

FLOW CHART SYMBOLS AND INTERPRETATIONS

CONTENTS

Par.	Page	Par.	Page
1.	Introduction	2	
2.	Related Information	2	
PART I. SYMBOLOGY FOR TEST PROCEDURES		5.23	Relay
3.	Method of Presentation	3	17
3.01	General	3	17
3.02	Actions	3	17
3.03	Observations	3	17
3.04	Functional Designations	3	17
3.05	Remarks or Notes	3	17
3.06	Test Setup Changes	3	17
3.07	Repetitive Actions	3	17
3.08	Logic "AND" and "OR"	3	17
4.	Glossary of Lines	4	17
4.01	Action Lines	4	17
4.02	Convergence of Action Lines	4	17
4.03	Interruption in Action Lines	5	17
4.04	Observation Lines	5	17
4.05	Repetitive Action Lines	5	17
5.	Glossary of Symbols	6	17
5.01	General	6	17
5.02	Alarm, Audible	6	17
5.03	Circuit Breaker, Nonalarm-Type	6	17
5.04	Dial, Rotary or Key Pad	6	17
5.05	End, Action	7	17
5.06	Hard-Copy Printout or Display	7	17
5.07	Fuse, Alarm-Type	8	17
5.08	Fuse, Nonalarm-Type	8	17
5.09	Ground, Momentary Application	8	17
5.10	Ground, Solid Application	9	17
5.11	Interrogation or Decision	9	17
5.12	Jack	11	17
5.13	Key or Key-Lamp	11	17
5.14	Lamps	11	17
5.15	Lead	12	17
5.16	Manual Input	12	17
5.17	Meter	12	17
5.18	Oscilloscope	13	17
5.19	Oscilloscope Traces, Standard	15	17
5.20	Printed Wiring Board Assembly and Connector	15	17
5.21	Pushbutton	16	17
5.22	Register	16	17
5.23	Resistor, Pull-Down	17	17
5.24	Resistor, Pull-Up	17	17
5.25	Reverse Directive or Reverse Operation	18	17
5.26	Start, Action	18	17
5.27	Switch	18	17
5.28	Telephones	19	17
5.29	Temporary Connections	20	17
5.30	Terminal	20	17
5.31	Terminals, Momentary Connection	20	17
5.32	Test Equipment	20	17
5.33	Time Delays	21	17
5.34	Tone or Ringing Signal	21	17
5.35	Transmission Path (Voice)	22	17
5.36	Variable Adjustment	23	17
5.37			17
PART II. SYMBOLOGY FOR TEST SETUPS			
6.	Method of Presentation	24	
6.01	General	24	
6.02	Symbols	24	
6.03	Tables	24	
7.	Glossary of Symbols	24	
7.01	General	24	
7.02	Bay	24	
7.03	Cabinet, Auxiliary	25	
7.04	Cabinet, Equipment	25	
7.05	Circuit	25	
7.06	Cord, Patching	25	
7.07	Frame, Distributing	26	
7.08	Gate	26	
7.09	Jack	26	
7.10	Oscilloscope	26	
7.11	Panel	26	
7.12	Post, Binding	26	
7.13	PWBA Contact Ground	27	
7.14	PWBA Contact Insulation	27	
7.15	PWBA Contact Short	27	
7.16	Rack	28	
7.17	Telephones	28	
7.18	Terminations, Cord	28	
7.19	Test Equipment, System	28	

1. INTRODUCTION

1.01 This section presents the symbology for Stromberg-Carlson test procedures and test setups. Part I describes the method of symbolic presentation of test procedure instructions, illustrates the symbols used, and explains typical symbol applications and interpretations. Part II discusses the symbols used in test equipment setup diagrams. An index, at the end of the section, identifies test procedure and test setup symbols pictorially and references the associated descriptive text in this section.

1.02 This section replaces issue 2, dated October 1975, and is reissued to describe and illustrate

additional symbols required for the symbolic presentations of test procedures. Some of these symbols were previously added by Addendum 1 and Appendix 1 to issue 2; these are now incorporated in this issue. Significant changes and additions are indicated by bars in the margins.

2. RELATED INFORMATION

2.01 A Sales and Instructional Literature Index, which lists the latest publications available from Stromberg-Carlson Corporation, can be obtained from your Stromberg-Carlson sales representative or from Publications Services, Stromberg-Carlson Corporation, P.O. Box 1698, Sanford, Florida 32771.

PART I. SYMBOLOGY FOR TEST PROCEDURES

3. METHODS OF PRESENTATION

3.01 General.

Test procedures are presented as a sequence of actions and observations that are shown in symbolic form with appropriate designations. Additional information necessary for interpretation of the symbolic test procedures is presented in a REMARKS table located near the applicable symbols.

3.02 Actions.

Actions to be done by test personnel are presented sequentially in a vertical line starting from the top. Symbolic action instructions and necessary designations are presented inside the symbols and/or adjacent to them.

3.03 Observations.

Observations that test personnel should note as the result of actions are presented on horizontal lines to the right of the action line. Each observation line is connected to the action line directly below the action that should cause the symbolic observations. Designations are presented, as necessary, to facilitate interpretations. The need for corrective maintenance and/or equipment replacement is indicated when observed results do not agree with presented observations.

3.04 Functional Designations.

Designations of telephones, keys, switches, etc., are presented to the right of action line symbols and below observation line symbols. The specific position to which a key or switch is operated, when significant, is shown in parentheses adjacent to or below its functional designation. Designations of alarms, loudspeakers, test equipment, etc., are presented inside the symbols. The location of equipment, control, or indicator, when significant, is shown underlined below its designation.

3.05 Remarks or Notes.

Remarks or notes are presented, when necessary, in REMARKS tables located on the flow charts. Numbers in triangular symbols refer to the tabular information. If a note pertains to specific actions that test personnel are to take, the note symbol is shown on a solid vertical action line.

3.06 Test Setup Changes.

Information or instructions pertaining to test setup changes, when appearing on an action line, are presented in solid-line boxes. Where it is impossible or impractical to describe all relevant test setup changes in this way, brief notes are presented in a REMARKS table to explain the changes in more detail.

3.07 Repetitive Actions.

Some test procedures require that an action be repeated several times in order to check similar system functions. Such repetitive actions are shown by dashed lines with arrowheads indicating direction of actions to be repeated. Whenever repetitive actions are indicated, they are to be repeated as many times as necessary to complete all tests of related circuit or system functions.

3.08 Logic "AND" and "OR."

a. Boolean algebra equations are frequently encountered in diagnostic procedures and troubleshooting information presented with symbolic flow chart test procedures. It is beyond the scope of this section to explain Boolean algebra, but this paragraph explains and illustrates the use of Boolean signs for "AND" and "OR" logic, as used in Boolean equations. This is done to remind test personnel that the signs for these logic functions are to be interpreted according to principles of Boolean algebra and not according to similar appearing signs used in conventional mathematics. A thorough understanding of these logic signs is essential to correct interpretations of Boolean algebra presentations on logic diagrams.

b. The Boolean sign most commonly encountered for "AND" is a dot ($\cdot$). Two other signs may be used in some Boolean equations to symbolize the "AND" function: an x and parentheses.

c. The Boolean sign for "OR" is two short lines crossing each other at right angles with one line vertical and the other line horizontal ($+$).

d. It is very important to remember that in Boolean equations the signs for an "AND" function are not multiplication signs. Also, the sign for an "OR" function is not an addition sign.

e. To illustrate the use of these signs, first consider the simple logic diagram shown at right. In words, the meaning of this diagram is as follows: The condition or state at terminal P1-E depends on the condition or state of lead $\overline{\text{STT}}$ AND lead LMR OR the condition or state of lead LMO. Now, in Boolean algebra notation, this logic diagram can be written as follows:

