DRAWINGS ON 35mm MICROFILM
GENERAL INFORMATION

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1. GENERAL

1.01 This section outlines the general plan for the production, distribution, and use of 35mm microfilm of engineering drawings in the Bell System.

> ***Note:*** This section does not cover file and storage conditions for permanent records. For conditions governing archival permanence, reference should be made to American National Standards PH5.4, Practices for Storage of Microfilm. Copies may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

1.02 This section is reissued primarily to include information covering computer-output microfilm (COM). Detailed reasons for reissue will be found at the end of the section.

1.03 Engineering drawings are the backbone of the operating equipment installed throughout the Bell System. Millions of copies of these drawings are required by the various organizations of the Bell System. Copies are used by the Bell Laboratories in the design and development of the equipment. The Western Electric Company uses copies for manufacturing the equipment, for engineering specific telephone company orders, and for installation of the equipment in the field. The operating telephone companies use copies for the engineering, operation, and maintenance of the equipment. The AT&T uses copies for engineering and reference purposes.

1.04 Unitized microfilm, that is, individual 35mm microfilm frames mounted in electrical accounting machine (EAM) cards, of engineering drawings provides an improved method of furnishing drawing information throughout the Bell System. ◗Drawings are photographed at their source on 35mm film or generated directly on 35mm film by means of a computer-output microfilm (COM) device (see Note). The provision of legible microfilm is dependent upon the preparation of these drawings in accordance with standard drawing practices (Technical Design Manual — Drafting Standards — Product CI 97.104), or generation on a COM device in accordance with X-76081 "Standards for 35mm Computer-Output Microfilm (COM) for Engineering Drawings."◖ Each microfilm is mounted in an apertured EAM card that is punched and interpreted to identify the drawing. Microfilm of these drawings required by each Bell System location will be distributed by the Western Electric Company and kept up-to-date as they are reissued. Thus, each location will have a microfilm file of all required drawings available to the engineers at all times. This will avoid the frequent delays experienced under a print file system when prints which are out of file when required must be located or reordered.

> ◗***Note:*** A computer-output (COM) device is a recorder that converts data from a computer into a human readable form and records it on microfilm.◖

1.05 Each Bell System location will be equipped with microfilm readers and printers. When a request is received at a file for a drawing, a duplicate microfilm will be made from the file master microfilm. The nonreturnable duplicate microfilm may be used in a reader to obtain the information required. If an enlarged paper print is required, it will be made from the file master microfilm.

1.06 Unitized microfilm provides a means of furnishing all drawings in a standard uniform size card. The use of microfilm in the Bell System offers substantial savings that result from reduced floor space requirements, simplified filing operations, faster and less costly shipping and mailing, reduced service intervals, and increased engineering efficiency. These savings can only be achieved if recommendations in regard to equipment and procedures are followed by all who use microfilm.

1.07 Standards ranging from the quality of the raw film and the mounting of microfilm in apertured cards through requirements for the equipments used to produce and use microfilm have been established to assure a completely coordinated and compatible microfilm system.

1.08 ***Refurbishing of Illegible Drawings:*** (This applies to drawings supplied to the telephone companies.) It has been recognized that the condition of some existing Bell Laboratories and WE drawings is such that completely legible microfilm cannot be produced and a program for refurbishing active drawings is being followed to provide legible microfilm copies. All drawings, when reissued, will be reviewed and those from which completely legible microfilm cannot be produced will be refurbished (see Note 1) or, classified as indicated below. The class number shall appear on the drawing in or near the title block and keypunched and interpreted in column 44 on the microfilm card. (On drawings issued prior to January 1, 1968, the class number will appear either on the drawing in or near the title block, or interpreted on the first line in columns 54, 55, and 57 or prominently stamped on the microfilm card.) In addition to the active drawing refurbishing program, drawings may be reviewed on a mass basis and refurbished or classified, as appropriate.

CLASSIFICATION	MEANING OF CLASSIFICATION
CLASS II or CL II (on drawing) 2 (on card)	Refurbishing required but scheduled for later date. (See Note 2.)
CLASS III or CL III (on drawing) 3 (on card)	Refurbishing not intended because of low activity. (See Note 3 and 1.09.)

