solicitations accepted    | The total number of times a remote node accepted solicitations from the local node. If you specify a remote node with the SHOW NODE command, the number of accepted solicitations by that remote node.                                                                                                                                             |
| Solicitations rejected    | The total number of times a remote node rejected solicitation from the local node. If you specify a remote node with the SHOW NODE command, the number of rejected solicitations by that remote node.                                                                                                                                              |
| Solicitation failures     | The total number of times solicitations by the local node received no response.                                                                                                                                                                                                                                                                    |
| Transmit errors           | The total number of times the data link failed to transmit a LAT message.                                                                                                                                                                                                                                                                          |
| Last transmit error       | The most recent transmit error.                                                                                                                                                                                                                                                                                                                    |
| Virtual circuit timeouts  | The total number of times a LAT circuit to another node timed out, indicating that the remote node failed to send a valid message in the required time span. If you specify a remote node with the SHOW NODE command, the number of times the local node timed out from a connection to that remote node.                                          |

(continued on next page)

## LATCP SHOW NODE

**Table 11-7 (Cont.) LAT Node Counters**

| Counter                    | Description                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Discarded output bytes     | The total number of data bytes that were discarded because of an overflow of an internal buffer before the data could be output to an LTA device. |
| User data lost             | The total number of times LTDRIVER failed to allocate resources to buffer session data. User data is lost and the session is stopped.             |
| Resource errors            | The number of times LTDRIVER was unable to allocate system resources.                                                                             |
| Incoming solicits accepted | The total number of times the local node accepted solicitations from other nodes.                                                                 |
| Incoming solicits rejected | The total number of times the local node rejected solicitations from other nodes.                                                                 |

The protocol errors that are counted as illegal messages are as follows. These protocol error messages are displayed if their associated counter is greater than zero:

- Invalid message type received
- Invalid start message received
- Invalid sequence number received in start message
- Zero-node index received
- Node circuit index out of range
- Node circuit sequence invalid
- Node circuit index no longer valid
- Circuit was forced to halt
- Invalid server slot index
- Invalid node slot index
- Invalid credit field or too many credits used
- Repeat creation of slot by server
- Repeat disconnection of slot by master

### **/FULL**

Displays the node's status, identification string, LAT protocol version, and the values of the node's characteristics. This is the default except when you specify the /ALL qualifier.

## Description

This command displays information about a specified node or, if you do not specify a node name, about your local node. With the /ALL qualifier, the SHOW NODE command displays information about all nodes known to your local node. Depending on the qualifiers you use, you can display node counters, node status, the node identification string, the LAT protocol version running on the node, and the values set for the node's characteristics.

## Examples

### 1. LATCP> SHOW NODE/FULL

The SHOW NODE command in this example produces the following display of information about the local node:

```

Node Name: LTC LAT Protocol Version: 5.2
Node State: On
Node Ident: LTC - Engineering Development

Incoming Connections: Enabled Incoming Session Limit: None
Outgoing Connections: Enabled Outgoing Session Limit: None
Service Responder: Disabled

Circuit Timer (msec): 80 Keepalive Timer (sec): 20
Retransmit Limit (msg): 20 Node Limit (nodes): None
Multicast Timer (sec): 20 CPU Rating: 8
Maximum Unit Number: 9999

User Groups: 43, 73
Service Groups: 7-9, 13, 23, 40, 43, 45, 66, 72-73, 89, 120-127, 248-255

Service Name Status Rating Identification
LTVMS Available 31 D .

```

This display indicates that the local node LTC is in the On state, which means LAT connections can be created on the node. LTC is running Version 5.2. of the LAT protocol. The identification of the node is "LTC - Engineering Development". Because this is the local node, the display does not give the address of a LAN device. Use the SHOW LINK command to find addresses of devices on the local node. The display for the status of remote nodes, as shown in Example 2, gives the Ethernet address of that node.

Both incoming and outgoing connections can be made on node LTC, and there is no limit to the number of sessions. The display indicates the values of various timers and lists the groups that are enabled. Users on the local node can access service nodes belonging to user groups 43 and 73. Locally offered services can be accessed by nodes belonging to the service groups listed.

The display indicates that the CPU rating of the local node is 8. The display shows that the node offers a service named LTVMS. This service is available and its rating is 31 D (dynamic). (An S would indicate the rating is static.)

### 2. LATCP> SHOW NODE/FULL RWWUP

The SHOW NODE command in this example produces the following display about the remote node RWWUP:

## LATCP SHOW NODE

```
Node Name: RWWUP LAT Protocol Version: 5.2
Node State: Reachable Address: AA-00-04-00-11-10
Node Ident: .
```

Incoming Connections: Enabled

```
Circuit Timer (msec): 80
Multicast Timer (sec): 20
```

Service Groups: 7, 13, 42-43, 45, 66, 70-72, 75-82, 88-89

| Service Name | Status    | Rating | Identification |
|--------------|-----------|--------|----------------|
| NAC          | Available | 28     | .              |
| SYSMGR       | Available | 28     | .              |

This display indicates that remote node RWWUP is reachable and runs Version 5.2 of the LAT protocol. The display includes the Ethernet address of node RWWUP. Because incoming connections are enabled, you can connect to a service on node RWWUP, provided that your node belongs to one of the service groups listed in the display.

Node RWWUP offers two services: NAC and SYSMGR. Both are available.

### 3. LATCP> SHOW NODE/ALL/BRIEF

The SHOW NODE command in this example produces the following display about all nodes known to the local node:

| Node Name | Status    | Identification                     |
|-----------|-----------|------------------------------------|
| -----     | -----     | -----                              |
| ABLAN     | Reachable | Unauthorized access is prohibited. |
| ASKWEN    | Reachable | .                                  |
| CHUNK     | Reachable | A member of the MAIN VMScluster    |
| .         | .         | .                                  |
| UTOO      | On        | Can be healthy at the Center       |
| VULCUN    | Reachable | Beam me up                         |
| ZENX      | Reachable | ZENX                               |

The SHOW NODE command in this example indicates the status (whether a node is reachable) and identification of all nodes known to the local node. Note also that the display includes the status of the local node UTOO. The status can be either On, Off, or Shut. Here it is On.

---

## SHOW PORT

Displays the status and LAT characteristics of ports on the local node.

### Format

```
SHOW PORT [port-name]
```

### Parameter

#### port-name

Specifies the name of the port for which information is displayed. If you do not specify a port name, the SHOW PORT command displays the characteristics for all LTA $n$ : ports on a node.

Do not use the /APPLICATION, /DEDICATED, /FORWARD, or /INTERACTIVE qualifiers with a specific port name.

## Qualifiers

### **/APPLICATION**

Generates a display of all application ports.

### **/BRIEF**

Displays port type, port status, and the remote node name, port, and service associated with the port. This is the default if you do not specify a port name with the SHOW PORT command.

### **/DEDICATED**

Generates a display of all dedicated ports.

### **/FORWARD**

Generates a display of all LAT ports used for either outgoing LAT connections or local LAT management functions.

### **/FULL**

This displays the following information. For more details, see the discussion for the sample display in the SHOW PORT/FULL example.

- Port type
- Port status
- Target port name, node name, and service name associated with the port
- Remote node name, port, and service associated with the port if a connection is currently active

### **/INTERACTIVE**

Generates a display of all LAT ports used for incoming interactive connections.

## Description

If a port is an application port, the display lists the remote node name, remote port name, and remote service name that you specified in the SET PORT command.

If the port is a dedicated port, the display lists the service name that you specified in the SET PORT command.

If LATCP shows the port as Interactive in the display, a user on a terminal server or on a node that supports outgoing LAT connections is currently using the port.

For all ports with active sessions, the remote node sends its node name and port name to your local node. These names are listed in the display.

## Example

```
LATCP> SHOW PORT /FULL
```

The SHOW PORT command in this example produces the following type of display. The display reflects the characteristics set by the command examples given with the SET PORT command.



# LATCP SHOW PORT

```
Local Port Name: LTA16: Local Port Type: Forward
Local Port State: Inactive
Connected Link:

Target Port Name: Actual Port Name:
Target Node Name: LATCP$MGMT_PORT Actual Node Name:
Target Service Name: Actual Service Name:

Local Port Name: LTA17: Local Port Type: Interactive
Local Port State: Active
Connected Link: LAT$LINK

Target Port Name: Actual Port Name: PORT 1
Target Node Name: Actual Node Name: MY_DS200_SERVER
Target Service Name: Actual Service Name:

Local Port Name: LTA19: Local Port Type: Application (Queued)
Local Port State: Active
Connected Link: LAT$LINK

Target Port Name: Actual Port Name:
Target Node Name: TLAT1 Actual Node Name: TLAT1
Target Service Name: PRINTER Actual Service Name: PRINTER

Local Port Name: LTA21: Local Port Type: Dedicated
Local Port State: Inactive
Connected Link:

Target Port Name: Actual Port Name:
Target Node Name: Actual Node Name:
Target Service Name: GRAPHICS Actual Service Name:

Local Port Name: LTA22: Local Port Type: Application (Queued)
Local Port State: Active
Connected Link: LAT$LINK

Target Port Name: LN02 Actual Port Name: LN02
Target Node Name: TS33EW Actual Node Name: TS33EW
Target Service Name: Actual Service Name:
```

The display in this example shows information about all the ports on the local node. There are four types of ports. The display shows information for each of these types, as follows:

- **Forward:** a port used for outgoing LAT connections or for executing local management functions and LATCP commands. Port LTA16: is a forward port. The display shows that the port is currently inactive, that is, there is no current LAT connection. The target node name of LATCP\$MGMT\_PORT indicates that LATCP is using this port to execute the LATCP commands entered by the user. If the display listed a node and service name, it would mean that the port is being used for an outgoing connection.
- **Interactive:** a port created as a result of an incoming LAT connection request from another node or terminal server. Port LTA17: is an interactive port connected with port PORT\_1 on the terminal server MY\_DS200\_SERVER.
- **Application:** a port used for solicited connections to devices on terminal servers or to application services on remote LAT service nodes. Port LTA22: is an application port. The port maps to port LN02 (a printer) on a terminal server node TS33EW. The display indicates that server TS33EW queues connection requests from the local node. Port LTA19: is also an application port. The port maps to the service PRINTER on terminal server TLAT1.

- **Dedicated:** a port dedicated to a local application service. Port LTA21: is dedicated to the service GRAPHICS.

The target port name, target node name, and target service name are the names specified with the SET PORT command. They are passed to the remote node or terminal server when the connection request is made.

The actual port name, actual node name, and actual service name are the names returned by the remote node when it accepts the connection request. They may differ from the corresponding target names (specified with the SET PORT command) if the remote node translates the names. For example, terminal servers that accept connections to LAT service names usually return the name of the port to which the connection was actually directed.

---

## SHOW SERVICE

Displays the status and LAT characteristics of LAT services known to the local node.

### Format

SHOW SERVICE [service-name]

### Parameters

**service-name**

Specifies the name of the service for which information will be displayed. If you do not specify a service name, LATCP displays information about all services known to the node.

### Qualifiers

**/BRIEF**

Displays the status and identification string of the service.

**/COUNTERS**

Displays the counters kept for the service. Do not use the /BRIEF or /FULL qualifier with this qualifier. The following table lists and describes the counters:

| Counter                | Description                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Remote Counters</b> |                                                                                                          |
| Connections attempted  | The total number of times the local node attempted to connect to the service offered on a remote node.   |
| Connections completed  | The total number of times the local node successfully connected to the service offered on a remote node. |

## LATCP SHOW SERVICE

| Counter               | Description                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Local Counters</b> |                                                                                                                         |
| Connections accepted  | The total number of times the local node accepted a connection request from a remote node to a locally offered service. |
| Connections rejected  | The total number of times the local node rejected a connection request from a remote node to a locally offered service. |

### **/FULL**

Displays the status, identification string, and type of service, and the values set for service characteristics. This qualifier also displays the status of all service nodes offering the service.

### **/LOCAL**

Displays information about services offered by the local node only. You can use this qualifier with the **/BRIEF**, **/COUNTERS**, or **/FULL** qualifier.

## Description

This command displays information about services. If you do not specify a service name, the command displays information about all services known to your local node. If you do not specify a service name but specify the **/LOCAL** qualifier, the command displays information about all services offered by your local node.

Depending on whether you use the **/BRIEF**, **/COUNTERS**, or **/FULL** qualifier, you can display the status, identification string, and type of service, the status of all service nodes offering the service, the values set for service characteristics, and service counters.

## Examples

1. LATCP> SHOW SERVICE HOMEWK/FULL

The **SHOW SERVICE** command in this example produces the following display of information about service **HOMEWK**. This service is offered by the local node.

```
Service Name: HOMEWK Service Type: General
Service Status: Available
Service Ident: .

Node Name Status Rating Identification
LAV On 31 D .
LATP Reachable 48 .
LITTN Reachable 37 .
LTDRV Reachable 82 .
```

The display in this example indicates that the locally offered service **HOMEWK** is available and its service type is **General**, meaning that it is a general timesharing service (in contrast to a dedicated application service). The display also lists the status of all the nodes that offer the service. The local node is **LAV**. The status of the local node can be either **On**, **Off**, or **Shut**. Here node **LAV**'s status is **On**. The status of the other nodes indicates whether they are reachable. The display lists the ratings of each service node, indicating their relative capacity to accept new connections. The **D**

## LATCP SHOW SERVICE

next to the locally offered service indicates that node LAV computes its rating dynamically. An S would indicate that the node's rating was set permanently by the node's system manager.

### 2. LATCP> SHOW SERVICE OFFICE/FULL

The SHOW SERVICE command in this example produces the following display of information about the service OFFICE, which is offered by a remote node:

```
Service Name: OFFICE
Service Status: Available
Service Ident: .

Node Name Status Rating Identification
BURGIL Reachable 121 .
DARWIN Reachable 43 .
```

The display in this example indicates that the service is available. The display also indicates the status and other information about the nodes that offer the service, BURGIL and DARWIN.

---

## SPAWN

Creates a subprocess, enabling you to execute DCL commands without terminating your LATCP session. The LATCP SPAWN command is similar to the DCL SPAWN command.

To return to your LATCP session, either log out of the subprocess by entering the DCL LOGOUT command, or use the DCL ATTACH command to attach your terminal to the process running LATCP.

### Format

```
SPAWN [DCL-command]
```

### Parameter

#### DCL-command

Specifies a DCL command. If you specify a DCL command, LATCP executes the command in a subprocess. Control returns to LATCP when the DCL command terminates.

If you do not specify a DCL command, LATCP creates a subprocess and you can then enter DCL commands. You can continue your LATCP session by logging out of the spawned subprocess or by attaching to the parent process with the DCL ATTACH command.

### Description

The SPAWN command acts exactly like the DCL SPAWN command. You can enter DCL commands (such as to create print queues, change the protection of a device, answer mail, and so forth) without ending your LATCP session.

You cannot use this command to gain access to DCL if you are running LATCP from a captive account.

## LATCP SPAWN

### Example

```
LATCP> SPAWN
$
```

The SPAWN command in this example creates a subprocess at DCL level. You can now enter DCL commands. Log out or enter the DCL ATTACH command to return to the LATCP prompt.

---

## ZERO COUNTERS

Resets the link, node, and service counters maintained by the local node. You must have OPER privilege to use this command.

### Format

```
ZERO COUNTERS
```

### Qualifiers

**/LOG**

**/NOLOG**

Specifies whether LATCP displays a message confirming that the counters were reset. If you do not specify the /LOG or /NOLOG qualifier, the default is that no message will be displayed.

**/LINK[=link-name]**

Specifies the link (on your local node) for which you want counters reset. If you do not specify a link name, LATCP zeroes counters for the link LAT\$LINK.

**/NODE[=node-name]**

Specifies the node for which you want counters reset. If you do not specify a node name, LATCP zeroes the counters for your local node.

**/SERVICE=service-name**

Specifies the service (on your local node) for which you want counters reset.

### Description

This command resets counters. You can specify whether you want to reset link, node, or service counters. You must specify either /LINK, /NODE, or /SERVICE.

### Example

```
LATCP> ZERO COUNTERS/SERVICE=LTVM
LATCP> SHOW SERVICE LTVM /COUNTERS

Service Name: LTVM

Seconds Since Zeroed: 9
Connections Attempted: 0 Connections Accepted: 0
Connections Completed: 0 Connections Rejected: 0
```

The ZERO COUNTERS command in this example resets the counters kept for service LTVM. The display produced by the SHOW SERVICE command shows how the ZERO COUNTERS command reset the counters to zero.

---

**Log Manager Control Program (LMCP) Utility**



---

## LMCP Description

The Log Manager Control Program (LMCP) utility creates and manages the transaction logs used by DECdtm services.

---

### Caution

---

Some LMCP commands can corrupt data.

See the *OpenVMS System Manager's Manual* to understand the reasons for using LMCP and how to use it safely.

---



---

## LMCP Usage Summary

LMCP lets you create and manage the transaction logs used by Digital's distributed transaction manager, DECdtm services.

### Format

```
RUN SYS$SYSTEM:LMCP
```

### Usage Summary

To invoke LMCP, enter `RUN SYS$SYSTEM:LMCP` at the DCL command prompt. At the `LMCP>` prompt, you can enter any of the LMCP commands described in the following section.

To exit from LMCP, enter the `EXIT` command at the `LMCP>` prompt, or press `Ctrl/Z`.

## LMCP Commands

Table 12–1 summarizes the LMCP commands.

**Table 12–1 LMCP Commands**

| Command     | Description                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------|
| CONVERT LOG | Creates a new transaction log and copies records from an existing transaction log to the new transaction log |
| CREATE LOG  | Creates a new transaction log                                                                                |
| DUMP        | Displays the contents of a transaction log                                                                   |
| EXIT        | Exits LMCP                                                                                                   |
| HELP        | Gives help on LMCP commands                                                                                  |
| REPAIR      | Changes the state of transactions                                                                            |
| SHOW LOG    | Displays information about transaction logs                                                                  |

## CONVERT LOG

Creates a new transaction log and copies records from an existing transaction log to the new one.

Use the CONVERT LOG command when you want to move a transaction log or change its size.

### Caution

If a node already has a transaction log, using the CONVERT LOG command to create a new one can corrupt data. See the *OpenVMS System Manager's Manual* for information on how to use the CONVERT LOG command.

The CONVERT LOG command requires:

- The CMKRNL privilege.
- READ access to the existing transaction log and the directory it is in.
- READ and WRITE access to the directory in which the new transaction log is to be created.

## Format

CONVERT LOG old-filespec new-filespec

# LMCP CONVERT LOG

## Parameters

### **old-filespec**

The file specification of the transaction log whose records are to be copied.

The CONVERT LOG command uses the following defaults:

- If you omit the disk and directory, the CONVERT LOG command looks for the transaction log in the directories pointed to by the logical SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.
- If you omit the file type, the CONVERT LOG command uses .LM\$JOURNAL.

### **new-filespec**

The file specification of the new transaction log to be created.

For DECdtm services on a node to use the transaction log, the file must have a name of the form SYSTEM\$node.LM\$JOURNAL, where *node* is the name of the node.

The CONVERT LOG command uses the following defaults:

- If you omit the disk and directory, the CONVERT LOG command creates the new transaction log in the first accessible directory pointed to by the logical SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.
- If you omit the file type, the CONVERT LOG command uses .LM\$JOURNAL.

## Qualifiers

### **/OWNER=uic**

Specifies the owner of the new transaction log.

Specify the owner using the standard UIC format, as described in the *OpenVMS User's Manual*.

### **/SIZE=size**

Specifies the size of the new transaction log in blocks.

The minimum size is 100 blocks. If you omit this qualifier, the new transaction log is created with the default size of 4000 blocks.

## Description

The CONVERT LOG command creates a new transaction log and copies all active transaction records from the specified transaction log into the new one.

## Example

```
LMCP> CONVERT LOG/SIZE=6000 DISK$LOG2:[LOGFILES]SYSTEM$RED.LM$OLD -
_LMCP> DISK$LOG2:[LOGFILES]SYSTEM$RED.LM$JOURNAL
```

This example creates a 6000-block transaction log called SYSTEM\$RED.LM\$JOURNAL in directory DISK\$LOG2:[LOGFILES]. It then copies all active transaction records from the existing transaction log, SYSTEM\$RED.LM\$OLD in directory DISK\$LOG2:[LOGFILES], into the new transaction log.

---

## CREATE LOG

Creates a new transaction log.

---

### Caution

---

If a node already has a transaction log, using the CREATE LOG command to create a new one can corrupt data.

---

Requires READ and WRITE access to the directory in which the transaction log is to be created.

### Format

CREATE LOG filespec

### Parameter

#### filespec

The file specification of the transaction log to be created.

For DECdtm services on a node to use the transaction log, it must have a name of the form SYSTEM\$node.LM\$JOURNAL, where *node* is the name of the node.

The CREATE LOG command uses the following defaults:

- If you omit the disk and directory, the CREATE LOG command creates the transaction log in the first accessible directory pointed to by the logical SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.
- If you omit the file type, the CREATE LOG command uses .LM\$JOURNAL.

If you specify a disk and directory not pointed to by SYS\$JOURNAL, a warning message is displayed. However, the transaction log is still created. The transaction log will not be used until either:

- SYS\$JOURNAL is modified to point to the disk and directory where the log was created
- or
- You move the new transaction log to a directory pointed to by SYS\$JOURNAL.

### Qualifiers

#### /NEW\_VERSION

Forces the CREATE LOG command to create a new version of an existing transaction log.

## LMCP DUMP

---

### Caution

---

Creating a new version of an existing transaction log can lead to data corruption.

The data in the two transaction logs cannot be merged. Once it has started using the new transaction log, DECdtm services cannot access any transaction records in the old transaction log.

---

#### **/OWNER=uic**

Specifies the owner of the transaction log.

Specify the owner using the standard UIC format, as described in the *OpenVMS User's Manual*.

#### **/SIZE=size**

Specifies the size of the transaction log in blocks.

The minimum size is 100 blocks. If you omit this qualifier, the transaction log is created with the default size of 4000 blocks.

### Example

```
LMCP> CREATE LOG/SIZE=5000 DISK$LOG1:[LOGFILES]SYSTEM$ORANGE.LM$JOURNAL
```

This example creates a 5000-block transaction log for node ORANGE in DISK\$LOG1:[LOGFILES].

---

## DUMP

Displays the contents of a transaction log.

Requires READ access to the transaction log and the directory it is in.

### Format

DUMP filespec

### Parameter

#### **filespec**

The file specification of the transaction log whose contents you want to display.

The DUMP command uses the following defaults:

- If you omit the disk and directory, the DUMP command looks for the transaction log in the directories pointed to by the logical SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.
- If you omit the file type, the DUMP command uses .LM\$JOURNAL.

### Qualifiers

#### **/ACTIVE**

Selects records only for active transactions.

**/FORMAT(default)**

**/NOFORMAT**

Determines whether the contents of the transaction log are displayed as formatted records. Specify both the **/NOFORMAT** and the **/HEX** qualifiers to display the contents of the transaction log in hexadecimal only.

If the **/NOFORMAT** qualifier is specified without the **/HEX** qualifier, only the transaction log header is displayed.

**/HEX**

**/NOHEX(default)**

Specifies that the contents of the transaction log are displayed as both ASCII characters and hexadecimal longwords. Specify both the **/NOFORMAT** and **/HEX** qualifiers to display the contents of the transaction log in hexadecimal only.

**/LOGID=logid**

Selects records only for transactions that have participants using the specified log.

The **logid** is in the *Log ID* field, to the right of the *Type* field. The value you specify must be exactly as it appears in the display, including hyphens.

Note that you can use this qualifier only with the **/RM** qualifier.

**/OUTPUT[=filespec]**

Requires **READ** and **WRITE** access to the directory in which the output file is to be created.

Specifies where the output from the **DUMP** command is sent. If you omit this qualifier, output is sent to the current **SY\$OUTPUT** device (usually your terminal). To send the output to a file, use the **/OUTPUT** qualifier. If you do not supply a file specification, the output is sent to the file **LMCP\_DUMP.LIS** in your default directory.

**/RM=name**

Selects records only for transactions that have participants whose names begin with the specified value.

The participant name is shown in the *Name* field, and is output in both ASCII and hexadecimal.

If the participant name includes undisplayable characters, you can select records for that participant by using the hexadecimal form of its name. When specifying the hexadecimal form of the name, you must convert it by reversing the pairs in the hexadecimal number. For example, if the participant name is:

Name (11): "SYSTEM\$RED" (4445 52244D45 54535953)

the value you specify for the **/RM** qualifier is:

**/RM=%X53595354454D24524544**

**/STATE=COMMITTED**

**/STATE=PREPARED**

Selects records only for transactions in either the Committed or Prepared states.

**/TID=transaction\_id**

Selects records only for the specified transaction.

## LMCP DUMP

The **transaction\_id** is shown in the *Transaction ID* field. The value you specify must be exactly as it appears in the display, including hyphens.

### Description

Use the DUMP command to display the contents of a transaction log. Example 12-1 is a sample of a transaction log, with the important fields identified.

