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PUBLICATIONS REVISION

General

8407 Diskette Drive

Reference

UP-8921 Rev. 1

This Library Memo announces the release and availability of "SPERRY® 8407 Diskette Drive Reference", UP-8921 Rev. 1.

This revision adds new information on Incorrect Length Indication to the operating sequence section. Five new diagnostic commands have been added to the command repertoire section. In addition, minor technical changes have been made to Sections 2 and 3.

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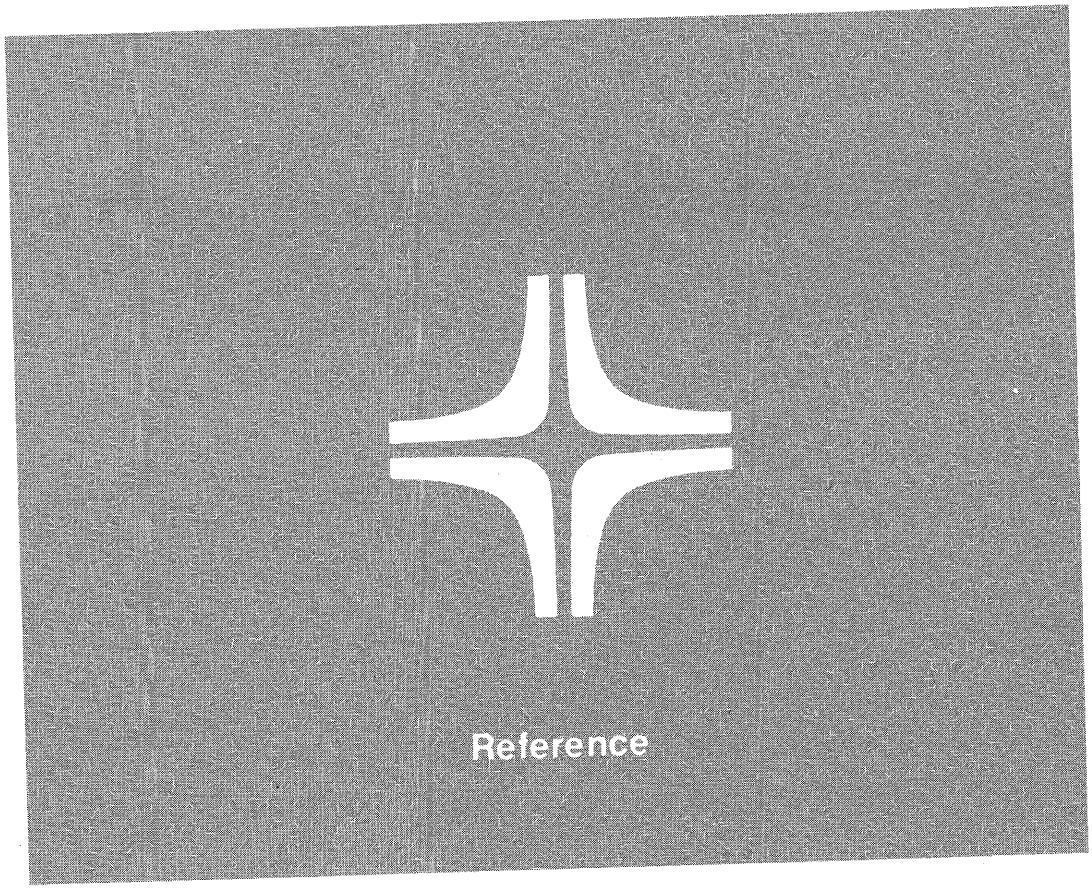
8407 Diskette Drive



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1. Introduction

This manual provides the programmer with basic information to aid in the programming and general understanding of the SPERRY 8407 diskette drive (Figure 1-1) from the hardware point of view. Description of the hardware includes the diskette characteristics, configurations, drive unit components, and operating sequences. Programming information, which is limited to control and diagnostic byte structures, includes a description of all commands and status and sense bytes, along with procedures required for operation and diagnostic purposes.

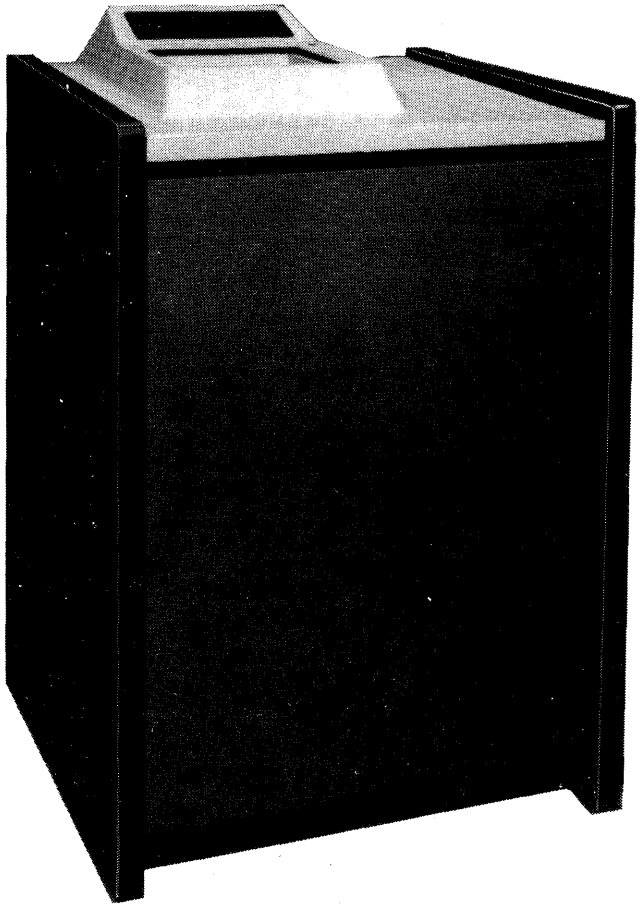


Figure 1-1. SPERRY 8407 Diskette Drive

2. Description

2.1. GENERAL

The 8407 diskette drive is a freestanding, autoloader diskette drive unit. It is an external direct-access storage device having a self-contained diskette drive with removable, interchangeable diskettes acting as the storage media for online and offline operations. Each diskette:

- mounts into the diskette drive mechanism;
- rotates at a speed of 360 revolutions per minute; and
- has a maximum gross data storage of 499,200 bytes per diskette side using the double-density recording format.

The diskette drive can read, write, and initialize multiple diskettes of the type conforming to both SPERRY and IBM standards. The drive can handle up to 20 single- or double-sided diskettes with its recording format in either single (FM) or double (MFM) density.

2.2. CHARACTERISTICS

Table 2–1 lists the functional characteristics of the diskette drive.

Table 2—1. Functional Characteristics

Item	Characteristic
Drive mechanisms per cabinet	1
Data read/write heads per drive mechanism	2
Bytes per sector	128, 256, 512
Sectors per track	26, 15, 8
Density in bits per inch	3400/6800
Physical tracks per diskette side	77
Tracks per inch	48
Data bytes per diskette side:	
– Single density (FM)	249,600
– Double density (MFM)	499,200
Access time:	
– Track-to-track	3 milliseconds (step time)
– Head settling	15 milliseconds (step settle time)
– Head loading	50 milliseconds
Read data rate	Up to 8125 records per minute
Write data rate	Up to 4345 records per minute
Average latency time	83.33 milliseconds
Diskette rotational speed	360 revolutions per minute normal (166.7 milliseconds per revolution)

2.3. CONFIGURATION

The configuration for the 8407 diskette drive is illustrated in Figure 2–1. The basic 8407 diskette drive unit contains one autoloader mechanism, power supply, power control, microprocessor controller control panel, and frame and casework.

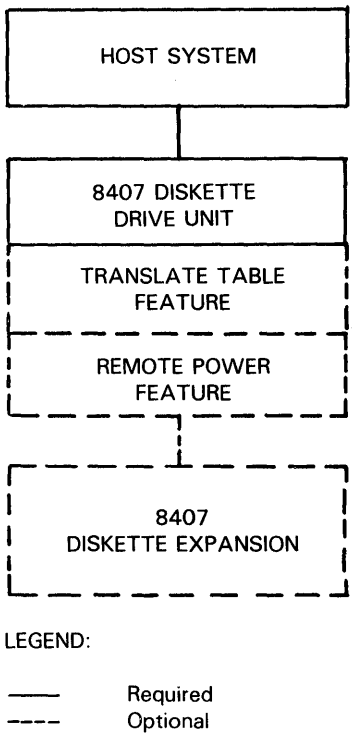


Figure 2–1. 8407 Diskette Drive Configuration

2.3.1. Standard and Special Features

Table 2–2 lists the standard and special features available with the 8407 diskette drive.

Table 2–2. 8407 Diskette Drive Standard and Special Features

Item	Description
8407 Diskette Drive Unit	Freestanding drive unit that consists of one 60-Hz diskette drive mechanism, one autoloader mechanism, power supply, power control, microprocessor controller, frame and casework. The autoloader can process either single- or double-sided diskette media in either single (FM) or double (MFM) density, supporting both SPERRY and IBM formats.
8407 Diskette Expansion	Provides an additional autoloader drive, frame, and casework. The necessary controller logic and power are controlled by the 8407 diskette drive.
Translate Table Feature	Provides user-loadable, 512-byte RAM that is used by the 8407 diskette drive to translate inbound and outbound data to the code that is loaded into the RAM.
Remote Power Feature	Allows dc power to be controlled from the host processor.

2.4. COMPONENTS

2.4.1. Diskette Media

A typical diskette medium is shown in Figure 2–2. It is a removable and interchangeable magnetic storage unit that consists of a single flexible disk enclosed in a jacket. One version of the media permits recording only on one side of the disk, while a second version permits recording on both sides of the disk. The disk contains 77 recording tracks per side, with each track being divided into 26, 15, or 8 sectors. The tracks are numbered 0 to 76, with track 0 being designated the outermost track. Typically, track 0 is reserved for labels, and tracks 1 through 74 are used to store data. Tracks 75 and 76 are used as alternate data tracks where there are defective tracks in the data area.