Note 1: Illegible issue notes on ▸Standard drawings dated prior to the current drawing issue date need not be refurbished.◂

Note 2: The Class II designation shall not apply to any new, redrawn, or reissued drawing issued after April 1, 1969.

Note 3: A Class III drawing will be considered for refurbishing if a specific request indicating an urgent need for improved legibility in such a drawing is received from a telephone company. All such requests should be referred to the Western Electric Regional Quality Service Engineer.

1.09 ***Criteria for Placement in Class III:*** A drawing will be assigned Class III if one or more of the following conditions apply.

(a) It is associated with the Manual or Panel Systems.

(b) It is a Bell Laboratories ED-01 drawing that has been replaced or is being replaced by a dual-rated WE drawing.

(c) ▸It is a replaced ED, H, or J specification drawing.◂

(d) It is a superseded or replaced Job T- drawing.

(e) It is ▸a standard◂ drawing, bearing a Standard or A&M Only rating, that has not been issued in the last 10 years. See Note.

(f) It is ▸a standard◂ drawing, bearing a rating other than Standard or A&M Only, that has not been reissued in the last 5 years. See Note.

(g) It is a Job T- drawing that has not been reissued in the last 5 years, or is associated with an installation that is retired or is about to be retired. See Note.

(h) ▸It is a standard drawing, other than an ED, H, or J specification drawing, or a schematic or wiring diagram drawing, reissued to rate it Mfr Disc.◂

Note: When a drawing is reissued to rate it Mfr Disc. and no other change is made, the date of the previous issue shall be used

to determine whether the drawing should be assigned Class III.

1.10 ***Drawings Refurbished or Remicrofilmed Without Issue Change:*** Drawings which have been refurbished or remicrofilmed without change need not have the issue raised. If the issue is not raised, the current issue number on the microfilm card will be preceded by an X.

1.11 ***Superseded or Replaced Drawings***

(a) ***Job T- Drawings:*** In order that the telephone companies may have a complete issue note record on Job T- drawings, microfilm cards of superseded or replaced drawings will be furnished. These microfilm cards will be identified with an RTN (meaning retain) in the issue number block in place of an issue number and should be retained permanently.

(b) ***Standard Drawings:*** A standard drawing which has been replaced will be indicated by a GN-1861 card bearing the letters RPL (meaning replaced) in place of the issue. The card will also furnish replacement drawing information. In cases where a number of drawings replace one drawing, several GN-1861 cards will be furnished to provide complete replacement information. When more than one card is furnished, an alphanumeric code will appear in the section number box. The alpha portion will indicate the specific card furnished and the numeric portion will indicate the total number of cards furnished. For example, D5 designates the fourth card of five required for replacement information.

1.12 ***Job Wiring List Record of Equipment Removed:*** In order that the telephone companies may have a complete record on Job T- wiring list drawings of the equipment removed from the office, microfilm cards of such drawings whose drawing dash number is suffixed R will be furnished. These cards will be identified with an RTN (meaning retain) in the issue number block in place of an issue number and should be retained permanently.

1.13 ***Microfilm Temporarily Delayed:*** A white GN-1867 temporary record card will be distributed in place of microfilm, when microfilm of any sheet of a standard drawing or Job T- drawing is temporarily delayed. The existing microfilm cards for the delayed sheets should be retained until the delayed microfilm cards are received.

1.14 ***Safeguarding Classified Information:*** Security regulations should be followed in the production and use of microfilm of classified information. Procedures for handling classified microfilm should be discussed with the local security representative.

1.15 ***Government Contracts:*** Deviations from the requirements established for microfilm for Bell System use may be authorized when microfilm supplied to government agencies must conform to government contract requirements.

2. PRODUCING MICROFILM

2.01 Microfilming has as its purpose:

(a) The recording of engineering drawings on microfilm.

(b) The use of microfilm to service file requests for reference information.

(c) The use of microfilm as an intermediary for mass production and distribution of drawing information.

