Technical Newsletter

This Newsletter No. GN26-0375
Date February 24, 1984

Base Publication No. GA26-1672-0
File No. S/370-07, 4300-07

Previous Newsletters GN26-0372

IBM Disk Storage Management Guide, Error Handling

This Technical Newsletter provides replacement pages for the subject publication. Pages to be inserted and/or replaced are:

5, 6
15 through 18
23 through 26
43 through 46

A change to the text or an illustration is indicated by a vertical line to the left of the change.

Summary of Amendments

Shows differences in the reporting of 3370 errors.

Note: *Please file this cover letter in the back of the manual to provide a record of changes.*

IBM Corporation, Technical Publishing, Department G26, San Jose, California 95150

Printed in U.S.A.

Description of Resources

This section describes the System Exception reports printed by the EREP program and the error handling functions provided by the Device Support Facilities program. Later, guidelines will be given on how to use information from the System Exception reports to perform Device Support Facilities functions.

System Exception Reports Description

The EREP program prints a full set of System Exception reports in a single job step; however, you need only three of these reports for information on disk storage errors. The other System Exception reports apply to other components or are intended primarily for service representatives.

The three System Exception reports you will use for disk storage error handling are:

- System Error Summary (Part 2)
- Subsystem Exception, DASD
- DASD Data Transfer Summary

Later, each report will be illustrated along with instructions on how to read it.

System Error Summary (Part 2)

The System Error Summary (Part 2) report applies to disk storage and tape storage. The report lists *each incident of a permanent I/O error.* The type of error may be a data check or an equipment check. The errors are in sequence according to the time they occurred. Each error incident has the *job name* of the job in progress. A *probable failing unit* is given for each of the errors.

This report is helpful if there is a problem while running a particular job and you want to determine if any type of I/O error occurred at the time. The report also is helpful in giving a quick perspective of all permanent I/O errors during the time covered by the report.

Subsystem Exception, DASD

The Subsystem Exception, DASD, report applies only to *disk storage.* The report lists *accumulated permanent and temporary errors.* The accumulated errors are given for each unit in the probable failing unit category. For example, each volume with errors is listed in the volume category. The accumulated total will include each permanent error listed in the System Error Summary (Part 2). Description of the type of error depends on the probable failing unit.

- If the probable failing unit is a *hardware* component, permanent and temporary errors can be a *data, control, or equipment type of error.*
- If the probable failing unit is a *volume,* both permanent and temporary errors are *always a data type of error.*

The hardware probable failing units are listed first and the volume probable failing units are listed last.

Usage, in terms of *number of thousands seeks and number of megabytes read,* is given for each unit reporting errors. This information can be used along with the total number of errors for the unit to assist in evaluating whether recovery action should be taken.

The DASD exception report will bring to your attention any problems related to disk storage operation that may need further investigation and treatment. If the span of error records in the report covers more than three days, a message is printed at the top of the report. A report that spans longer than three days may not provide the most accurate probable failing unit indication because corrective action may have been taken.

To improve the report's usefulness, *you can establish limits for the number of temporary data errors* acceptable in your installation. Probable failing units with temporary data errors below this limit will not be printed. Limits can be set for each type of error and for each storage control type and disk storage type. (Limits can not be set for 3375s, 3380s, and 3370s. Temporary data errors have a threshold established in the subsystem for 3375s, 3380s, and most 3370s.) 3370s attached directly to the 4321 or 4331 do not have a threshold established. Limit control statements are used to make these specifications. If there are units that have errors that are not reported because the errors did not exceed the limit, a message gives the total number of such units.

DASD Data Transfer Summary

The DASD Data Transfer Summary report also applies to *disk storage* but *only to data check type errors.* It gives *details* of data errors. All volumes that were listed in the DASD exception report (where they are listed with a total count of errors) are given in this report with details of the data errors for that volume.

Detailed information is provided for all permanent data errors, because permanent errors are logged in the system error log. For temporary errors, the information is provided *if* the error description (not just the count) is logged in the system error log. Whether a temporary error is logged depends on the disk storage product type and the area in which the error occurs. Logging is described in the manual, *Background Reference Information*, Publications No. GA26-1675.

