FIELD CHANGE ORDER
NUMBER: RF31T-0001, RF35-0001, RF73-0001

APPLICABILITY:
All RF31T, RF35 and RF73 disk drives installed on VAX VMS and OpenVMS systems must be upgraded to minimum revision level of T387.

NOTE
ULTRIX based systems do not support these drives and, therefore, unaffected.

PROBLEM & SYMPTOM:
Engineering has become aware of a potential data corruption problem with the above mentioned disk drives. The problem manifests itself with applications that implement the IOS_WRITECHECK function. These drives may return incorrect data in certain circumstances. One Digital application known to implement this command is VOLUME SHADOWING for OpenVMS (PHASE II), (also known as Host Based Volume Shadowing, HBVS). Applications that are not Digitals may also implement this command. (Continued on Page 2)

SOLUTION:
Upgrade all RF31T/RF31T+, RF35/RF35+ and RF73 drives running on VAX VMS based systems to minimum T387 or to currently shipping Rev T392. (Continued on Page 3)

QUICK CHECK:
Check for drive firmware revision of T387, minimum. (Continued on Page 3)

PRE/CO-REQUISITE FCO:
None

TOOL/TEST EQUIPMENT:
None

FCO PARTS INFORMATION

<table>
<thead>
<tr>
<th>FCO KIT NO.</th>
<th>DESCRIPTION OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ-01672-01</td>
<td>1 AQ-PVZA0-R1B01 TK50 tape with code load</td>
</tr>
<tr>
<td></td>
<td>programs and instructions</td>
</tr>
<tr>
<td>FA-05008-01</td>
<td>1 FA-05008-01 A01 FCO Document</td>
</tr>
</tbody>
</table>

FCO CHARGING INFORMATION (See Last Page)

APPROVALS

TECH. ENGINEER: Frank Fontaine
ENG. BUSINESS MGR.: Dick Search
DSHQ LOGISTICS: Joe Michalski
DS PRODUCT SAFETY: Bob Brister
PROBLEMS & SYMPTOMS: (Continued)

Invalidate cache after failed Compare -

If a Compare command failed, the first block of compared-against data was marked valid in the cache. A subsequent Read would pick up the cached data, not the on-disk data.

Allow Supplement Write Log modifier -

This modifier was ignored in previous versions. However, the ReUse modifier use to always cause a Supplement.

Also, the firmware now allows the Supplement Write Log modifier on Erase commands.

Allow Access NVR to request less than 32 bytes -

An Access NVR command which specified less than 32 bytes of data was rejected for an invalid command length.

Clear SeqNum field in all end messages.

Fixed in T387E

Controller memory error (EDC error)

Some cases of DSSI disk drives reporting an MSCP status of 012A (controller memory error) while reading are fixed by this release. The blocks reporting this error are reread several times. If the rereads are successful, the host computer does not see any error.

256-byte Compare corrupts cache.

If an application program issues a Compare command or a Read command with the Compare modifier (also called IO$_READCHECK and IO$_WRITECHECK), and
the size of the transfer is not an even multiple of 512 bytes, then a subsequent 512-byte read of the same data may report incorrect data.

ADDITIONAL FUNCTIONALITY
------------------------

Code load on VAXclusters without rebooting

RFxx disks on which the NODENAME or UNITNUM parameters had been changed use to forget these parameters when new firmware was loaded. The code loader software could work around this on a single node, but not on a cluster. All nodes on the cluster had to reboot to see the disk again.

Now, the loader stores these parameters into nonvolatile RAM before loading, and the new firmware knows how to read the parameters and restore them before talking to the host.

This is the difference between T387 and T387A.

QUICK CHECK (Continued)
------------------------

To check the firmware revision use the VMS Show Cluster command at the VMS prompt.

