

*National Archives and  
Records Administration*

Washington, DC 20408



Executive Registry

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**NARA BULLETIN**

**NO. 87-5**

February 11, 1987

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TO: Heads of Federal Agencies

SUBJECT: Electronic Recordkeeping

1. Purpose. This bulletin re-issues the guidelines on managing records created, stored, or transmitted using personal computers, word processors or other electronic office equipment contained in NARA Bulletin 85-2, "Electronic Recordkeeping," dated June 18, 1985.

2. Expiration date. This bulletin expires January 1, 1989.

3. Background. On May 13, 1986, NARA's Office of Records Administration requested comments from agency records management officers on the utility of NARA Bulletin 85-2 and GSA FIRMR, Bulletin 23 which are identical. Five comments were received, none of which were extensive or substantial. Based upon this response, it is assumed that the information in the Bulletin is meeting agency needs. Therefore, no changes have been made to the Attachments.

4. Application. The creation, maintenance, and disposition of all official records regardless of physical form is controlled by the provisions of 44 U.S.C. chapters 21, 29, 31, and 33, National Archives and Records Administration (NARA) regulations in 36 CFR Ch. XII and the Federal Information Resources Management Regulation (FIRMR) (41 CFR Ch. 201).

a. Records are defined in 44 U.S.C. 3301 as:

" . . . all books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the United States Government under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government or because of the informational value of data in them. Library and museum material made or acquired and preserved solely for reference or exhibition purposes, extra copies of documents preserved only for convenience of reference, and stocks of publications and of processed documents are not included."

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b. Agency heads are required to make and preserve records containing adequate and proper documentation of the organization, functions, policies, decisions, procedures, and essential transactions of the agency and designed to furnish the information necessary to protect the legal and financial rights of the Government, and of persons directly affected by the agency's activities (44 U.S.C. 3101).

c. The Administrator of General Services is required by law to "provide guidance and assistance to Federal agencies to ensure economical and effective records management by such agencies" (44 U.S.C. 2904).

d. The Archivist of the United States is required by law to "provide guidance and assistance to Federal agencies with respect to ensuring adequate and proper documentation of the policies and transactions of the Federal Government and ensuring proper records disposition" (44 U.S.C. 2904).

e. Agency heads are required to submit records disposition schedules to the Archivist of the United States for approval. No records may be destroyed without the authorization of the Archivist (44 U.S.C. 3303, 3303a, 3314).

f. The Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.) calls for the coordination and integration of ADP, telecommunications, and records management policies. All three of these disciplines are present in electronic recordkeeping systems.

5. Agency action. Heads of Federal agencies should make adequate plans for preserving and maintaining records that have been created in electronic form; ensure that cost-effective, adequate, and proper documentation of agency functions, activities, and operations is created; and ensure that appropriate internal practices and procedures are instituted to prevent unauthorized access to, or loss, removal, or theft of, official records created or acquired in electronic form. The issues discussed in this bulletin should be addressed in the agency 5-year ADP and telecommunications plans. Agencies should incorporate in policy directives the issues discussed in the attachments and should send copies of these directives to GSA and NARA at the addresses in paragraph 6. Agencies that develop solutions (procedural, technical, legal) to electronic recordkeeping problems are encouraged to inform GSA and NARA, so successes can be shared.

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## ELECTRONIC RECORDKEEPING GUIDELINES

### 1. General.

a. The increased use of personal computers and other electronic office equipment results in more employees, ranging from senior program officials to clerks, making decisions concerning the maintenance, accessibility, and preservation of information. To familiarize all these individuals with their new responsibilities, agency administrators should undertake a major training effort. The following guidelines represent a first step in that direction.

b. These guidelines address a range of issues concerning the creation, maintenance, disposition, and preservation of electronically stored information. They offer few definitive answers but they identify the problems and suggest possible solutions. This guidance will be revised when experience shows better solutions to the problems.

c. The guidelines in this attachment address the following concerns:

- (1) Records creation practices,
- (2) Indexing electronic records,
- (3) Retrieval of electronically stored records,
- (4) Ensuring the retention of records,
- (5) Destruction of electronic records,
- (6) Electronic record standards,
- (7) Judicial use of records,
- (8) Appropriate records storage medium,
- (9) Security,
- (10) Software for electronic systems,
- (11) Equipment configuration, and
- (12) Flexible disk care and handling.

