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IBM Disk Pack Handling and Operating Procedures

This manual provides suggested operating and handling procedures for this unique data processing device. This edition applies to the IBM 2316 and 1316 Disk Packs and the IBM 2315 Disk Cartridge.



Fifth Edition

This publication (Form A26-5756-4) is a major revision that replaces and makes obsolete Form A26-5756-3. Extensive changes have been made throughout the manual, including the addition of information on the IBM 2316 Disk Pack and the IBM 2315 Disk Cartridge.

Specifications contained herein are subject to change from time to time. Any such change will be reported in subsequent revisions or Technical Newsletters.

Copies of this and other IBM publications can be obtained through IBM Branch Offices.

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In 1953 the introduction of IBM magnetic tape provided data processing systems with the ability to process large volumes of input and output data at high speeds; in addition; it provided virtually unlimited storage. Entire jobs and master record files were accessible simply by changing a reel of tape. In 1956, the introduction of the IBM RAMAC[®] Disk File presented another new concept in data processing by permitting mass storage of data that could be accessed in either a random or a sequential manner. In 1961, the IBM 1311 Disk Storage Drive, with its removable disk pack, introduced new dimensions of usefulness by combining the large storage and sequential processing advantages of magnetic tape and the random access ability of disk storage.

Disk Characteristics

The individual recording surfaces are made from precisely finished aluminum disks coated with magnetic iron oxide particles suspended in a plastic binder. Each pack is contained within its own cover to protect the disks from dust and other contaminants and mechanical damage.

Information is written on the recording surfaces by creating selected combinations of closely spaced magnetic spots on the iron oxide coating. During reading, these magnetic spots induce electrical pulses in the read/write head, which flies on a self-induced air bearing a few microinches thick. These pulses are amplified and interpreted as characters of information—numbers, letters, or special symbols.

Removable disk packs of different sizes as well as the respective drive mechanisms for these packs have been developed by IBM to allow the customer to tailor his data processing system to his present needs with room to grow as needs increase. On most systems, a disk drive with removable disk pack can be added conveniently as an external input/output device. On some systems, the drive can be exchanged for a larger and more powerful drive. Three different removable disk packs are available:

1. IBM 2316 Disk Pack—11 stacked disks providing 20 recording surfaces mounted on a central hub (Figure 1).

2. IBM 1316 Disk Pack—six stacked disks providing 10 recording surfaces mounted on a central hub (Figure 2).
3. IBM 2315 Disk Cartridge—a single disk with an integral protective cover providing two recording surfaces (Figure 3).

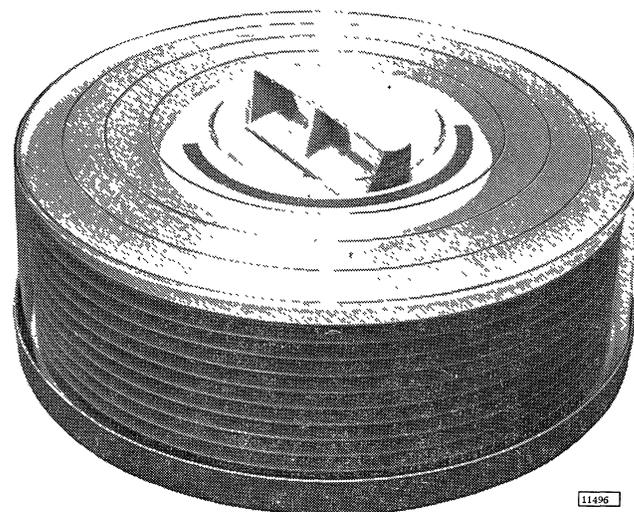


Figure 1. IBM 2316 Disk Pack

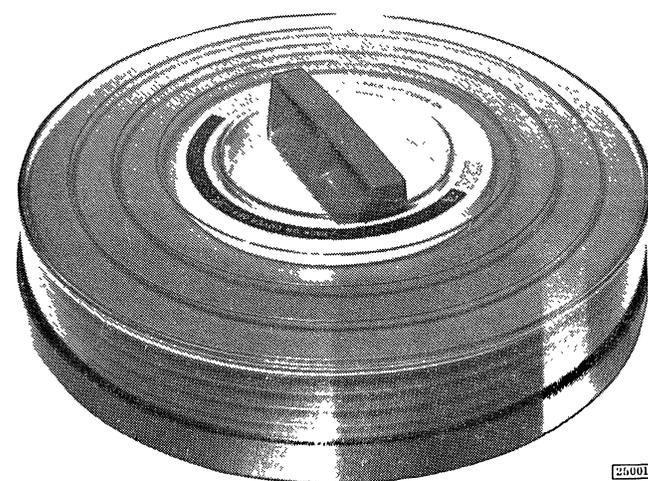


Figure 2. IBM 1316 Disk Pack

NOTE: The illustrations in this manual have a code number in the lower corner. This is a publishing control number and is not related to the subject matter.

