Computer-Output-Microfilm Systems

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Preface

This book is intended to describe the design, installation, and evaluation of computer-output-microfilm (COM) systems. It attempts to anticipate those questions which will be, or should be, asked by both systems analysts and managers given the responsibility of evaluating if, and how, a COM system can be effectively used. It provides a systematic approach to a COM study, including hardware and software considerations and options, design and installation of a microfilm retrieval system, choice of a COM service bureau, installation of an in-house COM production facility, and evaluation of installed systems. Also, the book shows how COM systems can be successfully combined with other types of systems, including hard-copy (document) microfilm, on-line computer, and manual systems.

Chapter 1 is intended to provide those with little or no microfilm experience background in general microfilm terminology and techniques. Those readers who have previous microfilm experience will probably be able to skim over or skip this chapter entirely.

An effort has been made not to mention particular manufacturers by name, except where unavoidable. In an industry such as this which is in its developmental stages, with companies entering and leaving the field rather frequently, the usefulness of hardware-oriented books rapidly diminishes. Rather, analyses and checklists have been included to channel the reader into making his own hardware evaluations, using the most up-to-date information available from the various manufacturers.

Several cost and timing examples are included in the book. It should be understood that the numbers given in these examples are based on the use of specific equipment and techniques. They are provided for illustrative purposes, showing a method of analysis. Given these examples, though, the reader should be able to arrive at meaningful estimates by substituting the speeds and costs of the specific equipment being considered or installed.

Stress has been given to those COM system techniques and equipment which are most frequently used. This is not to suggest that other, less commonly used techniques would not prove equally acceptable. However, the inexperienced microfilm user should consider the strong arguments for using these more common procedures for initial applications, minimizing unforeseeable problems, while gaining invaluable experience.

Finally, this book attempts to cover not only the advantages of COM systems, but also the potential problems of installing and using them. This was done to provide the reader with a more balanced picture of this new, and powerful, systems technique. Many times, by being aware of the existence of these potential difficulties, the user can easily avoid them and considerably minimize the installation difficulties of initial applications, thus insuring their success.

I would like to thank the National Microfilm Association and Mr. Don Avedon for allowing me to include the "Glossary of Micrographics" as an appendix to this book.

Philadelphia, Pennsylvania *Robert F. Gildenberg*

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Chapter One

Microfilm Information Systems

ADVANTAGES OF MICROFILM

The production of microfilm is divided into two basic categories—hard-copy (document) microfilm, and computer-output-microfilm (COM). The use of microfilm generated from either of these techniques provides several advantages, including:

Space Savings

A microfilm file requires only approximately 2% of the space of an equivalent paper file. With floor space at a premium for most companies, the space saved by placing paper documents onto microfilm can provide significant cost benefits. In some cases the documents are placed onto microfilm only for archive retention. More and more, however, documents are microfilmed to provide user groups with an information inquiry and retrieval system, difficult to surpass from a price/performance point of view.

File Integrity

In many applications, documents are constantly removed from paper files for use. Their placement back into the file, however, is frequently done in haste, with a large percentage of misfilings the result. In many cases, once misfiled, the documents are as good as lost, with a major effort required to locate them. Depending on the application, the inability to locate this information may be very costly, leading to lost revenues and dissatisfied customers. Once the documents are microfilmed, though, their location in the file is

fixed, thus insuring file integrity. Various indexing techniques and the use of finder files can be used to rapidly locate any document on the microfilm, generally in a matter of seconds.