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## 2. Records creation practices.

a. To retrieve information created and stored electronically, the user is dependent upon labels, both external and internal. Accurate and complete labels are essential for two major reasons: to ensure that agency personnel can identify the contents of individual disks and diskettes and that they can retrieve information stored on them. Insufficient external labels result in the inability to identify the contents of disks or diskettes. A label such as, "Smith 5" or "Jane 3," generally is of use only to the creators and sometimes not to them. Agency personnel should be informed about the importance of accurate and specific external labels for disks and diskettes. External labels should include: title, dates, software, and file code and identification of the equipment on which the records were created.

b. Some agencies may prefer to treat each diskette as a "file drawer", containing similar documents. Others may reject this approach because it requires that each time users begin work on a different type of document, they must use a different diskette. Regardless of how an agency chooses to store the information it creates, accurate and complete external labels are necessary.

c. Agency personnel also need to use readily understandable and standard internal document labels so that they, their colleagues, and their successors can retrieve information which is stored electronically. If staff members invent their own labeling systems without communicating them to others, the information is virtually inaccessible to everyone other than the creators and is accessible to them only as long as they remember the scheme they used.

d. There are some immediate actions that agencies can take. Personnel should be instructed to use the agency's file code headings and subheadings in labeling electronically created records. They should be notified that every document must be named, dated, and described and that these labels should be accurate and sufficiently detailed to permit the user to retrieve documents previously created. These descriptions should be entered on the index of the diskette as part of the file title.

e. A possible future solution to the labeling problem, and one that also will help avoid inadvertent destruction of records, is to use software which requires that before a document can be created, the user must list whether the item is a record, its file

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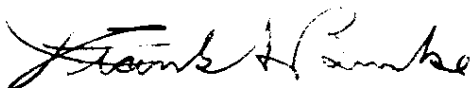
6. GSA and NARA action. GSA will advise agencies concerning the effective use of electronic records and NARA will advise agencies concerning adequacy of documentation and disposition of electronic records. Both agencies will serve as clearinghouses for information on electronic records and will keep agencies informed of their plans and progress in this area. Requests for assistance and offers of information should be directed to:

<u>Address</u>	<u>Telephone</u>
National Archives and Records Administration Office of Records Administration (NI) Washington, DC 20408	FTS 8-724-1453 (202) 724-1453
General Services Administration Office of Innovative Office Systems (KO) Information Resources Management Service Washington, DC 20405	FTS 8-535-7429 (202) 535-7429

7. Additional information.

a. Agency directives on electronic records management received by the Office of Records Administration have incorporated various segments from NARA Bulletin 85-2. Requests for these directives should be addressed to the Records Administration Information Center (NIA), Washington, DC 20408.

b. NARA and the General Services Administration are developing regulations governing the management of electronic records. Those regulations will be published in the Federal Register for agency review and comments.



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code, subject terms, and the date the document is created. This information should reflect the agency's filing systems and records control schedules. If a variety of application software is used on the same machine, the operating system should also require the user to identify which application software is used. In addition, inactive records could be transferred automatically in the future to a central storage facility.

f. A procedure such as this offers many advantages: it alerts agency personnel to the necessity for retaining certain categories of information, it facilitates the retrieval of information since each document is indexed as it is created, and it simplifies disposition since the identifying information is tied to the agency's records control schedules. The value of such a procedure depends, however, upon the accuracy and specificity of the identifying information provided by the user. This requirement for identifying information needs to be built into the operating system. Therefore, this solution is feasible only for those offices which are acquiring new systems. Because implementing such a procedure incorporates both agency mission and records management concerns, agency line managers and records management staff should participate in the development of the specifications.

