

# The IBM Diskette General Information Manual

**The IBM Diskette  
General Information Manual**

**IBM**

**Product Reference Literature**

#### **Fourth Edition (September 1977)**

This is a major revision of, and obsoletes, GA21-9182-2. This manual has been extensively revised to add information about two-sided, double-density diskettes and should be read in its entirety. Information in this publication is subject to change. Before using this publication, be sure you have the latest edition and any technical newsletters.

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This publication describes IBM diskettes. No prerequisite knowledge of diskettes is required, but a basic knowledge of data processing is assumed.

This publication provides:

- General information about diskette handling, storage, and physical features.
- The IBM diskette format for basic data exchange.
- A list of some devices that use IBM diskettes and descriptions of different types of diskettes.
- Information about diskettes and associated supplies.

#### Related Publications

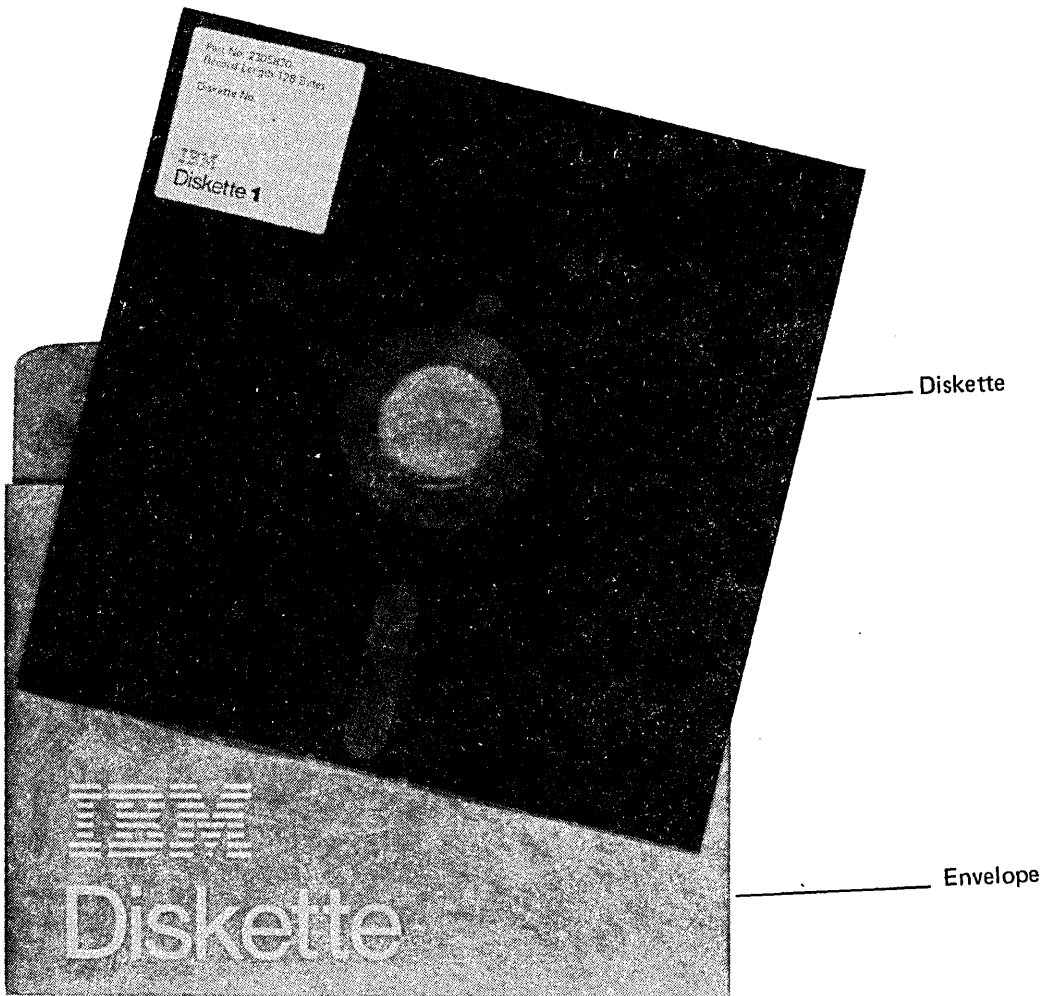
- *IBM Series/1 System Summary*, GA34-0035
- *IBM System/32 Functions Reference Manual*, GA21-9176
- *IBM System/34 Introduction*, GC21-5153
- *IBM 3540 Diskette Input/Output Unit Operator's Guide and Programmer's Reference*, GA21-9197
- *IBM 3600 Finance Communications System Programmer's Guide and Component Description*, GC27-0004
- *IBM 3740 Data Entry System System Summary and Installation Manual — Physical Planning*, GA21-9152
- *IBM 3741 Data Station Operator's Guide*, GA21-9131

- *IBM 3742 Dual Data Station Operator's Guide*, GA21-9136
- *IBM 3747 Data Converter Reference Manual and Operator's Guide*, GA21-9170
- *IBM 3770 Data Communication System — System Components*, GA27-3097
- *An Introduction to the IBM 3790 Communication System*, GA27-2767
- *IBM 3881 Optical Mark Reader Models 1, 2, and 3 Reference Manual and Operator's Guide*, GA21-9143
- *IBM 3890 Document Processor Operator's Guide*, GA24-3619
- *IBM 5230 Data Collection System User's Guide*, GA34-0040
- *IBM 7840 Film Thickness Analyzer Product Description*, GA22-7100
- *IBM 7841 Textile Color Analyzer Product Description*, GA22-7101

*Note:* This list contains selected publications for each system that uses the IBM diskette. See these manuals or the system bibliographies for other related publications.



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### BASIC CONCEPTS

An IBM diskette is a thin, flexible disk permanently enclosed in a semi-rigid, protective, plastic jacket. (When the diskette is properly inserted in the diskette drive, the disk turns freely within the jacket.) The diskette jacket contains a liner material that cleans the disk as it turns. The disk surface is coated with a magnetic recording material. Data is written on the recording surface by generating magnetically charged spots (magnetic fields) at specific locations (addresses). These addresses provide direct access to specific information. Data written at an address remains there until it has been replaced by writing new data or blanks. To read data, the desired address is found and the magnetic fields are converted back into machine readable code. Reading the diskette does not erase or change the data stored on it.

There are three basic types of diskettes:

- Diskette 1: This diskette is written on one side and is available in three formats: 128, 256, or 512 bytes per sector.
- Diskette 2: This diskette is written on both sides and is available in one format: 256 bytes per sector.
- Diskette 2D: This diskette is written in double-density encoding on both sides and is available in two formats: 256 or 1,024 bytes per sector.

Before being shipped to a user, each diskette is checked for manufacturing defects that could prevent writing or reading data accurately. The diskette is then initialized. Initialization is a process whereby label information and data addresses are recorded on the disk surface. Initialization and the format used for data exchange between devices are discussed later in this manual.

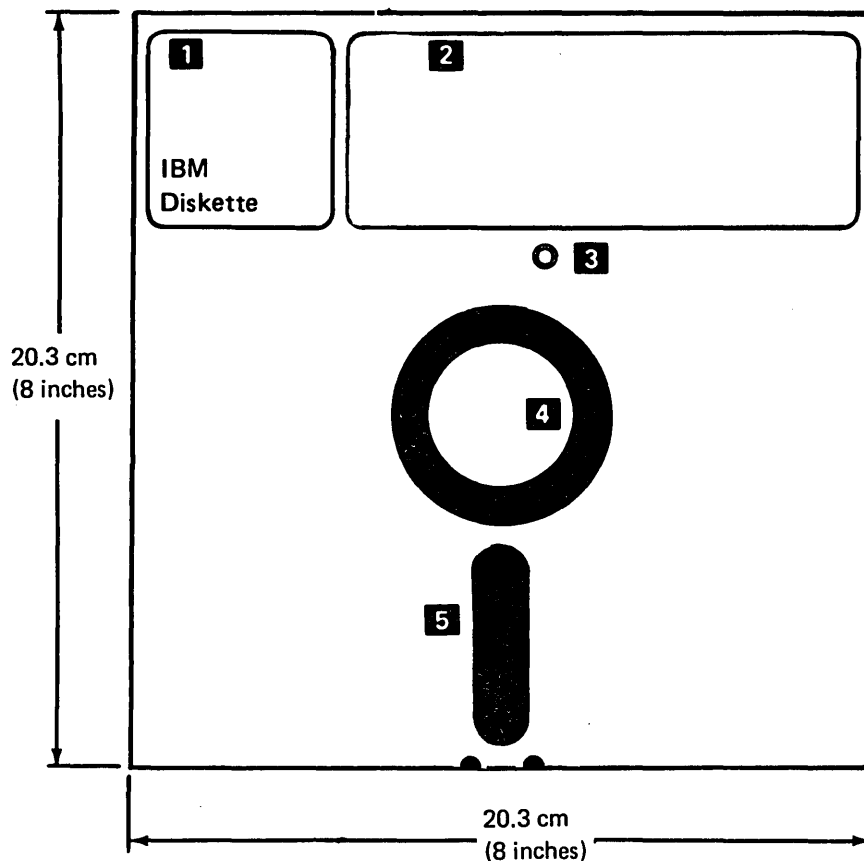
Diskettes can be used for various purposes, depending on the using system and the application. Diskettes can be used to store data for exchange between devices. Some IBM devices can also use diskettes to store control, diagnostic, and programming information that is not intended for exchange. Diskettes not used for storing data are not discussed in this manual; however, the same handling precautions apply to them.

