SPERRY UNIVAC
Double-Sided Flexible Diskette
Media

SPERRY UNIVAC Double-Sided Flexible Diskette

Media

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PRINTED IN U.S.A.

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ISSUE: UP-9166

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1. Introduction

1.1. GENERAL

This manual describes unrecorded double-sided flexible diskettes for use with various SPERRY UNIVAC systems and is intended as general information. The information is based on current Sperry Univac requirements and is subject to change without notice.

The manual provides information about the general, physical, and magnetic characteristics of the flexible diskette for use with SPERRY UNIVAC diskette drives and associated information processing systems. The flexible diskette is enclosed in a protective envelope and has two recording surfaces (see Figure 1-1). It is intended specifically for use with digital recording and reproducing equipment that employs access mechanisms capable of positioning to 77 data tracks.

1.2. RESPONSIBILITY FOR DISKETTE OPERATION

Parameters within this document are provided as general guidelines and do not constitute a qualification specification. The user of this information should be aware that flexible diskette materials and vendor processes vary. Therefore, although diskettes of various vendors may conform generally to the characteristics of the diskette described herein, there is no guarantee or assurance by Sperry Univac that such diskettes will operate satisfactorily on SPERRY UNIVAC flexible diskette drives. Questions concerning levels of performance and consistency of quality should be resolved by the user and the vendor. Acceptance of a source of supply should be based on proven test results.

1.3. RESERVATION OF RIGHTS

Sperry Univac reserves the right to implement design changes in its systems without notification, notwithstanding that such changes may affect the performance of the flexible diskette on such systems.

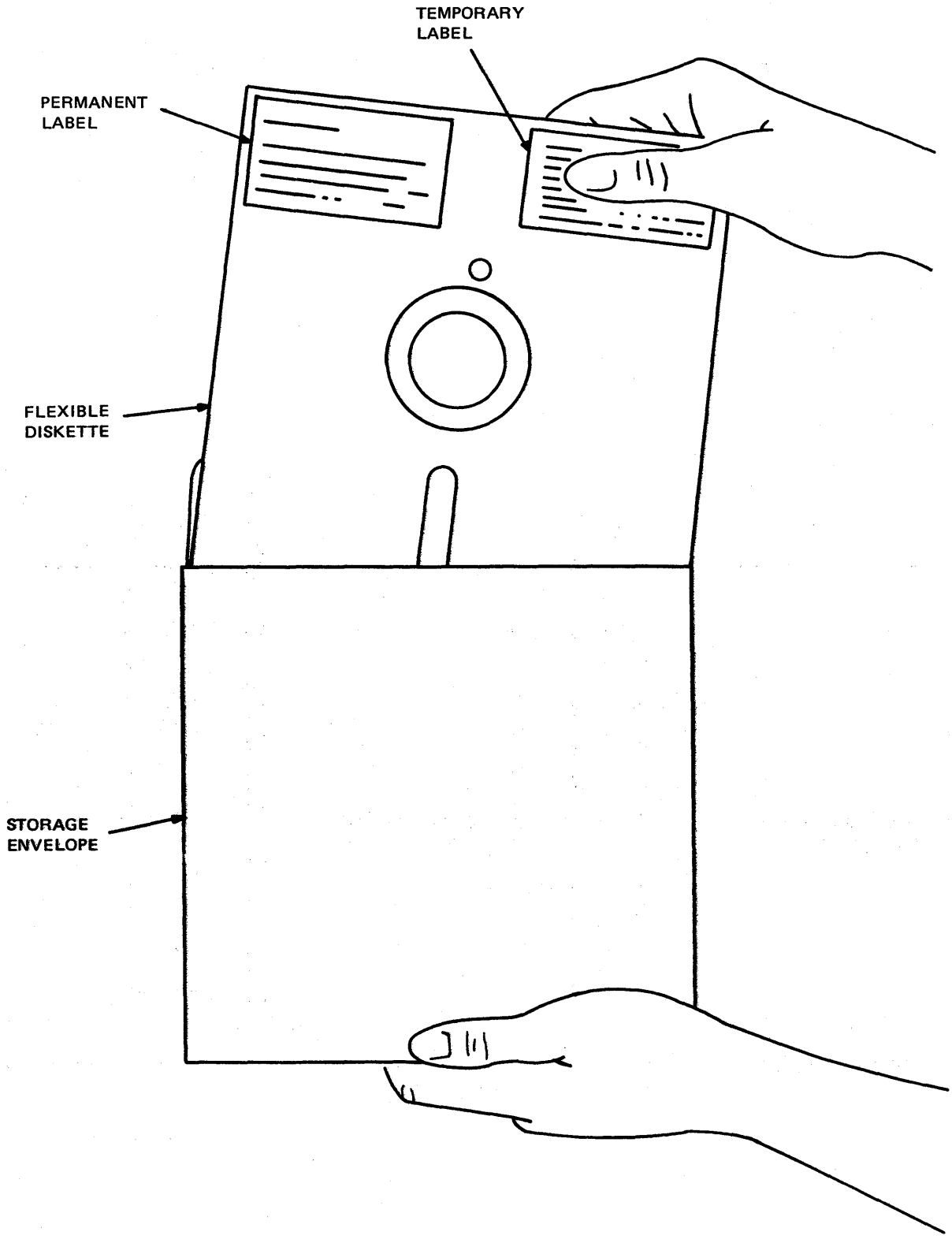


Figure 1—1. Flexible Diskette and Storage Envelope

2. Physical Description

2.1. BASIC DESCRIPTION

A flexible diskette is a thin flexible disk enclosed in a semirigid plastic jacket. When the diskette is correctly inserted in the diskette drive, the disk turns freely inside the jacket. The jacket is lined with a wiping material which cleans the disk as it turns, keeping its surface free of foreign materials.