### 3. Indexing electronic records.

a. Electronic records need to be indexed if they are going to be retrieved. Sometimes system software provides a way to accomplish this.

b. How complex the indexing system needs to be is a function of the volume of records, how long the records must be retained, and how familiar the persons retrieving the records are with the records. Do not assume that since the current users are very familiar with the records that no index or only a limited one is needed. Consider the likely personnel turnover in the originating office from the time the records are created until they are no longer needed for current operations. Also consider what indexes will be required by persons to whom the records may be transferred.

c. The electronic indexes should be able to assist in locating the records based upon the characteristics of the particular record. These would include such things as date, subject, sender, receiver, and number (case, contract, purchase order, etc.). How the index operates should be an easily accessible part of the system documentation.

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d. In addition to the electronic index to the records, indexes to diskettes may be required. If the diskettes are properly labeled, they may be largely self-indexing if there are only a few of them. If there are more, the physical file of them may need to be logically subdivided in order to aid retrievability. Additionally, the diskette indexes should be printed out to ensure easy access to them.

#### 4. Retrieval of electronically stored records.

a. Agency personnel should be able to easily retrieve electronically stored records until their authorized disposition. This requirement is important when an agency upgrades its automated system or replaces it with a new one. Records stored on the old system should be converted, or the new system should be designed, so that these records continue to be usable until their authorized disposition date. One possibility is to design systems that are compatible with a variety of other systems. An alternative is to contract with a commercial service which will convert records from one format to another.

b. Permanent records which are to be transferred to the National Archives and Records Administration and which are stored on disks or diskettes should be either converted to magnetic tape (see 36 CFR 1228.188 (formerly FPMR § 101-11.411-6)) or converted to paper or microform. (Microforms should meet the standards in 36 CFR Part 1230 (formerly FPMR Subpart 101-11.5)). The first alternative, although possibly more technically complicated, may be of assistance to future users of the records particularly if the records contain data which the user may want to manipulate. NARA staff should be involved in the decision on the conversion process and on the record sequence which would be in the best interest of the Government.

#### 5. Ensuring the retention of records.

a. The fact that information is created or stored electronically has no bearing upon whether that information is record or non-record. Record status is determined by the same criteria for all information, regardless of the medium on which it is created or stored. But, ensuring the retention of records stored electronically is not as simple as ensuring the retention of records stored on microform or paper.

b. The decision about whether an electronic document is a record needs to be made much earlier than for paper because of the ease of erasing or changing the record.

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c. The record status of electronically stored drafts of policy documents should be re-evaluated as changes are made. Substantive updates to such electronic records probably constitute new records while minor changes probably do not.

d. Many electronic mail systems automatically erase information after the recipient has read it. Therefore, agency personnel should take positive action, at the time they receive electronic messages, to retain any records received in this manner in a medium which will satisfactorily store the record until its disposition date. (Many electronic mail messages will not contain enough substance to be considered records.)

e. If the same information is stored on more than one medium (such as paper and disk), agencies, in consultation with NARA, should schedule the disposition of all copies.

6. Destruction of electronic records.

a. As with paper records, electronic records can only be destroyed according to an approved agency records control schedule or a General Records Schedule. In addition, personnel should follow the agency's established procedures for the systematic destruction of records. However, there are certain considerations agencies must address when destroying records stored electronically. To destroy them, agencies must erase the disks or tapes rather than merely telling the system to delete them. Only by erasure or by using a program which will completely overwrite the data to be destroyed can agencies protect against unauthorized access to record information which has been approved for destruction.

b. The compactness of electronic media may present additional problems. These records may be stored in non-traditional locations. Also, they do not present the space problems evident with paper records. As a result of both phenomena, agency personnel may become less diligent in destroying records at the time of their authorized destruction. The failure to destroy records in a timely manner will undermine the effectiveness of the agency's records management program. Agency personnel also should be aware that records which have been authorized for destruction but which have not yet been destroyed may be subject to Freedom of Information Act requests.



