

PROGRAM DOCUMENTS ASSOCIATED WITH
 STORED PROGRAM CONTROL SYSTEMS

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1.	<u>GENERAL</u>	1.14	The Generic (fixed) Section contains all the translating, call processing and maintenance programs that are fundamental to the system's operation. The generic data and programs are the same for all central offices of a given type, i.e., tandem, toll, etc.
1.1	<u>Scope of Section</u>	1.15	The Parameter Section, contains parameter data, that is, information that is peculiar to a specific given Office. Whenever certain changes occur in an Office because of growth or other modifications, some of the parameter data must be altered to reflect the Office changes. The location (address) of certain parts of the parameter data and the procedure for finding the rest of the data cannot change since the generic program which refers to the parameter area does not change.
1.11	This section covers the definitions and descriptions of generic and X-ray program documents associated with Stored Program Control Systems (SPCS).	1.16	The Translation Section contains the translation data, that is, all the assignment routing and charging information except for the most recent changes. Translation information differs greatly from office to office, depending upon the number of customers served, and the services they use. In addition, its contents may change rapidly depending on the rate at which customers change or add to their basic services or take advantage of the customer calling or other special services offered.
1.12	A <u>Stored Program Control System</u> is one whose functions are directed by programs which consist of appropriate combinations of precisely defined instructions. The program instructions, suitably encoded, are stored in a memory unit from which they are transmitted sequentially (one at a time) to the control circuitry for execution. The operation of a Stored Program Control System can be altered considerably by the introduction of program changes without necessitating any circuit revisions, i.e., wiring changes, etc.		
1.13	The memory of a Stored Program Control System is comprised of three distinct sections, namely: The Generic Section, Parameter Section and Translation Section.		

2. PROGRAM DEFINITIONS

2.1 Generic Program

2.11 A Generic (universal) Program is one which is considered as standard for a specific type of Stored Program Control System. Thus, a single type program is capable of serving many offices having different features and characteristics and during their continued growth. If the program does not change, then the data to which it refers must change to take account of the different features, numbers of lines and trunks, types of signaling, and other variables.

2.2 Installation Test Programs

2.21 X-ray Programs

2.211 An X-ray Program is one which provides a diagnostic step-by-step verification of the "hardware" i.e., the components, circuitry and logic functions of the system. The term "X-ray" is used to convey the idea of examining the internal and basic functions of the system. The two aspects of hardware testing are the detection and location of troubles. The latter is by far the more difficult. One objective in the design of X-ray programs is to simplify the method used in hardware testing. The programs developed, not only detect troubles at system speed but also aid in locating them easily and quickly.

2.22 Network Fabric X-ray Program

2.221 A Network Fabric X-ray Program (used in 2-wire and 4-wire ESS Offices) is one which tests the cross-points in the networks for false cross and ground, and indirectly tests the controllers which activate the network relays.

3. GENERIC PROGRAM DOCUMENTS

3.01 Generic Program Document Listing

→ 3.011 The documents associated with SPCS generic programs consist of the following: PG, PD, PF, PR, PC, PK, PA, ML, TLM, IM, OM and TG. Table I lists the documents and the block number assignments for the systems and system segments.

3.02 Program Document Index (PG)

3.021 The Program Document Index (PG) is an index of all the documents associated with a specific generic program. It lists the individual documents and issues thereof that represent a particular system.

3.03 Program Specification or Description - Program System Specification (PD)

3.031 A Program Specification or Description (PD) provides a description of the program in "English." This type of description permits an understanding of the functions of the program without requiring the need of interpretation by the programmer(s) or other individuals experienced in the use of the program. The PD outlines the purpose or objectives of the program, its field or application, and where applicable, its relationship to other programs. The PD provides the following:

- (a) Indication of the capabilities and restrictions that apply to the use of the program.
- (b) Includes a Glossary which outlines the symbolic labels and terms which are used in the program.
- (c) Lists references to associated program documents and maintenance documents which apply to the program.

3.032 A Program System Specification (PD) provides the following:

- (a) Describes the general program common of all Offices having a particular system, i.e., No. 1 ESS 2-wire, No. 1 ESS 4-wire, No. 101 ESS, etc.
- (b) Lists the functions controlled by a particular generic program available to an Office.
- (c) Identifies the program documents and other supporting documents peculiar to a specific generic program.
- (d) Introduces the reader to the type and contents of documents used to discuss and support a generic program.
- (e) Serves as a document in which generic program changes are described and against which they are written.