#### Example 12-1 Sample Transaction Log

Log Manager Control Program V1.0

```
Dump of log file DISK$LOGFILE:SYSTEM$BLUE.LM$JOURNAL;1
End of file block 4002 / Allocated 4002
Log Version 1.0
Log File UID: 647327A0-2674-11C9-8001-AA00040069F8 ❶
Penultimate Checkpoint: 000000000239 0039
Last Checkpoint: 00000000042E 002E
```

```
Dump of log file DISK$LOGFILE:SYSTEM$BLUE.LM$JOURNAL;1
Present Length: 134 (00000086) Last Length: 0 (00000000)
VBN Offset: 0 (00000000) Virtual Block: 2 (00000002) ❷
Section: 3 (00000003)
```

```
Record number 1 (00000001), ❸ 114 (0072) bytes ❹
Transaction state (1): PREPARED ❺
Transaction ID: 1D017140-2676-11C9-9F34-08002B174360 ❻ (8-JUL-1994 14:08:29.14)
DECdtm Services Log Format V1.0 ❼
DECdtm Timestamp: 0 000 000000000000 0000000000000000 ❽
Type (3): LOCAL RM ❸ Log ID: 00000000-0000-0000-0000-000000000000 ❿
Name (6): "RMS$USER1.....I+..." ❶
(0000 002B4919 00000000 00000031 52455355 24534D52)
Type (4): PARENT NODE ❸ Log ID: A2ADD200-2641-11C9-8001-AA00040021F8 ❶
Name (11): "SYSTEM$RED" ❶(4445 52244D45 54535953)
```

In this example, the significant fields are:

- ❶ Transaction log header — information about the transaction log's attributes.
- ❷ Section header — the section header of multiple transaction records.
- ❸ Record number — the record number, in both decimal and hexadecimal.
- ❹ Record size — the record size in both decimal and hexadecimal.
- ❺ Transaction state — the type of the record. This can be:
  - Prepared  
This type of record is logged when the transaction enters the Prepared state. Note that this type of record is not logged at the node on which the transaction was started.
  - Committed  
This type of record is logged when the transaction enters the Committed state.
  - Forgotten

This type of record is logged:

- When the transaction is aborted, if a record of type Prepared was logged for the transaction.
- For a transaction that commits, when no participants require the local DECdtm transaction manager to remember that the outcome of the transaction is commit.

Note that DECdtm uses the presumed abort logging protocol.

- Checkpoint

Unlike the other types of record, this is not associated with a particular transaction. It is logged when the transaction log is checkpointed, to compress the space used by active transaction records. It is used internally by the DECdtm transaction manager to mark checkpoint events.

- ⑥ Transaction ID — the unique transaction identifier (TID) generated by the DECdtm transaction manager.
- ⑦ DECdtm Services Log Format — the version number of the transaction log format.
- ⑧ DECdtm Timestamp — reserved for future use.
- ⑨ Type — the type of the participant in the transaction. This can be:
  - Child Node — An immediate child transaction manager. This is a node that might query the local DECdtm transaction manager to determine the outcome of the transaction.
  - Parent Node — The immediate parent transaction manager. This is the node that the local DECdtm transaction manager can query to determine the outcome of the transaction. You see this type of participant only for transactions in the Prepared state.
  - Local RM — A resource manager on the local node.
- ⑩ Log ID — the identifier of the participant's log. For a participant of type Child Node or Parent Node, this is the identifier of the DECdtm transaction log. For a local resource manager, this is the identifier of its private log.
- ⑪ Name — The name of the participant in the transaction, in both ASCII and hexadecimal.

## Example

```
LMCP> DUMP/RM="RMS$" DISK$LOGFILE:SYSTEM$BLUE.LM$JOURNAL
```

```
Dump of log file DISK$LOGFILE:SYSTEM$BLUE.LM$JOURNAL;1
End of file block 4002 / Allocated 4002
Log Version 1.0
Log File UID: 6A034B20-6FCC-0095-D7E4-EAA500000000
Penultimate Checkpoint: 0000000382E 002E
Last Checkpoint: 00000003C2E 002E
```

```
Dump of log file DISK$LOGFILE:SYSTEM$BLUE.LM$JOURNAL;1
Present Length: 46 (0000002E) Last Length: 512 (00000200)
VBN Offset: 30 (0000001E) Virtual Block: 32 (00000020)
Section: 1 (00000001)
```



## LMCP HELP

Record number 2 (00000002), 5 (0005) bytes  
Transaction state (3): CHECKPOINT  
Checkpoint record contains no active transactions.

Record number 1 (00000001), 21 (0015) bytes  
Transaction state (0): FORGOTTEN  
Transaction ID: 271D9FC0-7082-0095-98E7-EAA500000000

Dump of log file DISK\$LOGFILE:SYSTEM\$BLUE.LM\$JOURNAL;1  
Present Length: 113 (00000071) Last Length: 512 (00000200)  
VBN Offset: 29 (0000001D) Virtual Block: 31 (0000001F)  
Section: 2 (00000002)

Record number 1 (00000001), 93 (005D) bytes  
Transaction state (2): COMMITTED  
Transaction ID: 271D9FC0-7082-0095-98E7-EAA500000000 ( 3-MAR-1994 13:53:03.42)  
DECdtm Services Log Format V1.0  
Type (2): CHILD NODE Log ID: EF006060-CF37-11C9-8001-AA000400DEFA  
Name (10): "SYSTEM\$ORANGE" (45 474E4152 4F244D45 54535953)  
Type (3): LOCAL RM Log ID: 28C5D180-7082-0095-0000-000000000000  
Name (22): "RMS\$USER1.....'"....."  
(0000 00178B60 00000000 00000031 52455355 24534D52)

.  
.  
.

Total of 1 transactions active, 0 prepared and 1 committed.

This example displays the contents of the transaction log for node BLUE, selecting only transactions in which RMS Journaling for OpenVMS is participating.

---

## HELP

Gives help on LMCP commands.

### Format

HELP [help-topic [help-subtopic]]

.  
.

### Parameter

#### help-topic

Specifies the command that you want help for.

#### help-subtopic

Specifies the parameter or qualifier that you want help for.

---

## REPAIR

Changes the state of transactions.

---

### Caution

---

The REPAIR command can corrupt data. Use it only if none of the resource managers participating in the transaction provides a means of changing transaction states.

---

The REPAIR command requires:

- The CMKRNL privilege.
- READ and WRITE access to the transaction log and the directory it is in.

## Format

REPAIR filespec

## Parameter

### filespec

The file specification of the transaction log containing the transactions whose states you want to change.

The REPAIR command requires the following:

- The logical SYS\$JOURNAL must be defined in executive mode in the system logical name table.
- The transaction log must be in a directory pointed to by the logical SYS\$JOURNAL.
- The file type of the transaction log must be .LM\$JOURNAL.

The REPAIR command uses the following defaults:

- If you omit the disk and directory, the REPAIR command looks for the transaction log in the directories pointed to by the logical SYS\$JOURNAL.
- If you omit the file type, the REPAIR command uses .LM\$JOURNAL.

## Qualifiers

### /LOGID=logid

Selects records only for transactions that have participants using the specified log.

The **logid** is in the *Log ID* field, to the right of the *Type* field in the output from the DUMP command. The value you specify must be exactly as it appears in the display, including hyphens.

Note that you can use this qualifier only with the /RM qualifier.

### /RM=name

Selects records only for transactions that have participants whose names begin with the specified value.

## LMCP REPAIR

The participant name is shown in the *Name* field in the output from DUMP, and is output in both ASCII and hexadecimal.

If the participant name includes undisplayable characters, you can select records for that participant by using the hexadecimal form of its name. When specifying the hexadecimal form of the name, you must convert it by reversing the pairs in the hexadecimal number. For example, if the participant name is:

```
Name (11): "SYSTEM$RED" (4445 52244D45 54535953)
```

the value you specify for the /RM qualifier is:

```
/RM=%X53595354454D24524544
```

**/STATE=COMMITTED**

**/STATE=PREPARED**

Selects records only for transactions in either the Committed or Prepared states.

**/TID=transaction\_id**

Selects records only for the specified transaction.

The **transaction\_id** is shown in the *Transaction ID* field in the output from the DUMP command. The value you specify must be exactly as it appears in the display, including hyphens.

## Description

Use the REPAIR command to change the state of transactions.

---

### Caution

---

The REPAIR command can corrupt data. Use it only if none of the resource managers participating in the transaction provides a means of changing transaction states.

---

Use this command only if none of the resource managers participating in the transaction provides a means of changing the transaction state. For example, if Rdb for OpenVMS is a participant in the transaction, do not use REPAIR; use the Rdb for OpenVMS Management Utility (RMU) commands instead. Similarly, if DBMS for OpenVMS is a participant, use the Database Operator utility (DBO) commands.

Change the transaction state only when you already know the outcome of the transaction and need to manually update the transaction log immediately. You might want to do this because, for example, you have lost the network link to a remote node.

When you use the REPAIR command you use qualifiers to specify which transactions you want to change. By default, the REPAIR command selects all transactions.

Once you have selected the transactions to change, you enter the REPAIR subcommand mode. Within this mode, the prompt changes to REPAIR> and you have a set of additional subcommands, described in Table 12-2. You use these commands either to manually change the state of the transaction, or to select the next transaction that matches your selection criteria.

Table 12-2 Subcommands of the REPAIR Command

| Subcommand | Action                                                                                                                                                                                                                                    |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABORT      | Specifies that a Prepared transaction is to be aborted by removing its record from the transaction log. This writes a record of type Forgotten for the transaction.<br>Note that DECdtm services use the presumed abort logging protocol. |
| COMMIT     | Specifies that a Prepared transaction is to be committed. This writes a record of type Committed for the transaction.                                                                                                                     |
| EXIT       | Returns to the LMCP> prompt.                                                                                                                                                                                                              |
| FORGET     | Specifies that a Committed transaction can be removed from the transaction log. This writes a record of type Forgotten for the transaction.                                                                                               |
| NEXT       | Displays the next transaction that matches your selection criteria.                                                                                                                                                                       |

LMCP displays each of the selected transactions in turn, so that you can change them. For each selected transaction, you can either use the ABORT, COMMIT, and FORGET subcommands to change the state of the transaction, or use the NEXT subcommand to select the next transaction.

To exit from the REPAIR subcommand mode, enter the EXIT subcommand or press Ctrl/Z.

### Example

```
LMCP> REPAIR/STATE=PREPARED/RM="RMS$" DISK$JOURNALS:[LOGFILES]SYSTEM$ORANGE

Dump of log file DISK$JOURNALS:[LOGFILES]SYSTEM$ORANGE.LM$JOURNAL;1
End of file block 5001 / Allocated 5001
Log Version 1.0
Log File UID: 61F37F80-9AD0-0094-F0B6-00000000A656 (5-JUN-1994 15:13:54.04)
Penultimate Checkpoint: 0000010CB514 0314
Last Checkpoint: 0000010DFA08 0408

Transaction state (2): PREPARED
Transaction ID: F2ED7F80-1547-0095-A42A-00000000A656 (5-JUN-1994 5:07:09.24)
DECdtm Services Log Format V1.0
Type (3): LOCAL RM Log ID: A656B6F0-0000-0000-0000-000000000000
Name (6): "RMS$USER1.....I+..."
(0000 002B4919 00000000 00000031 52455355 24534D52)
Type (3): PARENT NODE Log ID: A656B6F0-0000-0000-0000-000000000000
Name (6): "SYSTEM$BLUE" (45554C 42244D45 54535953)

REPAIR> COMMIT
REPAIR> NEXT
.
.
.
```

In this example, transactions to be modified are selected from the transaction log for node ORANGE. The transactions selected are those that match both of the following criteria:

- RMS Journaling for OpenVMS is participating in the transaction.

## LMCP SHOW LOG

- The transaction is in the Prepared state.

The first transaction is committed by manually changing its state from Prepared to Committed, then the NEXT subcommand is used to advance to the next selected transaction.

---

## SHOW LOG

Displays information about transaction logs.

Requires READ access to the transaction logs and the directories they are in.

### Format

SHOW LOG [filespec]

### Parameter

#### filespec

The file specification of the transaction logs you want to display information about. This can include the percent (%) and asterisk (\*) wildcard characters.

The SHOW LOG command uses the following defaults:

- If you omit the disk and directory, the SHOW LOG command looks for the transaction log in the directories pointed to by SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.
- If you omit the file type, the SHOW LOG command uses .LM\$JOURNAL.

## QUALIFIER

### /CURRENT

Displays information about the local node's transaction log. This includes the number of checkpoints and stalls that have occurred since DECdtm services started on this node.

To use the /CURRENT qualifier:

- You must have the CMKRNL privilege.
- You must omit the parameter to the SHOW LOG command.

### /FULL

Lists all attributes of the transaction logs. For each transaction log, both the full file specification of the transaction log and its size are displayed.

If you do not specify which transaction log you want to display, the SHOW LOG command lists all transaction logs of the form SYSTEM\$\*.LM\$JOURNAL, in all directories pointed to by the logical SYS\$JOURNAL, which must be defined in executive mode in the system logical name table.

### /OUTPUT[=filespec]

Requires READ and WRITE access to the directory in which the output file is to be created.

## LMCP SHOW LOG

Specifies where the output of the SHOW LOG command is sent. If you omit this qualifier, output is sent to the current SYS\$OUTPUT device (usually your terminal). To send the output to a file, use the /OUTPUT qualifier. If you do not supply a file specification, the output is sent to the file LMCP\_SHOW.LIS in your default directory.

### Example

```
LMCP> SHOW LOG/FULL
Directory of DISK$JOURNALS:[LOGFILES]
DISK$JOURNALS:[LOGFILES]SYSTEM$BLUE.LM$JOURNAL;1
End of file block 4002 / Allocated 4002
Log Version 1.0
Log File UID: 647327A0-2674-11C9-8001-AA00040069F8
Penultimate Checkpoint: 00000001A39 0039
Last Checkpoint: 00000001C8A 008A
Total of 1 file.
Directory of DISK$RED:[LOGFILES]
DISK$RED:[LOGFILES]SYSTEM$RED.LM$JOURNAL;1
End of file block 4002 / Allocated 4002
Log Version 1.0
Log File UID: 17BB9140-2674-11C9-8001-AA0004006AF8
Penultimate Checkpoint: 000000ECADE5 41E5
Last Checkpoint: 000000F105FC 41FC
Total of 1 file.
Directory of DISK$LOGFILES:[LOGS]
DISK$LOGFILES:[LOGS]SYSTEM$YELLOW.LM$JOURNAL;1
End of file block 1002 / Allocated 1002
Log Version 1.0
Log File UID: 590DAA40-2640-11C9-B77A-08002B14179F
Penultimate Checkpoint: 00000C8B4819 2019
Last Checkpoint: 00000C8BC15B 335B
Total of 1 file.
Total of 3 files in 3 directories.
```

This example displays full details about the transaction logs in all directories pointed to by the logical SYS\$JOURNAL. This logical is defined in executive mode in the system logical name table.



---

## ACL Editor Keypad Editing Commands

By default, the access control list editor (ACL editor) prompts you for each access control entry (ACE) and provides values for some of the fields within an ACE. You can navigate the ACE fields by using keypad commands, such as `FIELD` and `ITEM`.

This appendix describes all the keypad editing commands supplied by the ACL editor. You can supplement or change these key definitions by modifying and recompiling the ACL editor section file `SYS$LIBRARY:ACLEEDIT.TPU` (see Appendix B for more information). To get help on the ACL editor keypad commands, press `PF2`.

### A.1 ACL Editor Keypad Commands

Figure A-1 shows the default ACL editor keypad commands for LK201 keyboards. The numeric keypad on VT100-series terminals is identical to that of the LK201 keyboard shown in Figure A-1; VT100 terminals, however, do not have the supplemental editing keypad (keys `E1` through `E6`).



# ACL Editor Keypad Editing Commands

## A.1 ACL Editor Keypad Commands

Figure A-1 Keypad for an LK201-Series Keyboard

VT200

|              |                      |                      |                         |                         |                       |                           |
|--------------|----------------------|----------------------|-------------------------|-------------------------|-----------------------|---------------------------|
| E1<br>FIND   | E2<br>INSERT         | E3<br>REMOVE<br>COPY | PF1<br>GOLD             | PF2<br>HELP<br>HELP FMT | PF3<br>FNDNXT<br>FIND | PF4<br>DEL ACE<br>UND ACE |
| E4<br>SELECT | E5<br>PREV<br>SCREEN | E6<br>NEXT<br>SCREEN | 7<br>FIELD<br>ADVFIELD  | 8<br>MOVE<br>SCREEN     | 9<br>-                | DEL W<br>UND W            |
|              | ↑<br>UP              |                      | 4<br>ADVANCE<br>BOTTOM  | 5<br>BACKUP<br>TOP      | 6<br>,                | DEL C<br>UND C            |
| ←<br>LEFT    | ↓<br>DOWN            | →<br>RIGHT           | 1<br>WORD               | 2<br>EOL<br>DEL EOL     | 3                     | ENTER                     |
|              |                      |                      | 0<br>OVER ACE<br>INSERT | .<br>ITEM               |                       |                           |

ZK-1758-GE

Table A-1 describes each of the keypad commands you can use with the ACL editor. In this table, KP $n$  refers to a keypad key labeled with the number  $n$ . For example, KP4 refers to the keypad key labeled with the number 4.

Table A-1 ACL Editor Keypad Commands

| Command   | Key or Key Sequence | Description                                                                                                                               |
|-----------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| ADVANCE   | KP4                 | Sets the current direction forward for the FIND, FNDNXT, MOVE SCREEN, OVER ACE, and WORD commands. Movement is toward the end of the ACL. |
| ADV FIELD | GOLD-KP7            | Completes the current ACE field and moves the cursor to the next ACE field.                                                               |
| BACKUP    | KP5                 | Reverses the current direction for the FIND, FNDNXT, MOVE SCREEN, OVER ACE, and WORD keys. Movement is toward the beginning of the ACL.   |
| BOTTOM    | GOLD-KP4            | Positions the cursor after the last line of the last ACE. Any entries you add are placed at the end of the ACL.                           |
| DEL ACE   | PF4                 | Deletes the entire ACE in which the cursor is positioned and stores it in the delete-ACE buffer.                                          |
| DEL C     | Comma               | Deletes the character on which the cursor is positioned and stores it in the delete-character buffer.                                     |
| DEL EOL   | GOLD-KP2            | Deletes text from the current cursor position to the end of the line and stores it in the delete-line buffer.                             |

(continued on next page)

## ACL Editor Keypad Editing Commands

### A.1 ACL Editor Keypad Commands

**Table A-1 (Cont.) ACL Editor Keypad Commands**

| Command     | Key or Key Sequence | Description                                                                                                                                                                                                                                                                           |
|-------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DEL W       | Minus               | Deletes the text from the current cursor position to the beginning of the next word and stores it in the delete-word buffer.                                                                                                                                                          |
| ENTER       | Enter               | Indicates that the current ACE is complete. The ACL editor terminates the insertion and verifies that the syntax of the ACE is complete. You can press the Enter key while the cursor is located at any position within the ACE. (Pressing the Return key produces the same results.) |
| EOL         | KP2                 | Moves the cursor to the end of the current line.                                                                                                                                                                                                                                      |
| FIELD       | KP7                 | Completes the current ACE field and moves the cursor to the next ACE field or subfield, inserting text as needed. If the ACL editor is not in prompt mode, the ACL editor advances to the next field in the current ACE.                                                              |
| FIND        | GOLD-PF3            | Searches for an occurrence of a string. Press the FIND key and then enter the string from the main keyboard. Press the ENTER key to search for the string in the current direction, or the ADVANCE or BACKUP key to change the search direction.                                      |
| FNDNXT      | PF3                 | Searches in the current direction for the next occurrence of the string previously entered with the FIND key.                                                                                                                                                                         |
| GOLD        | PF1                 | When pressed before another keypad key, specifies the second key's alternate function (the bottom function on the keypad diagram).                                                                                                                                                    |
| HELP        | PF2                 | Displays information about using the editing keypad.                                                                                                                                                                                                                                  |
| HELP FMT    | GOLD-PF2            | Displays information about ACE formats.                                                                                                                                                                                                                                               |
| INSERT      | GOLD-KP0            | Moves all text from the current line down one line, leaving a blank line where an ACE is to be inserted.                                                                                                                                                                              |
| ITEM        | Period              | Selects the next item for the current ACE field. If the ACL editor is not in prompt mode, this key is ignored.                                                                                                                                                                        |
| MOVE SCREEN | KP8                 | Moves the cursor one screen in the current direction (see ADVANCE or BACKUP). A screen is defined as two-thirds the number of lines in the display.                                                                                                                                   |
| OVER ACE    | KP0                 | Moves the cursor to the beginning of the next ACE (if the direction is set to ADVANCE) or to the beginning of the previous ACE (if the direction is set to BACKUP).                                                                                                                   |
| TOP         | GOLD-KP5            | Moves the cursor position to the first character of the first ACE in the access control list.                                                                                                                                                                                         |
| UND ACE     | GOLD-PF4            | Inserts the contents of the delete-ACE buffer in front of the ACE in which the cursor is currently positioned.                                                                                                                                                                        |
| UND C       | GOLD-Comma          | Inserts the contents of the delete-character buffer directly in front of the cursor.                                                                                                                                                                                                  |
| UND W       | GOLD-Hyphen         | Inserts the contents of the delete-word buffer directly in front of the cursor.                                                                                                                                                                                                       |
| WORD        | KP1                 | Moves the cursor one word forward (if the direction is set to ADVANCE) or backward (if the direction is set to BACKUP).                                                                                                                                                               |

# ACL Editor Keypad Editing Commands

## A.2 Additional ACL Editing Keys and Key Sequences

### A.2 Additional ACL Editing Keys and Key Sequences

In addition to keypad editing, the ACL editor lets you use other keyboard keys and key sequences to perform editing functions. Table A–2 describes these additional ACL editing keys and key sequences. Keys in parentheses indicate the equivalent key for an LK201-series keyboard.

**Table A–2 Additional ACL Editing Keys and Key Sequences**

| Key or Sequence | Action Taken When Key or Sequence is Pressed                                                                                                                                                                                                                                    |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ↓               | Moves the cursor to the character directly in line below it. If the ACE in which the cursor is positioned is new, the ACL editor processes the ACE before moving the cursor. If the entry is incomplete or formatted incorrectly, an error occurs and the cursor does not move. |
| ←               | Moves the cursor one character to the left. If the cursor is at the left margin, moves it to the rightmost character in the line above.                                                                                                                                         |
| →               | Moves the cursor one character to the right. If the cursor is at the right margin, moves it to the leftmost character in the line below.                                                                                                                                        |
| ↑               | Moves the cursor to the character directly in line above it. If the ACE in which the cursor is positioned is new, the ACL editor processes the ACE before moving the cursor. If the entry is incomplete or formatted incorrectly, an error occurs and the cursor does not move. |
| GOLD-←          | Shifts the text in the display window 8 characters to the left.                                                                                                                                                                                                                 |
| GOLD-→          | Shifts the text in the display window 8 characters to the right.                                                                                                                                                                                                                |
| Backspace (F12) | Moves the cursor to the beginning of the current line.                                                                                                                                                                                                                          |
| Ctrl/A          | Changes the current mode from insert mode to overstrike mode or from overstrike mode to insert mode. Insert mode (the default) inserts a character to the left of the current character. Overstrike mode replaces the current character.                                        |
| Ctrl/D          | Allows you to execute one TPU command.                                                                                                                                                                                                                                          |
| Ctrl/H          | Moves the cursor to the beginning of the line. (Performs the same function as the backspace key.)                                                                                                                                                                               |
| Ctrl/J          | Deletes the text from the cursor back to the beginning of the word. (Performs the same function as the linefeed key.)                                                                                                                                                           |
| Ctrl/R          | Refreshes the screen display. Clears and redraws the screen, deleting any extraneous characters or messages that might have appeared on the screen but are not part of the ACL you are editing. (Performs the same function as Ctrl/W.)                                         |
| GOLD-Ctrl/R     | Returns the ACL to its original state before the ACL editor was invoked. (Performs the same function as GOLD-Ctrl/W.)                                                                                                                                                           |
| Ctrl/U          | Deletes the text from the cursor to the beginning of the line.                                                                                                                                                                                                                  |
| GOLD-Ctrl/U     | Inserts the contents of the deleted-line buffer into the line at the current position. The line might wrap automatically.                                                                                                                                                       |
| Ctrl/W          | See Ctrl/R.                                                                                                                                                                                                                                                                     |
| GOLD-Ctrl/W     | See GOLD Ctrl/R.                                                                                                                                                                                                                                                                |
| Ctrl/Z          | Ends the editing session and updates the ACL. (Unless otherwise specified, any recovery and journal files are deleted.)                                                                                                                                                         |
| GOLD-Ctrl/Z     | Ends (quits) the editing session without saving any of the changes made to the ACL. (Unless otherwise specified, any recovery and journal files are deleted.)                                                                                                                   |
| Delete (⌫)      | Deletes the character to the left of the cursor.                                                                                                                                                                                                                                |

(continued on next page)

## ACL Editor Keypad Editing Commands

### A.2 Additional ACL Editing Keys and Key Sequences

**Table A–2 (Cont.) Additional ACL Editing Keys and Key Sequences**

| Key or Sequence | Action Taken When Key or Sequence is Pressed                                                                                                                                       |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linefeed (F13)  | Deletes the text from the cursor back to the beginning of the word. If the cursor is positioned at the first character of the word, deletes to the beginning of the previous word. |
| Tab             | Moves the text located to the right of the cursor to the next tab stop.                                                                                                            |

### A.3 ACL Editing Keys on the Supplemental Keypad (LK201-Series Keyboards)

You can use the supplemental keypad on an LK201-series keyboard to move sections of text from one part of an ACL to another. However, note that certain supplemental editing keys (Insert Here, Remove, and Select) require a PASTE buffer, which is not enabled by default. To enable the PASTE buffer for the current editing session, do the following:

1. Press Ctrl/D
2. At the TPU command: prompt, enter the following statement:

TPU command: ACLEDIT\$X\_PASTE\_BUFFER:=1

3. Press Ctrl/D again, and enter the following statement:

TPU command: ACLEDIT\$X\_CHECK\_MODIFY:=0

Setting the value of the ACLEDIT\$X\_CHECK\_MODIFY variable to 0 prevents the ACL editor from checking for a modifiable ACE. The two features (support for the PASTE buffer and the check for a modifiable ACE) are not compatible.