When compared with punched cards, diskettes have the following advantages:

- A diskette can be reused to store new data after the data it contains is no longer needed. Cards cannot be reused.
- Incorrect data on a diskette can be corrected by placing correct data in the locations containing the incorrect data. Because holes are punched in cards to store data, new cards must be punched to correct errors.
- Data stored on a diskette can be more easily moved, stored, and mailed than the same amount of data stored on cards.



## PHYSICAL FEATURES



**1** Permanent Diskette Label  
Use a fiber-tip or ball-point pen on this label to record information describing the diskette and its condition. Record information such as:

- Serial number (volume ID)
- Date first used
- Location of defective cylinders

**2** Temporary Adhesive Identification Label  
Use a fiber-tip or ball-point pen on this label to record changing items such as:

- Data stored on the diskette—job numbers, names, and dates
- Who entered the data
- Date of data verification
- Device used to write the data on the diskette

Write the information on the label while the diskette is in the envelope or before attaching the label to the diskette. This reduces damage and contamination of the recording surface of the diskette. The protective envelope permits writing on the label while the diskette is in the envelope.

When starting a new job on a diskette, cross out the old information on the label—do not erase it (the dust from the erasure can get inside the protective jacket). When the label is full, remove the label and attach a new one. If new labels are pasted over old ones, the label buildup affects machine performance. Do not attach labels to the reverse side of the jacket and do not cover any of the holes.

Replace labels every six months even if they are not completely filled. Otherwise, the adhesive may harden and make the label difficult to remove.

Ten diskettes are packaged in a box. With each 10 diskettes IBM provides blank temporary labels in the following color stripes: red, blue, green, yellow, and gray. Color stripes can be used to identify certain types of information at a glance. Order additional temporary labels from your IBM IRD (Information Records Division) representative (see *Diskettes and Supplies*).

You can attach the temporary adhesive label to the protective envelope instead of the diskette. Write the diskette serial number on both the envelope and the permanent label to reduce the possibility of returning the diskette to the wrong envelope.

### **3** Index Hole

The outer circle shows a hole in the diskette jacket; the inner circle shows the index hole in the disk. When these two holes are aligned while the diskette is turning in the drive, a beam of light shines through the holes. The pictures at the right show that the index holes on one-sided and two-sided diskettes do not occupy the same location. However, regardless of their locations, the index holes are used by diskette drive timing circuits; the diskette drive also senses the index holes to determine that a diskette of the correct type has been inserted in the drive correctly.

### **4** Drive Spindle Hole

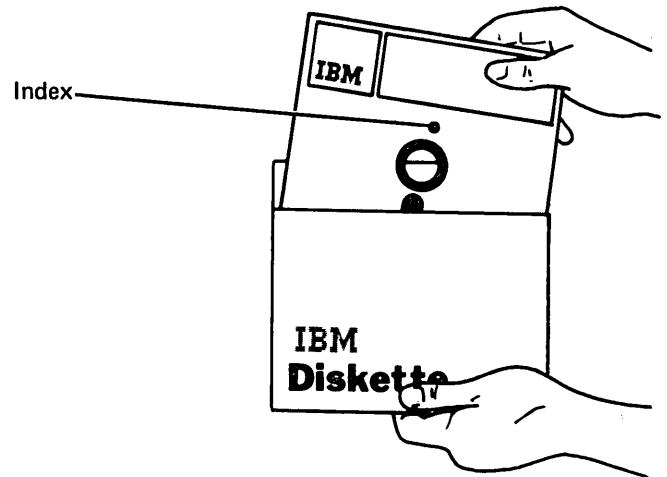
The outer circle shows the drive access opening in the diskette jacket; the inner circle shows the drive spindle hole in the disk. After the diskette is inserted, the diskette drive inserts the drive spindle in the drive spindle hole, and the drive mechanism clamps onto the portion of the disk exposed by the drive access opening.

### **5** Head Slot

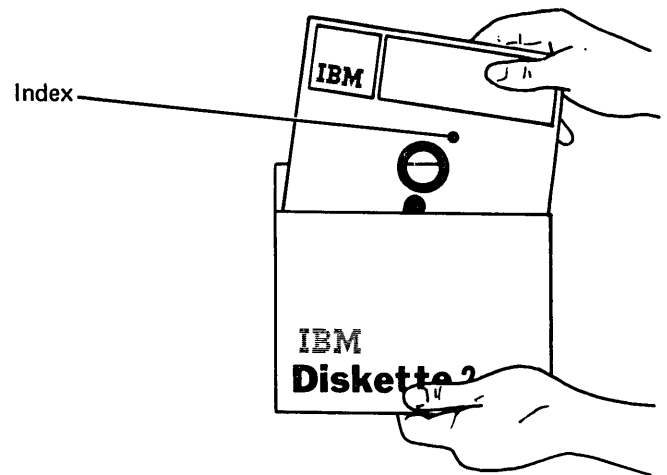
The head slot exposes the surface of the disk to the read/write mechanism. For a two-sided diskette, both surfaces are exposed to the read/write heads. Data can also be recorded on the second side, or front, of the two-sided diskette.

### **6** Stress Relief Notches

The stress relief notches in the diskette jacket aid in distributing the stress in the slot area if the diskette is bent.



One-Sided Diskette (Diskette 1)



Two-Sided Diskette (Diskette 2 or 2D)

## Diskette Handling and Care

### OPERATION

#### Diskette Insertion

##### CAUTION

If a diskette has been exposed to temperatures outside the machine's environmental range, allow five minutes for the diskette to adjust to the machine's environment. The diskette should be removed from its shipping container during this time.

1. Open the diskette drive cover.
2. Remove the diskette from its envelope by grasping its upper edge and lifting.
3. Insert the diskette into the drive by grasping the diskette by its upper edge and carefully placing it in the drive.
4. Close the cover only after the diskette has been fully inserted.

#### Diskette Removal

1. Open the diskette drive cover.
2. Remove the diskette by grasping its upper edge and lifting it straight out.
3. Slide the diskette into its envelope and return it to a clean storage area.

### DISKETTE WEAR

Because of wear, the disk surface can develop areas on which readable records cannot be written. Normally, a diskette with a defective area should be removed from service. However, some machines are capable of reinitializing a diskette and assigning up to two alternative cylinders to bypass a defective area. If this capability is used, the number of the defective cylinder should be recorded on the permanent diskette label after the diskette is reinitialized.

If diskette errors occur, you must make a decision regarding replacement of individual diskettes. The following procedures can help with this decision:

- When using a new diskette, assign a serial number to it and record that number on the diskette permanent label and in the space provided in the diskette internal label (volume ID field).
- Keep a log of diskette serial numbers and the initial date used so you can estimate wear by the diskette age. You may be able to estimate wear based on diskette age and general experience accumulated at your installation.
- Whenever a diskette error occurs repeatedly on the same cylinder, reinitialize the diskette as soon as possible. To reinitialize, first copy any useful data from the diskette. As part of the initialization routine, the device assigns cylinder and sector numbers to the diskette, bypasses the defective cylinder, and assigns the cylinder number of the defective cylinder to the next good cylinder. For two-sided diskettes, both tracks of a cylinder must be relocated if either is defective. Two defective cylinders per diskette can be replaced in this manner.
- Periodically examine the log of diskette serial numbers and the permanent labels on the diskettes. If a diskette is too old to continue using, or if there are more than two defective cylinders, replace the diskette.