3.0321 A Program System Specification is generally divided into Sections.

Section 1 consists of four parts as follows:

- (1) The general description provides a brief summary of the overall program and interrupt plan, the manner in which input-output information is handled in Offices with a signal processor and in Offices without processor, and surveys the two principal divisions of the programs, i.e., call processing and maintenance.
- (2) The program documentation lists and explains the types of documents which deal with the programs and with some of the input-output and auxiliary information which is closely related to the programs.
- (3) The glossary explains terms, symbols, and abbreviations which are widely used in various parts of the documentation. Definitions and explanations included in the glossary are not usually repeated in the individual PD's.
- (4) The references list the various Bell System Practices (BSP's) and other general documents which pertain to the program.

Section 2 lists the features provided with each generic program.

Section 3, 4, ..., etc., (depending upon the number of generic programs) each section lists the program units and related documents for the corresponding generic programs.

Section 10 contains all the program change information.

3.0322 The following is a list of the Program System Specifications associated with the particular types of systems:

<u>PD</u>	<u>System</u>
PD 1A001	No. 1 ESS 2-wire
PD 2A001	No. 1 ESS 4-wire
PD 3A001-01	No. 1 ESS ADF
**PD 1H099	No. 101 ESS
PD 2H201	No. 2 ESS

<u>PD</u>	<u>System</u>
PD 1B100	TSPS
PD 68000	ETS
PD 1C000	SPC (TSPS and ETS)
*PD 1B200-01	AIS

*Number reserved, PD's not issued as yet.

**Overall view of the entire program; references are made to other PD's.

3.04 Program Flow Chart (PF)

3.041 The Program Flow Chart (PF) provides symbolic representation of groups of related operations performed by a program or by a system of related programs. Information in PF's is assigned to sections as shown in Table A, below.

TABLE A

Section	Contents
A	Sheet Index Supporting Information Special Abbreviations List Other information of an index nature
B	Program Notes Information Notes General Flow Chart Figures (GFC)
C	Functional Flow Chart Figures (FFC)
D	Detailed Flow Chart Figures (DFC)
E	Subordinate Flow Chart Figures (SFC)
F	Input-Output Characterization Tables (NX)

3.042 The Sheet Index lists the contents of each sheet and designates the latest issue numbers according to the individual sheet reissue plan. The rules governing sheet reissue are shown on the first sheet of the Sheet Index under the heading SHEET INDEX NOTES.

- 3.043 The Entrance Index, when required, includes a list of symbolic addresses of entrance to the program with the figure number and sheet coordinate location in the Flow Chart Figures at which the entry can be found. The Entrance Index is used to locate the entry point into the drawing when referred to it from a symbolic address at an exit point from another program.
- 3.044 Supporting Information consists of references to associated program documents and any other necessary references.
- 3.045 Program Notes relate specifically to the operation of the program and are numbered consecutively.
- 3.046 Information Notes contain general information such as timing diagrams, tables, training information, etc., and are numbered consecutively.
- 3.047 The Special Abbreviations List provides definitions of any special abbreviations and notations used in the PF.
- 3.048 Flow Chart Figures having four distinct designations are used to generate flow chart drawings. The four types of figures, represent four levels of presentation which range from a general display of the overall flow to a detailed step-by-step presentation. A higher level figure provides cross-references to a lower level figure in cases where a more detailed expansion of the program flow is required. The four types of figures and their respective levels of presentation are designated as follows:
- (1) GFC - A General Flow Chart figure depicts an entire program system, subsystem or individual program.
 - (2) FFC - A Functional Flow Chart figure presents a nondetailed picture (display) of a program.
 - (3) DFC - A Detailed Flow Chart figure provides a detailed diagram of the logical operations performed and the manner in which they are accomplished.
- (4) SFC - A Subordinate Flow Chart figure shows subroutines or repetitive routines referred to in the Detailed Flow Chart.
- 3.0481 Each type of flow chart figure is numbered consecutively, for example: GFC1, GFC2, FFC1, FFC2, etc., and is given a descriptive title.
- 3.0482 Figure 1 of this instruction shows the symbols and their meaning as used in Flow Charts.
- 3.049 Input-Output Characteristic Tables are provided whenever it is necessary to show the status of certain registers and memory locations at points of entrance to and exit from a program.
- 3.05 Program Listing (PR)
- 3.051 Program Listing (PR) is a machine generated document which contains the sequential instructions used to perform the logical steps of the program. The instructions are shown in both symbolic and machine language. The development of a program is aided by a general purpose computer which translates the programmers' symbolics into binary machine language. During this process, a printout can be requested and will include the programmers' symbolics and comments as well as the machine instructions in octal form. This printout becomes the Program Listing (PR) and is reproduced for wide distribution. The Program Listing contains the following:
- (a) An Index Sheet which list the Pidents (Program Identifications) included in the PR.
 - (b) A Tables Section which lists the names of data locations.
 - (c) A Program Section which lists the program instructions.
 - (d) A Symbolic Reference Table which provides references to the various locations at which a given symbol appears in the listing.

