NAME OF SYSTEM:

Aircraft Maintenance Manual Distribution and Updating

ORIGINATOR:

Eastern Airlines

Miami Maintenance Base, Miami International Airport

Miami, Florida 33848

OBJECTIVE. To develop and operate a company-wide aircraft maintenance information storage, retrieval, and display system that is better suited to the needs of the maintenance facilities; also, to reduce costs and elapsed time for reproducing, distributing, and updating manuals.

BACKGROUND. What began long ago as a fairly simple operation—the provision of maintenance manuals for aircraft operated by commercial airlines—today has grown as much in complexity as the aircraft themselves. From a book about the size of a modern automobile maintenance guide, these aircraft manuals have grown to enormous sizes. To illustrate, until recently it took as many as 7,000 manual pages to properly document all the engineering and maintenance details for just one type of jet aircraft. In total, the full Eastern Airline's fleet of over 250 aircraft required about 150,000 pages of technical instructions. To keep the documents current throughout the Airline's network of about 70 locations, over four million inserted changes were made in 1965. Because of this constantly expanding bulky file of information and the impending addition of three new types of aircraft to the fleet during the following three years, Eastern Airlines began studying the unique qualities of microform for solving the problem.

The company desired a microfilm system that would present the manual information in an easily accessible manner, both for mechanics and inspectors working on the line, as well as for people responsible for entering procedural and technical changes. They felt that any new system should have the capability of providing the line mechanic with specific pages covering a particular assignment.

An in-depth study of the problem resulted in the adoption of a system that utilized the best features of systems developed by three major microform manufacturers. The company believes that this system should satisfy their maintenance information handling needs for many years to come.

THE NEW METHOD. The adopted system requires the maintenance of only one master aircraft maintenance manual, kept in paper form at Miami, for each aircraft type. One person is assigned the responsibility for keeping the master copy up to date. This conventional master manual is periodically recorded in 16-mm. silver halide microfilm through use of two types of film cameras. A B–H rotary (automatic) camera is used for filming of normal text, while a Recordak planetary or overhead camera is used for the detailed wiring diagrams and other high resolution tasks.

The film is developed in a Sepratron processor. Approximately 100 diazo negative roll microfilm copies are then produced on a CBS (Columbia Broadcasting System) continuous film duplicator for distribution to about 70 primary aircraft maintenance facilities throughout the EAL network and elsewhere. An index is prepared for use with a Filmac Model 400 cartridge roll microfilm reader-printer that uses the odometer technique for image finding. The microfilm copies are loaded into cartridges and index labels are placed on the outside. The complete manual sets, usually consisting of three cartridges for each type of aircraft, are placed in special shipping containers used for distribution of the new microform copies and for return of the old copies to Miami; thus, the cartridges are used over and over again.

The user's microfilm cartridges are stored in a special receptacle located close to the reader-printer. The user—a mechanic, an inspector or supervisor—has the option of viewing the page image on the reader or of obtaining a disposable enlarged paper copy for

use in his work location. As a safety factor, the paper copies are self-erasing within 60 days.

Microform copies are also distributed for use on portable readers kept at secondary locations, such as on board aircraft involved in EAL off-system operations. These readers operate on aircraft, motor vehicle, or self-contained battery power. The microform manual file and reader for this secondary use are contained in a single package weighing about 14 pounds and about the size of a portable typewriter, in contrast to the 80-pound weight of a set of paper manuals.

