

VAX/VMS
Release Notes
Version 3.0

Order No. AA-D015D-TE

digital
software

VAX/VMS

Release Notes

Version 3.0

Order No. AA-D015D-TE

May 1982

This document contains information not included elsewhere in the documentation set. Typically, this information covers software and/or documentation errors that were discovered or changes that were made late in the development cycle, plus hints concerning system installation and operation. This document should be read before the system is installed or used.

REVISION/UPDATE INFORMATION: This new document supersedes the VAX/VMS Release Notes, Version 2.0 (Order No. AA-D015C-TE), the VAX/VMS Release Notes, Version 2.1 (Order No. AA-K055A-TE), the VAX/VMS Release Notes, Version 2.2 (Order No. AA-K760A-TE), the VAX/VMS Release Notes, Version 2.3 (Order No. AA-L286A-TE), and the VAX/VMS Release Notes, Version 2.4 (Order No. AA-L836A-TE). VAX/VMS Release Notes, Version 2.5 (Order No. AA-M439A-TE).

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CHAPTER 1

HOW TO INSTALL VAX/VMS VERSION 3.0

VAX/VMS Version 3.0 is a major release of the VAX/VMS operating system. Current customers use the Version 3.0 distribution kit to upgrade their VAX/VMS Version 2.5 system to a Version 3.0 system. New customers use the distribution kit to install a VAX/VMS Version 3.0 system.

This section is an overview of the information necessary to install (or upgrade to) a VAX/VMS Version 3.0 system. The definitions of and procedures for system installations and system upgrades for your processor are found in the VAX-11 Software Installation Guide provided with this kit. The installation guide describes the method for upgrading a VAX/VMS Version 2.5 system to a Version 3.0 system.

1.1 IDENTIFYING THE VAX/VMS VERSION 3.0 KIT

Current customers will receive one of the following distribution kits:

VAX-11/780	VAX-11/750
Magnetic Tape Upgrade 1 Magnetic Tape 2 STAND/ALONE Backup Floppy Diskettes 1 Blank Floppy Diskette	Magnetic Tape Upgrade 1 Magnetic Tape 2 STAND/ALONE Backup TU58 Cartridges 1 Blank TU58 Cartridge
RK07 Upgrade 1 RK07 Disk Pack 3 Blank Floppy Diskettes	RK07 Upgrade 1 RK07 Disk Pack 3 Blank TU58 Cartridges

New customers will receive one of the following distribution kits:

VAX-11/780	VAX-11/750	VAX-11/730
Magnetic Tape Installation 1 Magnetic Tape 2 STAND/ALONE Backup Floppy Diskettes 1 Blank Floppy Diskette	Magnetic Tape Installation 1 Magnetic Tape 2 STAND/ALONE Backup TU58 Cartridges 1 Blank TU58 Cartridge	RL02 Primary Installation Kit 1 RL02 Disk Pack 3 Blank TU58 Cartridges

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RK07 Installation	RK07 Installation
1 RK07 Disk Pack	1 RK07 Disk Pack
3 Blank Floppy Diskettes	3 Blank TU58 Cartridges

NOTE

DECnet-VAX customers will receive a floppy diskette or TU58 cartridge installation kit in addition to the items listed above.

Note that an optional RL02 distribution kit is available for VAX-11/730 customers. This optional kit contains one RL02 disk pack and no console media.

1.2 VAX-11 OPTIONAL SOFTWARE PRODUCTS

This kit does not contain updates to any VAX-11 optional software product. Documentation for an optional software product is shipped with that product.

1.3 BEFORE INSTALLING THE KIT

To ensure successful installation of the VAX/VMS Version 3.0 distribution kit, do the following:

1. Read the VAX-11 Software Installation Guide for your processor.

The software installation guide is the basic document for understanding how to install, upgrade, or update a VAX/VMS system.

2. Read this document, the VAX/VMS Release Notes (Version 3.0).

This document contains necessary information to ensure successful installation of (or upgrade to) a VAX/VMS Version 3.0 system.

3. Examine the System Identification Register (SID). See the VAX-11 Software Installation Guide for your processor for information describing how and why to examine the System Identification Register.

4. If you are a current customer, ensure that your current system is a VAX/VMS Version 2.5 system. The VAX/VMS Version 3.0 distribution kit will only upgrade a VAX/VMS Version 2.5 system.

1.3.1 Minimum Real Memory Requirement

The minimum real memory requirement for VAX/VMS Version 3.0 is 512 kilobytes. If you bootstrap either the system or standalone BACKUP on a configuration with less memory than 512 kilobytes, the results are unpredictable and correct operation cannot be guaranteed.

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1.4 INSTALLING THE VAX/VMS VERSION 3.0 DISTRIBUTION KIT

To install VAX/VMS Version 3.0, follow the instructions in the VAX-11 Software Installation Guide that is provided with this kit. Current Version 2.5 customers will perform a system upgrade; new customers will perform a system installation.

If your VAX/VMS Version 3.0 distribution kit does not contain any stand-alone back-up media, create your own after you install or upgrade to VAX/VMS Version 3.0. See the VAX-11 Software Installation Guide specific for your processor for information on creating your own stand-alone back-up media.

NOTE

If you have a VAX-11/730, follow the system installation procedure, not the system upgrade procedure. The system upgrade procedure will not execute on a VAX-11/730 processor.

1.5 AUTOGEN PROCEDURE CONFIGURES VAX/VMS VERSION 3.0

VAX/VMS Version 3.0 provides an AUTOGEN procedure that configures and tunes VAX/VMS for your hardware configuration. This AUTOGEN procedure does the following:

- Creates the necessary system files (paging, swapping, and dump files)
- Creates a default list of installed images
- Sets the SYSGEN (system generation) parameters as best estimated for your hardware configuration.

This procedure replaces the VAX/VMS Version 2.0 use of nnUSER.PAR files for estimating SYSGEN parameters.

When generating the system, the AUTOGEN procedure can recommend file sizes for the paging, swapping or dump file that will not fit on the system disk. This can occur during an upgrade if the system disk is nearly full or has a very large paging file. It may also occur during an installation if the system disk is an RK07. In these cases, the AUTOGEN procedure prints out the recommended size and does nothing to the existing file. The system manager should decide on the correct action.

Certain layered products such as DBMS or DATATRIEVE will require additional adjustments of some SYSGEN parameters. See the appropriate layered products installation guides for more information.

The system manager can still use the AUTOGEN procedure after the system is operational. If you are generating a system disk on a machine that is different from the target machine, which the disk will eventually be run on, you must run the AUTOGEN procedure manually on the target machine. Refer to Chapter 12 of the VAX/VMS System Management and Operations Guide for more information.

If you cannot successfully bootstrap the system after manually using the AUTOGEN procedure, or after installing VAX/VMS Version 3.0, attempt to bootstrap the system using default values for all SYSGEN

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parameters. To do this, do a conversational bootstrap, as documented in your software installation guide, and when SYSBOOT prompts, enter the following commands:

```
SYSBOOT> USE DEFAULT
SYSBOOT> CONTINUE
```

This should allow bootstrapping on any hardware configuration.

1.6 AFTER INSTALLING THE VAX/VMS VERSION 3.0 KIT

New customers should install optional software products after the VAX/VMS Version 3.0 system has been installed.

After completing the system upgrade, current customers must:

1. Reassemble any code using SYS\$LIBRARY:LIB.MLB (for example, user-written device drivers).
2. Relink any user-coded software linked with SYS\$SYSTEM:SYS.STB (for example, user-written device drivers or user-written system services).
3. Reinstall all optional software.
4. Update optional software that has been superseded.

NOTE

See the DECnet-VAX Software Installation Guide provided with this distribution kit for procedures on how to install a DECnet-VAX license to operate in a multinode environment. If you are an existing DECnet-VAX customer, you will have received either a floppy diskette or a TU58 cartridge installation kit.

1.6.1 Installing VAX-11 BLISS-32 Version 2.1 on VAX/VMS Version 3.0

LIB.REQ has been modified for Version 3.0 of VAX/VMS. To ensure the successful installation of VAX-11 BLISS-32 Version 2.1, perform the three steps outlined below.

1. Before installing the VAX-11 BLISS-32 Version 2.1 kit, issue the command:

```
$ APPEND/NEW SYS$LIBRARY:STARLET.REQ,LIB.REQ SYS$LIBRARY:LIB.REQ
```

2. Install the VAX-11 BLISS-32 Version 2.1 kit
3. Remove the concatenated version of LIB.REQ to prevent problems when attempting to install the VAX-11 BLISS-32 Version 3.0 kit by entering the following command line:

```
$ DELETE SYS$LIBRARY:LIB.REQ;
```

You do not need to perform the three steps previously listed when installing VAX-11 BLISS-32 Version 3.0 on your VAX/VMS Version 3.0 system.

CHAPTER 2

DIFFERENCES BETWEEN VAX/VMS VERSION 3.0 AND VAX/VMS VERSION 2.5

Because VAX/VMS Version 3.0 is a major release of the VAX/VMS operating system, there are many changes and new features. The purpose of this section is to highlight some of them: changes and new features are described completely in the software documentation set for this release.

2.1 CI780 AND COMPUTER CLUSTERS

The CI (Computer Interconnect) is a new high speed serial bus. VAX-11/780 processors interface to the CI through CI780 ports. The bus supports up to sixteen nodes and is used to create clusters of VAX-11/780 processors. Each node contains an independent VAX/VMS system. Users on the individual systems in the cluster use DECnet-VAX to communicate.

2.1.1 Hardware Components and Installation

The hardware components of a typical CI installation are listed below:

- Two or more VAX-11/780 or VAX-11/782 processors
- One CI780 port per system
- A set of four connecting cables per port (with a maximum length of 45 meters per cable)
- One STAR coupler

The CI780 port consists of the following components:

- A card cage, to be installed in either the VAX-11/780 main cabinet or a SBI expander cabinet
- Optionally, a H1700A power supply
- Two bulkhead connectors with coax cables
- Four boards comprising the port hardware

Two DIP switches are located in the upper half of one of the boards. These switches are used to set the port number (also known as the station address). Each port on a cluster must have a unique port number in the range of 0 through 15. Unless otherwise indicated, field service should assign port numbers starting at zero. Both switches must contain the same number.

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There are four coax cables between each port and the STAR coupler. These cables should have plastic labels on each end identifying the cables as follows:

R A - Receive path A
T A - Transmit path A
R B - Receive path B
T B - Transmit path B

In addition, the port number should be written on each label. There is a marked connection on both the bulkhead connectors and the STAR coupler that corresponds to each cable.

The STAR coupler is a passive connector box that contains a transformer splitter and attenuator network. It requires no power or operator intervention and should be located near the center of a cluster.

2.1.2 Software Components

VAX/VMS support of the CI consists of the following two device drivers: (1) The CI port driver, which performs basic port operations and a set of services called System Communications Services (SCS); and (2) A DECnet class driver, which implements a set of QIO functions compatible with those implemented by the DMC11 and DMP11 device drivers.

2.1.2.1 CI Port Driver - The CI port is called device PA. Its driver is PADRIVER.EXE. Device PA is a single unit device and an adapter on the SBI. Only one CI780 adapter per system is permitted. Normally, the CI780 is configured with the SYSGEN>AUTOCONFIGURE ALL command in your SYSTARTUP.COM file. If it is not automatically configured this way, use the following SYSGEN command to configure the device driver:

```
SYSGEN>CONNECT PAA0/ADAPTER=CI0
```

The CI port uses microcode in control store, which is not sustained over a power failure. When VAX/VMS is bootstrapped, the bootstrap program loads the CI microcode into nonpaged pool from the console block storage device. (The microcode file on the console block storage device is named CI780.BIN.) If a CI is present, but the bootstrap program cannot find the microcode file on the console block storage device, a warning message is printed on the console terminal and the bootstrap program continues. Therefore, if the microcode file is missing, the CI port driver may be autoconfigured but remains offline because the device initialization fails.

The microcode resides permanently in nonpaged pool to be accessible in case the system recovers from a power failure.

When the PA driver is autoconfigured or connected, it initializes the CI780 by performing the following steps:

- Builds port-specific data structures.
- Loads the microcode into the port.
- Starts the microprogram.
- Starts the port driver configuration poller.

If any of these steps fail, device PA remains offline.

DIFFERENCES BETWEEN VAX/VMS VERSION 3.0 AND VAX/VMS VERSION 2.5

2.1.2.1.1 Configuration Poller - Periodically, PADRIVER sends datagrams to all sixteen nodes. For each node that responds, including the local node, PADRIVER attempts to exchange several datagrams containing information about the remote port and remote system. If the exchange is successful, an entry is made for the remote system in a configuration database maintained in nonpaged pool.

Because the CI has redundant paths (path A and path B), the configuration poller makes one pass probing all sixteen nodes over path A, then makes a pass later probing over path B, and so on, alternating paths. The poller is the only VMS software that explicitly selects one path or the other. Normally, the port selects a path that is usable and not currently busy with traffic.

The port keeps an internal record of paths for each possible node to which the last transmission has succeeded and paths for which the last transmission failed. When automatically selecting a path, the port will not try a path marked failed. However, the poller directs an explicit path selection and the port will try the selected path even if it is currently marked failed. If the path succeeds, the port revises its record to show the path usable and that path can be used in automatic path selection. Thus, the configuration poller restores formerly unusable paths.

2.1.2.1.2 System Communications Services - PADRIVER supports no QIO functions. Instead, PADRIVER contains a collection of subroutines that the DECnet class driver can use called System Communications Services (SCS). SCS includes the services listed below:

- Allows DECnet class drivers on different systems to open and close fork-process to fork-process connections.
- Sends datagrams over a connection. (Datagrams are packets of information addressed to a specific port without guaranteed delivery.)
- Queues buffers in which datagrams are received.
- Gives the class driver notification of received datagrams.
- Gives the class driver notification of failure of the interfork process connection.

2.1.2.2 DECnet Class Driver - The DECnet-CI class driver is a software-only driver named CNDRIVER.EXE that serves as the interface between the QIO/IRP oriented interface of the NETDRIVER and the SCS interface of the port driver. Use the following SYSGEN command to load CNDRIVER.EXE into the system. (You can add this command to the installation's SYS\$MANAGER:SYSTARTUP.COM file.)

```
SYSGEN>CONNECT CNA0/NOADAPTER
```

When the port driver is up and running, and CNDRIVER is loaded, you can add the CI to the network with the following commands using the NCP facility:

```
NCP>SET LINE CI-0 [REC BUF x] STA ON  
NCP>SET CIRC CI-0.y TRIB y COST 1 STA ON
```

In the above command lines, the value for "x" is the number of receive buffers to be allocated from the LRP list for each circuit on the CI.

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(The NCP default per line is four, but you should use six for the CI). The value for "y" is the port number (station address) of the remote node.

To avoid reentering the above SET commands every time the network is restarted, enter the same commands, substituting DEFINE for SET. This will put the CI line and circuit into the network's permanent data base.

2.1.3 SYSGEN Parameters

Some of the parameters that control CI and SCS behavior are listed below. For more detailed information about all parameters, see the VAX/VMS System Management and Operations Guide.

SCSSYSTEMID	A number in the range of 1 through 255 which is the DECnet node number of the system. It must be unique for each node.
PAPOLLINTERVAL	The number of seconds between passes through the configuration poller. Ten to twenty seconds is adequate for most applications, but the value can be changed dynamically. It should be set short enough to recognize a new system on the cluster within a reasonable time, but not so short that excessive CPU time is used polling.
PASTIMOUT PASTRETRY	Control retries on the initial exchange of datagrams between two nodes. PASTIMOUT is the number of seconds between retries and PASTRETRY is the total number of retries attempted. The product of PASTIMOUT*PASTRETRY must be greater than or equal to PAPOLLINTERVAL or configuration pollers may be unable to recognize new systems. If PAPOLLINTERVAL is increased, increase PASTIMOUT by the same factor.

2.1.4 Nonpaged Pool Requirements

If your configuration contains a CI at system installation time, the AUTOGEN system generation procedure sets approximate requirements for nonpaged pool. If a CI is added to an already running system, then either use the AUTOGEN procedure manually or the SYSGEN utility to add extra nonpaged pool to the system. DECnet nonpaged pool requirements for a CI cluster with three nodes using the default SYSGEN/SCS and NCP parameter settings are listed below:

SYSGEN Parameter	Parameter Settings
NONPAGEDYN	35 kilobytes
LRPCOUNT	19
IRPCOUNT	15
SRPCOUNT	25

2.1.5 Cluster Maintenance Considerations

The following sections discuss power failures, port hardware errors, path recovery, and system rebootstrap.

2.1.5.1 Power Failures - When the CI780 port loses power, the microcode must be reloaded and the device must be reinitialized. When the system recovers from a power failure, the cluster configuration database is cleared and any DECnet class driver connections to remote systems are broken. The configuration poller then reidentifies remote systems allowing connections to be reestablished. This process may take as long as several poller intervals.

2.1.5.2 Port Hardware Errors - The CI780 port has retry logic to recover from many types of transmission errors. However, there are several kinds of port errors (such as parity error) that the port does not try to recover from. In these cases, the port driver employs limited retries. On each retry it reinitializes the port as if a port power failure had occurred. If no retries are left, the port is shut down and set offline and no further activity is possible on the CI without rebootstrapping the system. Following each port reinitialization, a small amount of nonpaged pool may be permanently lost. Other systems in the cluster should continue normally except that they must reestablish connections to the failed port following each successful reinitialization and will be unable to reestablish connections following the final shutdown of the failed port.

2.1.5.3 Path Recovery - If one of the redundant CI paths is removed from the port or star coupler, activity will continue over the remaining path. When the path is reattached, the port continues to assume that path is unusable until it is selected by the configuration poller. This action can take up to 2*PAPOLLINTERVAL seconds. Therefore, do not detach the remaining usable path for at least that period of time.

If both paths are removed, all remote systems are removed from the configuration database and associated SCS connections are broken. Otherwise, all systems in the cluster continue to run normally. When one path is reinstated, the poller rebuilds the configuration database and connections may be reestablished.

2.1.5.4 System Rebootstrap - A cluster of systems knows when one of its systems or ports shuts down because either: (1) traffic addressed to it will not be delivered, or (2) configuration pollers see that it no longer responds. As the other systems in the cluster notice the shut down system or port, they remove the failed system from their configuration databases and break DECnet class driver connections. The other systems continue to run normally. Their configuration pollers detect when a system is rebootstrapped and connections can be reestablished.