The disk has two magnetic recording surfaces. Data is written on the disk surface by generating magnetic fields at specific locations (addresses) on the surface. When data is written at an address, it remains there until new data or blanks are written. Data is read by seeking the desired address and then converting the magnetic fields back into machine-readable code. Reading the diskette does not change or erase the data stored on it.

2.2. PHYSICAL FEATURES

Figure 2–1 shows the dimensions and features of a flexible diskette for use on SPERRY UNIVAC equipment. The following is a brief description of these features.

2.2.1. Permanent Diskette Label

A permanent diskette label may be present and may contain vendor identification and part number.

2.2.2. Temporary Adhesive Identification Label

CAUTION

The temporary identification label must not affect the operation of the diskette or the drive in which it is used. In addition, only a fiber-tipped pen, not a ballpoint pen or a pencil, should be used to write on the labels of the diskette. Writing should be done before removing the diskette from its storage envelope, which prevents damage or contamination to the recording surface of the diskette.

A temporary adhesive label may be attached to the diskette by the operator, as shown in Figure 2–1, to provide such information as:

- Part number
- Volume label
- Description of diskette contents
- Revision level

2.2.3. Index Access Hole

There is an outer hole in the jacket and an inner hole in the disk. When these two are aligned while the diskette is turning in the drive, a beam of light shines through the holes. This light is sensed by the drive and is used for timing purposes.

2.2.4. Drive Spindle Hole

The outer hole is the drive access opening in the jacket, and the inner hole is the drive spindle hole in the diskette. The diskette is inserted in the drive, with the drive spindle fitting into the drive spindle hole of the diskette. The drive mechanism clamps onto the part of the disk exposed by the drive access opening.

2.2.5. Head Slot

The disk surfaces (front and back) are exposed to separate read/write heads through the head slot openings. During a read or write operation (either side), the read/write head on the reverse surface of the disk pushes the disk against the opposite read/write head.

2.2.5. Stress Relief Notches

The two stress relief notches in the disk jacket help to distribute stress in the slot area if the diskette is bent.

2.2.7. Optional Features: Write Protect Hole or Write Inhibit Notch

The diskette has an optional write protect hole, which when open protects the diskette from writing. The write inhibit notch is an alternate configuration that performs this same protective function (see Figure 2–2). A folded adhesive-backed, metalized tab is used to cover the protect hole or the inhibit notch. It wraps around the diskette so as to cover the hole or notch on both sides. When the tab is in place, writing is allowed; when the tab is removed, the diskette is again write-protected or write-inhibited.

The light transmissivity with the tab in place is 1 percent or less for infrared light (900-nanometer wavelengths) to enable writing; when the write inhibit is enabled (notch or hole uncovered), the transmissivity exceeds 70 percent.