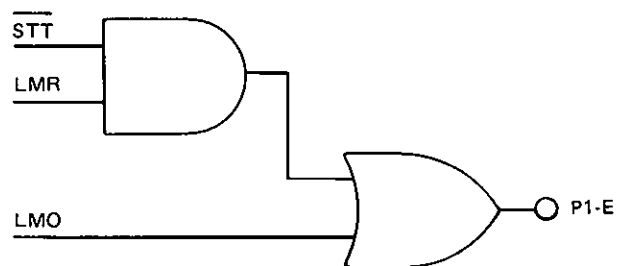
$$\text{P1-E} = (\overline{\text{STT}} \cdot \text{LMR}) + \text{LMO},$$

where the $\cdot$ and the + signs mean "AND" and "OR," respectively. This equation could also have been written as follows:

$$\text{P1-E} = (\overline{\text{STT}} \times \text{LMR}) + \text{LMO},$$

or

$$\text{P1-E} = (\overline{\text{STT}}) (\text{LMR}) + \text{LMO}.$$



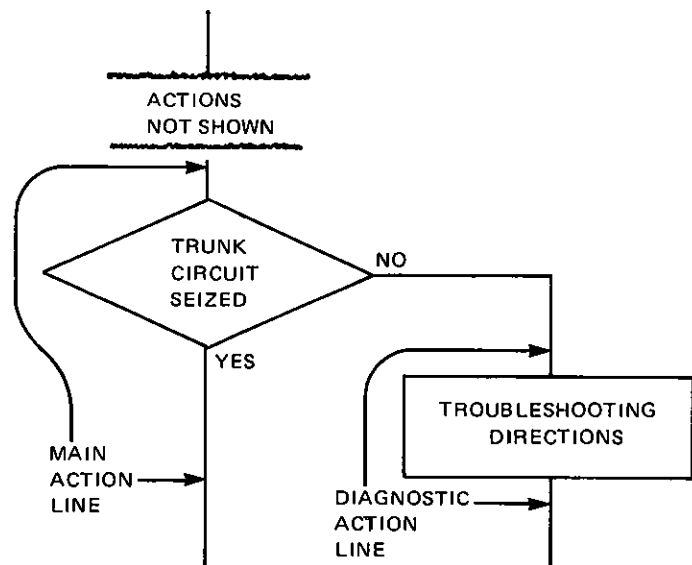
4. GLOSSARY OF LINES

4.01 Action Lines.

a. Actions that test personnel are to take are always presented sequentially on vertical action lines on which are located symbolic instructions and, where necessary, functional designations and abbreviations. An action line that extends to a following page is marked with an arrowhead at the end of the line to indicate that the action line continues on the following page.

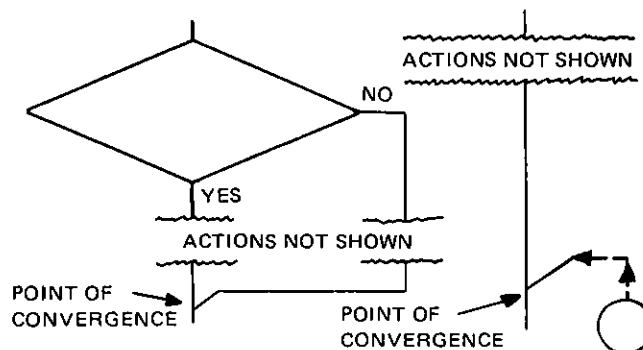
b. The main action line, which is followed unless a trouble condition is encountered, normally proceeds vertically down the page.

c. When leaving a decision diamond, the main action normally leaves from the bottom center and continues downward; a diagnostic action line leaves from the right-hand point, turns downward, and then includes any necessary troubleshooting directions. A typical example is shown at the right.



4.02 Convergence of Action Lines.

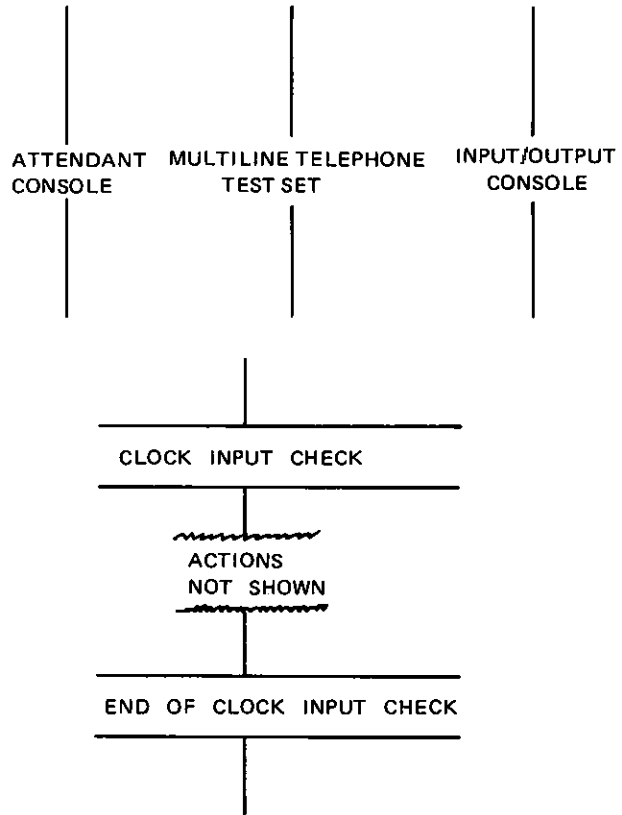
Two action lines meet or converge at an acute angle, as shown at the right. Also, a dashed repetitive action line meets or converges at a solid action line at an acute angle. The acute angle at the point of convergence stresses the fact that subsequent actions to be done are those shown below the point of convergence. Conversely, actions shown above the point of convergence are not to be repeated.



4.03 Interruption in Action Line.

a. An interruption in an action line is a break in the vertical line in which appears a location designation. See examples at the right. Such a designation specifies the location of equipment, controls, or indicators where subsequent actions or observations are to be taken or made. All actions and observations occur at the specified location, unless indicated otherwise by an underlined location designator or until a following action line interruption directs test personnel elsewhere. This method of specifying locations eliminates repetitive, underlined location designators.

b. The start and end of a particular part of a testing sequence can be indicated by a break in the action line, with the desired information indicated in the break. For this type of information presentation, horizontal lines are provided directly above and below the information. See example shown at the right.



4.04 Observation Lines.

Observations that test personnel should make as the result of preceding actions are presented symbolically on horizontal observation lines along with necessary functional designations and abbreviations.

4.05 Repetitive Action Lines.

a. Repetitive actions that test personnel are to take to test multiple, but similar, system features and functions are indicated by dashed lines. The dashed lines extend to the right from the vertical line following the action steps for a specific test phase back to the beginning of the action steps for that test phase and form a closed loop encompassing the repetitive actions and observations. Arrowheads show direction of repetitive actions. One arrowhead is shown near the bottom of the vertical extension of the dashed lines; another near the left-hand end of the horizontal extension where it joins the action line at the beginning of the repetitive actions. A typical example is shown in paragraph 5.11e.

b. A circled letter at the end of a short vertical extension of a dashed repetitive action line refers to the same letter designator at the beginning of a similar line on the indicated page on which the

repetitive action steps start. Arrowheads on the dashed lines show direction of repetitive actions. See examples at the right.

5. GLOSSARY OF SYMBOLS

5.01 General.

This paragraph describes and illustrates, in alphabetical order, the flow chart symbols most commonly used in graphic presentations of test procedures. The examples have been kept simple so that the actions and observations being illustrated are not obscured by extraneous and detailed information. No attempt has been made to illustrate all possible combinations of symbols, but those shown are intended to be instructive to the point where the reader can extrapolate the symbolic interpretations to understand those encountered in practice. Furthermore, the size of some symbols may vary because of the amount of information presented inside them. Symbol size, therefore, does not affect symbol meaning.

5.02 Alarm, Audible.

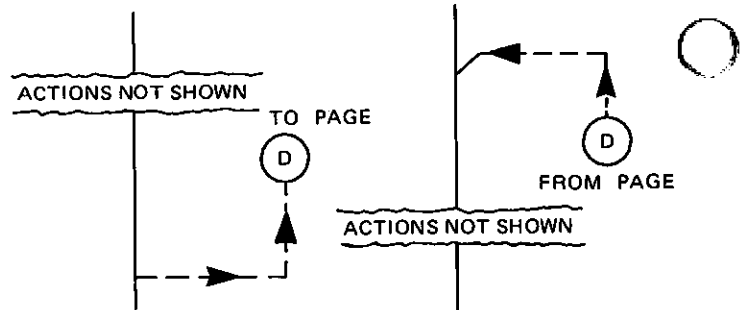
This symbol on an observation line indicates that an audible alarm is activated as a result of a preceding action. Functional designations related to the alarm, when applicable, are shown inside the symbol in abbreviated form. For example, MAJ denotes a major alarm; MIN, a minor alarm. Other pertinent alarm designations or brief explanatory notes are shown below the symbol. For example, the word REMOTE below the symbol means that an audible alarm is activated in an area remote from the switching equipment, such as the supervisor's office, maintenance headquarters, or other area specified for the installation.

5.03 Circuit Breaker, Nonalarm-Type.

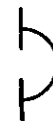
These symbols indicate circuit breakers of the nonalarm type. Symbol (A) indicates an open breaker; symbol (B), a closed breaker. They are action symbols. On an action line, they direct test personnel either to open or to close the designated circuit breaker. Circuit breaker designation and location are shown to the right of the symbol.

5.04 Dial, Rotary or Key Pad.

- a. This symbol, inside a solid-line box on an action line, directs test personnel to dial or key a specific number - line, directory, or code. Dialing or keying instructions are included with the symbol in the action box.