The DASD Data Transfer Summary has two sections, one for *Volume* probable failing units and one for *Other* probable failing units. The same type of information about the data errors is provided in both sections, but the means for recovery action is different.

For data errors in the *Volume* section, you can use Device Support Facilities for recovery action.

For data errors in the *Other* section, a service representative is needed.

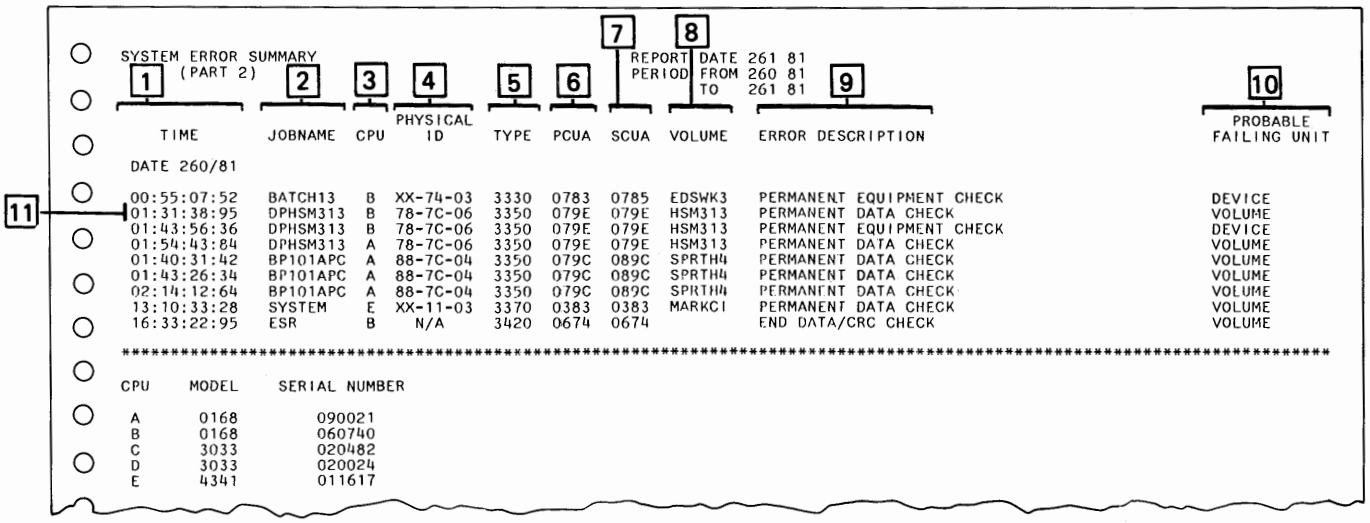

Figure 2. System Summary (Part 2) Example

How to Read the Subsystem Exception, DASD

Item	Description
PROBABLE FAILING UNIT 1	This column is organized by probable failing unit categories: channel (CHAN), storage control unit (SCU), controller (CONT), device (DEV), and volume (VOL). All of the units in each category that had errors are listed with probable failing unit identifiers and product type number. The following digit identifiers are used to identify probable failing units. When a physical ID is used to identify a probable failing unit, the physical ID represents either a real physical ID set with switches or a physical ID made up especially for the EREP program based on an address. CHAN - channel address digit followed by xx (for example 02xx). SCU - physical ID of storage control or storage director (for example 18-xx-xx). CONT - physical ID of controller (for example, xx-22-xx). No controller is shown in the illustration. DEV - physical ID of controller and device (for example, xx-7C-06). VOL - serial number of volume (for example HSM313). For example, there was an error at a device probable failing unit with the physical ID xx-7C-06 on a 3350. There also was an error on a volume probable failing unit with serial number HSM313 on a 3350. (If both of the errors were reported from the same 3350, the physical addresses, to the right, will be the same.)
FAILURE AFFECT 2	You do not need the information in this column.
CPU 3	As in the System Error Summary (Part 2), the alphabetic identifiers in this column identify the CPU that received the error records. At the bottom of the report, the alphabetic identifiers for all of the CPUs covered by the report are given with their model and serial numbers.
PHYSICAL ADDRESS 4	This column contains an identifier of a serviceable unit. It is a 3-digit physical address (preceded by a zero) or a 6-digit physical ID for units that have physical IDs (set with switches). For example, the physical address 79E, belonging to a 3350, is listed twice, once for device and once for volume.
TOTALS 5 PERM TEMP	This column gives the total permanent errors and total temporary errors for each unit with errors. For example, scanning down the probable failing unit column to volume, HSM313 had a total of 2 permanent errors and volume MARKCI had 1 permanent and 19 temporary errors. If the probable failing unit is a *volume*, the permanent and temporary error is *always a data error* associated with a read operation. Values for temporary data errors at a volume do not represent the same thing for all disk storage types. • For the 3330, 3340, 3344, 3350, and those 3370s that are attached directly to the 4321 or 4331, the value is the *total number of data errors for that volume*. For example, volume MARKCI had a total of 19 temporary data errors. Because there can be only two digits in the temporary column, the highest number of temporary errors printed is 99. Even though 99 is printed, there may actually have been more than 99 temporary errors attributed to that probable failing unit. You may wish to establish limits that will apply to your installation. • For the 3375, 3380, or those 3370s that are not attached directly to the 4321 or 4331, the value is the *number of times the temporary data error rate threshold was exceeded on that volume*. For example, volume VM8001 exceeded the data error rate threshold one time. These device thresholds are established for the product by IBM, and the threshold value is the same for all devices of that product type.

How to Read the Subsystem Exception, DASD (continued)

Item	Description
IMPACT OF TEMPORARY ERRORS 6	You do not need the information in these columns when the probable failing unit is a volume, because volume errors are always associated with a read operation. (The abbreviations are interpreted as follows: EQU CHK = equipment check, SKS = seeks, RD = read, OVRN = overrun. OTHER refers to items B, C, D, and I as defined on the top line across the columns.)
USAGE 7	The usage column gives the total number of seeks (times 1000) and total number of megabytes read during the period the permanent or temporary errors occurred at that volume. For example, during the period when volume HSM313 had two permanent read errors, there were 18,000 seek operations and 504 megabytes read.
UNK 8	A statement about unknowns may be printed after the regular listings. Such an unknown indicates that records were logged that should not have been, or a probable failing unit could not be determined from the sense information.