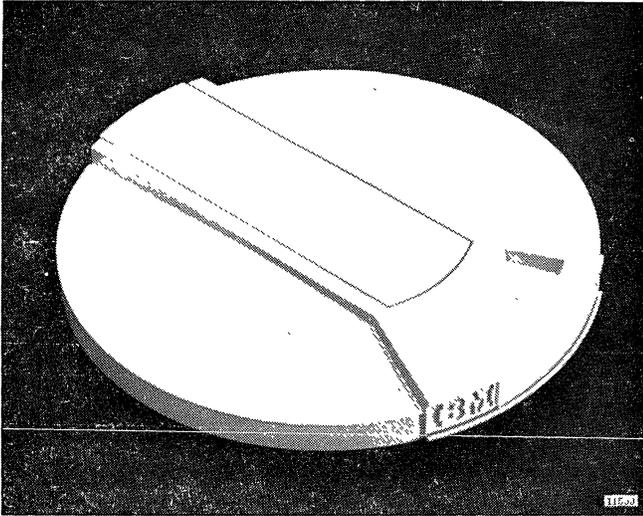


Figure 3. IBM 2315 Disk Cartridge

The disk packs or cartridges are precision instruments which require careful handling and housekeeping procedures to ensure data integrity. The following practices will result in a normal long, trouble-free life for the disk packs and cartridge:

1. Always reassemble the disk pack bottom and top protective covers. This should be done even when no disk pack is contained in the cover so that the dust and dirt do not accumulate inside the covers.
2. Clean the pack protective covers periodically to remove any buildup of dust. Use a soft lint-free cloth or paper wipe.
3. Replace cracked, distorted, or otherwise damaged covers.
4. Keep hands, pencils, or other objects off the disk surfaces. The disk surfaces can be distorted or damaged through impact or excessive pressure or abrasion. Should a pack be suspected of damage, have it inspected by an IBM Customer Engineer before attempting to use it on a device.
5. Don't stop the pack from turning by pressing on the top disk. This can be dangerous and can damage the disk.
6. Coffee and other beverages spilled on the pack and/or covers may require that the pack be reconditioned. Keep them off the drive and away from the pack storage area.
7. Remember, the disk pack or cartridge may contain information that is vital to the installation. It is advantageous to protect it as much as possible.

Storing The Disk Pack And Cartridge

Short-Term Storage

Disk packs and cartridges that are in frequent use during the day are best stored in the machine room or similar environment. The ideal environment is 60-90° F (15.6-32.2° C) and 10-80% relative humidity.

Cabinets that are clean and free of dust and made of metal or other fire-resistant material provide the best storage medium. Such a cabinet should have metal doors to provide better protection.

Disk packs should never be stored in direct sunlight. They should also never be exposed to intense magnetic fields (high-current bus bars, cables, welding transformers, etc.). Technically, a field intensity of more than 50 gauss may cause loss of information. The IBM Installation Planning Engineer should be consulted if high-intensity fields are suspected.

Disk packs can only be stored flat, i.e. resting on the bottom cover. They cannot be stacked on top of each other or stored on edge. Cartridges are specifically designed to be stacked on top of each other or stored on edge.

Long-Term Storage

For long-term storage the disk packs and cartridges are best stored in the original plastic foam shipping containers. When stored in this manner, they may be stored on edge or on top of each other. Figure 4 gives the specifications for the packs and cartridge and their shipping containers. Refer to Figure 5 for a drawing of the packs with their plastic covers.

The temperature for long-term storage must remain within the following limits: -40° F to 150° F (-40° C to 66° C).

High-Security Storage

Vitaly important data or duplicate master records should be stored in fire-resistant cabinets or in a separate storeroom that provides protection against catastrophic damage. The storage facilities provided should be insulated in such a manner that the internal temperature of the room or cabinet cannot rise above 150° F in case of fire.