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Attachment A7. Electronic record standards.

a. The National Bureau of Standards (NBS) has issued the following Federal Information Processing Standards Publications (FIPS PUBS) that are particularly relevant to records creation, storage, and transmission using personal computers or other electronic office equipment. (Note.--FIPS PUBS with an asterisk are mandatory standards that are (or will be) implemented in FIRMR Part 201-8.)

- (1) FIPS PUB 46\* Data Encryption Standard.
- (2) FIPS PUB 48 Guidelines on Evaluation of Techniques for Automated Personnel Identification.
- (3) FIPS PUB 51\* Magnetic Tape Cassettes for Information Interchange 3.8.10mm (0.150 in) Tape of 32 BPMM (800 BDI) Phase Encoded.
- (4) FIPS PUB 52\* Recorded Magnetic Cartridge for Information Interchange, 4-Track (.30mm (0.250 in), (3 BPMM (1600 BDI), Phase Encoded.
- (5) FIPS PUB 54\* Computer Output Microform (COM) Formats and Reduction Ratios, 16mm and 105mm.
- (6) FIPS PUB 65 Guideline for ADP Risk Analysis.
- (7) FIPS PUB 73 Guidelines for Security of Computer Applications.
- (8) FIPS PUB 74 Guidelines for Implementing and using The NBS Data Encryption Standard.
- (9) FIPS PUB 81\* DES Modes of Operation.
- (10) FIPS PUB 82 Guideline for Inspection and Quality Control for Alphanumeric Computer Output Microform.
- (11) FIPS PUB 83 Guideline on User Authentication Techniques for Computer Network Access Control.
- (12) FIPS PUB 91\* Magnetic Tape Cassettes for Information Interchange, Dual Track Complimentary Return-to-bias (CRB). Four states Recording on 3.81mm (0.150 in) tape.

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- (13) FIPS PUB 93\* Parallel Recorded Magnetic Tape Cartridge for Information Interchange, 4-Track, 6.30 (0.250 in) 63 BPMM (1600 BDI), Phase Encoded.
- (14) FIPS PUB 98\* Message Format for Computer-Based Message Systems.
- (15) FIPS PUB 108\* Alphanumeric Computer Output Microform Quality Test Slide.

b. In addition NBS is developing FIPS PUBS in the following areas:

(1) Flexible disks. The following have been adopted by the International Organization for Standardization (ISO) and will be processed as FIPS PUBS.

(a) 200 mm (8 inch) Flexible Disk Cartridge Track Format Using Two-Frequency Recording at 6631 bits per radian (bprad) on One Side - 1.9 tracks per millimeter (tpmm) (48 tracks per inch (tpi)) for Information Interchange.

(b) 200 mm (8 inch) Flexible Disk Cartridge Track Format Using Modified Frequency Modulation Recording at 13262 bprad on Two Sides - 1.9 tpmm (48 tpi) for Information Interchange.

(c) 130 mm (5.25 inch) Flexible Disk Cartridge Track Format Using Two - Frequency Recording at 3979 bprad on One Side - 1.9 tpmm (48 tpi) for Information Interchange.

(d) 130 mm (5.25 inch) Flexible Disk Cartridge Track Format Using Modified Frequency Modulation Recording at 7958 bprad on Two Sides - 1.9 tpmm (48 tpi) for Information Interchange.

(2) Labeling and file structure.

(a) Standard for flexible disk cartridges based on an ISO standard. A FIPS PUB will probably be issued when the current draft standard completes the American National Standards Institute (ANSI) review and approval process.

(b) Data descriptive file standard, which will address structuring data on any medium.

(3) Document interchange format. The specifications, which are being tested by the Department of the Navy, have been submitted to an American National Standards Institute (ANSI) Committee for review and processing.

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(4) Local area network standards. Standards for carrier sense multiple access with collision detection have been completed. The standards listed below are undergoing final review and will be issued as FIPS PUBS. NBS is also continuing to work on standards for other access methods including token bus and token ring.