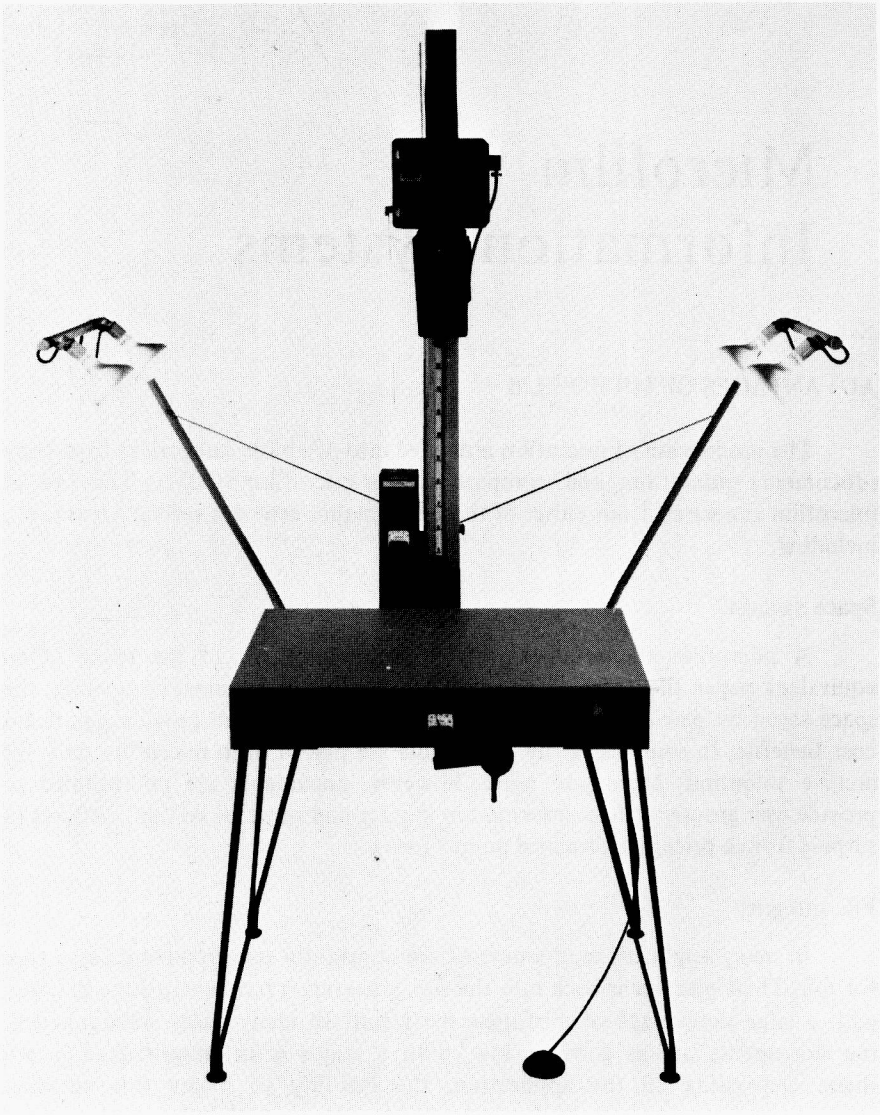

FIGURE 1. Planetary camera. (Courtesy of Eastman Kodak Company.)

File Accessibility

It is estimated that information can be found five times faster on a microfilm file than on an equivalent paper file. Access times of 30 to 90 seconds, or less, are attainable on a microfilm information system. Also, two-stage look-ups, requiring an initial search on one microfilm file to determine the location of the desired document on a second microfilm file, are highly effective on a microfilm system. Similar two-stage look-ups are generally impractical on a paper-oriented system.

HARD-COPY MICROFILMING

The planetary and rotary are the two types of cameras commonly used to microfilm paper documents. The planetary camera consists of a flatbed over which a microfilm camera and lights are suspended (Figure 1). The documents are placed on the flatbed, and a picture taken. The reduction ratio (the number of times the document is reduced–generally 20 to 48 (20x to 48x)) can be varied by raising or lowering the camera. The primary advantages of using a planetary camera include the variety of reduction ratios which can be achieved, the variety of size and type of documents which can be microfilmed, and the good quality of reproduction produced by these types of cameras. The primary disadvantage of the planetary camera is the slow manual operation of placing each document on the flatbed.

With the rotary camera (Figure 2), the operator can manually feed the documents, or an automatic device can feed them. Speeds of 600–6000 documents per hour can be achieved by using this type of microfilm camera. The rotary cameras are relatively inexpensive and easy to operate. The main disadvantages of this camera include the inability of microfilming bound documents, and the size restrictions for the documents being microfilmed.

TYPES OF MICROFILM

As the documents are passed through the rotary microfilmer, or placed on the planetary camera's flatbed, their images are recorded on a silver halide original film. Once developed, though, copies of this original silver film can be placed on a silver halide, diazo, or vesicular type of copy film.