2.02 ◗Microfilming of drawings begins with the original drawings being photographed with a precision 35mm camera or generated directly on 35mm film by means of a computer-output microfilm (COM) device◖ under controlled conditions that have been established to ensure microfilm of high quality.

2.03 The exposed microfilm is then processed carefully. Upon completion of processing, the microfilm is inspected to determine that requirements have been met.

2.04 Following the inspection, each frame of microfilm is mounted in an aperture card using a precision mounter. Before mounting the film, the aperture card is keypunched and interpreted with drawing identification information.

2.05 Duplicate copies of the original microfilm are produced in card-to-card printers in the quantity required for distribution.

2.06 The equipment and detailed requirements for producing microfilm are covered in Section 006-110-100.

2.07 To ensure compatibility in using equipment, telephone companies microfilming their own drawings should follow the requirements outlined in Section 006-110-100 for producing the complete microfilm mounted in an aperture card.

3. RECOMMENDED METHOD OF OPERATING WITH MICROFILM IN TELEPHONE COMPANY ENGINEERING OFFICES

3.01 The Western Electric Company will supply microfilm of new and reissued WE and Bell Laboratories equipment engineering drawings mounted in EAM aperture cards to Bell System files upon request.

3.02 When a new microfilm file of WE and Bell Laboratories drawings is to be established, the required microfilm cards should be obtained from WE. They should not be produced locally since locally produced cards introduce another generation which adversely affects the quality of microfilm copies made to fill requests.

3.03 Only one microfilm of each drawing will be required at each microfilm file. This microfilm will serve as the master file copy. If replacements are required, they should be ordered from the WE location which supplied the initial microfilm.

3.04 The microfilm file should be located convenient to the file of associated engineering papers.

3.05 In order to keep the file intact, it is advisable that the file master microfilm card ***should not*** leave the file area. Instead, nonreturnable duplicate microfilm cards should be made to fill all requests for drawings. As necessary, the file personnel may make a paper print from the file master microfilm card.

3.06 Microfilm readers, which permit microfilm to be read directly, and printers, which when necessary can be used to quickly produce enlarged paper prints from microfilm, are required in sufficient quantities to ensure efficient operation.

3.07 Fig. 1 illustrates the use of microfilm in telephone company engineering offices.

EQUIPMENT REQUIREMENTS

3.08 See Section 006-115-100 for detailed descriptions and recommended operating procedures for the equipment required to use microfilm.

File Areas

3.09 ***Microfilm Card Files:*** Filing facilities should be provided on the basis of the number of cards in the file, the activity of the file, and the floor space available. Provision for future growth should also be considered.

3.10 ***Manual Card-to-Card Printers:*** One manual card-to-card printer for making duplicate microfilm cards is required for each file area. The production rate of these machines ranges from 150 to 300 duplicate cards per hour. There should be no need for standby or spare card-to-card printers, since paper prints could temporarily be produced by file personnel from the file master microfilm cards in an emergency.

3.11 ***Readers:*** A sufficient number of readers should be provided to permit quick reference at the file. The following types of readers on which a magnified microfilm image may be viewed are available.

(a) A reader with a small screen (10-1/2 by 12 inches) which occupies a minimum of space. The reader is equipped with a scanning device since the entire drawing cannot be viewed at one time. The scanning device permits optimum positioning of the portion of a drawing being viewed.

(b) A reader with an intermediate size screen which provides a greater magnification than other recommended readers. It is equipped with a scanning device serving the same function as the scanning device for the small screen reader.

(c) A reader with a large screen (18 by 24 inches) which permits the entire drawing to be viewed without scanning.

(d) A reader-printer which combines a large screen reader with a printer for production of paper copies. See 3.12.