2.2 CHANGES TO THE DOCUMENTATION KIT

The VAX/VMS V3.0 Documentation Kit includes several new manuals and revisions to current manuals. To find the information you need, read

the VAX-11 Information Directory and Index that is provided with this kit. The information directory describes the intended audience and features of each manual in the documentation kit and now contains a master index to the entire documentation set. The new master index is a merger of the indexes from each of the individual books.

Each manual that has been revised for VAX/VMS Version 3.0 contains a summary of technical changes. The purpose of these summaries is to point you quickly to portions of the documentation that were changed or added to describe new Version 3.0 features.

General information about VAX/VMS Version 3.0 is found in the following documentation:

- VAX-11 Information Directory and Index
- VAX/VMS Summary Description and Glossary
- VAX/VMS Primer
- VAX/VMS Release Notes

2.3 COMMAND LANGUAGE AND SYSTEM MESSAGES

The following sections contain notes on changes and additions to the DIGITAL Command Language (DCL) and system message facility. Documentation describing DCL and system messages is found in the following manuals:

- VAX/VMS Command Language User's Guide
- VAX/VMS Guide to Using Command Procedures
- VAX/VMS System Messages and Recovery Procedures Manual

2.3.1 Assignment Statements

You can now use the = and == assignment operators to define both string and integer symbols. Note that this generalization of the assignment operator does not apply to assignment operators used for substring substitution. For example, the following line will generate an error:

```
A[4,8] = "B"
```

See the VAX/VMS Guide to Using Command Procedures for more information.

2.3.2 Substring Assignment Statements

The bitfield assignment operator has been modified for Version 3.0 of VAX/VMS in an effort to be compatible with previous releases. The = and == bitfield assignment operators no longer insert an integer value into a string. If the previous value type into which the bitfield is being inserted is integer, then the value resulting from the insertion will be an integer. If the previous value type is character string, or if the symbol was previously undefined, the resulting type will be, as in previous versions, a character string.

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This change could affect command procedures that contain the following command sequences:

```
$ X = 0                ! Previous type is integer
$ X[0,32]=28          ! Value is now integer 28
$ Y = 'F$CVUI(0,16,X) ! Extract the first 16 bits of X
```

In previous Versions of VAX/VMS, X would have had a string value, and this code segment would assign Y the decimal value 28. In Version 3.0, X is an integer symbol. Since the F\$CVUI lexical function operates on strings, this means that DCL must convert the integer value of X to a character string value before performing the lexical function. This results in the integer 28, which has a hexadecimal representation of 0000001C, being converted to the character string "28", which has a hexadecimal representation of 3832. Thus, when the extraction is performed, it yields a decimal integer result of 14386, or hexadecimal 3832.

2.3.3 Character String Comparison

DCL no longer disregards trailing blanks when performing string comparisons. When comparing strings of unequal length, DCL inserts null characters (binary 0) at the end of the shorter string. Therefore, the expression "ABC" .EQS. "ABC " is considered false by DCL.

2.3.4 Character String to Integer Conversion

Numeric character strings are converted to their integer equivalents. Character strings beginning with the letters T,t,Y, or y are converted to integer 1. All other character strings are converted to integer 0.

Integers are converted to character strings by using their ASCII decimal equivalents.

See the VAX/VMS Guide to Command Procedures for additional information.

2.3.5 String Operators

Two new string operators are now available with VAX/VMS Version 3.0. See the VAX/VMS Guide to Using Command Procedures for information about these new string concatenation (+) and string reduction (-) operators.

Note that because the "+" and "-" operators now have two different meanings within expressions, depending on the types of their operands, some expressions will evaluate differently in Version 3.0 than they did in previous versions of VAX/VMS. For example, consider the following three command lines.

```
$ a := 3
$ b := 4
$ sum = a+b
```

In previous versions, sum is the arithmetic sum of 3 and 4, which is 7. In Version 3.0, sum is the result of concatenating the strings "3" and "4", which is "34".

2.3.6 COPY Command Modified

The DCL command COPY has changed how an output file version number is defaulted when a version number is not specified for the output file and is specified for the input file. (There is no change if the input file version number is defaulted or is a wild card character.)

In the past when the following command was given, COPY would always create a file, NAME2.TY2 in [DIR2], with a version number one higher than the highest existing version number for NAME2.TY2:

```
$ COPY [DIR1]NAME1.TY1;V [DIR2]NAME2.TY2
```

COPY now tries to create NAME2.TY2;V, using the input file version number for the output file. If this file already exists, an error message is issued and the copy fails.

2.3.7 Incorrect LRL Computation in COPY and APPEND

When you use the DCL command COPY or APPEND to concatenate more than two files into a single output file, the longest record length (LRL) field of the output file may be incorrect. The LRL of the output file is set to the LRL of either the first or last input file, depending on which is larger. The LRL of the output file will be incorrect if an input file other than the first or last file contains the largest LRL of all the input files.

To avoid this problem, use the DCL command APPEND to concatenate the input files one at a time.

2.3.8 CTRL/T Implemented in DCL to Display Process Statistics

Pressing CTRL/T during an interactive session in which CTRL/T is enabled will cause DCL to momentarily interrupt execution of the current command or image and display a single line of process statistics. To enable CTRL/T handling you must use the SET CONTROL=T command. (See the VAX/VMS Command Language User's Guide for details.) To enable or disable CTRL/T processing by DCL during the execution of a user-written program use the new VAX-11 RTL routines LIB\$DISABLE_CTRL and LIB\$ENABLE_CTRL.

2.3.9 DIFFERENCES Facility Rewritten in Native Mode

DIFFERENCES has been rewritten in native mode. The previously implemented output formats have been modified and a new side-by-side output format has been added. Also, the facility now exits with a severity status that can be tested to determine the results of the facility's execution.

2.3.10 DUMP Facility Rewritten in Native Mode

DUMP has been rewritten in native mode. The output formats and some of the options have been modified.

2.3.11 EDIT/SUM Command Default

The VAX/VMS Command Language User's Guide and the VAX-11 Utilities Reference Manual state that the default for the EDIT/SUM command is /OUTPUT. This is incorrect, the default is /NOOUTPUT. You must use /OUTPUT if you want an updated copy of the input file.

2.3.12 EXIT Command Modified to Exit with Status

The EXIT command now exits with status from all command levels, including command level 0, (for example, interactive and batch command levels). Therefore, batch jobs in which several command procedures are being executed but in which one terminates with an error status, will terminate at the point of the error.

2.3.13 HELP Command with Interactive Option

The DCL command HELP now has an interactive option that allows you to move forward and backward through the help file in a tree-structured fashion. You can also specify that HELP paginate its output. In addition, you can use logical names to specify your own set of default HELP libraries.

The /[NO]LIBLIST qualifier for the DCL command HELP is not implemented for VAX/VMS Version 3.0. By default, HELP assumes that /LIBLIST has been specified.

2.3.14 INQUIRE Command Modified

The INQUIRE command now enforces the restriction that a prompt string containing embedded blanks must be enclosed in quotation marks.

2.3.15 LIBRARY/RSX/LIST Command Modified

For VAX/VMS Version 3.0, the following command is slightly modified:

```
LIBRARY/RSX/LIST=file-spec library-name
```

For Version 2.0 of VAX/VMS, the file was written in the current default directory. Now, the file is written in the same directory as the library. Therefore you must explicitly specify the device and directory for the listing file.

2.3.16 READ Command Enhanced

The maximum size of a readable record has been increased from 132 characters to 1024 characters.

2.3.17 SEARCH Command

The DCL command SEARCH allows you to search a file, or group of files, for one or more strings.

2.3.18 SET UIC Command Modified

The DCL command SET UIC now affects only the user identification code (UIC) of your process. It does not modify your default directory.

2.3.19 SHOW Command

The output format of several SHOW displays has been modified and several new displays have been added.

2.3.20 New SHOW MEMORY Features

The SHOW MEMORY command displays additional information and accepts qualifiers. Enter the following command for information about each qualifier:

```
HELP SHOW MEMORY QUALIFIERS
```

The details of the output are described in the VAX/VMS Command Language User's Guide.

2.3.21 SPAWN Command

The following restrictions apply both to the DCL command SPAWN and the LIB\$SPAWN run-time library routine.

- The use of the DCL command SPAWN within command procedures is unsupported.
- You must manage input or output streams shared by multiple processes. For example, you must manage the terminal while the DCL command SPAWN/NOWAIT DIRECTORY, issued at an interactive command level, is sending its output to the terminal.
- The SPAWN command does not manage terminal characteristics. For example, SPAWN does not save and restore hardware characteristics such as VT100 terminal scrolling regions, or software characteristics such as terminal width.
- You cannot spawn a subprocess that receives its input from the same terminal as its parent if the parent process has an associated terminal mailbox.
- CTRL/C and out-of-band ASTs established in the parent process are not disabled by a SPAWN command. Therefore, appropriate ASTs will be delivered to the parent process at subprocess completion time, if the appropriate asynchronous condition was raised in the subprocess.
- You cannot use per-process concealed logical names when specifying file specifications for the input or output record streams.
- SPAWN will not copy symbols containing more than 245 characters to a spawned subprocess.

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- A spawned subprocess uses the default command interpreter specified in your authorization file record. If you spawn a subprocess with a default CLI other than DCL, you will receive unpredictable results.
- More than one process will simultaneously attempt to use the same input or output stream when several processes share the same stream and you terminate a subprocess to which you are not currently attached (or a process that is not spawned from the process to which you are currently attached).
- Unpredictable behavior will result if the following two conditions are met: (1) A SPAWN command line begins with an at sign (@), and (2) A value is supplied for the last qualifier to the SPAWN command. An example of a command line meeting these two criteria is shown below:

```
$ SPAWN/PROC=TESTSUB @[TEST.OBJ]X
```

To avoid this problem, use /WAIT or /NOWAIT as the last qualifier to the SPAWN command, for example:

```
$ SPAWN/PROC=TESTSUB/WAIT @[TEST.OBJ]X
```

The following behavior of the SPAWN command is not documented in the VAX/VMS Command Language User's Guide.

- If you specify a command for the spawned subprocess to execute, but do not specify an input stream, SPAWN uses the null device, NL:, as the default input stream.
- The /NOLOG qualifier suppresses the output of all informational SPAWN messages, but does not affect ATTACH requests.

See the descriptions of the DCL commands SPAWN and ATTACH in the VAX/VMS Command Language User's Guide for more information.

2.3.22 TYPE Command

The DCL command TYPE has been modified to enable CTRL/O to suspend output, rather than terminating the file currently being typed. When a file is being displayed, CTRL/O halts the display of the file while the TYPE command software continues to read through the file. A subsequent CTRL/O causes the display of the file to resume at the location the software is reading. This change enables you to "skip ahead" when displaying a long file.

If you enter CTRL/O to suspend the display and do not reenter CTRL/O before the software reaches the end of the file, the next file requested (if any) is displayed.

2.3.23 USERS Replaced by SHOW USERS

USERS, which was an unsupported utility until VAX/VMS Version 3.0, is now supported as SHOW USERS. Note that, if SHOW is installed with SETPRV, then SHOW USERS will show all users on the system. Otherwise, you must have either GROUP or WORLD privilege to have other users displayed.

2.3.24 Directory Protection

It is now impossible to delete a directory that contains files. Attempting to delete such a directory results in an `SS$ DIRNOTEMPTY` error status. No privilege overrides this protection. In order to delete the directory, you must either remove or delete all the files listed in it. Or, you must use the `SET FILE/NODIRECTORY` command to change the directory file from a directory to a file.

2.3.25 Execute Protection on Directories

VAX/VMS Version 3.0 implements execute access as a restricted form of read permission. When you are granted execute access, but not read access, to a directory, you may not do wild card operations on that directory. All the files may not be listed, but a specific file may be accessed by name.

2.3.26 File Protection Defaults Modified

For VAX/VMS Version 3.0, file protection defaults have been modified to become more restrictive. When you use the DCL command `INITIALIZE`, the system files created on the volume by default receive the following protection:

The Master File Directory (MFD): `S:RWED, O:RWED, G:RE, W:E`

All others: `S:RWED, O:RWED, G:RE, W:NO ACCESS`

The `SYSGEN` parameter `RMS_FILEPROT` has been added to set the initial process default file protection for all users. This value is normally set to the following:

`S:RWED, O:RWED, G:RE, W:NO ACCESS`

You may override the setting of `RMS_FILEPROT` by including a `SET PROTECTION /DEFAULT` command in your `LOGIN.COM` file. However, `RMS_FILEPROT` always determines the protection assigned to batch and network log files since these files are created before your `LOGIN.COM` is executed.

When processes are created, the current default file protection of the creator is given to the new process. For example, processes created with the `SPAWN` or `RUN` commands will run with the current default file protection of the creator.

2.3.27 SHOW PROCESS/CONTINUOUS Utility

`INFO`, which was an unsupported utility before VAX/VMS Version 3.0, is now supported as `SHOW PROCESS/CONTINUOUS`. Note the following behavior changes:

- Previously, `INFO` could be invoked without `GROUP` or `WORLD` privileges; this is no longer true. When you enter the DCL command `SHOW PROCESS/CONTINUOUS`, you must have either `GROUP` or `WORLD` privilege to display information about a process other than the current process (or subprocesses of the current process).

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- Since process names are implicitly qualified by UIC, if you want to view a process with a group UIC different from that of the current process group UIC, specify the process identification (PID) instead of the process name using the following format:

```
$ SHOW PROCESS/CONTINUOUS/ID=process-id
```

2.3.28 Disabling CTRL/Y

To disable CTRL/Y, you must set both the CAPTIVE flag and the DISCTLY flag in the UAF record.

2.3.29 Locking Passwords

To lock a password, you must set the LOCKPWD flag in the UAF record.

2.3.30 LOGINOUT: Behavior Change

The behavior of LOGINOUT has been modified with Version 3.0 of VAX/VMS. Before VAX/VMS Version 3.0, if you created a detached process from DCL, running LOGINOUT, the first two lines of the input file (DET.COM) had to contain a user name and password. Now, when you create a detached process, running LOGINOUT, you no longer need to specify a user name and password in the input file (DET.COM). Note that the process login command file will not be invoked although the system-wide command file will be invoked.

2.3.31 Image Restrictions

The following three subsections document several image restrictions for Version 3.0 of VAX/VMS.

2.3.31.1 Privileged Images and Logical Names - Several restrictions exist when executing privileged images. All shareable images referenced by such images must be installed. In addition, any logical name redirection for these images in either the process or group logical name table is ignored.

2.3.31.2 Foreign Terminals and Privileged Images - An image that is mapped to provide support for foreign terminals must be installed if it is used with MAIL or SHOW or any other image that is installed with privilege.

2.3.31.3 CLIs Must Be Installed - Because the LOGINOUT image that maps command interpreters is installed with privilege, these restrictions (shown below) apply to all CLIs.

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- All command interpreters must be installed.
- Any logical name redirection that does not appear in the system name table is ignored when the CLI is mapped into P1 space.

2.3.32 Wild Cards Not Allowed in Library File Specifications

Wild card characters are not allowed in library file specifications with Version 3.0 of VAX/VMS. Therefore, disregard all documentation in the VAX/VMS Command Language User's Guide that mentions the use of wild card characters with library file specifications in the DCL command LIBRARY.

2.3.33 Interrupting Privileged Images

DCL no longer runs down privileged images that have been interrupted with a CTRL/Y. However, after interrupting a privileged image, you can make DCL run down your image by issuing any DCL command other than CONTINUE, SPAWN, or ATTACH.

2.3.34 Time Specifications

Various DCL commands use time qualifiers (for example, /BEFORE and /SINCE) that previously required the specification of an absolute time. Now these qualifiers will accept an absolute time, delta time, or a combination of absolute and delta time. For example, the DCL command \$ PRINT/AFTER="+5" FILE specifies that FILE be printed 5 hours from the current time. See Chapter 5 of the VAX/VMS Command Language User's Guide for more information.

2.3.35 F\$MODE Lexical Function Enhancement

The F\$MODE lexical function has been enhanced to return the string "NETWORK" for network jobs, in addition to "BATCH" and "INTERACTIVE". See Chapter 5 of the VAX/VMS Guide to Using Command Procedures for more information.

2.3.36 New Lexical Functions

The following new lexical functions have been added to DCL. See Chapter 5 of the VAX/VMS Guide to Using Command Procedures for more information.

F\$CVTIME	F\$FAO	F\$FILE_ATTRIBUTES
F\$GETDVI	F\$GETJPI	F\$GETSYI
F\$INTEGER	F\$PARSE	F\$PID
F\$PRIVILEGE	F\$SEARCH	F\$SETPRIV
F\$STRING		

2.3.37 F\$FILE_ATTRIBUTES Lexical Function Restriction

The F\$FILE_ATTRIBUTES lexical function cannot be used to retrieve information about relative files.

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2.3.38 Symbol Substitution within Comments

In previous versions of VAX/VMS, symbol substitution was performed within comments whenever a symbol was preceded by an apostrophe. (This was an undocumented feature of DCL.) For VAX/VMS Version 3.0, this kind of symbol substitution within comments is no longer supported except with the lexical function F\$VERIFY().

2.3.39 ISAM File Support

The DCL commands OPEN and READ have been enhanced to allow random access to indexed sequential (ISAM) files. See the descriptions of these commands in the VAX/VMS Command Language User's Guide and Chapter 8 of the VAX/VMS Guide to Using Command Procedures for more information.

2.3.40 VAX/VMS Message Manual Expanded

The VAX/VMS System Messages and Recovery Procedures Manual is expanded with Version 3.0 of VAX/VMS to include documentation for messages generated by numerous facilities. See Table 1 of the VAX/VMS System Messages and Recovery Procedures Manual for a complete list of these facilities.

2.4 TEXT EDITORS AND FORMATTERS

The following sections contain notes on changes and additions to the text editors and formatters supported by VAX/VMS Version 3.0. Documentation describing text editors and formatters is found in the following manuals:

- VAX-11 SOS Text Editing Reference Manual
- EDT Editor Manual
- VAX-11 DIGITAL Standard Runoff User's Guide (new manual)

2.4.1 EDT Replaces SOS as Default Editor

EDT is now the default editor invoked for VAX/VMS Version 3.0 when you enter the DCL command EDIT. To invoke the SOS editor, specify EDIT/SOS.