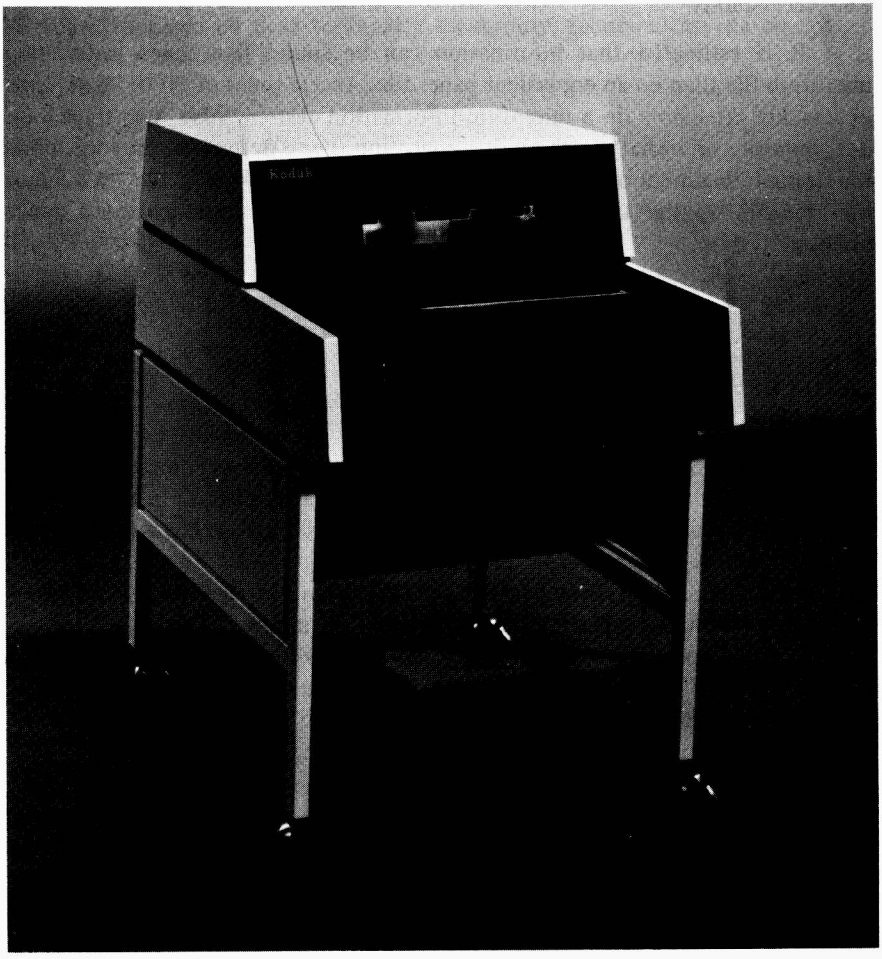

FIGURE 2. Rotary camera. (Courtesy of Eastman Kodak Company.)

Silver Halide Film

This type of film contains silver halide crystals with a gelatin coating which releases free silver when exposed to light and developed. The image produced on silver duplicating film is the opposite of the original film's image. Therefore, if the original film is positive (black letters on a white background), the silver copy will have a negative image (white letters on a black background) (Figure 3). Silver film can meet all government archival requirements if properly