- 3.06 Program Change (PC)
- 3.061 Program Change (PC) is an interim document which is issued for each "point" issue of a generic program and supplements the existing Program Listing (PR). The PC document identifies and includes only the instructions of the pidents affected by the generic program change.
- 3.0611 The PC document for each succeeding point issue of the generic program contains all the information which was included in the preceding PC document.
- 3.0612 The standard program document, i.e., Program Listing (PR) for the next full issue (restart) of the generic program will include all the information covered in the PC document for the previous final point issue.
- 3.07 Supplementary Information (PK)
- 3.071 Supplementary Information (PK) documents contain information which supplement information furnished in the other documents. Three types of PK's are usually furnished: Compool, Map and Raw Data.
- 3.0711 Compool is a common communications pool of information which is used jointly by all programs in a system. The use of the Compool shortens and simplifies the individual system programs by using a common program wherever possible. The Compool translates the programmers' symbolic language into the numerical equivalents.
- 3.0712 Map lists the address of the start and end of each portion of a program. It provides cross-references between machine addresses and symbolic locations.
- 3.0713 Raw Data provides assistance in locating troubles when a normal diagnostic program printout does not produce a match with any listing in the Trouble Locating Manual. The Raw Data aids in analyzing the pattern of failures for different tests of the appropriate diagnostic program.
- 3.08 Magnetization Listing (ML)
- 3.081 Magnetization Listing (ML) is a document which consists of a computer printout, in octal form, of the state of the magnets on each twistor (memory) card associated with a particular system.
- 3.09 Trouble Locating Manual (TLM)
- 3.091 Trouble Locating Manual (TLM) contains information which is used for locating troubles within the system as indicated by the results of a diagnostic program. The Manual cross-references the results generated by the system with trouble numbers. The procedures for clearing the troubles are listed adjacent to the associated trouble number.
- 3.10 Input Message Manual (IM)
- 3.101 Input Message Manual (IM) lists all the messages that can be transmitted from the maintenance teletypewriters (TTY's) to cause a system action or function. An outline of the format, use, cautions and expected results is given for each message. The messages are arranged in alphabetical order and a topical index for the specific message to be used is provided. Detailed instructions for using the manual are provided in its Application Section.
- 3.11 Output Message Manual (OM)
- 3.111 Output Message Manual (OM) lists all the system TTY messages in alphanumeric order. The manual gives a description of each message format, the reason the message was issued, expected alarm indications, and the action to be taken as a result of the message issued. Detailed instructions for using the manual are provided in its Application Section.
- 3.12 Translation Guide (TG)
- 3.121 Translation Guide (TG) provides all the technical information necessary to engineer the software translations portion of an Electronic Switching System office.

4. ADDITIONAL GENERIC PROGRAM DOCUMENTS

4.1 Program Application (PA)

4.1.1 Program Application (PA) documents provide the technical information that is necessary to engineer the software portion of an Electronic Switching System office.

5. RATING OF GENERIC PROGRAM DOCUMENTS

5.1 Program Documents (PG, PD, PF, PR, PC, PK, ML, TLM, IM and OM) are rated "Provisional" until such time as they are stabilized and rerated "AT&T Company SPCS" (Stored Program Control System).

5.2 Program Application Specifications (PA's) are rated "Western Electric SPCS" and shall be treated in a similar manner as are the documents listed in paragraph 5.1.