To enable the PASTE buffer for all ACL editing sessions, change the values of the variables ACLEDIT\$X\_PASTE\_BUFFER and ACLEDIT\$X\_CHECK\_MODIFY in the ACL editor section file and recompile the file (see Appendix B).

Table A–3 describes the supplemental keypad keys you can use with the ACL editor.

**Table A–3 ACL Editing Keys on the Supplemental Keypad**

| Key or Key Sequence | Description                                                                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Find                | Elicits the Search for: prompt as the first step in the FIND operation. Type the search string after the prompt; then, press either the Do key or the Enter key to process the search. Performs the same function as the FIND keypad command. |
| Insert Here         | Indicates where an ACE is to be inserted or, if support for the PASTE buffer is enabled, indicates the line where the selected text in the PASTE buffer is to be inserted.                                                                    |
| Remove              | Removes the selected text to the PASTE buffer. Each time you press the Remove key, the ACL editor deletes the previous contents of the PASTE buffer.                                                                                          |

(continued on next page)

## ACL Editor Keypad Editing Commands

### A.3 ACL Editing Keys on the Supplemental Keypad (LK201-Series Keyboards)

Table A-3 (Cont.) ACL Editing Keys on the Supplemental Keypad

| Key or Key Sequence | Description                                                                                                                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GOLD-Remove (COPY)  | Copies the selected text to the PASTE buffer. Each time you use the COPY command, the ACL editor deletes the previous contents of the PASTE buffer.                                                                                                                 |
| Select              | Marks the beginning of a range of text to be removed or copied to the PASTE buffer. Press the Select key. Then, move the cursor to include the desired amount of text to be removed or copied. Press either Remove or GOLD-Remove (COPY) to complete the operation. |
| Prev Screen         | Moves the cursor to the previous screen. By default, a screen is defined as two-thirds the number of lines in the display.                                                                                                                                          |
| Next Screen         | Moves the cursor one screen forward. By default, a screen is defined as two-thirds the number of lines in the display.                                                                                                                                              |

# B

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## Customizing the ACL Editor

You can modify the access control list editor (ACL editor) by modifying and recompiling the ACL section file `SYS$LIBRARY:ACLEDIT.TPU` (the source file used to create the compiled ACL section file `SYS$LIBRARY:ACLEDT$SECTION.TPU$SECTION`). You can also create your own ACL section file.

See the *DEC Text Processing Utility Reference Manual* for more information on writing and processing section files.

### B.1 Modifying Variables in the ACL Section File

Table B-1 lists the ACL section file variables and their defaults.

**Table B-1 ACL Section File Variables**

| Variable                                 | Meaning                                                                                                                                                                                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>ACLEDIT\$X_CHECK_DUPLICATES</code> | Controls whether a check for duplicate ACEs is made. This variable can take the following values:<br>0 No duplicate ACE check is made.<br>1 A duplicate ACE check is made. If the ACE to be entered matches an existing ACE, an error message is returned. This is the default. |
| <code>ACLEDIT\$X_CHECK_MODIFY</code>     | Allows or disallows modification of ACEs. This variable can take the following values:<br>0 The ACE can be modified.<br>1 The ACE cannot be modified. If an attempt is made to modify the ACE, it is replaced with the original ACE. This is the default.                       |
| <code>ACLEDIT\$X_DIRECTORY_FILE</code>   | Indicates whether the object is a directory file. This variable can take the following values:<br>0 The object is not a directory file.<br>1 The object is a directory file.                                                                                                    |

(continued on next page)

## Customizing the ACL Editor

### B.1 Modifying Variables in the ACL Section File

**Table B-1 (Cont.) ACL Section File Variables**

| Variable                   | Meaning                                                                                                                                                                                                                                                                                             |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACLEDIT\$X_PASTE_BUFFER    | Controls whether PASTE buffer support is enabled for VT200 series terminals. This variable can take the following values:<br>0 PASTE buffer support is disabled. This is the default.<br>1 PASTE buffer support is enabled.                                                                         |
| ACLEDIT\$X_PROMPT          | Controls whether automatic text insertion (prompt mode) is enabled. This variable can take the following values:<br>0 Prompt mode is disabled.<br>1 Prompt mode is enabled. This is the default.                                                                                                    |
| ACLEDIT\$X_USE_DEFAULT_OPT | Controls whether the DEFAULT option can be used with nondirectory ACEs. This variable can take the following values:<br>0 The DEFAULT option can only be used with ACEs of directory (.DIR) files. This is the default.<br>1 The DEFAULT option is available for use with ACEs of all object types. |
| ACLEDIT\$C_WINDOW_SHIFT    | Specifies the number of columns to shift the edit window in the direction wanted, GOLD key and left arrow for a left shift and GOLD key and right arrow for a right shift. The default is 8 columns.                                                                                                |

If you modify any of the variables in Table B-1 or change any other part of the ACL section file, recompile the section file with the following command:

```
$ EDIT/TPU/NOSECTION/COMMAND=SYS$LIBRARY:ACLEDIT
```

Use the preceding command if you make changes directly to the source code file (SYS\$LIBRARY:ACLEDIT) that creates the compiled ACL section file SYS\$LIBRARY:ACLEDT\$SECTION. If you add a private command file to the existing ACL section file, recompile the section file using the following command:

```
$ EDIT/TPU/SECTION=SYS$LIBRARY:ACLEDT$SECTION/COMMAND=CUSTOM_ACL.TPU
```

The compiled DECTpu ACL section file is placed in your current directory. To use the new section file, do one of the following:

- Move the compiled section file, ACLEDT\$SECTION.TPU\$SECTION, to the SYS\$LIBRARY directory. This changes the default ACL editor section file for all users.
- Keep the compiled section file in your directory and define the logical name ACLEDT\$SECTION in your LOGIN.COM file to point to the file, as follows:

```
$ DEFINE ACLEDT$SECTION yourdisk:[yourdir]ACLEDT$SECTION
```

Note that the default file type for the section file before compiling (the source file) is TPU, and the default file type for the compiled section file is TPU\$SECTION.

For more information on writing and processing a DECTpu section file, see the *DEC Text Processing Utility Reference Manual*.

## B.2 Using the ACL Editor CALL\_USER Routine

The ACL editor CALL\_USER routine is part of the shareable image SYS\$LIBRARY:ACLEDTSHR.EXE. You can incorporate the ACL editor CALL\_USER routine with its existing function codes into your own ACL section file, or you can write your own CALL\_USER routine that recognizes a different set of function codes.

The ACL editor CALL\_USER routine recognizes only those functions used by the ACL editor DECtpu section file. All other function codes are passed to a user-supplied CALL\_USER routine; if the high-order word of the CALL\_USER function code contains the ACL editor facility code (277 in decimal or 115 in hexadecimal), it is handled by the ACL editor CALL\_USER routine. Otherwise, an attempt is made to locate a user-supplied CALL\_USER routine. Refer to the description of the CALL\_USER routine in the *DEC Text Processing Utility Reference Manual* for more information on creating your own CALL\_USER routine.

Table B-2 describes the CALL\_USER routine function codes supported by the ACL editor.

**Table B-2 CALL\_USER Function Codes**

| Function Code | Mnemonic                | Description                                                                                                                                                                                                                                                                                       |
|---------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18153473      | ACLEDIT\$C_PARSE_ACE    | Parses the input string (ACE) and returns the parsed (binary) ACE if no errors are found. Otherwise, the returned string contains a zero as the first two characters, and the unparsed portion of the input ACE as the remainder of the string.                                                   |
| 18153474      | ACLEDIT\$C_CHECK_MODIFY | Returns the string "READ_WRITE" if the ACE can be modified by the user. Otherwise, returns the string "READ_ONLY."                                                                                                                                                                                |
| 18153475      | ACLEDIT\$C_PROMPT_MODE  | Returns the string "PROMPT_MODE" if the prompt mode option was specified. Otherwise, returns the string "NOPROMPT_MODE."                                                                                                                                                                          |
| 18153476      | ACLEDIT\$C_CHECK_ACE    | Parses the input string (ACE) and returns the parsed (binary) ACE if no errors are found. Otherwise, the ACE text is highlighted in reverse video and a DECtpu variable of the form ACLEDIT\$X_RANGE_x is created to identify the ACE in error. (The "x" is a sequential number starting with 1.) |
| 18153477      | ACLEDIT\$C_CHECK_DIR    | Returns the string "DIRECTORY_FILE" if the object being edited is a directory file. Otherwise, returns the string "NODIRECTORY_FILE."                                                                                                                                                             |

(continued on next page)



## Customizing the ACL Editor

### B.2 Using the ACL Editor CALL\_USER Routine

Table B-2 (Cont.) CALL\_USER Function Codes

| Function Code | Mnemonic                  | Description                                                                                                                                                                                                                                                                                                                            |
|---------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18153478      | ACLEEDIT\$C_SET_CANDIDATE | Parses the input string (ACE) and returns the string "PARSE_OK" if no error was encountered. Otherwise, returns the string "PARSE_ERROR." If the parse was successful, a check is made for duplicate ACEs using the CALL_USER function ACLEEDIT\$C_CHECK_DUP.                                                                          |
| 18153479      | ACLEEDIT\$C_CHECK_DUP     | Parses the input string (ACE) and returns the string "PARSE_ERROR" if an error was encountered. Otherwise, the parsed (binary) ACE is compared with the candidate ACE set by the CALL_USER function ACLEEDIT\$C_SET_CANDIDATE. Returns the string "DUPLICATE_ACE" if the ACE is a duplicate, or "UNIQUE_ACE" if it is not a duplicate. |
| 18153482      | ACLEEDIT\$C_MESSAGE       | Assumes the input string is a system error code and returns in the ACL editor message window the message text associated with the error code.                                                                                                                                                                                          |

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## Accounting Information for Programmers

Table C-1 gives a summary of the system services that relate to accounting. There is no system service that reads accounting files; to do this you must use knowledge of the structure of accounting files.

**Table C-1 Summary of Accounting System Services**

| System Service | Description                                                                                                                      |
|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| \$CREPRC       | Creates a process in which accounting can be disabled.                                                                           |
| \$SNDJBC       | Controls what resources are logged in the current accounting file, or logs a user defined record in the current accounting file. |

This appendix describes the structure of an accounting file. It is for programmers who want to access accounting data directly.

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**Note**

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The formats described here are subject to change without notice in a future release.

---

The symbols and offsets described in this appendix are defined by the \$ACRDEF macro in the STARLET library.

### C.1 Format of an Accounting File Record

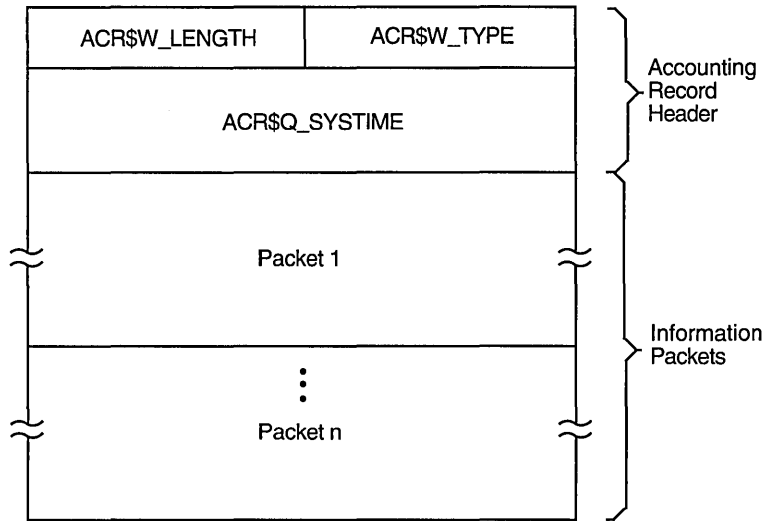
An accounting record consists of an accounting record header and a number of information packets. The number and type of information packets depend on the type of the record.

Figure C-1 illustrates the general format of an accounting record. Table C-2 describes the fields in the record header. The type field in the record header is subdivided into five fields, described in Table C-3.

# Accounting Information for Programmers

## C.1 Format of an Accounting File Record

Figure C-1 Format of an Accounting Record



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Table C-2 Fields in an Accounting Record Header

| Symbolic Offset | Description                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------|
| ACR\$W_TYPE     | Identifies the type of the record. This field is subdivided into five fields, described in Table C-3. (word) |
| ACR\$W_LENGTH   | Total length of the record, in bytes. (word)                                                                 |
| ACR\$Q_SYSTIME  | System time (64-bit absolute time). (quadword)                                                               |

Table C-3 ACR\$W\_TYPE Fields in an Accounting Record Header

| Symbolic Offset    | Description                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------|
| ACR\$V_PACKET      | Identifies this header as a record header. This bit must be 0. (1 bit)                                      |
| ACR\$V_TYPE        | Identifies the type of the record. There are currently eight record types, described in Table C-4. (7 bits) |
| ACR\$V_SUBTYPE     | Identifies the type of process with which the record is associated. The subtypes (4 bits) are:              |
| <b>Symbol</b>      | <b>Meaning</b>                                                                                              |
| ACR\$K_BATCH       | Batch process                                                                                               |
| ACR\$K_DETACHED    | Detached process                                                                                            |
| ACR\$K_INTERACTIVE | Interactive process                                                                                         |
| ACR\$K_NETWORK     | Network process                                                                                             |
| ACR\$K_SUBPROCESS  | Subprocess                                                                                                  |

(continued on next page)

## Accounting Information for Programmers

### C.1 Format of an Accounting File Record

**Table C-3 (Cont.) ACR\$W\_TYPE Fields in an Accounting Record Header**

| Symbolic Offset  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |                 |                     |                  |                                |                 |                                                   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|-----------------|---------------------|------------------|--------------------------------|-----------------|---------------------------------------------------|
| ACR\$V_VERSION   | <p>Note that this field is only meaningful for records of type ACR\$K_IMGDEL and ACR\$K_PRCDEL.</p> <p>Identifies the version of the accounting file record structure. The versions (3 bits) are:</p> <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Symbol</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>ACR\$K_VERSION2</td> <td>VAX/VMS Version 2.0</td> </tr> <tr> <td>ACR\$K_VERSION3T</td> <td>VAX/VMS Version 3.0 field test</td> </tr> <tr> <td>ACR\$K_VERSION3</td> <td>OpenVMS Alpha Version 1.0 and VAX/VMS Version 3.0</td> </tr> </tbody> </table> | Symbol | Meaning | ACR\$K_VERSION2 | VAX/VMS Version 2.0 | ACR\$K_VERSION3T | VAX/VMS Version 3.0 field test | ACR\$K_VERSION3 | OpenVMS Alpha Version 1.0 and VAX/VMS Version 3.0 |
| Symbol           | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |         |                 |                     |                  |                                |                 |                                                   |
| ACR\$K_VERSION2  | VAX/VMS Version 2.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |         |                 |                     |                  |                                |                 |                                                   |
| ACR\$K_VERSION3T | VAX/VMS Version 3.0 field test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |         |                 |                     |                  |                                |                 |                                                   |
| ACR\$K_VERSION3  | OpenVMS Alpha Version 1.0 and VAX/VMS Version 3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |         |                 |                     |                  |                                |                 |                                                   |
| ACR\$V_CUSTOMER  | Identifies whether the record was written by Digital software or by customer software. If this bit is 0, the record was written by Digital software. If this bit is 1, the record was written by customer software. (1 bit)                                                                                                                                                                                                                                                                                                                                                                                                                             |        |         |                 |                     |                  |                                |                 |                                                   |

#### C.1.1 Types of Accounting Record

The type of an accounting record identifies the type of event that caused the record to be logged. There are currently eight types of accounting record, shown in Table C-4. This table shows the information packets contained in each type of record.

**Table C-4 Types of Accounting Record**

| Symbol         | Event                                                         | Information Packets                              |
|----------------|---------------------------------------------------------------|--------------------------------------------------|
| ACR\$K_FILE_BL | The accounting file was opened                                | ACR\$K_FILENAME                                  |
| ACR\$K_FILE_FL | The accounting file was closed                                | ACR\$K_FILENAME                                  |
| ACR\$K_IMGDEL  | An image terminated                                           | ACR\$K_ID<br>ACR\$K_RESOURCE<br>ACR\$K_IMAGENAME |
| ACR\$K_LOGFAIL | A login attempt failed                                        | ACR\$K_ID<br>ACR\$K_RESOURCE                     |
| ACR\$K_PRCDEL  | A process terminated                                          | ACR\$K_ID<br>ACR\$K_RESOURCE                     |
| ACR\$K_PRINT   | A print job finished                                          | ACR\$K_ID<br>ACR\$K_PRINT                        |
| ACR\$K_SYSINIT | The system was initialized                                    | ACR\$K_ID<br>ACR\$K_RESOURCE                     |
| ACR\$K_USER    | An accounting message was sent by the \$SNDJBC system service | ACR\$K_ID<br>ACR\$K_USER_DATA                    |

#### C.1.2 Format of an Information Packet

There are six types of information packets. The header in each information packet defines the type of packet as follows:

- File name packet (ACR\$K\_FILENAME)
- Identification packet (ACR\$K\_ID)

# Accounting Information for Programmers

## C.1 Format of an Accounting File Record

- Image name packet (ACR\$K\_IMAGENAME)
- Print resource packet (ACR\$K\_PRINT)
- Resource packet (ACR\$K\_RESOURCE)
- User data packet (ACR\$K\_USER\_DATA)

Section C.1.2.1 describes the general format of an information packet. Section C.1.2.2 to Section C.1.2.7 describe the format of each type of information packet.

### C.1.2.1 General Format

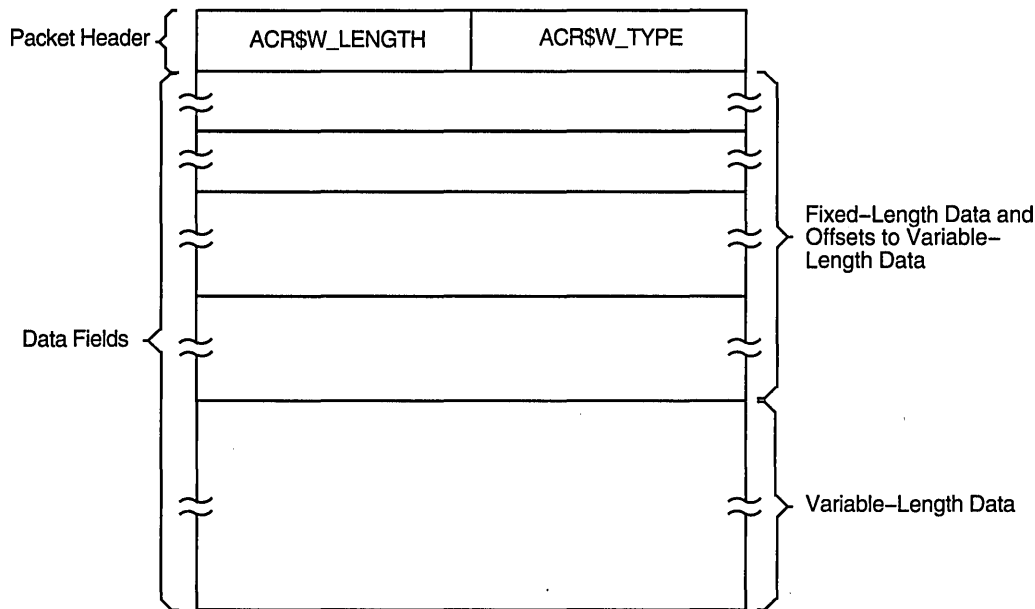
Each information packet contains a packet header, followed by data fields. The data fields can contain fixed-length data, variable-length data, or offsets to variable-length data. Offsets contain the distance in bytes from the beginning of the packet to the variable-length data.

All variable-length data are represented as counted strings. Variable-length data follow the last fixed-length data field in the packet. Figure C-2 shows the general format of an information packet. An information packet may not have values in all of its data fields.

See Section C.1.2.2 to Section C.1.2.7 for complete descriptions of the data fields contained in each information packet.

All information packets start with a packet header that has ACR\$W\_LENGTH and ACR\$W\_TYPE fields (see Table C-5).

Figure C-2 Format of an Information Packet



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## Accounting Information for Programmers C.1 Format of an Accounting File Record

**Table C-5 Fields in an Information Packet Header**

| Symbolic Offset | Description                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------|
| ACR\$W_TYPE     | Identifies the type of the packet. This field is subdivided into five fields, described in Table C-6. (word) |
| ACR\$W_LENGTH   | Total length of the packet, in bytes. (word)                                                                 |

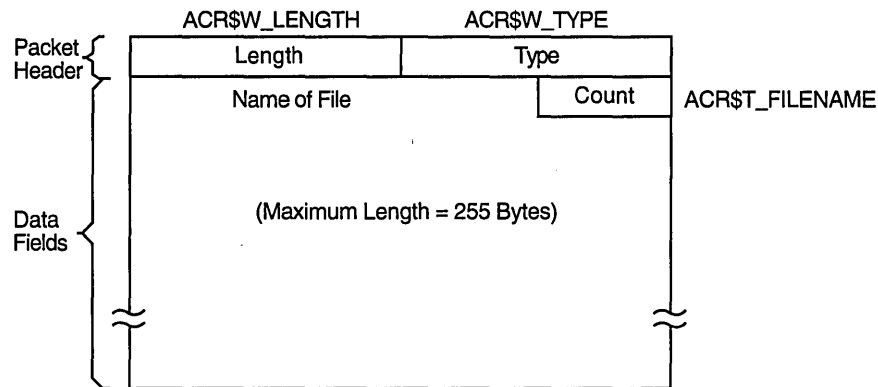
**Table C-6 ACR\$W\_TYPE Fields in an Information Packet Header**

| Symbolic Offset  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-----------------|------------------|-----------|-----------------------|------------------|-------------------|--------------|-----------------------|-----------------|-----------------|------------------|------------------|
| ACR\$V_PACKET    | Identifies this header as a packet header. This bit must be 1. (1 bit)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$V_TYPE      | Identifies the type of the packet. There are currently six packet types. The packet types (7 bits) are: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Symbol</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>ACR\$K_FILENAME</td> <td>File name packet</td> </tr> <tr> <td>ACR\$K_ID</td> <td>Identification packet</td> </tr> <tr> <td>ACR\$K_IMAGENAME</td> <td>Image name packet</td> </tr> <tr> <td>ACR\$K_PRINT</td> <td>Print resource packet</td> </tr> <tr> <td>ACR\$K_RESOURCE</td> <td>Resource packet</td> </tr> <tr> <td>ACR\$K_USER_DATA</td> <td>User data packet</td> </tr> </tbody> </table> | Symbol | Description | ACR\$K_FILENAME | File name packet | ACR\$K_ID | Identification packet | ACR\$K_IMAGENAME | Image name packet | ACR\$K_PRINT | Print resource packet | ACR\$K_RESOURCE | Resource packet | ACR\$K_USER_DATA | User data packet |
| Symbol           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_FILENAME  | File name packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_ID        | Identification packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_IMAGENAME | Image name packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_PRINT     | Print resource packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_RESOURCE  | Resource packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$K_USER_DATA | User data packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$V_SUBTYPE   | Identifies the packet subtype; reserved for future use. (4 bits)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$V_VERSION   | See Table C-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |
| ACR\$V_CUSTOMER  | See Table C-3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |             |                 |                  |           |                       |                  |                   |              |                       |                 |                 |                  |                  |

### C.1.2.2 File Name Packet (ACR\$K\_FILENAME)

The file name packet contains the name of the accounting file. Figure C-3 shows the format of the file name packet. Table C-7 describes the field contained in the packet. See Section C.1.2.1 for information on the packet header.