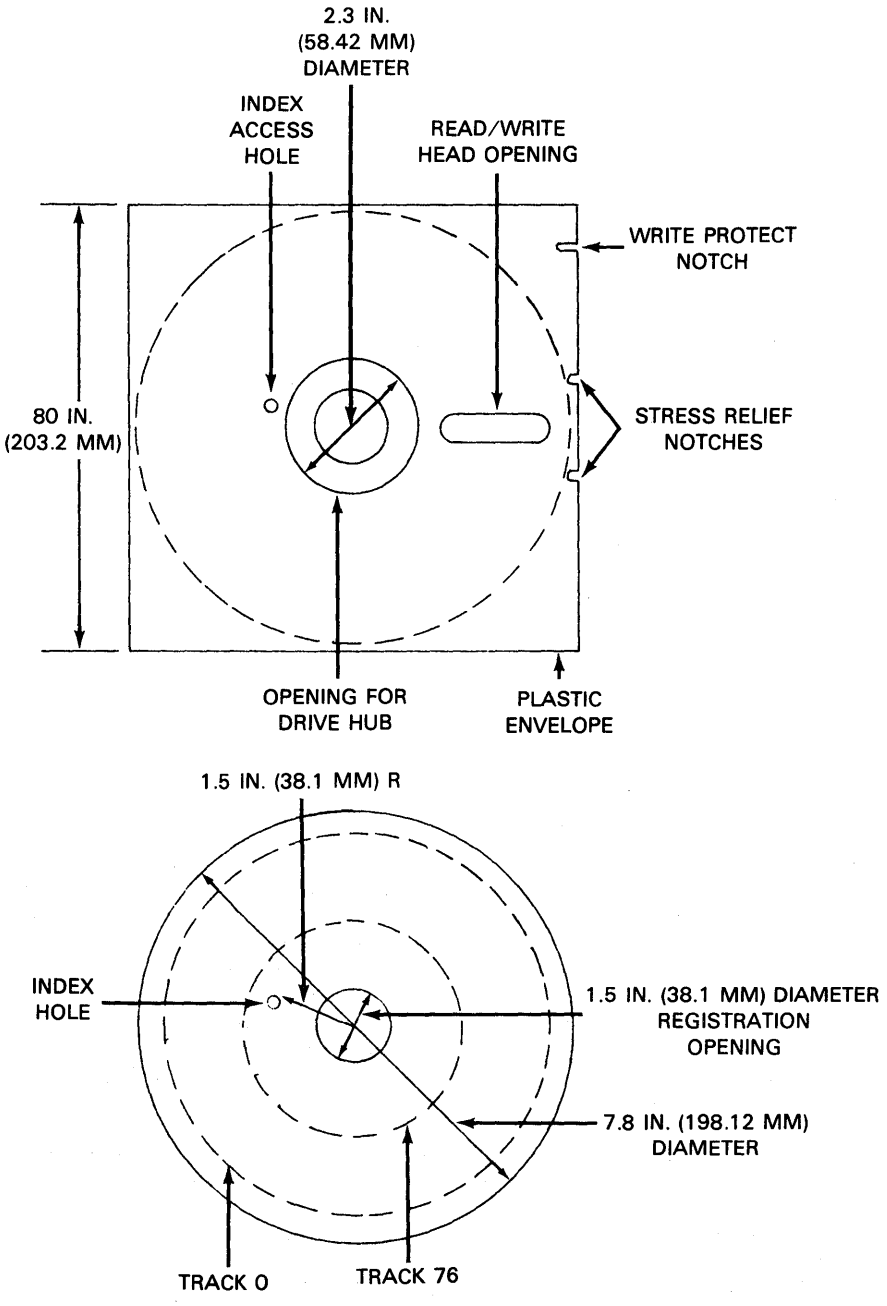
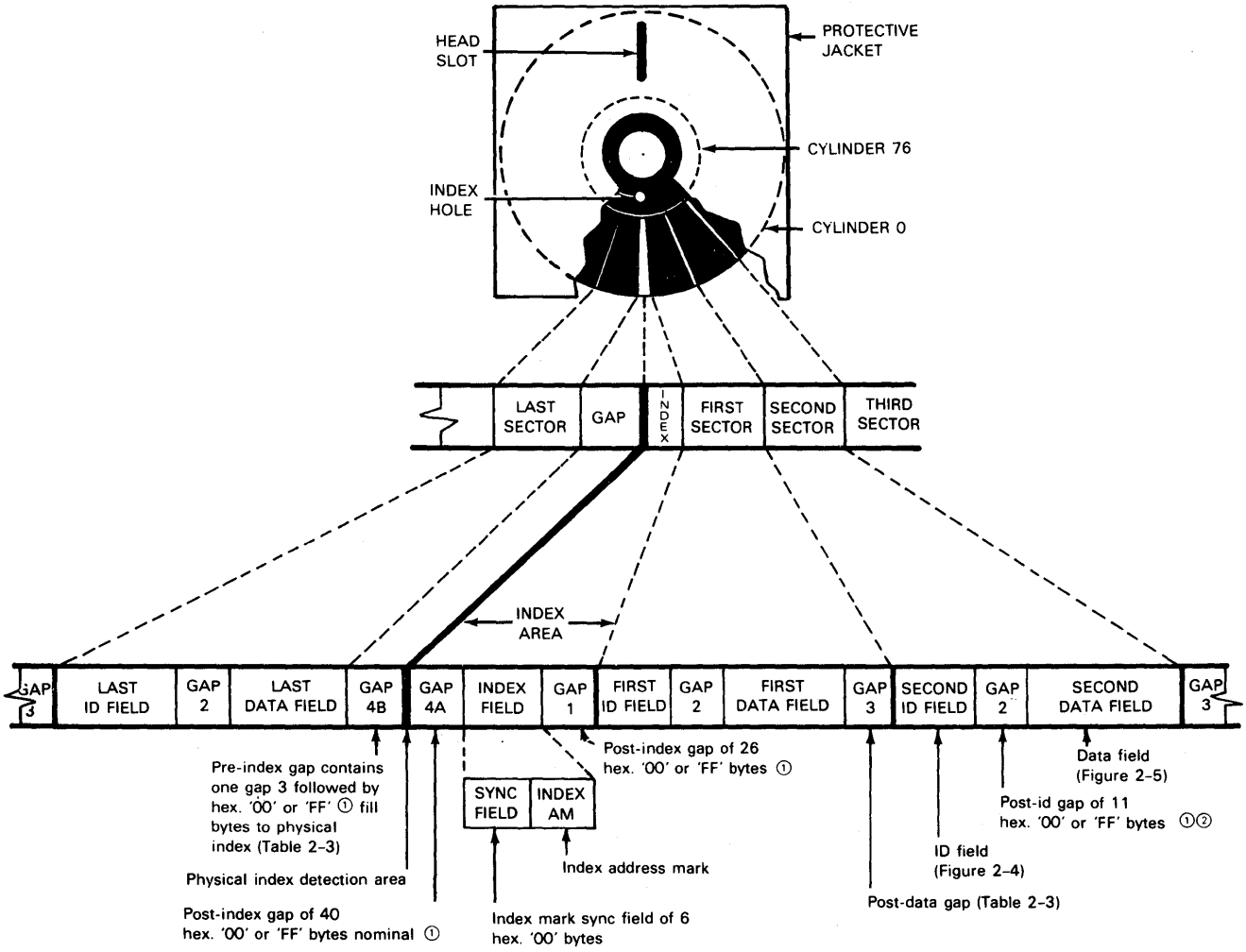


Figure 2—2. Typical Flexible Diskette Medium

The diskette employs a fixed format approach using electronic sectoring. Information recorded on the tracks consists of gap bytes, sync bytes, track/sector addresses, data, and cyclic redundancy check (CRC) bytes. The actual track formats that are supported are:

- IBM-compatible single density (FM); and
- IBM-compatible double density (MFM).

Figures 2–3, 2–4, and 2–5, and Table 2–3 show the formats (physical sectoring arrangements) for single density (FM) flexible diskettes; Figures 2–6, 2–7, and 2–8, and Table 2–4 show the formats (physical sectoring arrangements) for double density (MFM) flexible diskettes.

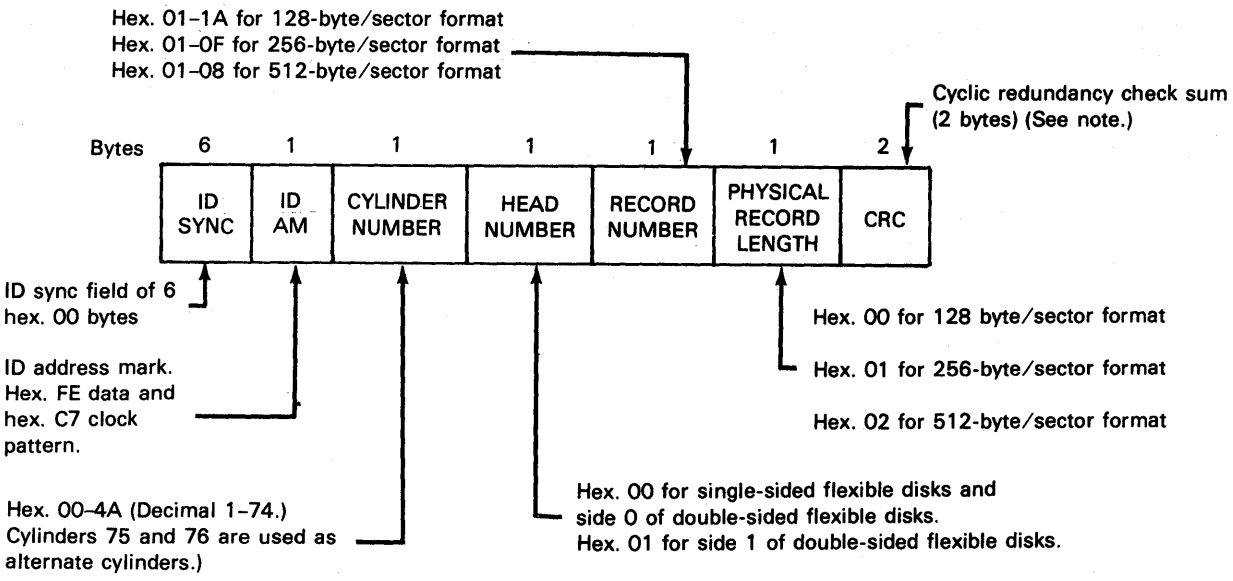


NOTES:

① Hexadecimal FF is preferred.