At the bottom of the report is the number of units excluded due to limits that were set by the installation on temporary errors reported. In the example, there were no units excluded.

```
SUBSYSTEM  EXCEPTION                                       REPORT DATE 261 81
        [1] DASD       [2]     [3]      [4]     [5]        PERIOD FROM 260 81        [6]                      [7]
                                                                   TO   261 81
B-BUS OUT PARITY CHK  C-CHECK DATA CHK  D-DISKETTE CHK   I-INVOKED OFFSETS
PROBABLE                                                     ---IMPACT OF TEMPORARY ERRORS---   ---USAGE---
FAILING           FAILURE           PHYSICAL  ---TOTALS---   EQU                                 1000    MB.
UNIT              AFFECT      CPU   ADDRESS   PERM  TEMP     CHK    SKS    RD    OVRN   OTHER    SKS    READ
**************************************************************************************************************
CHAN  02XX        CHAN/SCU          TOTAL            3                           3               N/A    N/A
                               A    0280             1                           1                 3     32
                               A    02B3             2                           2                99   1530
-------------+----------+--------+----------+------+-------+-------+------+------+------+--------+------+------+
SCU   18-XX-XX    CHAN/SCU          TOTAL            2       2                                   N/A    N/A
        3830                   B    0745             2       2                                     3    118
-------------+----------+--------+----------+------+-------+-------+------+------+------+--------+------+------+
DEV   XX-7C-06    DEV               TOTAL      1                                                 N/A    N/A
        3350                   B    079E       1                                                  18    504

-------------+----------+--------+----------+------+-------+-------+------+------+------+--------+------+------+
VOL    SPRTH4     DATAXFR           TOTAL      3                                                 N/A    N/A
        3350                   A    079C       3                                                  41    392

       HSM313     DATAXFR           TOTAL      2                                                 N/A    N/A
        3350                   AB   079E       2                                                  18    504

       MARKCI     DATAXFR           TOTAL      1    19                    19                     N/A    N/A
        3370                   E    0383       1    19                    19                       6    850

       BALIBT     DATAXFR           TOTAL           99                    99                     N/A    N/A
        3330                   B    0218            99                    99                      20    920

       USPET      DATAXFR           TOTAL           30                    30                     N/A    N/A
        3340                   B    0238            30                    30                     241   8343

       VM8001     DATAXFR           TOTAL            1                     1                     N/A    N/A
        3380                   C    06-10-00         1                     1                     131   3878

-------------+----------+--------+----------+------+-------+-------+------+------+------+--------+------+------+
[8] UNK           UNKNOWN           TOTAL                                                        N/A    N/A
                               B    0709
**************************************************************************************************************
   0 UNIT(S) EXCLUDED DUE TO LIMITS

CPU    MODEL    SERIAL NUMBER

 A     0168      090021
 B     0168      060740
 C     3033      020482
 D     3033      020024
 E     4341      011617

** ENTRIES WITH AN ASTERISK INDICATE THAT DASDID CARDS WERE NOT FOUND FOR THE UNIT.
NOTE: "IMPACT OF TEMPORARY ERRORS" IS THE NUMBER OF TIMES ERROR THRESHOLD HAS BEEN EXCEEDED.
NOTE: BLANK ENTRIES INDICATE ZERO VALUES OR NOT APPLICABLE. N/A = NOT AVAILABLE.