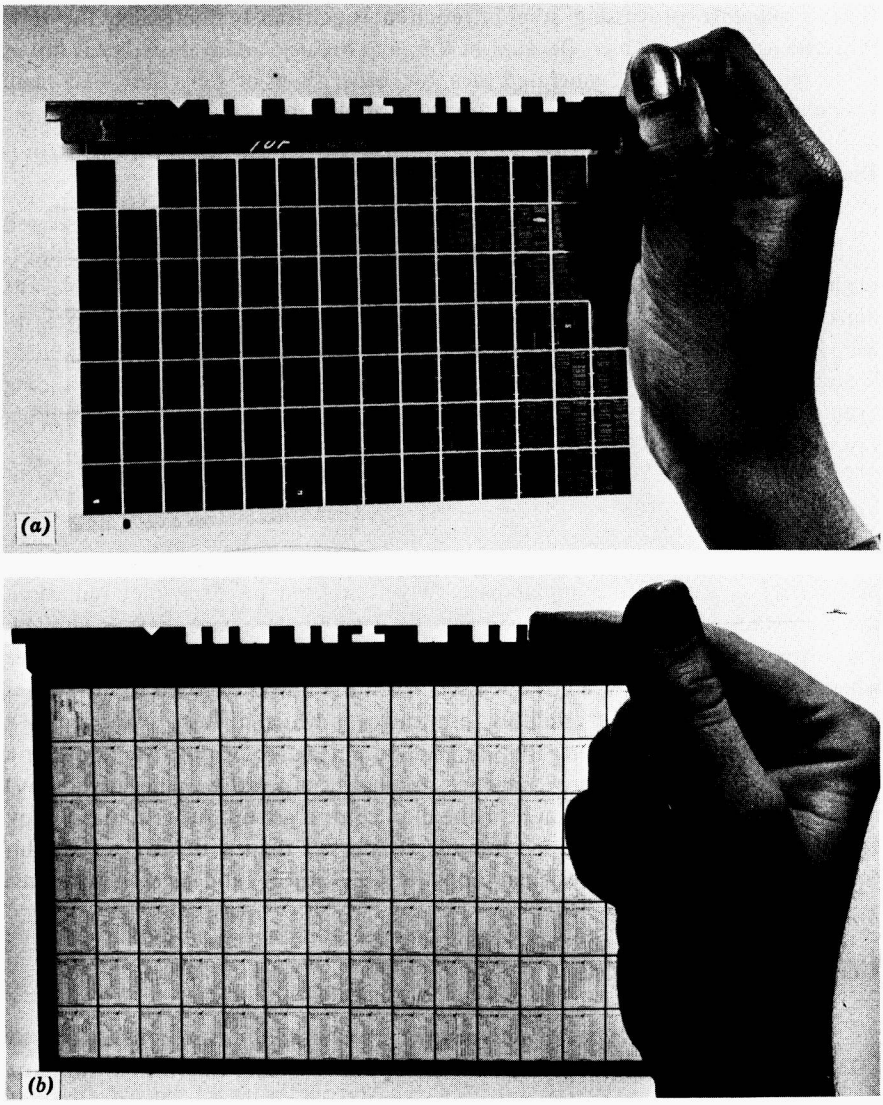

FIGURE 3. *(a)* Negative and *(b)* positive image film. (Courtesy of Image Systems, Inc.)

processed and quality controlled. The quality of the image on silver film is excellent. However, silver halide film has several disadvantages, including the requirement of a darkroom for processing, the need for wet chemical baths for developing, and the tendency of the film to scratch easily. Also, as a duplicate

film, a separate processing step is required, significantly increasing the time required to generate copies. Because of this, and because archival quality is not as often required for COM generated files, two other types of copy film—diazo and vesicular—are more commonly used for these applications.

Diazo Film

Diazo film contains azo dyes which produce a visible image when exposed to ammonia vapors and a strong light. Unlike silver film, if the original film is positive, the diazo copy will be positive. Or, if the original film is negative, the diazo copy will also be negative. Although the film is not intended for archival use, its cost is low, and its processing easy to master. Care should be taken to insure that if diazo is being considered as the copy film, the local building ordinances are checked to see if special venting is required for the ammonia vapors used in the process.

Vesicular Film

Transparent crystalline particles are mixed with a transparent resinous plastic and coated onto a mylar base. When exposed to ultraviolet radiation, these crystallites change to nitrogen gas. To develop the image, heat is applied. The nitrogen gas pockets expand, with small bubbles created. It is these bubbles which form the image viewed by the user. When the film is exposed to ultraviolet radiation, the remaining crystallites form nitrogen which diffuses away. Either a reversal image (positive or negative original to a negative or positive copy), or a nonreversal image (positive or negative original to a positive or negative copy) can be produced, depending on how the duplicator is set up. As with diazo copy equipment, training of the operations staff is easier than with silver copy film equipment. The finished vesicular copy is very sturdy and scratch resistant.

TYPES OF MICROFORMS

Several different types of microforms are available for use in hard-copy or COM microfilm information systems. 16, 35, and 105 mm microfilms are most commonly used. Several factors should be considered when choosing the type of microform. These include:

1. Volume of records in the file
2. Frequency of file updates
3. Number of file inquiries
4. Number of copies required of the file
5. Access speed requirements
6. Type of readers currently being used for other microfilm applications