2.4.2 EDT Editor Manual

The following information, problems, and restrictions apply to EDT for VAX/VMS Version 3.0 (this information is not VT100-specific):

- CTRL/C Restrictions:
 - If you press CTRL/C when inserting text at the end of a line in keypad mode, the CTRL/C echoes as ^C, interrupting the screen display. To refresh the screen, press CTRL/W after pressing CTRL/C.

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- If you press CTRL/C during the EXIT command, EDT may leave a truncated output file because the operation is writing the file. (CTRL/C aborts the current operation.) To avoid this result, do not type CTRL/C during the EXIT command.
- If you press CTRL/C to abort an operation, for example, a long search, EDT's journal file becomes invalid, making subsequent recovery impossible. Therefore, you should type EXIT and reinvoke EDT to continue editing the file.
- The following command line writes the current select range to a file:

```
WRITE file-spec SELECT
```

- Hard-copy keypad mode is not described in the manual.
- In hard-copy keypad mode, the setting of TRUNCATE, and the values of SHL and SHR, are not reflected in the text displayed.
- After entering a line mode command (for example, TYPE) that takes a multiline range (for example, 5:10), the first line of the range becomes the current line. For example:

```
TYPE 5:10
```

After the lines are displayed, line 5 will be the current line. If you specify ALL instead of a line range, the first line of the buffer becomes the current line.

- When you edit a file using a directory to which you do not have write access, specify that the output and journal files are to be written to a directory to which you have write access.
- Use the range specifier ".", which is defined local to each buffer, instead of the range specifier LAST.
- When you use the RESEQUENCE line mode command from keypad mode (using <GOLD> 7), the informational message that the RESEQUENCE command prints causes the screen to scroll. Press CTRL/W to refresh the screen.
- To enable the word-wrapping feature of the EDT editor, set the screen to at least two characters wider than the word-wrapping point you want. For example, on a VT52 you can issue the commands SET SCREEN 82 and WRAP 80, or SET SCREEN 80 and WRAP 78.
- EDT runs on VT52, VT100, VT101, VT102, VT132, and VT125 terminals. EDT treats the VT101, VT102, VT132 and the VT125 as VT100 terminals. If you have a VT100 without the Advanced Video Option (AVO) or if you have a VT101: (1) do not use SET SCREEN 132 and (2) set the cursor to "block". EDT treats all other terminals as hard-copy terminals.
- If a file has more than 42949 lines, EDT numbers them incorrectly and line mode will work incorrectly after line 42949.
- When you use the SUBSTITUTE command, you cannot use an apostrophe ('), a quotation mark ("), or a percent sign (%) as the delimiter.

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- If you define a key to execute a line-mode macro using EXT, the macro cannot enter keypad mode using the C command.
- If you undelete a line that is 128 characters long or longer, you may not undelete multiple lines. For example, the following command would not work:

```
<GOLD> 2 <GOLD> <UNDL>
```

- If you delete a <CR> using <DEL C>, <DEL W>, or <DEL L>, and then undelete it, the <CR> is turned into a line break. If you use CUT, the <CR> is preserved.
- After performing a RECOVER operation, verify that your main buffer is correct, and EXIT from the file. This will ensure that your edited file is preserved.
- EDT does not support stream files.

2.5 PROGRAM DEVELOPMENT TOOLS

The following sections contain notes on changes and additions to the system components used to develop software. Program development tools are documented in the following manuals:

- VAX-11 Utilities Reference Manual
- VAX/VMS Magnetic Tape User's Guide (new manual)
- VAX-11 SORT/MERGE User's Guide
- VAX-11 MACRO Language Reference Manual
- VAX-11 Linker Reference Manual
- VAX-11 Symbolic Debugger Reference Manual

2.5.1 VAX-11 SORT/MERGE User's Guide: New /STATISTICS Qualifier

The /STATISTICS qualifier has been added (for use with SORT only) with Version 3.0 of VAX/VMS. You must specify this qualifier to cause SORT to display a statistical summary at the end of your sort operation. A statistical summary will no longer be displayed by default after a completed sort.

2.5.2 BACKUP Restriction: Restoring Directories

If a save set was created with a version of BACKUP prior to Version 3.0 of VAX/VMS using the selection file specification [000000...] without the /FAST qualifier, the directory specifications stored in the save set contain a leading [000000]; for example, [000000.SYSEXE].

You must take this into consideration if you selectively restore directories from such save sets. For example, you must specify /SELECT=[000000.SYSEXE] to restore directory [SYSEXE] because the qualifier /SELECT=[SYSEXE] does not select the recorded directory specification [000000.SYSEXE]. You can use the /LIST qualifier to determine whether the recorded directory specifications in the save set you want to process contain a leading [000000].

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In save sets created with Version 3.0 of BACKUP, the leading [000000] is not present. Therefore, to restore directory [SYSEXE], specify /SELECT=[SYSEXE].

2.5.3 VAX-11 Utilities Reference Manual

Version 3.0 of the VAX-11 Utilities Reference Manual is expanded to include documentation for all utilities supported by VAX/VMS. The following utilities are new with Version 3.0:

- Accounting Utility (ACCOUNTING)
- Command Definition Utility (SET COMMAND)
- Monitor Utility (MONITOR)
- Phone Utility (PHONE)
- Verify Utility (ANALYZE/DISK_STRUCTURE)

The following utilities contain major enhancements with Version 3.0 of VAX/VMS:

- Authorize Utility (AUTHORIZE)
- Backup Utility (BACKUP)
- Install Utility (INSTALL)
- Librarian Utility (LIBRARY)
- Message Utility (MESSAGE)
- Personal Mail Utility (MAIL)
- RMS Share Utility (RMSSHARE)
- SYE Utility (SYE)
- System Generation Utility (SYSGEN)

2.5.4 Obsolete Images Removed

The images listed below have been removed for VAX/VMS Version 3.0:

- SYS\$LIBRARY:VMLIB.OLB (RSX virtual memory support routines)
- SYS\$SYSTEM:DISPLAY.EXE (replaced by MONITOR)
- INFO (previously unsupported, replaced by SHOW PROCESS/CONTINUOUS)
- MDL (never supported)
- SETNAME (previously unsupported, replaced by SET PROCESS/NAME=)
- SFA (previously unsupported, replaced by new DUMP and ANALYZE/IMAGE)
- TALK (previously unsupported, replaced by PHONE)

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- VFY1 (replaced by ANALYZE/DISK_STRUCTURE)
- VFY2 (replaced by ANALYZE/DISK_STRUCTURE)
- WHO (not supported)

2.5.5 Command Definition Utility

For VAX/VMS Version 3.0, a new command definition utility has been added to DCL. See Chapter 5 of the VAX-11 Utilities Reference Manual for instructions on how to use this utility to define DCL commands, to request that DCL parse your commands, and to retrieve information from DCL about your commands.

2.5.6 Accounting Record Formats

The accounting record formats have changed for Version 3.0 of VAX/VMS. This was done to include new information and make future enhancements easier while maintaining upward compatibility.

If you require record formats of versions of VAX/VMS prior to Version 3.0, use the Conversion Utility, CNVACC. This utility processes an input file containing either Version 3.0 formats or formats of previous versions of VAX/VMS and produces an output file whose records are in the former format (that is, the format described on page 174 of the Version 2.0 VAX/VMS System Services Reference Manual). To convert an accounting file to the former format, use the following command sequence:

```
$ CNVACC ::= $CNVACC
$ CNVACC <input-file-spec> <output-file-spec>
```

The Conversion Utility will prompt for any arguments not supplied. The default input file specification is "ACCOUNTNG.DAT". The default output file specification is "ACCOUNTNG.OLD". CNVACC can read the current accounting file without first having to render it inactive.

2.5.7 Image Level Accounting

Image level accounting, a new feature for Version 3.0, is by default disabled. It may be enabled or disabled with the \$SNDACC system service or with the DCL command SET.

To enable or disable image level accounting with the \$SNDACC system service, use the job type code, ACC\$KIMGTRM, which is defined in the \$ACCDEF macro.

To enable or disable image level accounting with the DCL command SET, use the following format:

```
$ SET ACCOUNTING /ENABLE=IMAGE
$ SET ACCOUNTING /DISABLE=IMAGE
```

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2.5.8 ANALYZE Command Notes

The DCL command ANALYZE, used with the qualifiers listed below, performs the indicated functions:

- ANALYZE/CRASH_DUMP - Invokes the System Dump Analyzer (SDA) to analyze a VAX/VMS crash dump file.
- ANALYZE/DISK_STRUCTURE - Invokes the Verify Utility to analyze and optionally repair a disk structure, or to generate a binary usage file.
- ANALYZE/IMAGE - Generates a formatted listing of the contents of an image file.
- ANALYZE/OBJECT - Generates a formatted listing of the contents of an object file.
- ANALYZE/RMS_FILE - Performs a structure analysis of RMS files with an interactive option.
- ANALYZE/SYSTEM - Invokes the System Dump Analyzer (SDA) to examine the running system.

2.5.9 Synonym Directory Entries on System Disk

Two files, SYSBOOT.EXE and SYSMOINT.DIR, have the following synonym directory entries on a normally functioning VAX/VMS Version 3.0 system:

```
[SYSEXE]SYSBOOT.EXE
[SYSEXEMIN]SYSBOOT.EXE
[SYS0.SYSEXE]SYSBOOT.EXE

[000000]SYSMAINT.DIR
[SYS0]SYSMAINT.DIR
```

Therefore, the ANALYZE/DISK_STRUCTURE utility will report %VERIFY-I-BACKLINK error messages for these files. These messages are entirely normal.

2.5.10 AUTHORIZE Command String Length Restriction

For Version 3.0 of VAX/VMS, AUTHORIZE uses the new Command Definition Utility to interpret a command string after placing the string into an internal buffer. AUTHORIZE command strings cannot be greater than 508 characters in length (excluding hyphens for continuation) because the Command Definition Utility will not process command buffers longer than 508 bytes. If a command string exceeds this limit, divide it into two or more command strings.

2.5.11 Null Passwords Implemented

You can now use the DCL command SET PASSWORD or the qualifier /PASSWORD with the AUTHORIZE command to specify null passwords. When you have a null password, you only need to enter your username to log in because LOGIN does not perform a password prompt or verification. See the AUTHORIZE chapter of the VAX-11 Utilities Reference Manual or Chapter 2 of the VAX/VMS System Management and Operations Guide for more information.

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2.5.12 AUTHORIZE String Delimiter Restrictions

When using the AUTHORIZE command, you must delimit all strings with double quotation marks (") that contain embedded blanks. For example, the following command is in the correct form:

```
UAF>MODIFY DOE /OWNER="JANE DOE"
```

2.5.13 AUTHORIZE Qualifier /MAXACCTJOBS Unimplemented

The /MAXACCTJOBS qualifier for the Authorize Utility is not supported for VAX/VMS Version 3.0 and should not be used.

2.5.14 INSTALL Restriction

INSTALL prints an incorrect value for the size of the image headers of images that are installed HEADER_RESIDENT. A future version of VAX/VMS will correct this problem.

2.5.15 Monitor Utility Notes

The following items apply to the Monitor Utility for VAX/VMS Version 3.0:

- When a recording file containing a comment string is played back, the comment is included in the heading of the display or summary.
- When a VAX-11/782 attached processor is started or stopped with a START/CPU or STOP/CPU command during execution of a MONITOR MODES request, data collected for the interval during which the operation takes place may contain incorrect MODES data.

2.5.16 Disabling Dialup and Network Access

To prevent an account in SYSUAF.DAT from being logged in to through the use of a "SET HOST node" command or through a dialup, use the following two new login flags for primary and secondary days as shown in the following AUTHORIZE command:

```
UAF>MODIFY <USER> /PFLAGS=(DISDIALUP,DISNETWORK) -  
/SFLAGS=(DISDIALUP,DISNETWORK)
```

2.5.17 New Quota: ENQLM

The VAX/VMS Version 3.0 lock management services use a new quota called the enqueue quota (ENQLM). The enqueue quota represents the total number of locks a process and its subprocesses can own. Version 2.0 of VAX/VMS provides the authorization file with a field for ENQLM in each user record. However, this field has always been zero. The VAX/VMS Version 3.0 upgrade procedure contains a section that runs AUTHORIZE and changes every account to have a nonzero ENQLM. However, you must do this manually for any additional authorization files that your installation maintains. Use the MODIFY command in AUTHORIZE.

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This command has been enhanced to support the use of wild card characters to make this procedure easier. For example, to set the ENQLM to 10 for every account, issue the following command to AUTHORIZE:

```
MODIFY */ENQLM=10
```

To set the ENQLM to 20 for a group, issue the following command:

```
MODIFY [11,*]/ENQLM=20
```

Then, individually set any accounts that require a different ENQLM.

You may receive the SSS_EXENQLM error message if your process performs extensive RMS file sharing without sufficient enqueue quota.

2.5.18 Lock Management Services

For Version 3.0 of VAX/VMS, VAX-11 RMS uses the lock management services to synchronize shared files, global buffers, and record locks. One lock will be taken out for each shared file, global buffer, and outstanding record lock.

If your system performs extensive VAX-11 RMS file sharing, the default setting of the SYSGEN parameter LOCKIDTBL may be too low. (LOCKIDTBL controls the maximum number of locks allowed on the system.) If LOCKIDTBL is set too low, programs will receive the SSS_NOLOCKID error message.

Please note that if you increase the SYSGEN parameter LOCKIDTBL, you must also increase the SYSGEN parameter RESHASHTBL. See the VAX/VMS System Management and Operations Guide for more information about these parameters.

2.5.19 Elimination of /SHARE=COPY and GSMATCH=NEVER Linker Options

Version 3.0 of VAX/VMS no longer supports the /SHARE=COPY linker option. This option enabled you to store a shareable image in an executable image file and activate the entire entity as a single image.

If you specify the /SHARE=COPY option to the Version 3.0 linker, you will receive a warning message and the image will be linked as if the =COPY option to the /SHARE qualifier was not present. In order to transport an application from one system to another, the executable image and all shareable images referenced by that image must be moved. (The ANALYZE/IMAGE/FIXUP command gives a list of all shareable images referenced by an executable image.)

Although the GSMATCH=NEVER option is accepted by the linker, the executable image that is produced when linking with such an image will not execute. A future version of VAX/VMS will correct the linker to disallow GSMATCH=NEVER.

Note that images linked under VAX/VMS Version 2.5 (or earlier) with the /SHARE=COPY option will continue to activate successfully.

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2.5.20 SYSGEN AUTOCONFIGURE Modifications

For Version 3.0 of VAX/VMS, the algorithm for computing floating control/status registers (CSR) for UNIBUS devices has been slightly changed. Devices at the high end of floating space could be affected (for example, LPalls after the first, as well as DR11Bs and DR11Ws). If you encounter problems, see the VAX-11 Utilities Reference Manual for information about the new SYSGEN commands SHOW/UNIBUS, SHOW/CONFIGURATION, and CONFIGURE. (You can use the CONFIGURE command to calculate the addresses necessary for each controller on a UNIBUS.)

Some SYSGEN AUTOCONFIGURE modifications for Version 3.0 of VAX/VMS are listed below:

- TU58 cartridges are now autoconfigured in the slot formerly reserved for KL11s.
- DUP11s will not autoconfigure because there is no standard driver name for SYSGEN to reference.
- The DC11 vector alignment has changed from 4 to 8.
- The DR11B vector alignment has changed from 8 to 4.
- All devices that AUTOCONFIGURE finds where an RX11 or RX211 should be, are assumed to be RX211s. This causes the proper driver to be loaded.

2.5.21 Restriction in Activating Privileged Shareable Images

In VAX/VMS Version 3.0, privileged shareable images are not permitted to make outbound calls. This means that a privileged shareable image cannot reference global symbols defined in some other shareable image. The activation of an image that references such an illegal privileged shareable image will fail with the SS\$_NOSHRIMG error message.

To work around this restriction, use the /NOSYSSHR qualifier with the DCL command LINK and explicitly include all the object modules in the privileged shareable image.

2.5.22 VAX-11 Linker Reference Manual

The following technical changes are new with Version 3.0 of the VAX-11 Linker. Shareable images linked under Version 2.0 or 2.1 that contain copy always image sections must be relinked.

- References to shareable images that do not use general addressing mode (G^ in VAX-11 MACRO, and ADDRESSING MODE(GENERAL) in VAX-11 BLISS-32) will cause an error message at link time. Also, .LONG references to relocatable addresses found in the creation of a shareable image will be flagged. However, these images should execute correctly.
- Use of the VAX-11 MACRO directives .ADDRESS and .ASCID in a program section makes that program section nonshareable. Thus, if multiple processes must access a code section or read-only data section, ensure that these directives do not appear in the sections.

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- The linker map format has changed slightly. There are no lines with embedded carriage control.
- In a linking operation that creates a shareable image, if the linker encounters the object language equivalents of the VAX-11 MACRO assembler directives .ADDRESS or .ASCID or their equivalent, it includes a fix-up image section in the image. The fix-up image section contains information that allows the image activator to make these position-dependent references position independent. In this way, a shareable image, which would otherwise be position dependent, is made position independent.
- Position independent shareable images can now be placed at a specified address in virtual memory by means of the CLUSTER= option.
- Sharing of a single COMMON data area (such as those used in VAX-11 FORTRAN, VAX-11 BASIC, and VAX-11 PL/I) by multiple shareable images can now be achieved without sacrificing the independence of any of the shareable images.
- In resolving symbolic references, the linker now searches the system default shareable image library IMAGELIB.OLB after searching any user-defined default libraries. IMAGELIB.OLB contains VMSRTL.EXE, a shareable image library that the linker previously searched by default.
- In an options file, an empty cluster may be defined by specifying the CLUSTER= option without including one or more files as input to the cluster.
- In an options file, input files no longer need to be specified first.
- The CHANNELS= option is no longer available or needed.
- The GSMATCH=NEVER option should not be used because the resulting executable image will not run.
- When specifying a base address with the /SYSTEM qualifier, the linker rounds the specified address to the next highest page boundary only when the /HEADER qualifier is also specified; otherwise it uses the specified address. Before Version 3.0 of VAX/VMS, the linker always rounded to the next highest page boundary.
- Images created under VAX/VMS Version 3.0 cannot be used on versions of VAX/VMS systems prior to Version 3.0.
- If a specific common area is defined in two different shareable images, the linker reports an error.
- If a common area in an input object module is larger than a common area (with the same name) in a shareable image, the linker will report an error.