NOTE: ZERO ENTRIES INDICATE RECORDS EXIST IN EREP REPORTS BUT THRESHOLDS WERE NOT EXCEEDED.
```

Figure 3. Subsystem Exception, DASD Example

How to Read the DASD Data Transfer Summary

Recall that this report has a *Volume* section and an *Other* section. Only the volume section will be explained. All of the errors in this section are data errors with volume probable failing units.

Item	Description
FIRST LINE [1]	Each volume is listed beginning with the unit address used to select the volume, then the device type, and then the volume serial number. For example, the first volume shows Unit Address 79E, Device Type 3350, Volume HSM313.
SECOND LINE [2]	For each volume, a CPU and physical address are given. For example, the first volume shows CPU A, Physical Address 79E.
FAILURE AT ADDRESS [3] OR FAILURE AT BLOCK [5]	For each volume, one or more addresses are given where errors occurred. For count, key, and data devices, addresses are cylinder and head numbers. (The hexadecimal cylinder and head numbers are translated to decimal values for the report, but are in hexadecimal in the sense information.) For example, volume HSM313 at a 3350 with unit address 79E had errors at the address: Cylinder 0270, Head 28 For fixed-block architecture devices, addresses are block numbers (in decimal), and cylinder, head, and sector numbers (in decimal). For example, volume MARKCI at a 3370 selected with unit address 383 had errors at the address: Block 256413, CCHS 0344-05-35
SENSE [4] INFORMATION	Below each address is the date and time of the last sense record and 24 bytes of sense information, in hexadecimal. If more than one error is reported for an address, the sense information applies to the *last* error. The only sense information you may need are the last four digits, which contain a symptom code. 00000000 00000000 00000000 00000000 00000000 0000xxxx
PERM [6] TEMPORARY [7]	Error counts for permanent and temporary data errors are shown on the right side of volume information, with titles above the column. Values for temporary errors are interpreted as follows. Note that under Temporary, there are two possibilities: Offset Invoked *No* or *Yes*. For the 3330, 3340, 3350, and those 3370s that are attached directly to the 4321 or 4331: The values under Temporary are *all logged temporary data errors*. The value is always listed under Offset Invoked *No*. The number 0 always appears under Threshold Logging. For example, Volume USPET had 30 temporary logged data errors. For the 3375, 3380, and those 3370s that are not attached directly to the 4321 or 4331: The values under Temporary Offset Invoked No are the *number of times the data error rate threshold for the volume* was exceeded. The value under Temporary Offset Invoked Yes is the number of times the offset threshold was exceeded. For example, volume VM8001 exceeded the error rate threshold one time and an offset was **not** invoked.
THRESHOLD LOGGING [8] (Temporary Errors)	Only the 3375, 3380, and those 3370s not attached to a 4321 or 4331 will have values under the Threshold Logging columns. For 3375s and 3380s, the value under Threshold Logging is the *number of errors* at that address *while the string was in logging mode*. For example, 3380 volume VM8001 exceeded the temporary data error threshold 1 time, and there are 15 errors logged at cylinder 0770, head 01. Also there are 2 errors logged at the other address. Other volumes on the string also may have values under the Threshold Logging column although there are no values under the other error columns. This is because *all* volumes on the string are placed in logging mode when *any* volume causes logging mode to begin. No examples are shown. For a 3370 not attached to 4321 or 4331, the value under Threshold Logging is the number of errors at that address while the drive is in logging mode. When a 3370 drive exceeds the threshold, only that drive goes into logging mode.
	It is possible for 3330, 3350, and 3370 disk storage to have temporary data errors that were not logged, and therefore, no cylinder and head numbers are available. The volumes are listed after all the listings. None are shown in the example. The error will be included in the error count in the DASD exception report.