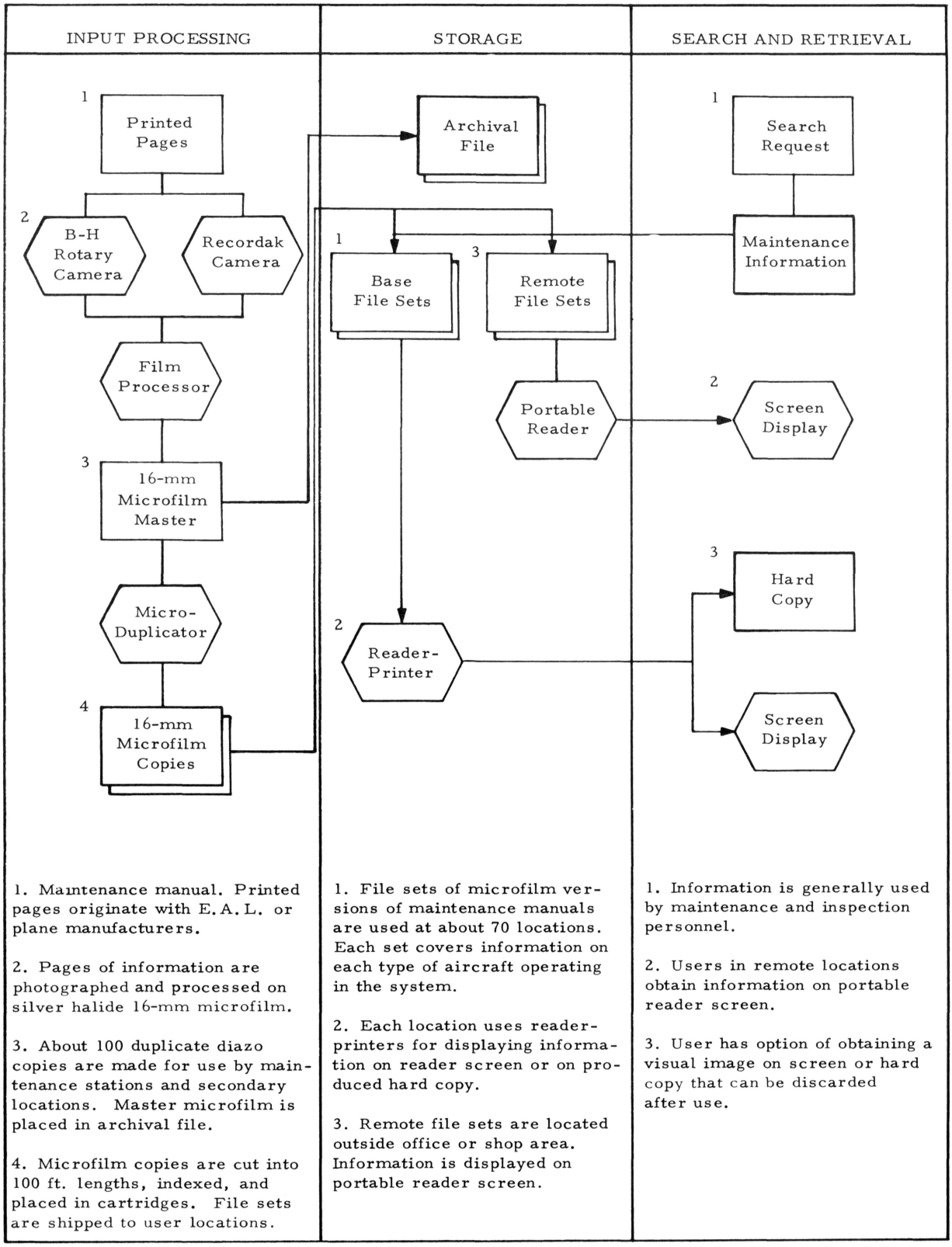
New information of importance received between each month's file updating is handled by teletype messages or through use of temporary paper revisions, which are filed in a binder adjacent to the viewer equipment. Careful control keeps this supplemental paper to a minimum, and it is destroyed upon receipt of the completely updated microform copy.

REMARKS. One of the problems generally associated with the distribution of technical information is that of file integrity. However, under this system excellent file integrity is assured due to the specially maintained single master paper copy. Formerly, about 75 people throughout the Eastern Airline network had some responsibility for maintenance of the aircraft manuals.

Due to elimination of the time consuming mass paper printing, packaging, and shipping processes and the close cooperation between the airline and the many aircraft manufacturers, the time required to provide current information to the many maintenance facilities has been greatly reduced. The new system has reduced the former space requirement of a 12-foot shelf of books to a reference file about the size of a shoe box.

In summary, in addition to the tangible benefits in the form of savings in personnel, handling, storage, and other costs, this system has resulted in greatly improved quality control; greater flexibility in file location and display methods; and earlier receipt of the latest technical changes at the using locations.

AIRCRAFT MAINTENANCE MANUAL DISTRIBUTING AND UPDATING



1. Maintenance manual. Printed pages originate with E.A.L. or plane manufacturers.

2. Pages of information are photographed and processed on silver halide 16-mm microfilm.

3. About 100 duplicate diazo copies are made for use by maintenance stations and secondary locations. Master microfilm is placed in archival file.

4. Microfilm copies are cut into 100 ft. lengths, indexed, and placed in cartridges. File sets are shipped to user locations.

1. File sets of microfilm versions of maintenance manuals are used at about 70 locations. Each set covers information on each type of aircraft operating in the system.

2. Each location uses reader-printers for displaying information on reader screen or on produced hard copy.

3. Remote file sets are located outside office or shop area. Information is displayed on portable reader screen.

1. Information is generally used by maintenance and inspection personnel.

2. Users in remote locations obtain information on portable reader screen.

3. User has option of obtaining a visual image on screen or hard copy that can be discarded after use.