



Device Support Facilities:

GC26-4498-2

**Primer for the User of IBM 3380 and 3390
Direct Access Storage**

Release 11





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| **Third Edition (July 1989)**

| This edition replaces and makes obsolete the previous edition, GC26-4498-1.

| This edition applies to Release 11 of Device Support Facilities, and to any subsequent releases until otherwise indicated in new editions or technical newsletters.

Changes are made periodically to this publication; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370, 30xx, 4300, and 9370 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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Preface

This publication is intended to help you install, use, and maintain the DASD subsystem. It contains overviews of ICKDSF commands which can be used for problem determination and media maintenance. This publication provides no programming interfaces.

The publication is for individuals who are responsible for the proper installation, use, and maintenance of the DASD subsystem in the data processing complex. Its intent is to provide the reader with an understanding of the Device Support Facilities product (ICKDSF) and its use and capabilities with the IBM 3380 and 3390 family of direct access storage devices. This manual assumes that the reader is running Device Support Facilities Release 11.

The scope of this publication is the device installation, problem determination, and media maintenance functions of Device Support Facilities. The overviews of certain ICKDSF commands that are provided should not be viewed as an in-depth explanation of all of the functions and capabilities of the Device Support Facilities product. This document assumes that the reader has some familiarity with the Device Support Facilities product, its uses, and syntax.

It is important to read the "Introduction" on page 1 before proceeding to the remainder of the manual, which is organized as follows:

"Part 1. The Character of Data Checks" on page 3 contains general information on the meaning of data checks.

"Part 2. Device Support Facilities Functions" on page 7 describes ICKDSF commands and parameters that are necessary for installation, problem determination, and media maintenance on the IBM 3380 and 3390 family of DASD. There is a description of not only what each command does, but also what to expect when command processing completes.

"Part 3. Using Device Support Facilities" on page 15 describes the recommended circumstances for using the commands and parameter combinations explained in Part 2.

This manual is intended for use in conjunction with the following related publications:

- *Device Support Facilities Users Guide and Reference Manual*, GC35-0033, for complete information on ICKDSF
- *Maintaining IBM Storage Subsystem Media*, GC26-4495, for information on 3380 and 3390 error conditions and the complete set of guidelines for performing media maintenance
- *Environmental Record Editing and Printing Program User's Guide and Reference*, GC28-1378, for detailed information on the System Exception Reports.

Summary of Changes

Release 11, July 1989

New Device Support

A new device, the IBM 3390, is now supported by Device Support Facilities. Information to support the new device has been included in this edition.

The INSTALL command has a new parameter, SETMODE, which allows you to change the mode to 3390 mode or 3380 track compatibility mode on the IBM 3390.

Release 10, July 1988

INSTALL Command Support

A new command, INSTALL has been added to Device Support Facilities. This command performs the procedures necessary for installation, head-disk assembly (HDA) replacement, and physical movement of IBM 3380 DASD.

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Introduction

The ability of your data processing complex to meet the needs of your business requires immediate and successful access to your data. This is dependent upon the ability of your storage subsystem to store and retrieve data accurately.

When you consider the number of I/O operations that move data to and from your DASD along multiple channels through multiple paths, the total number of bytes transferred in the course of a day is astronomical and increasing!

In accessing data, the vast majority of DASD I/O operations complete quickly and successfully.

Given the enormous number of bytes transferred and the increasing I/O workload, there is a growing probability that a bit or two could be transmitted incorrectly. For this reason, increasingly sophisticated methods have been developed to provide immediate detection and correction for these bits, and thus allow the data to flow to the user accurately and uninterrupted.

The methods are collectively known as error recovery procedures. Error recovery procedures are automatic; they are built into the hardware and software to correct the situation and maintain efficient and successful operation. Error recovery procedures are transparent to your processing and always there as needed to maintain smooth operation, just as a thermostat ensures a steady temperature.

Every processing complex has different data and places varying demands and requirements on the DASD. The information in this publication is provided to help you, in the unlikely event that your DASD is causing the error recovery procedures to be invoked more often than expected. The considerations covered in this manual are similar to the gages and indicators on your automobile; they can help you understand when you need to take preventive action.

