



This Newsletter No. GN26-0373
Date March 1983
Base Publication No. GA26-1675-0
File No. S/370-07, 4300-07
Previous Newsletters None

IBM Disk Storage Management Guide, Background Reference Information

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

3, 4
31, 32

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

Summary of Amendments

1. Correction to Figure 1: Example of Possible Channel and String Switches.
2. Correction to Figure 7: Summary of Subsystem and System Handling of Data Checks.

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

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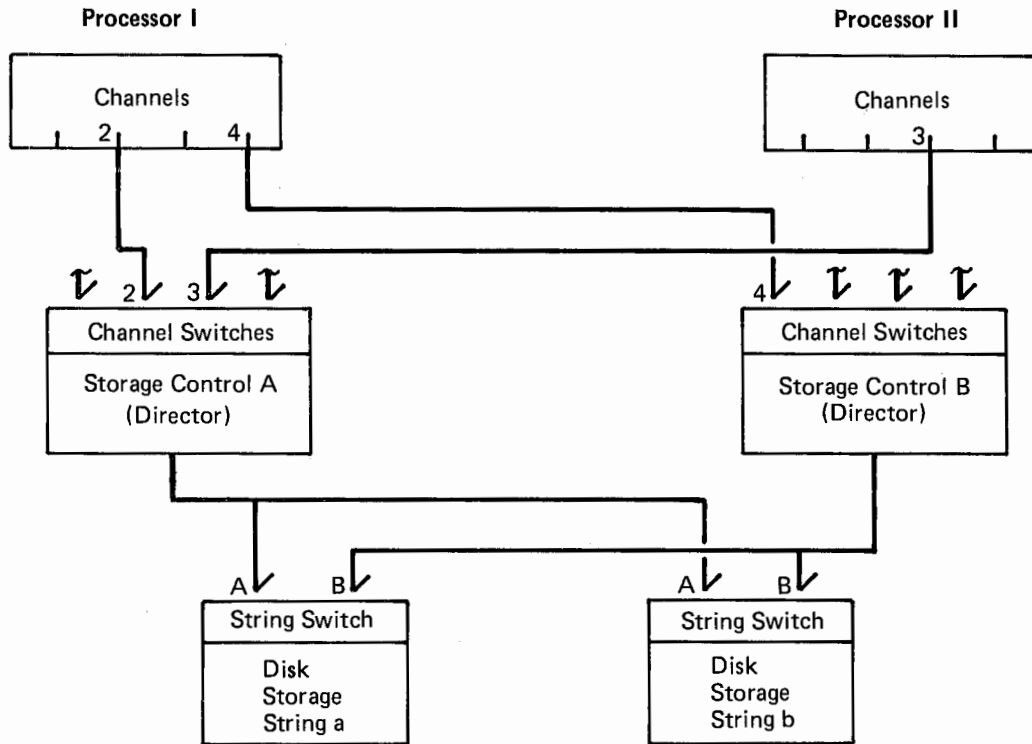


Figure 1. Example of Possible Channel and String Switches

Control of Availability

Disk storage and the path components are made available for system selection, or removed from availability, by system operator commands, or in some cases, by switches at a separate controlling console. Commands for OS/VS are the VARY Online or Offline commands; for DOS they are the DEVICE Up or Down commands.

When channel or string switches are installed, there are enable and disable switches on the storage control and disk storage unit control panels or at a remote control panel. There is a switch for each channel that can potentially be switched to the storage controls or for each storage control that can potentially be switched to the string. A switch must be set in the enable position to allow the storage control or string controller to be made available for selection by system console commands. More than one switch can be in the enable position but only one at a time can be selected and active. Use of system operator commands to control availability of a disk storage device also depends on the manual setting of switches at unit control panels.

Request and Response

Traditionally the same path (through the same components) is used to send a response from the disk storage as was used to send the request to disk storage. Recently it has become possible to respond over the first available channel of the processor, if there is the required system support. (For example, this has been announced as dynamic reconnection for a 3380 Model AA attached to a 3081 processor, using System 370/Extended Architecture.)

Device Reserve

A disk storage device can be reserved for the exclusive use of one channel or a group of channels. Reservation and release are controlled by channel commands.

Simultaneous Transfer

Some of the newer subsystems permit transfer over two paths to the same string at the same time, as long as the transfer is to different devices in the string. This is possible for 3375 and 3380 disk storage that have two controllers (attached to two different 3880 storage directors and channels). In these cases, two paths can simultaneously perform transfer type operations.

Counting and Logging

There are two logs that may contain information about disk storage errors. These are the subsystem log and the system log.