A sprinkler system is recommended as additional fire protection. If a sprinkler system is used it should be of the pre-action type, which guards against the possibility of accidental head seal breakage.

The cover of the IBM 2316 and 1316 Disk Packs is made of a plastic material that provides protection against dust and impact. Like many other modern high-quality plastics, it is not impervious to heat. Above 180° F (82.2° C) the cover deforms rapidly, exposing the pack to any gaseous

| Disk with cover | | | | Shipping container | | Temperature range | | |
|-----------------|---------------|----------|---------|--------------------|---------|--------------------------|----------------------------|--------|
| Type | Weight pounds | Diameter | Height | Length | Height | Shipping or long storage | Operating or short storage | RH |
| 2316 | 14 1/8 | 14.7 in. | 6.0 in. | 18.5 in. sq. | 9.5 in. | -40°F to 150°F | 60°F to 90°F | 10-80% |
| 1316 | 9 3/8 | 14.5 in. | 4.0 in. | 18.5 in. sq. | 8.0 in. | -40°F to 150°F | 60°F to 90°F | 10-80% |
| 2315 | 4 1/8 | 15.0 in. | 1.5 in. | 18.5 in. sq. | 6.5 in. | -40°F to 150°F | 60°F to 90°F | 10-80% |

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Figure 4. Disk Pack and Cartridge Storage and Shipping Specifications

or particulate contamination present in the atmosphere. At approximately 250° F (121° C) the top cover deforms to the point of interfering with the disks. At temperature in excess of 250° F, the cover liquefies and can flow onto the disk surfaces. At 475° F (246° C) the ignition point is reached. If the cover burns it releases carbon monoxide gas, chlorine compounds, and intense smoke.

The IBM 2315 Disk Cartridge is made of polycarbonate material that is self-extinguishing. The cartridge deforms at 270° F (132° C).

Receiving and Shipping the Disk Pack

The disk pack or cartridge is shipped in a plastic foam container that can withstand normal freight handling abuse. Single packs or cartridges are further protected by packing the plastic foam container within a cardboard box. Multiple-pack shipments are shipped with the plastic foam containers stacked on pallets.

Upon receiving the disk pack, examine each container for possible shipping damage. If the container shows damage, the pack or cartridge must be inspected prior to installation on the disk storage drive. IBM Customer Engineers are available to make this inspection. By inspecting the pack or cartridge, the Customer Engineer can eliminate the possibility of further damage to the disks and damage to the drive.

Retain the original plastic foam container for storing and reshipping the pack. An additional supply of containers can be obtained through an IBM representative.

When a disk pack is being shipped from one location to another, certain precautions should be followed.

1. The pack must be tightly secured in its two-piece cover. This cover provides a positive dust seal; therefore, it is not necessary to use a plastic bag around the pack. Similarly, it is not necessary to use a plastic bag around a disk cartridge; however, an inspection should be made to ensure that the cartridge door is closed.
2. If a disk pack is to be shipped via common carrier or by mail, it is advisable to use a double-protection shipping container. The plastic foam container, in which the pack was initially shipped is intended for one-time usage only and should not be reused alone. The plastic foam container may be reused in the following manner.

Place the plastic foam container in a larger corrugated box and surround it by approximately two inches of padding material. A specially designed double container may be obtained through and IBM office. If the original plastic foam container has become worn or damaged, another can also be obtained through an IBM office.

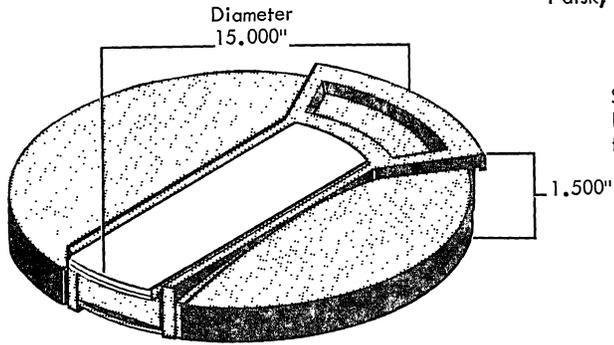
Disk Pack Handling Hints

The IBM 2316 as well as the IBM 1316 disk pack assembly is specifically designed to prevent removal of the top cover when the pack is not on the disk storage drive. The disk pack should never be handled without its cover.