### HANDLING PRECAUTIONS

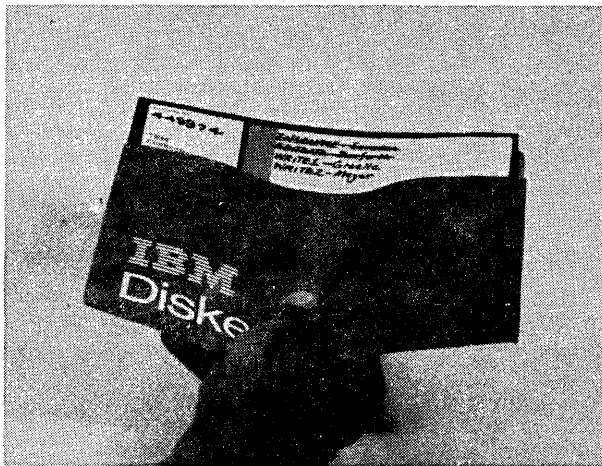
Replace the diskette if it is physically damaged (torn, folded, creased), or if the recording surface becomes contaminated. Do not use diskettes that are contaminated with sticky fluids (soft drinks, coffee) or abrasive substances (metal filings) on the recording surface. Placing a contaminated diskette in a device can contaminate the read/write head, causing operating errors. In addition, contaminants can be passed to clean diskettes. A substance spilled on the diskette jacket can be removed and the data recovered only if the contaminant does not reach the recording surface. After recovering the data, discard the diskette.

To remove a diskette from its envelope, grasp the diskette by its upper edge and pull.

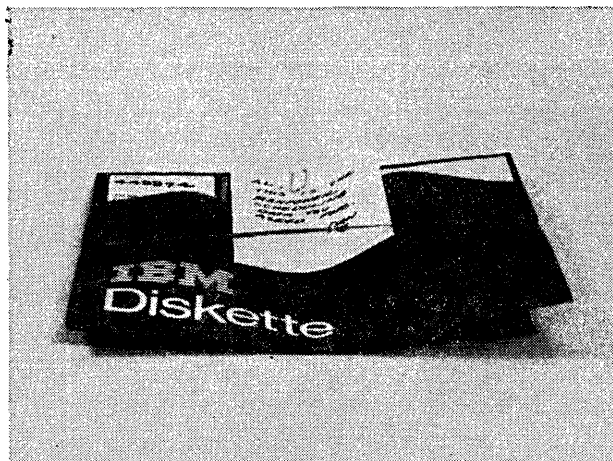


Return the diskette to its protective envelope whenever it is removed from the diskette drive and whenever you are writing on a label on the diskette.

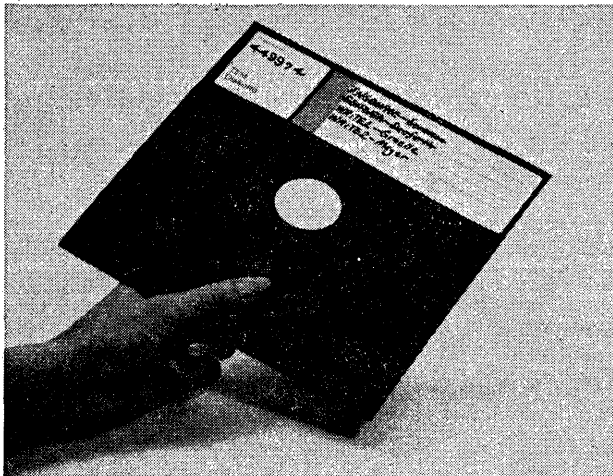
Do not bend or fold the diskette.



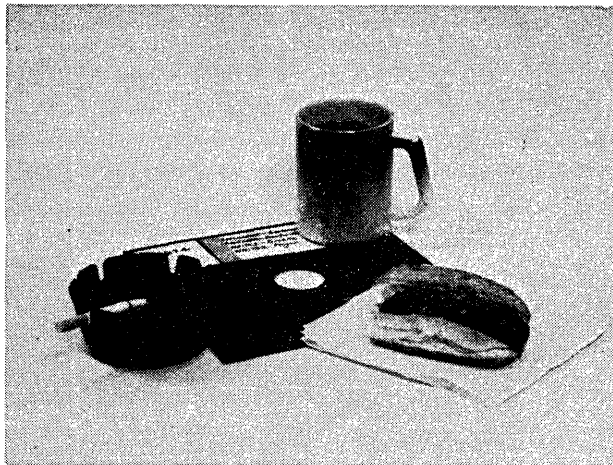
Do not use rubber bands or paper clips on the diskette.



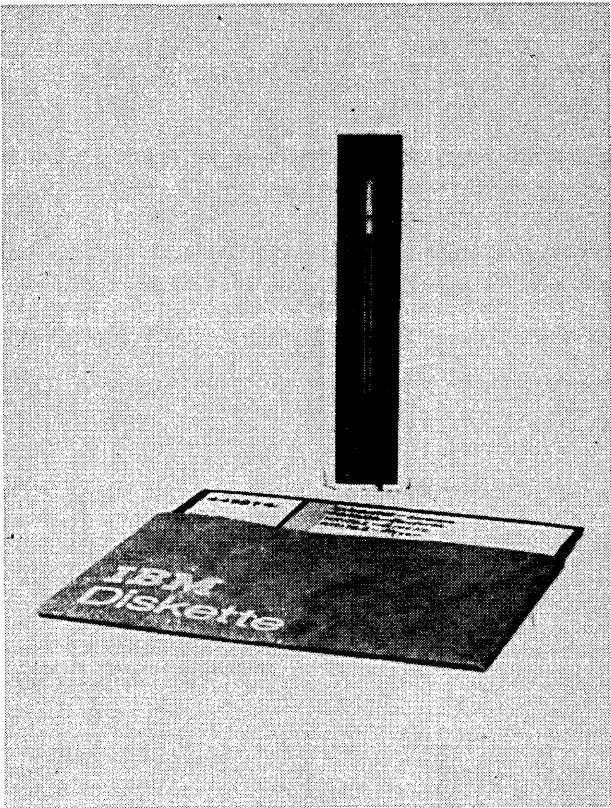
Do not touch or clean the exposed disk surface.



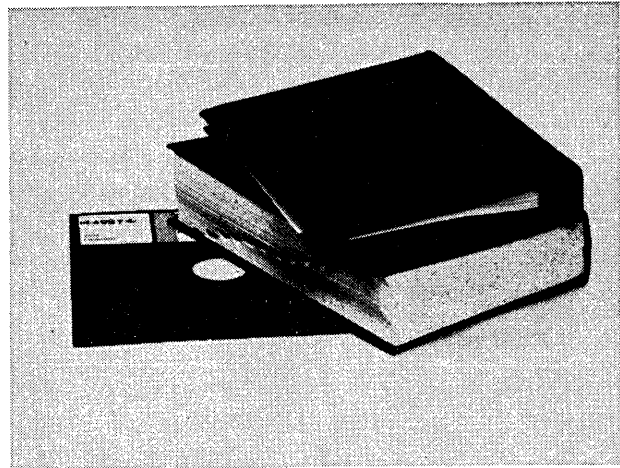
Do not smoke, eat, or drink while handling the diskette.



Do not expose the diskette to excessive heat or sunlight.

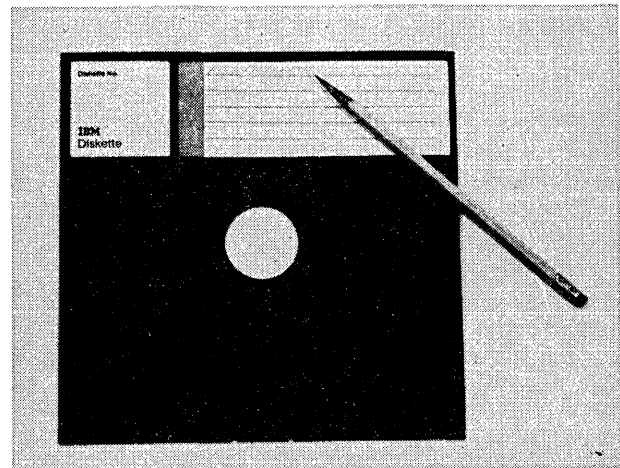
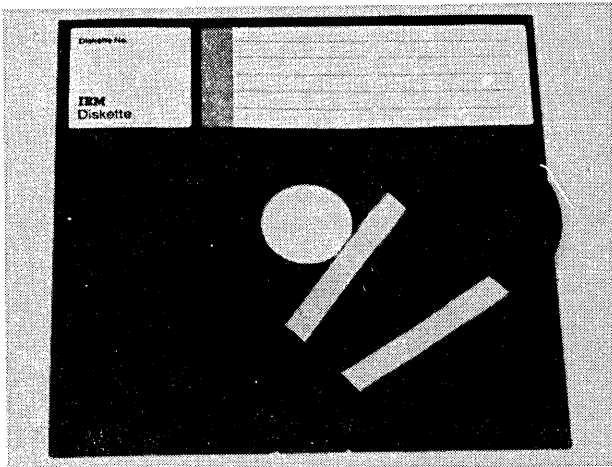


Do not place heavy objects on the diskette.