(A)



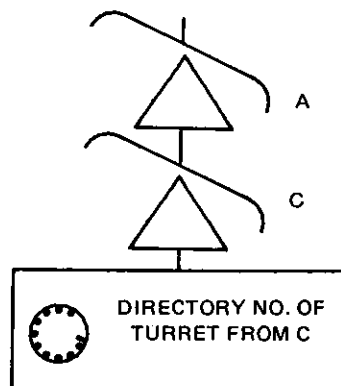
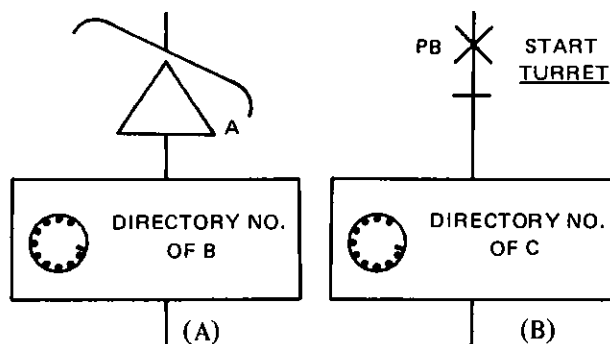
(B)



b. Note that this is an action symbol. It conveys a directive to dial or key the number given in the box. If the type of dialing – dual-tone multifrequency (DTMF), multifrequency (toll MF), or dial pulse (DP) – is essential to the test being conducted, the abbreviation DTMF, MF, or DP, respectively, is shown in the box along with the number to be dialed.

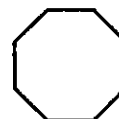
c. The telephone or turret from which the call is to be initiated is the instrument prepared for dialing (keying) by an immediately preceding action step. For example, symbols (A) direct test personnel to go off-hook with telephone A and to dial or key the directory number of telephone B from telephone A. As another example, symbols (B) direct test personnel to press and release the turret START pushbutton (PB), which prepares the turret circuit for dialing, and to dial or key the directory number of telephone C from the turret.

d. When necessary to avoid ambiguity, the instrument from which the call is initiated is designated with the instructions in the action box. For example, if test personnel are directed to go off-hook with telephones A and C and to dial the directory number of the turret, it is ambiguous as to which telephone to use to dial the turret. Therefore, the symbolic representation of these instructions includes the designation of the call-initiating telephone, as shown.



5.05 End, Action.

This symbol on an action line indicates the end of the preceding series of actions related to a specific test procedure. Furthermore, this symbol directs test personnel to remove all test setup and monitoring equipment, including test telephones and test cords, that may still be in place at the end of the procedure.



5.06 Hard-Copy Printout or Display.

This symbol on an observation line indicates that a previous action has caused information to be displayed. This display can be a hard-copy printout by a teletypewriter (TTY) or some other printing device, or it can be a display on a cathode-ray tube (CRT), a lamp field, or by any similar means.

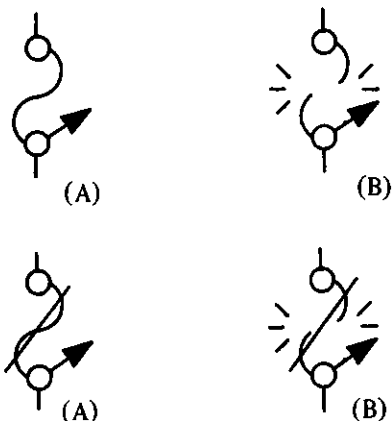


5.07 Fuse, Alarm-Type.

a. These symbols indicate fuses of the alarm type.

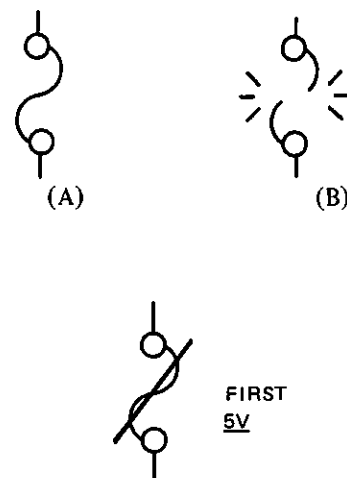
Symbol (A) indicates an unoperated (good) fuse; symbol (B), an operated (blown) fuse. They are action symbols. On an action line, they direct test personnel to install either a good or a blown alarm-type fuse. Fuse designation and location are shown to the right of the symbol.

b. These fuse symbols with diagonal lines through them direct test personnel to remove a good alarm-type fuse (A) or a blown alarm-type fuse (B).

**5.08 Fuse, Nonalarm-Type.**

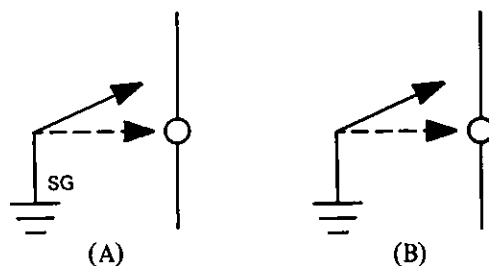
a. These symbols indicate fuses of the nonalarm type. Symbol (A) indicates an unbroken (good) fuse; symbol (B), a broken (blown) fuse. They are action symbols. That is, symbol (A) on an action line directs test personnel to install a good nonalarm-type fuse; symbol (B), to install a blown nonalarm-type fuse. Fuse designation and location are shown to the right of the symbol.

b. The fuse symbol with a diagonal line through it directs test personnel to remove the designated nonalarm-type fuse. This illustration, for example, directs test personnel to remove the good nonalarm-type fuse in the first fuse position of the 5-volt power section.

**5.09 Ground, Momentary Application.**

a. Momentary application of either signal ground or 48-V (frame) ground is defined as the temporary application of ground at a designated terminal for a period of time sufficient only to effect the results shown on the immediately following observation line.

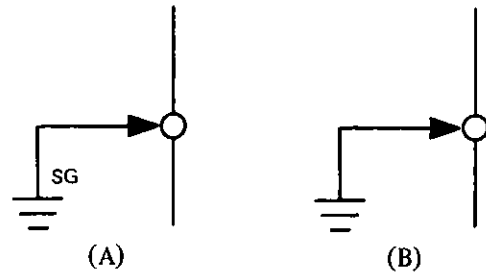
b. Symbol (A) directs test personnel to apply momentary signal ground (SG) to the terminal shown. Symbol (B) directs that momentary 48-V (frame) ground be applied to the designated terminal. Terminal designation for either symbol (A) or (B) is made according to instructions in paragraph 5.31.



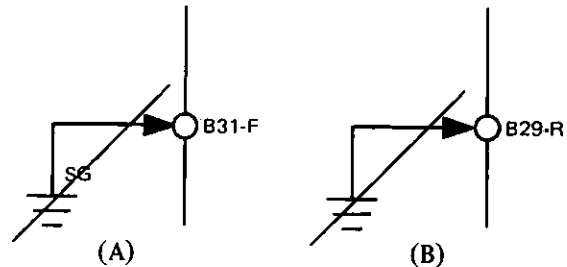
5.10 Ground, Solid Application.

a. Solid application of either signal ground or 48-V (frame) ground is defined as the application of ground at a designated terminal that is to remain in effect until a subsequent action step specifically directs that the ground be removed.

b. Symbol (A) directs test personnel to apply solid signal ground (SG) to the terminal shown. Symbol (B) directs that solid 48-V (frame) ground be applied to the designated terminal. Terminal designation for either symbol (A) or (B) is made according to instructions in paragraph 5.31.

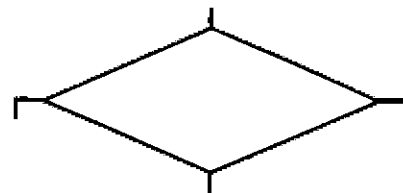


c. The ground symbol with a diagonal line through it directs test personnel to remove the solid ground from the designated terminal. Symbol (A), for example, directs that signal ground be removed from terminal B31-F; symbol (B), that 48-V (frame) ground be removed from terminal B29-R.



5.11 Interrogation or Decision.

a. This symbol indicates an interrogation or decision point for test personnel. It is at this point that a question is asked and a decision must be made based on system features, wiring options (strapping), and/or observations resulting from preceding action steps. The answer to the interrogation or the decision made leads to only one of the action paths below the symbol. The left-hand action path is used only when there are three action path possibilities.