② When updating data field takes place, this gap is maintained at 11 bytes ± 2 bytes.

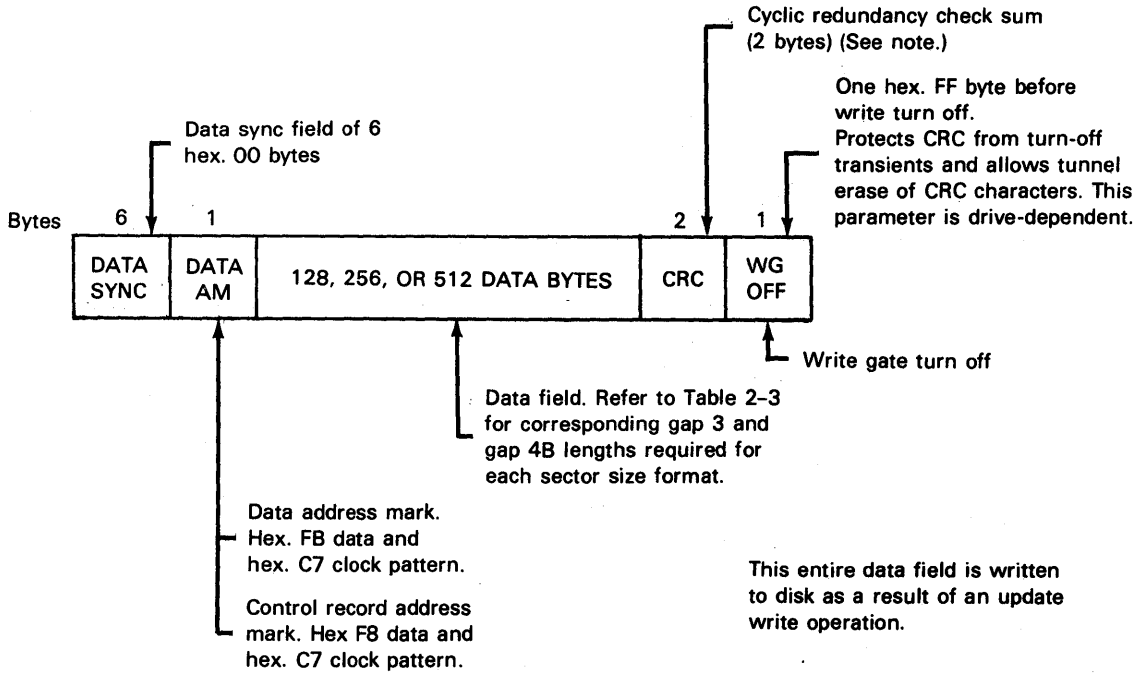
Figure 2—3. Physical Sectoring Arrangements for Single Density (FM) Flexible Diskettes



NOTE:

The CRC polynomial is: $X^{16} + X^{12} + X^5 + 1$. The CRC bytes are computed beginning with the first data bit of the ID AM and ending with the last data bit of the physical record length.

Figure 2—4. ID Field (FM)



NOTE:

The CRC polynomial is: $X^{16} + X^{12} + X^5 + 1$. The CRC bytes are computed beginning with the first data bit of the data AM and ending with the last data bit of the data field.

Figure 2—5. Data Field (FM)

Table 2—3. Gap Lengths (FM)

Sector Size (bytes)	Data Capacity (bytes)		Gap 3 Size (Hex. 00 or FF bytes)	Gap 4B Size (Hex. 00 or FF bytes)
	Track	Side		
128	3328	246,272	26	247 + one gap 3
256	3840	284,160	41	170 + one gap 3
512	4096	303,104	57	311 + one gap 3

NOTES:

1. Cylinder 0 is always written in 128-byte/sector mode.
2. Hexadecimal FF is preferred.

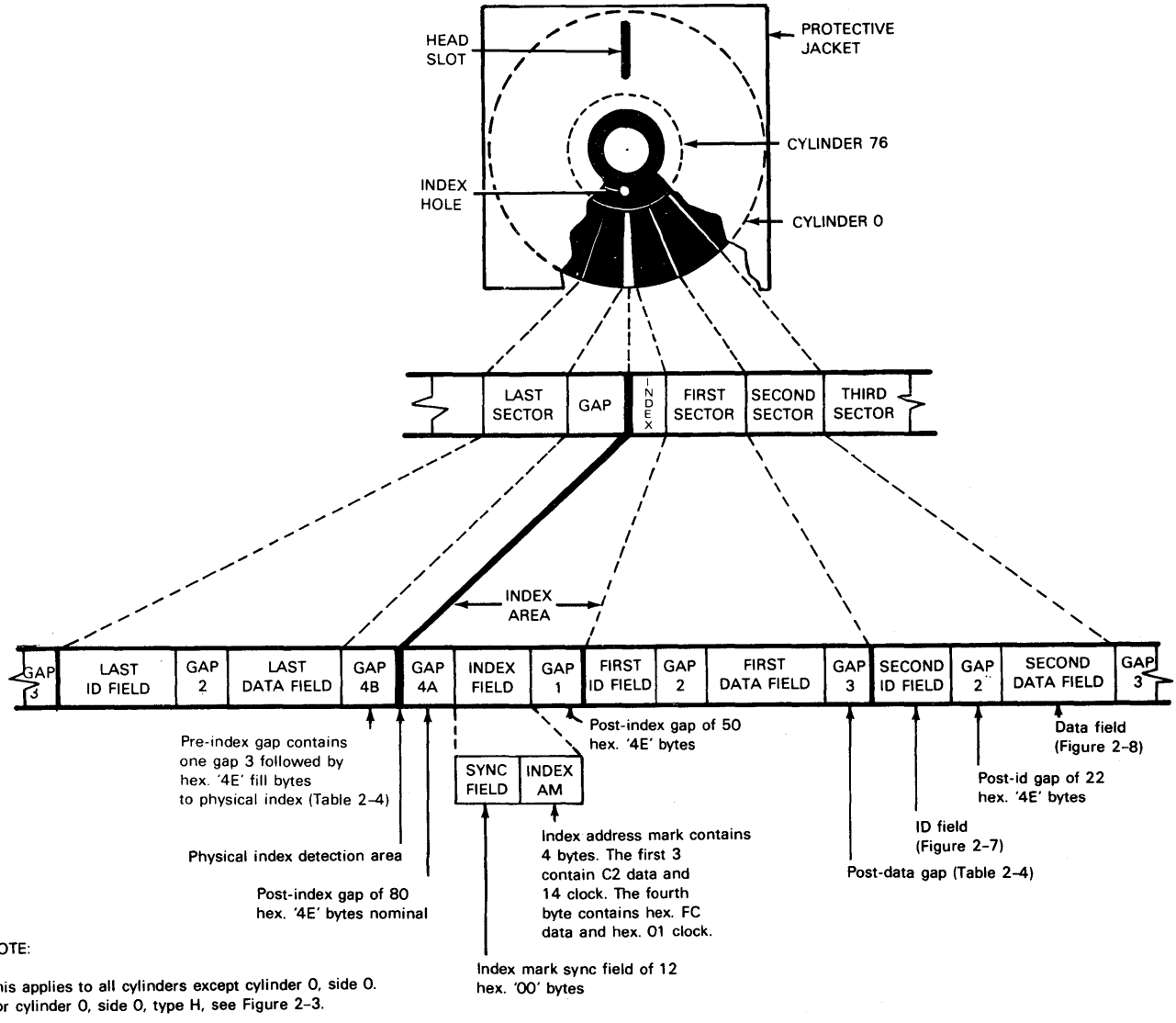
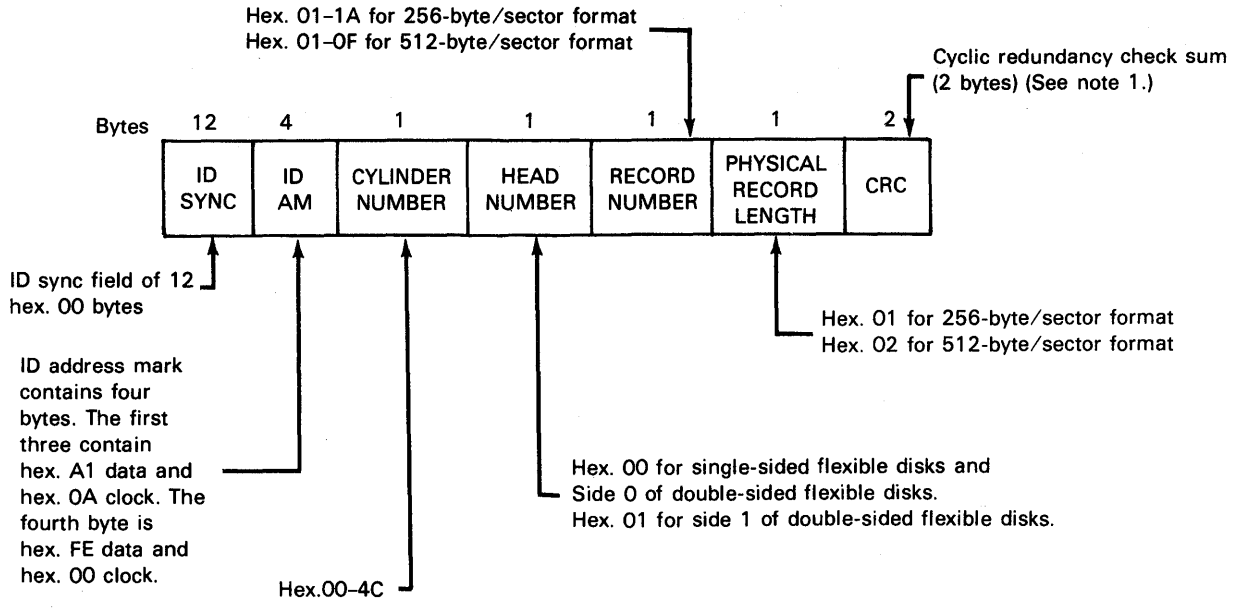


Figure 2—6. Physical Sectoring Arrangements for Double Density (MFM) Flexible Diskettes