Do not erase labels attached to the diskette, or make any erasures on or near the diskette. Erasure residue could get in the diskette, and this should be avoided. To discourage erasures, IBM recommends that you use a fiber-tip or ball-point pen when marking on the diskette labels. Mark temporary labels before attaching them to the diskette. Alter temporary labels with the diskette in the envelope.

Do not use magnets or magnetized objects near the diskette. Data can be lost from a diskette that is exposed to a magnetic field.



## STORAGE

### Environment

Temperature: 10°C to 51°C (50°F to 125°F)  
Relative humidity: 8% to 80%  
Maximum wet bulb temperature: 29°C (85°F)

### Short-Term Storage

Store diskettes needed for immediate use flat in their envelopes, in stacks of 10 or less. If storing vertically, support the diskettes so they do not lean or sag.

### Long-Term Storage

Store diskettes not needed for immediate use in their original shipping cartons, with each diskette in its protective envelope. Shipping cartons can be stored either vertically or horizontally.

### CAUTION

Do not apply pressure to diskette envelopes or cartons, because pressure can warp the diskettes.

## SHIPPING AND RECEIVING

When shipping a diskette, always label the package **DO NOT EXPOSE TO HEAT OR SUNLIGHT**. When receiving a diskette, check the carton and the diskette for possible damage. Diskettes can be safely exposed to temperatures from -40°C (-40°F) to 51°C (125°F) during shipment.

To pack one diskette:

- Place the diskette in its protective envelope.
- Put the envelope in a single-diskette carton.

To pack multiples of 10 diskettes:

- Place each diskette in its protective envelope.
- Put 10 diskettes in a 10-diskette box.
- Put each 10-diskette box between spacers to prevent damage during shipping.
- Insert top and bottom pads in the carton.

- Place the 10-diskette boxes and their spacers in the appropriate size carton.
- Fill the open space in partially filled cartons and 10-diskette boxes with a filler that cannot contaminate the diskette or enter the diskette jacket.

### CAUTION

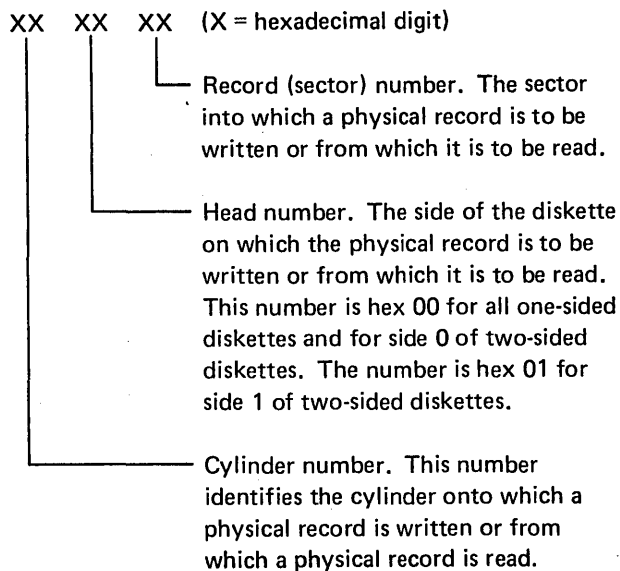
Do not use so much filler that diskettes are tightly compressed; compression can warp the diskettes.

See *Diskettes and Supplies* for a list of shipping and packing materials available from your IBM IRD representative.

## Diskette Addressing and Layout

Information is stored on a diskette as physical records in addressable locations on the recording surface of the disk. On a one-sided diskette, data is recorded on only one side of the disk; on a two-sided diskette, data is recorded on both sides.

The location on the disk surface where physical records can be written and from which physical records can be read is called an address. This address consists of a combination of cylinder number, head number, and record number as follows:



### Record

A record is a collection of related items of data, treated as a unit; for example, one line of an invoice may form a record.

### Physical Record

A physical record is one or more records written within one sector on a track.

### Track

A track is the recording area on a single diskette recording surface that passes the read/write head while the disk makes a complete revolution. The read/write head is held by a carriage that can be moved to 77 distinct locations along a straight line from the center of the disk. Therefore, each recording surface of the diskette has 77 concentric tracks on which data can be stored. The diskette drive for two-sided diskettes has a read/write head on each side. Each track on side 0 of a two-sided diskette has an associated track on side 1.

### Cylinder

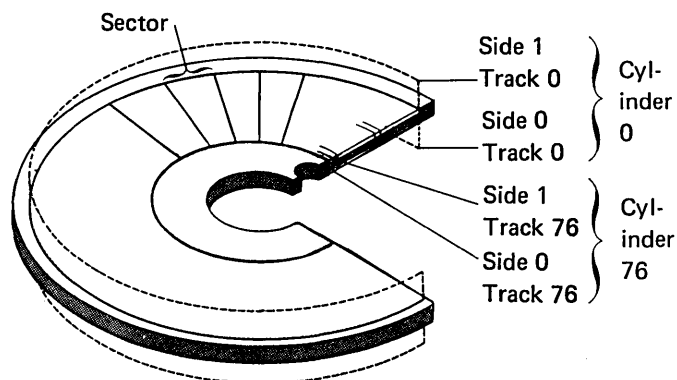
The diskette provides two recording surfaces (one recording surface on a one-sided diskette) separated by the base material of the diskette. If you mentally enlarge a cross section of a diskette (see drawing), you can see that a track on one side is opposite a track on the other side. These two tracks form a cylinder; hence, the cylinder concept. On a two-sided diskette, a numbered track on one side is duplicated by a numbered track on the opposite side. For example, track 01 on side 0 of the diskette is in about the same location as track 01 on side 1 of the diskette. Thus, if a vertical line were passed through each of these tracks, and then moved around the diskette following the tracks, the geometric figure formed by the path of the line would be a cylinder.

For purposes of consistency, the name cylinder is also used for track location on a one-sided diskette.

The importance of cylinders is better understood by considering how they are used. It takes time for the access mechanism to move heads to a different cylinder. Selecting a head is controlled electronically and, thus, is instantaneous by comparison. While reading or writing, a device can call out a cylinder once and, by selecting heads, can read or write on both tracks of a cylinder. For example, you can select head 0 to read all the data from a track on one side of the diskette and then select head 1 to read all the data from the opposite track. This way, two tracks of data can be read continuously without the time delay necessary for the access mechanism to move the heads to another cylinder. This is the advantage of the cylinder concept.

## Sector

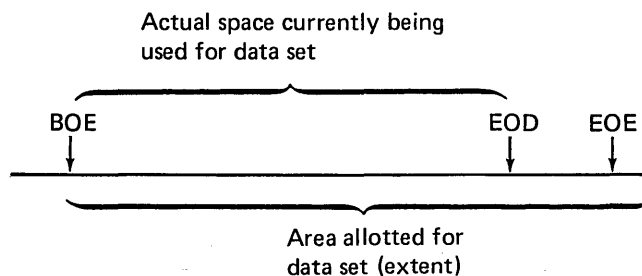
A sector is a fixed location on a track and is addressable. Only one physical record can be written into or read from a sector; therefore, sector number and record number are the same for a physical record. All sectors on a single track are the same size. The number of sectors on cylinders 1 through 76 depends on the diskette type (Diskette 1, 2, or 2D) and on the number of bytes per sector for that diskette. Cylinder 0, side 0 always contains 26 sectors (128 bytes per sector).



**Logical Organization of the Tracks Forming a Cylinder**  
(Diskette 2 or Diskette 2D; Diskette 1 uses side 0 only)

## Index Cylinder

Cylinder 0 is called the index cylinder, and is reserved for information that describes the diskette and its contents. Cylinder 0 contains information about the diskette, such as volume and owner identification (see *Index Cylinder Layout*). The index cylinder also contains information associated with each group of records (data set) on the diskette. This information includes the name of each data set and the addresses associated with the data set extents. An extent is the maximum space a data set can occupy. The address at the beginning of this space is called the beginning of extent (BOE). The address at the end of this space is called the end of extent (EOE). A data set may not use all of the space allotted for it by the BOE and EOE addresses; therefore, another address for end of data (EOD) exists (see the following example). The EOD address is used to identify the next unused area within the extent or to indicate that data has been written to the EOE address.