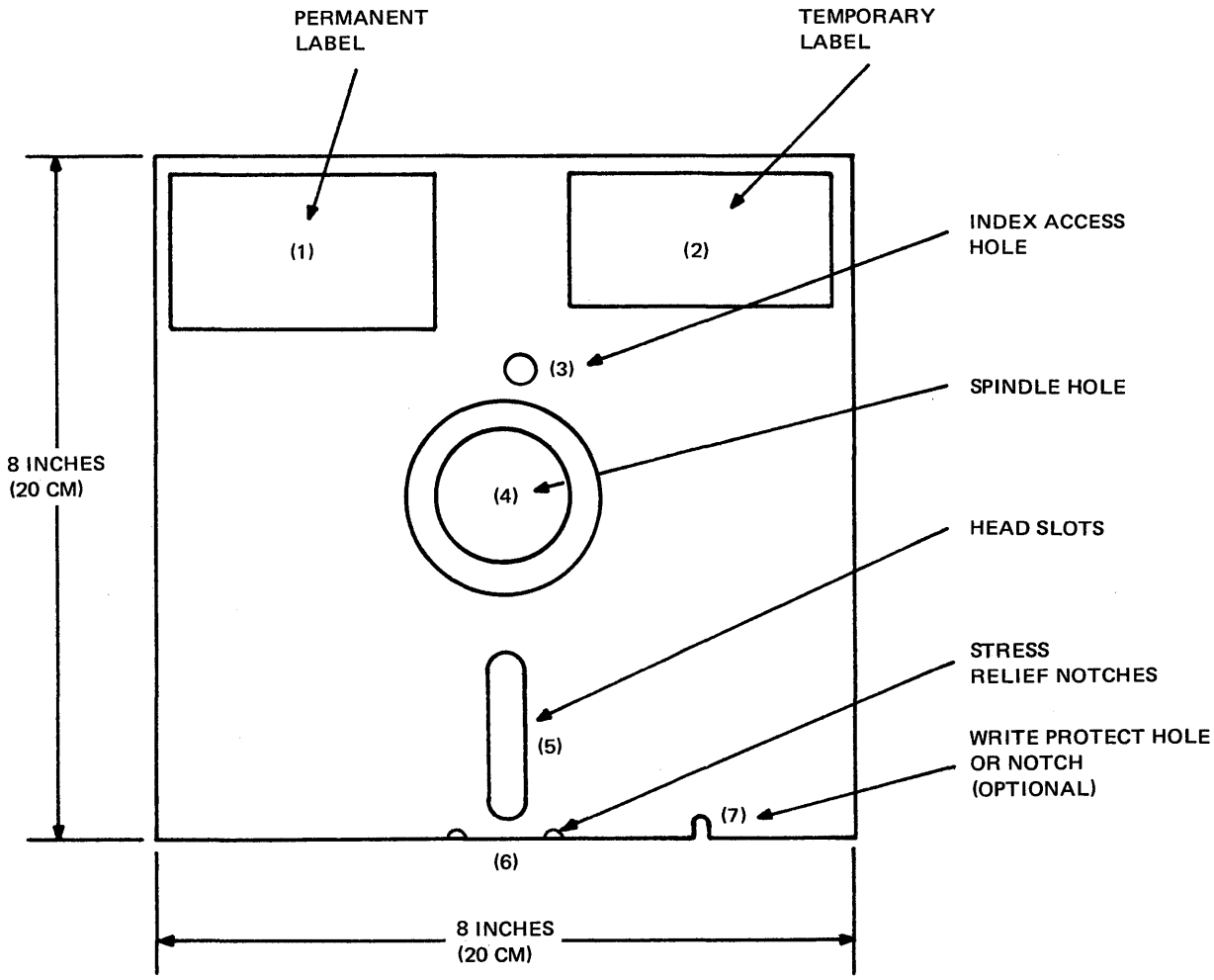


Figure 2—1. Dimensions and Features

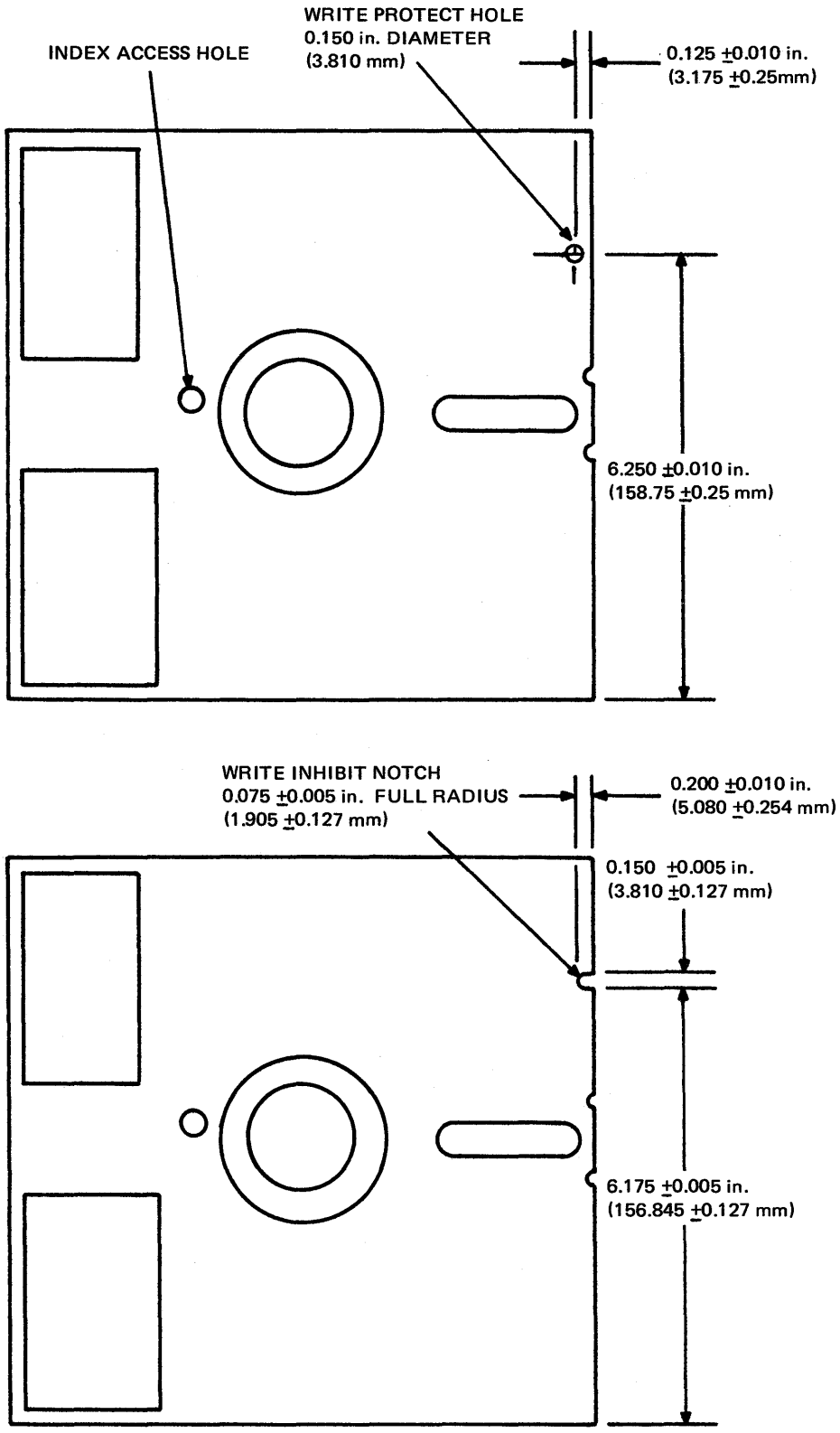


Figure 2—2. Write Protect Hole/Write Inhibit Notch Dimensions

3. Diskette Handling and Care

3.1. ENVIRONMENT

The diskette should be capable of operating at a surface temperature in the range of 50° to 125° F (10° to 51.6° C) and should be stored at temperatures conforming to vendor specifications. The diskette should also be capable of operating in a relative humidity of from 8 to 80 percent with no condensation; vendor specifications should be consulted for the humidity range recommended for storage.