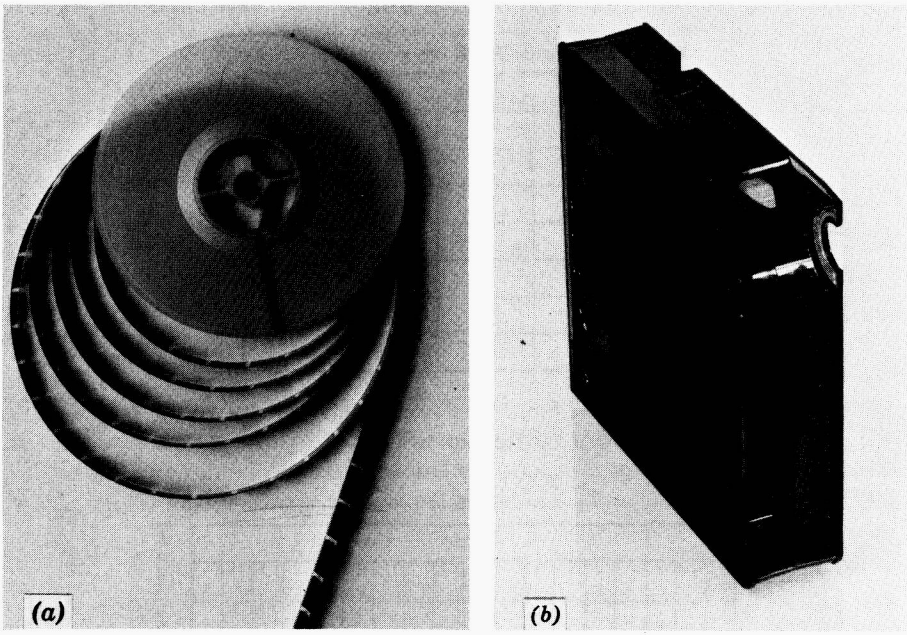

FIGURE 4. Roll film – *(a)* spool and *(b)* cartridge. (Courtesy of Eastman Kodak Company.)

The most commonly used microforms for microfilm information systems are:

1. Roll
2. Fiche
3. Ultrafiche
4. Aperture cards

Roll Film

Depending on the reduction ratio used, generally 2000 or more pages of information can be placed on a roll of microfilm. Roll film is commonly used for larger files, files which are updated in their entirety, and applications requiring fewer numbers of readers. Roll film can be loaded onto spools or cartridges (Figure 4). As a general rule, spools should only be used if the file is intended for archival purposes. Spools are difficult to thread into the reader, and must be kept in boxes to keep them dust-free. Spool readers are used, though, because of their lower cost. Cartridges provide for easy reader loading and film handling, and protection for the film from dust and unwinding. Because of the

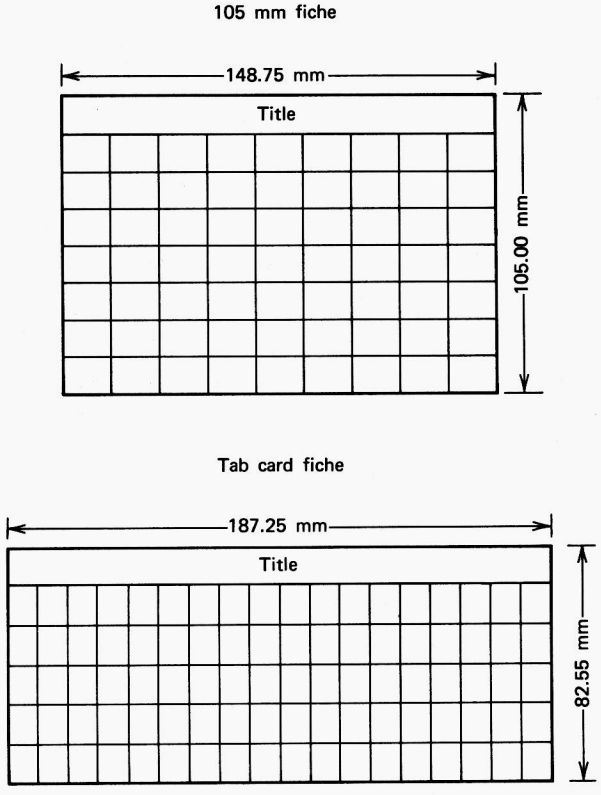

FIGURE 5. Fiche.

ease of loading and handling, cartridges reduce the time required to locate a record on the file, reduce operator training time, and increase operator acceptance of the microfilm system.

Roll film has several advantages over the other types of microforms, including the maintenance of file integrity, the ease of storage for large files, and the minimization of manual handling of the film. Its disadvantages include the higher cost of the readers, the necessity of usually regenerating the entire file, or using a secondary file (see Chapter 5) when updating is required, and the difficulty of selectively distributing parts of the file.

Fiche Film

Two sizes of fiche are commonly used for microfilm information systems. The first, and most common, is approximately 4 X 6 inch, or 105 X 148.75 mm.