**Figure C-3 Format of a File Name Packet**



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# Accounting Information for Programmers

## C.1 Format of an Accounting File Record

**Table C-7 Data Fields in a File Name Packet**

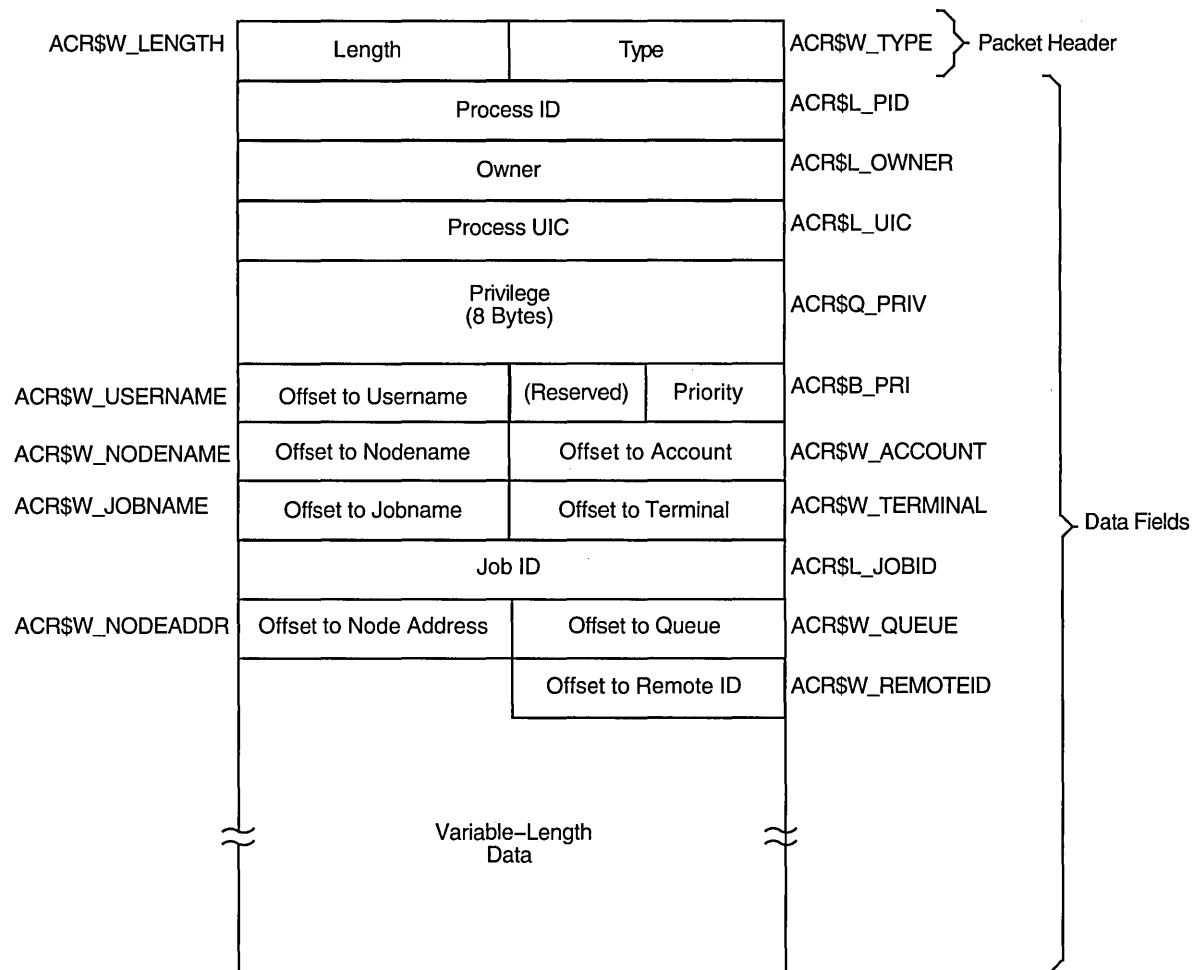
| Symbolic Offset | Description                                                                 |
|-----------------|-----------------------------------------------------------------------------|
| ACR\$T_FILENAME | Name of the file (counted ASCII string that gives full file specification). |

### C.1.2.3 Identification Packet (ACR\$K\_ID)

The identification packet identifies the process that caused the record to be logged.

Figure C-4 shows the format of the identification packet. Table C-8 describes the fields contained in the packet. See Section C.1.2.1 for information on the packet header.

**Figure C-4 Format of an Identification Packet**



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## Accounting Information for Programmers

### C.1 Format of an Accounting File Record

**Table C–8 Data Fields in an Identification Packet**

| Symbolic Offset | Description                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACR\$L_PID      | Process identification (PID) of the process. (longword)                                                                                               |
| ACR\$L_OWNER    | PID of the parent process. (longword)                                                                                                                 |
| ACR\$L_UIC      | UIC of the process. The UIC can be addressed as two separate words: ACR\$W_MEM for the member number, and ACR\$W_GRP for the group number. (longword) |
| ACR\$Q_PRIV     | Privileges held by the process. (quadword)                                                                                                            |
| ACR\$B_PRI      | Base priority of the process. (byte)                                                                                                                  |
| ACR\$W_USERNAME | Offset to counted ASCII string containing the user name of the process. (word)                                                                        |
| ACR\$W_ACCOUNT  | Offset to counted ASCII string containing the account name of the process. (word)                                                                     |
| ACR\$W_NODENAME | Offset to counted ASCII string containing the node name of the remote process. (word)                                                                 |
| ACR\$W_TERMINAL | Offset to counted ASCII string containing the terminal name. (word)                                                                                   |
| ACR\$W_JOBNAME  | Offset to counted ASCII string containing the job name. (word)                                                                                        |
| ACR\$L_JOBID    | Identification of the print or batch job (queue entry number). (longword)                                                                             |
| ACR\$W_QUEUE    | Offset to counted ASCII string containing the name of the queue with which a batch or print job is associated. (word)                                 |
| ACR\$W_NODEADDR | Offset to a counted binary string containing the remote node address. (word)                                                                          |
| ACR\$W_REMOTEID | Offset to counted ASCII string containing the remote ID of the remote process (varies with network implementation and use). (word)                    |

#### C.1.2.4 Image Name Packet (ACR\$K\_IMAGENAME)

The image name packet contains the name of the image executed by the identified process.

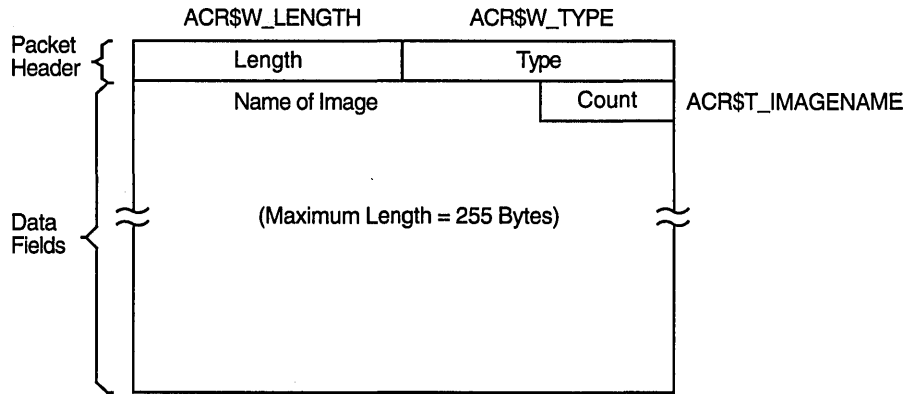
Figure C–5 shows the format of the image name packet. Table C–9 describes the field contained in the packet. See Section C.1.2.1 for information on the packet header.



# Accounting Information for Programmers

## C.1 Format of an Accounting File Record

**Figure C-5 Format of an Image Name Packet**



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**Table C-9 Data Fields in an Image Name Packet**

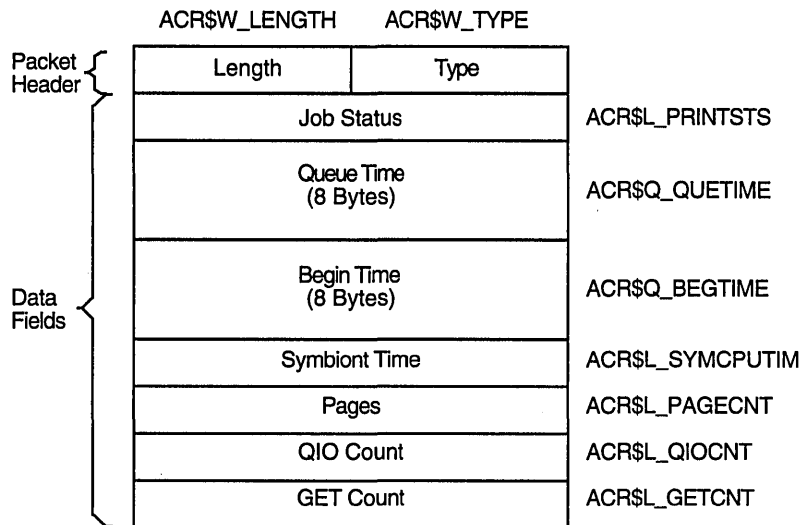
| Symbolic Offset  | Description                                                                  |
|------------------|------------------------------------------------------------------------------|
| ACR\$T_IMAGENAME | Name of the image (counted ASCII string that gives full file specification). |

### C.1.2.5 Print Resource Packet (ACR\$K\_PRINT)

The print resource packet contains information about print jobs.

Figure C-6 shows the format of the print resource packet. Table C-10 describes the fields contained in the packet. See Section C.1.2.1 for information on the packet header.

**Figure C-6 Format of a Print Resource Packet**



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## Accounting Information for Programmers

### C.1 Format of an Accounting File Record

**Table C-10 Data Fields in a Print Resource Packet**

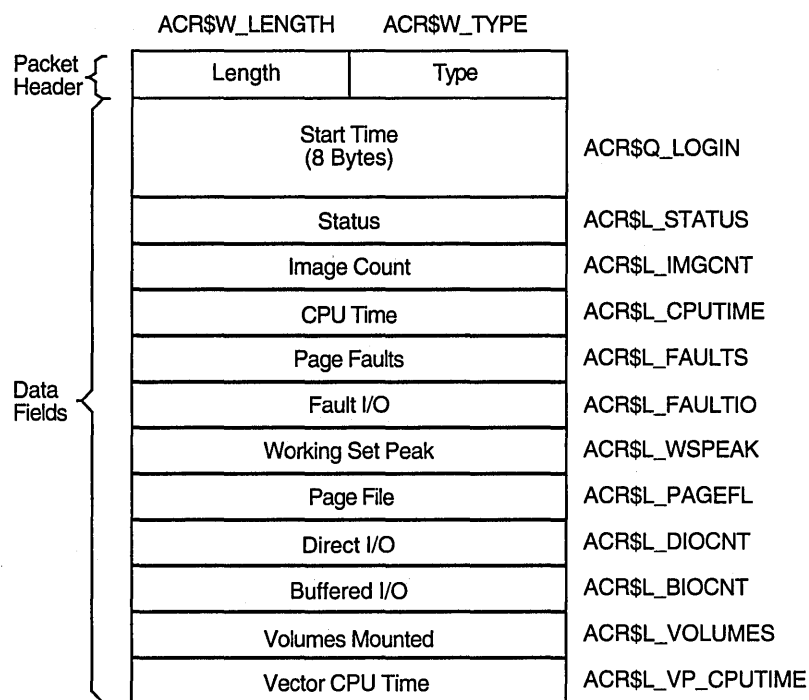
| Symbolic Offset  | Description                                               |
|------------------|-----------------------------------------------------------|
| ACR\$L_PRINTSTS  | Status of the print job. (longword)                       |
| ACR\$Q_QUEETIME  | Time the job was queued. (64-bit absolute time)           |
| ACR\$Q_BEGTIME   | Time the job was started. (64-bit absolute time)          |
| ACR\$L_SYMCPUTIM | Symbiont CPU time (always zero). (longword)               |
| ACR\$L_PAGECNT   | Number of pages printed. (longword)                       |
| ACR\$L_QIOCNT    | Number of QIOs issued to the printer. (longword)          |
| ACR\$L_GETCNT    | Number of GETs from the file that was printed. (longword) |

#### C.1.2.6 Resource Packet (ACR\$K\_RESOURCE)

The resource packet contains information about the identified process.

Figure C-7 shows the format of a resource packet. Table C-11 describes the fields contained in the packet. See Section C.1.2.1 for information on the packet header.

**Figure C-7 Format of a Resource Packet**



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## Accounting Information for Programmers

### C.1 Format of an Accounting File Record

**Table C–11 Data Fields in a Resource Packet**

| Symbolic Offset    | Description                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| ACR\$Q_LOGIN       | 64-bit absolute time at which the image was run or the process was created. (quadword)                                           |
| ACR\$L_STATUS      | Final exit status of the image, or for a process, the final status of the last image executed in the process. (longword)         |
| ACR\$L_IMGCNT      | Number of images run by the process. (longword)                                                                                  |
| ACR\$L_CPU TIME    | Total CPU time used by the image or process, measured in units of 10 milliseconds. This includes any vector CPU time. (longword) |
| ACR\$L_FAULTS      | Number of hard and soft page faults incurred by the image or process. (longword)                                                 |
| ACR\$L_FAULTIO     | Number of hard page faults incurred by the image or process. (longword)                                                          |
| ACR\$L_WSPEAK      | Maximum working set size used by the image or process. (longword)                                                                |
| ACR\$L_PAGEFL      | Maximum page file usage. (longword)                                                                                              |
| ACR\$L_DIOCNT      | Number of direct I/Os made by the image or process. (longword)                                                                   |
| ACR\$L_BIOCNT      | Number of buffered I/Os made by the image or process. (longword)                                                                 |
| ACR\$L_VOLUMES     | Number of volumes mounted by the image or process. (longword)                                                                    |
| ACR\$L_VP_CPU TIME | Vector CPU time used by the image or process, measured in units of 10 milliseconds. (longword)                                   |

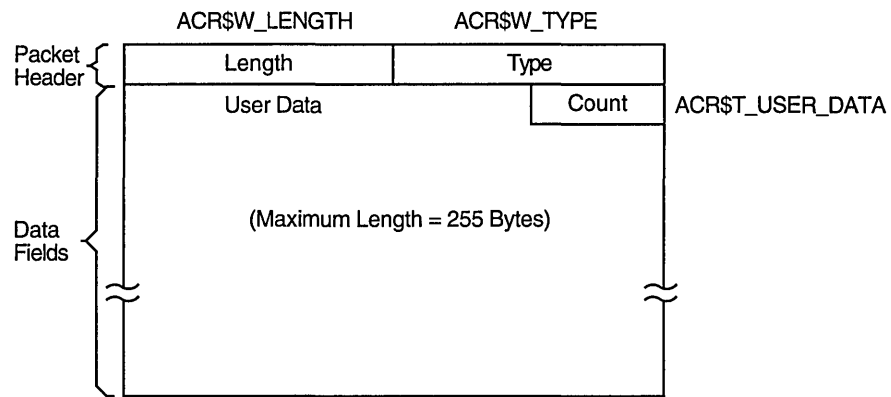
#### C.1.2.7 User Data Packet (ACR\$K\_USER\_DATA)

The user data packet contains an accounting message sent by the \$SNDJBC system service.

Figure C–8 shows the format of the user data packet. Table C–12 describes the fields contained in the packet. See Section C.1.2.1 for information on the packet header.

## Accounting Information for Programmers C.1 Format of an Accounting File Record

**Figure C-8 Format of a User Data Packet**



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**Table C-12 Data Fields in a User Data Packet**

| Symbolic Offset  | Description                               |
|------------------|-------------------------------------------|
| ACR\$T_USER_DATA | Up to 255 bytes of data (counted string). |



---

## ANALYZE/DISK\_STRUCTURE—Stage Checks

ANALYZE/DISK\_STRUCTURE performs the verification of a volume or volume set in eight distinct stages. During these stages, ANALYZE/DISK\_STRUCTURE compiles information that is used in reporting errors and performing repairs.

Before ANALYZE/DISK\_STRUCTURE can proceed with each stage, it must perform the following four initialization functions:

- Read the device name, validate access to the device, and save the device name
- Read the user-specified file names for the /LIST and /USAGE qualifiers, if specified, and open the files
- Assign all appropriate channels to the device being checked
- Write-lock the volume set to prevent simultaneous updates

The following sections describe the eight stages that ANALYZE/DISK\_STRUCTURE goes through while verifying a disk. These descriptions assume that you specified the /REPAIR qualifier in the command. An annotated ANALYZE/DISK\_STRUCTURE listing is included at the end of this appendix.

### D.1 Stage 1

In Stage 1, ANALYZE/DISK\_STRUCTURE gathers various volume information (such as cluster size, volume labels, and the number of volumes in the set) from several reserved files, verifies the information for accuracy, reports all discrepancies, and corrects problems discovered during this stage.

ANALYZE/DISK\_STRUCTURE identifies the volume and all the characteristics of that volume by using the parameters of the home block in INDEXF.SYS. When ANALYZE/DISK\_STRUCTURE confirms this information, it builds a current version of VOLSET.SYS in memory and reads and verifies the status control block (SCB) of BITMAP.SYS.

ANALYZE/DISK\_STRUCTURE then compares the volume-set attributes for the version of VOLSET.SYS in memory to the attributes listed in the version of VOLSET.SYS resident on the volume, reports discrepancies, and corrects errors.

### D.2 Stage 2

In Stage 2, ANALYZE/DISK\_STRUCTURE copies the current version of QUOTA.SYS into working memory, and establishes the structure on which another QUOTA.SYS file is built during subsequent stages. In Stage 7, these copies are compared with each other and inconsistencies are reported.

## ANALYZE/DISK\_STRUCTURE—Stage Checks

### D.3 Stage 3

#### D.3 Stage 3

Stage 3 checks consist of ANALYZE/DISK\_STRUCTURE operations that use the reserved file INDEXF.SYS. During Stage 3, ANALYZE/DISK\_STRUCTURE opens INDEXF.SYS, reads each file header, and completes the following steps:

- Validates each file's FID, and confirms that all files can be retrieved through the FID
- Validates the header and the revision date of each file
- Validates any extension headers of each file
- Confirms that each segment number reflects the proper sequence of extension headers

ANALYZE/DISK\_STRUCTURE also does the following during Stage 3:

- Builds a map of header linkage so that ambiguities can be detected
- Determines the high block (HIBLK) and end-of-file block (EFBLK) record attributes and compares these values with the recorded values in INDEXF.SYS
- Checks the high-water mark (HIWATERMARK)

While performing these checks, ANALYZE/DISK\_STRUCTURE builds several maps that it uses in subsequent stages. Table D-1 briefly describes each map built in Stage 3.

**Table D-1 Stage 3 Maps**

| Bitmap                      | Function                                                         |
|-----------------------------|------------------------------------------------------------------|
| Valid file numbers          | The current state of the bitmap for INDEXF.SYS                   |
| Lost file numbers           | All the valid file numbers not yet found in a directory          |
| Directory files             | List of all directory files                                      |
| Extension linkages          | List of all valid extension headers                              |
| Multiply-allocated clusters | List of all clusters that are referenced by more than one header |
| Allocated clusters          | All allocated clusters on the volume (or volume set)             |
| System map                  | The new storage bitmap                                           |
| Valid file backlink         | A map of all valid file backlinks                                |
| Invalid backlink            | A map of all invalid backlinks                                   |

#### D.4 Stage 4

In Stage 4, ANALYZE/DISK\_STRUCTURE builds a current version of BITMAP.SYS using the maps built during Stage 3. In addition, ANALYZE/DISK\_STRUCTURE reports any discrepancies between the headers' maps and the storage bitmap. In Stage 4, ANALYZE/DISK\_STRUCTURE does the following:

- Copies BITMAP.SYS into working memory
- Compares the corrected version of BITMAP.SYS with a map built from INDEXF.SYS

## ANALYZE/DISK\_STRUCTURE—Stage Checks

### D.4 Stage 4

- Writes a corrected version of BITMAP.SYS to disk
- Reports multiply-allocated clusters

### D.5 Stage 5

In this stage, ANALYZE/DISK\_STRUCTURE completes a pass of all entries in the invalid backlink map. ANALYZE/DISK\_STRUCTURE searches the directory hierarchy of the volume to confirm that all files included in INDEXF.SYS are retrievable through the directory structure. In addition, ANALYZE/DISK\_STRUCTURE identifies lost directories and attempts to reestablish valid backlinks to those directories.

In Stage 5, ANALYZE/DISK\_STRUCTURE does the following:

- Confirms the locations of all directories listed in the directory map (compiled in Stage 3) and the subsequent files in those directories
- Enters all directories indicated as lost and locates a valid parent (if any)

### D.6 Stage 6

Stage 6 is essentially a cleanup operation for lost file headers. Following Stage 5, ANALYZE/DISK\_STRUCTURE is left with a list of files that are truly lost—files that have backlinks to nonexistent directories. These files were not traceable through the directory structure. ANALYZE/DISK\_STRUCTURE is also left with a list of files with bad backlinks; these files are traceable through the directory structure, but the backlinks of the files do not point back to the directory that contains them.

During Stage 6, ANALYZE/DISK\_STRUCTURE does the following:

- Checks the backlink map to locate all files with invalid backlinks, then repairs backlinks
- Checks the lost file bitmap for lost files and places lost files in [SYSLOST] if you specified /REPAIR.
- If you specified the /USAGE qualifier, creates an entry for each lost file

### D.7 Stage 7

In this stage, ANALYZE/DISK\_STRUCTURE compares the values stored in the quota file built during Stage 2 with those stored in the reserved file QUOTA.SYS. During Stage 7, ANALYZE/DISK\_STRUCTURE opens QUOTA.SYS and performs the following operations:

- Compares the block usage for each UIC listed in QUOTA.SYS to parallel statistics listed in the copy of QUOTA.SYS built in Stage 2.
- Modifies QUOTA.SYS such that values in QUOTA.SYS match values in the copy built in Stage 2.
- Closes QUOTA.SYS



## ANALYZE/DISK\_STRUCTURE—Stage Checks

### D.8 Stage 8

### D.8 Stage 8

Throughout the first seven stages, ANALYZE/DISK\_STRUCTURE places operations that cannot be performed during a particular stage on a deferred list. The list includes FIDs sorted by operation. In Stage 8, ANALYZE/DISK\_STRUCTURE performs all operations stored on the deferred list. In Stage 8, ANALYZE/DISK\_STRUCTURE does the following:

- Removes an FID from the deferred list, renames the file, and adds the file to SYSLOST.DIR or to a user-specified directory
- Updates QUOTA.SYS to reflect all additional blocks used by the UIC that received the lost file
- Updates VOLSET.SYS to correct inconsistencies discovered during previous ANALYZE/DISK\_STRUCTURE stages

### D.9 Annotated Example

Example D-1 is an annotated example of an ANALYZE/DISK\_STRUCTURE session. The command used to generate this example did not include the /REPAIR qualifier.