This publication is a guide for preventive action procedures performed with the Device Support Facilities product and for preparation procedures when new DASD is installed. It is provided for members of the processing complex staff who are responsible for proper use and maintenance of DASD resources.

Although the need for media maintenance is rare, you can perform this activity without the assistance of a service representative and with minimum impact to your current processing environment.

Part 1. The Character of Data Checks

A data check is an error detected in the bit pattern read from the disk. Some data checks are caused by hardware and require the assistance of an IBM service representative. Some are caused by the recording media and can be handled by using ICKDSF functions. Others are random events that require no action.

Causes of Data Checks

A data check can occur as a result of:

- A defect on the surface of the media
- An error when writing the data
- A hardware error when reading the data
- A random event.

Data Check Repeatability

Every data check has a certain degree of repeatability. The repeatability determines the probability of an error being detected for any given read. For example, if a data check is 1% repeatable, 99 times out of 100 the data is read error-free. Conversely, if a data check is 99% repeatable, 1 time out of 100 the data is read error-free.

Data Check Visibility

Data checks can be caused by defects smaller than the area of a single bit on the surface of the media. Since these defects are so small, data that is rewritten has the potential to “straddle” the defect and prevent subsequent reads from detecting the presence of the defect.

The percentage of time that a data check is detected after multiple writes determines its visibility.

Attributes of Data Checks

Correctable versus Uncorrectable

When data is written, check bytes are recorded along with the data in order to enable data check detection and correction. These check bytes are called Error Checking and Correcting (ECC) bytes. Along with the ability to detect the data check, these bytes may provide sufficient information to reconstruct the data in error. When this reconstruction occurs, the data check is **ECC-correctable**. ECC-correctable data checks are corrected either by the storage subsystem or by the operating system Error Recovery Procedures (ERPs).

The Character of Data Checks

When the ECC bytes are insufficient to reconstruct the data, the data check is **ECC-uncorrectable**. In this case, the operating system and/or storage subsystem will invoke other data recovery procedures in an attempt to read the data correctly, as explained below in "Temporary versus Permanent."

The Enhanced Subsystem models have more comprehensive Error Checking and Correcting bytes than previous IBM 3380 models.

Temporary versus Permanent

In the event that an ECC-uncorrectable data check occurs, either the subsystem or the system executes a series of recovery attempts below the application level.

Temporary Data Checks

A data check is temporary if subsystem or system error recovery procedures are successful. A temporary data check is only seen by the system, and is never returned to the application.

Offset Recovery: As part of the recovery process, the subsystem can attempt to read the data by offsetting the access mechanism in order to read to the left and to the right of the track center. If this offset process results in a successful read of the data, a temporary data check is recorded in the Error Recording Data Set (ERDS) to indicate that offset was invoked.

Permanent Data Checks

The term *permanent data check* has meaning from two different perspectives.

- System View of a Permanent Data Check

From the system perspective, a data check is permanent if error recovery procedures performed by the system or subsystem at the time the error occurred cannot successfully recover from the error condition.

- Application View of a Permanent Data Check

A data check is permanent from an application perspective if an error condition must be returned to the application, indicating unsuccessful completion of the I/O request. The application is then responsible for determining how to deal with the error.

As an example, a data check might be caused by a path error. That data check is permanent to the system, and is recorded in the ERDS as a permanent path error. However, when system error recovery procedures retry the read from an alternate path, the data is read successfully. The application program is not notified of the error, so the error is not permanent to the application. On the other hand, if the system error correction activity is not successful, the data check is permanent from both the system and application points of view.

Throughout this document, a permanent data check refers to permanent data checks from the system view, unless otherwise noted.

Data Check Considerations

Permanent data checks are always recorded in the ERDS. Temporary data checks (including ECC-correctable data checks) may be recorded in the ERDS when conditions indicate the potential for causing a performance impact in your environment.

Customer action must be taken for permanent data checks. Action should be considered for those temporary data checks that are affecting application or system performance.

The remaining parts of this manual are provided as a guide to Device Support Facilities, as it relates to the operations and procedures necessary in determining when and what action must be taken for initializing volumes and handling any data checks encountered during use.

Part 2. Device Support Facilities Functions

The Device Support Facilities product (ICKDSF) is provided for use by the customer to perform various functions needed for installation, use, and maintenance of IBM DASD.

