PROGRAM DOCUMENTATION STANDARDS
FLOWCHART SYMBOLS AND NOTATIONS

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1. GENERAL

1.01 ▸This section covers the approved symbols and notations used in the preparation of Bell System flowcharts for machine data processing and stored program control systems. The symbols are those established by the American National Standard, "Flowchart Symbols and Their Usage in Information Processing" ANSI X3.5, and those established by the National Microfilm Association Standard NMA MS4, "Flowchart Symbols and Their Usage in Micrographics."

1.02 This section is reissued to revise symbol definitions to agree with the ANSI Standard, to add specialized symbols Fig. 20 through 23, to add micrographic symbols Fig. 24 through 27, and to delete conventions applying to similar letters and numbers formerly in 3.02.◀

1.03 The application of these symbols in flowcharting shall be in accordance with the following sections.

(a) Section 007-105-101, covering preparation of system flowcharts.

(b) Section 007-110-101, covering preparation of program flowcharts.

1.04 The orientation of each symbol on a flowchart shall be the same as shown in this section.

1.05 The size of each symbol may be varied to accommodate the information to be placed within the symbol. However, *the dimensional ratios of the symbols shall be maintained* as specified. (This ratio is greatest width to greatest

height.) To maintain a reasonable symbol size, effort should be made to present the information in a concise manner.

1.06 The Bell System Flowcharting Template No. 38-Y-3991A, illustrated on Fig. 28, will produce the symbols shown on Fig. 1 through 23 and may be obtained from the Western Electric Company. ▸NMA Template MS-107 will produce the micrographic symbols shown on Fig. 24 through 27.◀

2. FLOWCHART SYMBOLS

2.01 *The basic input/output symbol* (Fig. 1) represents an input/output function (I/O); that is, the making available of information for processing (input), or the recording of processed information (output). This symbol should be used when the media on which the input/output data is recorded is not known at the time of flowchart preparation or is immaterial to the purpose of the flowchart.

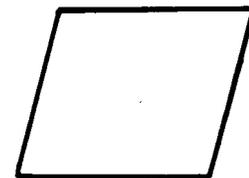Dimensional Ratio
width:height=1:2/3

Fig. 1—Basic Input/Output Symbol

2.02 *The punched card symbol* (Fig. 2) represents an I/O function in which the medium is punched cards, including mark sense cards, partial cards, stub cards, mark scan cards, deck of cards, file of cards, and so forth.

Dimensional Ratio
width:height=1:1/2

Fig. 2—Punched Card Symbol

2.03 *The magnetic tape symbol* (Fig. 3) represents an input/output function in which the medium is magnetic tape.
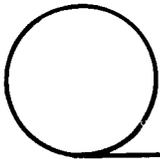
Fig. 3—Magnetic Tape Symbol

2.04 *The punched tape symbol* (Fig. 4) represents an input/output function in which the medium is punched tape.

Dimensional Ratio
width:height=1:1/2

Fig. 4—Punched Tape Symbol

2.05 *The document symbol* (Fig. 5) represents an input/output function in which the medium is a document.

Dimensional Ratio
width:height=1:2/3

Fig. 5—Document Symbol

2.06 *The manual input symbol* (Fig. 6) represents an input function in which the information is entered manually at the time of processing; for example, by means of on-line keyboards, switch settings, or pushbuttons.
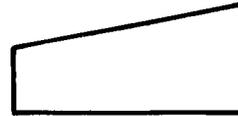
Dimensional Ratio
width:height=1:1/2

Fig. 6—Manual Input Symbol

2.07 *The display symbol* (Fig. 7) represents an input/output function in which the information is displayed for human use at the time of processing, by means of on-line indicators, video devices, ▶console printers,◀ plotters, and so forth.

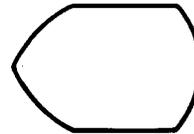Dimensional Ratio
width:height=1:2/3

Fig. 7—Display Symbol

2.08 *The communication link symbol* (Fig. 8) represents a function in which information is transmitted ▶by a telecommunication link.◀ The symbol is always drawn with a superimposed arrowhead to denote the direction of data flow.

Fig. 8—Communication Link Symbol

2.09 *The on-line storage symbol* (Fig. 9) represents an input/output function utilizing ▶any type of on-line storage; for example, magnetic tape, magnetic drum, magnetic disc.◀
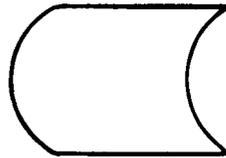
Dimensional Ratio
width:height=1:2/3

Fig. 9—On-Line Storage Symbol

2.10 *The off-line storage symbol* (Fig. 10) ▶represents the function of storing information off-line,◀ regardless of the medium on which the information is recorded.