3.12 ***Enlarger-Printers and Reader-Printers:*** Printers for making paper prints may be

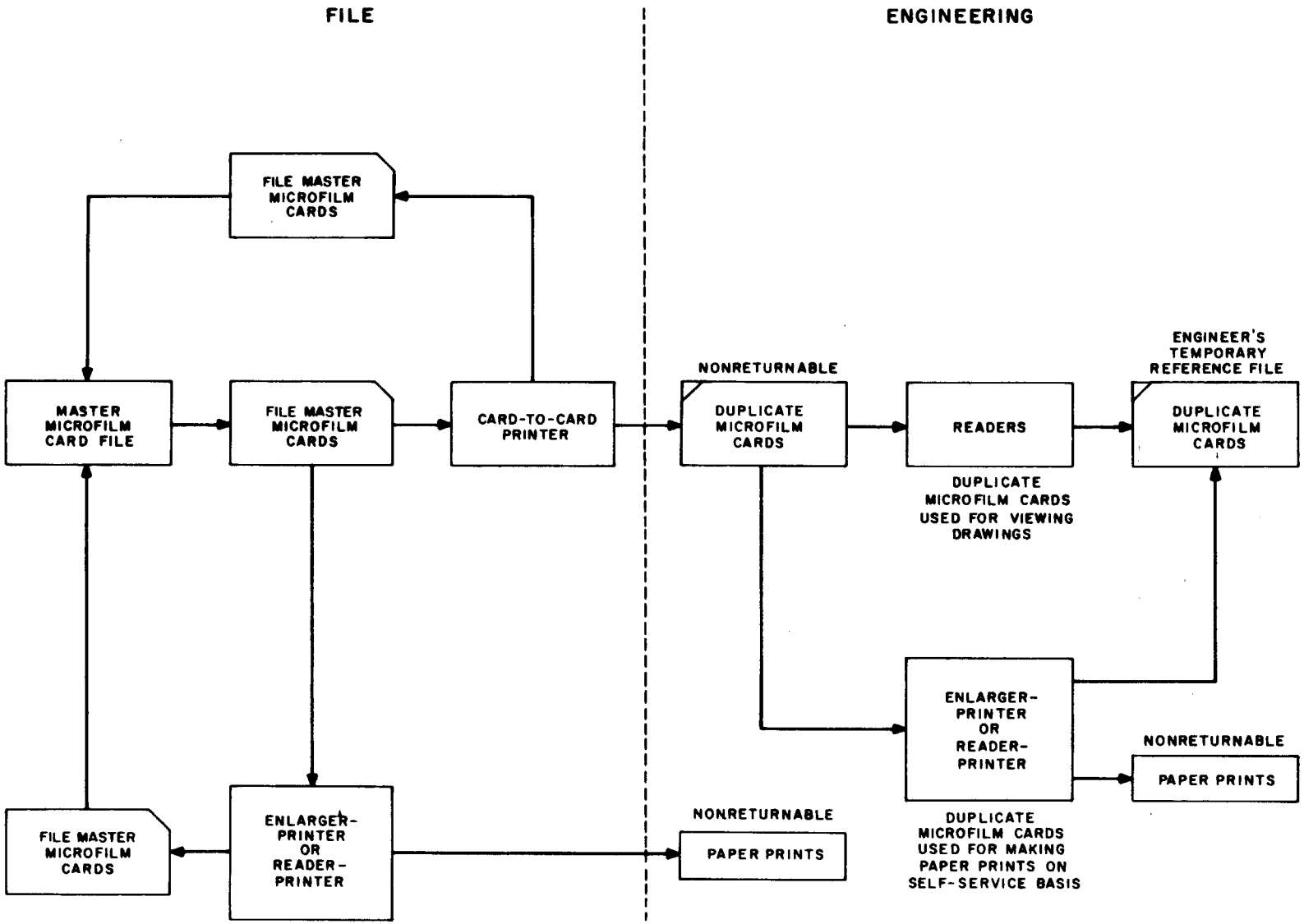

Fig. 1—Use of Microfilm in Telephone Company Offices

required in a file area. The two types of printers presently available are enlarger-printers and reader-printers. These printers may use an electrostatic (xerographic), electrochemical, photochemical, or dry silver process to produce paper copies. The electrostatic process is limited in tonal range, and marginal information not reproducible by this process is often reproducible by the other processes which have wider tonal range. In general, the enlarger-printers provide low-cost paper copies where large numbers of prints are required. When a printer is required, a reader-printer or, where volume warrants, a reader-printer and an enlarger-printer should be provided to ensure adequate printing facilities. In order to ensure production of more legible paper copies from microfilm which contains marginal information, one printer should have a wide tonal range.