#### Example D-1 ANALYZE/DISK\_STRUCTURE—Annotated Example

```
%VERIFY-I-BADHEADER, file (487,173,1) MAIL$0004008EEAEE0572.MAI;1 ❶
 invalid file header
%VERIFY-I-BADHEADER, file (531,112,1) MAIL$0004008EEFBB198B.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (589,104,1) MAIL$0004008EEAF199B9.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (604,157,1) MAIL$0004008EF12C3B28.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (674,247,1) MAIL$0004008EF6053C9B.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (688,41,1) MAIL$0004008EF608AFF4.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (689,135,1) MAIL$0004008EEE445A31.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (750,71,1) MAIL$0004008EEED19ADF.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (753,217,1) MAIL$0004008EE7C4A017.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (780,236,1) MAIL$0004008EF777ACA8.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (852,57,1) MAIL$0004008EF06C15F6.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (856,44,1) MAIL$0004008EE7D2520D.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1059,42,1) MAIL$0004008EEB045608.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1134,76,1) MAIL$0004008EE9EC806D.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1316,147,1) MAIL$0004008EEEDA734F.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1350,74,1) MAIL$0004008EE89BA8B0.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1351,64,1) MAIL$0004008EEB09B036.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1490,104,1) MAIL$0004008EE8B448B0.MAI;1
 invalid file header
%VERIFY-I-BADHEADER, file (1493,106,1) LASTNOTIC.NIL;1
 invalid file header
```

(continued on next page)

# ANALYZE/DISK\_STRUCTURE—Stage Checks D.9 Annotated Example

## Example D-1 (Cont.) ANALYZE/DISK\_STRUCTURE—Annotated Example

%VERIFY-I-BADHEADER, file (1548,204,1) MAIL\$0004008EF7B4D1B8.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (1613,61,1) MAIL\$0004008EECEE4BA5.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (1812,81,1) MAIL\$0004008EE7DF05EC.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (1848,26,1) MAIL\$0004008EF78659B9.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (1983,34119,1) MAIL\$0004008EE7E49C13.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (1987,33907,1) REMIND.CAL;9  
invalid file header

%VERIFY-I-BADHEADER, file (2196,123,1) MAIL\$0004008EE6FA2DC9.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (2372,125,1) MAIL\$0004008EF06339F9.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (2569,67,1) MAIL\$0004008EF2BF0C15.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (2605,72,1) MAIL\$0004008EE856FC73.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (2616,70,1) MAIL\$0004008EF063C04F.MAI;1  
invalid file header

%VERIFY-I-BADHEADER, file (2774,29818,1) LASTNOTIC.NIL;1  
invalid file header

%VERIFY-I-ALLOCLR, blocks incorrectly marked allocated ②  
LBN 442398 to 445538, RVN 1

%VERIFY-I-BADHEADER, file (487,0,1) MAIL\$0004008EEAEE0572.MAI;1 ③  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (487,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (531,0,1) MAIL\$0004008EEFBB198B.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (531,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (589,0,1) MAIL\$0004008EEAF199B9.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (589,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (604,0,1) MAIL\$0004008EF12C3B28.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (604,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (674,0,1) MAIL\$0004008EF6053C9B.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (674,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (688,0,1) MAIL\$0004008EF608AFF4.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (688,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (689,0,1) MAIL\$0004008EEEE445A31.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (689,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (750,0,1) MAIL\$0004008EEED19ADF.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (750,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (753,0,1) MAIL\$0004008EE7C4A017.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (753,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (780,0,1) MAIL\$0004008EF777ACA8.MAI;1  
invalid file header

%VERIFY-I-LOSTEXTHDR, file (780,0,1)  
lost extension file header

%VERIFY-I-BADHEADER, file (852,0,1) MAIL\$0004008EF06C15F6.MAI;1

(continued on next page)

# ANALYZE/DISK\_STRUCTURE—Stage Checks

## D.9 Annotated Example

### Example D-1 (Cont.) ANALYZE/DISK\_STRUCTURE—Annotated Example

```
invalid file header
%VERIFY-I-LOSTEXTHDR, file (852,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (856,0,1) MAIL$0004008EE7D2520D.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (856,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1059,0,1) MAIL$0004008EEB045608.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1059,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1134,0,1) MAIL$0004008EE9EC806D.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1134,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1316,0,1) MAIL$0004008EEEDA734F.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1316,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1350,0,1) MAIL$0004008EE89BA8B0.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1350,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1351,0,1) MAIL$0004008EEB09B036.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1351,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1490,0,1) MAIL$0004008EE8B448B0.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1490,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1493,0,1) LASTNOTIC.NIL;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1493,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1548,0,1) MAIL$0004008EF7B4D1B8.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1548,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1613,0,1) MAIL$0004008EECEE4BA5.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1613,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1812,0,1) MAIL$0004008EE7DF05EC.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1812,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1848,0,1) MAIL$0004008EF78659B9.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1848,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1983,0,1) MAIL$0004008EE7E49C13.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1983,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (1987,0,1) REMIND.CAL;9
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (1987,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (2196,0,1) MAIL$0004008EE6FA2DC9.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2196,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (2372,0,1) MAIL$0004008EF06339F9.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2372,0,1)
 lost extension file header
```

(continued on next page)

# ANALYZE/DISK\_STRUCTURE—Stage Checks D.9 Annotated Example

## Example D-1 (Cont.) ANALYZE/DISK\_STRUCTURE—Annotated Example

```
%VERIFY-I-BADHEADER, file (2569,0,1) MAIL$0004008EF2BF0C15.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2569,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (2605,0,1) MAIL$0004008EE856FC73.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2605,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (2616,0,1) MAIL$0004008EF063C04F.MAI;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2616,0,1)
 lost extension file header
%VERIFY-I-BADHEADER, file (2774,0,1) LASTNOTIC.NIL;1
 invalid file header
%VERIFY-I-LOSTEXTHDR, file (2774,0,1)
 lost extension file header
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [ALLWAY]NOTES.LOG;25 ④
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN.BOOTS]LOADER.OBJ;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN.BOOTS]SYSGEN.OBJ;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]MAIL_20600841.TMP;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]NETSERVER.LOG;181
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]NETSERVER.LOG;180
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]NETSERVER.LOG;179
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]NETSERVER.LOG;178
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BLAIN]NETSERVER.LOG;170
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BOEMUS.MAIL]MAIL$0004008EF94A72A0.MAI;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BOEMUS]NETSERVER.LOG;10
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [BOEMUS]UPDATE.LOG;1
%VERIFY-I-BACKLINK, incorrect directory back link [CALGON.GER]OBJ.DIR;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [CALGON]T.TMP;1
%VERIFY-I-BACKLINK, incorrect directory back link [CLABIN.BACKUP.TMPSRC]BACKDEF.SDL;1
%VERIFY-I-BACKLINK, incorrect directory back link [CLABIN.BACKUP.TMPSRC]COMMON.REQ;1
%VERIFY-I-BACKLINK, incorrect directory back link [CLABIN.BACKUP.TMPSRC]DUMMY.MSG;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [CLABIN.NMAIL]NMAIL.LOG;77
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [CLABIN.NMAIL]NMAIL.LOG;76
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DESIN.8800]2840HT86.GNC;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DESIN.8800]2840TP86.GNC;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.MAIL]MAIL$0004008EF94A79B3.MAI;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]MORT.OBJ;15
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;36
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;35
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;34
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;33
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;32
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;31
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [DOWNE.PRO]OUTPUT.LOG;30
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GAMBLE]CONFLICTS.LIS;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GAMBLE.DOC]SMP.LOCK;6
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GAMBLE]NETSERVER.LOG;5
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GAMBLE.NMAIL]NMAIL.LOG;22
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GAMBLE.NMAIL]NMAIL.LOG;21
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GILLEY.MAIL]MAIL$0004008EF94A7B70.MAI;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [GILLEY]NETSERVER.LOG;657
%VERIFY-I-BADDIRENT, invalid file identification in
directory entry [GILLEY]NETSERVER.LOG;656
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;33
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;32
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;31
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;30
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;29
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;28
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;27
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;26
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;25
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [HALL]2.LOG;24
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [NAMOLLY]NETSERVER.LOG;2
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [NAMOLLY]NETSERVER.LOG;1
```

(continued on next page)

## ANALYZE/DISK\_STRUCTURE—Stage Checks

### D.9 Annotated Example

#### Example D-1 (Cont.) ANALYZE/DISK\_STRUCTURE—Annotated Example

```
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [RUSS]082654.LOG;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [SCHROEDER.LOGIN]NETSERVER.LOG;17
%VERIFY-I-BADDIR, directory [SYSLOST.BOOTS] has invalid format
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOEN]NETSERVER.LOG;374
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOEN]NETSERVER.LOG;373
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOEN]NETSERVER.LOG;367
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOMAS.MAIL]MAIL$0004008EF94D75EB.MAI;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOMAS.MAIL]MAIL$0004008EF955DDF3.MAI;1
%VERIFY-I-BADDIRENT, invalid file identification in directory entry [THOMAS.MAIL]MAIL$0004008EFD118B44.MAI;1
%VERIFY-I-LOSTSCAN, due to directory errors, lost files will not be entered ⑤
%VERIFY-I-INCQUOTA, QUOTA.SYS indicates 69663 blocks used, actual use is 69740 blocks for [11,402] ⑥
%VERIFY-I-INCQUOTA, QUOTA.SYS indicates 1764 blocks used, actual use is 1770 blocks for [12,12]
%VERIFY-I-INCQUOTA, QUOTA.SYS indicates 0 blocks used, actual use is 31 blocks for [11,720]
```

- ① ANALYZE/DISK\_STRUCTURE has completed the first two stages, and is beginning Stage 3. Stage 1 involves collection and verification of various volume information. ANALYZE/DISK\_STRUCTURE found no problems with volume information. In Stage 2, ANALYZE/DISK\_STRUCTURE copies the current version of QUOTA.SYS to working memory, and builds the structure on which a new copy is built during subsequent stages. The first error message is produced by Stage 3. Stage 3 uses the reserved file INDEXF.SYS to locate a variety of file problems. Here, Stage 3 detects a number of invalid file headers. Note that the error message includes the FID and the file name.
- ② This error message is produced during Stage 4, during which ANALYZE/DISK\_STRUCTURE builds a current version of BITMAP.SYS, resolves multiple references to extension headers, and corrects discrepancies in the map sections of headers. Here, ANALYZE/DISK\_STRUCTURE has found that the specified logical blocks on the specified relative volume were marked allocated in the storage bit map, but were not allocated to a file.
- ③ This message marks the beginning of Stage 5. Here, messages stating “lost extension file header” and “invalid file header” indicate that ANALYZE/DISK\_STRUCTURE is performing a pass of all entries placed on the invalid backlink map. This map was created in Stage 3.
- ④ This message marks the beginning of the second phase of Stage 5, in which ANALYZE/DISK\_STRUCTURE confirms that all files in INDEX.SYS are retrievable through the directory structure. Here, the series of “invalid file identification . . .” messages indicates those directory entries that did not contain a valid file identification.
- ⑤ This message is produced by Stage 6, which is essentially a cleanup phase for lost files. This message indicates that ANALYZE/DISK\_STRUCTURE encountered errors during the directory scan that were reported in previous messages. As a result, the file is not entered in directory [SYSLOST].
- ⑥ Here, ANALYZE/DISK\_STRUCTURE begins Stage 7, in which it compares values stored in the quota file built during Stage 2 with values in the reserved file QUOTA.SYS. The last three messages here indicate discrepancies between the two files.

Note that no messages were produced during Stage 8. During Stage 8, ANALYZE/DISK\_STRUCTURE executes all operations placed on the deferred list, and if you specified /REPAIR, updates QUOTA.SYS and VOLSET.SYS as necessary.

---

## ANALYZE/DISK\_STRUCTURE—Usage File

When you specify the /USAGE qualifier, ANALYZE/DISK\_STRUCTURE creates a disk usage accounting file. The first record of this file, the identification record, contains a summary of the disk and volume characteristics. The identification record is followed by many file summary records, one record for each file on the disk. Each file summary record contains the owner, size, and name of a file.

The identification record is characterized by the type code USG\$K\_IDENT in the USG\$B\_TYPE field of the record. Table E-1 contains a description of all the fields in this record.

**Table E-1 Identification Record Format(Length USG\$K\_IDENT\_LEN)**

| Field            | Meaning                                                                                                                                                                                                                                                                                  |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USG\$L_SERIALNUM | Serial number of the volume. This is an octal longword value.                                                                                                                                                                                                                            |
| USG\$T_STRUCNAM  | Volume set name (if the volume is part of a volume set). For a Files-11 Structure Level 1 volume, this field contains binary zeros; for a Files-11 Structure Level 2 volume that is not part of a volume set, this field contains spaces. The length of this field is USG\$\$_STRUCNAME. |
| USG\$T_VOLNAME   | Volume name of relative volume 1. The length of this field is USG\$\$_VOLNAME.                                                                                                                                                                                                           |
| USG\$T_OWNERNAME | Volume owner name. The length of this field is USG\$\$_OWNERNAME.                                                                                                                                                                                                                        |
| USG\$T_FORMAT    | Volume format type. For a Files-11 Structure Level 1 volume, this field contains "DECFILE11A"; for a Files-11 Structure Level 2 volume, this field contains "DECFILE11B". The length of this field is USG\$\$_FORMAT.                                                                    |
| USG\$Q_TIME      | Quadword system time when this usage file was created. The length of this field is USG\$\$_TIME.                                                                                                                                                                                         |

Each file summary record is characterized by the type code USG\$K\_FILE in the USG\$B\_TYPE field of the record. Table E-2 contains a description of all the fields in these records.

## ANALYZE/DISK\_STRUCTURE—Usage File

**Table E-2 File Record Format (Length USG\$K\_FILE\_LEN)**

| Field            | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USG\$L_FILEOWNER | File owner UIC. This can be considered as a single longword value or as two word values (USG\$W_UICMEMBER and USG\$W_UICGROUP).                                                                                                                                                                                                                                                                                                                                                                           |
| USG\$W_UICMEMBER | The member field of the file owner UIC. This is an octal word value.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| USG\$W_UICGROUP  | The group field of the file owner UIC. This is an octal word value.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| USG\$L_ALLOCATED | Number of blocks allocated to the file, including file headers. This is a decimal longword value.                                                                                                                                                                                                                                                                                                                                                                                                         |
| USG\$L_USED      | Number of blocks used, up to and including the end-of-file block. This is a decimal longword value.                                                                                                                                                                                                                                                                                                                                                                                                       |
| USG\$W_DIR_LEN   | Length of the directory string portion of USG\$T_FILESPEC, including the brackets. This is a decimal word value.                                                                                                                                                                                                                                                                                                                                                                                          |
| USG\$W_SPEC_LEN  | Length of the complete file specification in USG\$T_FILESPEC. This is a decimal word value.                                                                                                                                                                                                                                                                                                                                                                                                               |
| USG\$T_FILESPEC  | File specification, in the following format:<br>[dir]nam.typ;ver<br>This field is of variable length. A file that has more than one directory entry is listed under the first file specification found. A lost file has an empty directory string “[ ]” and the file name is taken from the file header. In some cases this information does not exist; you must take this into consideration when you write application programs to process the usage file. The length of this field is USG\$S_FILESPEC. |

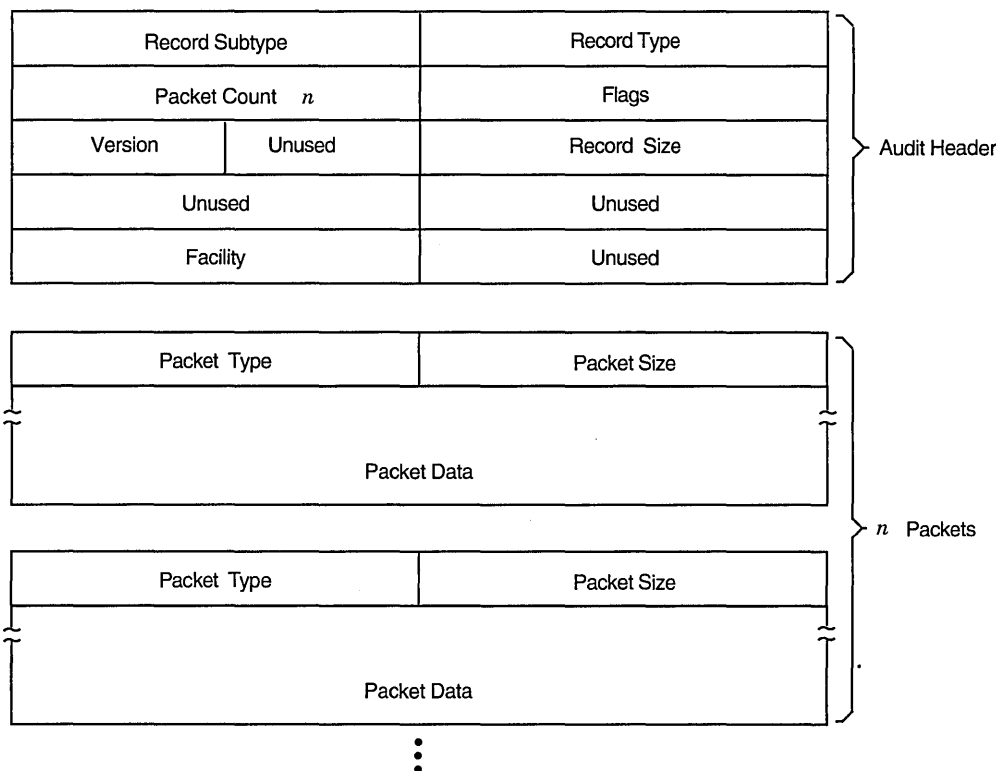
The symbolic names referenced in both the identification and the file summary records are defined in the system definition macro \$USGDEF. The length of the identification record is USG\$K\_IDENT\_LEN. The length of a file summary record is USG\$K\_FILE\_LEN.

## Security Audit Message Format (VAX Only)

This appendix describes the format of the auditing messages written to the security auditing log file on VAX systems. The default audit log file SECURITY.AUDIT\$JOURNAL is created by default in the SYS\$COMMON:[SYSMGR] directory. If you are using an AXP system, see Appendix G.

Each security audit record consists of a header packet followed by one or more data packets, as shown in Figure F-1. The number of data packets depends on the type of information being sent. This appendix describes the format of the audit header and its data packets as well as the contents of the data packets.

Figure F-1 Format of a Security Audit Message



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# Security Audit Message Format (VAX Only)

## F.1 Audit Header Packet

### F.1 Audit Header Packet

Table F-1 describes the fields contained in the audit header packet, illustrated in Figure F-2.

**Figure F-2 Audit Header Packet Format**

|                       |        |                    |
|-----------------------|--------|--------------------|
| NSA\$W_RECORD_SUBTYPE |        | NSA\$W_RECORD_TYPE |
| NSA\$W_PACKET_COUNT   |        | NSA\$W_FLAGS       |
| NSA\$C_VERSION_3      | Unused | NSA\$W_RECORD_SIZE |
| Unused                |        | Unused             |
| NSA\$W_FACILITY       |        | Unused             |

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Symbols representing the types or subtypes of security events are listed in Table F-2. For each audit event record type defined by `NSA$W_RECORD_TYPE`, there is a record subtype defined by the symbol `NSA$W_RECORD_SUBTYPE`, which further defines the event.

Table F-3 identifies any flags associated with the audited event.

The symbol `NSA$K_MSG_HDR_LENGTH` defines the current size of the message header (in bytes).

## Security Audit Message Format (VAX Only) F.1 Audit Header Packet

**Table F-1 Description of the Audit Header Fields**

| Field        | Symbolic Offset       | Contents                                                                                                                   |
|--------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------|
| Type         | NSA\$W_RECORD_TYPE    | Indicates the type of event that has occurred. See Table F-2 for details.                                                  |
| Subtype      | NSA\$W_RECORD_SUBTYPE | Further defines the type of event that has occurred. See Table F-2 for details.                                            |
| Flags        | NSA\$W_FLAGS          | Identifies any flags associated with the audited event. See Table F-3 for details. Reserved to Digital. (Word)             |
| Packet count | NSA\$W_PACKET_COUNT   | Number of data packets in the audit record. (Word)                                                                         |
| Record size  | NSA\$W_RECORD_SIZE    | Total size of the audit message; the size represents the header packet plus all its data packets. (Word)                   |
| Version      | NSA\$C_VERSION_3      | Indicates the version of the security auditing facility. The symbol NSA\$C_VERSION_3 indicates the current version. (Byte) |
| Facility     | NSA\$W_FACILITY       | The facility code for the generated event. By default, this field is zero, indicating a system-generated event. (Word)     |

**Table F-2 Description of Audit Event Types and Subtypes**

| Symbol of Event Type       | Meaning                                       |
|----------------------------|-----------------------------------------------|
| NSA\$C_MSG_AUDIT           | Systemwide change to auditing                 |
| <b>Subtype and Meaning</b> |                                               |
| NSA\$C_ALARM_STATE         | Events enabled as alarms                      |
| NSA\$C_AUDIT_DISABLED      | Audit events disabled                         |
| NSA\$C_AUDIT_ENABLED       | Audit events enabled                          |
| NSA\$C_AUDIT_INITIATE      | Audit server startup                          |
| NSA\$C_AUDIT_LOG_FIRST     | First entry in audit log (backward link)      |
| NSA\$C_AUDIT_LOG_FINAL     | Final entry in audit log (forward link)       |
| NSA\$C_AUDIT_STATE         | Events enabled as audits                      |
| NSA\$C_AUDIT_TERMINATE     | Audit server shutdown                         |
| NSA\$C_SNAPSHOT_ABORT      | System snapshot attempt has aborted           |
| NSA\$C_SNAPSHOT_ACCESS     | Snapshot file access/deaccess                 |
| NSA\$C_SNAPSHOT_SAVE       | System snapshot save in progress              |
| NSA\$C_SNAPSHOT_STARTUP    | System booted from a snapshot file            |
| NSA\$C_MSG_BREAKIN         | Break-in attempt detected                     |
| <b>Subtype and Meaning</b> |                                               |
| NSA\$C_BATCH               | Batch process                                 |
| NSA\$C_DETACHED            | Detached process                              |
| NSA\$C_DIALUP              | Dialup interactive process                    |
| NSA\$C_LOCAL               | Local interactive process                     |
| NSA\$C_NETWORK             | Network server task                           |
| NSA\$C_REMOTE              | Interactive process from another network node |
| NSA\$C_SUBPROCESS          | Subprocess                                    |
| NSA\$C_MSG_CONNECTION      | Logical link connection or termination        |

(continued on next page)

## Security Audit Message Format (VAX Only)

### F.1 Audit Header Packet

Table F-2 (Cont.) Description of Audit Event Types and Subtypes

| Symbol of Event Type                   | Meaning                                                   |
|----------------------------------------|-----------------------------------------------------------|
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_CNX_ABORT                       | Connection aborted                                        |
| NSA\$C_CNX_ACCEPT                      | Connection accepted                                       |
| NSA\$C_CNX_DECNET_CREATE               | DECnet logical link created                               |
| NSA\$C_CNX_DECNET_DELETE               | DECnet logical link disconnected                          |
| NSA\$C_CNX_DISCONNECT                  | Connection disconnected                                   |
| NSA\$C_CNX_INC_ABORT                   | Incoming connection request aborted                       |
| NSA\$C_CNX_INC_ACCEPT                  | Incoming connection request accepted                      |
| NSA\$C_CNX_INC_DISCONNECT              | Incoming connection disconnected                          |
| NSA\$C_CNX_INC_REJECT                  | Incoming connection request rejected                      |
| NSA\$C_CNX_INC_REQUEST                 | Incoming connection request                               |
| NSA\$C_CNX_IPC_CLOSE                   | Interprocess communication association closed             |
| NSA\$C_CNX_IPC_OPEN                    | Interprocess communication association opened             |
| NSA\$C_CNX_REJECT                      | Connection rejected                                       |
| NSA\$C_CNX_REQUEST                     | Connection requested                                      |
| NSA\$C_MSG_INSTALL                     | Use of the Install utility (INSTALL)                      |
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_INSTALL_ADD                     | Known image installed                                     |
| NSA\$C_INSTALL_REMOVE                  | Known image deleted                                       |
| NSA\$C_MSG_LOGFAIL                     | Login failure                                             |
| <b>Subtype and Meaning</b>             |                                                           |
| See subtypes for<br>NSA\$C_MSG_BREAKIN |                                                           |
| NSA\$C_MSG_LOGIN                       | Successful login                                          |
| <b>Subtype and Meaning</b>             |                                                           |
| See subtypes for<br>NSA\$C_MSG_BREAKIN |                                                           |
| NSA\$C_MSG_LOGOUT                      | Successful logout                                         |
| <b>Subtype and Meaning</b>             |                                                           |
| See subtypes for<br>NSA\$C_MSG_BREAKIN |                                                           |
| NSA\$C_MSG_MOUNT                       | Volume mount or dismount                                  |
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_VOL_DISMOUNT                    | Volume dismount                                           |
| NSA\$C_VOL_MOUNT                       | Volume mount                                              |
| NSA\$C_MSG_NCP                         | Modification to network configuration database            |
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_NCP_COMMAND                     | Network Control Program (NCP) command issued              |
| NSA\$C_MSG_NETPROXY                    | Modification to network proxy database                    |
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_NETPROXY_ADD                    | Record added to network proxy authorization file          |
| NSA\$C_NETPROXY_DELETE                 | Record removed from network proxy authorization file      |
| NSA\$C_NETPROXY_MODIFY                 | Record modified in network proxy authorization file       |
| NSA\$C_MSG_OBJ_ACCESS                  | Object access attempted                                   |
| <b>Subtype and Meaning</b>             |                                                           |
| NSA\$C_OBJ_ACCESS                      | Access attempted to create, delete, or deaccess an object |
| NSA\$C_MSG_OBJ_CREATE                  | Object creation attempted                                 |

(continued on next page)