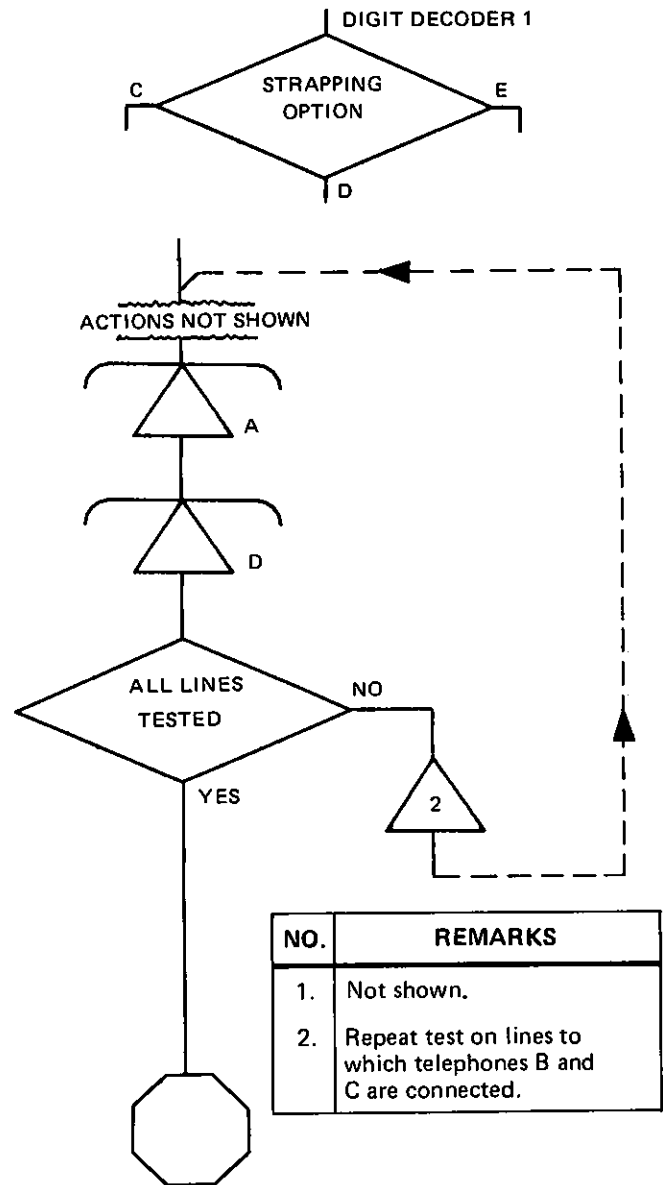
b. The interrogation symbol itself represents a question. Therefore, only principal words are shown inside the interrogation symbol; and a question mark is not used.

c. This interrogation symbol, for example, asks the question: Is message registration provided in the system? If this feature is available, test personnel are directed to follow the right-hand (YES) action path; if not (NO), the bottom path. Note that the words "is" and "provided" and a question mark are not used inside the decision symbol.

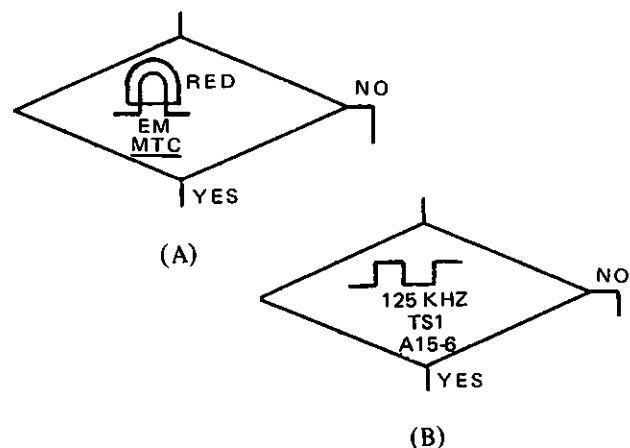


d. This interrogation symbol, for example, asks the question: Is strapping option C, D, or E provided on digit decoder 1? Since only one of the three options is provided, test personnel are directed to follow only one action path.

e. These symbols illustrate the use of the interrogation symbol, a repetitive action line, and a REMARKS table. (This simplified example is part of a power failure cutthrough test procedure.) Telephones A, B, and C are connected to cutthrough lines; telephone D to the simulated central-office line. The actions not shown direct test personnel to verify communication between telephones A and D. The actions shown direct personnel to go on-hook with telephones A and D and to proceed to the interrogation or decision point. If all lines have been tested (YES), the test is concluded. If not (NO), the dashed repetitive action line and Note 2 in the REMARKS table direct personnel to repeat the test for the other power failure cutthrough lines.



f. An interrogation or decision symbol with another symbol inside asks the question whether or not the event depicted by the enclosed symbol is observable as a result of an immediately preceding action. For example, symbol (A) asks whether the red EM lamp on the maintenance test console (MTC) lights steadily. Symbol (B), on the other hand, asks whether a 125-kHz repetitive signal is observed on the TS1 lead at terminal A15-6.



5.12 Jack.

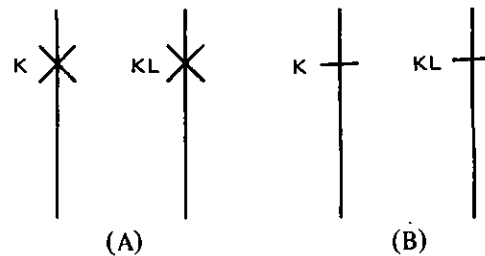
This symbol indicates a jack. Functional designations are shown above and to the right of the symbol in test procedures and above or below the symbol in test setups.



5.13 Key or Key-Lamp.

a. A key is a lever-type switch or a two-position rotary switch most commonly found on control or test panels and attendants turrets. A key-lamp is a key switch with an internal indicator lamp. The abbreviation for a key is K; for a key-lamp, KL.

b. These symbols direct test personnel to operate a key (K) or a key-lamp (KL) to its operated position (A) and to its released or normal position (B); see Note. The designation K or KL is always shown to the left of the symbol to identify the symbol as that representing a key or key-lamp. The name of the key or key-lamp and other relevant designation or information are shown to the right of the symbol.



NOTE. The "normal" position of a lever-type key is defined as the position of the key when its handle is at a right angle (perpendicular) to the panel or surface on which the key is mounted. Special note: The center position of a bent-handle key is not its normal position.

c. This symbol, for example, directs test personnel to operate the NIGHT key-lamp on the attendant turret to the ON position.

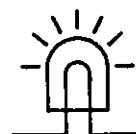


5.14 Lamps.

a. This symbol on an observation line indicates that the designated lamp lights steadily as a result of a preceding action step. Color of the lamp, when relevant, is shown in the upper right quadrant adjacent to the symbol. Functional designation and other relevant information are shown below the symbol.

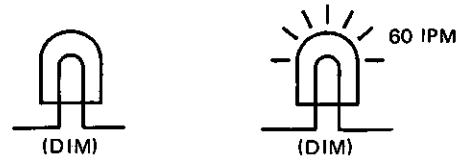


b. This symbol indicates that the designated lamp flashes at the rate shown. Flashing rate, expressed in interruptions (or flashes) per minute (IPM), is shown in the upper right quadrant adjacent to the symbol.

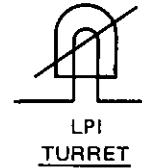


FLASHING RATE
30 IPM = wink
60 IPM = slow flash
120 IPM = fast flash

c. The word DIM in parenthesis below a lamp symbol means that the lamp lights or flashes at a reduced level of illumination intensity. Also, this notation means that the intensity of the lamp, if lighted or flashing previously, is reduced as the result of an immediately preceding action step.

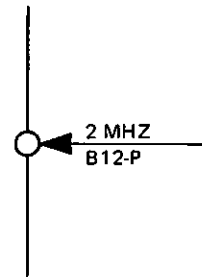


d. A straight diagonal line drawn through a lamp symbol means that the designated lamp goes dark as the result of an immediately preceding action step. Furthermore, the lamp symbol with the diagonal line means that the lamp goes dark regardless of its previous state; that is, lighted steadily or flashing.



5.15 Lead.

A lead is shown as a straight, horizontal line extending from a test equipment symbol to an action line connection and terminating with an arrowhead at the action line connection symbol. Lead designation is shown above the lead line immediately to the right of the action line. Terminal identification nomenclature is shown below the lead line and immediately to the right of the terminal symbol. For example, this symbol directs test personnel to connect lead 2MHZ to terminal B12-P, where B is the gate level, 12 is the connector mounting position, and P is the pin designator.



5.16 Manual Input.

This action symbol directs test personnel to manually enter specific characters or functions by means of an on-line keyboard (such as a teletypewriter or CRT console), switch settings, or pushbuttons. Characters or functions to be entered are included inside the symbol. For example, RETURN included in this symbol indicates that the carriage return function must be entered at the input device.



5.17 Meter.

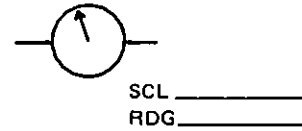
a. This symbol on an action line or in test setup instructions directs test personnel to connect a meter to the designated terminals. Polarity, when relevant, is shown to the left of the action line and close to the meter symbol. Information on the specific type of meter to use is given in the associated test procedure in the list of test equipment required. If more than one type of meter is listed, the symbol must identify the particular meter shown. Meter identification is shown immediately to the right of



the symbol. Other required information regarding the meter or its operation is to be presented in a REMARKS table near the symbol.

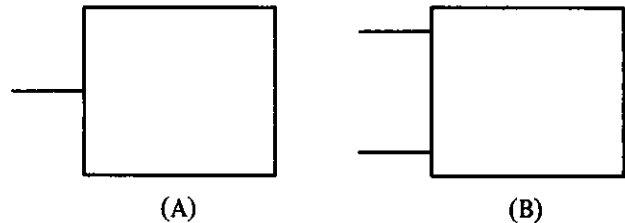
b. This symbol on an observation line indicates a specific meter reading resulting from a preceding action step. The scale to use and the approximate reading to be observed are shown on the lines adjacent to the abbreviations SCL and RDG, respectively.