$Sho Cluster

View of Cluster from system ID 65534 node: DREAD 8-AUG-1992 10:20:32

<table>
<thead>
<tr>
<th>SYSTEMS</th>
<th>MEMBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NODE</td>
<td>SOFTWARE</td>
</tr>
<tr>
<td>DREAD</td>
<td>VMS V5.4</td>
</tr>
<tr>
<td>KB3958</td>
<td>RFX T387</td>
</tr>
<tr>
<td>CX1231</td>
<td>RFX T387</td>
</tr>
<tr>
<td>CX2576</td>
<td>RFX T387</td>
</tr>
</tbody>
</table>

SOLUTION (Continued)
This FCO is the field implementation of the following option level ECOs. These ECOs allow implementation of T387 firmware.

RF31T = RF31T_SH004  
RF35 = RF35_SH008  
RF73 = 76-07865_KB002

This FA document contains all the information needed to upgrade the affected drives.

FIRMWARE UPGRADE PROCEDURE
-----------------------------

This section regarding the firmware upgrade procedure is generic and will apply to all affected drives. EQ-01672-01 contains the FCO document and a TK50 tape cartridge with CSCPAT_1066013.A. This file contains all the necessary programs to upgrade RF31T/RF31T+, RF35/RF35+ or RF73 disk drives for both VAX/VMS and VMS Install Utility to install the file. The executables and upgrade instructions will be placed in SYSSCOMMON:[SYSUPD], the release notes are placed in SYSSCOMMON:[SYSHLP]. Below is an example of an installation.

```
$ mount sixirn$mua0: cscpat
%MOUNT-I-WRITELOCK, volume is write locked
%MOUNT-I-MOUNTED, CSCPAT mounted on _SIXIRN$MUA0:
$
$copy sixirn$mua0:cscpat_1066013.A []*
$
$ @sys$update:vmsinstal

VAX/VMS Software Product Installation Procedure V5.5-2 It is
14-JUL-1993 at 14:03.

Enter a question mark (?) at any time for help.
* Are you satisfied with the backup of your system disk [YES]? yes
* Where will the distribution volumes be mounted: $1$dia1:[fontaine]
Enter the products to be processed from the first distribution volume set.
* Products: cscpat_1066013
* Enter installation options you wish to use (none):

The following products will be processed:

CSCPAT_1066 V1.3

Beginning installation of CSCPAT_1066 V1.3 at 14:05

%VMSINSTAL-I-RESTORE, Restoring product save set A ...
%VMSINSTAL-I-RELMOVED, Product’s release notes have been moved to SYS$HELP.

***** Processing RF_UPGRADE.VUG

Your system will now be updated to include the following new and modified files:

SYS$UPDATE:FIRMWARE_UPGRADE.TXT [new]
SYS$UPDATE:RF1C_T392_DEC.EXE [new]
SYS$UPDATE:RF31_T392_DEC.EXE [new]
SYS$UPDATE:RF35_T392_DEC.EXE [new]
SYS$UPDATE:RF5C_T392_DEC.EXE [new]
SYS$UPDATE:RF73_T392_DEC.EXE [new]
SYS$HELP:CSCPAT_1066013.RELEASE_NOTES [new]

FIELD APPLICATION DOCUMENT (FA), Continuation Page

+---------------------------+   |   FCO RF31T-0001, RF35-0001,
|   |   |   |   |   |   |   |               RF73-0001
| d | i | g | i | a | t | i |   |          PAGE 5 OF 15
+---------------------------+   |

IMPORTANT

In order to complete the necessary changes for this update to take effect read and review SYS$UPDATE:FIRMWARE_UPGRADE.TXT.

Press RETURN to continue or Control-Y to abort ...

%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...
Installation of CSCPAT_1066 V1.3 completed at 14:08

Enter the products to be processed from the next distribution volume set.
* Products: exit
$ dir sys$update:rf*

Directory SYSSCOMMON:[SYSUPD]
Before proceeding with the upgrade ENSURE that your customer has backed up the drives to be upgraded. This backup is a precautionary measure, the code load programs do not access the HDA. After a normal upgrade the data will not have to be restored, however there is one exception, RF73 ONLY.

If you have RF73 drives at T324 firmware level, these drives will need to be reinitialized and data restored after the microcode upgrade is complete. There was a change between T324 and later revisions which added one additional cylinder to the disk. In order to access this additional cylinder, a new BITMAP.SYS file needs to be created to include the added blocks. (A new bitmap file is created when the drive is reinitialized.)

DETERMINING DRIVE TYPE

To determine which RF31T or RF35 drive you have on your system do the following.

The drive type can be determined from the SET HOST/DUP utility ‘PARAMS’. To use the SET HOST/DUP utility, you must first install the FYDRIVER (the DUP class driver). To load the driver, issue the following commands:
Then enter the PARAMS utility using the command below:

```bash
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS <node_name_of_disk>
```

And, at the PARAMS> prompt, issue the "STATUS CONFIG" command.
It reports whether you have a RF31 or RF35, and the Apache
revision. The Apache revision information can then be used to
determine what type of RF31 or RF35 drive you have installed.

For example:

```
PARAMS> STATUS CONFIG
Configuration:
Node TEST is an RF35 controller using Apache V1.1
Software RFX T329A built on 2-DEC-1991 17:48:29
Electronics module name is ZG14600907

NOTE: The revision of the Apache determines whether the drive
is a RF31T+ or RF35+. For example:

<table>
<thead>
<tr>
<th>Apache Revision</th>
<th>Driver Type</th>
<th>Loader Program To Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0 or V1.1</td>
<td>RF31T</td>
<td>RF31_T392_DEC.EXE</td>
</tr>
<tr>
<td>RF35</td>
<td>RF35_T392_DEC.EXE</td>
<td>RF35_T392_DEC_ALPHA.EXE</td>
</tr>
<tr>
<td>V1.4</td>
<td>RF31T+</td>
<td>RF1C_T392_DEC.EXE</td>
</tr>
<tr>
<td>RF35+</td>
<td>RF5C_T392_DEC.EXE</td>
<td>RF5C_T392_DEC_ALPHA.EXE</td>
</tr>
</tbody>
</table>

Not reported original RF31 ROM Based, No Loader

Note:

The RF31T and RF31T+ are cost-reduced versions of the RF31. The RF35+
is a cost-reduced version of the RF35.

The RF31T is the 3.5 inch form factor replacement for the 5.25 inch,
half height RF31. The 5.25 inch RF31 does not exhibit this potential
corruption problem.
DETERMINING STATE OF THE HISPEED PARAMETER

There are two ways of determining the state of the HISPEED parameter. There is only one way to set (= 1) the HISPEED parameter and that is using the "PARAMS" utility. Once set, the "WRITE" command must be issued before it will take affect. See Example 2.

1. This is the easiest way to determine if the HISPEED bit is set to a one. With the drive mounted, do a "sho dev/full" command, and look at Device Type or the Total Blocks. If the HISPEED bit set, as shown in the following command, the device type will be RFHxx.

   $ sho dev/full R5ATAA$DIA3:

   Disk R5ATAA$DIA3:, device type RF35, is online, allocated, deallocate on dismount, mounted, file-oriented device, shareable, available to cluster, error logging is enabled.

   Error count 0 Operations completed
   Owner process "_LTA5007:" Owner UIC
   Owner process ID 2020012D Dev Prot S:RWED,O:R
   Reference count 2 Default buffer size
   Total blocks 1664628 Sectors per track
   Total cylinders 2086 Tracks per cylinder
   Host name "R5ATAA" Host type, avail

2. To determine if you have the HISPEED bit set, connect the FYDRIVER then issue the SET HOST/DUP command as follows:

   $ RUN SYSGEN
   SYSGEN> CONNECT FYA0/NOADAPTOR
   SYSGEN> EXIT

   $ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS <disk nodename>
   PARAMS> SHOW HISPEED
   Parameter Current Default Type Radix
   -------- ----------- -------------- ------ ------
   HISPEED 1 0 Boolean 0/1

   PARAMS>SET HISPEED 1
   PARAMS>WRITE
   Changes Require Controller Initialization, OK? [Y/(N)] Y
   Initializing

   If the current value is 1, the HISPEED parameter is set.
NOTE: When the HISPEED parameter is set to 1, the drive’s storage capacity is cut by half. For example:

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Total Blocks</th>
<th>HISPEED Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF31</td>
<td>744400</td>
<td>0</td>
</tr>
<tr>
<td>RFH31</td>
<td>372200</td>
<td>1</td>
</tr>
<tr>
<td>RF35</td>
<td>1664628</td>
<td>0</td>
</tr>
<tr>
<td>RFH35</td>
<td>832314</td>
<td>1</td>
</tr>
<tr>
<td>RF73</td>
<td>3585820</td>
<td>0</td>
</tr>
<tr>
<td>RFH73</td>
<td>1953955</td>
<td>1</td>
</tr>
</tbody>
</table>

Therefore, do not set HISPEED unless you want to reduce the total disk capacity.

RF Standalone Loader Program
----------------------------

PURPOSE:

The purpose of this program is to upgrade the firmware in an RFxx disk drive to T392.

OVERVIEW:

The new drive firmware is contained within the program image. There is a separate program for each of the RF drive types affected (i.e., RF31T, RF31T+, RF35, RF35+, RF73). If you should choose an incorrect program for your drive type, the program will return an error message and display the correct program filename on your screen. The list below indicates which loader should be used for each drive type:

<table>
<thead>
<tr>
<th>Drive</th>
<th>Loader File</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF31T</td>
<td>RF31_T392_DEC.EXERF31_T392_DEC_ALPHAXA.EXE</td>
</tr>
<tr>
<td>RF31T+</td>
<td>RF1C_T392_DEC.EXERF1C_T392_DEC_ALPHAXA.EXE</td>
</tr>
<tr>
<td>RF35</td>
<td>RF35_T392_DEC.EXERF35_T392_DEC_ALPHAXA.EXE</td>
</tr>
<tr>
<td>RF35+</td>
<td>RF5C_T392_DEC.EXERF5C_T392_DEC_ALPHAXA.EXE</td>
</tr>
<tr>
<td>RF73</td>
<td>RF73_T392_DEC.EXERF73_T392_DEC_ALPHAXA.EXE</td>
</tr>
</tbody>
</table>
During the upgrade, all loader programs will save the following drive parameters then restore them once the upgrade is complete:

- FORCENAM
- UNITNUM
- FORESEEN
- ALLCLASS
- NODENAME
- SYSTEMID

However, other drive parameters will be set back to their default value. For instance, the drive parameter ‘HISPEED’ will be set to the default value of 0 after the upgrade completes even if it was previously set to 1. To retain this value, you will have to use the DUP Utility PARAMS to manually reset it after running the loader program.

After the firmware is loaded, the drive will perform a ‘long calibration’ if the existing firmware revision level is T324. The calibration phase can require up to 20 minutes for a high capacity drive. By default the program will not wait for the drive to complete the final calibration. However, the drive will be unavailable until the process is done.

Restrictions
------------

- The program must be run from a privileged account such as the system account.
- Copy the files from the tape or diskette to the privileged account.
- The process working set quota (WSQUOTA) must be set to 1024 or greater. Use the AUTHORIZE command ‘SHOW user-spec’ to determine the current working set quota. If it is not set correctly, use the following AUTHORIZE command to change the WSQUOTA value:

```
$ RUN SYS$SYSTEM:AUTHORIZE
UAF> MODIFY user=spec /WSQUOTA=value
UAF> EXIT
```

NOTE: You must log out and log back in for this change to take effect.
- The target disk drive must be dismounted unless the drive is a booted system disk connected to a non-KFQSA adapter.

- A booted system disk connected to a KFQSA adapter CANNOT be upgraded while mounted. These disks must be brought up as dismounted user disks to be upgraded.

- When upgrading the mounted system device, the system must be booted MIN. The SYSGEN parameter 'STARTUP_P1' must be set to "MIN" either by using the SYSGEN Utility or by performing a conversational boot.