**Security Audit Message Format (VAX Only)**  
**F.1 Audit Header Packet**

**Table F-2 (Cont.) Description of Audit Event Types and Subtypes**

| Symbol of Event Type                                | Meaning                                                 |
|-----------------------------------------------------|---------------------------------------------------------|
| <b>Subtype and Meaning</b><br>NSA\$C_OBJ_CREATE     | Access attempted to create an object                    |
| NSA\$C_MSG_OBJ_DEACCESS                             | Object deaccessed                                       |
| <b>Subtype and Meaning</b><br>NSA\$C_OBJ_DEACCESS   | Attempt to complete access to an object                 |
| NSA\$C_MSG_OBJ_DELETE                               | Object deletion attempted                               |
| <b>Subtype and Meaning</b><br>NSA\$C_OBJ_DELETE     | Object deletion attempted                               |
| NSA\$C_MSG_PROCESS                                  | Process controlled through a system service             |
| <b>Subtype and Meaning</b><br>NSA\$C_PRC_CANWAK     | Process wakeup canceled                                 |
| NSA\$C_PRC_CREPRC                                   | Process created                                         |
| NSA\$C_PRC_DELPRC                                   | Process deleted                                         |
| NSA\$C_PRC_FORCEX                                   | Process exit forced                                     |
| NSA\$C_PRC_GETJPI                                   | Process information gathered                            |
| NSA\$C_PRC_GRANTID                                  | Process identifier granted                              |
| NSA\$C_PRC_RESUME                                   | Process resumed                                         |
| NSA\$C_PRC_REVOKID                                  | Process identifier revoked                              |
| NSA\$C_PRC_SCHDWK                                   | Process wakeup scheduled                                |
| NSA\$C_PRC_SETPRI                                   | Process priority altered                                |
| NSA\$C_PRC_SIGPRC                                   | Process exception issued                                |
| NSA\$C_PRC_SUSPND                                   | Process suspended                                       |
| NSA\$C_PRC_TERM                                     | Process termination notification requested              |
| NSA\$C_PRC_WAKE                                     | Process wakeup issued                                   |
| NSA\$C_MSG_PRVAUD                                   | Use of privilege                                        |
| <b>Subtype and Meaning</b><br>NSA\$C_PRVAUD_FAILURE | Unsuccessful use of privilege                           |
| NSA\$C_PRVAUD_SUCCESS                               | Successful use of privilege                             |
| NSA\$C_MSG_RIGHTSDB                                 | Modification to the rights database                     |
| <b>Subtype and Meaning</b><br>NSA\$C_RDB_ADD_ID     | Identifier added to rights database                     |
| NSA\$C_RDB_CREATE                                   | Rights database created                                 |
| NSA\$C_RDB_GRANT_ID                                 | Identifier granted to user                              |
| NSA\$C_RDB_MOD_HOLDER                               | List of identifier holders modified                     |
| NSA\$C_RDB_MOD_ID                                   | Identifier name or attributes modified                  |
| NSA\$C_RDB_REM_ID                                   | Identifier removed from rights database                 |
| NSA\$C_RDB_REVOKE_ID                                | Identifier taken away from user                         |
| NSA\$C_MSG_SYSGEN                                   | Use of the System Generation utility (SYSGEN)           |
| <b>Subtype and Meaning</b><br>NSA\$C_SYSGEN_SET     | System Generation utility (SYSGEN) parameter modified   |
| NSA\$C_MSG_SYSTIME                                  | Modification to system time                             |
| <b>Subtype and Meaning</b><br>NSA\$C_SYSTIM_SET     | System time set                                         |
| NSA\$C_SYSTIM_CAL                                   | System time calibrated                                  |
| NSA\$C_MSG_SYSUAF                                   | Modification to system user authorization file (SYSUAF) |

(continued on next page)

## Security Audit Message Format (VAX Only)

### F.1 Audit Header Packet

Table F-2 (Cont.) Description of Audit Event Types and Subtypes

| Symbol of Event Type       | Meaning                                            |
|----------------------------|----------------------------------------------------|
| <b>Subtype and Meaning</b> |                                                    |
| NSA\$C_SYSUAF_ADD          | Record added to system user authorization file     |
| NSA\$C_SYSUAF_COPY         | Record copied in system user authorization file    |
| NSA\$C_SYSUAF_DELETE       | Record deleted from system user authorization file |
| NSA\$C_SYSUAF_MODIFY       | Record modified in system user authorization file  |
| NSA\$C_SYSUAF_RENAME       | Record renamed in system user authorization file   |

Table F-3 Description of Audit Event Flags

| Symbol <sup>1</sup> | Meaning                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------|
| NSA\$M_ACL          | Event generated by an alarm access control entry (ACE) or an audit ACE.                   |
| NSA\$M_ALARM        | Event is a security alarm.                                                                |
| NSA\$M_AUDIT        | Event is a security audit.                                                                |
| NSA\$M_FLUSH        | Event forced the audit server to write all buffered event messages to the audit log file. |
| NSA\$M_FOREIGN      | Event occurred outside of the system trusted computing base.                              |
| NSA\$M_MANDATORY    | Event resulted from a mandatory process audit.                                            |

<sup>1</sup>All other flags are reserved by Digital.

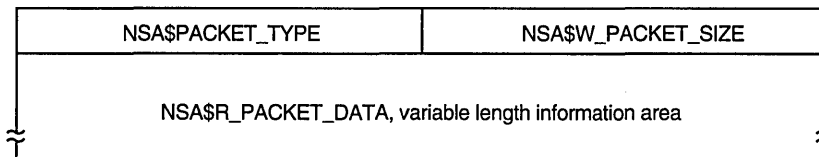
## F.2 Audit Data Packets

Figure F-3 illustrates the format of an audit data packet. NSA\$K\_PKT\_HDR\_LENGTH defines the current size of each packet header (in bytes).

Note that audit data packets do not appear in any predefined order within an event message, and packet types can appear more than once throughout the event message.

For examples of the types of data appearing in different event messages, see the appendix of alarm messages in the *Security Guide*.

Figure F-3 Audit Data Packet Format



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## Security Audit Message Format (VAX Only) F.2 Audit Data Packets

Table F-4 describes the fields contained in these packets.

**Table F-4 Description of the Audit Data Packet**

| Field       | Symbolic Offset    | Contents                                                             |
|-------------|--------------------|----------------------------------------------------------------------|
| Packet size | NSA\$W_PACKET_SIZE | Indicates the size of the data packet. (Word)                        |
| Packet type | NSA\$W_PACKET_TYPE | Indicates the type of data in the packet, as described in Table F-5. |
| Packet data | NSA\$R_PACKET_DATA | Variable length field containing the packet data.                    |

**Table F-5 Types of Data in Audit Packets**

| Symbol                     | Packet Contents                                                                                                                                  |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$_ACCESS_DESIRED       | Access requested or granted to the object as defined by \$ARMDEF (Longword)                                                                      |
| NSA\$_ACCESS_MODE          | Access mode of the process (Byte)                                                                                                                |
| NSA\$_ACCOUNT              | Account name associated with the process (String of 1-32 characters)                                                                             |
| NSA\$_ALARM_NAME           | Name of the user (or the security class operators terminal) to receive the record (String of 1-32 characters)                                    |
| NSA\$_ASSOCIATION_NAME     | Interprocess communication (IPC) association name (String of 1-256 characters)                                                                   |
| NSA\$_AUDIT_FLAGS          | Bit mask of enabled or disabled events. This is reserved to Digital and supported through VMS V5.5. (40-byte record) (String of 1-65 characters) |
| NSA\$_AUDIT_NAME           | Journal file to receive the audit record (String of 1-65 characters)                                                                             |
| NSA\$_COMMAND_LINE         | Command line the user entered (String of 1-2048 characters)                                                                                      |
| NSA\$_CONNECTION_ID        | Interprocess communication (IPC) connection identification (Longword)                                                                            |
| NSA\$_DECNET_LINK_ID       | DECnet logical link identification (Longword)                                                                                                    |
| NSA\$_DECNET_OBJECT_NAME   | DECnet object name (String of 1-16 characters)                                                                                                   |
| NSA\$_DECNET_OBJECT_NUMBER | DECnet object number (Longword)                                                                                                                  |
| NSA\$_DEFAULT_USERNAME     | Default local user name for incoming network proxy requests (String of 1-32 characters)                                                          |
| NSA\$_DEVICE_NAME          | Device name where the volume resides (String of 1-64 characters)                                                                                 |
| NSA\$_DIRECTORY_ENTRY      | Directory entry associated with file system operation (Longword)                                                                                 |
| NSA\$_DIRECTORY_ID         | Directory file identification (Array of 3 words)                                                                                                 |
| NSA\$_DIRECTORY_NAME       | Directory file name                                                                                                                              |
| NSA\$_DISMOUNT_FLAGS       | The \$DMTDEF macro in STARLET defines the dismount flags; each flag is one quadword.                                                             |
| NSA\$_EFC_NAME             | Event flag cluster name (String of 1-16 characters)                                                                                              |
| NSA\$_EVENT_FACILITY       | Facility code for the generated event (Word)                                                                                                     |

(continued on next page)

## Security Audit Message Format (VAX Only)

### F.2 Audit Data Packets

Table F-5 (Cont.) Types of Data in Audit Packets

| Symbol                  | Packet Contents                                                                                                                         |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$_FIELD_NAME        | Name of the field being modified. This is used in combination with NSA\$_ORIGINAL_DATA and NSA\$_NEW_DATA. (String of 1-256 characters) |
| NSA\$_FILE_ID           | File identification (Array of words)                                                                                                    |
| NSA\$_FINAL_STATUS      | Status (successful or unsuccessful) causing the auditing facility to be invoked (Longword)                                              |
| NSA\$_HOLDER_NAME       | Name of user holding the identifier (String of 1-32 characters)                                                                         |
| NSA\$_HOLDER_OWNER      | Owner (UIC) of holder (Longword)                                                                                                        |
| NSA\$_ID_ATTRIBUTES     | Attributes of the identifier, which are defined by the \$KGBDEF macro in STARLET (Longword)                                             |
| NSA\$_IDENTIFIERS_USED  | Identifiers (from the access control entry (ACE) granting access) used to gain access to the object (Array of longwords)                |
| NSA\$_ID_NAME           | Name of the identifier (String of 1-32 characters)                                                                                      |
| NSA\$_ID_NEW_ATTRIBUTES | New attributes of the identifier, which are defined by the \$KGBDEF macro in STARLET (Longword)                                         |
| NSA\$_ID_NEW_NAME       | New name of the identifier (String of 1-32 characters)                                                                                  |
| NSA\$_ID_NEW_VALUE      | New value of the identifier (Longword)                                                                                                  |
| NSA\$_ID_VALUE          | Value of the identifier (Longword)                                                                                                      |
| NSA\$_ID_VALUE_ASCII    | Identification value provided by \$IDTOASC (Longword)                                                                                   |
| NSA\$_IMAGE_NAME        | Name of the image being executed when the event took place (String of 1-1024 characters)                                                |
| NSA\$_INSTALL_FILE      | The name of the installed file (String of 1-255 characters)                                                                             |
| NSA\$_INSTALL_FLAGS     | The INSTALL flags correspond to qualifiers for the Install utility (for example, NSA\$_M_INS_EXECUTE_ONLY); each flag is one longword.  |
| NSA\$_LNM_PARENT_NAME   | Name of the parent logical name table (String of 1-31 characters)                                                                       |
| NSA\$_LNM_TABLE_NAME    | Name of the logical name table (String of 1-31 characters)                                                                              |
| NSA\$_LOCAL_USERNAME    | User name of the account available for incoming network proxy requests (String of 1-32 characters)                                      |
| NSA\$_LOGICAL_NAME      | Logical name associated with the device (String of 1-255 characters)                                                                    |
| NSA\$_MAILBOX_UNIT      | Mailbox unit number (Longword)                                                                                                          |
| NSA\$_MATCHING_ACE      | ACE granting or denying access (Array of bytes)                                                                                         |
| NSA\$_MESSAGE           | Associated message code; see NSA\$_MSGFILNAM for translation (Longword)                                                                 |
| NSA\$_MOUNT_FLAGS       | The MOUNT flags defined by the \$MNTDEF macro in STARLET (Longword)                                                                     |
| NSA\$_MSGFILNAM         | Message file containing the translation for the message code in NSA\$_MESSAGE (String of 1-255 characters)                              |

(continued on next page)

## Security Audit Message Format (VAX Only) F.2 Audit Data Packets

**Table F-5 (Cont.) Types of Data in Audit Packets**

| Symbol                  | Packet Contents                                                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$_NEW_DATA          | Contents of the field named in NSA\$_FIELD_NAME after the event occurred. NSA\$_ORIGINAL_DATA contains the field contents prior to the event. (String of 1-n characters) |
| NSA\$_NEW_IMAGE_NAME    | Name of the new image (String of 1-1024 characters)                                                                                                                      |
| NSA\$_NEW_OWNER         | New process owner (UIC) (Longword)                                                                                                                                       |
| NSA\$_NEW_PRIORITY      | New process priority (Longword)                                                                                                                                          |
| NSA\$_NEW_PRIVILEGES    | New privileges (Quadword)                                                                                                                                                |
| NSA\$_NEW_PROCESS_ID    | New identification of the process (Longword)                                                                                                                             |
| NSA\$_NEW_PROCESS_NAME  | New name of the process (String of 1-15 characters)                                                                                                                      |
| NSA\$_NEW_PROCESS_OWNER | New owner (UIC) of the process (Longword)                                                                                                                                |
| NSA\$_NEW_USERNAME      | New user name (String of 1-32 characters)                                                                                                                                |
| NSA\$_NOP               | Packet in static event list to omit from processing                                                                                                                      |
| NSA\$_OBJECT_CLASS      | Object class name, as defined by the system or by the user. (String of 1-23 characters)                                                                                  |
| NSA\$_OBJECT_MAX_CLASS  | The minimum access classification of the object. (20-byte record)                                                                                                        |
| NSA\$_OBJECT_MIN_CLASS  | The minimum access classification of the object. (20-byte record)                                                                                                        |
| NSA\$_OBJECT_NAME       | Object's name (String of 1-255 characters)                                                                                                                               |
| NSA\$_OBJECT_NAME_2     | Alternate object name; currently applies to file-backed global sections where the alternate name of global section is the file name. (String of 1-255 characters)        |
| NSA\$_OBJECT_OWNER      | UIC or general identifier of the process causing the auditable event (Longword)                                                                                          |
| NSA\$_OBJECT_PROTECTION | UIC-based protection of the object (Vector of words or longwords)                                                                                                        |
| NSA\$_OBJECT_TYPE       | Object's type code, as listed in \$ACLDEF. This is supported through VMS V5.5. (String of 1-23 characters)                                                               |
| NSA\$_OLD_PRIORITY      | Former process priority (Longword)                                                                                                                                       |
| NSA\$_OLD_PRIVILEGES    | Former privileges (Quadword)                                                                                                                                             |
| NSA\$_ORIGINAL_DATA     | Contents of the field named in NSA\$_FIELD_NAME before the event occurred. NSA\$_NEW_DATA contains the field contents following the event. (String of 1-n characters)    |
| NSA\$_PARAMS_INUSE      | Set of parameter values given to the SYSGEN command USE (String of 1-255 characters)                                                                                     |
| NSA\$_PARAMS_WRITE      | File name for the SYSGEN command WRITE (String of 1-255 characters)                                                                                                      |
| NSA\$_PARENT_ID         | Process identification (PID) of the parent process; only used when auditing events pertaining to a subprocess (Longword)                                                 |
| NSA\$_PARENT_NAME       | Parent's process name; only used when auditing events pertaining to a subprocess (String of 1-15 characters)                                                             |

(continued on next page)



## Security Audit Message Format (VAX Only) F.2 Audit Data Packets

**Table F-5 (Cont.) Types of Data in Audit Packets**

| Symbol                     | Packet Contents                                                                                                                                             |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$_PARENT_OWNER         | Owner (UIC) of the parent process (Longword)                                                                                                                |
| NSA\$_PARENT_USERNAME      | User name associated with the parent process (String of 1-32 characters)                                                                                    |
| NSA\$_PASSWORD             | Password used in unsuccessful break-in attempt (String of 1-32 characters)                                                                                  |
| NSA\$_PRIVILEGES           | Privilege mask (Quadword)                                                                                                                                   |
| NSA\$_PRIVS_MISSING        | Privileges that are lacking (Longword or quadword)                                                                                                          |
| NSA\$_PRIVS_USED           | Privileges used to gain access to the object (Longword or quadword)                                                                                         |
| NSA\$_PROCESS_ID           | PID of the process causing the auditable event (Longword)                                                                                                   |
| NSA\$_PROCESS_NAME         | Process' name that caused the auditable event (String of 1-15 characters)                                                                                   |
| NSA\$_REM_ASSOCIATION_NAME | Interprocess communication (IPC) remote association name (String of 1-256 characters)                                                                       |
| NSA\$_REMOTE_LINK_ID       | Remote logical link identification number (Longword)                                                                                                        |
| NSA\$_REMOTE_NODE_ID       | DECnet address of the remote process (Longword)                                                                                                             |
| NSA\$_REMOTE_NODENAME      | DECnet node name of the remote process (String of 1-6 characters)                                                                                           |
| NSA\$_REMOTE_USERNAME      | User name of the remote process (String of 1-32 characters)                                                                                                 |
| NSA\$_REQUEST_NUMBER       | Request number associated with the system service call. (Longword)                                                                                          |
| NSA\$_RESOURCE_NAME        | Lock resource name (String of 1-32 characters)                                                                                                              |
| NSA\$_SECTION_NAME         | Global section name (String of 1-42 characters)                                                                                                             |
| NSA\$_SNAPSHOT_BOOTFILE    | The name of the snapshot boot file, the saved system image file from which the system just booted. (String of 1-255 characters)                             |
| NSA\$_SNAPSHOT_SAVE_FILNAM | The name of the snapshot save file, which is the original location of the snapshot file at the time that the system was saved. (String of 1-255 characters) |
| NSA\$_SNAPSHOT_TIME        | The time the picture of the configuration was taken and saved in the snapshot boot file. (Quadword)                                                         |
| NSA\$_SOURCE_PROCESS_ID    | Identification of process originating the request (Longword)                                                                                                |
| NSA\$_SUBJECT_CLASS        | The current access class of the process causing the auditable event. (A 20-byte record)                                                                     |
| NSA\$_SUBJECT_OWNER        | Owner (UIC) of the process causing the event. (Longword)                                                                                                    |
| NSA\$_SYSTEM_ID            | SCS identification of the cluster node where the event took place (SYSGEN parameter SCSSYSTEMID). (Longword)                                                |
| NSA\$_SYSTEM_NAME          | System Communication Services (SCS) node name where the event took place (SYSGEN parameter SCSNODE) (String of 1-6 characters)                              |

(continued on next page)

## Security Audit Message Format (VAX Only) F.2 Audit Data Packets

**Table F-5 (Cont.) Types of Data in Audit Packets**

| Symbol                     | Packet Contents                                                                                                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$_SYSTEM_SERVICE_NAME  | Name of the system service associated with the event. (String of 1-256 characters)                                                                                              |
| NSA\$_SYSTEM_NEW           | New system time (Quadword)                                                                                                                                                      |
| NSA\$_SYSTEM_OLD           | Old system time (Quadword)                                                                                                                                                      |
| NSA\$_TARGET_DEVICE_NAME   | Target device name (String of 1-64 characters)                                                                                                                                  |
| NSA\$_TARGET_PROCESS_CLASS | The target process classification. (A 20-byte vector)                                                                                                                           |
| NSA\$_TARGET_PROCESS_ID    | Target process identifier (PID) (Longword)                                                                                                                                      |
| NSA\$_TARGET_PROCESS_NAME  | Target process name (String of 1-64 characters)                                                                                                                                 |
| NSA\$_TARGET_PROCESS_OWNER | Target process owner (UIC) (Longword)                                                                                                                                           |
| NSA\$_TARGET_USERNAME      | Target user name (String of 1-32 characters)                                                                                                                                    |
| NSA\$_TERMINAL             | Name of the terminal to which the process was connected when the auditable event occurred (String of 1-256 characters)                                                          |
| NSA\$_TIME_STAMP           | The time that the event occurred (Quadword)                                                                                                                                     |
| NSA\$_TRANSPORT_NAME       | Name of transport: interprocess communication (IPC), DECnet, or System Management Integrator (SMI), which handles requests from the SYSMAN utility (String of 1-256 characters) |
| NSA\$_UAF_ADD              | Name of the authorization record being added (String of 1-32 characters)                                                                                                        |
| NSA\$_UAF_COPY             | Original and new names of the authorization record being copied (String of 1-32 characters)                                                                                     |
| NSA\$_UAF_DELETE           | Name of the authorization record being removed (String of 1-32 characters)                                                                                                      |
| NSA\$_UAF_FIELDS           | Fields being changed in an authorization record and their new values. This is supported through VMS V5.5 and reserved to Digital. (Quadword bitmask)                            |
| NSA\$_UAF_MODIFY           | Name of the authorization record being modified (String of 1-32 characters)                                                                                                     |
| NSA\$_UAF_RENAME           | Name of the authorization record being renamed (String of 1-32 characters)                                                                                                      |
| NSA\$_UAF_SOURCE           | User name of the source record for an Authorize utility (AUTHORIZE) copy operation (String of 1-32 characters)                                                                  |
| NSA\$_USERNAME             | User name of process causing the auditable event (String of 1-32 characters)                                                                                                    |
| NSA\$_VOLUME_NAME          | Volume name (String of 1-15 characters)                                                                                                                                         |
| NSA\$_VOLUME_SET_NAME      | Volume set name (String of 1-15 characters)                                                                                                                                     |



## Security Audit Message Format (AXP Only)

This appendix describes the format of AXP system auditing messages written to the security auditing log file. The default audit log file SECURITY\_AUDIT.AUDIT\$JOURNAL is created by default in the SYS\$COMMON:[SYSMGR] directory.

Each security audit record consists of a header packet followed by one or more data packets, as shown in Figure G-1. The number of data packets depends on the type of information being sent. This appendix describes the format of the audit header and its data packets as well as the contents of the data packets.

### G.1 Audit Header Packet

Table G-1 describes the fields contained in the audit header packet, illustrated in Figure G-1.

**Figure G-1 Audit Header Packet Format**

|                       |        |                    |
|-----------------------|--------|--------------------|
| NSA\$W_RECORD_SUBTYPE |        | NSA\$W_RECORD_TYPE |
| NSA\$W_PACKET_COUNT   |        | NSA\$W_FLAGS       |
| NSA\$C_VERSION_3      | Unused | NSA\$W_RECORD_SIZE |
| Unused                |        | Unused             |
| NSA\$W_FACILITY       |        | Unused             |

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## Security Audit Message Format (AXP Only)

### G.1 Audit Header Packet

**Table G-1 Audit Header Packet**

| Field        | Symbolic Offset       | Contents                                                                                                                   |
|--------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------|
| type         | NSA\$W_RECORD_TYPE    | Indicates the type of event that has occurred, as described in Table G-2.                                                  |
| subtype      | NSA\$W_RECORD_SUBTYPE | Further defines the type of event that has occurred, as described in Table G-3.                                            |
| flags        | NSA\$W_FLAGS          | Identifies any flags associated with the audited event. Reserved for future use. (word)                                    |
| packet count | NSA\$W_PACKET_COUNT   | Number of data packets in the audit record. (word)                                                                         |
| record size  | NSA\$W_REC_SIZE       | Total size of audit message (header packet plus all data packets). (word)                                                  |
| version      | NSA\$C_VERSION_3      | Indicates the version of the security auditing facility. The symbol NSA\$C_VERSION_3 indicates the current version. (byte) |
| facility     | NSA\$W_FACILITY       | The facility code for the generated event. By default, this field is zero, indicating a system-generated event. (word)     |

Table G-2 lists the symbols that represent the type of security event that has occurred.

**Table G-2 NSA\$W\_RECORD\_TYPE Event Types**

| Symbol              | Meaning                                       |
|---------------------|-----------------------------------------------|
| NSA\$C_MSG_ACCESS   | Object access attempted                       |
| NSA\$C_MSG_AUDIT    | SET AUDIT command issued                      |
| NSA\$C_MSG_BREAKIN  | Breakin attempt detected                      |
| NSA\$C_MSG_INSTALL  | Install utility used to install a file        |
| NSA\$C_MSG_LOGFAIL  | Login failure                                 |
| NSA\$C_MSG_LOGIN    | Successful login                              |
| NSA\$C_MSG_LOGOUT   | Successful logout                             |
| NSA\$C_MSG_MOUNT    | Device mount or dismount                      |
| NSA\$C_MSG_NETUAF   | Modification to network proxy database        |
| NSA\$C_MSG_RIGHTSDB | Modification to rights database               |
| NSA\$C_MSG_SYSUAF   | Modification to system authorization database |

For each audit event record type defined by NSA\$W\_RECORD\_TYPE, there is a record subtype defined by the symbol NSA\$W\_RECORD\_SUBTYPE, which further defines the event. Table G-3 describes those symbols that represent the record subtypes.