Steps in Error Handling

Print the EREP System Exception reports every day and review them for error information.

Use the System Summary (Part 2), when needed, to investigate a known problem. If you have been notified that an error occurred when a particular job was in progress at a particular time, examine the System Error Summary (Part 2) to determine if the problem may have been caused by a permanent I/O error. If there is a permanent error associated with a disk storage, examine the Subsystem Exception, DASD.

Use the Subsystem Exception, DASD, to determine whether there are hardware problems requiring a hardware service representative or data errors you should handle with the Device Support Facilities program. Use the report for routine review of possible permanent or temporary disk storage errors and for known permanent disk storage errors found in the System Summary (Part 2).

Are there hardware probable failing units with errors? These are listed as channel, storage control, controller, and device.

Are there volume probable failing units with data errors? Volumes are listed after all the hardware probable failing units. All errors at a volume are data errors.

For each probable failing unit category, look for the device type and probable failing unit identifier. For volumes, this is the volume serial number. Then read across the column to find the total permanent and temporary errors.

With information obtained from the Subsystem Exception, DASD, use the guidelines.

- If a hardware probable failing unit has a permanent error, call a hardware service representative.
- If a volume probable failing unit has a permanent error, proceed to the DASD Data Transfer Summary.
- If a volume probable failing unit has temporary errors, decide whether the temporary errors are excessive. All temporary errors, up to a maximum of 9999, are reported for the 3330, 3340, 3344, 3350, and those 3370s that are attached directly to a 4321 or 4331. If you establish a threshold for your installation to limit the number of temporary errors reported, this threshold number may then be used as the criterion for judging whether temporary errors are excessive. For the 3375, 3380, and those 3370s that are not attached directly to a 4321 or 4331, a listing in the temporary column indicates the established threshold has been exceeded. If this occurs one or more times, action with Device Support Facilities is recommended. (Temporary errors and their impact will be discussed later.) If the temporary errors are excessive, proceed to the DASD Data Transfer Summary.

In this example:

[1] A device probable failing unit, identified by xx-7C-06, on a 3350 with physical address 79E has one permanent error.

[2] A volume probable failing unit, identified by SPRTH4, on a 3350 with physical address 79C has three permanent errors.

[3] A volume probable failing unit, identified by HSM313, on a 3350 with physical address 79E, has two permanent errors. Note that this is the same physical address as in item [1].