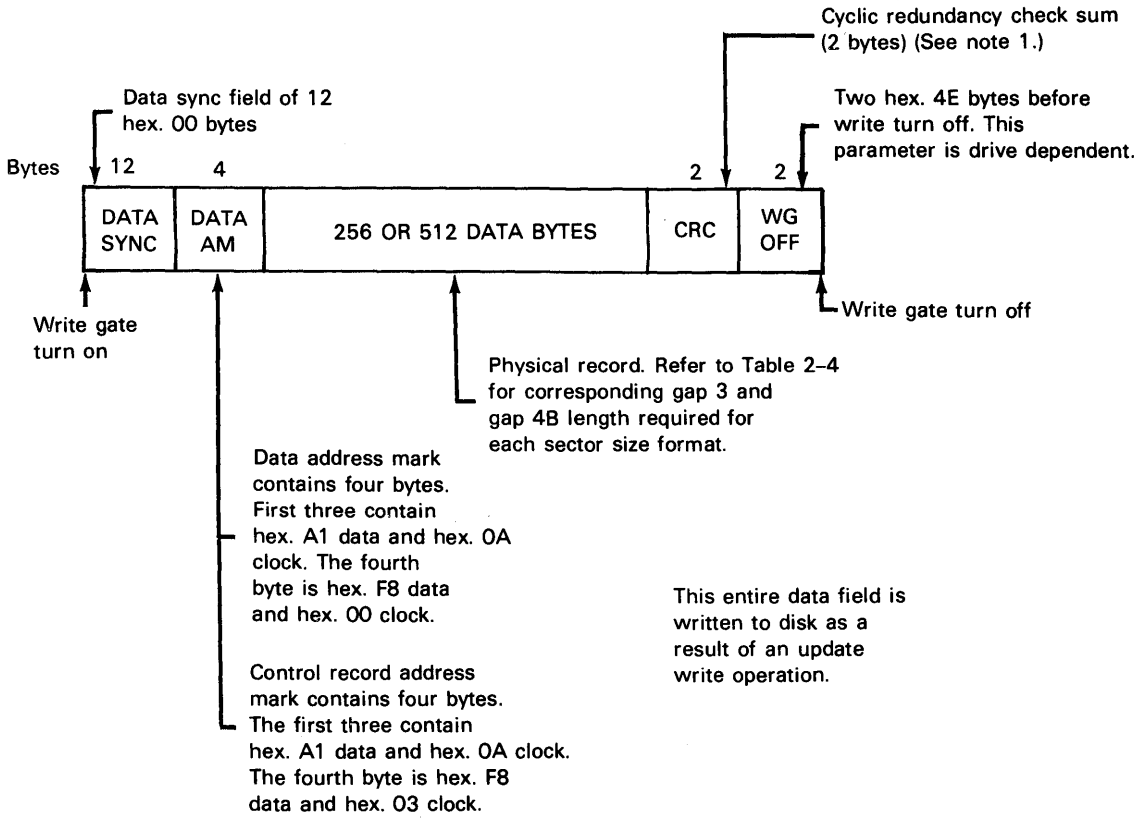


NOTES:

1. The CRC polynomial is: $X^{16} + X^{12} + X^5 + 1$. The CRC bytes are computed beginning with the first data bit of the first byte of the ID AM and ending with the last data bit of the physical record length. The CRC check starts with all 1's in the registers.

2. This ID field diagram applies to all cylinders except cylinder 0, side 0. For cylinder 0, side 0, type H, see Figure 2–3.

Figure 2—7. ID Field (MFM)



NOTES:

1. The CRC polynomial is: $X^{16} + X^{12} + X^5 + 1$. The CRC bytes are computed beginning with the first data bit of the first byte of the data AM and ending with the last data bit of the data field. The CRC check starts with all 1's in the registers.

2. This data field diagram applies to all cylinders except cylinder 0, side 0. For cylinder 0, side 0, type H, see Figure 2–3.

Figure 2–8. Data Field (MFM)

Table 2—4. Gap Lengths (MFM)

Sector Size (bytes)	Data Capacity (bytes)		Gap 3 Size (Hex.4E bytes)	Gap 4B Size (Hex.4E bytes)
	Track	Side		
256	6656	492,544	52	598 + one gap 3
512	7680	568,320	82	400 + one gap 3

2.4.1.1. Handling Precautions

Because the flexible disk is enclosed in a jacket to protect it against mechanical damage, other precautions must be observed when handling these diskettes:

- Do not write on diskette jacket with a pencil or a ball-point pen. Writing pressure damages the magnetic surface of the diskette.

- Do not use paper clips or bend the diskette.
- Do not touch or clean the flexible diskette surface.
- Return diskette (in its jacket) to its storage envelope whenever it is removed from the diskette drive.
- Replace storage envelope when it becomes worn, cracked, or distorted.
- Keep storage envelope (with diskette enclosed) away from magnetic fields or from ferromagnetic materials that might be magnetized.
- Do not expose storage envelope (with diskette enclosed) to heat or sunlight.

2.4.2. Microprocessor Controller

The diskette drive unit microprocessor controller can handle different media characteristics and any type of command on each drive. The controller can overlap the execution of a feed or unload command on one device while it is executing a nonfeed or nonunload command on another device. It cannot, however, simultaneously execute two nonfeed or nonunload commands. All necessary parameters for individual drive operations are stored in separate areas of the drive unit random access memory (RAM).

When the software from the host system issues the first media-related command to a drive, the controller determines the characteristics of the mounted diskette. No command is required from the host software to precondition the drive. The diskette drive automatically determines the number of recording surfaces, the recording density, the sector size, and the number of sectors per track.

In addition, any logical sector sequence and bad tracks are automatically handled while the diskette is being processed. Also, when a sector is being processed, the controller automatically executes retry procedures if an error occurs. If the retry is successful, unit check/program alert is reported at command termination; if retry is unsuccessful, unit check/data check is reported at command termination.

2.4.3. Data Format

The standard data character for the diskette drive is an 8-bit byte. In the direct access mode (DAM), it is recorded on the data cylinders (01 through 76) of the diskette in any code. However, in the data set mode (DSM), it is recorded on the index cylinder (00) in either ASCII or EBCDIC. Also, during the execution of the data set open and data set close commands, the processing of the information in the data set labels on cylinder 00 is assumed by the microcode to be in either ASCII or EBCDIC.

2.4.4. Data Rates

The data transfer rates are highly dependent on the logical sector sequence arrangement that is employed on the particular diskette and on how the tracks are processed. They are also dependent on the number of buffers that are available in the diskette drive unit. There is a possible performance degradation down to 360 records per minute when using the 512-byte format due to the single record buffer.

The spiral format provides a sequential arrangement whereby on each successive track the first logical sector (01), and all subsequent logical sectors, are physically displaced from the last logical sector of the preceding track. This format eliminates wasting one full latency time when stepping from one track to the next, provided the time for the number of sectors physically displaced equals the head step time.

When the standard sequential arrangement of 1 through 26 is employed and the tracks on each side are processed alternately before stepping, the maximum obtainable data rates (in records per minute) are as shown in Table 2–5.

Table 2—5. Data Rates in Records per Minute

Operation	Track Format	Diskette Media			
		One-Sided		Two-Sided	
		No Spiral	Spiral*	No Spiral	Spiral*
Read	FM 128/26	4670	8125	6225	8690
	FM 256/15	2695	4750	3590	5050
	FM 512/8	1440	2550	1915	2700
	MFM 256/26	4670	8125	6225	8690
	MFM 512/15	337	356	348	358
Write	FM 128/26	3115	4345	3735	4500
	FM 256/15	1800	2525	2150	2600
	FM 512/8	960	1350	1150	1390
	MFM 256/26	3115	4345	3735	4500
	MFM 512/15	317	333	327	335

* Assumes that the spiral offset equals:

6 sectors for the track format with 26 sectors

4 sectors for the track format with 15 sectors

2 sectors for the track format with 8 sectors

2.4.5. Direct Access Mode

Direct access mode (DAM) provides essentially unrestricted access and operation with the mounted diskette. Read and write commands can occur at any sector on the diskette. Therefore, responsibility for maintaining any existing file structure and integrity while operating in this mode is required. It should be noted that, even though the diskette drive is capable of addressing all 76 cylinders in this mode, only cylinders 1 through 74 should be used for data and cylinders 75 and 76 should be reserved for alternate cylinder assignment.

Upon the power turn-on sequence or the system clear sequence, the diskette drive unit places the devices in DAM and sets the device track address register (TAR) to 01_{16} and the side/sector address register (SSAR) to 01_{16}. A data-set-close command or an initial-load command places only the addressed drive in DAM. Read or write commands start at track 1, side 0, sector 1, or the load track/side/sector command can be used to set the TAR and SSAR to any other starting sector on the diskette.

2.4.6. Data Set Mode

Data set mode (DSM) permits access and operation with the mounted diskette to the beginning of extent (BOE) and end of extent (EOE) limits that are specified in a data set label (DSL). Read and write commands can occur only within the BOE and EOE limits of the data set label. In this mode, less support software is necessary to process files because the diskette drive processes and checks most of the data set label and maintains certain parameters (pointers) while processing records.

A device can enter the data set mode only by way of a data-set-open command. Normal exiting is by way of a data-set-close command. A system-reset or initial-load command at this time causes a catastrophic exit from DSM, and file integrity is compromised.

Once a data set is opened, the diskette (volume) it resides on should not be removed (manual feed) until a data-set-close command is issued because this DSC command may have to update the data set label parameters to maintain file integrity.

The user-specified parameter byte for the data-set-open command determines the starting track and side/sector values for read and write commands. The load track/side/sector command can be used to position the hardware to any sector within the data set label limits of BOE and EOE.

2.4.7. Data Set Label Checking

The diskette drive checks certain fields of a data set label during a data-set-open (DSO) command. It declares an invalid label if any of the following conditions exist:

- The BOE address is less than track 01, sector 01.
- The EOE address is greater than track 74, sector 26.
- The EOD address is greater than the EOE address plus 1 or is less than the BOE address.
- The BOE, EOE, and EOD sector address is equal to 00 or greater than 26.
- The EOE address is less than the BOE address.
- The block length is equal to 0.
- The block length is greater than the physical record length.
- The physical record length byte is not a 0, 1, or 2.
- The DSO parameter byte specifies open at EOD, but the data set is full.
- The DSO parameter byte specifies open at BOE for reads only, but the data set is empty.
- The BOE, EOE, or EOD sector address is greater than the value specified in the physical record length byte.