## Security Audit Message Format (AXP Only) G.1 Audit Header Packet

**Table G-3 Audit Record Subtypes**

| Symbol                                                                                                           | Meaning                                                                                |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Subtypes for NSA\$C_MSG_ACCESS Record Type</b>                                                                |                                                                                        |
| NSA\$C_FILE_ACCESS                                                                                               | File access attempted                                                                  |
| NSA\$C_GRPGBL_ACCESS                                                                                             | Group global section access attempted                                                  |
| NSA\$C_SYSGBL_ACCESS                                                                                             | System global section access attempted                                                 |
| <b>Subtypes for NSA\$C_MSG_AUDIT Record Type</b>                                                                 |                                                                                        |
| NSA\$C_AUDIT_TERMINATE                                                                                           | Audit server shutdown (SET AUDIT /SERVER=EXIT)                                         |
| NSA\$C_AUDIT_INITIATE                                                                                            | Audit server startup (SET AUDIT /SERVER=START)                                         |
| <b>Subtypes for NSA\$C_MSG_BREAKIN, NSA\$C_MSG_LOGFAIL, NSA\$C_MSG_LOGIN, and NSA\$C_MSG_LOGOUT Record Types</b> |                                                                                        |
| NSA\$C_BATCH                                                                                                     | Batch process breakin, login, logout, or login failure attempt                         |
| NSA\$C_DETACHED                                                                                                  | Detached process breakin, login, logout, or login failure attempt                      |
| NSA\$C_DIALUP                                                                                                    | Dialup interactive breakin, login, logout, or login failure attempt                    |
| NSA\$C_LOCAL                                                                                                     | Local interactive breakin, login, logout, or login failure attempt                     |
| NSA\$C_NETWORK                                                                                                   | Network server task breakin, login, logout, or login failure attempt                   |
| NSA\$C_REMOTE                                                                                                    | Interactive breakin, login, logout, or login failure attempt from another network node |
| NSA\$C_SUBPROCESS                                                                                                | Subprocess breakin, login, logout, or login failure attempt                            |
| <b>Subtypes for NSA\$C_MSG_INSTALL Record Type</b>                                                               |                                                                                        |
| NSA\$C_INSTALL_ADD                                                                                               | Known image installed                                                                  |
| NSA\$C_INSTALL_REMOVE                                                                                            | Known image deleted                                                                    |
| <b>Subtypes for NSA\$C_MSG_MOUNT Record Type</b>                                                                 |                                                                                        |
| NSA\$C_VOL_DISMOUNT                                                                                              | Volume dismount                                                                        |
| NSA\$C_VOL_MOUNT                                                                                                 | Volume mount                                                                           |

(continued on next page)

## Security Audit Message Format (AXP Only)

### G.1 Audit Header Packet

**Table G-3 (Cont.) Audit Record Subtypes**

| Symbol                                              | Meaning                                              |
|-----------------------------------------------------|------------------------------------------------------|
| <b>Subtypes for NSA\$C_MSG_NETUAF Record Type</b>   |                                                      |
| NSA\$C_NETUAF_ADD                                   | Record added to network proxy authorization file     |
| NSA\$C_NETUAF_DELETE                                | Record removed from network proxy authorization file |
| NSA\$C_NETUAF_MODIFY                                | Record modified in network proxy authorization file  |
| <b>Subtypes for NSA\$C_MSG_RIGHTSDB Record Type</b> |                                                      |
| NSA\$C_RDB_ADD_ID                                   | Identifier added to rights database                  |
| NSA\$C_RDB_CREATE                                   | Rights database created                              |
| NSA\$C_RDB_GRANT_ID                                 | Identifier granted to holder                         |
| NSA\$C_RDB_MOD_HOLDER                               | Identifier holder list modified                      |
| NSA\$C_RDB_MOD_ID                                   | Identifier name or attributes modified               |
| NSA\$C_RDB_REM_ID                                   | Identifier removed from rights database              |
| NSA\$C_RDB_REVOKE_ID                                | Identifier deleted from holder's process rights list |
| <b>Subtypes for NSA\$C_MSG_SYSUAF Record Type</b>   |                                                      |
| NSA\$C_SYSUAF_ADD                                   | Record added to system authorization file            |
| NSA\$C_SYSUAF_COPY                                  | Record copied in system authorization file           |
| NSA\$C_SYSUAF_DELETE                                | Record deleted from system authorization file        |
| NSA\$C_SYSUAF_MODIFY                                | Record modified in system authorization file         |
| NSA\$C_SYSUAF_RENAME                                | Record renamed in system authorization file          |

In addition, the symbol NSA\$R\_PACKET\_LIST is defined as a pointer to the beginning of the first audit data packet.

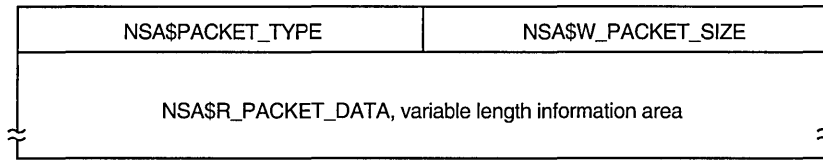
## G.2 Audit Data Packets

Figure G-2 illustrates the format of an audit data packet.

Note that audit data packets do not appear in any predefined order within an event message. Packet types can appear more than once throughout the event message.

## Security Audit Message Format (AXP Only) G.2 Audit Data Packets

**Figure G-2 Audit Data Packet Format**



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Table G-4 describes the fields contained in these packets.

**Table G-4 Audit Data Packet**

| Field       | Symbolic Offset    | Contents                                                             |
|-------------|--------------------|----------------------------------------------------------------------|
| Packet size | NSA\$W_PACKET_SIZE | Indicates the size of the data packet. (word)                        |
| Packet type | NSA\$W_PACKET_TYPE | Indicates the type of data in the packet, as described in Table G-5. |
| Packet data | NSA\$R_PACKET_DATA | Variable length field containing the packet data.                    |

Table G-5 identifies the type of data in the audit data packet.

**Table G-5 NSA\$W\_PACKET\_TYPE Data Types**

| Symbol                      | Meaning                                                                                                                                              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$C_PKT_ACCESS_DESIRED   | The data in the packet contains the access requested/granted to the object. (Longword)                                                               |
| NSA\$C_PKT_ACCOUNT          | The data in the packet contains the account name associated with the process causing the auditable event. (ASCII string)                             |
| NSA\$C_PKT_ALARM_DISABLE    | The data in the packet specifies the security events to disable. (Vector)                                                                            |
| NSA\$C_PKT_ALARM_ENABLE     | The data in the packet specifies the security events to enable. (Vector)                                                                             |
| NSA\$C_PKT_ALARM_NAME       | The data in the packet contains the name of the user (or the security class operators terminal) to which the record will be directed. (ASCII string) |
| NSA\$C_PKT_AUDIT_NAME       | The data in the packet contains the name of the journal to which the record will be directed. (ASCII string)                                         |
| NSA\$C_PKT_DEFAULT_USERNAME | The data in the packet contains the default local user name to use for incoming network proxy requests. (ASCII string)                               |
| NSA\$C_PKT_DEVICE_NAME      | The data in the packet contains the device name on which the volume resides. (ASCII string)                                                          |
| NSA\$C_PKT_DISMOUNT_FLAGS   | The data in the packet contains the dismount flags. (Longword)                                                                                       |

(continued on next page)



## Security Audit Message Format (AXP Only)

### G.2 Audit Data Packets

**Table G-5 (Cont.) NSA\$W\_PACKET\_TYPE Data Types**

| Symbol                      | Meaning                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$C_PKT_FIELD_NAME       | The data in the packet contains the name of the field being modified. This is used in combination with NSA\$C_PKT_ORIGINAL_DATA and NSA\$C_PKT_NEW_DATA. (ASCII string) |
| NSA\$C_PKT_FINAL_STATUS     | The data in the packet contains the status (error or success) which caused the auditing facility to be invoked. (Longword)                                              |
| NSA\$C_PKT HOLDER_NAME      | The data in the packet contains the ID holder username. (ASCII string)                                                                                                  |
| NSA\$C_PKT HOLDER_OWNER     | The data in the packet contains the owner ID for the identifier. (Longword)                                                                                             |
| NSA\$C_PKT_ID_ATTRIBUTES    | The data in the packet contains the new attributes of the identifier. (Longword)                                                                                        |
| NSA\$C_PKT_ID_NAME          | The data in the packet contains the name of the identifier. (ASCII string)                                                                                              |
| NSA\$C_PKT_ID_NEW_NAME      | The data in the packet contains the new name of the identifier. (ASCII string)                                                                                          |
| NSA\$C_PKT_ID_NEW_VALUE     | The data in the packet contains the new value of the identifier. (Longword)                                                                                             |
| NSA\$C_PKT_ID_VALUE         | The data in the packet contains the value of the identifier. (Longword)                                                                                                 |
| NSA\$C_PKT_IDENTIFIERS_USED | The data in the packet contains any identifiers used (from the ACE granting access) to gain access to the object. (Longword vector)                                     |
| NSA\$C_PKT_IMAGE_NAME       | The data in the packet contains the name of the image being executed at the time the event took place. (ASCII string)                                                   |
| NSA\$C_PKT_INSTALL_FILE     | The data in the packet contains the name of the installed file. (ASCII string)                                                                                          |
| NSA\$C_PKT_INSTALL_FLAGS    | The data in the packet contains the flags associated with the installed file. (Longword)                                                                                |
| NSA\$C_PKT_INSTALL_PRIVS    | The data in the packet contains the privileges associated with the installed file. (Quadword)                                                                           |
| NSA\$C_PKT_LOCAL_USERNAME   | The data in the packet contains the user names of the accounts that may be used for incoming network proxy requests. (ASCII string)                                     |
| NSA\$C_PKT_LOGICAL_NAME     | The data in the packet contains the logical name associated with the device. (ASCII string)                                                                             |
| NSA\$C_PKT_MOUNT_FLAGS      | The data in the packet contains the mount flags. (Longword)                                                                                                             |
| NSA\$C_PKT_NEW_DATA         | The data in the packet contains the value to be utilized after the event occurs. (Vector)                                                                               |

(continued on next page)

## Security Audit Message Format (AXP Only) G.2 Audit Data Packets

**Table G-5 (Cont.) NSA\$W\_PACKET\_TYPE Data Types**

| Symbol                       | Meaning                                                                                                                                                                 |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$C_PKT_OBJECT_ID         | The data in the packet contains a unique object identification code. Currently this only applies to files, and is the file identification (file ID). (Longword vector)  |
| NSA\$C_PKT_OBJECT_NAME       | The data in the packet contains the object's name. (ASCII string)                                                                                                       |
| NSA\$C_PKT_OBJECT_OWNER      | The data in the packet contains the owner identifier (UIC) of the process causing the auditable event. (Longword)                                                       |
| NSA\$C_PKT_OBJECT_PROTECTION | The data in the packet contains the UIC based protection of the object. (Word or Longword Vector)                                                                       |
| NSA\$C_PKT_OBJECT_TYPE       | The data in the packet contains the object's type code (see \$ACLDEF). (Longword)                                                                                       |
| NSA\$C_PKT_ORIGINAL_DATA     | The data in the packet contains the value prior to the event taking place. (Vector)                                                                                     |
| NSA\$C_PKT_PARENT_ID         | The data in the packet contains the process identification (PID) of the parent process. (This is only used when auditing events pertaining to a subprocess.) (Longword) |
| NSA\$C_PKT_PARENT_NAME       | The data in the packet contains the parent process name. (This is only used when auditing events pertaining to a subprocess.) (ASCII string)                            |
| NSA\$C_PKT_PARENT_OWNER      | The data in the packet contains the owner identifier (UIC) of the parent process. (Longword)                                                                            |
| NSA\$C_PKT_PARENT_USERNAME   | The data in the packet contains the user name associated with the parent process. (ASCII string)                                                                        |
| NSA\$C_PKT_PASSWORD          | The data in the packet contains the failing password for break-in attempts. (ASCII string)                                                                              |
| NSA\$C_PKT_PRIVS_USED        | The data in the packet contains any privileges used to gain access to the object. (Longword)                                                                            |
| NSA\$C_PKT_PROCESS_ID        | The data in the packet contains the PID of the process that caused the auditable event. (Longword)                                                                      |
| NSA\$C_PKT_PROCESS_NAME      | The data in the packet contains the process name for the process causing the auditable event. (ASCII string)                                                            |
| NSA\$C_PKT_REMOTE_NODE_ID    | The data in the packet contains the DECnet address of the remote process. (Longword)                                                                                    |
| NSA\$C_PKT_REMOTE_NODENAME   | The data in the packet contains the DECnet node name of the remote process. (ASCII string)                                                                              |
| NSA\$C_PKT_REMOTE_USERNAME   | The data in the packet contains the user name of the remote process. (ASCII string)                                                                                     |

(continued on next page)

## Security Audit Message Format (AXP Only)

### G.2 Audit Data Packets

**Table G-5 (Cont.) NSA\$W\_PACKET\_TYPE Data Types**

| Symbol                   | Meaning                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| NSA\$C_PKT_REPLY_MAILBOX | The data in the packet contains the name of a mailbox to which the event completion status will be written. (ASCII string)                          |
| NSA\$C_PKT_SUBJECT_CLASS | The data in the packet contains the current access class of the process causing the auditable event. (Longword vector)                              |
| NSA\$C_PKT_SUBJECT_OWNER | The data in the packet contains the owner identifier (UIC) of the process causing the event. (Longword)                                             |
| NSA\$C_PKT_SYSTEM_NAME   | The data in the packet contains the SCS name of the node on which the event took place (SYSGEN parameter SCSNODE). (ASCII string)                   |
| NSA\$C_PKT_SYSTEM_ID     | The data in the packet contains the SCS identification of the cluster node on which the event took place (SYSGEN parameter SCSSYSTEMID). (Longword) |
| NSA\$C_PKT_TERMINAL      | The data in the packet contains the name of the terminal to which the process was connected at the time of the auditable event. (ASCII string)      |
| NSA\$C_PKT_TIME_STAMP    | The data in the packet contains the time that the event occurred. (Quadword)                                                                        |
| NSA\$C_PKT_UAF_ADD       | The data in the packet contains the name of the authorization record being added. (ASCII string)                                                    |
| NSA\$C_PKT_UAF_COPY      | The data in the packet contains the original and new names of the authorization record being copied.                                                |
| NSA\$C_PKT_UAF_DELETE    | The data in the packet contains the name of the authorization record being removed. (ASCII string)                                                  |
| NSA\$C_PKT_UAF_FIELDS    | The data in the packet contains the codes indicating the fields being changed in an authorization record (along with the new value).                |
| NSA\$C_PKT_UAF_MODIFY    | The data in the packet contains the name of the authorization record being modified. (ASCII string)                                                 |
| NSA\$C_PKT_UAF_RENAME    | The data in the packet contains the name of the authorization record being renamed. (ASCII string)                                                  |
| NSA\$C_PKT_UAF_SOURCE    | The data in the packet contains the user name of the source record used for a copy operation. (ASCII string)                                        |

(continued on next page)

**Security Audit Message Format (AXP Only)**  
**G.2 Audit Data Packets**

**Table G-5 (Cont.) NSA\$W\_PACKET\_TYPE Data Types**

| <b>Symbol</b>              | <b>Meaning</b>                                                                                                        |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| NSA\$C_PKT_USERNAME        | The data in the packet contains the user name associated with the process causing the auditable event. (ASCII string) |
| NSA\$C_PKT_VOLUME_NAME     | The data in the packet contains the volume name. (ASCII string)                                                       |
| NSA\$C_PKT_VOLUME_SET_NAME | The data in the packet contains the volume set name. (ASCII string)                                                   |



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## Valid Combinations of BACKUP Qualifiers

The following figures show the qualifiers that can be used in BACKUP save, restore, copy, compare and list operations. The figures also indicate valid combinations of BACKUP qualifiers.

- Figure H-1 shows command qualifiers used in save operations.
- Figure H-2 shows input file-selection qualifiers used in save operations.
- Figure H-3 shows output save-set qualifiers used in save operations.
- Figure H-4 shows command qualifiers used in restore operations.
- Figure H-5 shows input save-set qualifiers used in restore operations.
- Figure H-6 shows output file qualifiers used in restore operations.
- Figure H-7 shows command qualifiers used in copy operations.
- Figure H-8 shows input file-selection qualifiers used in copy operations.
- Figure H-9 shows output file qualifiers used in copy operations.
- Figure H-10 shows command qualifiers used in compare operations.
- Figure H-11 shows input file-selection qualifiers used in compare operations.
- Figure H-12 shows input save-set qualifiers used in compare operations.

# Valid Combinations of BACKUP Qualifiers

Figure H-1 Command Qualifiers Used in Save Operations

| Command Qualifiers       | /[NO]ASSIST | /BRIEF | /DELETE | /FAST | /FULL | /IGNORE | /IMAGE | /[NO]INITIALIZE | /INTERCHANGE | /JOURNAL | /LIST          | /[NO]LOG | /PHYSICAL | /RECORD | /VERIFY | /VOLUME |
|--------------------------|-------------|--------|---------|-------|-------|---------|--------|-----------------|--------------|----------|----------------|----------|-----------|---------|---------|---------|
| /[NO]ASSIST <sup>1</sup> | -           | Y      | Y       | Y     | Y     | Y       | Y      | N               | Y            | Y        | Y              | Y        | Y         | Y       | Y       | Y       |
| /BRIEF <sup>2</sup>      | Y           | -      | Y       | Y     | N     | Y       | Y      | N               | Y            | Y        | Y              | Y        | N         | Y       | Y       | Y       |
| /DELETE                  | Y           | Y      | -       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y              | N        | N         | Y       | Y       | Y       |
| /FAST                    | Y           | Y      | Y       | -     | Y     | Y       | Y      | Y               | Y            | Y        | Y              | N        | Y         | Y       | Y       | Y       |
| /FULL <sup>2</sup>       | Y           | N      | Y       | Y     | -     | Y       | Y      | Y               | Y            | Y        | Y              | N        | Y         | Y       | Y       | Y       |
| /IGNORE                  | Y           | Y      | Y       | Y     | Y     | -       | Y      | Y               | Y            | Y        | Y              | Y        | Y         | Y       | Y       | Y       |
| /IMAGE                   | Y           | Y      | Y       | Y     | Y     | -       | Y      | Y               | Y            | Y        | N              | Y        | Y         | Y       | Y       | Y       |
| /[NO]INITIALIZE          | N           | Y      | Y       | Y     | Y     | Y       | -      | Y               | Y            | Y        | Y              | N        | Y         | Y       | Y       | Y       |
| /INTERCHANGE             | Y           | Y      | Y       | Y     | Y     | Y       | -      | Y               | Y            | N        | Y              | Y        | Y         | Y       | Y       | Y       |
| /JOURNAL                 | Y           | Y      | Y       | Y     | Y     | Y       | Y      | -               | Y            | N        | Y              | Y        | Y         | Y       | Y       | Y       |
| /LIST                    | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | -        | Y <sup>3</sup> | N        | Y         | Y       | Y       | Y       |
| /[NO]LOG                 | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | -              | N        | Y         | Y       | Y       | Y       |
| /PHYSICAL                | Y           | N      | N       | N     | N     | N       | N      | N               | N            | N        | N              | -        | N         | Y       | N       | N       |
| /RECORD                  | Y           | Y      | N       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y              | N        | -         | Y       | N       | N       |
| /VERIFY                  | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y              | Y        | Y         | Y       | -       | Y       |
| /VOLUME <sup>4</sup>     | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y              | N        | Y         | Y       | -       | -       |

| Input File-Selection Qualifiers | /[NO]ASSIST | /BRIEF | /DELETE | /FAST | /FULL | /IGNORE | /IMAGE | /[NO]INITIALIZE | /INTERCHANGE | /JOURNAL | /LIST | /[NO]LOG | /PHYSICAL | /RECORD | /VERIFY | /VOLUME |
|---------------------------------|-------------|--------|---------|-------|-------|---------|--------|-----------------|--------------|----------|-------|----------|-----------|---------|---------|---------|
| /BACKUP                         | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /BEFORE                         | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /BY_OWNER                       | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /CONFIRM                        | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /CREATED                        | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /EXCLUDE                        | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /EXPIRED                        | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /MODIFIED                       | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |
| /SINCE                          | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | N       |

| Output File Qualifiers        | /[NO]ASSIST | /BRIEF | /DELETE | /FAST | /FULL | /IGNORE | /IMAGE | /[NO]INITIALIZE | /INTERCHANGE | /JOURNAL | /LIST | /[NO]LOG | /PHYSICAL | /RECORD | /VERIFY | /VOLUME |
|-------------------------------|-------------|--------|---------|-------|-------|---------|--------|-----------------|--------------|----------|-------|----------|-----------|---------|---------|---------|
| /BLOCK_SIZE                   | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /BY_OWNER                     | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | N         | Y       | Y       | Y       |
| /COMMENT                      | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /[NO]CRC                      | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /DENSITY <sup>1,6</sup>       | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /GROUP_SIZE                   | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /LABEL <sup>1</sup>           | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /PROTECTION                   | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /[NO]REWIND <sup>1</sup>      | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /SAVE_SET <sup>5</sup>        | Y           | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |
| /TAPE_EXPIRATION <sup>1</sup> | Y           | Y      | Y       | Y     | Y     | Y       | N      | Y               | Y            | Y        | Y     | Y        | Y         | Y       | Y       | Y       |

<sup>1</sup> Use only when saving to magnetic tape save sets.  
<sup>2</sup> You must specify the /LIST qualifier with this qualifier.  
<sup>3</sup> When you specify /LIST with /LOG, direct the output from the list operation to a file.  
<sup>4</sup> You must specify /IMAGE with this qualifier.  
<sup>5</sup> Required when creating save sets on disk.  
<sup>6</sup> You must specify /REWIND with this qualifier.

## Valid Combinations of BACKUP Qualifiers

Figure H-2 Input File-Selection Qualifiers Used in Save Operations

| Input<br>File-Selection<br>Qualifiers |   | /BACKUP | /BEFORE | /BY_OWNER | /CONFIRM | /CREATED | /EXCLUDE | /EXPIRED | /MODIFIED | /SINCE |
|---------------------------------------|---|---------|---------|-----------|----------|----------|----------|----------|-----------|--------|
| /BACKUP                               | - | Y       | Y       | Y         | N        | Y        | N        | N        | Y         |        |
| /BEFORE                               | Y | -       | Y       | Y         | Y        | Y        | Y        | Y        | N         |        |
| /BY_OWNER                             | Y | Y       | -       | Y         | Y        | Y        | Y        | Y        | Y         |        |
| /CONFIRM                              | Y | Y       | Y       | -         | Y        | Y        | Y        | Y        | Y         |        |
| /CREATED                              | N | Y       | Y       | Y         | -        | Y        | N        | N        | Y         |        |
| /EXCLUDE                              | Y | Y       | Y       | Y         | Y        | -        | Y        | Y        | Y         |        |
| /EXPIRED                              | N | Y       | Y       | Y         | N        | Y        | -        | N        | Y         |        |
| /MODIFIED                             | N | Y       | Y       | Y         | N        | Y        | N        | Y        | Y         |        |
| /SINCE                                | Y | N       | Y       | Y         | Y        | Y        | Y        | Y        | -         |        |
| <hr/>                                 |   |         |         |           |          |          |          |          |           |        |
| Output<br>Save-Set<br>Qualifiers      |   |         |         |           |          |          |          |          |           |        |
| /BLOCK_SIZE                           | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /BY_OWNER                             | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /COMMENT                              | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /[NO]CRC                              | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /DENSITY <sup>1,2</sup>               | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /GROUP_SIZE                           | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /LABEL <sup>1</sup>                   | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /PROTECTION                           | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /[NO]REWIND <sup>1</sup>              | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /SAVE_SET <sup>3</sup>                | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |
| /TAPE_EXPIRATION <sup>1</sup>         | Y | Y       | Y       | Y         | Y        | Y        | Y        | Y        | Y         | Y      |

<sup>1</sup> Use only when saving to magnetic tape save sets.

<sup>2</sup> You must specify /REWIND with this qualifier.

<sup>3</sup> Required when creating save sets on disk.



# Valid Combinations of BACKUP Qualifiers

Figure H-3 Output Save-Set Qualifiers Used in Save Operations

| Input<br>File-Selection<br>Qualifiers     |   | /BLOCK_SIZE | /BY_OWNER | /COMMENT | /[NO]CRC       | /DENSITY | /GROUP_SIZE | /LABEL | /MEDIA_FORMAT=[NO]COMPACTION | /PROTECTION | /[NO]REWIND | /SAVE_SET | /TAPE_EXPIRATION |
|-------------------------------------------|---|-------------|-----------|----------|----------------|----------|-------------|--------|------------------------------|-------------|-------------|-----------|------------------|
| /BACKUP                                   | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /BEFORE                                   | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /BY_OWNER                                 | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /CONFIRM                                  | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /CREATED                                  | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /EXCLUDE                                  | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /EXPIRED                                  | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /MODIFIED                                 | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /SINCE                                    | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| <hr/>                                     |   |             |           |          |                |          |             |        |                              |             |             |           |                  |
| Output<br>Save-Set<br>Qualifiers          |   |             |           |          |                |          |             |        |                              |             |             |           |                  |
| /BLOCK_SIZE                               | - | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /BY_OWNER                                 | Y | -           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /COMMENT                                  | Y | Y           | -         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /[NO]CRC                                  | Y | Y           | Y         | -        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /DENSITY <sup>1, 2</sup>                  | Y | Y           | Y         | Y        | -              | Y        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /GROUP_SIZE                               | Y | Y           | Y         | Y        | Y              | -        | Y           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /LABEL <sup>1</sup>                       | Y | Y           | Y         | Y        | Y              | Y        | -           | Y      | Y                            | Y           | Y           | Y         | Y                |
| /MEDIA_FORMAT=[NO]COMPACTION <sup>1</sup> | Y | Y           | Y         | Y        | Y              | Y        | Y           | -      | Y                            | Y           | Y           | Y         | Y                |
| /PROTECTION                               | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | -                            | Y           | Y           | Y         | Y                |
| /[NO]REWIND <sup>1</sup>                  | Y | Y           | Y         | Y        | Y <sup>2</sup> | Y        | Y           | Y      | Y                            | -           | Y           | Y         | Y                |
| /SAVE_SET <sup>3</sup>                    | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | -           | Y         | Y                |
| /TAPE_EXPIRATION <sup>1</sup>             | Y | Y           | Y         | Y        | Y              | Y        | Y           | Y      | Y                            | Y           | Y           | -         | Y                |

<sup>1</sup> Use only when saving to magnetic tape save sets.