3.13 A sample microfilm file ultimately containing 120,000 cards would require the following facilities to ensure efficient operation.

File Facilities

One Rotary File (30 sq ft),* or

Six Tub Files (75 sq ft),* or

Two Vertical 22-Drawer Cabinets (14 sq ft)*

One Manual Card-to-Card Printer

Two Reader-Printers†

*Options based on file activity and available floor space.

†One reader-printer should use an electrochemical, photochemical, or dry silver process.

Engineering Areas

3.14 A sufficient number of readers, suitable for desk top use, should be provided to permit engineering personnel to work conveniently with microfilm rather than paper prints. In most applications each engineer will require his own reader to use microfilm efficiently. However, the engineer's immediate work situation as well as convenience should be given consideration in determining the number, type, and location of readers required in a given engineering area.

3.15 Printing facilities for making paper prints from duplicate microfilm cards on a self-service basis may be provided in a location convenient to the engineering personnel.

PROCEDURES

File Areas

3.16 In order to ensure that the microfilm file remains intact at all times, ***the file master microfilm cards should not be removed from the file area.***

Servicing Requests

(a) When a request for a drawing is received, determine whether the entire drawing is needed or whether specific sheets would serve. On multisheet drawings the index may be viewed in a reader at the file to determine the sheets required.

(b) In filling a request for a drawing, the file master microfilm card should be used to make a duplicate microfilm card or it may be used to make a paper print and then returned directly to file. The duplicate card or the paper print given to the engineer need not be loaned out on a "charge" basis nor returned to file.

(c) If a red card is in the file, indicating that microfilm of a particular drawing is not available, a paper print, which will be automatically distributed by WE in lieu of microfilm, should be furnished to the engineer.

Handling Cards

(a) Care should be exercised in handling cards. Fingers should not touch the film. File master microfilm cards should not be processed through unmodified Electrical Accounting Machines. Processing through unmodified machines may result in damage to film, increased wear of cards, and delays in returning cards to file.

(b) Unexposed duplicate cards (KS-20563, KS-20564, KS-20566, KS-20568, and KS-20569) should be kept in original containers until used and ***should not*** be subjected to ammonia fumes or

prolonged exposure to light, heat, moisture, or cold.

(c) Microfilm cards should not be discarded with other EAM cards which are being salvaged for EAM card stock. The adhesive on microfilm cards prohibits salvaging them with other EAM cards.

(d) When new file master microfilm cards of a reissued drawing are received, the cards of old issues should be removed from file. Cards containing the designation RTN in the issue number block should be retained permanently.

(e) An interdepartment mail envelope designed for special handling of microfilm cards is available from WE as Form GN-9027-B.

Engineering Areas

3.17 Requests for drawings should be made in the usual manner at the file. Only the specific sheets of multisheet drawings which are required should be requested. The index of these drawings may be viewed in a reader at the file to determine the sheets required.

3.18 The file will furnish a duplicate microfilm card of each drawing sheet requested. They may be viewed in readers at the file to verify the contents of the drawings or to determine whether other drawings are required. These duplicate cards need not be returned to file.

3.19 The duplicate microfilm cards are primarily intended to be used in readers in the engineering area for obtaining pertinent engineering information.

3.20 The duplicate microfilm cards may also be used to obtain paper prints, when necessary, using printers located convenient to the engineering area. If a legible paper print cannot be obtained from the duplicate microfilm card, a paper print should be requested from the file. In such cases, the paper print will be prepared from the file master microfilm card. (As with duplicate cards, paper prints need not be returned to file.)

3.21 If engineers retain duplicate microfilm, they should check for latest issue number before using on subsequent jobs.

REASONS FOR REISSUE

1. To include information covering computer-output microfilm (1.04, 2.02).

2. To revise information covering refurbishing of illegible drawings (1.08, Note 1).

3. To revise information covering criteria for Class III [1.09 (c), (e), (f), and (h)].