(a) IEEE 802.2 Type 1 class 1 Logical Link Control.

(b) IEEE 802.3 Carrier Sense Multiple Access with Collision Detection.

8. Judicial use of records.

a. Properly created and maintained computer based records pose no greater legal problems than do paper or microphotographic records unless there are specific statutory or regulatory requirements for paper records (as may be the case with certain medical records, for example). The Federal Rules of Evidence (Rule 803(8)) provide that official records may be admitted as evidence in lieu of the personal appearance of the official responsible for the activity. The text of the rule is:

"The following are not excluded by the hearsay rule, even though the declarant is available as a witness:

. . . (8) Public records and reports.--Records, reports, statements, or data compilations, in any form, of public offices or agencies, setting forth (A) the activities of the office or agency, or (B) matters observed pursuant to duty imposed by law as to which matters there was a duty to report, excluding, however, in criminal cases matters observed by police officers and other law enforcement personnel, or (C) in civil actions and proceedings and against the Government in criminal cases, factual findings resulting from an investigation made pursuant to authority granted by law, unless the sources of information or other circumstances indicate lack of trustworthiness."

b. Under this rule, if the only record is electronic, agencies will need to ensure that procedures are established and followed so that (1) the date of the record can be determined, (2) the date of any alterations will be automatically recorded by the system, and (3) it will be evident that the document was authorized to be issued ("signed") by an appropriate agency official. If these steps are not taken, the trustworthiness of the record could easily be called into question and it could be refused as evidence. Contact your agency counsel for specific advice.

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9. Appropriate record storage medium. Records may be stored on a variety of media including paper, microfilm, magnetic tape or discs, and optical digital data disks. Each medium has characteristics that may make it suitable or unsuitable depending upon the requirements. The characteristics are shown in Attachment B.

a. Agencies should ensure that the medium and system chosen to store records are compatible with at least the following requirements:

- (1) Need to quickly retrieve the information.
- (2) Need for more than one person to have the information simultaneously.
- (3) Need to retain the information until the authorized disposition date.

b. During the time the information must be retained it may be desirable or necessary to transfer it from one medium to another to: reduce costs, continue to have the information available, enhance the usefulness of the information, or to ensure the long-term preservation of the information.

c. Conversion projects should be undertaken only after considering the points below. If records are converted, care must be taken to ensure that the new records accurately reflect the information in the old ones.

- (1) Will the information be easier to use?
- (2) Will new equipment be required?
- (3) Will the conversion result in more cost-effective information management?
- (4) Will the ability to process the information be affected?
- (5) Will the exchange of information be affected?
- (6) Will the integrity of the records be enhanced?
- (7) Will the new medium be satisfactory to NARA for permanent records? (see 36 CFR Part 1230 (formerly FPMR Subpart 101-11.5) for microfilm and 36 CFR 1228.188 (formerly FPMR § 101-11.411-6) for magnetic media). NARA does not accept such records on diskettes.

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10. Security. Special precautions may need to be taken to ensure the security of data stored electronically. Before developing solutions, however, agencies should determine the degree of risk. This can be done by following established risk management techniques, keeping a reasonable ratio between the cost of the risk management study and the likely risk to be identified. The following items need to be considered:

a. Poor quality electrical power may cause equipment to malfunction and affect the electronic records. Check with your facilities manager to see what steps need to be taken to prevent problems of this type. Some problems can be solved with inexpensive devices. More serious problems may require additional electrical circuits.

b. Cleanliness of equipment and magnetic media can affect the records. See paragraph 13 for suggestions.

c. Procedures for using the equipment and the records may need to be examined to ensure that only authorized persons have access. The provisions of the Privacy Act and the protection of sensitive information should particularly be considered. Problems identified may be solved by limiting physical access or by encrypting the data.