Given the versatility of ICKDSF and the fact that it operates on all models of IBM DASD, there are many combinations of parameters that are device-specific. Presented here are those commands and parameters required when using the IBM 3380 and 3390 family of DASD. For information on when and why to use these commands, see "Part 3. Using Device Support Facilities" on page 15.

General Information

Device Support Facilities consists of various commands, with multiple parameters associated with each command to tailor it for a specific operation. Discussed here are the following commands:

- ANALYZE
- INSPECT
- INIT
- INSTALL

Only applicable parameters of each of these commands are discussed. Defaults are mentioned only when meaningful to the discussion.

Device Support Facilities operates on one device at a time. All commands require that a device be specified. This is done using the UNIT, DDNAME, or SYSNAME parameter, depending upon your environment and the disposition of the DASD. Device specification is not included in the discussions that follow.

Commands can be conditionally combined into one ICKDSF invocation by use of the IF-THEN-ELSE capabilities. As an example, you can run an INIT (initialize) and follow it with an ANALYZE only if the INIT is successful, as follows:

```
INIT UNIT(ccuu) NOVFY VALIDATE DATA VOLID(volser)
IF LASTCC < 8 THEN -
  ANALYZE UNIT(ccuu) DRIVETEST SCAN
```

For details on command syntax, see *Device Support Facilities Users Guide and Reference Manual*.

The ANALYZE Command

The ANALYZE command is used to examine a device and/or the data on a volume to help determine the existence and the nature of errors. There are two parts to the command, the drive test (invoked by the DRIVETEST parameter) and the scan (invoked by the SCAN parameter). DRIVETEST and SCAN can be invoked independently or together.

Running ANALYZE DRIVETEST

How ANALYZE DRIVETEST Works

DRIVETEST performs fundamental tests to ensure that device hardware can perform basic operations, such as seeks, reads, and writes. DRIVETEST is not disruptive to user operation.

How to Use ANALYZE DRIVETEST

You invoke DRIVETEST by specifying:

```
ANALYZE UNIT(ccuu) DRIVETEST
```

DRIVETEST parameter: Is the default when the ANALYZE command is invoked.

What to Expect from ANALYZE DRIVETEST

A specific invocation of DRIVETEST produces one of two basic messages. One indicates that no drive problems were found. The other indicates a "Suspected Drive Problem."

A "Suspected Drive Problem" message means that an error condition has been detected and that you need to call a service representative.

Additional information contained in the ANALYZE output is provided to supplement the information used in the problem determination process. It is important to save this output and provide it to the service representative to aid in resolving the situation. No data is recorded in the ERDS during ANALYZE DRIVETEST processing.

Your service representative might ask for additional ICKDSF functions to be run as part of the repair process.

Running ANALYZE SCAN

How ANALYZE SCAN Works

SCAN reads data that currently exists on a volume.

If SCAN reads the data successfully the first time, no further rereading of the track takes place.

If a data check is detected on the first read, further reads of the data are issued to establish that the data check is not a random occurrence and that a message should be reported for the track.

Data is read with subsystem and error recovery processes disabled to allow SCAN to identify all data checks. Data is never recorded in the ERDS during ANALYZE SCAN processing. SCAN has no affect on user data on the volume.

How to Use ANALYZE SCAN

SCAN is invoked by specifying:

```
ANALYZE UNIT(ccuu) SCAN
```

SCAN parameter: Initiates the scan function and must be specified.

Defaults and Optional Parameters:

- Limits can be placed on the area of data that is scanned by using the range parameters (TORANGE, FROMRANGE, CYLRANGE, HEADRANGE, LIMITS). ALL is the default limit parameter if SCAN is specified, as shown in the sample provided.
- SPEED can be specified to read an entire cylinder with each I/O. Caution is advised when using the SPEED option when other activity is heavy on the channel, because performance on the channel may be degraded. NOSPEED, the default, reads one track at a time, and was defaulted in the syntax shown.
- The sample invocation provided for ANALYZE SCAN will first perform the drive test function, since DRIVETEST is also defaulted. The drive test can be bypassed by specifying NODRIVETEST.