NOTE. In the meter symbol, a solid-line needle indicates a reading that continues until the meter is disconnected. A dashed-line needle indicates a momentary reading.



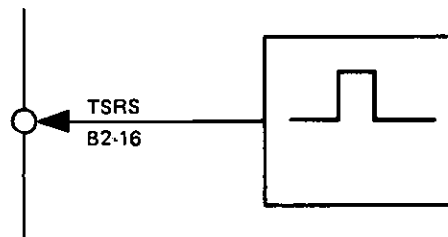
5.18 Oscilloscope.

a. These symbols indicate a single-trace oscilloscope (A) and a dual-trace oscilloscope (B). They are action-observation symbols. That is, an oscilloscope symbol shows test personnel the waveform or waveforms that are to be observed at designated terminals or test points as a result of an immediately preceding action. Standard oscilloscope traces are described and illustrated in paragraph 5.19. Additional waveform information, such as pulse width and pulse duration, is presented, when required, in the REMARKS column.

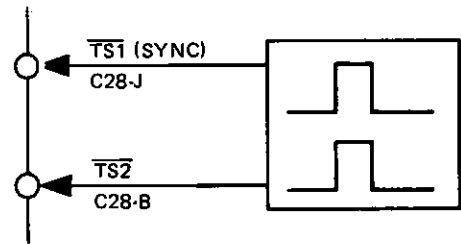


b. Lead information (par. 5.15) and terminal information (par. 5.31) identify the leads and terminals on which the indicated waveforms are to be observed. Lead designation is shown above the line representing the lead from the scope to the terminal. Terminal designation is shown below the line adjacent to the terminal symbol. The designation (SYNC) following a lead designation means that the lead and terminal so marked provides the synchronization or trigger pulse for channel 2 of a dual-trace oscilloscope.

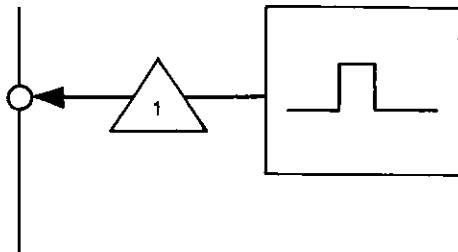
c. This symbol, for example, shows that a positive-going pulse is to be observed on lead TSRS at terminal B2-16.



d. This symbol, for example, shows that channel 1 of a dual-trace oscilloscope receives SYNC or trigger from lead TS1 at terminal C28-J for the positive-going pulse to be observed on lead TS2 at terminal C28-B.



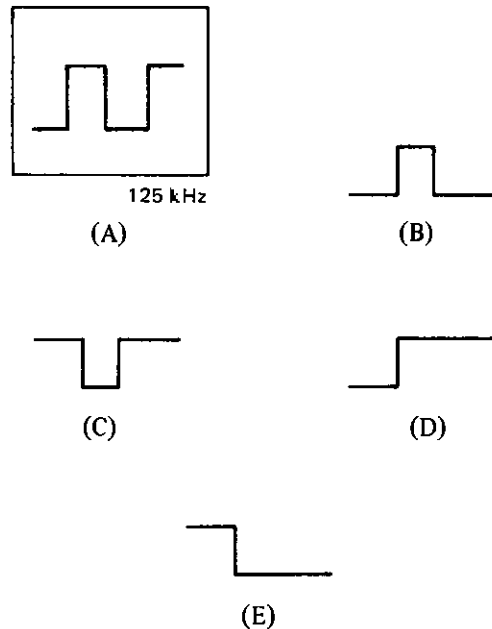
e. A series of oscilloscope waveforms to be observed in succession from different leads and terminals is sometimes presented in the REMARKS column. The waveforms are referenced by a correspondingly numbered triangular note symbol in the lead from the action line terminal symbol to the oscilloscope symbol. The following example illustrates the use of the oscilloscope, terminal, lead, and Note symbols, as well as the way in which successive detailed waveforms are shown in the REMARKS. The method of presentation is the same for either a single- or dual-trace scope.



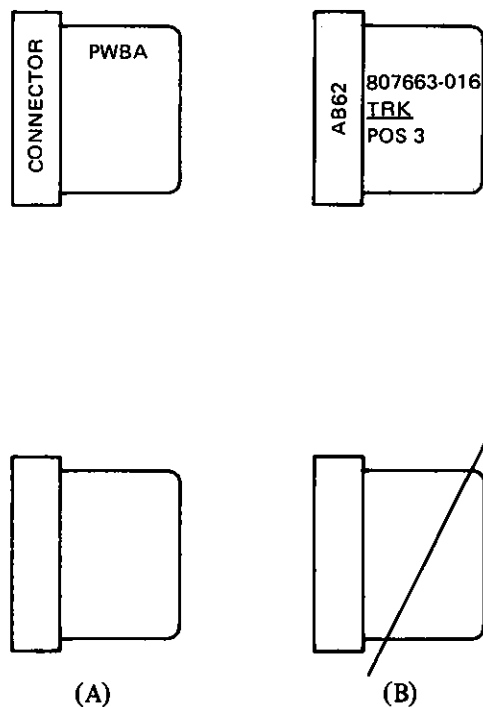
NO.	REMARKS		
1.	Connect oscilloscope, in succession, to each of the following terminals. Observe displays shown.		
	TERM.	LEAD DESIG	DISPLAY
	B2-16	$\overline{\text{TSRS}}$	
	B2-9	$\overline{\text{RTCK}}$	
	B2-11	$\overline{\text{RSRS}}$	

5.19 Oscilloscope Traces, Standard.

- a. These symbols indicate standard oscilloscope traces that are to be observed at designated terminals shown on an action line.
- b. Symbol (A) indicates a repetitive signal on the oscilloscope. The repetition rate or period of the waveform is shown below the oscilloscope symbol. In the example, the repetition rate is 125 kHz.
- c. Symbol (B) indicates a positive-going pulse (usually a single pulse).
- d. Symbol (C) indicates a negative-going pulse (usually a single pulse).
- e. Symbol (D) indicates a positive-going signal.
- f. Symbol (E) indicates a negative-going signal.

**5.20 Printed Wiring Board Assembly and Connector.**

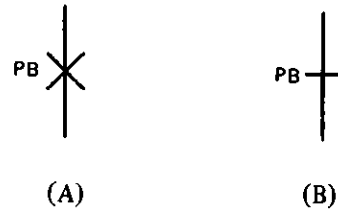
- a. This symbol in test procedures or test setup diagrams indicates a printed wiring board assembly (PWBA) and its associated connector. The PWBA is identified by number, cabinet location (underlined), and gate/cell position shown inside the PWBA section of the symbol. The connector is identified by position information shown inside the connector section and reading left-to-right when the page is rotated one-quarter turn clockwise. The symbol to the right, for example, specifies PWBA 807663-016, located in an ESC TRK cabinet gate position 3; it is a two-level PWBA with its connector located on levels AB in position 62.
- b. The PWBA and connector symbol (A) directs test personnel to insert the designated PWBA. The symbol (B) shown with a diagonal line drawn through the PWBA section directs test personnel to remove the designated PWBA from its connector.
- c. The symbols for PWBA connector terminal modifications required for specific test procedures are shown in paragraphs 7.13, 7.14, and 7.15.



5.21 Pushbutton.

a. A pushbutton is a push-type control most commonly found on control panels and attendant turrets or consoles. A pushbutton may be equipped with an internal indicator lamp. The abbreviation for a pushbutton is PB.

b. These symbols direct test personnel to press a pushbutton (PB) to its operated position (A) and to its released position (B). The designation PB is always shown to the left of the symbol to identify the symbol as that representing a pushbutton. The name of the pushbutton and other relevant designation or information are shown to the right of the symbol.



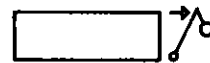
c. This symbol, for example, directs test personnel to press and hold the PAGE pushbutton on the attendant turret or console.



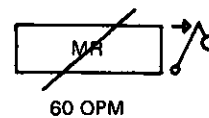
d. This symbol, on the other hand, directs test personnel to press and release the nonlocking LP RLS (loop release) pushbutton on the attendant turret or console.

**5.22 Register.**

a. This symbol on an action line or in test setup instructions directs test personnel to connect a register of the type indicated at that point in the procedure. An abbreviation of register type is shown inside the symbol; for example, ATB (all trunks busy), MR (message registration), T (traffic), PC (peg count), etc. If it is a timing register, the rate of operation is shown below the symbol; for example, 60 OPM means that the register, when activated, pegs or counts at the rate of 60 operations per minute. If it is an event-type register, that is, it pegs or counts once for each occurrence of the events being monitored, no operational rate is shown.