11. Software for electronic systems. The software for an electronic recordkeeping system is one of the most important elements in determining the success or failure of such a system. If an agency purchases off-the-shelf software, (the preferred approach, where feasible) the purchaser should include records management concerns when assessing the usefulness of a particular system. If an agency develops its own software, agency records officials should contribute to the development of the software specifications. The following considerations will help agency personnel evaluate the records management components of particular software systems.

a. Information stored on the current system must be usable or convertible so that it may be used on the new one.

b. Control procedures to ensure the security of information should be developed without significantly hampering legitimate access to information.

c. Mandatory identifying information should be incorporated in a manner easily used by records creators.

d. The system must be able to accommodate the data transportability specifications for those permanent records which will be transferred to NARA (see 36 CFR 1228.188).

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12. Equipment configuration. In deciding whether to install stand-alone or networked equipment, agencies should consider the costs and benefits associated with the two approaches. The initial capital outlay may be lower for stand-alone equipment. However, the network approach will provide operational benefits such as the ability to communicate using electronic mail, easier control of application software, and more cost-effective use of such peripheral equipment as large files and printers. It will also provide a relatively easy way to address problems such as organizational records accessibility, standard software and procedures, and storing medium-term records (2 yrs. - 7 yrs.) on equipment other than flexible disk. In the future it may be possible to easily transfer permanent records to the National Archives if such networks are available. When the above factors are considered, agencies will generally find networks more cost effective than stand-alone equipment to satisfy requirements of the work group.

13. Flexible Disk Care and Handling.

a. Media cleanliness is important. Maintain a clean working environment. Contamination of the flexible disk surface is a serious cause of data losses. Finger oil, smoke, food and drinks, abrasive materials (such as dust or filings), pencil eraser debris, etc., are typical contaminants. Read/write heads last longer when used with clean media.

b. Never make finger contact with the exposed media surface through the elongated, oval slot in the envelope where the head-to-disk access (contact) is made. Also avoid touching the exposed media surface area near the hub. These slotted regions offer access to the media surfaces by contaminants particularly fingerprint oils and dirt. Some of the new state-of-the-art micro-sized flexible disks which have 76 mm (3.0 in) to 102 mm (4.0 in) diameters have automatic shutter mechanisms which have been designed to prevent this finger contact problem.

c. Clean the flexible disk drive regularly, particularly at its insertion slot position. Dirt and dust can be picked up by the disk during insertion.

d. Clean the read/write heads on a regular basis.  
(Note.--Some flexible disk head and drive manufacturers will invalidate their warranties if some types of head cleaners are used. Contact individual manufacturers for head cleaning information.)

(1) Dilute isopropyl alcohol on a lint-free swab will clean contaminants from the head. Exert minimum force on the delicate tension springs.

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(2) Cleaning kits are available which employ flexible disks made of a special material as the rotating media rather than the magnetic media of the regular disks. The cleaning material is either run dry or is wetted with a cleaning fluid; the head is then lowered onto the surface and cleaned under rotation.

(3) One kit manufacturer suggests two cleanings per week, another suggests a cleaning after each 40 operational hours, while others recommend a daily cleaning. Others suggest cleaning the flexible disk as soon as data errors appear.

e. Always return the flexible disk into its protective envelope after it is used. This prevents contamination and physical damage to the media. Don't lose the envelope. Don't scatter the disks around on table tops and desks in a random fashion.

f. Don't flex or fold the flexible disks. Avoid bending the disk when loading into or extracting it from the drive. Although the envelope may recover, the internal media may be damaged permanently; a warped disk does not rotate properly. There are new micro-sized flexible disks which are enclosed in rigid plastic envelopes which do not bend or flex.

g. Don't put a rubber band or a paper clip onto the flexible disk envelope. The rubber band may cause the disk to remain bent permanently after long-term storage. The paper clip may emboss the media and cause permanent data losses due to head-to-media separation.

h. Always write on the label before it is applied to the disk. However, if the original label is used, do not write on it with a ball point pen; use a soft, fiber tipped pen. A ball point pen can emboss the surface of the disk and cause permanent surface defects and data losses.

i. Never erase the label on a flexible disk cartridge. Cross out previous information; remove and replace label when full. Erasure can be a source of contamination. In fact, don't write on the label with a lead pencil. Don't paste a new label over the old label and do not cover any flexible disk holes with the new label.