- The FYDRIVER must be loaded. To determine if the FYDRIVER is loaded, issue the following command:

  ```
  $ SHOW DEVICE FY
  %SYSTEM-W-NOSUCHDEV, no such device available
  ```

  If a NOSUCHDEV message is returned, issue the following SYSGEN command to load the FYDRIVER:

  ```
  $ RUN SYS$SYSTEM:SYSGEN
  SYSGEN> CONNECT FYA0/NOADAPTOR
  ```

- The RF73 model revision B and C must have a "FLASH Write Enable" jumper (J6) installed in order for their firmware to be upgraded. The jumper is located to the right of the DSSI Node address switches.

  If the jumper is removed and an upgrade is attempted, the drive will go "Host Unavailable" and remain in this state until the power is recycled. During the upgrade, if your drive goes "Host Unavailable" and the FAULT light remains on "solid", do the following:

  1. Cycle power to the drive (turn it off and on). The drive will run through a "Power On Self Test" and come online. At this point the drive is usable but the firmware has NOT been upgraded.

  2. Contact your local Digital Field Service office and log a service call so that the jumper can be installed.

  If the FAULT light is blinking, this means that the drive is
performing the long calibration described in the OVERVIEW section above. This calibration will take up 20 to 30 minutes to complete which is completely normal.

NOTE: These drives are shipped from manufacturing with the jumper installed. Therefore, this problem should be very rare.

Upgrade Procedure
-----------------

o It is advisable to perform an Image BACKUP of your RF drive before running the loader program to safeguard your data in case a problem occurs. This should be done even if the drive is a member of a shadow set.

NOTE: It is NOT necessary to do a BACKUP restore after the upgrade completes unless you have a RF73 disk drive at a T324 firmware level. See next bullet for more information.

o If you have RF73 drives at a T324 firmware level, these drives will need to be reinitialized and data restored after the microcode upgrade completes. There was a change between T324 and later revisions which added one additional cylinder to the disk. In order to access this extra cylinder, a new BITMAP.SYS file needs to be created to include the added blocks. (A new bitmap file is created when the drive is reinitialized.)

To determine what the current revision level is on your RF73 drive, issue the DCL 'SHOW CLUSTER/CONTINUOUS' command.

FIELD APPLICATION DOCUMENT (FA), Continuation Page
using the same method. For more information on shadow sets and BACKUP, refer to the "VMS Volume Shadowing Manual", (AA-PBTVA-TE).

- Select the proper loader program for your disk drive. If the wrong program is selected, the upgrade will not take place and a message indicating which program should be run will be displayed.

- Run the program. The program can be run directly and will prompt you for the device to load. For example:

  $ RUN RF73_T392_DEC.EXE
  
  Device:

  If a VMS foreign command is defined, up to three parameters can be parsed to the program. A foreign command is defined as follows:

  $ LOAD_5C :== $your_disk:[your_acct]RFxx_T392_DEC.EXE

  (Note: The dollar sign ($) must precede your disk specification.)

  The command is then run as follows:

  $ LOAD_5C R5ELAA$DIA1: TRUE TRUE

  The three command line parameters are

  - Target disk drive to upgrade.

  - Wait for final calibration flag (TRUE or FALSE). When this flag is set to TRUE, the program will wait until the final calibration completes. Otherwise, the program will print a message that the calibration is underway and the program will end. The default is FALSE.

  - Log File Flag (TRUE or FALSE). This flag indicates whether the log file should be generated during the upgrade. The log file is named RFLOAD_target-name.LOG and it contains the current drive parameters along with system information. The default is TRUE.

  - The loader can also be run in BATCH mode to upgrade a single or multiple drives. To do this, you must first create a command procedure with the appropriate commands. Then this command procedure must be submitted to BATCH using the DCL SUBMIT command.
For example:

```
! RF73.COM
:
$RF73UPGRADE:==$:SYS$:COMMON:[SYSEXE]RF73_T392_DEC.EXE
$RF73UPGRADE $4$DIA78: TRUE TRUE
$EXIT
$!<EOF>
:
$ SUBMIT RF73.COM
```

SAMPLE LOG FILE:

When the loader program is run, by default a log file is created. The following sample log file was created when upgrading a RF31T+ drive. Your output will be similar, but some differences are to be expected (for example, disk names).