2.5.23 Watchpoint Implementation Restriction in DEBUG

When you are using watchpoints in DEBUG on a VAX-11/730 processor, DEBUG may go into an infinite loop if the following conditions are true:

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- If you have set two or more watchpoints
- If a pair of the watchpoints lie on adjacent pages of memory
- If an instruction is executed whose target lies on both those pages

This infinite loop will cause your program to hang after you issue a STEP or GO command.

To avoid this problem, do not set more than one watchpoint simultaneously when using DEBUG on a VAX-11/730 processor. A future version of VAX/VMS will correct this problem.

2.6 SYSTEM SERVICES AND I/O

The following sections contain information on changes and additions to VAX/VMS system services and I/O. The documentation for these topics is found in the following manuals:

- VAX/VMS System Services Reference Manual
- VAX/VMS I/O User's Guide (Volume 1)
- VAX/VMS I/O User's Guide (Volume 2)

2.6.1 New System Status Codes

With Version 3.0 of VAX/VMS, the following new system status codes are returned by certain new system services to represent specific nonprivilege and quota-exceeded errors:

Nonprivilege			Exceeded Quota
SS\$_NOCMKRNL	SS\$_NOSYSNAM	SS\$_NOTMPMBX	SS\$_EXASTLM
SS\$_NOALLSPOOL	SS\$_NOBUGCHK	SS\$_NOBYPASS	SS\$_EXBIOLM
SS\$_NOCMEXEC	SS\$_NODETACH	SS\$_NODIAGNOSE	SS\$_EXBYTLM
SS\$_NOEXQUOTA	SS\$_NOGROUP	SS\$_NOGRP NAM	SS\$_EXDIOLM
SS\$_NOLOGIO	SS\$_NOMOUNT	SS\$_NONETMBX	SS\$_EXENQLM
SS\$_NOACNT	SS\$_NOOPER	SS\$_NOPFNMAP	SS\$_EXFILLM
SS\$_NOPHYIO	SS\$_NOPRMCEB	SS\$_NOPRMGBL	SS\$_EXPGLQUOTA
SS\$_NOPRMMBX	SS\$_NOPSWAPM	SS\$_NOALTPRI	SS\$_EXPRCLM
SS\$_NOSETPRV	SS\$_NOSHMEM	SS\$_NOSYSGBL	SS\$_EXTQELM
SS\$_NOSYSLCK	SS\$_NOSYSPRV	SS\$_NOVOLPRO	
SS\$_NOWORLD			

The VAX/VMS System Services Reference Manual identifies services that use these new status codes.

All VAX/VMS system services that returned the general error codes SS\$_NOPRIV or SS\$_EXQUOTA before Version 3.0, continue to do so.

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These will change, however, in a major release of VAX/VMS after Version 3.0, to return the explicit privilege or quota status codes listed above.

Therefore, after you install VAX/VMS Version 3.0, modify any programs that explicitly check for SS\$_NOPRIV or SS\$_EXQUOTA. Use the following four symbols to discover whether the status code is within the range of the specific codes:

Status Code	Definition
SS\$_NOPRIVSTRT	Start of specific no privilege status codes
SS\$_NOPRIVEND	End of specific no privilege status codes
SS\$_EXQUOTASTRT	Start of specific exceeded quota status codes
SS\$_EXQUOTAEND	End of specific exceeded quota status codes

Example:

```
Change from:  CMPW      R0, SS$_NOPRIV
              BEQL      NOPRIV_ERROR

To:          CMPW      R0, SS$_NOPRIV      ;As existed
              BEQL      NOPRIV_ERROR      ;before, adding
              CMPW      R0, SS$_NOPRIVSTRT
              BLSSU     10$
              CMPW      R0, SS$_NOPRIVEND
              BLEQU     NOPRIV_ERROR
              10$:
```

NOTE

You do not need to modify programs that check status codes for success or failure only. For example, the following codes will continue to be correct:

```
        CMPL      R0, SS$_NORMAL
        BEQL      SUCCESS
```

or

```
        BLBC      R0,ERROR
```

2.6.2 \$GETMSG System Service Restrictions

The following restrictions apply to the \$GETMSG system service:

- \$GETMSG does not check the length of the argument list and therefore cannot return the SS\$_INSFARG (insufficient arguments) error status code. If the service does not receive enough arguments, you may not get the desired results.
- \$GETMSG will not generate exceptions when failures occur and system service failure mode is enabled.

2.6.3 \$ENQ System Service Documentation Error

The description of the \$ENQ system service in the VAX/VMS System Services Reference Manual states that the SS\$ NOLOCKID error message is returned if lock identifications are not available and resource wait mode is disabled. This is incorrect. SS\$ NOLOCKID is returned whether resource wait mode is enabled or disabled.

2.6.4 /NOMODEM Default for Terminals

For Version 3.0 of VAX/VMS, the default modem characteristic for terminals is /NOMODEM. If you have terminal lines connected to modems, change this setting to /MODEM in your start-up command file. If you do not change the setting, VAX/VMS will ignore all modem control signals, producing undesired effects. For example, improperly defined lines for automatic answer modems will prevent the modem from answering incoming calls.

If you have non-dialin terminals set to /MODEM, then the DISDIALUP feature of login will assume that terminal is a dialup, and prevent restricted accounts from being logged into.

2.6.5 /AUTOBAUD Default for Terminals

For Version 3.0 of VAX/VMS, the default speed detection characteristic for terminals is /AUTOBAUD.

A terminal that is set to /AUTOBAUD will not receive broadcast messages if it is not logged in or attached to a process as an application terminal. The system will avoid writing messages to such a terminal until the proper transmission speed has been determined.

Thus, a terminal set to /AUTOBAUD will not receive the initial REPLY/ALL you may have placed in your SYSTARTUP command file notifying users that the system is up.

If you have terminals on fixed lines that always run at the same speed, they will not benefit from the automatic speed detection provided by /AUTOBAUD and you should specify their permanent speed in the SYSTARTUP command file.

For example, if line TTA0 is connected to a VT100 that is set to run at 9600 baud, then place the following command in the SYSTARTUP command file before any REPLY /ALL command:

```
SET TERMINAL TTA0: /DEVICE TYPE=VT100 -  
/PERMANENT /NOAUTOBAUD /SPEED=9600
```

Such terminals will have known transmission speeds, and the system will send broadcast messages to them even though they are not logged in.

2.6.6 New Terminal Driver Error Code

For VAX/VMS Version 3.0, the following new READ error code has been defined for terminal READ operations:

```
SS$ _DATAOVERUN
```

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This error will be returned if an overrun condition occurs in the terminal controller input SILO, or if the typeahead buffer overflows. (Before Version 3.0 of VAX/VMS, SS\$_PARITY was returned for these conditions.)

2.6.7 Read Outstanding Required for Remote Device Communication

When a terminal line is used as a communications mechanism to some remote device, ensure that the program using that line contains a read outstanding to the device whenever an input stream is expected. By doing this, your program forces the terminal driver to create the type-ahead buffer at the time the read is started.

Failure to supply this read outstanding can cause some input characters to be lost because of a timing problem in the creation of a type-ahead buffer.

2.6.8 Change in Default Terminal Protection

To improve system security, the default protection for unallocated terminals has changed. Terminals cannot be allocated by an existing process but can be logged in to a new process. This protection is controlled by the SYSGEN parameter TTY_PROT. To change the protection for terminal lines that need to be available for general process allocation, use the DCL command SET PROTECTION/DEVICE.

2.6.9 Device Information

The following three system services can be used to obtain information about devices:

- Get Device/Volume Information (\$GETDVI)
- Get Channel Information (\$GETCHN)
- Get Device Information (\$GETDEV)

The information obtained includes such categories as device characteristics, device type, error count, and operation count. \$GETDVI also returns information about the volume set.

It is recommended that new programs make use of the \$GETDVI system service to obtain device information. \$GETDVI returns all the information returned by \$GETCHN and \$GETDEV. However, only \$GETDVI will be extended in the future. (\$GETDEV and \$GETCHN are unchanged from Version 2.0 of VAX/VMS). See the VAX/VMS System Services Reference Manual for information about \$GETDVI.

2.6.10 \$CREPRC System Service Modified

The Create Process (\$CREPRC) system service has been modified with Version 3.0 of VAX/VMS. The following two status flags to this service now require DETACH privilege:

- BATCH used to be nonprivileged
- NETWRK used to require NETMBX privilege

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2.6.11 \$CREPRC System Service Privilege Bit Names

Two new privilege bit names, PRV\$V_ACNT and PRV\$V_ALTPRI, have been added to the \$PRVDEF macro. Their values are equal to those of PRV\$V_NOACNT and PRV\$V_SETPRI, respectively. These new bit names have been added to provide PRV names that are consistent with the names used by AUTHORIZE and DCL.

For compatibility, the old names are still defined by \$PRVDEF. However, it is strongly recommended that the new names be used in all future programs.

2.6.12 \$SETPRI System Service

For VAX/VMS Version 3.0, the \$SETPRI system service allows a process that does not have ALTPRI privilege to lower its priority and later raise priority back to the value indicated in its authorization record.

2.6.13 Undocumented System Service Interfaces

The use of the \$IMGACT procedure and the item JPI\$_IMAGECOUNT is reserved to DIGITAL as stated below:

- Image Activator

The system procedure that prepares images for execution is not called in the same fashion as the VAX/VMS Version 2.0 image activator. The use of the \$IMGACT procedure is reserved to DIGITAL. DIGITAL reserves the right to continue to make changes to this interface.

- JPI\$_IMAGECOUNT

There is an undocumented item that can be returned from the \$GETJPI system service called JPI\$_IMAGECOUNT. The use of this item is reserved by DIGITAL.

2.6.14 VAX/VMS I/O User's Guide Documentation Change

In Section 9.2.4 (Escape Sequences) of the terminal driver chapter of the VAX/VMS I/O User's Guide (Vol. 1), the sentence in the third paragraph that reads "The remaining characters are transmitted on the next read." should be replaced with the following statement:

If SS\$_PARTESCAPE is returned, the application program must issue enough single character reads, without timeout, to read the rest of the characters in the escape sequence, while parsing the syntax of the rest of the escape sequence.

2.7 RUN-TIME LIBRARY

The following sections contain notes on changes and additions to the VAX-11 Common Run-Time Procedure Library. The VAX-11 Run-Time Library is documented in the following manuals:

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- VAX-11 Run-Time Library User's Guide
- VAX-11 Run-Time Library Reference Manual
- VAX-11 Guide to Creating Modular Library Procedures
- VAX-11 Run-Time Library Language Support Reference Manual

2.7.1 VAX-11 Common Run-Time Procedure Library Modifications

For VAX/VMS Version 3.0 of the Run-Time Library, the VAX-11 RTL manuals have been reorganized for VAX/VMS Version 3.0. The VAX-11 Run-Time Library User's Guide contains detailed explanations of string handling, condition handling, the screen package and other concepts. The procedure descriptions in the VAX-11 Run-Time Library Reference Manual are now in alphabetical order. In addition, there is online help for the language independent procedures (HELP RTL) of the VAX-11 Run-Time Library.

New procedures have been added for the following:

- Analyzing string descriptors (LIB\$ANALYZE_SDESC)
- CLI callback routines (LIB\$GET_SYMBOL, LIB\$SET_SYMBOL, LIB\$DELETE_SYMBOL, LIB\$SET_LOGICAL, LIB\$DELETE_LOGICAL, LIB\$ENABLE_CTRL, LIB\$DISABLE_CTRL, LIB\$SPAWN, LIB\$ATTACH)
- Handling faults (LIB\$DECODE_FAULT)
- Manipulating binary trees (LIB\$INSERT_TREE, LIB\$LOOKUP_TREE, LIB\$TRAVERSE_TREE)
- Performing file lookups (LIB\$FILE_SCAN, LIB\$FIND_FILE)
- General-purpose conversions (LIB\$CVT_DX_DX)
- New screen-oriented procedures (LIB\$PUT_LINE, LIB\$SET_OUTPUT, LIB\$SET_SCROLL, LIB\$UP_SCROLL)
- Translation tables that provide a reversible transformation from ASCII to EBCDIC and back (LIB\$AB_ASC_EBC_REV, LIB\$AB_EBC_ASC_REV)
- Callable procedures that make additional VAX-11 MACRO instructions available to a high-level language (LIB\$CALLG, LIB\$MOVC3, LIB\$MOVC5, LIB\$EMUL, LIB\$EDIV)
- String arithmetic enhancements (new entry point STR\$DIVIDE)
- New math procedures that provide the following:
 - Hyperbolic arctangent (MTH\$ATANH, MTH\$DATANH, MTH\$GATANH, MTH\$HATANH)
 - Base 2 logarithms (MTH\$ALOG2, MTH\$DLOG2, MTH\$GLOG2, MTH\$HLOG2)
 - Sine and cosine (MTH\$SINCOS, MTH\$DSINCOS, MTH\$GSINCOS, MTH\$HSINCOS)
 - New math trigonometric procedures that take arguments or sine results in degrees to complement the existing procedures that use radians.

2.7.2 String Descriptors Require Valid Class and Datatype

Because new descriptor classes are supported in VAX/VMS Version 3.0, most VAX-11 Run-Time Library procedures that take string parameters check the string descriptor class and datatype fields for validity. Previous versions of these procedures did not examine these fields because the only supported string classes (static and dynamic) were often equivalent.

If you create string descriptors while programming in VAX-11 MACRO or VAX-11 BLISS-32, ensure that you initialize the class and datatype fields to appropriate values. You can specify a zero class and datatype and indicate a static text string. Failure to do so may give incorrect results, or the error "invalid string descriptor". The most common source of this type of error is a VAX-11 BLISS-32 program that declares the descriptor to be LOCAL, thereby allocating it on the stack. If the class and datatype fields are not filled in, the previous contents are used, causing errors.

If you are using strings in a high-level language or the VAX-11 MACRO directive .ASCID, the class and datatype fields are already being correctly filled in. See Appendix C of the VAX-11 Run-Time Library Reference Manual and the VAX-11 Run-Time Library User's Guide for more information.

2.7.3 Enabling and Disabling CTRL/T

Two new VAX-11 Run-Time Library procedures, LIB\$ENABLE_CTRL and LIB\$DISABLE_CTRL, allow you to enable and disable CLI interception of control characters. The description of these procedures in the VAX-11 Run-Time Library Reference Manual only mentions their use for enabling and disabling CTRL/Y interception. These procedures actually permit enabling and disabling of any control character supported by the CLI being used. For DCL, CTRL/T and CTRL/Y are supported. For MCR, only CTRL/Y is supported.

The symbol LIB\$M_CLI_CTRLT is defined as the bit mask for CTRL/T, in addition to the documented definition of LIB\$M_CLI_CTRLY. See the VAX-11 Run-Time Library Reference Manual for more information.

2.7.4 LIB\$SPAWN Restrictions

LIB\$SPAWN is a new Run-Time Library procedure that makes the DCL command SPAWN available as a callable procedure. Because it actually calls DCL to perform its function, LIB\$SPAWN is subject to any limitations and restrictions placed on the SPAWN command. However, if the SPAWN command displays an informational message warning you of a violated restriction (such as a symbol whose value is too long), a program calling LIB\$SPAWN will not receive any indication of the warning. Ensure that you understand all of the limitations of SPAWN before using LIB\$SPAWN. For more information, see the VAX/VMS Command Language User's Guide and the VAX-11 Run-Time Library Reference Manual.

2.7.5 Changes to VAX-11 RTL Routines for BASIC String Arithmetic

The interpretation of the P% parameter (the rounding and truncation parameter) has been changed to be compatible with the interpretation found in VMS BASIC-PLUS-2. The following tables are an extraction of

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those tables provided in the reference manuals for VMS BASIC-PLUS-2 and VAX-11 BASIC. Note where the differences occur; the new behavior of the VAX-11 BASIC run-time routines will reflect the results found in the VMS BASIC-PLUS-2 tables.

Input value = 12345.67898

P#	Effect	Result for VMS BASIC-PLUS-2	Old Result for VAX-11 BASIC
-5	Number rounded to 100,000s	0	0
-4	Number rounded to 10,000s	1	10000
-3	Number rounded to 1000s	12	12000
-2	Number rounded to 100s	123	12300
-1	Number rounded to 10s	1235	12350
0	Number rounded to units	12346	12346
1	Number rounded to tenths	12345.7	12345.7
2	Number rounded to hundredths	12345.68	12345.68
3	Number rounded to thousandths	12345.679	12345.679
4	Number rounded to ten-thousandths	12345.6789	12345.6789
5	Number rounded to hundred-thousandths	12345.67891	12345.67891
9995	Number truncated to 100,000s	0	0
9996	Number truncated to 10,000s	1	10000
9997	Number truncated to 1000s	12	12000
9998	Number truncated to 100s	123	12300
9999	Number truncated to 10s	1234	12340
10,000	Number truncated to units	12345	12345
10,001	Number truncated to tenths	12345.6	12345.6
10,002	Number truncated to hundredths	12345.67	12345.67
10,003	Number truncated to thousandths	12345.678	12345.678
10,004	Number truncated to ten-thousandths	12345.6789	12345.6789
10,005	Number truncated to hundred-thousandths	12345.67891	12345.67891

2.7.6 Obtaining RAB Pointer for FORTRAN Unit

A new VAX-11 Run-Time Library procedure makes it possible for a FORTRAN program to obtain the address of the VAX-11 RMS Record Access Block (RAB) for a FORTRAN logical unit (LUN) without using a USEROPEN procedure. The RAB can be accessed or modified as necessary to use RMS features that are not directly supported by FORTRAN.

The calling format of the procedure is:

```
RAB.wa.v = FOR$RAB (LUN.rl.r)
```

LUN is the FORTRAN logical unit number for which the address of the RAB is to be returned, and is passed as an integer by reference. The unit must be open.

See the VAX-11 RTL Language Support Procedures Reference Manual for guidelines to follow when manipulating VAX-11 RMS data structures used by the VAX-11 Run-Time Library.

2.7.7 Procedures No Longer Included in STARLET.OLB

Several undocumented procedures that were included in the VAX/VMS Version 2.0 STARLET.OLB are not included in the VAX/VMS Version 3.0 distribution kit.