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j. Except as indicated in (2) through (7) below, the following environmental standards apply to the operation, storage, and transportation of flexible disk cartridges.

(1) General

(a) Operating and Storage.

Temperature: 50°F to 125°F (10.0°C to 51.6°C).

Relative Humidity (RH): 8% to 80%.

Wet bulb reading: Not to exceed 85°F (29.4°C).

(b) Transportation.

Temperature: -40°F to 125°F (-40.0°C to 51.6°C).

RH: 8% to 90%.

(2) 200 mm (8-inch) flexible disk cartridge (single-sided, 48 tracks per inch (tpi)).

(a) Operating and Storage.

Condition at least one hour before operating.

(Note.--Condition the disk in the same environment in which the disk drive is operating. There shall be no moisture in or outside the cartridge.)

(b) Further information.

Refer to ANSI X3.73-1980.

(3) 200 mm (8-inch) flexible disk cartridge (double-sided, 48 tpi).

(a) Operating and Storage.

Condition at least 24 hours before operating. Rate of temperature change is not to exceed 36°F (20°C) per hour.

(b) Transportation.

No specification for relative humidity.



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(c) Further information.

Refer to ANSI X3.121-1984.

(4) 130 mm (5-1/4 in) flexible disk cartridge single-sided).

(a) Operating and Storage.

Condition at least one hour before operating.

(b) Transportation.

No specification for relative humidity.

(c) Further information.

Refer to ANSI X3.82-1980.

(5) 130 mm (5-1/4 inch) flexible disk cartridge (two-sided, double density, 48 tpi).

(a) Operating and Storage.

Condition at least 24 hours before operation. Rate of temperature change shall not exceed 36°F (20°C) per hour.

(b) Further information.

Refer to ANSI X3.125-1984.

(6) 130 mm (5-1/4 inch) flexible disk cartridge (double-sided, 96 tpi).

(a) Operating and Storage.

Temperature: 50°F to 115°F (10.0°C to 46.1°C).

RH: 20% to 80%.

Wet bulb reading: Not to exceed 80°F (26.6°C).

Condition at least 24 hours before operating. Rate of temperature change shall not exceed 36°F (20°C) per hour.

(b) Further information.

Refer to ANSI X3.126-1985 (to be published).

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(7) 90 mm (3-1/2 in) flexible disk cartridge.

(a) Operating.

Temperature: 50°F to 140°F (10°C to 60°C).

Rate of temperature change shall not exceed 36°F (20°C) per hour.

(b) Storage.

Temperature: 39.2°F to 127.4°F (4°C to 53°C).

RH: 8% to 90%

(c) Transportation.

Temperature: -40°F to 140°F (-40°C to 60°C).

(d) Further information.

Refer to X3B8/84-201, a document of the X3B8 Standards Committee on flexible disks.

k. Failure to observe the temperature and humidity (T-H) guidelines in paragraph 13j can result in media damage. Be careful about the storage location. Acceptable temperatures and humidities are normally maintained in an operating area such as an office. However, the temperatures in a closed, hot, stationary, automobile in the sunlight may exceed the upper limits. Excessively cold temperatures may make these disks rigid. Acclimatize these affected disks in a normal T-H environment for several hours before using. Don't use a flexible disk as a place mat.

l. Discontinue the use and acquisition of flexible disks which appear to shed excess debris and cause rapid head wear. They may have abrasive surfaces which create considerable friction and heat and usually have short operating lives. The wear rate for a flexible disk compared to a computer tape is accelerated by the fact that the disk heads will pass over and make contact with the same point on the disk surface typically five to six times per second. A rapid decrease in the disk signal level may indicate a rapidly wearing disk surface. Built-in disk coating lubricants reduce this wear effect.