→ 5.3 Translation Guides (TG's) are dual rated "AT&T Co. SPCS" - "Western Electric Company SPCS" and shall be treated in a similar manner as are the documents listed in paragraph 5.1.

5.4 Program Documents, Program Application Specifications and Translation Guide ratings are indicated on the first sheet of each document, and will also include the following restrictive legend:

"The content of this material is proprietary and constitutes a trade secret. It is furnished pursuant to written agreements or instructions limiting the extent of disclosure. Its further disclosure in any form without the written permission of its owner, Western Electric Company, Incorporated, is prohibited."

6. DISPOSITION OF GENERIC PROGRAM DOCUMENTS

→ 6.1 Superseded Program Documents, Program Application Specifications and Translation Guides shall be disposed

→ Arrowed lines indicate new or changed information.

of in accordance with the interim disposition procedures established in each of the Regions for such proprietary documents.

→ 6.2 Program Documents, Program Application Specifications and Translation Guides which are "current" but are no longer required, shall be disposed of in accordance with paragraph 6.1 above.

7. DISTRIBUTION OF UPDATED ISSUES OF GENERIC PROGRAM DOCUMENTS

7.1 Updated (revised) issues of Program Documents are distributed to holders of such documents in the following formats:

- PG - Complete reissue
- PD - Complete reissue or appendix
- PF - Individual sheet reissue
- PR - Pident reissue or complete reissue
- PC - Complete reissue
- PK - Section reissue, sheet reissue or complete reissue
- ML - Individual sheet reissue or complete reissue
- TLM, IM and OM - Individual sheet reissue or complete reissue
- PA - Individual sheet reissue or complete reissue
- TG - Individual section reissue or sheet reissue

8. X-RAY PROGRAM DOCUMENTS

8.1 X-ray test accessory sets are furnished in the form of magnetic tapes, twistor cards, punched tapes, etc. A Test Method of Operation (TMO) is generally furnished with each X-ray test accessory set and includes the necessary program documentation.

8.2 In cases where a TMO is not furnished for a particular X-ray test accessory set, the necessary program documentation is provided as part of the X-ray "package".

8.3 The descriptions of X-ray programs are basically similar to generic program documents which are outlined in paragraphs 3.03 to 3.06 of this instruction.

Manager, Engineering Practices

ATTACHMENT

Table I on Pages 7 to 9.
Figure 1 on Pages 10 to 12.

Reason for reissue:
To add reference to TG documents.
To expand Table I to list PG's,
TG's and additional PA's.

TABLE I

STORED PROGRAM CONTROL SYSTEM DOCUMENTS

1. SYSTEMS

Document	No. 1 ESS		ADF	No. 101	No. 2	TSPS	ETS	AIS
	2 Wire	4 Wire		ESS	ESS			
PG	(A)	(A)	(A)	(A)		(A)	(A)	(A)
PD								
PF	(A)	(A)	(A)	(A)		(A)	(A)	(A)
PR								
PC								
PK				(B)				
ML	(C)							
TLM								
IM								
OM								
No. Blocks	1A000- 1A999	2A000- 2A999	3A000- 3A999	1H000- 1H999	2H000- 2H999	1B000- 1B199	68000- 69999	1B200- 1B399

NOTES:

- (A) - Microfilm furnished unless paper prints are specified on individual orders.
- (B) - PK's are not applicable on 101 ESS.
- (C) - For manufacturing shops only, not furnished to Installation.