What to Expect from ANALYZE SCAN

Scan presents messages to indicate that the error is either "correctable" (ECC-correctable) or "uncorrectable" (ECC-uncorrectable). SCAN cannot distinguish between temporary and permanent data checks because it operates with all levels of recovery disabled. An uncorrectable data check message is **not** an indication that the error would be permanent to the application when the data is accessed during normal processing and recovery procedures are in effect; for example, the data may be read using the offset recovery process.

Sense information is provided for use by the service representative in the event that a "Suspected Drive Problem" message is also presented. It may be different from sense information in the ERDS and/or from operator console messages.

In addition to specific track messages, a head table is presented indicating which heads have experienced an error.

Notes on Invocations of SCAN

A data check must be detected the first time a track is read in order for further analysis of the track to take place. Any low repeatability data check can be detected on any given SCAN. Therefore, the following conditions may occur:

- Multiple runs of SCAN can produce messages regarding different tracks. (Data checks occurring as a result of additional runs are likely to be low repeatability data checks.)
- Tracks that are known to have experienced data checks may not be reported by ANALYZE SCAN.

ANALYZE SCAN contains logic to monitor data check information, and can produce a "Suspected Drive Problem" message when needed. It is important to save all output and provide it to the service representative to aid in resolving the situation.

The INSPECT Command

The INSPECT command is used for two primary purposes with the IBM 3380 and 3390 family of devices:

- Surface checking a track
- Rewriting data.

General Usage Notes for INSPECT

For DASD which is not attached to an IBM 3990, customer workload scheduling must allow ICKDSF exclusive control of the track being processed. The INSPECT command uses data protection mechanisms available for each operating environment, and it locks out other processors if the DASD is shared. However, the INSPECT command cannot guarantee ICKDSF exclusive access to any particular track from the same processor.

If your DASD is attached to an IBM 3990, concurrent media maintenance can be performed. This allows user access to the data on a track while INSPECT is processing on that track.

Either VERIFY or NOVERIFY must be specified for every invocation of the INSPECT command. VERIFY provides additional control to ensure that the existing volume serial number and/or owner identification on the volume are correct. NOVERIFY bypasses this checking, and is used in all sample invocations of INSPECT shown here.

Surface Checking a Track with INSPECT

Most media related data checks are the result of a small defective area on the surface of a track. This area can be "skipped" over by the DASD subsystem, and is referred to as a skip displacement. When a skip displacement is assigned to a track, data written on that track straddles the displaced location. Area reserved at the end of the track is employed to replace the skipped area, and the track capacity remains constant. Each track can have a maximum of seven skip displacement areas.

Skip displacement processing has been designed to detect and skip displace all locations that are determined to have the potential of causing a data check. The skip displacement algorithm is extremely sensitive. In fact, skip displacements may be assigned to locations that were not experiencing data checks.

Skip displacements are not necessarily an indication that normal running conditions would encounter any data checks. More important, they are not an indication that an error site would be a detriment to the running of any application against user data on that track.

How INSPECT Works for Surface Checking

In order to reliably locate low repeatability, low visibility data checks, INSPECT performs multiple write and read operations on a given track.

ICKDSF surface checking is designed to detect all error sites which might produce uncorrectable or correctable data checks when user data is stored on the track. Up to seven skip displacements per track can be assigned for these error sites. If more than seven sites are detected for a track, an alternate track can be assigned.

How to Use INSPECT for Surface Checking

Surface checking is invoked by using the INSPECT command with the SKIP parameter:

```
INSPECT UNIT(ccuu) NOVERIFY SKIP TRACKS(cccc, hhhh)
```

SKIP parameter: Invokes the skip displacement surface checking.

TRACKS parameter: Specifies the track to be processed.

Defaults and Optional Parameters:

- PRESERVE is defaulted to ensure existing data is restored to the track when processing is complete. If PRESERVE is specified, and the track is exhibiting permanent data checks that prevent the successful reading of the data, no processing is done on the track. In that case, INSPECT can be rerun specifying NOPRESERVE to skip displace the permanent data check location. **NOPRESERVE erases the data on the track.** If NOPRESERVE is used, the data on the track must be restored using recovery procedures for your computing complex.
- The CHECK parameter is the default in the syntax sample shown. This ensures that surface checking procedures are in effect for this invocation.
- ASSIGN is a default in the sample shown and allows an alternate track to be automatically assigned if more than seven skip areas are required on the track.
- This sample invocation of INSPECT operates on one track. Multiple tracks can be specified in the same invocation.