[4] A volume probable failing unit, identified by MARKCI, on a 3370 with physical address 383 has one permanent error and 19 temporary errors if that 3370 is attached directly to a 4321 or 4331.

If the 3370 is not attached directly to a 4321 or 4331, then one permanent error occurred and the temporary threshold was exceeded 19 times.

[5] In addition, the following volumes have only temporary errors. Volume BALIBT on a 3330 has 99, or more, temporary errors. Volume USPET on a 3340 has 30 temporary errors. Volume VM8001 on a 3380 has exceeded the temporary threshold one time.

SUBSYSTEM EXCEPTION DASD — REPORT DATE 261 81; PERIOD FROM 260 81 TO 261 81

B-BUS OUT PARITY CHK C-CHECK DATA CHK D-DISKETTE CHK I-INVOKED OFFSETS

PROBABLE FAILING UNIT	FAILURE AFFECT	CPU	PHYSICAL ADDRESS	---TOTALS--- PERM	TEMP	---IMPACT OF TEMPORARY ERRORS--- EQU CHK	SKS	RD	OVRN	OTHER	---USAGE--- 1000 SKS	MB. READ
CHAN 02XX	CHAN/SCU		TOTAL		3				3		N/A	N/A
		A	0280		1				1		3	32
		A	02B3		2				2		99	1530
SCU 18-XX-XX 3830	CHAN/SCU	B	TOTAL 0745		2 2	2 2					N/A 3	N/A 118
[1] DEV XX-7C-06 3350	DEV	B	TOTAL 079E	1 1							N/A 18	N/A 504
[2] VOL SPRTH4 3350	DATAXFR	A	TOTAL 079C	3 3							N/A 41	N/A 392
[3] HSM313 3350	DATAXFR	AB	TOTAL 079E	2 2							N/A 18	N/A 504
[4] MARKCI 3370	DATAXFR	E	TOTAL 0383	1 1	19 19	19 19					N/A 6	N/A 850
BALIBT 3330	DATAXFR	B	TOTAL 0218		99 99	99 99					N/A 20	N/A 920
[5] USPET 3340	DATAXFR	B	TOTAL 0238		30 30	30 30					N/A 241	N/A 8343
VM8001 3380	DATAXFR	C	TOTAL 06-10-00		1 1	1 1					N/A 131	N/A 3878

For the situations from the example, the following actions are indicated:

1. A service representative should be called for the error with the hardware probable failing unit in item [1].
2. The DASD Data Transfer Summary should be examined for the permanent errors reported at volume SPRTH4 on a 3350 in item [2].
3. A volume probable failing unit with the same physical address (79E) as in item [1] has an error in item [3]. Because there is evidence of a hardware problem, further investigation of the volume problem will be determined by the hardware service representative called for the 3350 as described in item [1].
4. The DASD Data Transfer Summary should be examined for the errors reported at volume MARKCI on a 3370.
5. For the temporary errors of item [5], the DASD Data Transfer Summary should be examined for the errors on VM8001 at a 3380. Further investigation of the errors at BALIBT and USPET depends on the requirements of your installation.

Use the DASD Data Transfer Summary to determine the track or block addresses where data errors occurred on a given volume. These are the tracks or blocks that should be checked with Device Support Facilities for possible defect skipping or alternate block assignment.

The way the functions of Device Support Facilities are used depends on the number of track or block addresses with errors and whether the errors are permanent or temporary.

Using the volume serial number obtained from the Subsystem Exception, DASD, find the same volume serial number on the DASD Data Transfer Summary. Confirm that the device type and physical address are the same as those for the volume in the Subsystem Exception, DASD.

How many times does Failure at Address *appear for that volume?* This gives the number of track or block addresses with data errors on that volume.

Are the errors permanent or temporary? For each track or block address, look to the right to find whether the data error at that address is permanent or temporary. (The permanent errors are listed first.)

With the information obtained from the DASD Data Transfer Summary, the following steps can be used as **general guidelines.** (Later, other considerations will be discussed and specific guidelines will be given for each device type.)