Care must be exercised in installing the 2316 and 1316 Disk Packs. If the hub of the disk storage drive receives a sharp impact from the disk pack, the contour of the hub and/or the pack drum can be altered and cause misalignment of the disk surfaces to the read/write heads. Foreign objects must never be placed between the disks or where they can fall or be pushed against the disk surfaces.

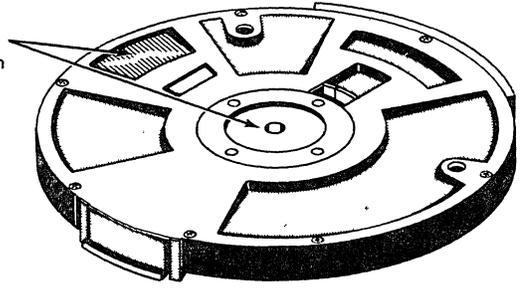
IBM 2315 Disk Cartridge

1 disk, 2 surfaces



Top View

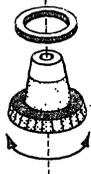
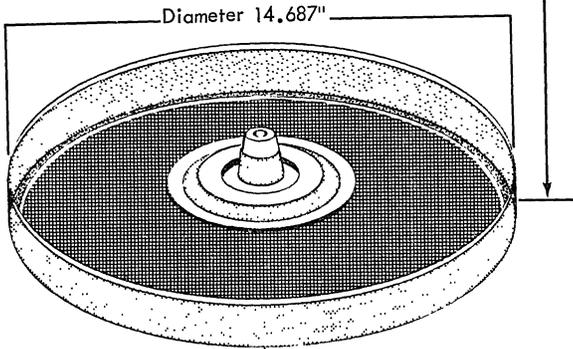
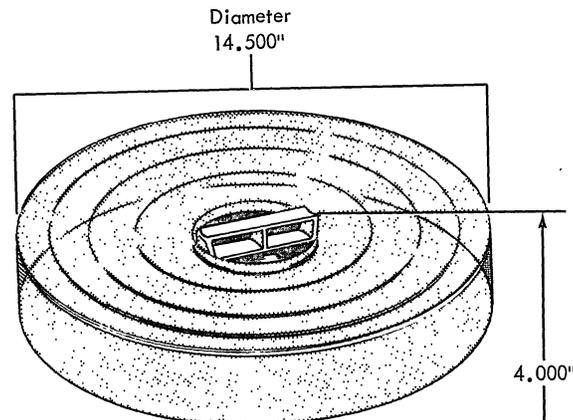
Sensitive Areas.
Do not strike with
foreign objects.



Bottom View

IBM 1316 Disk Pack

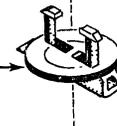
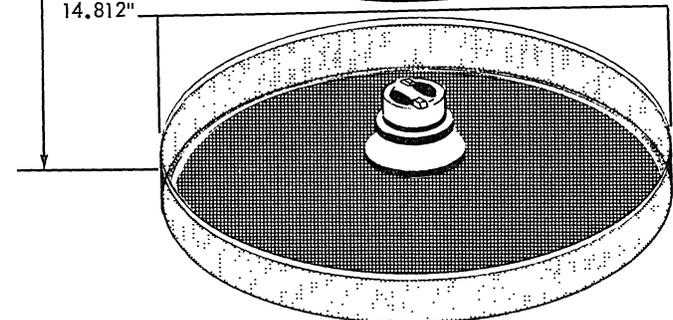
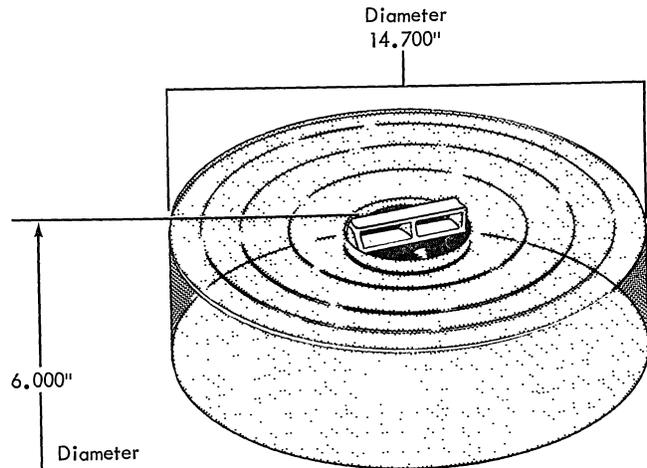
6 disks, 10 surfaces



Locking knob is recessed into cover leaving flat surface for storage. Knob does not detach from bottom cover. Shown detached for clarity.