Subsystem Log

A buffered log is kept in the storage control for each disk storage that attaches to it.

The log contains counts of the seeks made, the bytes read, and overruns.

For some devices, counts of data checks and seek checks are also kept. For the 3330 and 3370, counts are kept of all data checks and seek checks. For the 3350, counts are kept of retried data checks and seek checks. For the 3340, no count is kept of data nor seek checks. For the 3375 and 3380, seek checks and data error rates are calculated but the error counter values are not sent to the system. The subsystem detects the occurrence of an excessive number of temporary errors and causes logging of complete sense information for a specified number of subsequent errors.

When a counter is filled, the subsystem interrupts the system and sends the contents of *all* the counters for that device to the system. The counters are then reset to zeros. The content of the counters may also be obtained directly by the system by issuing a channel command to read the buffered log. This also causes all of the counters to be reset to zero.

System Log

Records of error and error usage information are stored in the system log as error recording data sets (ERDS). The information is stored in SYS1.LOGREC by OS/VS and in SYSREC by DOS. Much of the information stored in the log is supplied by the storage control as sense information.

For logging purposes, the system processes the sense information to produce the set of log records and adds information regarding the results of recovery actions.

Two types of records contain information about disk storage. Both are based on sense information supplied by the subsystem.

- Outboard Record (OBR) - contains error description (including record address) for each error situation
- Miscellaneous Data Record (MDR) - contains usage and error counts

The I/O address used for selection also is stored in the log.

These records stored in the system log are available to various programs that use the information for analyzing error situations and usage.

The Environmental Recording, Editing, and Printing (EREP) program prints error reports based on information it obtains from the system error log.

When an error is entered in the system log, the cylinder and head numbers at which the error occurred are available, because these locations are contained in the sense information.

Summary Tables by Device Type

Temporary Data Errors - Count, Key, and Data

		3330 and 3333	3340 and 3344	3350	3375 and 3380
HA, Count, Key Areas		Data checks corrected with ECC or recovered with retry, with and without offset, by subsystem in HA, count, and key areas. Logged when in logging mode. ¹	Data checks recovered with retry by system in HA, count, and key areas. Logged.	Data checks recovered with retry by subsystem in HA, count, and key areas. Logged when in logging mode. ¹	Data checks corrected with ECC or recovered with retry, with and without offset, by subsystem in HA, count, and key areas. Logged when in logging mode. ²
	Data Area	Data checks corrected with ECC by system or recovered with retry, with and without head offset, by subsystem in data area. Logged when in logging mode. ¹	Data checks corrected with ECC or recovered with retry by system in data area. Logged.	Data checks corrected with ECC by system or recovered with retry, without offset, by subsystem in data area. Data checks in data area corrected with ECC are logged. Data checks recovered with retry are logged when in logging mode. ¹	Data checks corrected with ECC by system or recovered with retry, with and without offset, by subsystem in data area. Logged when in logging mode. ²
Notes:					
1. Logging begins when the data error counter for the volume overflows or when logging is forced. Logging continues for the next four data checks for the drive. Use of head offset with retry is not reported.					
2. Logging begins when the data error rate threshold for the volume is exceeded. Logging continues after this first log for another 23 data checks (without offset) for the string. Use of offset with retry is always reported.					

Permanent Data Errors - Count, Key, and Data

		3330 and 3333	3340 and 3344	3350	3375 and 3380
HA, Count, Key Areas		Data checks in HA, count, and key areas not corrected with ECC nor recovered with retry by subsystem. Logged.	Data checks in HA, count, and key areas not recovered with retry by system. Logged.	Data checks in HA, count, and key areas not recovered with retry by subsystem. Logged.	Data checks in HA, count, and key areas not corrected with ECC nor recovered with retry by subsystem. Logged.
	Data Area	Data checks in data area not corrected with ECC by system nor recovered with retry by subsystem. Logged.	Data checks in data area not corrected with ECC nor recovered with retry by system. Logged.	Data checks in data area not corrected with ECC by system nor recovered with retry by subsystem. Logged.	Data checks in data area not corrected with ECC nor recovered with retry by subsystem. Logged.
Note: When executing a Read Multiple Count, Key, and Data command, the above described procedures apply to the first record read. If errors are detected when reading subsequent records, unit check status is sent. The system retries the operation 10 times, attempting to read the data correctly. If this fails, a system console message is issued and a permanent data error is logged.					

Figure 7. Summary of Subsystem and System Handling of Data Checks - By Disk Storage Type for Count, Key, and Data Devices