Before the diskette is inserted into the drive, it should be conditioned for a minimum of one hour in the same environment as the disk drive. There must be no visible moisture on the disk or the jacket of the diskette.

3.2. PRECAUTIONARY MEASURES

Diskettes, like all magnetic media, can be seriously affected by improper care and handling such as that which would cause dents, wrinkles, scratches, fingerprints, or debris to collect on the surface. To ensure that the diskette is properly protected from such damage and contamination, the following precautionary procedures should be followed:

1. Whenever the diskette is removed from the drive, return it to its storage envelope.
2. Replace the storage envelope when it becomes worn, cracked, or bent.
3. Do not fold or bend the diskette or put heavy objects on it.
4. Do not expose the diskette to direct sunlight or excessive heat.
5. Do not smoke, eat, or drink while handling the diskette. Ashes, food, or liquid can contaminate and damage the disk surface.
6. Do not touch or attempt to clean the disk surface. Abrasions can cause loss of stored data.
7. Keep diskette away from magnetic fields and from ferromagnetic material that might become magnetized. Strong magnetic fields can distort recorded data on the disk.
8. Only a fiber-tipped pen, not a ballpoint pen or a pencil, should be used to write on the labels of the diskette. Writing should be done before removing the diskette from its storage envelope, which prevents damage or contamination to the recording surface of the diskette.

3.3. DEFECTIVE TRACKS

When the diskette is being used, defective areas on the diskette surface can develop that prevent readable records from being written. Diskettes on which such defective tracks develop should normally be removed from service. For specific information concerning how to handle defective tracks, refer to the operator's reference manual of the system on which the diskette is being used.

3.4. INITIALIZATION OF THE DISKETTE

Initialization of the diskette is necessary before it can be used to record data. Refer to the manual of the system on which the diskette is being used for specific information.

3.5. CONTAMINATION OF THE DISKETTE

The diskette should be replaced if it is physically damaged (bent, torn, creased) or contaminated. It is important not to use diskettes that have been contaminated by sticky fluids, such as soft drinks, or by abrasive substances such as metal filings. Putting a contaminated diskette in the drive will cause operating errors and may contaminate the read/write head. In this way contamination can also be passed on to clean diskettes.

If a contaminating substance is spilled on only the diskette jacket and it has not reached the recording surface, the contaminating substance should be removed, and the data recovered, after which the diskette should be discarded.

3.6. STORAGE

Diskettes needed for immediate use can be stored for the short term in their storage envelopes in stacks of 10 or less. If they are to be stored vertically, they should be supported so that they don't sag or bend.

For long-term storage, diskettes should be kept in their storage envelopes in their original shipping cartons, stacked either horizontally or vertically.

4. Physical Parameters

4.1. DIMENSIONS

See Figures 4–1 through 4–3 for dimensions of diskette and jacket.

NOTE:

Characteristics indicated in this and following sections as being desirable may not necessarily be required for satisfactory operation but are considered advisable for avoiding a possibility of performance degradation which may occur if such characteristics are not provided.

4.2. DISK TENSILE YIELD FORCE

A tensile yield force of at least 10 pounds is desirable. A tensile yield force is defined as the force required to elongate a 0.5-inch (12.7-mm) sample of disk material by 3 percent.

4.3. DISK COEFFICIENTS OF EXPANSION

4.3.1. Thermal

A coefficient of linear thermal expansion in the diskette which does not exceed 9.4×10^{-4} percent per Fahrenheit degree (17×10^{-4} percent per centigrade degree) as measured using ASTM (American Society for Testing Materials) method D696-70 is desirable.

4.3.2. Hygroscopic

A coefficient of linear hygroscopic expansion in the diskette which does not exceed 11×10^{-4} percent per percent relative humidity is desirable.

4.4. SUBSTRATE MATERIAL

The substrate material of the disk should be a biaxially oriented polyethylene terephthalate or equivalent material.