It should be noted, however, that the software protect byte (position 43 in the label) does not invalidate the label because it may be desirable to issue only read commands while in the data set mode. Write or write-control commands are rejected in data set mode if the software-write-protect bit is set in the label field.

2.5. OPERATING SEQUENCE

Each time power is applied to the diskett drive unit, a resident diagnostic microprogram is executed. If the diagnostic microprogram encounters an error that is not corrected after it reexecutes that portion of the test several times, all processing is prevented and a *not operational* condition code is presented. The drive unit remains offline.

Operations are initiated when the diskette drive presents attention status from a diskette drive unit to the host. This status is presented when the controller is idle and a drive changes from the stop to the run state. Attention status is presented along with the device address of the appropriate diskette drive.

The run state is entered by pressing the RUN switch on the operator's panel and after the operator initiates a feed cycle and two revolutions of the diskette have been detected. Attention status is not presented at the completion of a software-initiated feed command cycle; normal ending status is presented in this instance.

2.5.1. IMPL/IPL Loading

The diskette drive supports initial microprogram load (IMPL) and initial program load (IPL) operations. Each of these operations requires a separate diskette; either or both operations are performed with any diskette drive that is operational.

IMPL/IPL operation is accomplished by issuing a special IPL (02_{16}) instruction to the diskette drive unit. The drive unit then begins reading data, starting with the sector at side 00, track 01, sector 01. Subsequent data is read with the normal read (06_{16}) command or read-control (46_{16}) command.

2.5.2. Recording Method Determination

Upon the acceptance of the first media-related command after a device has become ready, the diskette drive performs a read operation to determine whether the FM or the MFM recording method is employed on the mounted diskette. The internal read write circuitry remains in the condition that was successful. This operation is not repeated until the next time a diskette is loaded into the drive.

2.5.3. Device Addressing

The device addresses of the 8407–00/01 diskette drive are set by means of hexadecimal switches located in the controller. The basic unit address must always be even. When a second autoloaded feature is installed, its device address is always 1 plus the device address specified on the hexadecimal switches. The drive unit controller does not respond to the second address if the second autoloaded feature is not installed.

The device addresses for the 8407–04/05 diskette drive are fixed. They are 1 for the basic unit and 2 for the diskette expansion.

2.5.4. Attention Interrupt

Operations with the diskette drive are initiated when the drive is online and the controller presents attention status (80_{16}) from a drive to the host system. Attention status is presented, along with the device address of the appropriate diskette drive, when the controller is idle and a drive changes from the stop to the run state.

The run state is detected by the diskette drive when the RUN switch is pressed and the drive is in the ready state.

The ready state is entered after an operator-initiated manual feed cycle has been completed and two revolutions of the diskette have been detected. Again, attention status is not presented at the completion of a software-initiated feed command cycle, but rather a normal ending status is presented.

The first attention interrupt that is presented after a power turn-on or system reset sequence is an attention/device end status (84_{16}). This is always presented, even if the translate table feature is not installed. This indicates to the host that the translate tables should be loaded if this feature is installed.

When this attention indication is presented, software should issue the read volume ID command as the first media command to the device. This determines the recording method employed and provides software with the record length information to allocate buffer size.

2.5.5. Recording Errors

Diskette errors are detected by two cyclic redundancy check (CRC) bytes that are appended to the data and ID fields in each sector. The error detection code is a Fire code that detects all error bursts of 16 bits or less. It also detects two error bursts in the same field, each with a length of two bits or less.

2.5.6. Parity Checking

Internal parity circuits are provided to detect single bit errors occurring within the diskette drive. Parity checking is provided for all read operations from the controller PROM. Parity checking and parity generation are provided for all read/write operations involving the controller RAM and for all reading from the interface.

2.5.7. Retry

The diskette drive executes retries on two levels:

1. The host software can execute retries on command from the channel when certain error situations are detected on the channel.

2. The controller executes retries of certain media (diskettes) and mechanical-related errors and is under control of the diskette drive microprogram.

If a data field CRC error is detected, the controller automatically retries up to 12 times before indicating an error condition to the channel. Additional controller retries are for the following errors:

- Bad tracks
- ID field CRC error
- Track mismatch
- No sector found

Three direct retries are attempted. If the error persists, three retries of a special procedure are made. For an ID field CRC error, a track mismatch error, and a no sector-found error, the procedure is to recalibrate and step out. The diskette drive can take a maximum of 6 seconds to execute a retry procedure.

2.5.8. Interface Disconnect Sequence

The channel initiates the interface disconnect sequence. It causes the diskette drive controller to immediately terminate any ongoing interface operations and to disconnect from the I/O channel. The controller then initiates a selection sequence to present any status generated prior to the detection of the interface disconnect sequence. If the device is performing an I/O operation at the time of an interface disconnect sequence, ending status is presented. This ending status is presented in a manner consistent with the command ending status presented during normal interface conditions. Unit check is included with the device end status if the command cannot be successfully executed due to interruption of data transfers by the interface disconnect sequence or due to any other errors that preclude command execution.

2.5.9. Selective Reset Sequence

The channel initiates the selective reset sequence. It causes the diskette drive controller to reset only the controls and status pertaining to the particular I/O device in operation. The device proceeds to a normal stopping point with no further data transfers and device end status is presented. (Unit check can be included with this device end status if any errors have occurred). The device is placed in the stop state with device parameters set to direct access mode. If a command is issued within 50 microseconds of this selective reset operation, the command is terminated with stop state at ending status, rather than at initial selection.

2.5.10. System Reset

System reset causes the device to be cleared to its reset condition. Any pending status is cleared and any pending controller-initiated request for data transfer is cleared.

2.5.11. Incorrect Length Indication

The incorrect length bit in the channel status word indicates that the number of bytes transferred for the I/O operation is not equal to the number of bytes requested or offered. For those commands that always transfer a prescribed number of bytes, the incorrect length bit being set indicates an error condition, assuming that the initial byte count in the channel command word was correct for the specific command.

There are, however, certain commands that do not necessarily transfer a prescribed number of bytes. These are:

- Write (01)
- Write control (41)
- Initial load (02)
- Read (06)
- Read control (46)
- Format read (16) – under certain conditions

These commands set the incorrect length bit at the completion of the command under the following conditions:

1. The byte count that the channel maintains is depleted and neither the record length mode nor the cylinder mode bits are set.

2. If either the record length mode or the cylinder mode bits are set and the byte count maintained by the channel is depleted before the end of the expected sector or logical record is detected by the control unit.

3. If either the record length mode or the cylinder mode bits are set and the end of the expected sector or record occurs before the byte count maintained by the channel is depleted.

The incorrect length bit is set for the format read command (as in condition 1) only if the number of bytes requested does not equal the prescribed amount in relation to the number of sectors on the particular diskette being read.

To prevent the incorrect length bit from being set for those conditions, the suppress length indication (SLI) bit should be set in the channel command word for the affected commands.

3. Control and Diagnostic Byte Structure

3.1. BYTE STRUCTURE

Table 3–1 shows the structure of the status/sense bytes.

Table 3—1. Status/Sense Bytes (Part 1 of 2)

	Bits							
Bytes	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Status	Attention	Status modifier	Control unit end	Busy	Channel end	Device end	Unit check	Unit exception
SNS 0	Command reject	Intervention required	Bus out check	Equipment check	Data check	0	8407 bus parity	Program alert
SNS 1	Interface* disconnect	Early warning	1100 Byte count=zero	Translator not loaded	Translator parity error	PROM parity retry	RAM parity error	Stop state error
SNS 2	AM error	Disk parity error	ID CRC error	Data CRC error	Data late	0	0	0
SNS 3	Track error	Side error	Sector error	Length error	Format error	EOD/ EOE	Continued	Control AM
SNS 4	DSC R/W	DSL invalid	DSL not found	Not** installed	Invalid media	Invalid mode	Invalid sequence	Invalid parameter
SNS 5	Unload cycle	Load cycle	Stacker full	Hopper empty	Hang	Jam	Interlock error	Stop state
SNS 6	0	0	0	Record length mode	Inbound translate mode	Outbound translate mode	Inhibit* status	Cylinder mode
SNS 7	0	0	0	Drive ready	2-sided	MFM	FM	HWP

Table 3—1. Status/Sense Bytes (Part 2 of 2)

	Bits							
Bytes	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
SNS 8	MB0	MB1	MB2	0	ASCII mode	Four byte mode	0	0
SNS 9	DSL side	DSL half	DSL WP	DSL S0	DSL S1	DSL S2	DSL S3	DSL S4
SNS 10	0	T0	T1	T2	T3	T4	T5	T6
SNS 11	Side	0	0	S0	S1	S2	S3	S4

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3.2. STATUS BYTE

The status byte provides information pertaining to the state of the diskette drive unit and is presented to the host processor at the following times:

a. When a transition from the stop to the run state occurs

b. At the initiation of a command

c. At the completion of channel operations

d. At the completion of a command

Normally, when both the channel and I/O device portions of the operation have ended simultaneously, the completion of the command is indicated by the combination of channel end (bit 4 of status byte) and device end (bit 5 of status byte). Certain commands in the repertoire split this status presentation. Channel end (bit 4) is presented alone to indicate that the channel portion of the operation has ended. At some later time, device end (bit 5) is presented to indicate that the I/O device portion of the operation has ended. The commands that split status are as follows:

Feed	Load physical track
Unload	Format write
Data set open	Write
Data set close	Write control
Softscope	

A description follows for the various combinations of the status bits presented by the diskette drive (Table 3–1).

- Bit 0

  The attention bit (bit 0) indicates that the device whose address is given has made a transition from the stop to the run state. The run state is detected by the diskette drive when the RUN switch is pressed and the diskette drive is in the ready state. The ready state is entered when a manual feed operation has occurred and two index pulses have been detected.

  The attention bit (bit 0) and the device end bit (bit 5) are presented on the first transition from stop to run after a power turn-on sequence and indicate that the translate table is not loaded.