What to Expect from INSPECT When Surface Checking

INSPECT prints a message about any track for which it assigns a skip displacement and/or assigns an alternate track. It also provides a summary of any currently assigned alternate tracks.

Skip displacement processing requires approximately one minute per track minimum. During this time, INSPECT is doing multiple writes and reads, and the track is unavailable for other use until processing on it completes.

Rewriting Data with INSPECT

How INSPECT Works for Rewriting Data

The INSPECT command can be used to read and rewrite the data on a track. Existing data is read from the track. The surface of the track is checked for high repeatability, high visibility error sites, and the data is rewritten to the track.

How to Use INSPECT to Rewrite Data

The rewrite data process is invoked by using the NOSKIP parameter on the INSPECT command:

```
INSPECT UNIT(ccuu) NOVERIFY NOSKIP TRACKS(cccc,hhhh)
```

NOSKIP parameter: Invokes primary surface checking.

TRACKS parameter: Specifies the track to be processed.

Defaults and Optional Parameters:

- PRESERVE is defaulted in the sample shown. It ensures the rewrite procedure.
- The CHECK parameter, which is defaulted in the sample, ensures that the rewrite checking procedure is invoked.
- This command sample shown operates on one track. Multiple tracks can be specified in a single invocation.

What to Expect from INSPECT When Rewriting Data

If an error site is detected during any part of the rewrite procedure, skip displacement processing is automatically invoked for the track. Processing for that track proceeds as if SKIP has been specified. (See "Surface Checking a Track with INSPECT" on page 10.)

INSPECT provides a summary of all the currently assigned alternate tracks.

The INIT Command

The INIT command, which performs the initialize function, always writes a volume label, a volume table of contents (VTOC), and other items required for using volumes in specific operating environments. These functions are referred to as **minimal** initialization. As a result, access to existing data through a previous VTOC is destroyed by INIT.

In addition, the INIT command can be used to rewrite the home address and record zero fields for all tracks on a volume. This process is called **medial** initialization, and includes all functions provided by minimal initialize.

General Usage Notes for INIT

Customer workload scheduling must allow ICKDSF exclusive control of the volume being processed. The INIT command uses data protection mechanisms available for each operating environment, and locks out other processors if the DASD is shared. However, the INIT command cannot guarantee ICKDSF exclusive access to the volume from the same processor.

Either VERIFY or NOVERIFY must be specified for every invocation of the INIT command. VERIFY provides additional control to ensure that the existing volume serial number and/or owner identification on the volume are correct. NOVERIFY bypasses this checking, and is used in all samples shown here.

Rewriting Home Address and Record Zero with INIT

How INIT Works at the Medial Level

INIT run at the medial level rewrites the home address and record zero on every primary and alternate track on the volume. **All other data on the volume is erased.** The minimal initialization processes are performed.

How to Use INIT at the Medial Level

Using the VALIDATE parameter with the INIT command invokes medial initialization:

```
INIT UNIT(ccuu) NOVERIFY VOLID(volser) VALIDATE NODATA
```

VALIDATE parameter: Forces the home address and record zero on every track to be rewritten.

NODATA parameter: Ensures that all tracks not formatted during minimal initialization contain only a home address and a standard record zero at the completion of processing.

Defaults and Optional Parameters:

- DATA can be specified instead of NODATA. This will write a full track of data on every track on the volume that is not formatted during minimal initialization. This data is a predefined pattern similar to the data that is used to certify the volume at the factory. The data is referred to as *factory functional verification data patterns* FFVDP. Note that previously existing data on the volume is erased.

What to Expect from INIT at the Medial Level

At the completion of processing, INIT provides a summary of the assigned alternate tracks. These alternates were already assigned when INIT processing began; no alternates are assigned or reclaimed as a result of a medial initialization.

Medial initialization takes from 15-60 minutes to execute, depending upon the capacity of the device. The run time is the same with and without the DATA option.