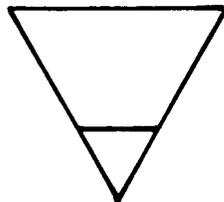Dimensional Ratio
Equilateral Triangle

Fig. 10—Off-Line Storage Symbol

2.11 *The process symbol* (Fig. 11) represents ▶any kind of processing function; for example, the process of executing a defined operation or group of operations resulting in a change in value, form, or location of information, or in the determination of which of several flow directions is to be followed.◀
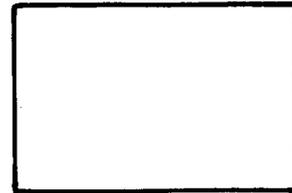
Dimensional Ratio
width:height=1:2/3

Fig. 11—Process Symbol

2.12 *The decision symbol* (Fig. 12) represents a decision ▶or switching-type◀ operation that determines which of a number of alternative paths is to be followed.
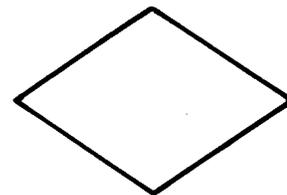
Dimensional Ratio
width:height=1:2/3

Fig. 12—Decision Symbol

2.13 *The predefined process symbol* (Fig. 13) represents a named process ▶consisting of one or more operations or program steps that are specified elsewhere; for example, subroutine or logical unit. (Elsewhere means not this set of flowcharts.)◀
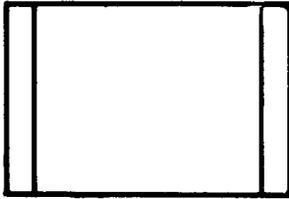
Dimensional Ratio
width:height=1:2/3

Fig. 13—Predefined Process Symbol

2.14   *The manual operation symbol* (Fig. 14) represents any off-line process geared to the speed of a human being, ▶without using mechanical aid.◀

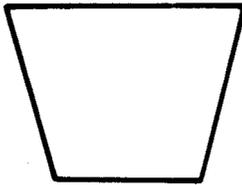Dimensional Ratio
width:height=1:2/3

Fig. 14—Manual Operation Symbol

2.15   *The auxiliary operation symbol* (Fig. 15) represents an off-line operation performed on equipment not under direct control of the central processing unit.
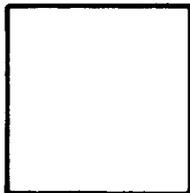
Dimensional Ratio
width:height=1:1

Fig. 15—Auxiliary Operation Symbol

2.16   ▶*The connector symbol* (Fig. 16) represents an exit to or an entry from another part of the flowchart. It is a junction in a line of flow. A set of two connectors is used to represent a continued flow direction when the flow is broken by any limitation of the flowchart. A set of two or more connectors is used to represent the junction of several flowlines with one flowline, or the junction of one flowline with one of several alternate flowlines.◀

Fig. 16—Connector Symbol

2.17   *The terminal symbol* (Fig. 17) represents a terminal point ▶in a flowchart; for example, start, stop, halt, delay, or interrupt.◀
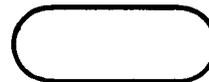
Dimensional Ratio
width:height=1:3/8

Fig. 17—Terminal Symbol

2.18   ▶*The annotation symbol* (Fig. 18) represents the annotation function; that is, the addition of descriptive comments or explanatory notes as clarification. The broken line is connected to any symbol at a point where the annotation is meaningful by extending the broken line in whatever fashion is appropriate.◀
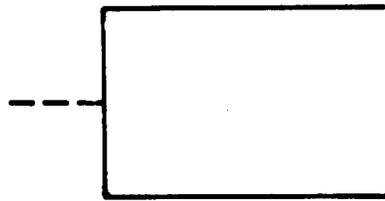
Dimensional Ratio
width:height=1:2/3

Fig. 18—Annotation Symbol

2.19 ◆*The flow direction* (Fig. 19) is represented by lines drawn between symbols. Normal direction of flow is from left to right and top to bottom. When the flow direction is not left to right or top to bottom, open arrowheads shall be placed on reverse-direction flowlines as shown on Fig. 19A. When increased clarity is desired, open arrowheads can be placed on normal-direction flowlines. When flowlines are broken due to page limitation, connector symbols shall be used to indicate the break. When flow is bidirectional, it can be shown by either single or double lines, but open arrowheads shall be used to indicate both normal-direction flow and reverse-direction flow as shown on Fig. 19B.◆
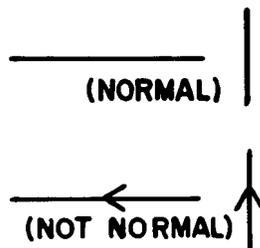