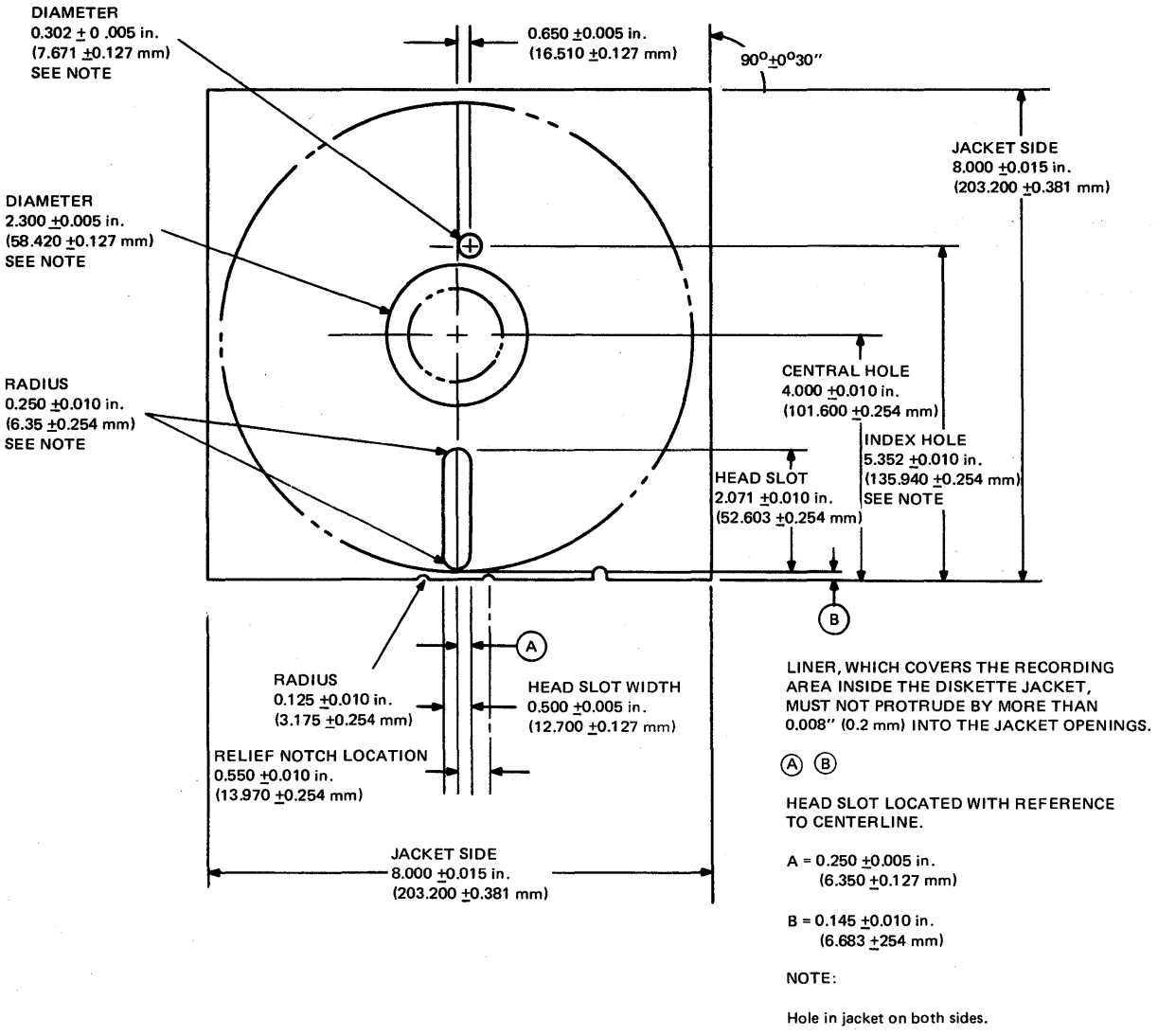
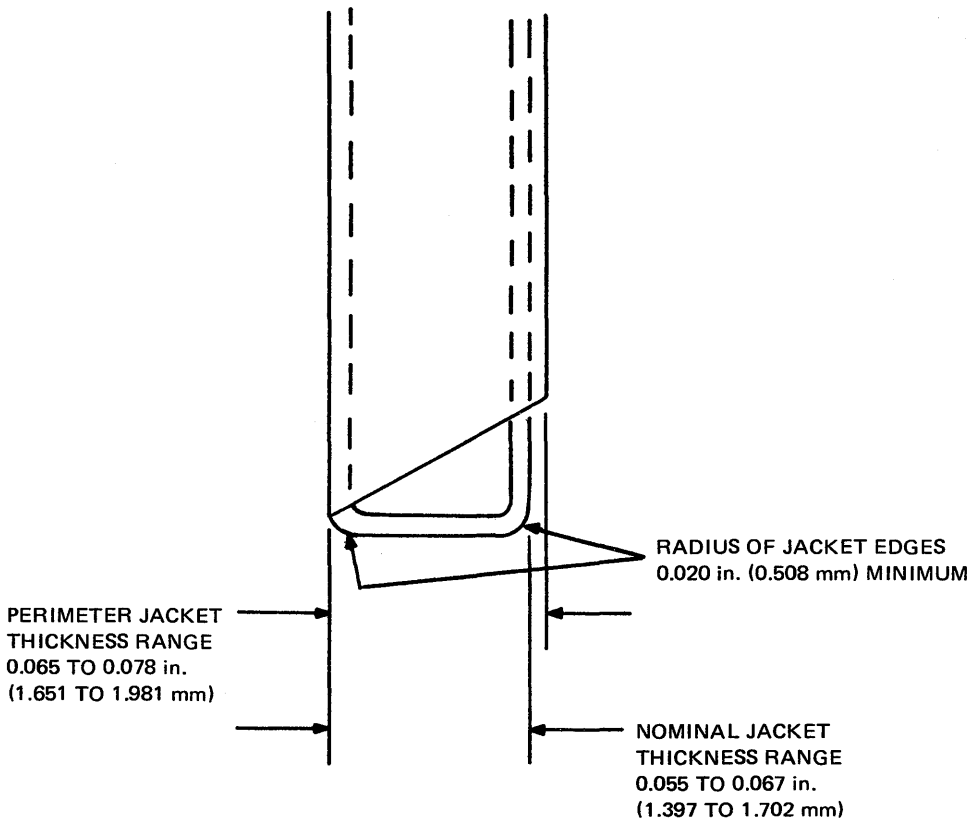