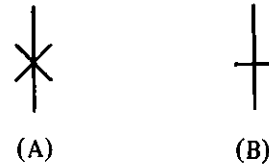


b. When the register symbol, with appropriate functional and operational designations, is shown on an observation line, it indicates that the specified register operates as the result of a preceding action step. A slanted line drawn through the register symbol indicates that the specified register does not operate. For example, this symbol on an observation line indicates that the 60-opm message register does not operate.

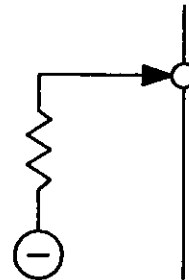


5.23 Relay.

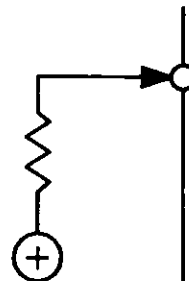
- a. These symbols indicate a relay in its manually operated position (A) and its manually released position (B). Note that these symbols are similar to those indicating pushbuttons, keys, or switches, but there is no letter of designation to the left of the symbols. These symbols without letter designations always indicate relays.
- b. This symbol, shown to the left of a relay symbol, indicates that it is necessary to block the relay in its operated or released position.
- c. This symbol, shown to the left of a relay symbol in test setup instructions or test procedures, indicates insulated relay contacts.
- d. This symbol indicates that a relay is energized; that is, electromagnetic pull is in effect.

**5.24 Resistor, Pull-Down.**

A pull-down resistor is a 5000-ohm resistor connected to a negative voltage or to ground. This symbol indicates a pull-down resistor and directs test personnel to connect it temporarily from 48 volts (unless otherwise specified) to the designated terminal. The resistor is to be removed upon completion of the specific test phase for which it was required, normally a scope observation. No action step directing the removal of the pull-down resistor is required.

**5.25 Resistor, Pull-Up.**

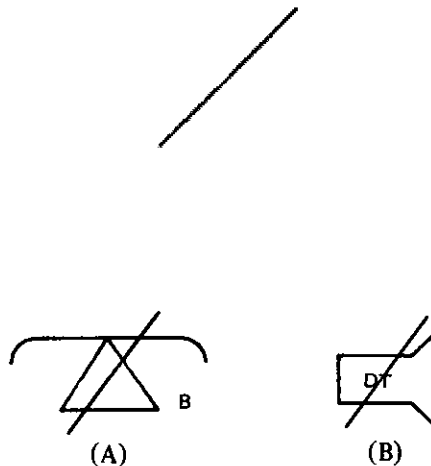
A pull-up resistor is a 5000-ohm resistor connected to positive logic supply voltage and used to increase the noise margin for logic signals. This symbol indicates a pull-up resistor and directs test personnel to connect it temporarily from +5 volts (unless otherwise specified) to the designated terminal. The resistor is to be removed upon completion of the specific test phase for which it was required. No action step directing the removal of the pull-up resistor is required.



5.26 Reverse Directive or Reverse Operation.

a. A straight diagonal line drawn through another symbol on an action line directs test personnel to reverse the action indicated by the symbol through which the line is drawn or to remove the test apparatus indicated by the symbol. When the line is shown through a symbol on an observation line, it indicates that the device operates to its reversed position or to the state opposite to that shown.

b. For example, symbol (A) on an action line directs test personnel to remove telephone B, which was connected in a previous action step. Symbol (B) on an observation line indicates that dial tone is removed as the result of a preceding action step.

**5.27 Start, Action.**

This symbol at the beginning of an action line indicates the starting point for the sequence of actions related to a specific test procedure.

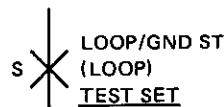
**5.28 Switch.**

a. A switch is either a toggle-type or a rotary-type control with three or more positions. Switches are most commonly found on control panels, test panels, or test sets. The abbreviation for a switch is S.

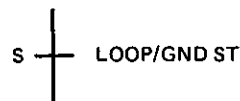
b. These symbols direct test personnel to operate a switch (S) to the designated position (A) and to its normal position (B). The designation S is always shown to the left of the symbol to identify the symbol as that representing a switch. The name of the switch and other relevant designation or information are shown to the right of the symbol.



c. This symbol, for example, directs test personnel to operate the LOOP/GND ST (loop/ground start) switch on the test set, which would have been identified previously, to the LOOP position.



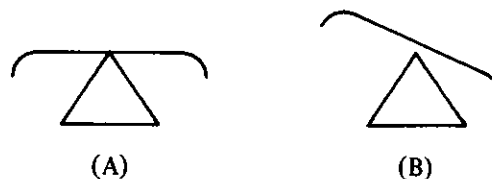
d. This symbol, for example, directs test personnel to return the LOOP/GND ST switch on the test set to its normal position.



5.29 Telephones.

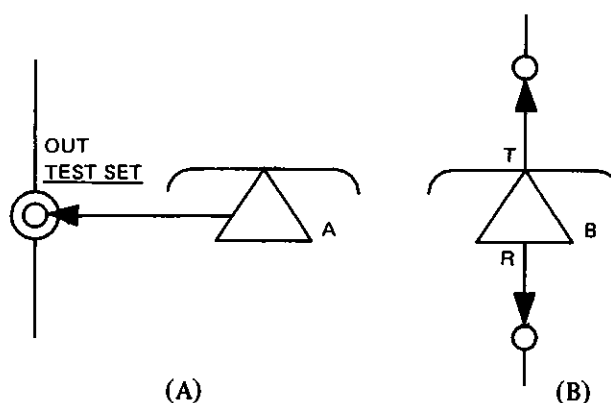
a. Station.

These symbols indicate a station telephone and direct test personnel to go on-hook (A) and off-hook (B) with the designated telephone. Telephone designations are shown to the right of the symbols. When the type of dialing is essential to the test being conducted, the abbreviation DP or DTMF is shown inside the symbol to specify the type of dialing: DP, dial pulse (rotary dial); DTMF, dual-tone multifrequency (pushbutton, or TONE-DIAL® telephone).



b. Station Telephone Connections.

These symbols direct test personnel to connect a station telephone to the designated jack or terminals. These symbolic directives for station telephone connections apply also to connections for other types of telephones and to other equipment or apparatus, when correct and convenient. Symbol (A), for example, directs that telephone A be connected to the OUT jack on the test set; symbol (B) directs that the tip (T) and ring (R) leads of telephone B be connected to the designated terminals.



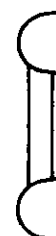
c. Hand Test.

This symbol indicates a hand test telephone and directs test personnel to connect it to the designated terminals or jack.



d. Handset.

This symbol indicates a handset and directs test personnel to connect the handset to the designated terminals or jack.



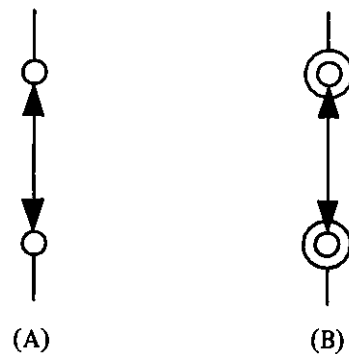
e. Operators Headset.

This symbol indicates an operator (or attendant) headset and directs test personnel to connect the headset to the designated jack.

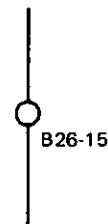


5.30 Temporary Connections.

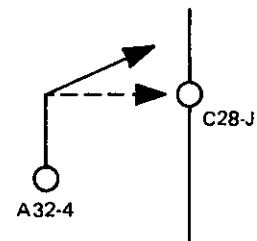
Temporary connections between designated terminals or jacks are made by way of test leads or patch cords, respectively. Symbol (A) directs test personnel to connect a test lead between two terminals; symbol (B), connect a test cord between two jacks. The lead or cord number, if applicable, is shown adjacent to the symbol. When required, special information or identification notation, such as lead or cord termination type and color of plug shell, is shown adjacent to the symbol or in the associated REMARKS table.

**5.31 Terminal.**

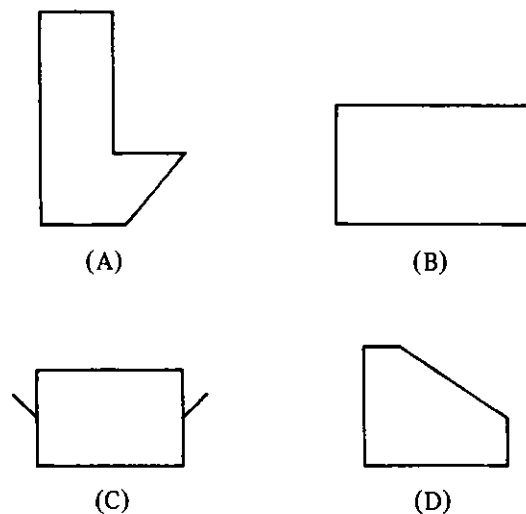
This symbol indicates a terminal. Terminal designation usually consists of letters or numbers indicating the connector mounting position and the pin on that connector. Terminal designation is shown to the right of and below the symbol. For example, typical terminal designations are: B26-15, C28-J, and A32-4.