(NORMAL)

(NOT NORMAL)
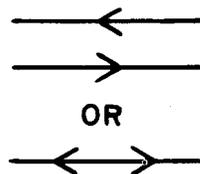
Fig. 19A—Unidirectional Flow

OR

Fig. 19B—Bidirectional Flow

Fig. 19—Flow Direction

2.20 ◆*The magnetic drum symbol* (Fig. 20) represents an input/output function in which the medium is magnetic drum.

Dimensional Ratio
width:height=5/4:2/3

Fig. 20—Magnetic Drum Symbol

2.21 *The magnetic disc symbol* (Fig. 21) represents an input/output function in which the medium is magnetic disc.
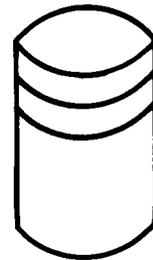
Dimensional Ratio
width:height=2/3:5/4

Fig. 21—Magnetic Disc Symbol

2.22 *The core symbol* (Fig. 22) represents an input/output function in which the medium is magnetic core.
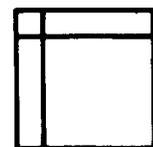
Dimensional Ratio
width:height=1:1

Fig. 22—Core Symbol

2.23 *The parallel mode symbol* (Fig. 23) represents the beginning or end of two or more simultaneous operations.
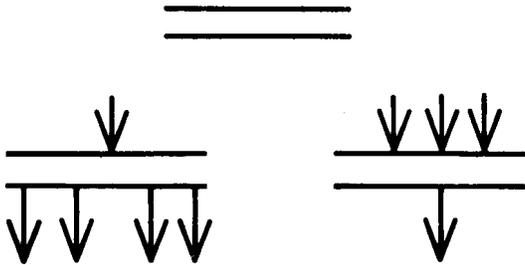

Fig. 23—Parallel Mode Symbol

2.24 *The microform symbol* (Fig. 24) represents any microform used in a micrographic systems flow.
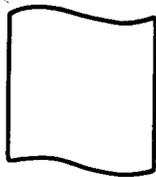
Dimensional Ratio
width:height 1:1

Fig. 24—Microform Symbol

2.25 *The microform recording symbol* (Fig. 25) represents the recording function of transferring information to an original microform master.

Dimensional Ratio
width:height 1:1/2

Fig. 25—Microform Recording Symbol

2.26 *The developing symbol* (Fig. 26) represents the developing process for making information or a medium permanent and/or readable by man or machine.
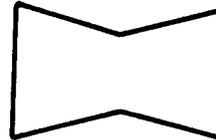
Dimensional Ratio
width:height 1:1/2

Fig. 26—Developing Symbol

2.27 *The duplicating symbol* represents the making of single or multiple copies of a document or microform, usually with the aid of a master or intermediate.
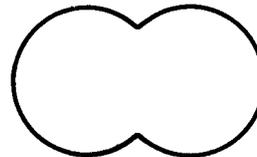
Dimensional Ratio
width:height 1:1/2

Fig. 27—Duplicating Symbol ◀

3. FLOWCHART NOTATIONS

3.01 To reduce the amount of text on system and program flowcharts, the use of certain mathematical and other commonly understood notations is permitted. Some of these notations are shown as follows:

$+$ plus, add

$-$ minus, subtract

$\pm$ plus or minus

/, ÷	divide
*, ×	multiply, times
=	equal
≠	not equal
<	less than
≮	not less than
>	greater than
≯	not greater than
≤	less than or equal to
≥	greater than or equal to
$	dollars
¢	cents
%	percent
/	per unit
#	number
:	compare, ratio of
Σ	summation of

@	at
∴	therefore
HI	high
LO	low
EQ	equal
π	pi (3.1416)
∞	infinity
$\sqrt{}$	square root
$\sqrt[n]{}$	nth root
&	and
†	footnote
∠	angle
$|n|$	absolute value of "n"
‖	parallel
⊥	perpendicular, normal

3.02 In any case where abbreviations must be used, the approved abbreviations listed in Section 005-101-111 shall be used.

Fig. 28—Flowcharting Template No. 38-Y-3991A