The INSTALL Command

The INSTALL command performs the procedures necessary for installation, head-disk assembly (HDA) replacement, and physical movement of IBM 3380 and 3390 DASD. It can be used when the validation functions of medial initialization are desirable.

The INSTALL command must be used for a mode change to either 3390 mode or 3380 track compatibility mode on the IBM 3390.

Using the INSTALL Command

The INSTALL command is used for volume preparation of the IBM 3380 and 3390 DASD. The command is an enhanced installation procedure which includes the writing of home address and record zero on every track on the volume.

How to Use INSTALL

The INSTALL functions are invoked by specifying the INSTALL command:

```
INSTALL UNIT(ccuu)
```

What to Expect from the INSTALL Command

The INSTALL command presents an indication that the installation procedures are complete and a minimal initialization should be run.

The INSTALL command takes about 12-60 minutes to execute, depending on the capacity of the device.

Note: After INSTALL command processing, the volume is not initialized for an MVS or VSE environment. Alternate tracks are reset and reassigned if necessary. You must perform a minimal initialization.

Part 3. Using Device Support Facilities

Device Support Facilities (ICKDSF) is a tool that must be used to support the installation, use, and maintenance of IBM direct access storage devices. Several scenarios that require the use of ICKDSF are presented here, along with information on when and how to use ICKDSF. The functions that ICKDSF performs are described.

Initializing and Preparing Volumes for Use

When Is Volume Initialization and Preparation Required?

When the service representative completes the physical installation process, the device must be initialized for use by the appropriate operating environment. In addition, volume preparation procedures are also performed after certain other events. The circumstances which require volume preparation include:

- Installation of a DASD unit
- Replacement of a head-disk assembly (HDA)
- Upgrading of an HDA
- Physical movement of a DASD unit to a new location.

How Is Volume Initialization and Preparation Performed?

Device Support Facilities initializes a volume for use by the operating system by means of the INIT command. Volume preparation procedures are performed by the INIT or INSTALL command. Additional optional functions are also discussed here.

Volume preparation procedures are:

- Required for IBM 3390.
- Required for IBM 3380 Models AJ4, BJ4, AK4, and BK4
- Recommended for IBM 3380 Models AE4 and BE4
- Optional for all other IBM 3380 models models.

INIT Command

The INIT command writes a volume label and a VTOC on the device. It optionally writes other items that are needed by a specific operating environment (for example, IPL text). This collection of functions is called a **minimal initialization** and performs volume initialization.

In addition to all the functions of minimal initialization, the INIT command can perform volume preparation functions by rewriting the home address and record zero for all tracks on the volume. This process, together with minimal initialization functions is called **medial initialization**. Medial initialization can be used to perform volume preparation procedures for all 3380 and 3390 models.

Note: The INSTALL command provides an alternative for the volume preparation functions performed by the medial level of the INIT command. See "INSTALL Command" on page 16 for information on INSTALL.

NODATA Option: NODATA is the default and ensures that all data (other than home address and record zero) is erased from each track on the volume.

DATA Option: DATA can be specified to recreate FFVDP on all tracks on the volume. This option should be invoked if the user intends to follow the INIT process with ANALYZE SCAN.

For additional information see "The INIT Command" on page 12.

INSTALL Command

The INSTALL command can be used to perform volume preparation for all 3380 and 3390 models.

The INSTALL command does the volume preparation functions of a medial initialization. It also performs additional testing to help ensure proper operation of the DASD in a user environment.

Note: After INSTALL command processing completes, all data on the volume is erased and you must perform a minimal initialization to use the volume in an MVS or VSE environment.

The INSTALL command must be used for a mode change to either 3390 mode or 3380 track compatibility mode on the IBM 3390.

The INIT command at the medial level also performs volume preparation. See "INIT Command" on page 15 for more information on the INIT command.

ANALYZE SCAN Command

Procedures at your computing complex can include running ANALYZE SCAN as an additional verification that the device is functioning as expected. Note that if this option is run following a medial initialization with the NODATA option, the only fields being scanned are the home addresses and record zeros.

If ANALYZE SCAN is run, you may see data checks reported. INSPECT SKIP should be run to surface check any track(s) on which ANALYZE reports a data check.