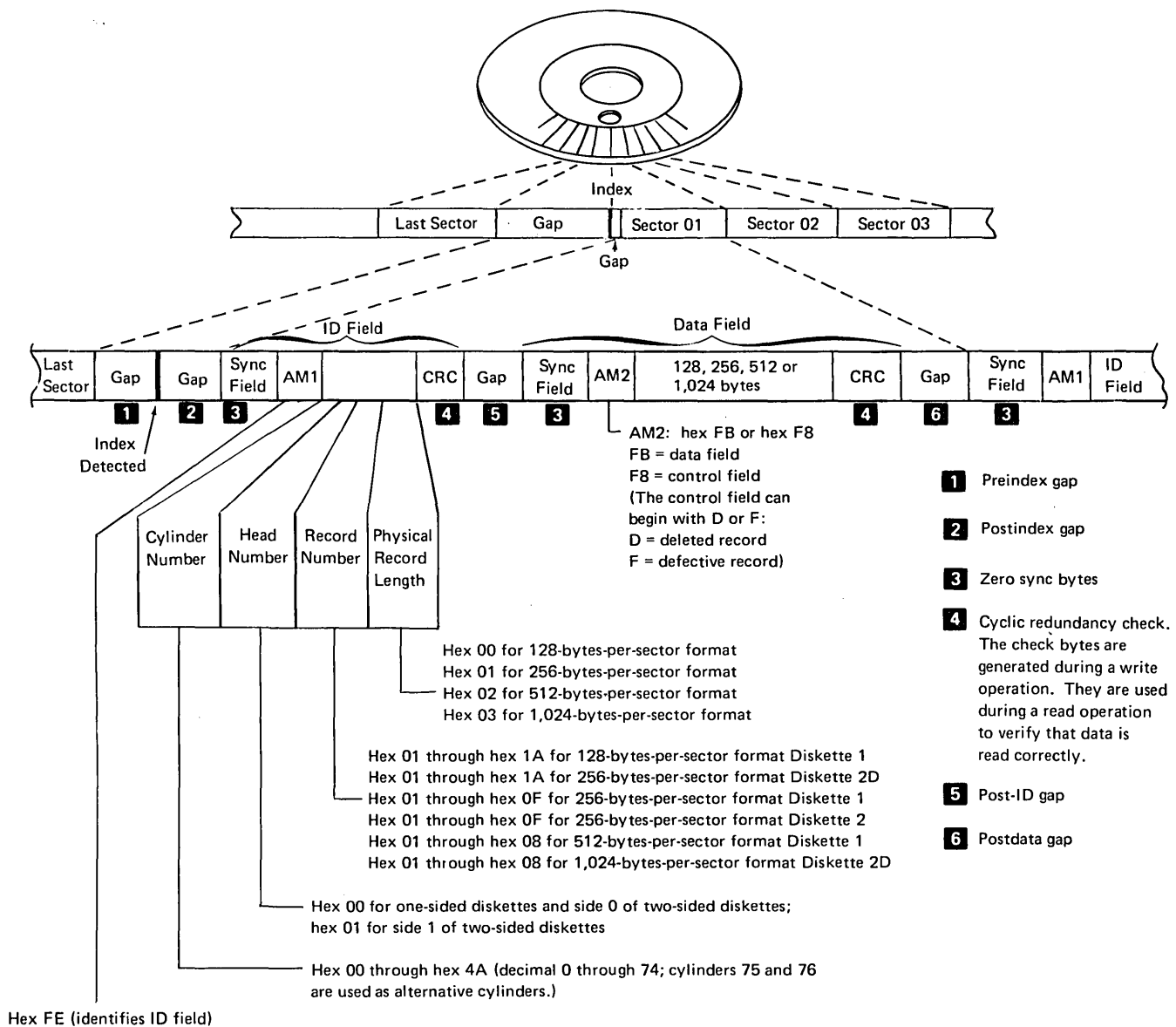


## Alternative Cylinders

The last two cylinders (75 and 76) are reserved for use as replacements (alternative cylinders) for defective cylinders. Cylinders 1 through 74 can be used for storing data.



## TRACK FORMAT



## INDEX CYLINDER LAYOUT

Use this chart in conjunction with the reference manual for the device(s) that use the diskette.

<p>The characters in the <i>Initialized To</i> column apply to various types of diskettes as follows: no number in parentheses, the character appears in all diskettes; (128), the character appears in all 128-bytes-per-sector diskettes; (256-1), the character appears in all 256-bytes-per-sector, one-sided diskettes; (512-1), the character appears in all 512-bytes-per-sector, one-sided diskettes; (256-2), the character appears in all 256-bytes-per-sector, two-sided diskettes; (256-D), the character appears in all 256-bytes-per-sector, double-density diskettes; (1,024-2D), the character appears in all 1,024-bytes-per-sector, double-density diskettes.</p>			
Side	Sector	Positions and Use	Initialized To
0	01	Positions 1-80 are reserved for IPL and IMPL.	Hex 40
		Positions 81-128 are reserved for IPL and IMPL.	Hex 00
0	02	Positions 1-80 are reserved for IPL and IMPL.	Hex 40
		Positions 81-128 are reserved for IPL and IMPL.	Hex 00
0	03	Positions 1-80 are reserved for system scratch.	Hex 40
		Positions 81-128 are reserved for system scratch.	Hex 00
0	04	Positions 1-80 are reserved.	Hex 40
		Positions 81-128 are reserved.	Hex 00
0	05	Positions 1-5 = ERMAP. (ERMAP is a label that identifies this record as an error map.)	ERMAP
		Position 6 is a separator and contains a blank.	Hex 40
		Positions 7-8 contain blanks if no defective cylinders exist. If defective cylinders exist, positions 7-8 contain the number of the first defective physical cylinder.	Hex 40
		Position 9 is a blank if no defective cylinder exists. If one or more defective cylinders exist, position 9 contains a zero.	Hex 40
		Position 10 is a separator and contains a blank.	Hex 40
		Positions 11-12 contain blanks if one or no defective cylinder exists. If more than one defective cylinder exists, positions 11-12 contain the number of the second defective physical cylinder.	Hex 40
		Position 13 is a blank if one or no defective cylinder exists. If more than one defective cylinder exists, position 13 contains a zero.	Hex 40
		Position 14 is a separator and contains a blank.	Hex 40
		Positions 15-22 are reserved.	Hex 40

Side	Sector	Positions and Use	Initialized To
0	05 (cont'd)	Position 23 is the diskette defect indicator. It contains a blank to indicate that no defective records to be handled by the alternative physical record method are contained within the data portion of any data set extent on the volume. At least one such defective record exists if position 23 contains a D.	Hex 40
		Position 24 is the error directory indicator. It contains a blank to indicate that no format or location for alternative physical record relocation has been previously specified. B or C indicates the defective physical records have had their contents relocated to a data set named ERRORSET. B indicates the addresses of the defective physical records have been recorded in the error directory in the discontinuous binary format (OCHR). C indicates that the addresses of the defective physical records have been recorded in the error directory in the character decimal format (bCCHRR).	(128) = Hex 40 (256-1) = Hex C2 (512-1) = Hex 40 (256-2) = Hex C2 (256-2D) = Hex 40 (1,024-2D) = Hex 40)
		Positions 25-72 are the error directory. This directory contains entries of addresses of physical records containing one or more defects. In the discontinuous binary format (OCHR), this field can contain addresses of up to 12 relocated physical records. In the character decimal format (bCCHRR), this field can contain the address of up to 8 relocated physical records. The relocated records are contained in a data set named ERRORSET in the same sequence as the addresses in the directory. Unused positions of the error directory must contain binary zeros if position 24 contains a B. If position 24 contains a C, unused portions of the error directory must contain blanks.	(128) = Hex 40 (256-1) = Hex 00 (512-1) = Hex 40 (256-2) = Hex 00 (256-2D) = Hex 40 (1,024-2D) = Hex 40
		Positions 73-80 are reserved.	Hex 40
		Positions 81-128 are padded.	(128) = Hex 00 (256-1) = Hex 00 (512-1) = Hex 00 (256-2) = Hex 00 (256-2D) = Hex 40 (1,024-2D) = Hex 40
0	06	Positions 1-80 are reserved.	Hex 40
		Positions 81-128 are reserved.	Hex 00
0	07	This sector is called the volume label. Various fields in this sector identify the diskette: the owner, security, sequence, and length of physical records.	
		Positions 1-4 identify the sector as a volume label.	VOL1
		Positions 5-10 are called the volume identifier. This field can contain the same volume identifier (serial number) that is written on the diskette permanent label. The ID consists of one to six digits or letters. The first character must be in position 5 of the sector, and any unused positions in the field to the right of the ID data must be blanks. No blanks are allowed between digits or letters in this field. When the diskette is initialized by an IBM device, this field will contain the value specified as part of the initialization procedure.	IBMIRD