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Module Name	Entry Point
CALLIMAGE	LIB\$CALL_IMAGE
CREMAPSEC	LIB\$ CREMAPSEC
LIB\$EXECUTE_CLI	LIB\$EXECUTE_CLI (*)
LIB\$MERGE	LIB\$ P1MERGE
LIBACP	LIB\$CHECK DIR
	LIB\$CREATE DIR
	LIB\$FID_TO_NAME
	LIB\$SET PROT
	LIB\$UNLOCK
SETPRIV	PRV\$SETPRIV

(*) See the VAX-11 Run-Time Library procedure LIB\$SPAWN.

2.8 VAX-11 RECORD MANAGEMENT SERVICES (VAX-11 RMS)

The following sections contain notes that describe changes and additions to the VAX-11 Record Management Services. Documentation on VAX-11 RMS is found in the following manuals:

- Introduction to VAX-11 Record Management Services
- VAX-11 Record Management Services Tuning Guide (new manual)
- VAX-11 Record Management Services Utilities Reference Manual (new manual)
- VAX-11 Record Management Services Reference Manual

2.8.1 EDIT/FDL Error Message

The EDIT/FDL facility will return the following error message if an invalid date/time string is specified:

FDL-W-INVDATIM, invalid date/time on line n

Ensure that the date/time string has a valid format as documented in the description of the SYS\$BINTIM system service in the VAX/VMS System Services Reference Manual.

2.8.2 CONVERT/FAST_LOAD Restriction

When you use the /FAST_LOAD qualifier with the CONVERT command to load an indexed file with key Duplicates enabled, the Maximum Key Length is 251 bytes. This is due to a SORT-32 restriction when doing a "stable" sort.

Use the /NOFAST_LOAD/NOSORT qualifiers with the DCL command CONVERT to avoid this problem.

2.8.3 EDIT/FDL Utility Treats Keys as Non-Segmented

For Version 3.0 of VAX/VMS, the new EDIT/FDL Utility will treat all keys as nonsegmented (only during design, redesign, or optimize scripts). The other VAX-11 RMS utilities will always treat segmented keys normally.

2.8.4 EDIT/FDL Utility Ignores EDF\$MAKEFDL

For VAX/VMS Version 3.0, the EDIT/FDL Utility ignores the EDF\$MAKEFDL logical name if it is defined. Therefore, use the DCL command SET PROTECTION instead to control access to FDL files.

2.8.5 ANSI-"a" File Names and VAX/VMS File Specifications

VAX-11 RMS now supports a file name field format (in full file specifications) that consists of up to 17 ANSI-"a" characters. This new file name format is supported only for magnetic tape devices.

The ANSI-"a" characters include uppercase letters, the digits 0 through 9, and the following special characters:

! " % & ' () * + - , . / : ; < = > ?

(including the "space" character)

The full file specification format describing this new file name field has the following form:

Device:[Directory]"Quoted ANSI-a string".;Version

If you use this format, you must place the file name within quotation marks. You cannot include a file type in your specification, when using this file name format. You can, however, include the file type delimiter (.). You can also include a version delimiter (;) as well as a specific version number, in your file specification.

The following file specification would be a legitimate instance of a specification using the new file name format:

MTA1:[SMITH]"AIKL U02%SCZ.W".;1

This file specification, containing the new file name format, can be used to describe files residing on magnetic tape devices only.

Lowercase characters within a quoted string file name field will be converted to uppercase by VAX-11 RMS. No other modifications will be made to your original specification.

The quotation mark (") is a legal character, and can be used as part of the file name specification. If you wish to use quotation marks within your quoted string file name, you must include two consecutive quotation marks (") for each quotation mark that you intend to use. VAX-11 RMS will ignore the first quotation mark (within the string), thereby treating the two consecutive quotation marks as a single quotation mark.

If you use only quotation marks within your quoted string file name specification, you can have a valid file name field with a maximum of 36 characters. For example, a file name consisting of all quotation marks would contain quotation marks at the beginning and end of the file name as well as 34 quotation marks (for the 17 characters permitted) within the quoted string file name. In this case, the file name field would appear as follows:

Note that this new file name format should not be confused with the Network Quoted string format. The ANSI-"a" quoted string file name field is part of a full file specification while the network quoted string immediately follows a node specification.

2.8.6 Relative Version Addressing

VAX/VMS Version 3.0 supports a new feature called relative version addressing. This feature uses negative version numbers to address file versions relative to the latest versions. If you specify version -n, you will obtain the next most recent version of the file. For example, when you specify zero, you obtain the latest version; -1, the next latest version, and so on. If you specify -n where n is greater than the number of versions of the file, a file not found error will occur.

Relative version addressing is fully supported by VAX-11 RMS, native mode utilities, and most compatibility mode utilities (such as PIP, SOS, and FLX) on Files-11 structure level 2 disks only. Relative version addressing is not supported on structure level 1.

2.8.7 Magnetic Tape Volume Identifiers Now Uppercased

For Version 3.0 of VAX/VMS, the Magnetic Tape ACP and the tape portions of the Mount and Initialize Utilities will uppercase all label strings. (Label strings passed in quotation marks will also be uppercased.)

The Mount Utility and Magnetic Tape ACP will also uppercase the VOL1 label, Volume Identifier field for comparison to the input. Before VAX/VMS Version 3.0, lowercase letters were allowed in tape volume labels. In order to conform to ANSI standards, VAX/VMS will no longer create tapes with lowercase letters in the Volume Identifier field or distinguish between cases during Volume Identifier verification.

If an ANSI magnetic tape volume label contains characters that are not valid VMS name characters (for example, the ANSI-"a" punctuation marks), the logical name produced by MOUNT will not be a useable logical name for VAX-11 RMS. In these cases, you should supply an explicit volume logical name. For example,

```
MOUNT MTA0: volume-name TAPE
```

2.8.8 Behavior Change for RT-11 Tapes on VAX/VMS

When RT-11 writes to tape a file name which is fewer than six bytes long it adds blanks. Thus, VAX/VMS MTAACP reads this file name, interpreting it as an ANSI file name. There are two results (1) When you perform a directory on the RT-11 generated tape, all the file names fewer than six bytes long will appear in quotes. (2) Wild card copy operations of these files from tape to disk will fail. (In order to copy the file, you must specify a VAX/VMS output file name.)

2.8.9 MOUNT, Logical Volume Names, and Concealed Devices

When you mount a disk or a tape, MOUNT produces a special logical name called a "logical volume name" that you can use to reference the volume. When you dismount the volume, the logical name is deleted. For example, the following command produces the logical volume name USER and equates it to the concealed device name string "__DRA1:".

```
$ MOUNT /SYSTEM DRA1: USERFILES USER
```

If you use this logical name, you do not need to know which physical drive the volume is mounted on. If you continue to use this logical

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name, you avoid building physical device names into programs and command procedures. Therefore, if DRA1 is used for another volume, you will not inadvertently reference the wrong volume.

The logical volume name produced by MOUNT differs from the logical name produced by the following command in one important way:

```
$ DEFINE /SYSTEM USER _DRA1:
```

The logical name produced by MOUNT is pointed to by a Mounted Volume List Entry which in turn points to the physical device. This linkage allows: (1) DISMOUNT to find and delete the logical volume name, and (2) the \$GETDVI system service to return this logical name when asked for the LOGVOLNAM item for the device DRA1.

The print symbiont displays this logical name on the banner page of listings. This logical volume name is also used by SHOW DEVICE /FILES and SHOW MEMORY /FILES.

If you want the volume name to be displayed in full, use the commands demonstrated in the following example.

Example

A data volume is produced once a month and given a volume label that includes the date it was created. The users want to refer to the volume as DATA:, but the dated volume name should be the device name actually displayed. The following commands accomplish this.

```
$ MOUNT /SYSTEM DRA2: DATA14APR82
$ DEFINE /SYSTEM DATA DISK$DATA14APR82:
```

Note that MOUNT defaults to DISK\$volume_name (for disks) or TAPE\$volume_name (for tapes) if it is not given an explicit logical volume name.

Also, note that DATA will translate to a physical device only if the data disk is actually mounted. Defining DATA as __DRA2: would be less desirable for the following reasons:

1. Other volumes are sometimes mounted instead of the data disk.
2. Consistent display of logical device names is desirable.

2.8.10 VAX-11 RMS File Name Specification Length Modified

For VAX/VMS Version 3.0, the value of the symbol NAM\$C_MAXRSS has been increased from 128 to 252 to accommodate VAX-11 RMS support for concealed devices. (NAM\$C_MAXRSS defines a buffer length for a file specification. It is defined by the MACRO \$NAMDEF.)

If your program encounters RMS\$_ESS or RMS\$_RSS errors, change the size of the expanded and resultant string buffers to the value NAM\$C_MAXRSS, and recompile the program.

2.8.11 VAX-11 RMS Modification of Carriage Control Processing

In previous versions of VAX/VMS, VAX-11 RMS treated all unit-record devices (terminals, line printers, mailbox devices, "foreign" magnetic tape devices, card readers, and network task-to-task) as carriage control devices. For example, if you specified FORTRAN carriage

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control (RAT=FTN), then the first character of each record was removed and used for carriage control. For mailbox devices, "foreign" magnetic tape devices, card reader devices, and network task-to-task devices, this behavior was incorrect.

For VAX/VMS Version 3.0, VAX-11 RMS performs this carriage control operation only for the carriage control devices, terminal devices, and line printers, (DEV\$V_CCL is set in the device characteristics). Modify any user programs that had compensated for this erroneous behavior.

2.8.12 Files-11 ACP Modifications: Window Handling

In VAX/VMS Version 3.0, any file that is handled by the memory management system (Global Sections or Executable images) uses segmented (cathedral) windows. In addition, your Byte Count Quota is now charged for all windows created by your process.

Cathedral windows are necessary to correct deadlock conditions that existed in earlier versions of VAX/VMS. While cathedral windows with more than one window segment are very rare, when they appear, it is usually an indication that the disk is very fragmented and should be compressed with BACKUP.

The following considerations should be noted about the window handling by the ACP for Version 3.0 of VAX/VMS:

- While it is not necessary to make any code changes, to avoid overhead, specify that cathedral windows are to be generated when a file is opened for section access. Specify a window size of 255 (by the FAB parameter RTV if the file is opened/created by VAX-11 RMS or the FIB\$B WSIZE field in the FIB if the file is explicitly opened using Files-ACP QIO calls). If you do not make this specification, the Create and Map Section System Service will request the ACP to remap the file using cathedral windows, thus causing an extra ACP operation.
- Extends to the window of a file open with cathedral windows are not done at the time of the extend operation, but rather when the first I/O is performed on the newly extended portion of the file. As a result, it is possible to receive the error status SS\$_EXBYTLM on read or write operations.
- Because all users are charged for any newly created windows, it may be necessary to increase the byte limit quota (the AUTHORIZE parameter BYTLM) for those users affected.

2.8.13 VAX-11 RMS Record Size Limits for Network Operations

The following record size restrictions exist for network access using the VAX-11 RMS routines \$GET, \$PUT, and \$UPDATE:

- For remote file access, the maximum record size supported by VAX-11 RMS is 512 bytes. This limit includes the record header for files having variable with fixed control (VFC) format. However, files with records larger than 512 bytes may be accessed in block mode using the \$READ and \$WRITE services. For example, the DCL command COPY uses block I/O mode to transfer files from one VAX/VMS node to another when both the source and destination devices are disks.

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- For intertask communication, records up to 4096 bytes in length can be exchanged between VAX/VMS programs.

2.8.14 VAX-11 RMS Key Limit Option for Network Operations

For network access of an indexed file, the LIM (key limit) option of the ROP (record options) field of the RAB is not supported. If this bit is set on calls to the VAX-11 RMS routines \$GET and \$FIND, the option will be ignored.

2.8.15 RMS-11 Utilities Replaced by Native-Mode VAX-11 RMS Utilities

The functions of the compatibility-mode RMS-11 utilities have been superseded by new native-mode VAX-11 RMS utilities. These utilities are also callable from VAX-11 native-mode programs. See the VAX-11 Record Management Services Utilities Reference Manual and the VAX-11 Record Management Services Tuning Guide for complete information. A list of equivalent capabilities follows.

Capability	RMS-11	VAX-11 RMS
File design and tuning:	N/A	EDIT/FDL
File specification and creation:	RMSDFN, RMSDEF	CREATE/FDL
File Loading:	RMSCNV, RMSIFL	CONVERT
File space reclamation:	N/A	CONVERT/RECLAIM
File inspection:	RMSDSP	ANALYZE/RMS_FILE
File analysis and verification:	RMSANLZ (unsupported utility)	ANALYZE/RMS_FILE

2.8.16 Prologue 3 Files Not Supported by RMS-11

VAX-11 RMS has implemented a new type of indexed files, designated Prologue 3 format. These files cannot be processed by either RMS-11 programs or by the RMS-11 utilities. The behavior of the RMS-11 Utilities is unpredictable; the native-mode VAX-11 RMS utilities must be used.

2.8.17 File Version Handling Modified

For Version 3.0 of VAX/VMS, file version handling has been modified. The previous limit (of roughly 60 versions per file) has been removed. Now, you can create versions of a file up to Files-11 architectural limit, 32767. You can still limit the number of versions of a file with the SET FILE/VERSION_LIMIT and SET DIRECTORY/VERSION_LIMIT commands.

The previous version limit was imposed by the maximum number of file versions that would fit into one directory block. Directory logic modifications in the file system now permit versions of a file to span

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multiple blocks by using multiple records, each containing the same name and type. The versions of the file are still arranged in descending lexical order.

This feature is an upward, but not downward, compatible change in Files-11. Downward compatibility does exist with the exception of the following two results that may occur when disks are transported from VAX/VMS Version 3.0 systems to earlier systems:

1. On an earlier system, DIRECTORY and wild card operations will return multiple versions of a file that has multiple directory records when you ask for wild card name or type and latest version. Other file operations on the directory will function correctly.
2. In previous versions of Files-11, versions of a file were prevented from overflowing one block by setting the version limit of the file to a value between 60 and 62, depending on the length of the file name. VAX/VMS Version 3.0 will create new files with a version limit of 32767 (or the version limit specified for the directory).

If you transport a disk written on VAX/VMS Version 3.0 to an earlier version of VAX/VMS, a directory may become corrupted if you attempt to create more versions of a file than will fit into one directory block. Thus, some files will have more than one directory entry. If this occurs, remove all the duplicate entries with the DCL command SET FILE/REMOVE.

VAX/VMS Version 2.5 contains a patch to the ACP that detects the overflow correctly and exits cleanly with an error leaving the directory intact. You can avoid this problem by not exceeding 60 versions. Another work-around is to do a SET FILE/VERSION_LIMIT=60 [*...]*.* on a disk that will be transported to an old system. Note that the SET FILE command must be executed on a new system; it does not exist on an old system.

Note that existing files will not automatically benefit from the extended version limit of 60 because they were created by the old version of the file system (with a version limit of 60). Thus, the new file system will continue to enforce this version limit. To increase the maximum versions of an old file, use the SET FILE/VERSION_LIMIT command.

2.9 COMPATIBILITY MODE

The following sections contain notes on changes and additions to functions that affect compatibility-mode programming on a VAX/VMS Version 3.0 operating system. Documentation describing compatibility-mode programming is found in the following manuals:

- VAX-11/RSX-11M User's Guide
- VAX-11/RSX-11M Programmer's Reference Manual

2.9.1 VAX-11/RSX-11M User's Guide

Refer to the VAX-11/RSX-11M User's Guide for information about new VAX/VMS MCR command qualifiers and indirect command file directives.

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The following commands have been added to MCR:

RENAME	SET VOLUME
SET DAY	SHOW ERROR
SET DIRECTORY	SHOW MEMORY
SET FILE	SHOW USERS

The SET /UIC command now has new behavior. It still affects the user identification code (UIC) only if you have Change Mode to Kernel (CMKRNL) privilege, but a message now appears if you do not have sufficient privilege to change the UIC default. Your directory default is always changed.

When the SET /UIC=[uic] command is echoed in a command file, it is echoed as SET UIC [uic] without the slash and the equal sign, which are stripped during parsing.

The APPEND, COPY, and TYPE commands each have a new syntax that is consistent with their VAX/VMS counterparts.

MCR supports the VAX/VMS Personal Mail Utility.

The following MCR commands used for native mode program development are no longer supported by VAX/VMS MCR:

- LIBRARY - native mode Library utility
- LINK - native mode linker
- MACRO - native mode assembler

MCR supports neither the CTRL/T keyboard action nor the SET CONTROL=T command that have been added to VAX/VMS DCL since VAX/VMS Version 2.0.

If your default command interpreter (CLI) in the user authorization file is MCR and you log in requesting /CLI=DCL, do not use the DCL command SPAWN or the Create Process (\$CREPRC) system service to create a subprocess specifying LOGINOUT as the image.

The LOGOUT command keywords (qualifiers) /BRIEF and /FULL are no longer supported under MCR. When you log out from an interactive terminal session, the brief format appears. When a batch job logs out, it writes the full format to the log file.

2.9.2 Compatibility Mode Support for Negative Version Numbers

Most compatibility mode utilities now support negative version numbers for Version 3.0 of VAX/VMS. Please note that VAX/VMS and RSX-11M differ as to how negative version numbers are used. For example, RSX-11M interprets a negative 1 (-1) as the oldest (numerically smallest) version number. Whereas, VAX/VMS interprets negative 1 (-1) as the next most recent version number.

Most RSX-11M utilities will correctly implement the VAX/VMS interpretation of negative version numbers. The ones that do not will display a syntax error for a negative version number.

All RSX-11M code using the standard RSX-11M Command String Interpreter (CSI1 and CSI2) that is relinked against the new copies in LB:[1,1]SYSLIB.OLB will work correctly.

2.9.3 VAX/VMS Compatibility Mode Software Modified

VAX/VMS compatibility mode software has been modified for Version 3.0 to allow RSX-11M Version 3.2 programs, which meet certain requirements, to run under VAX/VMS.