<sup>2</sup> You must specify /REWIND with this qualifier.

<sup>3</sup> Required when creating save sets on disk.

## Valid Combinations of BACKUP Qualifiers

**Figure H-4 Command Qualifiers Used in Restore Operations**

| Command Qualifiers         |   | /[NO]ASSIST | /BRIEF | /FULL | /IMAGE | /INCREMENTAL | /[NO]INITIALIZE | /LIST          | /[NO]LOG | /PHYSICAL | /[NO]TRUNCATE | /VERIFY | /VOLUME |
|----------------------------|---|-------------|--------|-------|--------|--------------|-----------------|----------------|----------|-----------|---------------|---------|---------|
| /[NO]ASSIST <sup>1</sup>   | - | Y           | Y      | Y     | Y      | N            | Y               | Y              | Y        | Y         | Y             | Y       | Y       |
| /BRIEF <sup>2</sup>        | Y | -           | N      | Y     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /FULL <sup>2</sup>         | Y | N           | -      | Y     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /IMAGE                     | Y | Y           | Y      | -     | N      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /INCREMENTAL               | Y | Y           | Y      | N     | -      | N            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /[NO]INITIALIZE            | N | Y           | Y      | Y     | N      | -            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /LIST                      | Y | Y           | Y      | Y     | Y      | Y            | -               | Y <sup>3</sup> | N        | Y         | Y             | Y       | Y       |
| /[NO]LOG                   | Y | Y           | Y      | Y     | Y      | Y            | Y <sup>3</sup>  | Y              | N        | Y         | Y             | Y       | Y       |
| /PHYSICAL                  | Y | N           | N      | N     | N      | N            | N               | N              | -        | N         | Y             | N       | N       |
| /[NO]TRUNCATE              | Y | Y           | Y      | Y     | Y      | Y            | Y               | Y              | N        | -         | Y             | Y       | Y       |
| /VERIFY                    | Y | Y           | Y      | Y     | Y      | Y            | Y               | Y              | Y        | Y         | -             | Y       | Y       |
| /VOLUME <sup>4</sup>       | Y | Y           | Y      | Y     | N      | Y            | Y               | Y              | N        | Y         | Y             | -       | -       |
| <b>Input</b>               |   |             |        |       |        |              |                 |                |          |           |               |         |         |
| <b>Save-Set Qualifiers</b> |   |             |        |       |        |              |                 |                |          |           |               |         |         |
| /[NO]CRC                   | Y | Y           | Y      | Y     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /LABEL <sup>1</sup>        | Y | Y           | Y      | Y     | Y      | N            | Y               | Y              | Y        | Y         | Y             | Y       | Y       |
| /[NO]REWIND <sup>1</sup>   | Y | Y           | Y      | Y     | Y      | N            | Y               | Y              | Y        | Y         | Y             | Y       | Y       |
| /SAVE_SET <sup>5</sup>     | Y | Y           | Y      | Y     | Y      | Y            | Y               | Y              | Y        | Y         | Y             | Y       | Y       |
| /SELECT                    | Y | Y           | Y      | N     | Y      | N            | Y               | Y              | N        | Y         | Y             | N       | N       |
| <b>Output</b>              |   |             |        |       |        |              |                 |                |          |           |               |         |         |
| <b>File Qualifiers</b>     |   |             |        |       |        |              |                 |                |          |           |               |         |         |
| /BY_OWNER                  | Y | Y           | Y      | Y     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /NEW_VERSION               | Y | Y           | Y      | N     | Y      | Y            | Y               | Y              | N        | Y         | N             | Y       | Y       |
| /OVERLAY                   | Y | Y           | Y      | N     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |
| /REPLACE                   | Y | Y           | Y      | N     | Y      | Y            | Y               | Y              | N        | Y         | Y             | Y       | Y       |

<sup>1</sup> Use only when restoring from magnetic tape save sets.

<sup>2</sup> You must specify the /LIST qualifier with this qualifier.

<sup>3</sup> When you specify /LIST with /LOG, direct the output from the list operation to a file.

<sup>4</sup> You must specify /IMAGE with this qualifier.

<sup>5</sup> Required when restoring save sets from disk.

## Valid Combinations of BACKUP Qualifiers

**Figure H-5 Input Save-Set Qualifiers Used in Restore Operations**

| Input Save-Set Qualifiers | /[NO]CRC | /[NO]REWIND | /SAVE_SET | /SELECT |
|---------------------------|----------|-------------|-----------|---------|
| /[NO]CRC                  | –        | Y           | Y         | Y       |
| /[NO]REWIND <sup>1</sup>  | Y        | –           | Y         | Y       |
| /SAVE_SET <sup>2</sup>    | Y        | Y           | –         | Y       |
| /SELECT                   | Y        | Y           | Y         | –       |

| Output File Qualifiers |   |   |   |   |
|------------------------|---|---|---|---|
| /BY_OWNER              | Y | Y | Y | Y |
| /NEW_VERSION           | Y | Y | Y | Y |
| /OVERLAY               | Y | Y | Y | Y |
| /REPLACE               | Y | Y | Y | Y |

<sup>1</sup> Use only when restoring from magnetic tape save sets.

<sup>2</sup> Required when restoring save sets from disk.

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**Figure H-6 Output File Qualifiers Used in Restore Operations**

| Input Save-Set Qualifiers | /BY_OWNER | /NEW_VERSION | /OVERLAY | /REPLACE |
|---------------------------|-----------|--------------|----------|----------|
| /[NO]CRC                  | Y         | Y            | Y        | Y        |
| /[NO]REWIND <sup>1</sup>  | Y         | Y            | Y        | Y        |
| /SAVE_SET <sup>2</sup>    | Y         | Y            | Y        | Y        |
| /SELECT                   | Y         | Y            | Y        | Y        |

| Output File Qualifiers |   |   |   |   |
|------------------------|---|---|---|---|
| /BY_OWNER              | – | Y | Y | Y |
| /NEW_VERSION           | Y | – | N | N |
| /OVERLAY               | Y | N | – | N |
| /REPLACE               | Y | N | N | – |

<sup>1</sup> Use only when restoring from magnetic tape save sets.

<sup>2</sup> Required when restoring save sets from disk.

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## Valid Combinations of BACKUP Qualifiers

**Figure H-7 Command Qualifiers Used in Copy Operations**

| Command Qualifiers   | /BRIEF | /DELETE | /FAST | /FULL | /IGNORE | /IMAGE | /[NO]INITIALIZE | /LIST          | /[NO]LOG       | /PHYSICAL | /RECORD | /[NO]TRUNCATE | /VERIFY | /VOLUME |
|----------------------|--------|---------|-------|-------|---------|--------|-----------------|----------------|----------------|-----------|---------|---------------|---------|---------|
| /BRIEF <sup>1</sup>  | -      | Y       | Y     | N     | Y       | Y      | Y               | Y              | Y              | N         | Y       | Y             | Y       | Y       |
| /DELETE              | Y      | -       | Y     | Y     | Y       | Y      | Y               | Y              | N              | N         | Y       | Y             | Y       | Y       |
| /FAST                | Y      | Y       | -     | Y     | Y       | Y      | Y               | Y              | N              | Y         | Y       | Y             | Y       | Y       |
| /FULL <sup>1</sup>   | N      | Y       | Y     | -     | Y       | Y      | Y               | Y              | N              | Y         | Y       | Y             | Y       | Y       |
| /IGNORE              | Y      | Y       | Y     | Y     | -       | Y      | Y               | Y              | Y              | Y         | Y       | Y             | Y       | Y       |
| /IMAGE               | Y      | Y       | Y     | Y     | Y       | -      | Y               | Y              | N              | Y         | Y       | Y             | Y       | Y       |
| /[NO]INITIALIZE      | Y      | Y       | Y     | Y     | Y       | Y      | -               | Y              | Y              | N         | Y       | Y             | Y       | Y       |
| /LIST                | Y      | Y       | Y     | Y     | Y       | Y      | Y               | -              | Y <sup>2</sup> | Y         | Y       | Y             | Y       | Y       |
| /[NO]LOG             | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y <sup>2</sup> | -              | N         | Y       | Y             | Y       | Y       |
| /PHYSICAL            | N      | N       | N     | Y     | N       | N      | N               | N              | -              | N         | N       | Y             | N       | N       |
| /RECORD              | Y      | N       | Y     | Y     | Y       | Y      | Y               | Y              | N              | -         | Y       | Y             | Y       | Y       |
| /[NO]TRUNCATE        | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y              | N              | Y         | -       | Y             | Y       | Y       |
| /VERIFY              | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y              | Y              | Y         | Y       | -             | Y       | Y       |
| /VOLUME <sup>3</sup> | Y      | Y       | Y     | Y     | Y       | Y      | Y               | Y              | Y              | N         | Y       | Y             | Y       | -       |

| Input<br>File-Selection<br>Qualifiers |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| /BACKUP                               | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /BEFORE                               | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /BY_OWNER                             | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /CONFIRM                              | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /CREATED                              | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /EXCLUDE                              | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /EXPIRED                              | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /MODIFIED                             | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /SINCE                                | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |

| Output<br>File Qualifiers |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| /BY_OWNER                 | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /NEW_VERSION              | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | N | N |
| /OVERLAY                  | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |
| /REPLACE                  | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Y | N |

<sup>1</sup> You must specify the /LIST qualifier with this qualifier.

<sup>2</sup> When you specify /LIST with /LOG, direct the output from the list operation to a file.

<sup>3</sup> You must specify /IMAGE with this qualifier.

# Valid Combinations of BACKUP Qualifiers

Figure H-8 Input File-Selection Qualifiers Used in Copy Operations

| Input File-Selection Qualifiers | /BACKUP | /BEFORE | /BY_OWNER | /CONFIRM | /CREATED | /EXCLUDE | /EXPIRED | /MODIFIED | /SINCE |
|---------------------------------|---------|---------|-----------|----------|----------|----------|----------|-----------|--------|
| /BACKUP                         | -       | Y       | Y         | Y        | N        | Y        | N        | N         | Y      |
| /BEFORE                         | Y       | -       | Y         | Y        | Y        | Y        | Y        | Y         | N      |
| /BY_OWNER                       | Y       | Y       | -         | Y        | Y        | Y        | Y        | Y         | Y      |
| /CONFIRM                        | Y       | Y       | Y         | -        | Y        | Y        | Y        | Y         | Y      |
| /CREATED                        | N       | Y       | Y         | Y        | -        | Y        | N        | N         | Y      |
| /EXCLUDE                        | Y       | Y       | Y         | Y        | Y        | -        | Y        | Y         | Y      |
| /EXPIRED                        | N       | Y       | Y         | Y        | N        | Y        | -        | N         | Y      |
| /MODIFIED                       | N       | Y       | Y         | Y        | N        | Y        | N        | -         | Y      |
| /SINCE                          | Y       | N       | Y         | Y        | Y        | Y        | Y        | Y         | -      |

| Output File Qualifiers | /BY_OWNER | /NEW_VERSION | /OVERLAY | /REPLACE |
|------------------------|-----------|--------------|----------|----------|
| /BY_OWNER              | Y         | Y            | Y        | Y        |
| /NEW_VERSION           | Y         | Y            | Y        | Y        |
| /OVERLAY               | Y         | Y            | Y        | Y        |
| /REPLACE               | Y         | Y            | Y        | Y        |

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## Valid Combinations of BACKUP Qualifiers

**Figure H-9 Output File Qualifiers Used in Copy Operations**

| Input File--Selection<br>Qualifiers | /BY_OWNER | /NEW_VERSION | /OVERLAY | /REPLACE |
|-------------------------------------|-----------|--------------|----------|----------|
| /BACKUP                             | Y         | Y            | Y        | Y        |
| /BEFORE                             | Y         | Y            | Y        | Y        |
| /BY_OWNER                           | Y         | Y            | Y        | Y        |
| /CONFIRM                            | Y         | Y            | Y        | Y        |
| /CREATED                            | Y         | Y            | Y        | Y        |
| /EXCLUDE                            | Y         | Y            | Y        | Y        |
| /EXPIRED                            | Y         | Y            | Y        | Y        |
| /MODIFIED                           | Y         | Y            | Y        | Y        |
| /SINCE                              | Y         | Y            | Y        | Y        |
| <hr/>                               |           |              |          |          |
| Output File<br>Qualifiers           |           |              |          |          |
| /BY_OWNER                           | -         | Y            | Y        | Y        |
| /NEW_VERSION                        | Y         | -            | N        | N        |
| /OVERLAY                            | Y         | N            | -        | N        |
| /REPLACE                            | Y         | N            | N        | -        |

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# Valid Combinations of BACKUP Qualifiers

Figure H-10 Command Qualifiers Used in Compare Operations

| Command Qualifiers       | /[NO]ASSIST | /BRIEF | /COMPARE | /FAST | /FULL | /IMAGE | /LIST          | /[NO]LOG       | /PHYSICAL | /VOLUME |
|--------------------------|-------------|--------|----------|-------|-------|--------|----------------|----------------|-----------|---------|
| /[NO]ASSIST <sup>1</sup> | -           | Y      | Y        | Y     | Y     | Y      | Y              | Y              | Y         | Y       |
| /BRIEF <sup>2</sup>      | Y           | -      | Y        | Y     | N     | Y      | Y              | Y              | Y         | Y       |
| /COMPARE                 | Y           | Y      | -        | Y     | Y     | Y      | Y              | Y              | Y         | Y       |
| /FAST                    | Y           | Y      | Y        | -     | Y     | Y      | Y              | Y              | Y         | Y       |
| /FULL <sup>2</sup>       | Y           | N      | Y        | Y     | -     | Y      | Y              | Y              | Y         | Y       |
| /IMAGE                   | Y           | Y      | Y        | Y     | Y     | -      | Y              | Y              | N         | Y       |
| /LIST                    | Y           | Y      | Y        | Y     | Y     | Y      | -              | Y <sup>3</sup> | Y         | Y       |
| /[NO]LOG                 | Y           | Y      | Y        | Y     | Y     | Y      | Y <sup>3</sup> | -              | Y         | Y       |
| /PHYSICAL                | Y           | Y      | Y        | Y     | Y     | N      | Y              | Y              | -         | Y       |
| /VOLUME <sup>4</sup>     | Y           | Y      | Y        | Y     | Y     | Y      | Y              | Y              | N         | -       |

Input  
File-Selection  
Qualifiers

|           |   |   |   |   |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|---|---|---|---|
| /BY_OWNER | Y | Y | Y | Y | Y | N | Y | Y | N | N |
| /BEFORE   | Y | Y | Y | Y | Y | N | Y | Y | N | N |
| /EXCLUDE  | Y | Y | Y | Y | Y | N | Y | Y | N | N |
| /SINCE    | Y | Y | Y | Y | Y | N | Y | Y | N | N |

<sup>1</sup> Use only when comparing magnetic tape save sets.  
<sup>2</sup> You must specify the /LIST qualifier with this qualifier.  
<sup>3</sup> When you specify /LIST with /LOG, direct the output from the list operation to a file.  
<sup>4</sup> You must specify /IMAGE with this qualifier.

## Valid Combinations of BACKUP Qualifiers

**Figure H-11 Input File-Selection Qualifiers Used in Compare Operations**

| Input File-Selection Qualifiers | /BY_OWNER | /BEFORE | /EXCLUDE | /SINCE |
|---------------------------------|-----------|---------|----------|--------|
| /BY_OWNER                       | -         | Y       | Y        | Y      |
| /BEFORE                         | Y         | -       | Y        | N      |
| /EXCLUDE                        | Y         | Y       | -        | Y      |
| /SINCE                          | Y         | N       | Y        | -      |

| Input Save-Set Qualifiers | /BY_OWNER | /BEFORE | /EXCLUDE | /SINCE |
|---------------------------|-----------|---------|----------|--------|
| /[NO]REWIND <sup>1</sup>  | Y         | Y       | Y        | Y      |
| /SAVE_SET <sup>2</sup>    | Y         | Y       | Y        | Y      |
| /SELECT                   | Y         | Y       | Y        | Y      |

<sup>1</sup> Use only when comparing magnetic tape save sets.

<sup>2</sup> Required when comparing save sets on disk.

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**Figure H-12 Input Save-Set Qualifiers Used in Compare Operations**

| Input File-Selection Qualifiers | /[NO]REWIND | /SAVE_SET | /SELECT |
|---------------------------------|-------------|-----------|---------|
| /BY_OWNER                       | Y           | Y         | Y       |
| /BEFORE                         | Y           | Y         | Y       |
| /EXCLUDE                        | Y           | Y         | Y       |
| /SINCE                          | Y           | Y         | Y       |

| Input Save-Set Qualifiers | /[NO]REWIND | /SAVE_SET | /SELECT |
|---------------------------|-------------|-----------|---------|
| /[NO]REWIND <sup>1</sup>  | -           | Y         | Y       |
| /SAVE_SET <sup>2</sup>    | Y           | -         | Y       |
| /SELECT                   | Y           | Y         | -       |

<sup>1</sup> Use only when comparing magnetic tape save sets.

<sup>2</sup> Required when comparing save sets on disk.

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## A

- Access control
  - required by ACL editor, *Sys Mgmt Util: A-L, 1-4*
  - with Identifier ACE, *Sys Mgmt Util: A-L, 1-13*
  - with protection codes, *Sys Mgmt Util: A-L, 1-13*
- Access control entries
  - See ACEs
- Access control list editor
  - See ACL editor
- Access control lists
  - See ACLs
- /ACCESSED qualifier
  - in Mount utility, *Sys Mgmt Util: M-Z, 2-8*
- Accounting
  - enabling image-level accounting, *Sys Mgmt Util: A-L, 10-5, 10-8, 10-18*
- ACCOUNTING command, *Sys Mgmt Util: A-L, 2-4*
- Accounting files
  - copying records between, *Sys Mgmt Util: A-L, 2-8, 2-19*
  - processing to produce reports, *Sys Mgmt Util: A-L, 2-9, 2-11, 2-25*
  - record format of, *Sys Mgmt Util: A-L, C-1*
  - types of record in, *Sys Mgmt Util: A-L, 2-29*
- Accounting reports
  - brief reports, *Sys Mgmt Util: A-L, 2-9*
  - full reports, *Sys Mgmt Util: A-L, 2-11*
  - summary reports, *Sys Mgmt Util: A-L, 2-25*
- Accounting utility, *Sys Mgmt Util: A-L, 2-4*
- ACEs (access control entries), *Sys Mgmt Util: A-L, 1-3, 1-6*
  - application-specific, *Sys Mgmt Util: A-L, 1-6*
  - Creator ACEs, *Sys Mgmt Util: A-L, 1-10*
  - Default Protection ACEs, *Sys Mgmt Util: A-L, 1-11*
  - Identifier ACEs, *Sys Mgmt Util: A-L, 1-13*
  - ordering entries in an ACL, *Sys Mgmt Util: A-L, 1-3*
  - security alarm, *Sys Mgmt Util: A-L, 1-6*
  - security audit, *Sys Mgmt Util: A-L, 1-8*
  - Subsystem ACEs, *Sys Mgmt Util: A-L, 1-16*
- ACL editor, *Sys Mgmt Util: A-L, 1-3, 1-4*
  - /CLASS qualifier, *Sys Mgmt Util: A-L, 1-18*
  - control access to objects, *Sys Mgmt Util: A-L, 1-4*
  - customizing, *Sys Mgmt Util: A-L, B-1*
  - DCL qualifiers, *Sys Mgmt Util: A-L, 1-18 to 1-21*
  - exiting from, *Sys Mgmt Util: A-L, 1-5*
  - file format required, *Sys Mgmt Util: A-L, 1-4*
  - /JOURNAL qualifier, *Sys Mgmt Util: A-L, 1-19*
  - keypad editing, *Sys Mgmt Util: A-L, A-1*
  - /MODE qualifier, *Sys Mgmt Util: A-L, 1-20*
  - object ownership, *Sys Mgmt Util: A-L, 1-4*
  - /OBJECT\_TYPE qualifier, *Sys Mgmt Util: A-L, 1-5, 1-20*
  - privileges required, *Sys Mgmt Util: A-L, 1-4*
  - prompting by, *Sys Mgmt Util: A-L, A-1*
  - qualifiers (table), *Sys Mgmt Util: A-L, 1-18*
  - /RECOVER qualifier, *Sys Mgmt Util: A-L, 1-21*
  - specifying file type, *Sys Mgmt Util: A-L, 1-4*
  - specifying object class, *Sys Mgmt Util: A-L, 1-5, 1-18*
  - wildcard restriction, *Sys Mgmt Util: A-L, 1-4*
- ACLs (access control lists)
  - impact of length on performance, *Sys Mgmt Util: A-L, 1-3*
  - list of supported object classes, *Sys Mgmt Util: A-L, 1-3*
  - rules for ordering entries, *Sys Mgmt Util: A-L, 1-3*
- ACL section files, *Sys Mgmt Util: A-L, B-1*
- ACP (ancillary control process)
  - volume mount, *Sys Mgmt Util: M-Z, 2-29*
- ACP system parameters
  - ACP\_BASEPRIO, *Sys Mgmt Util: M-Z, C-6*
  - ACP\_DATACHECK, *Sys Mgmt Util: M-Z, C-6*
  - ACP\_DINDXCACHE, *Sys Mgmt Util: M-Z, C-6*
  - ACP\_DIRCACHE, *Sys Mgmt Util: M-Z, C-6*
  - ACP\_EXTCACHE, *Sys Mgmt Util: M-Z, C-6*
  - ACP\_EXTLIMIT, *Sys Mgmt Util: M-Z, C-7*
  - ACP\_FIDCACHE, *Sys Mgmt Util: M-Z, C-7*
  - ACP\_HDRCACHE, *Sys Mgmt Util: M-Z, C-7*
  - ACP\_MAPCACHE, *Sys Mgmt Util: M-Z, C-7*
  - ACP\_MAXREAD, *Sys Mgmt Util: M-Z, C-7*
  - ACP\_MULTIPLE, *Sys Mgmt Util: M-Z, C-7*

ACP system parameters (cont'd)

ACP\_QUOCACHE, *Sys Mgmt Util: M-Z, C-7*  
ACP\_REBLDSYSD, *Sys Mgmt Util: M-Z, C-7*  
ACP\_SHARE, *Sys Mgmt Util: M-Z, C-8*  
ACP\_SWAPFLGS, *Sys Mgmt Util: M-Z, C-8*  
ACP\_SYSACC, *Sys Mgmt Util: M-Z, C-8*  
ACP\_WINDOW, *Sys Mgmt Util: M-Z, C-8*  
ACP\_WORKSET, *Sys Mgmt Util: M-Z, C-8*  
ACP\_WRITEBACK, *Sys Mgmt Util: M-Z, C-9*  
ACP\_XQP\_RES, *Sys Mgmt Util: M-Z, C-9*

Actual node name, *Sys Mgmt Util: A-L, 11-49*

Actual port name, *Sys Mgmt Util: A-L, 11-49*

Actual service name, *Sys Mgmt Util: A-L, 11-49*

Adapters

See Bus adapters

ADD (Field) command

CIRCUITS class, *Sys Mgmt Util: M-Z, 3-20*

CLUSTER class, *Sys Mgmt Util: M-Z, 3-21*

CONNECTIONS class, *Sys Mgmt Util: M-Z, 3-22*

COUNTERS class, *Sys Mgmt Util: M-Z, 3-23*

CREDITS class, *Sys Mgmt Util: M-Z, 3-24*

ERRORS class, *Sys Mgmt Util: M-Z, 3-24*

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-20*

LOCAL\_PORTS class, *Sys Mgmt Util: M-Z, 3-24*

MEMBERS class, *Sys Mgmt Util: M-Z, 3-26*

SYSTEMS class, *Sys Mgmt Util: M-Z, 3-28*

ADD CIRCUITS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-12*

ADD CLUSTER command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-14*

ADD command

in Authorize utility, *Sys Mgmt Util: A-L, 5-6*

in Install utility, *Sys Mgmt Util: A-L, 10-5*

ADD CONNECTIONS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-15*

ADD COUNTERS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-16*

ADD CREDITS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-18*

ADD ERRORS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-19*

ADD/IDENTIFIER command

in Authorize utility, *Sys Mgmt Util: A-L, 5-19*

ADD LOCAL\_PORTS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-29*

ADD MEMBERS command

in Show Cluster utility, *Sys Mgmt Util: M-Z, 3-31*

ADD/PROXY command

in Authorize utility, *Sys Mgmt Util: A-L, 5-21*

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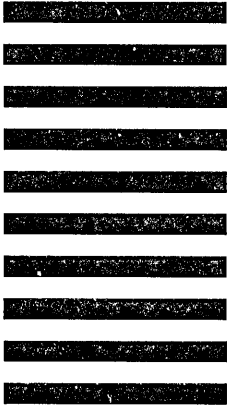
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