NOTE: If your upgrade is performed on the console, then Virtual Circuit Closing messages may be seen during the upgrade. Also, when the program is waiting for host available, downloading, and calibration to complete, a series of "." will be printed to indicate that progress is being made.
FIELD APPLICATION DOCUMENT (FA), Continuation Page

+---------------------------+   |   |   |   |   |   |   |   |          FCO  RF31T-O001, RF35-O001,                  |
|   | d | i | g | i | t | a | l |   |               RF73-O001 |
+---------------------------+   |          PAGE 14 OF 15

STATUS MESSAGES:

The following are the status messages returned by the loader program.

RETURN CODES - SUCCESS
----------------------
LOAD-S-COMPLETE, Load Completed

RETURN CODES - WARNING AND ERROR
--------------------------------
LOAD-W-PROGQUIT, Program Stopped by User
LOAD-E-NOTDONE, Load was not Done
LOAD-F-NOFYDEVICE, Unable to assign FYA0 (DUP class device)
LOAD-F-NORFDEVICE, Unable to assign specified RF device name
LOAD-F-BADRCVLENS, Conflicting data lengths in DUP_Receive
LOAD-F-UNKDUPMSG, Unknown DUP message type received
LOAD-F-BADROMINDEX, ROM Table index is out of range
LOAD-F-BADPEEKPOB, unexpected POB type was received after peek
LOAD-F-BADSTARTPOB, unexpected POB type was received after start
LOAD-F-BADGETDVI, Bad status returned from SYS$GETDVI
LOAD-F-FOPENERR, Unable to open specified image file
LOAD-F-BADCHECKSUM, Checksum in specified image is bad
LOAD-F-DEVMismatch, Device Type in Drive doesn’t match that of image to be loaded
LOAD-F-HOSTNOTAVAIL, Device failed to become hostavailable
LOAD-F-DEVMounted, Device is currently mounted, dismount and start again
LOAD-F-BADLOCKMODE, Unknown WS Lock Mode was passed
LOAD-F-SYSKFQSA, Mounted system disk on KFQSA can not be upgraded

FIELD APPLICATION DOCUMENT (FA), Last Page

<table>
<thead>
<tr>
<th>digital</th>
<th>FCO</th>
<th>RF31T-0001, RF35-0001, RF73-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PAGE 15 OF 15</td>
</tr>
</tbody>
</table>

LARS

USA  GIA   EUROPE

Activity -
(a) Contract W   U   K
Warranty W   U   W

(b) IN-DEC Contract K   U   A
Non Contract/Non Warranty F   F   F
(c) RTD/Off-site Agreement F   U   F

Hardware Segment Code 111  111  111
Product Line 031  031

DEC Option XXXXXX  XXXXXX  XXXXXX
<table>
<thead>
<tr>
<th>Option ID</th>
<th>N/A</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Call</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Action Taken</td>
<td>D</td>
<td>I/V</td>
</tr>
<tr>
<td>Fail Area-Module-FCO-Comments</td>
<td>RF*-O001</td>
<td>RF*-O001</td>
</tr>
<tr>
<td>Material Used</td>
<td>EQ-01672-01</td>
<td>EQ-01672-01</td>
</tr>
</tbody>
</table>

NOTE: * means either RF31T-O001, RF35-O001 or RF73-O001

(a) Warranty Optimum, Warranty Standard and Warranty Basic (on-site) Agreements; * Note material (only) free of charge for all customers.

(b) Applies to IN-DEC Area Only

(c) RTD=Return to Digital or Off-site Agreements; If Field Engineer On-site, use Activity Code "F".

<table>
<thead>
<tr>
<th></th>
<th>FCO CHARGING INFORMATION (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WARRANT/CONTRACT</td>
</tr>
<tr>
<td></td>
<td>ON-SITE</td>
</tr>
<tr>
<td>TRAVEL/INSTALL</td>
<td>EQ</td>
</tr>
<tr>
<td></td>
<td>DEC</td>
</tr>
<tr>
<td>CUS</td>
<td></td>
</tr>
</tbody>
</table>

\FCO_DOCS
\\RF31T
\FA-05008-01
\EQ-01672-01