Side	Sector	Positions and Use	Initialized To
0	07 (cont'd)	Position 11 is the volume accessibility field. A blank in this field permits access to the diskette. Any nonblank character in this field means additional qualifications are required for further access.	Hex 40
		Positions 12-37 are reserved.	Hex 40
		Positions 38-51 are called the owner identifier field. This field is not used by some systems.	Hex 40
		Positions 52-71 are reserved.	Hex 40
		Position 72 is called the volume surface indicator and contains either a blank, a 2, or an M. A blank indicates there is one recording surface; 2 indicates there are two recording surfaces; M indicates there are two double-density recording surfaces.	(128) = Hex 40 (256-1) = Hex 40 (512-1) = Hex 40 (256-2) = Hex F2 (256-2D) = Hex D4 (1,024-2D) = Hex D4
		Position 73 is the extent arrangement indicator and contains a blank or a P. A blank indicates there are no special constraints on the arrangement of extents, data set labels, or unallocated space on this diskette. P indicates the extents must be adjacent and must begin at cylinder 1, head 0, sector 1. P also indicates that the data set labels must begin at cylinder 0, head 0, sector 8 and must be in the same sequence as the extents they describe. P also indicates that all unallocated space must follow the last data set extent on the volume. If any unused space is created elsewhere, the extents must be rearranged to eliminate the space or this field must be changed to a blank.	Hex 40
		Position 74 is the special requirements indicator and contains a blank or an R. A blank indicates that there are no special requirements for accessing data on this volume. R indicates that some of the data sets were recorded in a logically nonsequential manner.	Hex 40
		Position 75 is reserved.	Hex 40
		Position 76 identifies the length of the physical record (sector) on cylinders 1 through 76, and contains a blank, 1, 2, or 3:  Blank = 128 bytes 1 = 256 bytes 2 = 512 bytes 3 = 1,024 bytes	(128) = Hex 40 (256-1) = Hex F1 (512-1) = Hex F2 (256-2) = Hex F1 (256-2D) = Hex F1 (1,024-2D) = Hex F3
		Positions 77-78 are the physical record (sector) sequence code. This field contains blanks or the characters 01 through 13 and indicates the physical sequence of the sectors. A blank or 1 indicates the sectors are physically sequential. Otherwise, this field is used as an increment to determine the next physical sector. Diskettes initialized on an IBM device may have a value specified as part of the initialization procedure.	Hex 40
		Position 79 is reserved.	Hex 40

Side	Sector	Positions and Use	Initialized To
0	07 (cont'd)	Position 80 is the label standard version field. W indicates that IBM standard labels are on the diskette.	W
		Positions 81-128 are padded.	(128) = Hex 00 (256-1) = Hex 00 (512-1) = Hex 00 (256-2) = Hex 00 (256-2D) = Hex 40 (1,024-2D) = Hex 40
0	8-26	These sectors are used to record the data set labels that define the data sets recorded on cylinders 01 through 74 of the diskette. Sectors 09 through 26 on side 0 and sectors 01 through 26 on side 1 are initialized as deleted records. (See <i>Data Set Label Layout</i> .)	See <i>Data Set Label Layout</i>
1	1-26		

## DATA SET LABEL LAYOUT

Use this chart in conjunction with the reference manual for the device(s) that use the diskette.

<p>The values shown in the <i>Field in Unused New Diskette Contains this Data</i> column are character representations that apply to the various types of diskettes as follows: no number in parentheses, the characters appear in all diskettes; (128), the characters appear in all 128-bytes-per-sector diskettes; (256-1), the characters appear in all 256-bytes-per-sector, one-sided diskettes; (512-1), the characters appear in all 512-bytes-per-sector, one-sided diskettes; (256-2), the characters appear in all 256-bytes-per-sector, two-sided diskettes; (256-2D), the characters appear in all 256-bytes-per-sector, double-density diskettes; (1,024-2D), the characters appear in all 1,024-bytes-per-sector, double-density diskettes.</p>				
Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data	
Position	Label	Description	Sector 08, Side 0	Sectors 09-26, Side 0 and Sectors 01-26, Side 1
1-4	Label ID (identifier)	Label identifier for system application.	HDR1	(128) = DDR1 (256-1) = Dbbb (512-1) = DDR1 (256-2) = Dbbb (256-2D) = DDR1 (1,024-2D) = DDR1
5		Position 5 is reserved	b	b
6-22  H	Data set identifier  Data sets	User name for data set. It must be 1 to 17 characters. The first character must be in position 6 and must be alphabetic. No blanks are allowed between characters. Duplicate names are not permitted on the same diskette. For basic data exchange and type only the first 8 characters are used. The names ERRORSET, SYSAREA, and ERMAP are reserved for special use.	DATAb...b	(128) = DATA09b...b through DATA26b...b (256-1) = b...b (512-1) = DATA09b...b through DATA26b...b (256-2) = b...b (256-2D) = DATA09b...b through DATA26b...b and DATA27b...b through DATA77b...b (1,024-2D) = DATA09b...b through DATA26b...b and DATA27b...b through DATA77b...b
23-27	Block length	This field contains a numeric value (1-32767) that specifies the maximum number of characters per block. At label creation, the contents must be entered. Blocks must begin on physical record boundaries. For a basic exchange data set, this field must be 1-128. For a type H data set, this field must be 1-256.	(128) = bbb080 (256-1) = 00256 (512-1) = bbb512 (256-2) = 00256 (256-2D) = bbb256 (1,024-2D) = b1024	(128) = bbb080 (256-1) = bbbbbb (512-1) = bbb512 (256-2) = bbbbbb (256-2D) = bbb256 (1,024-2D) = b1024

Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data	
Position	Label	Description	Sector 08, Side 0	Sectors 09-26, Side 0 and Sectors 01-26, Side 1
28	Record attribute	<p>Indicates blocking used within the data set. When the exchange type indicator (position 44) is a blank or H, this field must be a blank.</p> <p> b = Records unblocked, unspanned  R = Records blocked, spanned  B = Records blocked, unspanned </p>	b	b
29-33	Beginning of extent (BOE)	<p>Identifies the address of the first sector of the data set. Positions 29-30 contain the cylinder number, position 31 contains the head number, and positions 32-33 contain the sector number. (Some systems use a logical record number. In this case, position 74 of the volume label contains an R.)</p>	01001	(128) = 74001 (256-1) = bbbbbb (512-1) = 75001 (256-2) = bbbbbb (256-2D) = 75001 (1,024-2D) = 75001
34	Physical record length	<p>Indicates physical record length:</p> <p> b = 128 bytes per record  1 = 256 bytes per record  2 = 512 bytes per record  3 = 1,024 bytes per record </p> <p>The value in this field must be the same as position 76 of the volume label. When the exchange type indicator (position 44) is a blank, this field must be a blank. When position 44 is H, this field must be a 1.</p>	(128) = b (256-1) = 1 (512-1) = 2 (256-2) = 1 (256-2D) = 1 (1,024-2D) = 3	(128) = b (256-1) = b (512-1) = 2 (256-2) = b (256-2D) = 1 (1,024-2D) = 3
35-39	End of extent (EOE)	<p>Identifies the address of the last sector reserved for this data set, using the same format as BOE.</p>	(128) = 73026 (256-1) = 74015 (512-1) = 74108 (256-2) = 74115 (256-2D) = 74126 (1,024-2D) = 74108	(128) = 73026 (256-1) = bbbbbb (512-1) = 74108 (256-2) = bbbbbb (256-2D) = 74126 (1,024-2D) = 74108
40	Record/block format	<p>This field contains a blank or F and indicates fixed-length records in fixed blocks. When the exchange type indicator (position 44) is a blank or H, this field must be blank.</p>	b	b

Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data	
Position	Label	Description	Sector 08, Side 0	Sectors 09-26, Side 0 and Sectors 01-26, Side 1
41	Bypass indicator	Indicates a data set to be skipped during exchange or copy operations when transmitting or transferring the data sets on the volume. If set to a blank, the data set is transferred; if set to B, the data set is not transferred.	b	b
42	Data set security	A blank indicates the data set is not secured (can be accessed). A nonblank character means restricted access. When nonblank, the volume accessibility indicator in the volume label (track 00, sector 07) must also be nonblank.	b	b
43	Write protect	If this data set contains a P, the data set can be read only. This field must be a blank to allow both reading and writing.	b	b
44	Exchange type indicator	A blank indicates the data set can be used for basic data exchange; H indicates the data set is a type H data set. Any other value indicates that additional label checking must be performed in order to exchange the data set (see <i>Basic Data Exchange</i> and <i>Type H Data Exchange</i> ).	(128) = b (256-1) = E (512-1) = E (256-2) = E (256-2D) = H (1,024-2D) = E	(128) = b (256-1) = b (512-1) = E (256-2) = b (256-2D) = H (1,024-2D) = E
45	Multi-volume indicator	A blank in this field indicates a data set is wholly contained on this diskette; C indicates a data set is continued on another diskette; L indicates the last diskette on which a continued data set resides.	b	b
46-47	Volume sequence number	Specifies the sequence of volumes in a multivolume data set. The sequence must be consecutive, beginning with 01 (to a maximum of 99). Blanks indicate that volume sequence checking is not to be performed on this volume and all subsequent volumes of a multivolume data set.	bb	bb



Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data	
Position	Label	Description	Sector 08, Side 0	Sectors 09-26, Side 0 and Sectors 01-26, Side 1
48-53	Creation date	May be used to record the date the data set was created. The format is YYMMDD, where YY is the low-order 2 digits of the year, MM is a 2-digit representation of the month, and DD is a 2-digit representation of the day of the month. Blanks indicate that the creation date is not significant.	bbbbbb	bbbbbb
54-57	Record length	At label creation, record length must be defined. A blank means the record length equals the block length defined in position 23. (A blank or H in position 44 also means record length equals block length; therefore, this field can be ignored.)	bbbb	bbbb
58-62	Offset to next record space	This field indicates the starting position for the next sequential record relative to the end of the last block before EOD (end of data) and contains blanks or a decimal value to be used as a negative displacement. Blanks mean zero displacement from the next block (starts at EOD address). This field is used only in conjunction with blocked records.	bbbb	bbbb
63-66		Positions 63-66 are reserved.	bbbb	bbbb
67-72	Expiration date	May be used to contain the date the data set (and its label) may be deleted. The format is the same as creation date (positions 48-53). All blanks indicate the data set is considered expired. All 9s indicate the data set will never expire.	bbbbbb	bbbbbb

Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data	
Position	Label	Description	Sector 08, Side 0	Sectors 09-26, Side 0 and Sectors 01-26, Side 1
73	Verify/ copy indicator	This field must contain a blank, V, or C. A blank must be entered here when the data set is created. Systems that support verification enter a V to indicate the data set has been verified. Systems that support copy verification enter a C to indicate the data has been successfully transferred to another medium (for example, tape, transmission network). Do not enter C for partial data set copy or for null data set.	ḡ	ḡ
74	Data set organization	This field must contain a blank, S, or D. A blank or S indicates sequential organization. D means some organization that does not permit the sequential relocation method of processing defective physical records. When the exchange type indicator (position 44) is a blank or H, this field must contain a blank.	ḡ	ḡ
75-79	End of data (EOD)	Identifies the address of the next unused sector within the data set extent, using the same format as BOE. If this field is the same as BOE, the extent contains a null data set. If this field contains the address of the next block beyond the extent (for unblocked, unspanned records), the entire extent has been used. For blocked or spanned records, this field must be used with offset to next record space (positions 58-62) to determine the end of actual data recorded.	01001	(128) = 74001 (256-1) = ḡḡḡḡḡ (512-1) = 75001 (256-2) = ḡḡḡḡḡ (256-2D) = 75001 (1,024-2D) = 75001
80		Position 80 is reserved.	ḡ	ḡ
81-128		Positions 81-128 are padded.	(128) = Hex 00 (256-1) = Hex 00 (512-1) = Hex 00 (256-2) = Hex 00 (256-2D) = Hex 40 (1,024-2D) = Hex 40	(128) = Hex 00 (256-1) = Hex 00 (512-1) = Hex 00 (256-2) = Hex 00 (256-2D) = Hex 40 (1,024-2D) = Hex 40

Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data
The following positions apply only to the double-density diskettes (2D), Side 1:			
Position	Label	Description	Sectors 01-26, Side 1
129-132		Same as positions 1-4.	(256-2D) = DDR1 (1,024-2D) = DDR1
133		Same as position 5.	
134-15		Same as positions 6-22.	(256-2D) = DATA28... through DATA78... (1,024-2D) = DATA28... through DATA78...
151-155		Same as positions 23-27.	(256-2D) = 256 (1,024-2D) = 1024
156		Same as position 28.	
157-161		Same as positions 29-33.	(256-2D) = 75001 (1,024-2D) = 75001
162		Same as position 34.	(256-2D) = 1 (1,024-2D) = 3
163-167		Same as positions 35-39.	(256-2D) = 74126 (1,024-2D) = 74108
168		Same as position 40.	
169		Same as position 41.	
170		Same as position 42.	
171		Same as position 43.	
172		Same as position 44.	(256-2D) = H (1,024-2D) = E
173		Same as position 45.	
174-175		Same as positions 46-47.	
176-181		Same as positions 48-53.	
182-185		Same as positions 54-57.	
186-190		Same as positions 58-62.	
191-194		Same as positions 63-66.	

Specification (by Character Position) of Data Set Label Contents			Field in Unused New Diskette Contains this Data
Position	Label	Description	Sectors 01-26, Side 1
195-200		Same as positions 67-72.	bbbbbb
201		Same as position 73.	b
202		Same as position 74.	b
203-207		Same as positions 75-79.	(256-2D) = 75001 (1,024-2D) = 75001
208		Same as position 80.	b
209-256		Same as positions 81-128.	(256-2D) = Hex 40 (1,024-2D) = Hex 40

## Diskette Types

### DISKETTE 1

#### One-Sided, 128-Bytes-Per-Sector Diskette

The 128-bytes-per-sector diskette (IBM PN 2305830) can be used on such devices as the following:

- IBM 3540 Diskette Input/Output Unit
- IBM 3601 Finance Communication Controller
- IBM 3602 Finance Communication Controller
- IBM 3741 Data Station
- IBM 3742 Dual Data Station
- IBM 3747 Data Converter
- IBM 3773 Communication Terminal
- IBM 3774 Communication Terminal
- IBM 3775 Communication Terminal
- IBM 3776 Communication Terminal
- IBM 3777 Communication Terminal
- IBM 3791 Controller
- IBM 3881 Optical Mark Reader, Model 3
- IBM 3890 Document Processor
- IBM 4962 Disk Storage Unit, Models 2, 2F, and 4
- IBM 4964 Diskette Unit
- IBM 5231 Controller, Model 2
- IBM 5320 System Unit—System/32
- IBM 5340 System Unit—System/34
- IBM 7840 Film Thickness Analyzer
- IBM 7841 Textile Color Analyzer

This diskette has 77 tracks (00 through 76), with 26 sectors per track and one track per cylinder. Each sector is 128 bytes in length. Cylinders 1 through 74 are available for user data providing 1,924 sectors or 246,272 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

When this diskette is used for basic data exchange, 73 cylinders (1 through 73) are used. Cylinder 74 is not used. A basic data exchange diskette provides 1,898 sectors or 242,944 bytes.

#### One-Sided, 256-Bytes-Per-Sector Diskette

The 256-bytes-per-sector diskette (IBM PN 2305845) can be used on the following devices:

- IBM 3601 Finance Communication Controller, Models 1, 2A, and 3A
- IBM 3602 Finance Communication Controller
- IBM 3791 Controller

This diskette has 77 tracks (00 through 76), with one track per cylinder. The index cylinder (00) consists of 26 sectors with 128 bytes per sector. Cylinders 1 through 76 have 15 sectors per cylinder. Each sector is 256 bytes in length. Cylinders 1 through 74 are available for user data. This provides 1,110 sectors or 284,160 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

#### One-Sided, 512-Bytes-Per-Sector Diskette

The 512-bytes-per-sector diskette (IBM PN 1669954) can be used on the following devices:

- IBM 5320 System Unit—System/32
- IBM 5340 System Unit—System/34
- IBM 7840 Film Thickness Analyzer
- IBM 7841 Textile Color Analyzer

This diskette has 77 tracks (00 through 76), with one track per cylinder. The index cylinder (00) consists of 26 sectors with 128 bytes per sector. Cylinders 1 through 76 have 8 sectors per cylinder. Each sector is 512 bytes in length. Cylinders 1 through 74 are available for user data. This provides 592 sectors or 303,104 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

## **DISKETTE 2**

### **Two-Sided, 256-Bytes-Per-Sector Diskette**

The two-sided, 256-bytes-per-sector diskette (IBM PN 2736700) can be used on the following devices:

- IBM 3601 Finance Communication Controller, Models 2B and 3B
- IBM 3602 Finance Communication Controller, Models 1A and 1B
- IBM 4962 Disk Storage Unit, Models 2, 2F, and 4
- IBM 4964 Diskette Unit

This diskette has 77 cylinders (00 through 76). The index cylinder (00) consists of twenty-six 128-byte sectors on each side of the diskette for a total of 52 sectors. Cylinders 1 through 76 each have fifteen 256-byte sectors on each side of the diskette for a total of 30 sectors per cylinder. Cylinders 1 through 74 are available as primary cylinders for data. This provides 2,220 sectors or 568,320 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

## **DISKETTE 2D**

### **Two-Sided, Double-Density, 256-Bytes-Per-Sector Diskette**

The two-sided, double-density, 256-bytes-per-sector diskette (IBM PN 1766872) can be used on the IBM 5340 System Unit—System/34, Models A21, A22, A23, B21, B22, B23, C21, C22, and C23.