The VAX/VMS equivalent of the RSX-11M Disk Driver now supports the Write Physical Block with Deleted Data Mark function, IO.WDD, for RX01 and RX02 diskettes. Note that your process must have LOG_IO privilege to issue this function. When reading this type of physical block using the Read Physical Block function, the success status of the I/O is IS.RDD instead of IS.SUC. The VAX/VMS equivalent function for IO.WDD is IO\$ WRITEPBLK!IO\$M_DELDATA and the equivalent of IS.RDD is SS\$_RDELDATA.

The VAX/VMS equivalent of the RSX-11M Terminal Driver now supports the function SF.SMC to set the terminal type, TC.TTP characteristic, for the following terminals: LA36, LA120, LA34, LA38, VT05, VT52, VT55, VT100, VT101, VT102, VT105, VT125, VT131, and VT132. The SF.SMC function also supports the TC.BIN characteristic where no characters are interpreted as control characters (PASSALL).

RSX-11M features added since RSX-11M Version 3.2, that is, functionality associated with RSX-11M Version 4.0 and RSX-11M-PLUS, are generally not supported for other VAX/VMS compatibility mode components.

2.9.4 RSX AME No Longer Installed by STARTUP.COM

SYS\$SYSTEM:STARTUP.COM no longer installs the RSX AME. If you have compatibility mode applications that are installed with elevated privileges, you must install SYS\$SHARE:RSXSHR and SYS\$SHARE:RSXUSR in your SY\$STARTUP.COM file.

2.9.5 Rooted Directory Restriction in Compatibility Mode

Compatibility mode programs, such as the File Transfer Utility (FLX) and user-written compatibility mode executable images, may not recognize certain files in rooted directories.

In the following example, the default directory is rooted, which is not apparent from the output of the DIR command:

```
$ SHOW LOGICAL SYS$SYSROOT
  SYS$SYSROOT = _DBA4:[SYS0.]"
$ SET DEF SYS$SYSROOT:[SYSTEST]
$ DIR FILE*.
```

```
Directory SYS$SYSROOT:[SYSTEST]
```

```
FILE1.;1          FILE2.;1
```

In the following command line, FLX will fail to find FILE2 because of an interaction between the implementation of rooted directories and the file control system (FCS) processing of device names.:

```
$ MCR FLX TI:=FILE1.,FILE2./RS
FLX -- Invalid RSX file spec
SY:FILE2.COM -- No such file
```

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The logical unit number's (LUN) default assignment of SY: and the current directory [SYSTEST] are used for the input files because no explicit device and directory are specified. The problem occurs when you have a rooted directory in a compatibility mode program, because the implicit device name SY: is a logical name that describes not only the device, but the root directory (shown above as [SYS0.]). FCS in FLX correctly resolves the first file specification SY:[SYSTEST]FILE1 to DB4:[SYS0.SYSTEST]FILE1. FCS assigns the LUN to device DB4:. The first file is correctly copied. But, in parsing the second file specification, using the same LUN, the default device is now DB4:, because of the previous LUN assignment. The default directory of [SYSTEST] is still used, yielding a file specification of DB4:[SYSTEST]FILE1. FCS has lost the "[SYS0.]" information. The second file is actually named DB4:[SYS0.SYSTEST]FILE2 and is therefore not found.

To avoid this problem, explicitly state a device, either a real device or a logical name that resolves to a device name. For example, FLX will correctly execute the following command line because the device (SY:) is stated:

```
$ MCR FLX TI:=SY:FILE1.,FILE2./RS
```

This rooted directory problem can also occur with user-written programs. When the default directory is rooted, and FCS parses two or more file specifications on the same LUN, without specifying an explicit device and directory, only the first file specification will be correctly parsed.

Again, to avoid this problem, explicitly name a device in both file specifications. You can do this in a MACRO-11 program by using a default file name block specifying device SY0:.

2.10 SYSTEM PROGRAMMING

The following sections contain notes that describe changes and additions to the system components used by VAX/VMS system programmers. The documentation for system programming under VAX/VMS Version 3.0 is found in the following manuals:

- VAX/VMS Real-Time User's Guide
- VAX/VMS Guide to Writing a Device Driver
- VAX/VMS System Dump Analyzer Reference Manual
- VAX-11 PATCH Utility Reference Manual

2.10.1 TM03 FCO Required

Read the following information if you have a TE16, TU45, OR TU77 tape drive installed on your system.

Version 3.0 of VAX/VMS contains a new TMDRIVER. When you use this new driver in conjunction with a hardware FCO to the TM03 tape formatter, you will correct a problem that used to cause the system to hang until a rewinding tape drive either: (1) completed the rewind, or (2) was manually put offline. The system manager should ensure that the FCO is installed before you install VAX/VMS Version 3.0 to enable the updated software to work correctly. If the system manager does not

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install the FCO before installing VAX/VMS Version 3.0, unclearable system hangs will occur until a rewind in progress terminates. (The FCO will not adversely affect the previous VAX/VMS Version 2.0 TMDRIVER.)

The FCO number is M8909YA-R-0006. Installations in the field have one of three versions of the M8909YA boards in their TM03 tape formatters: revision H, revision J, or revision K. When this FCO is applied to a revision H board, it brings the board to level H1; and when it is applied to a revision J board, it brings the board to level J1. The FCO does not need to be applied to a revision K board because revision K boards already have the FCO built into them.

2.10.2 Remote Terminals Support New Terminal Driver Features

For Version 3.0 of VAX/VMS, all terminal driver features are supported by the remote terminal driver.

However, the server system (of systems supporting VAX/VMS Version 2.0 remote terminal protocol) does not support the following features when performing the SET HOST command:

- Out-of-band ASTs
- Extended characteristics

For the P2 parameter of a SET MODE or SET CHARACTERISTICS function, the server supports zero or eight bytes. If 12 bytes are requested, the SS\$_INCOMPAT is returned, but the additional longword is saved in the host by RTTDRIVER. The SS\$_INCOMPAT code will also be returned if bits are set in the second longword of characteristics that are not defined for VAX/VMS Version 2.0. (Note that for informational bits, (for example, ANSI), the 12-byte SET MODE will function as expected. This is because the bit is maintained in RTTDRIVER and will indicate to the program that the terminal has the ANSI characteristic even though the server is not aware of the bit.)

- Terminal maintenance functions

The RTTDRIVER at the Version 3.0 host system recognizes that the server cannot support the new features and completes the function with an alternate success code, SS\$_INCOMPAT.

2.10.3 Reassemble and Relink All Drivers

If you are a current customer, you must reassemble and relink all user-written drivers after you install VAX/VMS Version 3.0. Device drivers that you have in your distribution kit have been reassembled and relinked. Drivers must be reassembled and relinked with every version upgrade but not with version updates, because version updates include a patched system image (SYS.EXE), not a reassembled and relinked executive.

The sizes of the CRB and device-independent UCB are modified with Version 3.0 of VAX/VMS. Therefore, drivers that use constants instead of CRB\$_INTD and UCB\$_LENGTH, will not function properly until the constants have been updated to reflect the new sizes of their respective data structures. Do not use constants in place of symbolically defined data structure offsets and values.

2.10.4 Device-Dependent IOSB Field by Disk Drivers: New Behavior

For user-written disk drivers, note and conform to the new IOSB format described in the VAX/VMS I/O User's Guide.

2.10.5 All DDT and FDT Addresses Relocated by Driver Loading Procedures

The SYSGEN driver loading procedures now relocates all driver-relative offset-addresses in the driver dispatch table and the function decision table to system virtual addresses. Device drivers do not normally use these tables. User-written drivers that use the address information in these tables and assume the values to be driver-relative offsets, will not work properly under VAX/VMS Version 3.0. (Before Version 3.0 of VAX/VMS, the correct method for using DDT and FDT addresses allowed for both driver-relative offset-addresses and system virtual addresses.) The following code segment from IOC\$INITIATE, which locates and transfers control to a driver's start-I/O routine, is an example of how DDT and FDT addresses should be handled:

```

                MOVL    ..., R0                ;GET ADDRESS OF DRIVER DISPATCH TABLE
                ADDL3   DDT$$_START(R0),R0,R1 ;CALCULATE ADDRESS OF START ENTRY POINT
                BLSS    20$                    ;IF LESS, CORRECT ADDRESS CALCULATED
                SUBL    R0,R1                  ;ELSE, DDT ADDRESS WAS SYSTEM VIRTUAL
20$:            JMP     (R1)                   ;TRANSFER TO START I/O ROUTINE

```

Beginning with VAX/VMS V3.0, the following will be equivalent.

```

                MOVL    ...,R0                ;GET ADDRESS OF DRIVER DISPATCH TABLE
                JMP     @DDT$$_START(R0)      ;TRANSFER TO START I/O ROUTINE

```

Beginning with VAX/VMS V3.0, however, the following will not work.

```

                MOVL    ...,R0                ;GET ADDRESS OF DRIVER DISPATCH TABLE
                ADDL3   DDT$$_START(R0),R0,R1 ;CALCULATE ADDRESS OF START ENTRY POINT
                JMP     (R1)                   ;TRANSFER TO START I/O ROUTINE

```

2.10.6 Multiple Modules in a Device Driver

If you have multiple modules in a device driver, ensure that invocations of the DPTAB, DDTAB, and FUNCTAB MACROS occur within the same module. If they do not occur within the same module, system failures will occur when the driver is loaded initially or when the first QIO request is processed.

2.10.7 UNIBUS Memory on a UNIBUS Adapter

VAX/VMS now allows you to have UNIBUS memory on a UNIBUS adapter. This support includes the ability to bootstrap VAX/VMS from a UNIBUS device on the same adapter as the memory and is subject to the following restrictions:

- All memory on an adapter must be contiguous.
- The starting memory address must be zero.
- The total amount of memory must be less than or equal to 124 kilobytes.

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- For the VAX-11/750, if you are bootstrapping from a UNIBUS device on the same adapter as the memory, you must use the BOOT58 routines on the console media. The internal boot ROM will function incorrectly with the UNIBUS memory installed.

VMB (the primary bootstrap) probes all the UNIBUS address space of the UNIBUS adapter from which the system is bootstrapped in 2 kilobyte steps. For each bank of memory responding, VMB disables the corresponding mapping registers, thus allowing UNIBUS transfers to take place at higher addresses. When VAX/VMS is initialized, the adapter initialization routines again probe UNIBUS address space for each UNIBUS adapter present, disabling the corresponding mapping registers. In addition, the information stored in the adapter control block (ADP) for each adapter is updated to reflect the permanent allocation of these registers.

For user-written software that accesses this UNIBUS memory, you only need to allocate the required SPTs and map the memory.

2.10.8 Autoconfiguration Default Units and Unit Delivery

The SYSGEN autoconfiguration facility provides two features for UNIBUS devices: (1) default units and (2) unit-delivery action routines. A driver using these features can control the automatic configuration of the devices it services. Parameters stored in the driver prologue table control the exact operation of both features. See the VAX/VMS Guide to Writing a Device Driver for complete information.

2.10.9 ANALYZE/CRASH_DUMP (SDA) Help Text Not Updated

The help text for ANALYZE/CRASH_DUMP does not reflect new features added since VAX/VMS Version 2.0. See the VAX/VMS System Dump Analyzer Reference Manual for information on new features.

2.11 SYSTEM MANAGEMENT AND OPERATION

The following sections contain notes that describe changes and additions to system features that affect VAX/VMS system management and operations. The documentation for these features can be found in the following manuals:

- VAX-11/730 Software Installation Guide
- VAX-11/750 Software Installation Guide
- VAX-11/780 Software Installation Guide
- VAX/VMS System Management and Operations Guide
- VAX/VMS UETP User's Guide
- VAX-11/782 User's Guide

2.11.1 System Directories Have Moved

In VAX/VMS Version 3.0, the system disk organization has been changed to allow multiple, separately bootable systems to be on a single disk.

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This feature is implemented by placing a level of directory between the Master File Directory and the system directories, [SYSERR], [SYSEXEC], [SYSHLP], [SYSLIB], [SYSMAINT], [SYSMGR], [SYSMSG], [SYSTEST], and [SYSUPD]. (In VAX/VMS Version 2.0, these system directories were all cataloged in the Master File Directory (MFD), along with any user/installation management directories.)

In VAX/VMS Version 3.0, the system directories are moved out of the MFD and in their place is one or more system root directories of the form SYSx, where x is the hexadecimal digit 0-F. A system root directory catalogs all the system directories for that system. These system directories are now referenced through the new rooted device name SYS\$SYSROOT. They may no longer be referenced by such names as DRA0:[SYSMGR].

With the advent of System Root Directories in Version 3.0, two logical names replace SYS\$SYSDISK (formerly the name of the system disk containing system directories and user/installation management directories):

1. SYS\$SYSDEVICE is the physical device containing the user and installation management directories.
2. SYS\$SYSROOT is the device and root directory for the currently running set of system directories.

DIGITAL software no longer requires the logical name SYS\$SYSDISK. If you used this logical name, you used it in one of the following ways:

1. To reference system directories, for example, SYS\$SYSDISK:[SYSMGR].
2. To reference user and installation management directories on the system disk, for example, SYS\$SYSDISK:[PUBLIC].
3. For both of the above.

The STARTUP.COM command procedure has the definition:

```
$ DEFINE /SYSTEM SYS$SYSDISK SYS$SYSROOT:
```

This definition will make the first type of reference work correctly. If you used SYS\$SYSDISK in the second way, modify the installation SYSTARTUP.COM to redefine SYS\$SYSDISK as follows:

```
$ DEASSIGN /SYSTEM SYS$SYSDISK  
$ DEFINE /SYSTEM SYS$SYSDISK SYS$SYSDEVICE:
```

If you used SYS\$SYSDISK in the third way, eliminate one of the ways you use SYS\$SYSDISK. If you do not need the logical name SYS\$SYSDISK, deassign it in SYSTARTUP.COM.

You will no longer be able to access the system directories using names such as DRA0:[SYSMGR]. All system directories that did not have logical names in Version 2.0 of VAX/VMS have been given logical names for Version 3.0. See the VAX/VMS System Management and Operations Guide for these logical names.

The compatibility mode directories [1,1] and [1,2], which are synonyms for [SYSLIB] and [SYSMSG], respectively, have also moved. This will be transparent to compatibility mode software that references these directories on the conventional logical device LB (or LB0).

The System Root Directory F (SYSF) is reserved for use by VAX/VMS upgrade procedures. It must not be used by customers.

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Because the system directories are no longer at the same level as the installation and user directories in the directory tree, you should ensure that command procedures correctly reference both kinds of directories. For example, the command procedure SYSTARTUP.COM may contain references to the installation directory [SYSMGR] and the user directory [PUBLIC]. Your default device is SYS\$\$SYSROOT. Therefore, the reference to [PUBLIC] should take the form SYS\$\$SYSDEVICE:[PUBLIC] since SYS\$\$SYSROOT:[PUBLIC] does not exist.

2.11.2 SYS\$EXAMPLES Points to VAX/VMS Examples

For VAX/VMS Version 3.0, the system-wide logical name SYS\$EXAMPLES has been created to point to the directory of VAX/VMS examples (formerly, [SYSHLP.EXAMPLES]). It is similar to SYS\$SYSTEM, which points to the directory of VAX/VMS images.

2.11.3 WSQUOTA and WSEXTENT for User Accounts

VAX/VMS Version 3.0 now supports working sets larger than WSQUOTA. Use WSEXTENT for the upper limit on working set sizes.

If you are upgrading from a Version 2.5 system, lower the value of WSQUOTA and make the value of WSEXTENT larger than the original WSQUOTA value.

2.11.4 Bootstrapping with an Alternate STARTUP Command Procedure

If you need to bootstrap your system and want to avoid autoconfiguring all devices or invoking SYS\$MANAGER:SYSTARTUP.COM, bootstrap, stop in SYSBOOT, and issue the following command:

```
SYSBOOT>SET/STARTUP SYS$SYSTEM:STARTUP.MIN
```

Note that the start-up file must have an explicit device and directory, such as SYS\$SYSTEM.

2.11.5 Installation on Multiple UNIBUS Systems

During software installation, ensure that each UNIBUS (up to the one being bootstrapped) has exactly one disk controller of the same type as the one being bootstrapped.

2.11.6 Librarian Shareable Image (LBRSHR) Increased

The size of the VAX/VMS Librarian shareable image (LBRSHR) has been increased for Version 3.0.

Therefore, you must relink images under VAX/VMS Version 3.0 that are linked with LBRSHR.

2.11.7 VAX/VMS Version 3.0 SYSGEN Parameters

For Version 3.0 of VAX/VMS, the xxUSER.PAR, VIRT32MB.PAR, and MINIMUM.PAR files are no longer distributed. A general mechanism

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(which edits the `params.dat` file using the `autogen` procedure) is included for setting the values of `SYSGEN` parameters. `SYSGEN` will still read old customer parameter files and provide a way to create new files. Many of the `SYSGEN` parameter default values and minimum and maximum values have changed. Use `SYSGEN` to display these new values.

2.11.7.1 `SYSGEN` Parameter `AWSMAX` No Longer Needed - The `SYSGEN` parameter `AWSMAX` has been removed for Version 3.0 of VAX/VMS. You can accomplish the same function by adjusting the working set extent on a process-by-process basis.

2.11.7.2 `SYSGEN` Parameter `RMS_DCMBIDX` Changed - The `SYSGEN` parameter `RMS_DCMBIDX` has been changed to `RMS_DFMBIDX`.

2.11.7.3 `SYSGEN` Parameter `MPW_HILIM` Changed - The `SYSGEN` parameter `MPW_HILIM` has been changed to `MPW_HILIMIT`.

2.11.7.4 `SYSGEN` Parameters `MPW_HILIMIT` and `MPW_WAITLIMIT` - If `MPW_HILIMIT` is increased, `MPW_WAITLIMIT` may also need to be increased because a system deadlock will occur if `MPW_WAITLIMIT` is less than `MPW_HILIMIT`. (The value of `MPW_HILIMIT` is normally equal to the value of `MPW_WAITLIMIT`.)

2.11.7.5 `SYSGEN` Parameters `DIALTYPE` and `TTYSCANDELTA` Changed - The `SYSGEN` parameters `DIALTYPE` and `TTYSCANDELTA` have been changed to `TTY_DIALTYPE` and `TTY_SCANDELTA`.

2.11.8 `SWAPFILE.SYS` and `PAGEFILE.SYS`

During software installation or upgrade, the files `SWAPFILE.SYS` and `PAGEFILE.SYS` have been set to sizes appropriate for your system.