2. INDEX OF PG DRAWINGS FOR GENERIC PROGRAM VERSIONS

<u>Document</u>	<u>System</u>	<u>Program Version</u>
PG-1A001	#1 ESS (2-Wire)	Generic Program CC-0 (Obsolete)
PG-1A002	"	Non-Sig. Proc. - Non-Centrex CC-1 (Repl. by PG-1A006)
PG-1A003	"	Signal Processor Generic Program SP-1
PG-1A004	"	Central Control with Centrex - CC-CTX-1
PG-1A005	"	Signal Processor Generic Program SP-CTX-1
PG-1A006	"	Central Control Prog. W/9 Track Features
PG-1A007	"	Central Control Generic Program CC-3
PG-1A008	"	Not Yet Available
PG-1A009	"	Generic Program CC-CTX-2
PG-1A010	"	Generic Program SP-CTX-3
PG-1A011	"	Generic Program CC-CTX-4
PG-1A012	"	Generic Program SP-CTX-4
PG-1A201	"	8K Call Store Mtce. Prog. - CC-CTX
PG-1A202	"	32K " " " " - SP-CTX
PG-1A203	"	8K Call Store Mtce. Prog. - SP-CTX
PG-1A204	"	32K " " " " - CC-CTX
PG-1A500)	#1 ESS (2-Wire)	(
thru)		(
PG-1A550)		(Auxiliary Test Program
PG-1A551) For W.E.		(
thru) Installers		(
PG-1A559) Only		(
PG-2A001 (MD)	#1 ESS (4-Wire)	Generic Program CC-00425L+ (AV-1)
PG-2A002 (MD)	"	" " CC-0-176-1
PG-2A003 (MD)	"	" " CC-0-AVCMCI
PG-2A004 (MD)	"	" " CC-0-AV2 (RCD)

<u>Document</u>	<u>System</u>	<u>Program Version</u>
PG-2A005	#1 ESS (4-Wire)	Generic Program CC-0-AV3 (Full Program)
PG-2A006 (MD)	"	" " CC-0-176-2
PG-2A008 Colo. Spgs. Only	"	" " CC-0-AV-4 (Colo. Spgs. Only)
PG-2A009	"	" " CC-0-AV-176-4
PG-2A501	"	Auxiliary Test Program - TELCO
PG-2A599	"	" " "
PG-1B100	TSPS	Traffic Service Position System
PG-1B100-50	"	Software Specification
PG-1B101	"	Morristown Office Only
PG-1B200	AIS	Automatic Intercept System
PG-1C000	Common	SPC No. 1A (TSPS & ETS)
PG-1H001	#101 ESS	2-Store Program
PG-1H002	"	3- " "
PG-1H003	"	4- " "
PG-2H001	#2 ESS	Generic Program #2 ESS
PG-3A001	#1 ESS (2-Wire)	Generic Program - ADF
PG-68000	ETS	Electronic Translator System
PG-68000-50	"	ETS - Software Specification
PG-591500	#1 ESS (2-Wire)	H-510-027 Test Set
PG-591600	"	H-510-028 LI Test Set (Previously ITE-4728)
PG-591700	"	H-510-029 LI Test Set (Previously ITE-4786)
PG-591750	"	H-510-030 LI Test Set (Previously ITE-4899)
PG-591901	#2 ESS/AIS	H-460-004 LI Test Set (Previously ITE-4898)

3. PROGRAM APPLICATION SPECIFICATIONS (PA)

<u>PA Number</u>	<u>Title</u>
PA-591001	Parameters Input Specification - No. 1 ESS 2-Wire
PA-591003	Translations Output Configuration - No. 1 ESS 2-Wire
PA-591006	Translations Error Message Dictionary - No. 1 ESS 4-Wire
PA-591015	Parameters Input Specification - No. 1 ESS 4-Wire
PA-591079	Output Configuration - No. 1 ESS 4-Wire
PA-591070	Information Specification for Office Parameters - No. 1 ESS 2-Wire
PA-591071	Information Specification for Office Translations - No. 1 ESS 2-Wire
PA-591072	Information Specification for Office Parameters - No. 1 ESS 4-Wire
PA-591073	Information Specification for Office Translations - No. 1 ESS 4-Wire
PA-591083	Information Specifications for Office Program and Line Information Store Administration Information No. 101 ESS
PA-591078	User's Manual for Use with Regional Translation
PA-591079	Translations Output Configuration - No. 1 ESS 4-Wire
PA-591080	User's Manual for Use with Data Assem. Program System - No. 1 ESS 4-Wire
PA-591081	Input Specification for Office Translations - No. 1 ESS 4-Wire
PA-591082	Supporting Information for PA-591081 - No. 1 ESS 4-Wire
PA-591090	Mechanized Assignments Processing - Map - User's Instructions
PA-591091	Control System for Use with ESS User's Instructions
PA-591092	User's Manual - Analysis and Translations

PA NumberTitle

PA-591096	User's Manual - Gen. Prog. Twistor Run
PA-596150	Error Message for TSPS #1
PA-596151	Error Message for 4A or 4M Toll Sw. (ETS)
PA-596152	Input Specification for Office Data (TSPS)
PA-596153	Input Specification for 4A or 4M Toll Sw. (ETS)
PA-596154	Output Specification for Office Data (TSPS)
PA-596155	Output Specification for Office Data (ETS)

4. TRANSLATIONS GUIDES (TG)

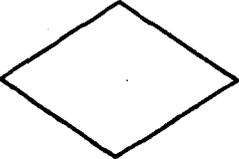
TG-1A	Translation Guide No. 1 ESS 2-Wire
TG-2A	Translation Guide No. 1 Ess 4-Wire
TG-2H	Translation Guide No. 2 ESS

1.