  The attention bit (bit 0) and the busy bit (bit 3) are presented to indicate that a command addressed a device with pending attention status.

  The attention bit (bit 0) and the control unit end bit (bit 2) are presented to indicate attention status and that the diskette drive has previously responded with a control unit busy indication.

- Bit 1

  The status modifier bit (bit 1) is always present along with the busy bit (bit 3); the combination of these two bits indicates control unit busy. Control unit busy indicates that a command has addressed a diskette drive while the diskette drive unit controller is currently executing a nonfeed/unload command for the other diskette drive.

- Bit 2

  The control unit end bit (bit 2) is presented to the channel when the diskette drive unit has previously responded to an interrogation by the channel with a control unit busy indication and is now available to communicate with the channel. It is presented along with the next ending or attention status presentation made by the system.

- Bit 3

  The busy bit (bit 3) indicates either control unit busy when it is presented along with the status modifier bit (bit 1) or device busy when it is presented alone. Device busy indicates that a command has addressed a diskette drive that is currently executing a command.

  When presented without status modifier or alone, it indicates that the status byte is pending or is a stacked status from a previous operation.

- Bit 4

  The channel end bit (bit 4) indicates the completion of the transfer of data when it is presented alone, or the completion of the command when it is presented along with the device end bit (bit 5).

- Bit 5

  The device end bit (bit 5) indicates that the diskette controller has completed the execution of an outstanding command and can accept another command. Device end may be presented either alone or simultaneously with the channel end bit (bit 4). It can also be presented along with the unit check bit (bit 6) and/or the unit exception bit (bit 7) to indicate that chaining should be suppressed due to some error or unusual condition that has occurred.

  When presented with the attention bit (bit 0), bit 5 indicates the first transition from stop to run after a power turn-on sequence or system clear sequence and that the translate table has not been loaded.

- Bit 6

  The unit check bit (bit 6) indicates that either an error condition exists at initial selection when it is presented alone, or an error condition occurred during execution of the last command when it was presented along with the device end bit (bit 5).

- Bit 7

  The unit exception bit (bit 7) is always presented along with the device end bit (bit 5); it indicates that one of the following unusual conditions occurred during execution of the last command:

  – the diskette controller has encountered the last record; or

  – the diskette controller has executed automatic error recovery procedures.

3.3. SENSE BYTES

The sense bytes (Table 3–1) are sent from the drive to the host processor in response to a sense command. The 12 sense bytes contain both error (bytes 0–5) and operational (bytes 7–11) information of the last command other than a sense command issued to the diskette drive. They are sent from the diskette drive to the host in response to a sense command.

The error information bytes (bytes 0–5) are reset (cleared) by the next command addressed to the controller unless that command is a sense command, a test-I/O command, a control immediate command that does not initiate an I/O operation (NOP), or any command that results in the busy bit being set during an initial selection sequence.

During the power turn-on sequence, sense bytes 0–9 are cleared to zeros, and sense bytes 10 and 11 are both set to 01_{16}.

The selective reset clears bytes 6 through 9 to zeros, and sense bytes 10 and 11 are set to 01_{16} for the addressed device.

Table 3–2 defines each bit of each sense byte.

Table 3–2. Sense Byte Descriptions (Part 1 of 7)

Bit Position	Name	Description
		Sense Byte 0
SB0,0	Command reject	Indicates either an invalid command code received at initial selection or a valid command code to a feature not installed at initial selection or a command byte parity error.
SB0,1	Intervention required	Indicates one or more of the following: 1. Device is in stop state at initial selection. 2. No index pulses detected 3. Autoloader time-out/malfunction occurred 4. Output stacker full 5. Device went into stop state during execution. 6. Input hopper empty 7. Interlock switch is tripped. 8. Autoloader jam condition

Table 3–2. Sense Byte Descriptions (Part 2 of 7)

Bit Position	Name	Description
		Sense Byte 0 (cont)
SB0,2	Bus out check	Indicates either a command byte or outbound data byte parity error
SB0,3	Equipment check	Indicates one or more of the following: 1. Hardware write-protected 2. Data set label write-protected 3. Internal overrun (The microprocessor did not service the disk logic in required time interval.) 4. No disk service request signal received 5. No track 0 detected during the recalibrate procedure 6. Disk write parity error 7. RAM parity error 8. No index pulses detected 9. Autoloader time-out or malfunction occurred. 10. Translator parity error 11. Early warning condition
SB0,4	Data check	Indicates one or more of the following: 1. Control record encountered 2. No data separator lock 3. ID CRC error 4. Data CRC error 5. Illegal ID field track byte 6. Illegal ID field side byte 7. Illegal ID field sector byte 8. Illegal ID field length byte 9. Track mismatch error 10. Side mismatch error 11. Sector mismatch error 12. Length mismatch error 13. ID field length byte is different from previous value on this track. 14. Density on this track is different from density on a previous track. 15. Track 0 is not formatted correctly.
SB0,5		Always set to 0
SB0,6	8407 bus* parity	Indicates 8407 diskette drive bus parity error on inbound byte
SB0,7	Program alert	Indicates one or more of the following: 1. Wrong operating mode to execute 2. Data set label not found 3. Data set label invalid 4. Not enough parameter bytes were sent. 5. Already past the EOD or EOE record 6. FF_{16} specified in first parameter position 7. Illegal parameter byte transmitted 8. Side 2 is specified but a 1-sided diskette is installed. 9. Translator not loaded 10. Interface disconnect sequence occurred. 11. Last record of diskette (DAM) or data set (DSM)

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Table 3–2. Sense Byte Descriptions (Part 3 of 7)

Bit Position	Name	Description
		Sense Byte 1
SB1,0	Interface* disconnect	Indicates that an interface disconnect sequence has occurred on the interface
SB1,1	Early warning	Indicates temperature within the cabinet is approaching an overheat condition
SB1,2	1100 byte count=zero	Indicates that the 1100 byte count = 0 (has not been loaded or the load-1100-byte-count command tried to load a value of 0).
SB1,3	Translator not loaded	Indicates translate mode command was issued but the translate table has not been loaded
SB1,4	Translator parity error	Indicates a translate table RAM parity error occurred
SB1,5	PROM parity retry	Indicates a PROM retry occurred
SB1,6	RAM parity error	Indicates a RAM parity error occurred.
SB1,7	Stop state error	Device in stop state at initial selection or device went into stop state during execution.
		Sense Byte 2
SB2,0	Address mark error	Indicates either no data separator lock or no disk service request signal or an illegal address mark was detected.
SB2,1	Disk parity error	Indicates a disk write parity error or retry
SB2,2	ID CRC error	Indicates an ID CRC error or retry
SB2,3	Data CRC error	Indicates a data CRC error or retry
SB2,4	Data late	Internal overrun (The microprocessor did not service the disk logic in required time interval.)
SB2,5–7		Always set to 0
		Sense Byte 3
SB3,0	Track error	Indicates one or more of the following: 1. An illegal ID field track byte 2. A track mismatch error 3. No track 0 during the recalibrate procedure
SB3,1	Side error	Indicates one or more of the following: 1. An illegal ID field side byte 2. A side mismatch error 3. Side 2 specified, but 1-sided media installed

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Table 3–2. Sense Byte Descriptions (Part 4 of 7)

Bit Position	Name	Description
		Sense Byte 3 (cont)
SB3,2	Sector error	Indicates either an illegal ID field sector byte or a sector mismatch error
SB3,3	Length error	Indicates an illegal ID field length byte or a length mismatch error
SB3,4	Format error	Indicates that either the ID field length byte is different from the previous value on this track or the density on this track is different from what it was on the previous track
SB3,5	EOD/EOE	Indicates one or more of the following: 1. Last record of diskette (DAM) 2. Last record of data set (DSM) 3. Already past the EOD or EOE record
SB3,6	Continued (end-of-volume)	Indicates last record of this data set (DSM) and the data set is continued on another diskette
SB3,7	Control mark	Indicates the record has a control address mark
		Sense Byte 4
SB4,0	Data set close read/write	Indicates information bit for the data set close command (0 = read operation of DSC, 1 = write operation of DSC)
SB4,1	Data set label invalid	Indicates data set label is invalid
SB4,2	Data set label not found	Indicates data set label not found
SB4,3	Not* installed	Indicates one or more of the following: 1. Invalid device address presented 2. Address device is not installed 3. Feature is not installed
SB4,4	Invalid media	Indicates track 0 of the installed diskette is not formatted properly
SB4,5	Invalid mode	Indicates device is in the wrong operating mode to execute the command
SB4,6	Invalid sequence	Indicates one or more of the following: 1. Not enough parameter bytes transmitted 2. Already past the EOD or EOE record 3. FF_{16} specified in first parameter position of data set open (DSO) command
SB4,7	Invalid parameter	Indicates one or more of the following: 1. FF_{16} specified in first parameter position of DSO command 2. Illegal parameter byte transmitted 3. Side 2 specified, but 1-sided media installed 4. Illegal ID field track byte 5. Illegal ID field side byte 6. Illegal ID field sector byte 7. Illegal ID field length byte

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Table 3–2. Sense Byte Descriptions (Part 5 of 7)

Bit Position	Name	Description
Sense Byte 5		
SB5,0	Unload cycle	Indicates autoloader mechanism is removing the diskette from the drive to the stacker
SB5,1	Load cycle	Indicates autoloader mechanism is inserting a diskette from the hopper to the drive
SB5,2	Stacker full	Indicates stacker is full
SB5,3	Hopper empty	Indicates hopper is empty
SB5,4	Hang	Indicates autoloader time-out/malfunction occurred
SB5,5	Jam	Indicates the autoloader feed path is blocked
SB5,6	Interlock error	Indicates interlock switch is tripped
SB5,7	Stop state	Device is in the stop state.
Sense Byte 6		
SB6,0–1		Always set to 0
SB6,2		Indicates 1100 byte count mode is set for the addressed drive.
SB6,3	Record length mode	Indicates record length mode is set for the addressed drive
SB6,4	Inbound translate mode	Indicates the inbound translate mode is set for the addressed drive
SB6,5	Outbound translate mode	Indicates outbound translate mode is set for the addressed drive
SB6,6	Inhibit* status	Indicates the inhibit status is set for the addressed drive
SB6,7	Cylinder mode	Indicates the cylinder mode is set for the addressed drive
Sense Byte 7		
SB7,0–2		Always set to 0
SB7,3	Drive ready	When set to 1, indicates the drive door is closed and 2 index pulses have been detected. When set to 0, indicates the drive is not ready.
SB7,4	Two-sided	When set to 1, indicates that a 2-sided diskette is installed. When set to 0, indicates a 1-sided diskette is installed.
SB7,5	MFM	When set to 1, indicates double-density recording (MFM). When set to 0, indicates recording density is not MFM.