Figure 4—1. Jacket Dimensions



NOTES:

1. Reference edge has a convex profile.
2. Thickness and edge radius measurements are made over length: 1.00" (25.4 mm).

Figure 4—2. Jacket Dimensions

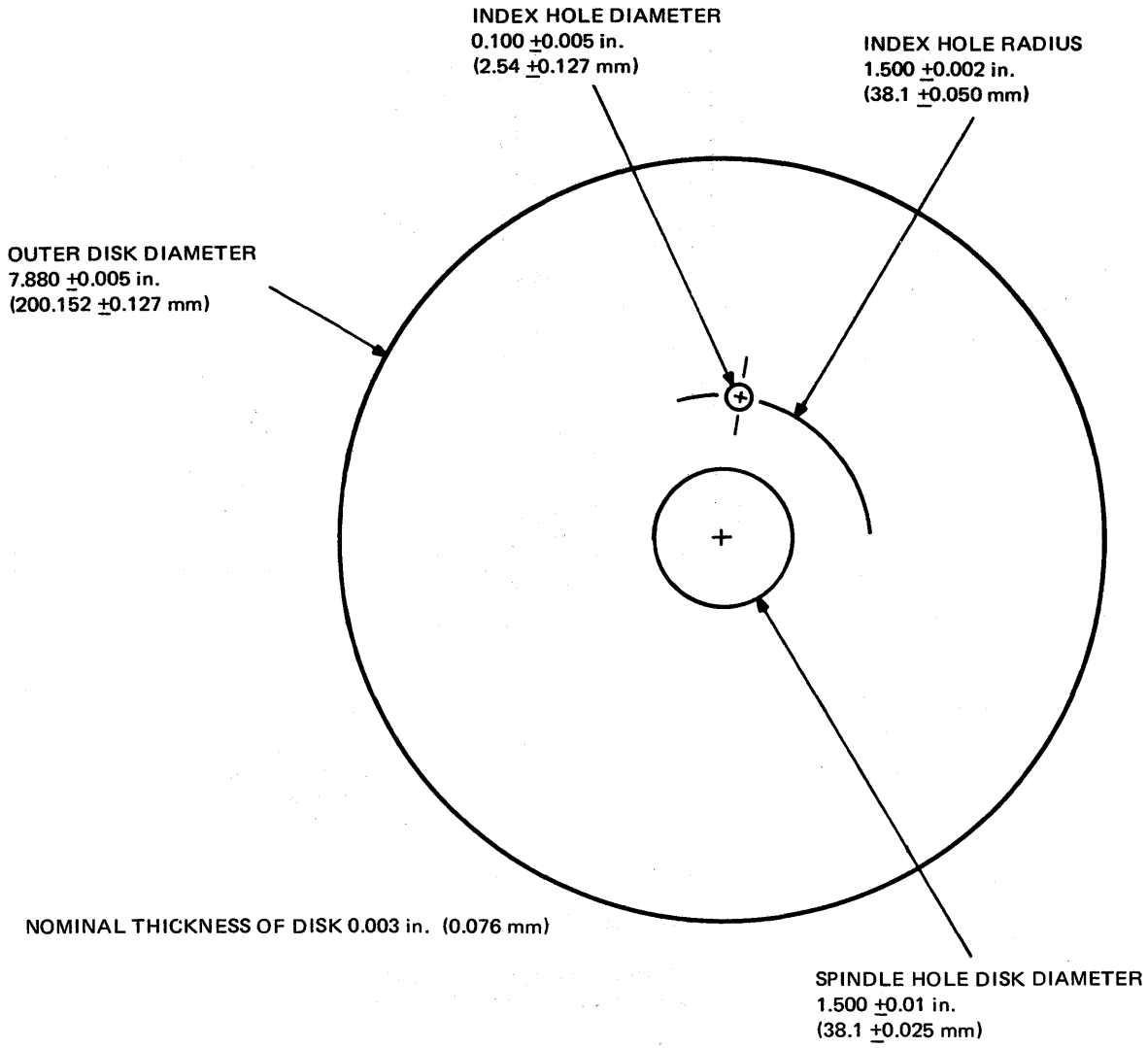


Figure 4—3. Disk Dimensions

4.5. DISK COATING CHARACTERISTICS

4.5.1. Surface Roughness

The finished magnetic surface of the disk should have a surface roughness of less than 3.0 microinches (0.076 micrometer), arithmetic average. The maximum deviation of the surface in height from the average should not exceed 15 microinches (0.356 micrometer) when measured with a 0.03-inch (0.75-mm) cutoff range.

4.5.2. Coating Thickness

A coating thickness of the disk surface of 100 ±20 microinches (2.54 ±0.5 micrometers) is desirable.

4.5.3. Light Transmittance

It is desirable that the index hole track of the disk have a light transmittance of not more than 0.5 percent, at every point except the index hole, as measured with an infrared optic system (900 ±10 nanometer wavelength).