- Take measures to protect data, depending on whether errors are permanent or temporary and on the Device Support Facilities command used. This important consideration will be discussed later.
- For devices with a removable disk pack or data module, you may try moving it to another drive. (There is a risk in moving a 3330 pack.) If data errors do not recur, call a hardware service representative to investigate a possible hardware problem.

  For devices with non-removable head and disk assemblies, use the Device Support Facilities ANALYZE command with the No Scan parameter. If a drive problem is reported in a message, call a hardware service representative to investigate a possible hardware problem.

  If data errors did recur when the pack or module was moved or if no hardware problem was reported when executing the ANALYZE command, proceed to the next item.
- If a few addresses have errors, use the Device Support Facilities INSPECT command to check each track or block that has errors. Obtain the track or block address from the DASD Data Transfer Summary. (A track address is given as cylinder and head numbers. In other manuals, the address is sometimes referred to as cylinder and tracks. They mean the same. A block address for fixed-block architecture device types is given as a relative block number.)

  If many addresses have errors, or if the home addresses should be rewritten, use the Device Support Facilities INIT command to check all of the tracks or blocks on the volume, or call a hardware service representative.

In the example:

[1] Volume HSM313 on a 3350 shows one track address with two permanent data errors. This same volume was used in the Subsystem Exception, DASD example, but because there was a hardware probable failing unit at the same physical address a service representative was recommended. However, if there was not a hardware probable failing unit with the same address, the one track on this volume should be checked with Device Support Facilities.

[2] Volume SPRTH4 on a 3350 has permanent errors at two tracks. Both tracks should be checked with Device Support Facilities. The track addresses are cylinder 0160, head 19 and cylinder 0217, head 3.

[3] Volume MARKCI on a 3370 that is attached directly to a 4321 or 4331 has one permanent error and three temporary errors at one block address. This block should be checked with Device Support Facilities. Whether you check block 263532 because of its 16 temporary errors depends on the requirements of your installation.

If the 3370 is not attached directly to a 4321 or 4331, then this volume has one permanent error and the temporary threshold was exceeded three times at one block address.

[4] Volume USPET on a 3340 has 30 temporary errors at one track address, which probably should be checked with Device Support Facilities. The 30 errors might be because the track had defects in more than one place or because the same data was frequently read.

[5] Volume VM8001 on a 3380 has no permanent errors, but the temporary error threshold was exceeded one time, with errors at four track addresses. (Temporary errors on 3380 and 3375, and which tracks to check, will be discussed later.)

[6] Volume BALIBT on a 3330 is listed at the bottom of the report, but with no cylinder and head numbers because the errors were not logged. This can also happen for a 3350 and 3370. (Temporary errors for 3330, 3370, and 3350 will be discussed later.)

3350 Condition 5: Temporary data checks but with no track addresses (cylinder and head numbers).

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to copy data from volume temporarily to another device. Use Device Support Facilities ANALYZE No Scan If Lastcc < 8 then INIT Check (3)	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INIT. Checks the surface of all tracks. Skips defects. If allowable skips are exhausted, flags the track and assigns an alternate track automatically. Rewrites HA and R0 of all tracks. Rewrites volume label and VTOC.	If "Suspected Drive Problem" message, call service representative. If INIT executed, restore data from temporary copy.

3350 Condition 6: Permanent data checks at 11 or more track addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Call hardware service representative.		

3350 Condition 7: Temporary data checks at 11 or more track addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to copy data from volume temporarily to another device. Use Device Support Facilities ANALYZE No Scan If Lastcc < 8 then INIT Check (3)	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INIT. Checks surface of all tracks. Skips defects. If allowable skips are exhausted, flags the track and assigns an alternate track automatically. Rewrites HA and R0 of all tracks. Rewrites volume label and VTOC.	If "Suspected Drive Problem" message, call service representative for possible hardware problem. If INIT executed, restore data from temporary copy.