IBM 2316 Disk Pack

11 disks, 20 surfaces



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Figure 5. Disk Pack and Cartridge Assemblies

Although the disk cannot be removed from the IBM 2315 cartridge, the operator should check the cartridge door to make sure that it is closed. If it is open, slight manual pressure will prove sufficient to close the door and thus provide a dust seal.

The IBM 2315 Disk Cartridge must always be placed on a table or other flat surface that is free of other objects. If the cartridge is dropped on a small hard object, the die cast aluminum hub can be damaged.

Disk Pack Labeling

Only the center trim shield of the IBM 2316 or 1316 Disk Pack is labeled, not the cover. The

transparent cover enables the disk pack label to be read with the cover on. Labeling only the disk pack precludes the possibility of placing a labeled cover on the wrong pack, an error which could result in the alteration or loss of pertinent data.

Disk packs should be labeled with a material that can be removed without leaving a residue. Adhesive stickers that can be applied and removed easily are satisfactory. Never use an eraser to alter the identification on a label.

The 2315 cartridge is provided with a molded frame (on the front edge) that is designed to hold labels without the use of adhesives. The label is simply inserted through the right hand side of the frame.

General Operating Procedures

Before a disk pack or a cartridge is used on the respective disk storage drive, it should be conditioned to the machine-room temperature for two hours prior to use. The ideal environment for disk packs and cartridges is the same as that recommended for the machine room, i. e., a temperature of 60-90° F (15.6-32.2°C) and a relative humidity of 10-80%. The conditioning time is required to assure correct track registration and data recording and retrieval.

Inspect the pack cover and remove any dust or dirt before removing the pack from the cover or before installing the pack on the machine. Reassemble the two piece cover and store in a clean, dry location.

On the drive, the disk pack or cartridge is supplied with air that is taken from the room and filtered on the intake of the drive unit. The cover of the disk drive should always be kept closed while the drive is in operation to keep dust from bypassing the filter.

Disk Pack Installation and Removal

Placing the IBM 2316 and 1316 Disk Pack on the Drive

The IBM 2316 and 1316 Disk Packs are enclosed in a dustproof cover that consists of a transparent dome-shaped top and a flat bottom. The top of the cover is used as a mounting tool and handle which permits the operator to secure the disk pack to the disk drive.

To install the disk pack on the disk storage drive, unscrew and remove the bottom cover from the disk pack using the bottom cover knob. Place the disk pack on the disk drive spindle. Turn the top cover in a clockwise direction (as indicated by the "on" arrow) until it comes to a full stop. Even though the cover might become disengaged before the full stop point is reached, the cover should continue to be turned to ensure the activation of the "pack on" safety switch. This switch must be activated before the drive mechanism can be started. The top cover can then be removed, leaving the disk pack locked on the spindle.

While the disk pack is on the drive, the top and bottom covers should be reassembled and stored in a clean, dry location.

Removal of the IBM 2316 and 1316 Disk Packs from the Drive

After pressing the stop key, wait until the disk pack has stopped before proceeding. The disk storage drive cover should never be opened until after the pack has come to a complete stop.

The disk pack is removed from the disk drive by replacing the top cover over the top of the pack, engaging the cover pins, and turning the cover in a counterclockwise direction (as indicated by the "off" arrow) for two full turns. The cover has then been securely fastened to the disk pack so that both the pack and the top cover can be removed as a unit from the spindle of the drive. The bottom cover must then be immediately attached.

Placing the IBM 2315 Disk Cartridge on the Drive

To install the cartridge, pull down the interlock handle on the drive. This clears the opening into which the cartridge is inserted. Pick up the cartridge at the handle-like front edge in such a manner that the cartridge is facing up and pointing away from your hand. The cartridge is held correctly when the letters "IBM", embossed in the handle, are to the left of your hand and rightside up. Make sure that the cartridge door is closed. Slide in the cartridge like a desk drawer. Close the interlock handle.

Removal of the IBM 2315 Disk Cartridge from the Drive

After pressing the stop key, wait until the drive stops (the interlock light comes on when the drive stops) because the interlock handle cannot be operated as long as the disk is still in motion. Pull down the interlock handle. Take hold of the cartridge handle and pull out the cartridge.

Close the cartridge door by pressing down on it. This step is important for two reasons: it creates a positive dust seal, and it immobilizes the disk in the cartridge.

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