4.5.4. Coating Adhesion

A coating which is resistant to wear under operating conditions and which maintains adhesion and abrasive wear resistance is desirable.

4.5.5. Head Wear

When operating on a drive, the diskette should not induce head wear in excess of certain limits as determined by the following procedure:

1. Measure the amplitude of a 500,000-ftps (flux transitions per second) readback signal at track 00 on one diskette to obtain a reference signal amplitude.

2. Then take another, previously unused diskette and use it as a test diskette in the SPERRY UNIVAC drive.

3. Subject the test diskette to 92 hours of wear revolutions over the 20 outermost tracks of the diskette. (A wear revolution is one revolution of the diskette with the heads loaded normally and the head motion at an access rate of 11 ±1 ms per step.)

4. Finally, reinsert the reference diskette on the drive and verify that the readback signal amplitude at track 00 has not been reduced to a level below 75 percent of the reference signal amplitude measured in step 1.

4.5.6. Coating Life Under Continuous Operation

It is desirable that the media have a life in excess of 250 hours of error-free operation when reading and writing data continuously on any one track with the heads of a SPERRY UNIVAC diskette drive loaded normally.

4.6. HEAD ABRASION TEST

When operating on a drive, the diskette should not cause head abrasion in excess of certain limits as determined by the following procedure (this test must be performed on new test heads and new diskettes):

1. Measure the amplitude of the readback signal at a test frequency of 500,000 ftps at track 76 on one diskette to obtain a reference signal amplitude.

2. Step the head successively on each of one hundred new diskettes at the rate of 220 ±20 milliseconds per step from track 00 to track 76 and back to track 00 for two cycles on each diskette.

3. Reinsert the first diskette on the drive and verify that the readback signal amplitude at track 76 has not been reduced to a level below 90 percent of the reference signal amplitude measured in step 1.

4.7. MAGNETIC COATING RESISTIVITY

The surface resistivity of the magnetic disk coating is desirably less than 5×10^9 ohms per square inch (7.75×10^6 ohms per mm^2) based on a measurement made in accordance with ASTM measurement specification D-257.

4.8. FLAMMABILITY AND TOXICITY

The diskette material should be self-extinguishing in a still, carbon dioxide atmosphere. The diskette should not cause bodily harm by contact during normal use.

4.9. TORQUE

4.9.1. Running Torque

The torque necessary to turn the disk should not exceed 10 ounce-inches (7×10^{-2} newton-meters) nor be less than 4 ounce-inches (2.8×10^{-2} newton-meters) when the diskette is operating under the following conditions:

1. Heads loaded with an equivalent area of 1.065 square inches (687 mm^2) and a force of 150 ±30 grams,

2. A speed of 360 rpm (±3 percent), and

3. The head located parallel to the head slot opening, as shown in Figure 2-1.

4.9.2. Starting Torque

The starting torque, without heads loaded to the dikette, should not exceed 6 ounce-inches (4.2×10^{-2} nm).

5. Track and Recording Information

5.1. TRACK GEOMETRY

5.1.1. Number of Tracks

There are 77 discrete, concentric track locations on the diskette at which the drive can position the read/write head in the head slot. Tracks are numbered 00 through 76, with track 00 being the outermost and track 76 the innermost tracks. See Figure 5-1.

5.1.2. Width of Tracks

The recorded track width on the disk surface is 0.0118 ±0.001 inch (0.3000 ±0.025 mm). The area between the tracks must be erased.

5.1.3. Track Locations

The nominal radius of the centerline of the outside track is 3.612 inches (91.754 mm) and the nominal radius of the inside track is 2.029 inches (51.537 mm).

5.1.4. Density

The density is 13,262 uniformly-spaced flex transitions per radian for all 1-bits. A tolerance of ±1.0 percent is recommended for the density.

5.2. INDEX

The index is the point which determines the beginning and the end of a track. At the instant the leading edge of the index hole is detected, the index is under the read/write gap.