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Table 3–2. Sense Byte Descriptions (Part 6 of 7)

Bit Position	Name	Description
		Sense Byte 7 (cont)
SB7,6	FM	When set to 1, indicates single-density recording (FM). When set to 0, indicates recording density is not FM.
SB7,7	Hardware write protected	When set to 1, indicates installed diskette has a hardware write protect notch. When set to 0, diskette does not have a hardware write protect notch.
		Sense Byte 8
SB8,0–2	Mode bits	Indicates the current operating mode of the addressed device as follows: MB0 MB1 MB2 Mode 0 0 0 DAM 1 0 0 DSM read @ BOE 1 0 1 DSM R/W @ BOE 1 1 0 DSM R/W @ EOD
SB8,3		Always set to 0
SB8,4	ASCII DSL	When set to 1, indicates that the addressed device is currently operating in the data set mode with ASCII encoded data set label characters. When set to 0, indicates EBCDIC characters.
SB8,5	Four byte mode	When set to 1, indicates that logical records are terminated in multiples of four bytes each. When set to 0, indicates that logical records are terminated at the data set label designated value.
SB8,6		Always set to 0
SB8,7		Always set to 0
		Sense Byte 9
SB9,0	Data set label side	When set to 1, indicates the current set mode data set label is located on side 1 of track 0. When set to 0, indicates data set label is located on side 0 of track 0.
SB9,1	Data set label half	When set to 1, indicates the current data set mode data set label is located in the second half (bytes 129–256) of the sector. When set to 0, indicates it is located in the first half (bytes 1–128) of the sector.
SB9,2	Data set label write protected	Indicates the specified data has the write protect byte set
SB9,3–7	Data set label sector address	The sector address in binary of the data set mode data set label (Bit 3 is the MSB.)
		Sense Byte 10
SB10,0		Always set to 0
SB10,1–7	Track address	Indicates the current track address in binary. (Bit 1 is the MSB.)

Table 3–2. Sense Byte Descriptions (Part 7 of 7)

Bit Position	Name	Description
		Sense Byte 11
SB11,0	Side address	Indicates the current side address where the next read or write command begins (0 = side 0, 1 = side 1)
SB11,1–2		Always set to 0
SB11,3–7	Sector address	Indicates the current sector address in binary. (Bit 3 is the MSB.)

4. Command Repertoire

4.1. COMMANDS

The commands that may be issued to the diskette drive by the host processor software are listed in Table 4–1 and are described in the following subsections. Any other commands issued are rejected and return a unit check status presentation to the host processor.

Table 4–1. Diskette Drive Commands (Part 1 of 2)

Command	Mnemonic	Binary Code	Hexadecimal Code
Sense	SNS	0000 0100	04
Test I/O①	TIO	XX000000	00
Test I/O①	TIO	XX110000	30
Set inhibit status①	SIS	XX010000	10
Reset inhibit status①	RIS	XX100000	20
No operation	NOP	0000 0011	03
No operation	NOPS	0111 0011	73
Record length mode set	RLMS	0100 0011	43
Record length mode reset	RLMR	0101 0011	53
Cylinder mode set	CMS	1100 0011	C3
Cylinder mode reset	CMR	1101 0011	D3
Recover	RCVR	0001 0011	13
Feed③	FD	0010 0011	23
Unload③	UNLD	0011 0011	33
Softscope③	SS	0110 0011	63
Format write③	FW	0001 0001	11
Write③	W	0000 0001	01
Write control③	WC	0100 0001	41
Data set open③	DSO	0010 0001	21
Data set close③	DSC	0101 0001	51
Load track/side/sector	LTSS	0011 0001	31
Write diskette drive buffers②	WSB	0111 0001	71
Load physical track③	LPT	0110 0001	61
Initial load	IL	0000 0010	02
Read volume ID②	RVID	0101 0110	56
Format read	FR	0001 0110	16
Read②	R	0000 0110	06
Read control②	RC	0100 0110	46
Read diskette drive area	RSA	0110 0110	66
Read diskette drive buffers②	RSB	0111 0110	76
Set inbound translate mode	SITM	1000 0011	83
Reset inbound translate mode	RITM	1001 0011	93
Set outbound translate mode	SOTM	1010 0011	A3
Reset outbound translate mode	ROTM	1011 0011	B3

Table 4–1. Diskette Drive Commands (Part 2 of 2)

Command	Mnemonic	Binary Code	Hexadecimal Code
Read translate table	RTT	1000 0110	86
Write translate table	WTT	1000 0001	81
Read control unit ID	RCID	0101 0100	F4
Read device ID	RDIC	0111 0100	74
Read display	RDSP	1101 0010	D2
Set 1100 byte count mode	SBCM	1110 0011	E3
Reset 1100 byte count mode	RBCM	1111 0011	F3
Load 1100 byte count	LBC	1001 0001	91
Set diagnose ④	SD	0100 1011	4B
Diagnostic sense ④	DSNS	0100 0100	44

NOTES:

① For 8407–00/01 only
② Data for these commands can be translated if the feature is installed and the translate mode is set.
③ Split status commands
④ For 8407–04/05 only

4.2. SENSE COMMAND

The sense command (04_{16}) is used for test, diagnostic, and error recovery purposes. This command performs the same function in both DSM and DAM modes of operation. It transfers up to a maximum of 12 sense bytes to the host system indicating the condition of the diskette drive and addressed device.

4.3. TEST-I/O COMMAND (8407–00/01 Only)

The test-I/O command (00_{16} or 30_{16}) relieves pending status from the addressed controller and device. This command is completed during an initial selection sequence, and no I/O operation is initiated as a result of this command.

4.4. SET-INHIBIT-STATUS COMMAND (8407–00/01 Only)

The set-inhibit-status command (10_{16}) sets the state of the diskette drive to prevent the drive from initiating a status sequence. This command is processed as a test-I/O command, presenting a status byte to the channel and setting the inhibit-status-in state in the drive.

4.5. RESET-INHIBIT-STATUS COMMAND (8407–00/01 Only) ←

The reset-inhibit-status command (20_{16}) is processed as a test-I/O command to permit the diskette drive to initiate a status sequence. A status byte is presented to the channel, and the inhibit-status-in state is reset in the drive.

4.6. NO-OPERATION COMMAND

The no-operation command (03_{16}) is used to determine whether the addressed controller is installed and the state (run or stop) of the addressed device.

- 8407–00/01

  If the addressed device is not installed, the diskette drive does not respond to the command at initial selection. If installed and the addressed device is in the run state, channel end/device status is presented without any operation being performed on the device. If the addressed controller is installed and the device is in the stop state, the command is rejected with unit check status and stop state error.

- 8407–04/05

  If the addressed device is not installed, the diskette drive responds to the command at initial selection with unit check status and *not installed* in sense data byte. If installed and the addressed device is in the run state, channel end/device end status is presented without any I/O operation being performed on the device. If the addressed controller is installed and the device is in the stop state, the command is rejected with unit check status.

  The no-operation command (73_{16}) determines whether the addressed control unit is installed.

- 8407–00/01

  If the addressed controller is not installed, the diskette drive does not respond to the command at initial selection. If the addressed controller is installed, channel end/device end status is presented without any I/O operation being performed on the device.

- 8407–04/05

  If the addressed controller is not installed, the diskette drive responds to the command at initial selection with unit check status and *not installed* in the sense data byte. If the addressed controller is installed, channel end/device end status is presented without any I/O operation being performed on the device.

4.7. RECORD-LENGTH-MODE-SET COMMAND

The record-length-mode-set command (43_{16}) sets the state in the addressed device that causes read or write commands to be terminated at record length boundaries. This command is processed as a no-operation (03_{16}) command, except that sense is cleared, channel end/device end status is presented to the channel, and the record-length-mode state is set in the diskette drive.

4.8. RECORD-LENGTH-MODE-RESET COMMAND

The record-length-mode-reset command (53_{16}) resets the state of the addressed device, causing the read or write commands to be terminated at record length boundaries. This command is processed as a no-operation (03_{16}) command, except that sense is cleared, channel end/device end status is presented to the channel, and the record-length-mode state is reset in the diskette drive.

4.9. CYLINDER-MODE-SET COMMAND

The cylinder-mode-set command ($C3_{16}$) sets the state of the addressed device, causing the read or write commands to be terminated at cylinder boundaries. This command is processed as a no-operation (03_{16}) command, except that sense is cleared, channel end/device end status is presented to the channel, and the cylinder mode state is set in the diskette drive.

4.10. CYLINDER-MODE-RESET COMMAND

The cylinder-mode-reset command ($D3_{16}$) resets the state of the addressed device, causing the read or write commands to be terminated at cylinder boundaries. This command is processed as a no-operation (03_{16}) command, except that sense is cleared, channel end/device end status is presented to the channel, and the cylinder mode state is reset in the diskette drive.

4.11. RECOVER COMMAND

The recover command (13_{16}) is part of an error recovery operation for the R, RC, W, or WC command. It causes the addressed device to be positioned back to the starting track, side, or sector of the previous read or write command. The command functions the same in both DAM and DSM modes.

Upon acceptance of this command, the diskette drive transfers the saved track, side, and sector values to the current track, side, and sector locations.

4.12. FEED COMMAND

The feed command (23_{16}) causes the autoloader mechanism to initiate an unload/load sequence of one diskette from the drive into the stacker and another diskette from the hopper into the drive. This command functions only in the DAM mode; in the DSM mode, the feed command is rejected.