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m. Never place a magnet of any kind onto the envelope surface of a flexible disk cartridge. These include typical bar magnets found in offices, coat and picture hanger magnets, flashlight magnets, magnetized screwdrivers, etc. Keep magnets at least 76 mm (3.0 in) away from recorded disks. This applies to both rigid and flexible disks. Exercise complete control over magnets in the office and the data processing workplace.

n. The flexible disk cartridges should be stored in a vertical position in a storage container.

(1) The vertically stored disks should be supported by the container so that they cannot lean or sag. Make certain that no pressure is exerted against the disk envelopes.

(2) For safest storage, do not use a cardboard container; use a more rigid type, such as a hard plastic unit.

o. Should reinforcing flexible disk hub rings be installed by the user?

(1) Special rings have been developed for the purpose of reducing both the slippage of the flexible disk and inner media hole damage under rotational conditions. At present, the question of the efficacy of these user-installed rings and their possible deleterious effects is unresolved for the larger diameter 203 mm (8.0 in) and 133 mm (5.25 in) flexible disks.

(2) Micro-disks with 76 mm (3.0 in) to 102 mm (4.0 in) diameters, which have recently been introduced into the market, are manufactured with a rigid hub material adhesively bound to the mylar surface. These appear to eliminate the need for these user-installed hub rings.

p. Maintain a schedule for checking, cleaning, or replacing associated air filters. Dirt causes data losses and media damage.

q. Use the proper type of tab to cover the write protect notch on the disk envelope. Don't use any tab material which leaves a sticky residue; use the tabs which are supplied with the disks.

r. Make copies of vital or master flexible disks and store in alternate locations. Do this as soon as possible before problems arise.

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s. Electrical discharges produced by static electricity cannot damage or alter the data which has been correctly recorded and stored on the flexible disks. However, electrical noise produced by arcing due to static electricity, may induce unwanted pulses into the sensitive electronic system.

t. Inspect and replace worn head pads if necessary. A worn pad may cause rapid debris formation and a change in signal level.

u. For additional detail see:

(1) Care and Handling of Computer Magnetic Storage Media. NBS Special Publication 500-101, June 1983, National Bureau of Standards, Department of Commerce. For sale by The Superintendent of Documents U.S. Government Printing Office, Washington, DC 20402 order number: SN 003-003-02486-4.

(2) FIRMR § 201-34.006 and NARA regulations (36 CFR Ch. XII) which furnish guidelines on the care and handling of magnetic computer tape.

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## Comparison of Various Media for Information Storage and Retrieval

Characteristics	Medium				
	Paper	Microform	Magnetic*		Optical digital data disk (read only)
			Tape	Diskette	
1. Life expectancy	Very good if paper quality, ink, and storage conditions are good. (70-100 yrs.)	Very good if properly processed and stored. (Silver - 100s of years) (Diazo and vesicular - 100 years)	Good. Subject to equipment malfunction or magnetic erasure. (10-12 yrs. with periodic exercising)	Good; subject to equipment malfunction or magnetic erasure (10-15 yrs.)	Mfgs. claims are 10 yrs.
2. Acceptable for transfer of permanent records to NARA?	Yes	Yes, if silver halide	Yes	No	No
3. Special equipment required to read?	No	Yes for normal operation. Simple optics will suffice in emergencies.	Yes	Yes	Yes
4. Data easy to alter unnoticed?	No	No	Yes	Yes	No
5. Data may be easily accidentally destroyed.	No	No	Yes	Yes	No
6. Complex indexing easily accomplished?	No	No (Yes, if computer assisted retrieval system is used)	Yes, with special software	Yes, with special software	Yes, with special software
7. Data easy to retrieve?	Volume Small - Yes Large - No	Depends upon indexing & labeling scheme. Computer assisted retrieval very helpful for large collections	Yes, if properly indexed	Yes, if properly indexed	Yes, if properly indexed
8. Data easy to electronically process after retrieval?	No	No	Yes	Yes	Machine readable - Yes Raster scan - No

\*For additional detail see par. 13u(1).