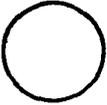
The processing symbol represents the processing of an operation or group of operations resulting in a change in value, form, or location of information.

2.



The decision symbol represents an operation in which a decision is made to determine which of two or more alternate paths is to be followed.

3.



The connector symbol represents a break in a line of flow (out-connector) and its subsequent continuation (in-connector).

4.



The predefined process symbol represents processing that takes place in a program described in information contained in a document other than the flow chart drawing in which this symbol appears.

5.



The annotation symbol is used to show additional descriptive information. The broken line extends to the point in the flow chart where the information is applicable.

6.



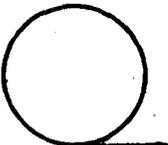
The terminal symbol represents a terminal point in the program such as a start, stop, or interrupt.

7.



The basic input/output symbol represents inserting information for processing (input) or the recording of processed information (output). This symbol is normally used for input/output functions regardless of the method used for storing and transmitting information.

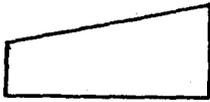
8.



The magnetic tape symbol represents an input/output function in which the medium is magnetic tape.

FIG. 1 FLOW CHART SYMBOLS

9.



The manual input symbol represents an input function in which information is entered manually by means of on-line keyboards, switches or pushbuttons.

10.



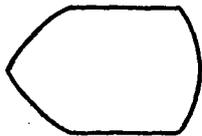
The punched tape symbol represents an input/output function in which the medium is punched tape.

11.



The document symbol represents an input/output function in which the medium is a document.

12.



The display symbol represents an input/output function in which information is displayed at the time of processing by means of indicators, lamps, or similar devices.

13.



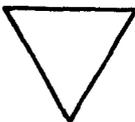
The punched card symbol represents an input/output function in which the medium is punched cards, mark sense cards, or other card type methods.

14.



The on-line storage symbol represents an input/output function utilizing auxiliary mass storage of information having on-line access.

15.



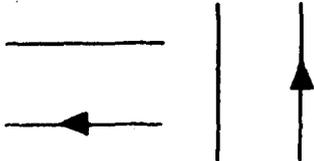
The off-line storage symbol represents an input/output function utilizing off-line storage of information regardless of the storage medium.

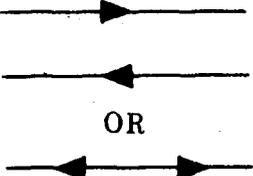
16.



The communication link symbol represents an input/output function in which the information is transmitted automatically between two locations. The arrowhead shows the direction of transmission.

FIG. 1 FLOW CHART SYMBOLS (Cont.)

17.  **Flowlines** are used to connect symbols to denote the direction of flow through a flow chart. Normal flow is from left to right and top to bottom. If the flow is other than normal, i.e., from right to left, or bottom to top, arrowheads are used to show the flow direction. For normal flow direction, arrowheads are not usually shown.

18.  **Bidirectional flowlines** may use single or double lines with double arrowheads to show a flow in both directions.

NOTES:

- (1) Symbols of the same type may vary in size while maintaining the dimensional ratio shown.
- (2) A brief description of the specific function performed is printed within each symbol which does not itself explain the operation sufficiently.
- (3) In-connectors are cross-referenced to their associated out-connectors, and out-connectors to their associated in-connectors by a common identifier placed within the symbol. A sheet coordinate cross-reference is also sometimes placed outside the connector symbol.
- (4) Symbols are often altered by placing a horizontal line across the symbol and near the top to indicate that its function is described in more detail in a lower level figure. Cross-referencing to the more detailed figure is located above the line, and a brief description of the overall function is located below the line. Return to the figure containing the altered symbol is made through an in-connector placed immediately after the altered symbol.

FIG. 1 FLOW CHART SYMBOLS (Cont.)