**5.32 Terminals, Momentary Connection.**

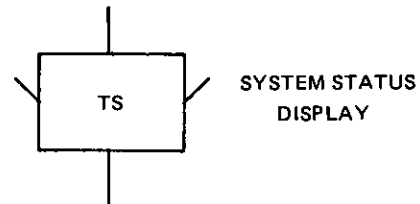
Momentary connection between two terminals is defined as the temporary electrical connection between a pair of designated terminals for a period of time sufficient only to effect the results shown on the immediately following observation line. For example, this symbol directs test personnel to make a momentary electrical connection between the two designated terminals.

**5.33 Test Equipment.**

a. These symbols indicate test equipment. Symbol (A) indicates a cord-type switchboard (SB), test console (TC), test desk (TD), or maintenance console (MC). Symbol (B) indicates a test panel (TP). Symbol (C) indicates a portable test set (TS). Symbol (D) indicates an attendant turret (AT) or operator turret (OT). Test equipment designation, identification, and other relevant information are shown inside and/or adjacent to the symbol. Special information or instructions, when necessary, are presented in the associated REMARKS table. On an action line, one of these symbols directs test personnel to connect the designated test equipment at the location indicated. On an observation line, the symbol indicates that the results shown occur on the designated test equipment.

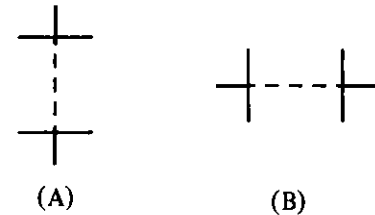


b. For example, this symbol on an action line directs test personnel to connect the system status display (portable test set) to the appropriate positions in the equipment cabinet. The cabinet locations for connecting the display are either shown along the action line or presented in the REMARKS table.

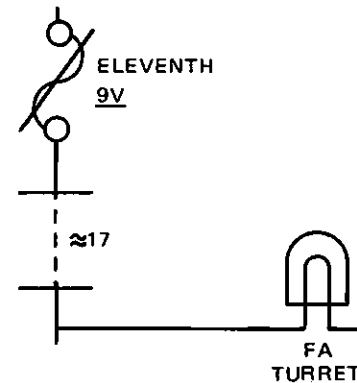


5.34 Time Delays.

a. These symbols indicate time delays: (A) before an action is to be taken; and (B) before an observation is to be made. The time, if specified, is shown to the right or above the dashed line. If not specified otherwise, all times are given in seconds.

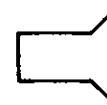


b. For example, these symbols direct test personnel to remove the eleventh nonalarm-type fuse in the 9-volt power section, wait approximately 17 seconds, and then observe that the FA (failure) lamp lights on the turret.



5.35 Tone or Ringing Signal.

a. This symbol on an observation line indicates that an audible tone or ringing signal is heard. An abbreviation to designate the type of tone or signal is shown inside the symbol; other relevant information, when required, is shown below the symbol.



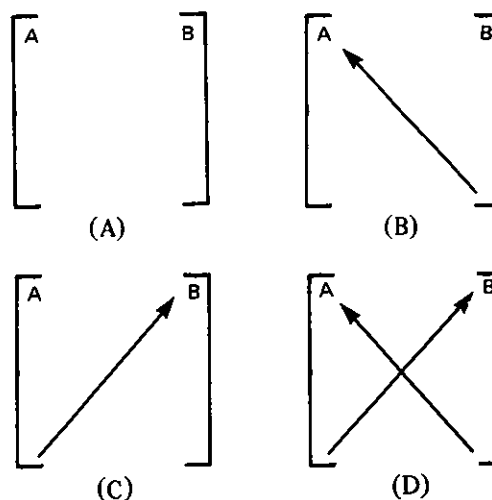
b. Table 1 lists the abbreviations of functional designations for many of the commonly used tones and ringing signals. Periods are not used with the abbreviations.

Table 1. Tones and Ringing Signals

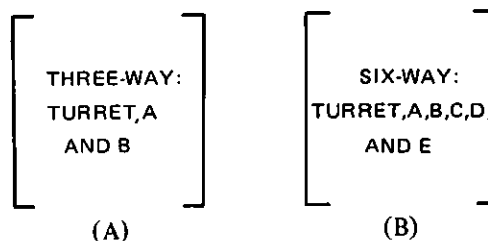
<i>ABBREVIATION</i>	<i>FUNCTIONAL DESIGNATION</i>	<i>ABBREVIATION</i>	<i>FUNCTIONAL DESIGNATION</i>
BIT	Break-In Tone	IBZ	Interrupted Buzz
BT	Busy Tone	IRNG	Interrupted Ringing
BZ	Buzz	LBT	Line-Busy Tone
CPT	Call-Passing (Zip) Tone	LT	Low Tone
CRNG	Continuous Ringing	OFT	Overflow Tone
CT	Trace Tone or Continuous Tone (Generated by Test Set)	PST	Permanent-Signal Tone
CWT	Call-Waiting Tone (Centrex)	PYST	Paystation Tone
DT	Dial Tone	RBT	Ringback Tone
EBT	Equipment-Busy Tone	RNG	Ringing
HT	High Tone	ST	Side Tone
HWLR	Howler Tone	TKT	Talk Tone
		TRT	Transmission Tone

5.36 Transmission Path (Voice).

a. The following symbols on an observation line indicate absence or presence of a voice transmission path between the two designated instruments. Symbol (A) indicates that no path has been established between telephones A and B, or that a previously established path between telephones A and B has been released. Symbol (B) indicates that B can talk to A, but A cannot talk to B. Symbol (C) indicates that A can talk to B, but B cannot talk to A. Symbol (D) indicates that A can talk to B, and B can talk to A (two-way transmission).



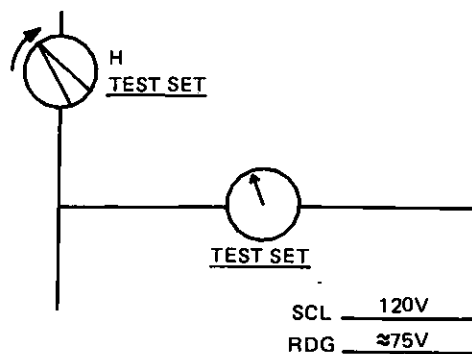
b. When the voice transmission path includes more than two instruments, such as during call transfer or conference, the number and designations of the instruments are specified inside the set of brackets indicating the transmission path. For example, symbol (A) indicates that a three-way path has been established between the turret and telephones A and B. Symbol (B) indicates that a six-way path (conference) has been established which, at this point, includes the turret.



5.37 Variable Adjustment.

a. This symbol directs test personnel to adjust the indicated control to achieve a result specified along with the symbol, on the following observation line, or in the accompanying REMARKS table. An arrow is shown adjacent to the upper left quadrant of the symbol, when required, to indicate direction of control rotation. If no arrow is shown, control is to be rotated in either direction required to achieve the specified result.

b. For example, these symbols direct test personnel to rotate test set control knob H clockwise until the meter on the test set reads approximately ($\approx$) 75 volts on its 120-volt scale.



PART II. SYMBOLOGY FOR TEST SETUPS**6. METHOD OF PRESENTATION****6.01 General.**

Test equipment setups are presented in symbolic connection diagrams. These diagrams identify the test equipment, show how the equipment is connected to the system, describe any special connections or patching cords, and, in some cases, show the interrelationship of the parts of the system involved in the tests.

6.02 Symbols.

The symbols used in the test equipment setup diagrams are described and illustrated in the following paragraphs. An illustrated index of these symbols is presented at the end of this section. This index identifies the symbols pictorially and references the descriptive text in paragraph 7.

6.03 Tables.

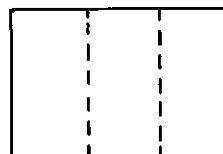
Two types of tables are presented, as required, on test equipment setup diagrams. One table lists the patching cords used to connect the test equipment; cords are identified in the table by diagram reference numbers, part numbers, and descriptions. The other table presents special remarks or notes. Entries in this table that refer to specific items or connections in the setup diagram are cross-referenced by numbers in triangular symbols.

7. GLOSSARY OF SYMBOLS**7.01 General.**

This paragraph describes and illustrates, in alphabetical order, the symbols most commonly used in graphic presentations of test equipment setups. No attempt is made to illustrate all possible symbols or combinations of symbols. Test equipment for special applications or that peculiar to a unique system cannot be anticipated. Specialized equipment and other equipment not included in this glossary will be identified completely on the setup diagram whenever such equipment is specified.

7.02 Bay.

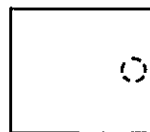
A bay is a row of equipment cabinets, racks, or frames. A numerical designation is usually shown on each end of the bay along with a location chart listing the contents of the bay. This symbol indicates a bay. The dotted vertical lines symbolize multiple cabinets,



racks, or frames. Bay identification is shown inside the symbol.