Subsequent runs of ANALYZE SCAN may detect low repeatability data checks. These data checks will have no noticeable affect on the performance of your DASD, and can be ignored.

In the unlikely event that ANALYZE detects a suspected drive problem, contact the service representative immediately.

See "The ANALYZE Command" on page 7 and "The INSPECT Command" on page 10.

Performing Media Maintenance

When Is Media Maintenance Required? (Use of EREP)

The Environmental Record and Editing Printing Program (EREP) System Exception Reports are essential tools for determining the need to perform media maintenance. The EREP Subsystem Exception DASD report provides information needed for making decisions about *when* to perform media maintenance, and the DASD Data Transfer Summary Report supplies information on *where* media maintenance is required.

The Storage Subsystem Library manual, *Maintaining IBM Storage Subsystem Media*, provides a detailed set of guidelines for interpreting the System Exception Report output.

In general, when the "Probable Failing Unit" specified on a System Exception Report is "volume," media maintenance is required for the following kinds of conditions:

- Tracks that have experienced permanent data checks
- Tracks with temporary data checks where offset has been invoked
- Tracks with temporary data checks, especially those on which a data check has occurred more than once.

To confirm that the failing component is the media and not the device hardware, run ANALYZE DRIVETEST before performing media maintenance. In some instances, it may be beneficial to supplement System Exception Report data by running ANALYZE SCAN.

ANALYZE SCAN collects data from the volume and can report information about data checks for tracks that were not necessarily accessed during the time the System Exception Report data was collected.

This data is especially useful in cases such as these:

- A volume is experiencing permanent data checks.
- Data checks follow a pattern; for example, they are clustering around a single head.

Media maintenance can be done for tracks reported by ANALYZE SCAN in accordance with the same guidelines established for tracks recorded in the DASD Data Transfer Summary Report.

How Is Media Maintenance Performed? (Use of ICKDSF)

In general, the INSPECT command is used for all media maintenance. The INIT command at the medial level is used when offset has been invoked for three or more tracks.

Using INSPECT for Media Maintenance

When media maintenance is required for a track, INSPECT SKIP should be run to ensure the detection of all low repeatability, low visibility defects. A skip displacement will be assigned for all defects on the surface of the media.

The INSPECT SKIP processing also eliminates those data checks that were caused by hardware errors during writing or reading (assuming no hardware repair action was required, or has already been performed).

If your DASD is not attached to the IBM 3990, during high-activity workload periods it may not be acceptable for a track to be unavailable for the time required to run INSPECT SKIP. In those cases, you can rewrite data with INSPECT NOSKIP and then schedule INSPECT SKIP for a later time, if necessary. This rewriting process provides for possible straddling of small defects, and it also eliminates those data checks that were caused by hardware errors during writing or reading (assuming no hardware repair action was required, or has already been performed).

If your DASD is attached to an IBM 3990, concurrent media maintenance is available which allows user access to the data while INSPECT is processing on that track.

Using INIT for Media Maintenance

When offset has been invoked for three or more tracks on a volume, a medial initialization is necessary. All user data on the volume is erased. The data must be saved and restored according to the procedures for your computing complex.

The NODATA option is sufficient for correcting the situation.

Summary Notes on Media Maintenance

It is important to keep the following considerations in mind:

- If your DASD is not attached to an IBM 3990, customer workload scheduling must allow ICKDSF exclusive control of the track being processed. ICKDSF uses data protection mechanisms available for each operating environment, and locks out other processors if the DASD is shared. However, command execution cannot guarantee ICKDSF exclusive access to any particular track from the same processor. Some media maintenance activity might require scheduling during a period when the system load is light, to diminish contention for the volume.

If your DASD is attached to an IBM 3990, concurrent media maintenance can be performed. This allows user access to the data on a track while INSPECT is processing on that track.

- If skip displacement processing is performed on a track and an error recurs on that track at a later date, the assistance of a service representative is necessary. The skip displacement process can be performed multiple times, if required.
- A medial initialization erases all data on the volume. The data must be saved and restored according to the procedures for your computing complex.

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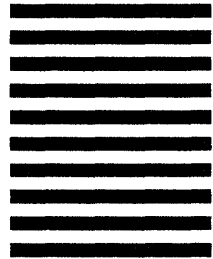


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