If you are upgrading your system, your new `PAGEFILE.SYS` may be smaller than the previous `PAGEFILE.SYS`. In this case, purge the previous file after the upgrade is complete.

The `PAGEFILE.SYS` size is also important for a correctly operational system. If this file is too small for your typical workload, overall system performance will suffer. As performance becomes significantly affected, the message `%SYSTEM-W-PAGEFRAG` is printed on the system console. If paging file space is significantly underconfigured for system load, the message `%SYSTEM-W-PAGECRIT` is printed on the system console and a system hang could result.

The guidelines given here are initial guidelines, and your specific needs may vary significantly from the given formulas. You can further understand your needs related to paging and swapping files by using the `DCL` command `SHOW MEMORY` with the system under load and looking at the usage of these files.

For `SWAPFILE.SYS` the file size is too small if the results of a `SHOW MEMORY` command indicate that the total space in the swapfiles is more than three-fourths used.

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For PAGEFILE.SYS the file size is too small if the results of a SHOW MEMORY command indicate that the total space in the page files is more than one-half used.

If these file sizes are overconfigured, the only consequence is lost disk space.

2.11.9 Mount Verification Canceling

VAX/VMS Version 3.0 supports a new feature called Mount Verification, which permits the system to recover from errors such as a disk going offline or becoming write-locked. I/O to the disk is suspended, and messages are issued to the system console and operator terminals to alert the operator of the problem. When the problem is corrected, I/O operations to the disk are resumed.

If a disk goes into mount verification while a file operation is in progress, it is possible for the file ACP to hang; if this ACP is also the file ACP for the system disk, most system operation will hang. In this case, you should put the defective disk back in service, or cancel the mount verification process, as follows:

Issue the following commands, specific to your processor, on the console. (These commands invoke a mount verification canceling routine.)

VAX-11/780	VAX-11/750	VAX-11/730
^P	^P	^P
>>>HALT	>>>D/I 14 C	>>>D/I 14 C
>>>D/I 14 C	>>>CONT	>>>CONT
>>>>CONT		

You will then receive the prompt IPC>. This prompt indicates that the mount verification canceling routine is ready to accept input. Issue any of the following three commands: C device, X, or ^Z (CTRL/Z).

Command	Function
C DBA0:	Cancel any pending mount verification on the specified device (in this case, DBA0:) or issues a warning if there was no mount verification in progress for the specified device.
X	Transfers control to XDELTA if XDELTA has been loaded with the system. (XDELTA must be loaded at system bootstrap time. See the <u>VAX/VMS Guide to Writing a Device Driver</u> for more information.) If XDELTA has not been loaded, the prompt IPC> will be issued again.
^Z	Causes the verification canceling routine to exit and transfers control back to what was previously in progress.

There are some special characteristics of the command processor for the mount verification canceling routine that should be noted.

- All lowercase characters are converted to uppercase.
- All illegal characters (such as most control characters) are not typed and are signaled by the terminal's "bell".

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- All leading spaces are ignored and not echoed.
- Multiple spaces are compressed into a single space. (This is done by ignoring any consecutive space characters after the first.)

NOTE

Mount verification will automatically be canceled if the SYSGEN parameter MVTIMEOUT is set before the disk goes into mount verification. (This parameter is the amount of time to wait before canceling a mount verification.) Please note that mount verification does not time out for write-lock errors. To cancel write-lock verification, use either the mount verification canceling routine outlined above or write-enable the disk.

2.11.10 Mount and Dismount Notification Messages

A new feature has been added for VAX/VMS Version 3.0 to aid system managers and operators in determining when disks and magnetic tapes are mounted and dismounted.

You can enable mount and dismount messages by setting the SYSGEN parameters MOUNTMSG and DISMOUMSG to one, respectively. To disable these messages, set the SYSGEN parameters to zero.

Because of the method in which these messages are sent to the enabled operators, there may be as much as a thirty second delay before the message is sent. In addition, the message will always indicate that the user sending the message is SYSTEM.

2.11.11 OPCOM Request Canceled

If an image issues an operator request that requires a reply (through the \$SNDOPR system service) and the image is run down without explicitly canceling the request, the request will still appear to be active. However, if an operator makes a reply to the request, OPCOM will detect that the request has been canceled, and issue an informative message.

2.11.12 VAX-11 COBOL-74: System-wide Logical Name Assignments

For Version 3.0 of VAX/VMS, the system-wide logical name assignments made in SYS\$SYSTEM:STARTUP.COM for VAX-11 COBOL-74 have been removed. If you are running VAX-11 COBOL-74 Version 4.3 or an earlier version,

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you will need to edit SYS\$MANAGER:SYSTARTUP.COM and add the following logical name definitions:

```
$ !
$ ! Assign COBOL systemwide logical names
$ !
$ ASSIGN /SYSTEM SYS$INPUT: COB$INPUT
$ ASSIGN /SYSTEM SYS$OUTPUT: COB$OUTPUT
$ ASSIGN /SYSTEM SYS$error: COB$CONSOLE
$ ASSIGN /SYSTEM SYS$INPUT: COB$CARDREADER
$ ASSIGN /SYSTEM SYS$INPUT: COB$PAPERTAPERREADER
$ ASSIGN /SYSTEM SYS$OUTPUT: COB$LINEPRINTER
$ ASSIGN /SYSTEM SYS$OUTPUT: COB$PAPERTAPEPUNCH
```

2.11.13 VAX-11 DIBOL Installation Restriction

When you install VAX-11 DIBOL on the current system disk, assign the logical name SYS\$SYSDISK to SYS\$SYSROOT. Likewise, when you install VAX-11 DIBOL on another disk, include the rooted directory specification in the reassignment of SYS\$SYSDISK (as described in the installation guide).

2.11.14 Bootstrapping with a VAX/VMS Version 2.0 VMB

The VMB released in Version 2.0 of VAX/VMS does not support bootstrapping the rooted directory structure of VAX/VMS Version 3.0. Therefore, two special directories and a synonym have been added to the installed system: [SYSEXEMIN], [SYSEXE], and [SYSEXE]SYSBOOT.EXE (a synonym for [SYS0.SYSEXE]SYSBOOT.EXE). These alternate names provide a way for Version 2.0 VMBs to locate the Version 3.0 SYSBOOT image and bootstrap the system.

However, the next major release of VAX/VMS will remove these synonyms and the Version 2.0 VMB will no longer bootstrap VAX/VMS.

2.11.15 Installing EDTCAI on VAX/VMS Version 2.5 Systems

If you already have EDTCAI installed on your VAX/VMS Version 2.5 system, and you upgrade your system from Version 2.5 to Version 3.0, the installation of EDTCAI on Version 3.0 will convert your roster file to the Version 3.0 format.

However, before you install EDTCAI, ensure that the definition of the logical name EDT\$CAI is correct for your Version 3.0 system. If EDT\$CAI was equated to the system library directory ([SYSLIB]) in Version 2.0, use the following command to change it to SYS\$LIBRARY: on your Version 3.0 system:

```
$ DEFINE EDT$CAI SYS$LIBRARY:
```

Then, you can perform the installation of EDTCAI.

Note that the logical name EDT\$CAI will not be needed on your Version 3.0 system. Therefore, you can remove it from your SYSTARTUP.COM. (The EDTCAI files are found in SYS\$INSTRUCTION on Version 3.0.)

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2.12 NETWORKING

The following sections contain notes that describe networking rules for VAX/VMS Version 3.0. The documentation providing more information is located in the following manuals:

- DECnet-VAX System Manager's Guide
- DECnet-VAX User's Guide
- DECnet-VAX Cross-System Notes
- DECnet-VAX Software Installation Guide

2.12.1 DECnet-VAX System Manager's Guide

The following formulas apply to the DMP for Version 3.0 of VAX/VMS. For a complete description of these parameters, see the DMP Synchronous Controller Technical Manual.

1. Line retransmit timer (in msec):

$$RTT = \frac{20000 \text{ MAX MESSAGE SIZE}}{\text{LINE SPEED IN BPS}} + \text{RTS/CTS MODEM DELAY}$$

NOTE: The Request to Send/Clear to Send (RTS/CTS) modem delay for coax lines can be ignored.

2. Line dead timer (in msec):

$$DET = \frac{1000 \text{ MAXIMUM DELAY IN SECONDS BEFORE A NODE IS RECOGNIZED}}{\text{MAXIMUM NUMBER OF DEAD TRIBUTARIES}}$$

NOTE: For best results this should be set as high as possible.

3. Line delay timer (in msec.):

DEL = 0 ; FOR COAX.
DEL = 50 ; FOR MULTIPOINT EIA LINES.
DEL = 200 ; IF ANY SOFTWARE IMPLEMENTATIONS OF DDCMP ARE
; ON THE MULTIPOINT LINE.

NOTE: In the event that more than one condition is true, the largest value must then be applied.

2.12.2 DECnet-VAX Events Not Downward Compatible

The format of DECnet-VAX event records that can be transmitted between DECnet-VAX systems has been extended. Therefore, if you log DECnet-VAX events to a previous version of the DECnet-VAX event logging process, this previous version may not recognize certain newer events, such as "circuit down" or "circuit up". The event logging process will not be able to process a "circuit" because "circuits" did not exist in previous versions of DECnet-VAX.

To avoid such problems, ensure that DECnet-VAX events are only sent between nodes of the same version. For example, in the following

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situation, ensure that the VAX2 sink node is using the same version of DECnet-VAX software as the current node.

```
NCP> SET LOGGING MONITOR SINK NODE VAX2 KNOWN EVENTS
```

2.12.3 DMP11 Default Parameter Settings

The VAX/VMS Version 3.0 default line parameter settings for the DMP11 device driver are listed below:

NCP KEYWORD	DEFAULT
Protocol	DDCMP point
Duplex	full
Controller	normal
Receive buffers	4
Stream timer	6000 (milliseconds)
Scheduling timer	50 (milliseconds)
Dead timer	10000 (milliseconds)
Delay timer	0 (milliseconds)
Retransmit timer	3000 (milliseconds)

The VAX/VMS Version 3.0 default tributary parameter settings for the DMP11 device driver are listed below:

NCP KEYWORD	DEFAULT
Polling state	automatic
Babble timer	6000 (milliseconds)
Transmit timer	0 (milliseconds)
Maximum buffers	255
Maximum transmits	4
Active base	255
Active increment	0
Inactive base	0
Inactive increment	64
Inactive threshold	8
Dying base	0
Dying increment	16
Dying threshold	2
Dead threshold	16

In order to perform a down line load, the EXECUTOR BUFFER SIZE must be at least as large as the Secondary Loader file which will be used in the down line load operation. For example, if the remote load device is a DMC11, the EXECUTOR BUFFER SIZE must be at least 512 bytes. The following list gives the size needed for each of the Secondary Loader files:

REMOTE DEVICE	SIZE IN DECIMAL BYTES
DMC11	512
DUP11	576
DUV11	576
DU11	576
DP11	576
DMP11	640
DQ11	768

APPENDIX A

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

This appendix contains listings of the journal files for patches applied to the VAX/VMS Version 3.0 system after the source Microfiche Kit was manufactured.

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]AUTHORIZE.EXE;1"
JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]AUTHORIZE.JNL;1"
DATE/TIME OF PATCH: 3-MAY-1982 15:38:05.98

Image does not contain local symbols
Some or all global symbols not accessible

```
PATCH>SET ECO 1
PATCH>SET MODE BYTE
PATCH>DEP 3C5A=11
old:                00003C5A: 0FB
new:                00003C5A: 11
PATCH>DEP 3C5B=13
old:                00003C5B: 03
new:                00003C5B: 13
PATCH>DEP 5F57=01
old:                00005F57: 00
new:                00005F57: 01
PATCH>DEP 5F64=27
old:                00005F64: 26
new:                00005F64: 27
PATCH>DEP 634A=01
old:                0000634A: 00
new:                0000634A: 01
PATCH>DEP 6357=27
old:                00006357: 26
new:                00006357: 27
PATCH>DEP 6714=01
old:                00006714: 00
new:                00006714: 01
PATCH>DEP 6721=27
old:                00006721: 26
new:                00006721: 27
PATCH>DEP 6B50=01
old:                00006B50: 00
new:                00006B50: 01
PATCH>DEP 6B5D=27
old:                00006B5D: 26
new:                00006B5D: 27
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]AUTHORIZE.EXE;2
PATCH>EXIT
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXEC]CNDRIVER.EXE;1"
JOURNAL FILE: "DISK\$RES26APR:[SYSEXEC]CNDRIVER.JNL;1"
DATE/TIME OF PATCH: 4-MAY-1982 13:34:37.61

Image does not contain local symbols

PATCH>SET ECO 1
PATCH>REPL/INST 958
OLD> "BBSS #09,B^5C(R4),97F"
OLD> EXIT
NEW> "BBSS #09,B^5C(R4),96B"
NEW> EXIT
old: 00000958: BBSS #09,B^5C(R4),0000097F
new: 00000958: BBSS #09,B^5C(R4),0000096B
PATCH>UPDATE
Updating image file DISK\$RES26APR:[SYSEXEC]CNDRIVER.EXE;2
PATCH>EXIT

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]DUDRIVER.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]DUDRIVER.JNL;1"
 DATE/TIME OF PATCH: 3-MAY-1982 15:39:23.51

Image does not contain local symbols

```

PATCH>SET ECO 1
PATCH>replace/word ^x8 = ^x1D97
NEW> ^x1E00
NEW> exit
old:                .$ABSS$.+8: 1D97
new:                .$ABSS$.+8: 1E00
PATCH>replace/long ^x1D98 = 0
NEW> ^x60
NEW> exit
old:                00001D98: 00000000
new:                00001D98: 00000060
PATCH>replace/long ^x1D9C = 0
NEW> ^x1DA0
NEW> exit
old:                00001D9C: 00000000
new:                00001D9C: 00001DA0
PATCH>set patch_area 1D98
PATCH>replace/instruction ^x0FD7+^x58 = 'pushl b^20(r5)'
NEW> 'pushl          b^20(r5)'
NEW> 'beql          ^x1000+^x58'
NEW> exit
old:                0000102F:  PUSHL   B^20(R5)
new:                0000102F:  BRW     PAB
new:                PAB:    PUSHL   B^20(R5)
new:                00001DA3:  BNEQ   00001DA8
new:                00001DA5:  BRW    00001058
new:                00001DA8:  BRW    00001032
PATCH>verify/instruction ^x484+^x58 = 'addl3 r1,##80002858,b^18(r0)'
old:                000004DC:  ADDL3  R1,##80002858,B^18(R0)
PATCH>replace/instruction ^x1A00+^x58 = 'addl2 r5,r0'
NEW> 'addl2          r5,r0'
NEW> 'movl           b^18(r0),r3'
NEW> 'movab          ^x1AE9+^x58,b^1C(r3)'
NEW> 'movzwl         b^2A(r0),r1'
NEW> 'addl3          r1,##80002858,b^18(r3)'
NEW> exit
old:                00001A58:  ADDL2  R5,R0
new:                00001A58:  BRW    00001DAB
new:                00001DAB:  ADDL2  R5,R0
new:                00001DAE:  MOVL   B^18(R0),R3
new:                00001DB2:  MOVAB  L^00001B41,B^1C(R3)
new:                00001DBA:  MOVZWL B^2A(R0),R1
new:                00001DBE:  ADDL3  R1,##80002858,B^18(R3)
new:                00001DC7:  BRW    00001A5B
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]DUDRIVER.EXE;2
PATCH>EXIT
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]F11AACP.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]F11AACP.JNL;1"
 DATE/TIME OF PATCH: 3-MAY-1982 15:40:03.49

Image does not contain local symbols
 Some or all global symbols not accessible

```

PATCH>DEFINE ECOL DIRACC=0
symbol "ECOL DIRACC" defined as 00000000
PATCH>DEFINE ECOL MRKINC=0
symbol "ECOL MRKINC" defined as 00000000
PATCH>DEFINE ECOL MRKCTH=0
symbol "ECOL MRKCTH" defined as 00000000
PATCH>SET ECOL 1
PATCH>REPLACE 48F0=0
NEW> OF8
NEW> EXIT
old:                000048F0: 00000000
new:                000048F0: 000000F8
PATCH>REPLACE 48F4=0
NEW> 48F8
NEW> EXIT
old:                000048F4: 00000000
new:                000048F4: 000048F8
PATCH>SET PATCH AREA 48F0
PATCH>DEFINE ECOL DIRACC=1AD4
symbol "ECOL DIRACC" redefined from 00000000 to 00001AD4
PATCH>REPLACE/I ECOL DIRACC+0DC
OLD> 'MOVL R0,W^23C'
OLD> EXIT
NEW> 'MOVL R0,W^23C'
NEW> 'BNEQ ECOL DIRACC+0E1'
NEW> 'CHMU #2A14'
NEW> 'RET'
NEW> EXIT
old:                00001BB0: MOVL    R0,W^0000023C
new:                00001BB0: BRW    PAB
new:                00001BB3: NOP
new:                00001BB4: NOP
new:                PAB: MOVL    R0,W^0000023C
new:                000048FD: BEQL   00004902
new:                000048FF: BRW    00001BB5
new:                00004902: CHMU   #2A14
new:                00004906: RET
new:                00004907: BRW    00001BB5
PATCH>DEFINE ECOL MRKINC=4A00+2DD
symbol "ECOL MRKINC" redefined from 00000000 to 00004CDD
PATCH>REPLACE/I ECOL MRKINC+30
OLD> 'MTPR #7,#12'
OLD> 'MOVL B^10(R1),R0'
OLD> 'ADDL3 #10,B^4(AP),R1'
OLD> EXIT
NEW> 'MOVL B^10(R1),R0'
NEW> 'ADDL3 #10,B^4(AP),R1'
NEW> 'MTPR #7,#12'
NEW> EXIT
old:                00004D0D: MTPR   #07,#12
old:                00004D10: MOVL   B^10(R1),R0
old:                00004D14: ADDL3  #10,B^04(AP),R1
new:                00004D0D: MOVL   B^10(R1),R0
new:                00004D11: ADDL3  #10,B^04(AP),R1
new:                00004D16: MTPR   #07,#12
PATCH>REPLACE/I ECOL MRKINC+52
OLD> 'BRB ECOL MRKINC+37'
OLD> EXIT
NEW> 'BRB ECOL MRKINC+3C'
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