4.13. UNLOAD COMMAND

The unload command (33_{16}) causes the autoloader mechanism to initiate an unload sequence of one diskette from the drive into the stacker. Unlike the feed command, this command terminates at this point, and no feeding of a diskette from the hopper is initiated. This command functions only in the DAM mode. In the DSM mode, the command is rejected when issued. (The current data set must be closed first.)

4.14. SOFTSCOPE COMMAND

The softscope command (63_{16}) is used for test and diagnostic purposes. It loads up to 768 bytes of data into the RAM buffer, which indicates the operational states of the autoloader mechanism during a feed cycle. This command functions only in the DAM mode. In the DSM mode, the softscope command is rejected.

4.15. FORMAT-WRITE COMMAND

The format-write command (11_{16}) is used to record continuous clock and data patterns onto a physical diskette track and thereby divides the track into soft sectors (the basic data-block-unit read or written by the diskette drive). This operation is also referred to as a *prep* or *initialization* of a track. This command functions only in the DAM mode; in the DSM mode, the format-write command is rejected. (The current data set must be closed first.)

4.16. WRITE COMMAND

The write command (01_{16}) writes host data onto a diskette in both DSM and DAM. As each sector of information is received, it is written onto the diskette sector pointed to by the current value of the track address register (TAR) and the side/sector address register (SSAR). This writing continues into each subsequent sector until a mode-dependent termination condition occurs, an unrecoverable error condition occurs, or the last record on the diskette is encountered.

In direct access mode, data is not written onto the diskette until a physical record has been transferred into the system buffer.

In data set mode, data is not written onto the diskette until a logical record has been transferred into the diskette drive buffer.

4.17. WRITE-CONTROL COMMAND

The write-control command (41_{16}) writes host data onto a diskette and writes a special code into the address mark field preceding this data. This code, with the character in the first position of the physical record, is used to indicate a deleted, sequentially relocated, or alternate relocated record. With the exception of writing the control address mark, the operation of the write-control command is identical to the write command.

4.18. DATA-SET-OPEN COMMAND

The data-set-open command (21_{16}) conditions the diskette drive to process a sequentially organized data set of one extent. Successful completion of this command opens a data set for processing and places the diskette drive in the data set mode (DSM). The command functions only in the direct access mode (DAM). In the DSM mode, the command is rejected because the data set will have already been opened.

4.19. DATA-SET-CLOSE COMMAND

The data-set-close command (51_{16}) is used to exit from the DSM and causes the diskette drive to enter the DAM. In addition, it permits parameters of the data set label to be updated. The command functions only in the DSM. In DAM, the command is rejected because no data set is currently open.

4.20. LOAD-TRACK/SIDE/SECTOR COMMAND

The load-track/side/sector command (31_{16}) specifies to the diskette drive the next physical sector to be subsequently processed. This command functions in both the DAM and DSM modes. Upon acceptance of the command, the drive accesses two bytes of data from the host system. The bytes are interpreted as the track number and the side/sector number. If the bytes are valid, they are loaded into the drive track address register (TAR) and side/sector address register (SSAR), respectively. If less than two bytes are accessed or any byte is out of range, the command is terminated and the appropriate status and sense is returned to the host processor.

4.21. WRITE-DISKETTE-DRIVE-BUFFERS COMMAND

The write-diskette-drive-buffers command (71_{16}) loads the diskette drive sector buffers with known data. The command functions the same in both the DAM and DSM modes.

4.22. LOAD-PHYSICAL-TRACK COMMAND

The load-physical-track command (61_{16}) is used for test or adjustment purposes. It permits the read/write head of the addressed drive to be loaded for a duration of 3 seconds at a host-designated physical track and side location. This command functions only in the DAM mode. In the DSM mode, the command is rejected.

4.23. INITIAL-LOAD COMMAND

The initial-load command (02_{16}) permits the host system to position the addressed device to the *load point* and begin reading data for IMPL and IPL purposes. This command causes the addressed drive to go into the direct access mode (DAM) and load its TAR and SSAR registers with 01_{16}. Data transfers to the host system now occur in the same manner as for the read-control command, with the starting sector being at side 0, track 1, and sector 1.

4.24. READ-VOLUME-ID COMMAND

The read-volume-ID command (56_{16}) obtains the volume ID record from side 0, track 0, and sector 7. This command can be used to determine whether the correct diskette is installed when the host receives attention status. The command functions the same in both the DAM and DSM modes. After the volume ID sector is recovered from the diskette without error, the diskette drive sends the data to the host. If the byte count is not depleted, a sector length number of bytes are sent.

4.25. FORMAT-READ COMMAND

The format-read command (16_{16}) obtains the ID field sector bytes from a particular track and side. This command can be used to determine the sector sequence on a track. This command functions only in the DAM mode. In the DSM mode, the format read command is rejected.

4.26. READ COMMAND

The read command (06_{16}) transfers diskette data from noncontrol sectors to the host system. In DAM, data is transferred to the host, beginning with the first noncontrol sector at the current values in the TAR and SSAR registers and continuing with each subsequent noncontrol sector until a mode-dependent termination condition or an unrecoverable error condition occurs. In direct access mode, an attempt is made to transfer all bytes from each noncontrol sector. In data set mode, an attempt is made to transfer only the logical record length number of bytes from each noncontrol sector.

4.27. READ-CONTROL COMMAND

The read-control command (46_{16}) transfers diskette data from all sectors to the host system. This command does not skip any records. When a control record is encountered, the data is transferred and the command is terminated with unit check status and control address mark (AM) sense. With the exception that the command terminates when a control record is encountered, the operation of the read-control command is identical to that of the read command.

4.28. READ-DISKETTE-DRIVE-AREA COMMAND

The read-diskette-drive-area command (66_{16}) is used for test and diagnostic purposes. It transfers up to 256 bytes from the diskette drive unit RAM control area to the host processor. This command functions the same in both the DAM and DSM modes.

4.29. READ-DISKETTE-DRIVE-BUFFERS COMMAND

The read-diskette-drive-buffers command (76_{16}) is used for test and diagnostic purposes. It transfers up to 768 bytes from the diskette drive RAM sector buffers area to the host processor. The command functions the same in both the DAM and DSM modes.

4.30. SET-INBOUND-TRANSLATE-MODE COMMAND

The set-inbound-translate-mode command (83_{16}) sets the mode for the addressed device in the diskette drive that causes data of the inbound commands (R, RC, RVID, RSB) to be translated.

4.31. RESET-INBOUND-TRANSLATE-MODE COMMAND

The reset-inbound-translate-mode command (93_{16}) resets the mode of the addressed device to prevent data translation of the inbound commands (R, RC, RVID, RSB).

4.32. SET-OUTBOUND-TRANSLATE-MODE COMMAND

The set-outbound-translate-mode command ($A3_{16}$) sets the mode for the addressed device to permit data translation of outbound commands (W, WC, WSB).

4.33. RESET-OUTBOUND-TRANSLATE-MODE COMMAND

The reset-outbound-translate-mode command ($B3_{16}$) resets the mode for the addressed device to prevent data translation of outbound commands (W, WC, WSB).

4.34. READ-TRANSLATE-TABLE COMMAND

The read-translate-table command (86_{16}) is used for test and diagnostic purposes. It transfers up to 512 bytes from the diskette drive translate table RAM to the host system. The first 256 bytes are the contents of the inbound translate table, and the second 256 bytes are the contents of the outbound translate table.

4.35. WRITE-TRANSLATE-TABLE COMMAND

The write-translate-table command (81_{16}) loads the diskette drive translator RAM. It provides a means of loading only the inbound translator RAM, only the outbound translator RAM, or both the inbound and outbound translator RAMs.

4.36. READ-CONTROL-UNIT-ID COMMAND (8407–00/01 Only)

The read-control-unit-ID command (54_{16}) provides informational data that permits the host software to determine the diskette drive hardware configuration.

4.37. READ-DEVICE-ID COMMAND (8407–00/01 Only)

The read-device-ID command (74_{16}) provides data that permits the host software to determine the diskette drive hardware configuration.

4.38. READ-DISPLAY COMMAND (8407–00/01 Only)

The read-display command ($D2_{16}$) is used for test and diagnostic purposes. It transfers up to 16 bytes of data that contain information about the operating state of the device. This command functions the same in both the DAM and DSM modes.

4.39. SET-1100-BYTE-COUNT-MODE COMMAND

The set-1100-byte-count-mode command ($E3_{16}$) sets the state in the addressed device, which causes read and read control commands to be terminated at the loaded byte count value. This command is processed as a no-operation command except that sense will be cleared.

4.40. RESET-1100-BYTE-COUNT-MODE COMMAND

The reset-1100-byte-count-mode command ($F3_{16}$) resets the state in the addressed device, which causes read and write control commands to be terminated at the load byte count value. This command is processed as a no-operation command except that sense will be cleared.

4.41. LOAD-1100-BYTE-COUNT COMMAND

The load-1100-byte-count command (91_{16}) loads the addressed device with a byte count value that can be used to terminate subsequent read and read control commands at this specified value. This command functions the same in both the DAM and DSM modes.

4.42. SET-DIAGNOSE COMMAND (8407–04/05 Only)

The set-diagnose command ($4B_{16}$) places a subsystem in a diagnostic mode and executes a specific subcommand operation via a command-chained read operation. The diagnostic mode is automatically terminated when:

1. command-chaining is not specified;
2. the chained command is not an 02_{16} read command; or
3. the command-chained 02_{16} read command is completed.

4.43. DIAGNOSTIC-SENSE COMMAND (8407–04/05 Only)

The diagnostic-sense command (44_{16}) recovers diagnostic related sense information. This command transfers up to 12 sense bytes to the host.

Glossary

A

AM
Address mark

B

BOE
Beginning of extent

C

CRC
Cyclic redundancy check

D

DAM
Direct access method

DSC
Data set close

DSL
Data set label

DSM
Data set mode

DSO
Data set open

E

EOD
End of data

EOE
End of extent

F

Fire code
Error detection code that detects all error bursts of 16 bits or less

FM
Frequency modulation (a single-density encoding scheme)

I

IMPL
Initial microprogram load

IPL
Initial program load

M

MB
Mode bits

MFM
Modified frequency modulation (a double-density encoding scheme)

S

SAR
Sector address register

SR
Side register

SS
Sector side

SSAR
Side/sector address register

T

TAR
Track address register

CUT

SPERRY

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