Error Handling for 3370

Special Instructions

For temporary errors on 3370s that are not attached directly to a 4321 or 4331, it is recommended that action be taken whenever the error rate threshold is exceeded one or more times. Examine the DASD Data Transfer Summary report to determine which blocks to check when the temporary threshold has been exceeded. The value in the temporary column is listed beside the block address where an operation was in progress when the data error rate threshold for the volume was exceeded. This does not necessarily mean this is the block address causing the problem. Errors could have been accumulating at other blocks on the volume until a single error at this block caused the threshold to overflow.

3370 Condition 1: Permanent data checks at 3 to 10 block addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use Device Support Facilities, ANALYZE No Scan. If ANALYZE test does not detect hardware problems, use appropriate utility or Data Set Services to copy as much data as possible from *all volumes of head disk assembly* temporarily to another device.	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem."	If "Suspected Drive Problem" message, use appropriate utility or diagram to dump as much data as possible from *all volumes of head disk assembly* temporarily to another device. Call service representative for possible hardware problem.
Use the following Device Support Facilities command sequence for **each** block. INSPECT Block (rbn) Check (1) - Assign - **Preserve** If Lastcc = 8 then INSPECT Block (rbn) Check (1) - Assign - **No Preserve**	Executes INSPECT. Preserves data from block if it can be read. Checks surface of blocks. If defect confirmed, flags defective block and assigns alternate blocks. If data was preserved, restores data.	If data was preserved, eliminate temporary copy. If not preserved, restore from temporary copy, or from copy created before error occurred and update as needed.

3370 Condition 2: Permanent data check at 1 or 2 block addresses

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to attempt to copy data from track temporarily to another device. Use the following Device Support Facilities command sequence for **each** block. ANALYZE No Scan If Lastcc c 8 then Do INSPECT Block (rbn) - Check (1) - Assign - **Preserve** If Lastcc = 8 then INSPECT Block (rbn) - Check (1) - Assign - **No Preserve** End	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INSPECT. Preserves data if it can be read. Checks surface of blocks. If defect confirmed, flags defective block and assigns alternate block. If data was preserved, restores data.	If "Suspected Drive Problem" message, call service representative for possible hardware problem. If INSPECT executed, do the following. If data was preserved, eliminate temporary copy, If not preserved, restore from temporary copy, or from copy created before error occurred and update as needed.

3370 Condition 3: Temporary data checks with 1 to 10 block addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to copy data from tracks, temporarily to another device. Use the following Device Support Facilities command sequence for **each** block. ANALYZE No Scan If Lastcc c 8 then INSPECT Block (rbn) Check (1) - Assign - **Preserve**	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INSPECT. If data can be preserved, checks surface of blocks. If defect confirmed, flags defective block and assigns alternate block. Restores data.	If "Suspected Drive Problem" message, call service representative for possible hardware problem. If INSPECT executed, do the following. If data was preserved, eliminate temporary copy. If data could not be preserved, you may wish to try INSPECT with No Preserve.

3370 Condition 4: Temporary data checks with no block addresses (block numbers).

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to copy data from volume temporarily to another device. Use Device Support Facilities ANALYZE No Scan If Lastcc c 8 then INIT Check (3)	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INIT. Checks the surface of all blocks. If defect confirmed, flags defective block and assigns alternate block. Rewrites volume label and VTOC.	If "Suspected Drive Problem" message, call service representative. If INIT executed, restore data from temporary copy.

3370 Condition 5: Permanent data checks at 11 or more block addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Call hardware service representative		

3370 Condition 6: Temporary data checks at 11 or more block addresses.

Your Action	Device Support Facilities Actions	Your Response to Device Support Facilities Action
Use appropriate utility or program to copy data from volume temporarily to another device. Use Device Support Facilities ANALYZE No Scan If Lastcc c 8 then INIT Check (3)	Exercises hardware. If ANALYZE test detects hardware problem, issues diagnostic message, "Suspected Drive Problem." If ANALYZE test does not detect hardware problem, executes INIT. Checks the surface of all blocks. If defect confirmed, flags defective block and assigns alternate blocks. Rewrites volume label and VTOC.	If "Suspected Drive Problem" message, call service representative. If INIT executed, restore data from temporary copy.