```

NEW> EXIT
old:                00004D2F: BRB      00004D14
new:                00004D2F: BRB      00004D19
PATCH>DEFINE ECO1 MRKCTH=4F00
symbol "ECO1 MRKCTH" redefined from 00000000 to 00004F00
PATCH>REPLACE/I ECO1_MRKCTH+2
OLD> 'MTPR #7,#12'
OLD> 'MOVL B^4(AP),R0'
OLD> EXIT
NEW> 'MOVL B^4(AP),R0'
NEW> 'MTPR #7,#12'
NEW> EXIT
old:                00004F02: MTPR      #07,#12
old:                00004F05: MOVL      B^04(AP),R0
new:                00004F02: MOVL      B^04(AP),R0
new:                00004F06: MTPR      #07,#12
PATCH>REPLACE/I ECO1_MRKCTH+1E+2
OLD> 'MTPR #7,#12'
OLD> EXIT
NEW> 'MTPR #0,#12'
NEW> EXIT
old:                00004F20: MTPR      #07,#12
new:                00004F20: MTPR      #00,#12
PATCH>REPLACE/I ECO1_MRKCTH+3B+2
OLD> 'MTPR #7,#12'
OLD> 'MOVL B^4(AP),R0'
OLD> EXIT
NEW> 'MOVL B^4(AP),R0'
NEW> 'MTPR #7,#12'
NEW> EXIT
old:                00004F3D: MTPR      #07,#12
old:                00004F40: MOVL      B^04(AP),R0
new:                00004F3D: MOVL      B^04(AP),R0
new:                00004F41: MTPR      #07,#12
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]F11AACP.EXE;2
PATCH>EXIT

```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982

IMAGE FILE BEING PATCHED:

"DISK\$RES26APR:[SYSEXE]F11BACP.EXE;1"

JOURNAL FILE:

"DISK\$RES26APR:[SYSEXE]F11BACP.JNL;1"

DATE/TIME OF PATCH:

3-MAY-1982 15:40:32.66

Image does not contain local symbols

Some or all global symbols not accessible

PATCH>DEFINE ECO1_MRKINC=0

symbol "ECO1_MRKINC" defined as 00000000

PATCH>DEFINE ECO1_MRKCTH=0

symbol "ECO1_MRKCTH" defined as 00000000

PATCH>SET ECO 1

PATCH>DEFINE ECO1_MRKINC=8A00+2FD

symbol "ECO1_MRKINC" redefined from 00000000 to 00008CFD

PATCH>REPLACE/I ECO1_MRKINC+30

OLD> 'MTPR #7,#12'

OLD> 'MOVL B^10(R1),R0'

OLD> 'ADDL3 #10,B^4(AP),R1'

OLD> EXIT

NEW> 'MOVL B^10(R1),R0'

NEW> 'ADDL3 #10,B^4(AP),R1'

NEW> 'MTPR #7,#12'

NEW> EXIT

old:	00008D2D:	MTPR	#07,#12
old:	00008D30:	MOVL	B^10(R1),R0
old:	00008D34:	ADDL3	#10,B^04(AP),R1
new:	00008D2D:	MOVL	B^10(R1),R0
new:	00008D31:	ADDL3	#10,B^04(AP),R1
new:	00008D36:	MTPR	#07,#12

PATCH>REPLACE/I ECO1_MRKINC+52

OLD> 'BRB ECO1_MRKINC+37'

OLD> EXIT

NEW> 'BRB ECO1_MRKINC+3C'

NEW> EXIT

old:	00008D4F:	BRB	00008D34
new:	00008D4F:	BRB	00008D39

PATCH>DEFINE ECO1_MRKCTH=8FF0

symbol "ECO1_MRKCTH" redefined from 00000000 to 00008FF0

PATCH>REPLACE/I ECO1_MRKCTH+2

OLD> 'MTPR #7,#12'

OLD> 'MOVL B^4(AP),R0'

OLD> EXIT

NEW> 'MOVL B^4(AP),R0'

NEW> 'MTPR #7,#12'

NEW> EXIT

old:	00008FF2:	MTPR	#07,#12
old:	00008FF5:	MOVL	B^04(AP),R0
new:	00008FF2:	MOVL	B^04(AP),R0
new:	00008FF6:	MTPR	#07,#12

PATCH>REPLACE/I ECO1_MRKCTH+1E+2

OLD> 'MTPR #7,#12'

OLD> EXIT

NEW> 'MTPR #0,#12'

NEW> EXIT

old:	00009010:	MTPR	#07,#12
new:	00009010:	MTPR	#00,#12

PATCH>REPLACE/I ECO1_MRKCTH+3B+2

OLD> 'MTPR #7,#12'

OLD> 'MOVL B^4(AP),R0'

OLD> EXIT

NEW> 'MOVL B^4(AP),R0'

NEW> 'MTPR #7,#12'

NEW> EXIT

old:	0000902D:	MTPR	#07,#12
old:	00009030:	MOVL	B^04(AP),R0
new:	0000902D:	MOVL	B^04(AP),R0

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

new: 00009031: MTPR #07,#12
PATCH>UPDATE
Updating image file DISK\$RES26APR:[SYSEXE]F11BACP.EXE;2
PATCH>EXIT

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]LOGINOUT.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]LOGINOUT.JNL;1"
 DATE/TIME OF PATCH: 3-MAY-1982 15:41:02.50

Image does not contain local symbols
 Some or all global symbols not accessible

```

PATCH>SET ECO 1
PATCH>REPLACE/INSTRUCTION 0D98
OLD> 'BRB 0DD7'
OLD> EXIT
NEW> 'BRB 0DDC'
NEW> EXIT
old:                00000D98: BRB      00000DD7
new:                00000D98: BRB      00000DDC
PATCH>REPLACE/INSTRUCTION 0DA7
OLD> 'BRB 0DD7'
OLD> EXIT
NEW> 'BRB 0DDC'
NEW> EXIT
old:                00000DA7: BRB      00000DD7
new:                00000DA7: BRB      00000DDC
PATCH>REPLACE/INSTRUCTION 0DB7
OLD> 'BNEQ 0DD7'
OLD> EXIT
NEW> 'BNEQ 0DDC'
NEW> EXIT
old:                00000DB7: BNEQ     00000DD7
new:                00000DB7: BNEQ     00000DDC
PATCH>REPLACE/INSTRUCTION 0DC8
OLD> 'BBS #01,@#7FFE7C12,0DD7'
OLD> EXIT
NEW> 'BBS #01,@#7FFE7C12,0DDC'
NEW> EXIT
old:                00000DC8: BBS      #01,@#7FFE7C12,00000DD7
new:                00000DC8: BBS      #01,@#7FFE7C12,00000DDC
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]LOGINOUT.EXE;2
PATCH>EXIT
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEX]MP.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEX]MP.JNL;1"
 DATE/TIME OF PATCH: 3-MAY-1982 15:41:25.99

Image does not contain local symbols
 Some or all global symbols not accessible
 PATCH>DEFINE ECO1 INT = 0
 symbol "ECO1 INT" defined as 00000000
 PATCH>SET ECO1
 PATCH>DEF ECO1 INT = ^X00000D90
 symbol "ECO1 INT" redefined from 00000000 to 00000D90

PATCH>RE /I
 LOC> ^X00000F8F
 OLD> 'CMPB R2,R3'
 OLD> 'BEQL ^X00000F99'
 OLD> 'MOVB R2,R3'
 OLD> 'BRB ^X00000F6A'
 OLD> EXIT
 NEW> 'ADAWI #^X00000000,(R4)'
 NEW> 'CML R1,B^X00000010(R4)'
 NEW> 'BNEQ ECO1 INT+1DA'
 NEW> EXI

old:	00000F8F:	CMPB	R2,R3
old:	00000F92:	BEQL	00000F99
old:	00000F94:	MOVB	R2,R3
old:	00000F97:	BRB	00000F6A
new:	00000F8F:	ADAWI	#00,(R4)
new:	00000F92:	CML	R1,B^10(R4)
new:	00000F96:	BNEQ	00000F6A
new:	00000F98:	NOP	

PATCH>U
 Updating image file DISK\$RES26APR:[SYSEX]MP.EXE;2
 PATCH>EXI

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]PUDRIVER.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]PUDRIVER.JNL;1"
 DATE/TIME OF PATCH: 5-MAY-1982 18:16:09.81

Image does not contain local symbols

```

PATCH>SET ECO 1
PATCH>replace/word ^x8 = ^x0B2A
NEW> ^x0C00
NEW> exit
old:                .$$ABSS$.+8: 0B2A
new:                .$$ABSS$.+8: 0C00
PATCH>replace/long ^x0B2C = 0
NEW> ^x00C0
NEW> exit
old:                00000B2C: 00000000
new:                00000B2C: 000000C0
PATCH>replace/long ^x0B30 = 0
NEW> ^x0B34
NEW> exit
old:                00000B30: 00000000
new:                00000B30: 00000B34
PATCH>set patch_area 0B2C
PATCH>replace/instruction ^x094D+^x5C = 'jsb @#8000B4C3'
NEW> 'pushl          r3'
NEW> 'pushl          r5'
NEW> 'movb           b^3F(r5),r0'
NEW> 'movl           w^00C0(r4),r5'
NEW> 'movl           b^20(r5),r3'
NEW> 'movb           r0,b^37(r3)'
NEW> 'jsb            @#80002EE8'
NEW> 'clrb           b^37(r3)'
NEW> 'movl           (sp)+,r5'
NEW> 'movl           (sp)+,r3'
NEW> 'jsb            @#8000B4C3'
NEW> exit
old:                000009A9: JSB      @#8000B4C3
new:                000009A9: BRW      PAB
new:                000009AC: NOP
new:                000009AD: NOP
new:                000009AE: NOP
new:                PAB:  PUSHL   R3
new:                00000B36:  PUSHL   R5
new:                00000B38:  MOVB    B^3F(R5),R0
new:                00000B3C:  MOVL    W^00C0(R4),R5
new:                00000B41:  MOVL    B^20(R5),R3
new:                00000B45:  MOVB    R0,B^37(R3)
new:                00000B49:  JSB     @#80002EE8
new:                00000B4F:  CLRB   B^37(R3)
new:                00000B52:  MOVL   (SP)+,R5
new:                00000B55:  MOVL   (SP)+,R3
new:                00000B58:  JSB    @#8000B4C3
new:                00000B5E:  BRW    000009AF
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]PUDRIVER.EXE;2
PATCH>EXIT
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]RMS.EXE;1"
JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]RMS.JNL;1"
DATE/TIME OF PATCH: 4-MAY-1982 13:34:10.86

Image does not contain local symbols
Some or all global symbols not accessible

PATCH>DEFINE ECO01 = ^X0B420
symbol "ECO01" defined as 0000B420

PATCH>SET ECO 1
PATCH>REPLACE/INST

LOC> ECO01+04A
OLD> 'BLBC R0,ECO01+0A4'

OLD> EXIT
NEW> 'BLBC R0,ECO01+0A7'

NEW> EXIT
old: 0000B46A: BLBC R0,0000B4C4
new: 0000B46A: BLBC R0,0000B4C7

PATCH>UPDATE
Updating image file DISK\$RES26APR:[SYSEXE]RMS.EXE;2
PATCH>EXIT

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]SCSLOA.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]SCSLOA.JNL;1"
 DATE/TIME OF PATCH: 4-MAY-1982 13:35:13.91

Image does not contain local symbols
 Some or all global symbols not accessible

```

PATCH>SET ECO 1
PATCH>replace/word ^x0 = ^x720
NEW> ^x800
NEW> exit
old: PAA: 0720
new: PAA: 0800
PATCH>replace/word ^x8 = ^x720
NEW> ^x800
NEW> exit
old: 00000008: 0720
new: 00000008: 0800
PATCH>replace/long ^x71C = 0
NEW> ^x0DC
NEW> exit
old: 0000071C: 00000000
new: 0000071C: 000000DC
PATCH>replace/long ^x720 = 0
NEW> ^x724
NEW> exit
old: 00000720: 00000000
new: 00000720: 00000724
PATCH>set patch area 71C
PATCH>replace/instruction ^x223 = 'movl #1,r0'
NEW> 'movl #1,r0'
NEW> 'movab b^30(r3),b^30(r3)'
NEW> 'movab b^30(r3),b^34(r3)'
NEW> 'movab b^38(r3),b^38(r3)'
NEW> 'movab b^38(r3),b^3C(r3)'
NEW> exit
old: 00000223: MOVL #01,R0
new: 00000223: BRW PAB
new: PAB: MOVL #01,R0
new: 00000727: MOVAB B^30(R3),B^30(R3)
new: 0000072C: MOVAB B^30(R3),B^34(R3)
new: 00000731: MOVAB B^38(R3),B^38(R3)
new: 00000736: MOVAB B^38(R3),B^3C(R3)
new: 0000073B: BRW 00000226
PATCH>UPDATE
Updating image file DISK$RES26APR:[SYSEXE]SCSLOA.EXE;2
PATCH>EXIT
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
 IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]SYS.EXE;1"
 JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]SYS.JNL;1"
 DATE/TIME OF PATCH: 3-MAY-1982 15:42:32.11

Image does not contain local symbols
 Some or all global symbols not accessible

```

PATCH>DEFINE ECO_2_40$ = 0
symbol "ECO_2_40$" defined as 00000000
PATCH>DEFINE ECO_2_SETUP = 0
PATCH>SET ECO_1
PATCH>EX/ASCII 800028F0
800028F0: 'X1JY'
PATCH>DEF/ASCII 800028F0='V3.0'
old:                               800028F0: 'X1JY'
new:                               800028F0: 'V3.0'
PATCH>EX/ASCII 8001C0F1
8001C0F1: 'X1JY'
PATCH>DEF/ASCII 8001C0F1='V3.0'
old:                               8001C0F1: 'X1JY'
new:                               8001C0F1: 'V3.0'
PATCH>UPDATE
!
! ECO_2
!
! Module SWAPPER , .PSECT $AEXENONPAGED , Base address = ^X80004530
!
PATCH>SET ECO_2
PATCH>SET PATCH AREA ^X80002FB0 ! Nonpaged read/write area to avoid JMP
PATCH>DEFINE ECO_2_40$ = ^X80004530 + ^X0624 ! Line 1079
symbol "ECO_2_40$" redefined from 00000000 to 80004B54
PATCH>REPLACE/INSTRUCTION
LOC> ^X80004530 + ^X05C5 ! Line 1052
OLD> 'MOVAL W^X80002608,R4'
OLD> EXIT
NEW> 'BBC #X02,W^X800026F0,ECO_2_40$' ! Branch to line 1079
NEW> 'MOVAL W^X80002608,R4'
NEW> EXIT
old:                               80004AF5: MOVAL W^80002608,R4
new:                               80004AF5: BRW PAB
new:                               80004AF8: NOP
new:                               80004AF9: NOP
new:                               PAB: BBS #02,W^800026F0,80002FC1
new:                               80002FBE: BRW ECO_2_40$
new:                               80002FC1: MOVAL W^80002608,R4
new:                               80002FC6: BRW 80004AFA
PATCH>VERIFY/INSTRUCTION
LOC> ECO_2_40$ ! Line 1079
OLD> 'MTPR #X02,#X0012'
OLD> EXIT
old:                               ECO_2_40$: MTPR #02,#12
PATCH>DEFINE ECO_2_SETUP = ^X80004530 + ^X064E ! Line 1100
symbol "ECO_2_SETUP" redefined from 00000000 to 80004B7E
PATCH>REPLACE/INSTRUCTION
LOC> ^X80004530 + ^X063D ! Line 1086
OLD> 'MTPR #X07,#X0012'
OLD> EXIT
NEW> 'MTPR #X07,#X0012'
NEW> 'BBC #X02,W^X800026F0,ECO_2_SETUP' ! Branch to line 1100
NEW> EXIT
old:                               80004B6D: MTPR #07,#12
new:                               80004B6D: BRW 80002FC9
new:                               80002FC9: MTPR #07,#12
new:                               80002FCC: BBS #02,W^800026F0,80002FD5
new:                               80002FD2: BRW ECO_2_SETUP
new:                               80002FD5: BRW 80004B70
  
```

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH>VERIFY/INSTRUCTION

LOC> ECO_2_SETUP

! Line 1101
^X80004530 + ^X0A13' ! BSBW OSINIT

OLD> 'BSBW'

OLD> EXIT

ECO_2_SETUP: BSBW 80004F43

old:

PATCH>UPDATE

Updating image file DISK\$RES26APR:[SYSEXEXE]SYS.EXE;2

PATCH>EXIT

PATCHES MADE AFTER MICROFICHE KIT MANUFACTURED

PATCH Version 3-00 15-Mar-1982
IMAGE FILE BEING PATCHED: "DISK\$RES26APR:[SYSEXE]XGDRIVER.EXE;1"
JOURNAL FILE: "DISK\$RES26APR:[SYSEXE]XGDRIVER.JNL;1"
DATE/TIME OF PATCH: 3-MAY-1982 15:43:07.06

Image does not contain local symbols
PATCH>SET ECO 01
PATCH>ex/i 0e4+78
0000015C: MOVAL W^0274(R5),R0
PATCH>ex/b 15d
0000015D: 0C5
PATCH>rep/byte .
OLD> 0c5
OLD> exit
NEW> 0c0
NEW> exit
old: 0000015D: 0C5
new: 0000015D: 0C0
PATCH>ex/i 15c
0000015C: MOVAL W^0274(R0),R0
PATCH>UPDATE
Updating image file DISK\$RES26APR:[SYSEXE]XGDRIVER.EXE;2
PATCH>EXIT

READER'S COMMENTS

NOTE: This form is for document comments only. DIGITAL will use comments submitted on this form at the company's discretion. If you require a written reply and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

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Please indicate the type of user/reader that you most nearly represent.

- Assembly language programmer
- Higher-level language programmer
- Occasional programmer (experienced)
- User with little programming experience
- Student programmer
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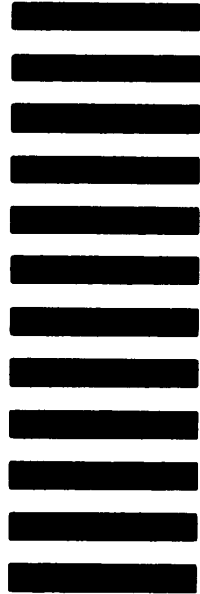


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