This diskette has 77 cylinders (00 through 76). The index cylinder (00) consists of twenty-six 128-byte sectors on side 0 and twenty-six 256-byte sectors on side 1 for a total of 52 sectors. Each 256-byte sector on cylinder 0 contains two 128-byte data set labels. Cylinders 1 through 76 each have twenty-six 256-byte sectors on each side of the diskette for a total of 52 sectors per cylinder. Cylinders 1 through 74 are available as primary cylinders for data. This provides 3,848 sectors or 985,088 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

### **Two-Sided, Double-Density, 1,024-Bytes-Per-Sector Diskette**

The two-sided, double-density, 1,024-bytes-per-sector diskette (IBM PN 1669045) can be used on the IBM 5340 System Unit—System/34, Models A21, A22, A23, B21, B22, B23, C21, C22, and C23.

This diskette has 77 cylinders (00 through 76). The index cylinder (00) consists of twenty-six 128-byte sectors on side 0 and twenty-six 256-byte sectors on side 1 for a total of 52 sectors. Each 256-byte sector on cylinder 0 contains two 128-byte data set labels. Cylinders 1 through 76 each have eight 1,024-byte sectors on each side of the diskette for a total of 16 sectors per cylinder. Cylinders 1 through 74 are available as primary cylinders for data. This provides 1,184 sectors or 1,212,416 bytes. Cylinders 75 and 76 are reserved for alternative cylinder assignment.

## Data Exchange

### BASIC DATA EXCHANGE

Basic exchange data sets have requirements assuring that diskettes may be exchanged between systems capable of reading and writing Diskette 1.

For basic exchange data sets, the exchange type indicator (data set label position 44) must be blank. This means:

- The data set is organized sequentially.
- The records are a maximum of 128 bytes long.
- The records are of fixed length, unblocked, and unspanned.
- The physical record length is 128 bytes.
- The data set identifier (data set label positions 6-22) is not longer than 8 positions.

In addition, a diskette containing basic exchange data sets must:

- Be initialized with physically sequential records (volume label positions 77-78 = bb or 01).
- Have the basic exchange data sets only on tracks 1 through 73.
- Not use alternative physical record relocation in a basic exchange data set.

### TYPE H DATA EXCHANGE

Type H exchange data sets have requirements assuring that diskettes may be exchanged between systems capable of reading and writing Diskette 2D.

For type H exchange data sets, the exchange type indicator (data set label position 44) must be H. This means:

- The data set is organized sequentially.
- The records are a maximum of 256 bytes long.
- The records are of fixed length, unblocked, and unspanned.
- The physical record length is 256 bytes.
- The data set identifier (data set label positions 6-22) is not longer than 8 positions.

In addition, a diskette containing type H exchange data sets must:

- Be initialized with physically sequential records (volume label positions 77-78 = bb or 01).
- Not use alternative physical record relocation in a type H exchange data set.

### DELETED RECORDS

Some devices have the ability to logically delete records. This is done by changing the address marker AM2 from hex FB to hex F8 and recording the character D in the first position of the physical record. During read operations, when a deleted record is encountered, it is ignored.

### SEQUENTIALLY RELOCATED RECORDS

Some devices have the ability to identify defective sectors when writing sequential data records. The data record intended for the defective sector is then written in the next sequential physical sector. The defective sector is changed to a control record by changing the address marker AM2 from hex FB to hex F8 and recording the character F in the first position of the physical record. During read operations, when this control record is encountered, the desired record is found in the next sequential physical sector.

### ALTERNATIVE RELOCATED RECORDS

Some devices use a different method of handling defective sectors. This method consists of changing the defective sector to a control record by changing the address marker AM2 from hex FB to hex F8 and recording a period (hex 4B) in the first position of the physical record. The data record intended for the defective sector is then written in an alternative sector that has been allocated for this purpose. The address of the alternative sector is written in the error directory (sector 05 on side 0 of the index cylinder). During read operations, when this control record is encountered, the location of the desired record is found by examining the error map.



## Defective Cylinders

Machines capable of initializing diskettes also are capable of flagging up to two defective cylinders. A defective cylinder is flagged by writing binary 1's in all of the ID fields on that cylinder. The cylinder number that would have been recorded in the ID fields of the defective cylinder is recorded in the ID fields of the next physical cylinder. Physical cylinder numbers of defective cylinders are recorded in the error map sector (sector 05 of side 0 of the index cylinder). Whenever a flagged defective cylinder is encountered during read or write operations, the read/write head automatically moves to the next higher numbered physical cylinder.

The following supplies are available from your IBM Information Records Division representative:

Item	Sold in Multiples Of	Weight
Diskettes <sup>1</sup>	10	1.1 kg (2.5 lbs)
Temporary adhesive identification labels (rainbow pack <sup>2</sup> or one color pack)	30 labels (1 pack)	—
Box for 10 diskettes (empty)	30	7.7 kg (17 lbs)
Protective envelopes (replacement)	50	1.1 kg (2.5 lbs)
Shipping carton for thirty 10-diskette boxes	25	24.9 kg (55 lbs)
Top and bottom pads for above carton	50	10.0 kg (22 lbs)
Shipping carton for twenty 10-diskette boxes	25	20.9 kg (46 lbs)
Top and bottom pads for above carton	50	7.3 kg (16 lbs)
Shipping carton for ten 10-diskette boxes	25	9.1 kg (20 lbs)
Top and bottom pads for above carton	50	4.1 kg (9 lbs)
Shipping carton for five 10-diskette boxes	25	6.4 kg (14 lbs)
Top and bottom pads for above carton	50	1.8 kg (4 lbs)
Shipping carton for one 10-diskette box	25	4.5 kg (10 lbs)
Shipping carton for one diskette	25	3.2 kg (7 lbs)
Die-cut spacer for a 10-diskette box	25	2.5 kg (5.5 lbs)
Zip-top plastic bags	10	—

<sup>1</sup> Diskettes are shipped in boxes of 10, each diskette enclosed in a protective envelope. Each box also contains a pack of temporary adhesive labels.

<sup>2</sup> A rainbow pack contains 30 labels, six each of red, blue, yellow, green, and gray.

## Glossary

**address:** The location of any physical record on the diskette, specified by the cylinder number, head number, and record number. (In publications describing the location of a physical record on a one-sided diskette, the address might be specified by track number, 00, and record number.)

**AM:** Address marker.

**basic data exchange:** A format for exchanging data on diskettes between systems or devices that use Diskette 1.

**block:** A set of adjacent logical records recorded as a unit.

**blocking:** Combining two or more records into one block.

**BOE:** Beginning of extent.

**byte:** A sequence of adjacent binary digits operated on as a unit; the representation of one character.

**C:** Celsius.

**cm:** Centimeters.

**cyclic redundancy check:** A method of error checking performed when reading or writing data.

**cylinder:** The tracks that can be accessed without repositioning the read/write head.

**data set:** The major unit of data storage, consisting of a collection of data records stored in a user-specified format.

**diskette drive:** The portion of the system or device that handles the diskette functions.

**diskette envelope:** The removable, protective envelope in which the diskette is stored.

**diskette jacket:** The permanent, protective cover that houses the flexible disk.

**double density:** Bits are written on the Diskette 2D diskette at twice the density used on the Diskette 1 or Diskette 2 diskette.

**drive spindle:** The portion of the diskette drive that is inserted in the diskette and revolves, turning the disk within the jacket.

**EOD:** End of data.

**EOE:** End of extent.

**F:** Fahrenheit.

**head:** See *read/write head*.

**ID:** Identification.

**IMPL:** Initial microprogram load.

**index cylinder:** Cylinder 00. This cylinder is used to store information about the diskette.

**index hole:** The small hole in the disk and the jacket, used for timing.

**initialization:** The process of writing the addresses, index cylinder information, and other system information on the diskette. (Initialization is also used to assign alternative cylinders.)

**IPL:** Initial program load.

**IRD:** Information Records Division.

**kg:** Kilograms.

**permanent diskette label:** The label attached permanently on the upper left corner of the diskette jacket.

**physical record:** One or more records written within one sector on a track.

**read (operation):** The process of sensing the magnetic fields on the diskette recording surface and converting them into machine-readable code.

**read/write head:** The data sensing and recording unit of the diskette drive.

**record:** A collection of related items of data, treated as a unit.

**recording surface:** The portion of the diskette that is used to store information.

**sector:** The addressable unit into which each track is divided.

**spanned record:** A logical record stored in more than one block.

**temporary identification label:** The removable label attached to the upper right corner of the diskette.

**track:** That portion of the diskette recording surface available to one read/write head at each access position.

**type H data exchange:** A format for exchanging data on diskettes between systems or devices that use the Diskette 2D diskette.

**write (operation):** The process of generating magnetic fields on the recording surface of the diskette.

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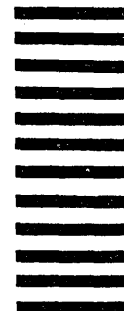
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