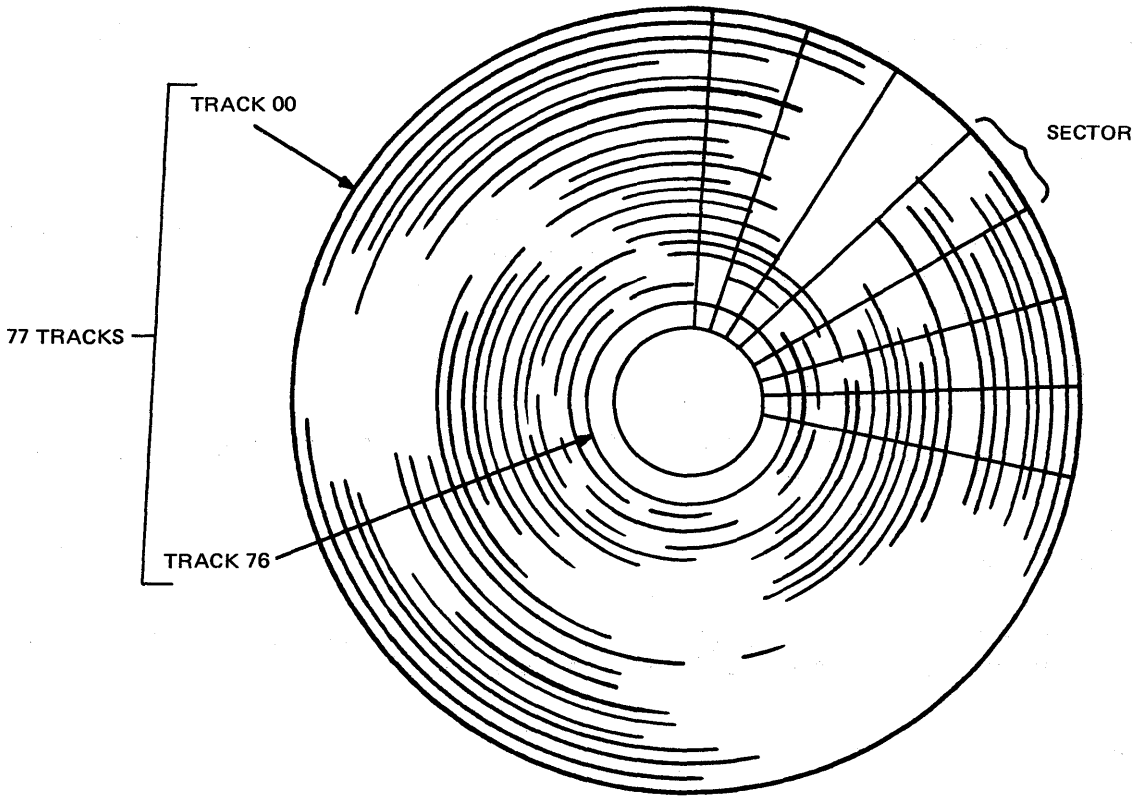


Figure 5—1. Tracks

6. Electrical Characteristics

6.1. SURFACE TESTS

For correlation purposes, the magnetic properties of the data surface are defined by the testing requirements given below. The test head must be calibrated to a standard amplitude reference surface.

6.1.1. Test Conditions

The diskette is tested at 360 ±7 rpm. The test frequency is either 250,000 ftps or 500,000 ftps.

6.1.2. Typical Field

A typical field* of the diskette within ±20 percent of a reference field** is desirable. The typical field is tested at 250,000 ftps on track 00 and at 500,000 ftps on track 76.

6.1.3. Average Signal Amplitude

The following average signal amplitude† characteristics are desirable when a disk has been recorded with the test recording currents†† and has been read back on a system calibrated by means of a standard amplitude reference surface recorded under the same conditions:

At track 00: For 250,000 ftps, not more than 130 percent of the average signal amplitude on the standard amplitude reference surface.

At track 76: For 500,000 ftps, not less than 80 percent of the average signal amplitude on the standard amplitude reference surface.

**The typical field is the minimum field (recording current) which when applied to a flexible diskette causes an average signal amplitude equal to 95 percent of the maximum average signal amplitude at the specified track and flux reversal frequency of that flexible diskette.*

***The reference field is the typical field as measured on a diskette that is being used as a reference in testing.*

†The average signal amplitude ia a peak-to-peak value averaged over one revolution.

††The test recording currents are measurements 1.5 ± 0.05 times the current required to produce the reference field. The first current is determined at track 00 and is used for recording on tracks 00 to 43. The second current is determined on track 76 and is used for recording tracks 44 to 76.

6.1.4. Resolution

On track 76, the ratio of average signal amplitude at 500,000 ftps to the average signal amplitude at 250,000 ftps is desirably greater than 85 percent of the value of the same ratio for a standard amplitude reference surface. The recording current is the test recording current for track 76.

6.1.5. Overwrite

A uniform 250,000-ftps signal is recorded for a minimum of one revolution, followed by the recording of a uniform 500,000-ftps signal for one revolution. A residual 250,000-ftps modulation component having a maximum amplitude of 3 percent of the original 250,000-ftps signal is desirable. This measurement is performed at tracks 00 and 76 and is made with a Hewlett-Packard wave analyzer, model 312A or equivalent.

6.1.6. Modulation

Average base-to-peak amplitude measured at the highest amplitude 350-microsecond sector of a track and not exceeding 10 percent of the average base-to-peak amplitude of the track is desirable. The modulation should be measured at 250,000 ftps at track 00, and 500,000 ftps at track 76.

6.2. SIGNAL QUALITY

6.2.1. Missing Bit

A missing bit occurs when (1) the peak-to-peak voltage amplitude of any flux transition is not at least 35 percent of the average peak-to-peak signal amplitude under test, (2) 500,000 ftps is the test frequency, and (3) the test recording current value is used.

6.2.2. Extra Bit

An extra bit occurs whenever a pulse is detected during a read attempt over a track that has previously been DC erased. To be considered an extra bit, the peak amplitude of this pulse must be greater than 20 percent of the average 500,000-ftps peak-to-peak signal amplitude from that track when recorded with the test recording current.

6.2.3. Weak Pulse

A weak pulse is any playback signal, measured peak-to-peak, which is less than 45 percent of the average signal amplitude of the track under test, when the track has been recorded with the appropriate test recording current.

6.3. DISKETTE QUALITY

6.3.1. Defective and Weak Track Definitions

A track that has one or more missing and/or extra bits is considered a defective track. A track that has one or more weak pulses is considered a weak track.

6.3.2. Recommended Track Quality

It is desirable that diskettes used on SPERRY UNIVAC systems have no defective track and no more than two weak tracks from track 01 to track 76, and that track 00 be neither defective nor weak. Refer to the system operator manual for detailed requirements.

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