7.03 Cabinet, Auxiliary.

An auxiliary cabinet is used to house special or optional equipment or apparatus that normally cannot be accommodated in system equipment cabinets. Smaller than an equipment cabinet, an auxiliary cabinet can be wall-, rack-, or floor-mounted, depending on system requirements. An auxiliary cabinet is identified by name or letter designation. This symbol identifies an auxiliary cabinet. Cabinet identification and/or location are shown inside the symbol.



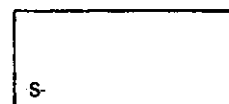
7.04 Cabinet, Equipment.

An equipment cabinet is used to house standard system equipment or apparatus that is mounted on gates or panels within the cabinet. In multicabinet systems, equipment cabinets are arranged in bays and are identified by name, letter, or alphanumeric designations. This symbol identifies an equipment cabinet. Cabinet identification and/or location are shown inside the symbol.



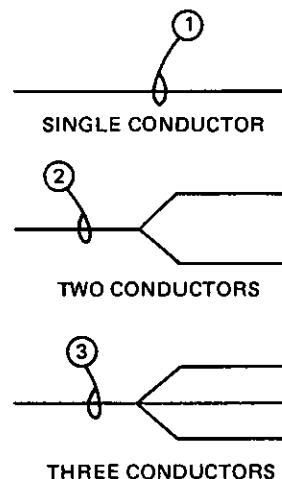
7.05 Circuit.

A circuit is a network of interconnected electrical elements designed to do a specific function. A circuit using all solid-state elements may consist of one or more PWBA's. A circuit is identified by name and schematic (S) number. This symbol identifies a circuit. Circuit identification is shown inside the symbol.



7.06 Cord, Patching.

A patching cord is used to make temporary electrical connections between equipment or circuits terminated on jacks or connector terminals. A patching cord can have one or several conductors terminated at each end in a plug or connector. The number of conductors and the type of end terminations determine which cord to use for a specific application. In a test equipment setup diagram, a patching cord is identified by a number enclosed in a circle connected to the cord symbol by a line whose other end encircles a segment of the cord symbol. This circled number refers to a correspondingly numbered item in the patching cord table on the diagram. The table gives the part number and a brief description of each cord used in the test equipment setup. These symbols indicate patching cords. Refer to paragraph 7.16 for associated cord terminations.

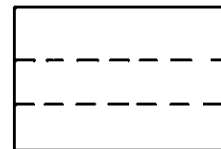


7.07 Frame, Distributing.

A distributing frame (DF) is any floor-mounted steel framework on which blocks of terminals or connectors are mounted. The term DF is a universal designation. It should be used when the specific type of frame is not known or is not important to the interpretation of the test equipment setup diagram. Three specific types of distributing frames commonly used in test setup diagrams are: combined distributing frame (CDF), intermediate distributing frame (IDF), and main distributing frame (MDF). This symbol, shown vertically or horizontally, indicates a distributing frame. More specifically, it indicates a section of a frame on which the terminals or connectors involved in a particular test setup are located. The abbreviation DF, CDF, IDF, or MDF is shown, where convenient, adjacent to the symbol. Terminals or connectors of interest are shown and identified inside the symbol.

**7.08 Gate.**

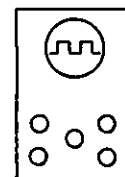
A gate is a cabinet-mounted, swing-out mounting arrangement for system equipment, such as relays, PWBAs, and matrix modules. This symbol indicates a gate. Gate identification and/or location are shown inside the symbol.

**7.09 Jack.**

A jack is a connector that makes electrical contact with the mating contacts of a plug on the end of a patching cord. This symbol indicates a jack. Jack identification is shown adjacent to the symbol.

**7.10 Oscilloscope.**

This symbol indicates an oscilloscope. It directs test personnel to connect the scope as shown on the test procedures setup diagram. Scope identification is given in the list of test equipment needed.

**7.11 Panel.**

A panel is a cabinet- or rack-mounted plate on which system equipment, controls, terminals, jacks, and/or plug receptacles are assembled and wired. This symbol identifies a panel. Panel identification is shown inside the symbol along with the connectors associated with the test equipment setup.

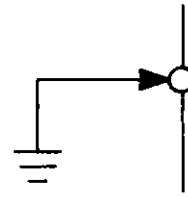
**7.12 Post, Binding.**

A binding post is a threaded stud around which wires can be wrapped or clamped by a binding nut to make an electrical connection. This symbol indicates a binding post. Post identification is shown adjacent to the symbol.

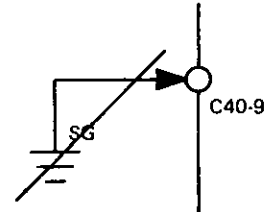


7.13 PWBA Contact Ground.

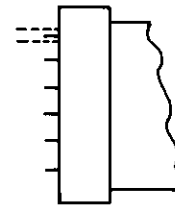
a. This symbol directs test personnel to connect ground to a designated PWBA contact on the back of the gate. The PWBA does not have to be removed from its connector. Contact designation is shown to the right of the small circle representing the contact. If signal ground is to be applied, the abbreviation SG is shown to the right of the ground section of the symbol.



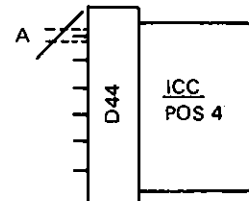
b. A diagonal line drawn through the section of the symbol showing the ground connector directs test personnel to remove the ground. For example, this symbol directs that signal ground be removed from contact C40-9.

**7.14 PWBA Contact Insulation.**

a. This symbol for a PWBA and its associated gate connector includes representative contact projections. Short dashed lines above and below a contact projection directs test personnel to insulate the designated contact. Contact designation is shown to the left of the projection and centered between the pair of dashed lines. The contact to be insulated is on the PWBA.

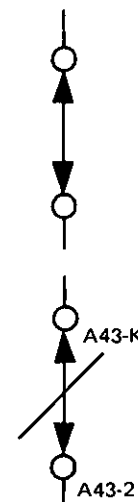


b. A diagonal line drawn through the section of the symbol showing the insulated contact directs test personnel to remove the insulation. This symbol, for example, directs that the insulation be removed from contact A of PWBA in location D44, gate position 4, of the ICC half-cabinet.

**7.15 PWBA Contact Short.**

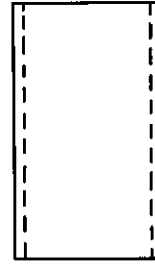
a. This symbol directs that the designated PWBA contacts be shorted by connecting a jumper between the contacts on the back of the gate. The PWBA does not have to be removed from its connector. Contact designations are shown to the right of the contact symbols.

b. A diagonal line drawn through the section of the symbol representing the shorting jumper directs that the contact short be removed. For example, this symbol directs that the short be removed between contacts A43-K and A43-2.

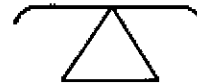


7.16 Rack.

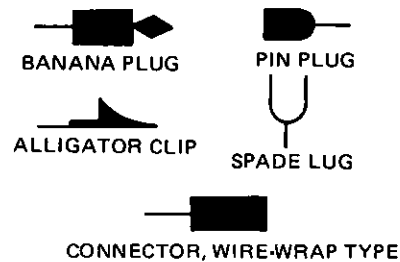
A rack is a floor-mounted steel framework on which equipment or panels are mounted. This symbol indicates a rack. Rack identification is shown inside the symbol.

**7.17 Telephones.**

The symbols for various types of telephones used in test equipment setups are the same as those described and illustrated in paragraph 5.29. In a test setup diagram, a telephone symbol directs test personnel to connect the specified type of instrument to the designated terminals or jacks before proceeding with the test procedures.

**7.18 Terminations, Cord.**

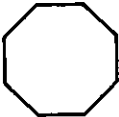
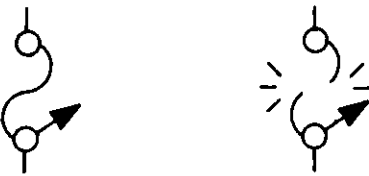
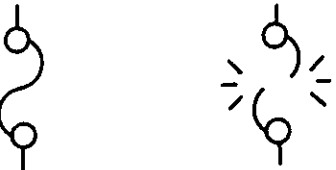
These symbols indicate various cord terminations. When necessary to the interpretation of a setup diagram, these termination symbols are shown on the ends of the patching cords or are included in the table describing the cords.

**7.19 Test Equipment, System.**

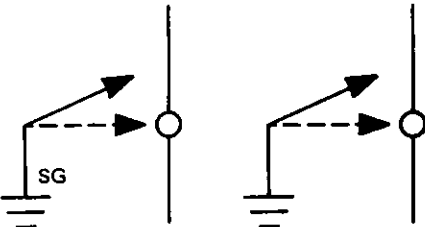
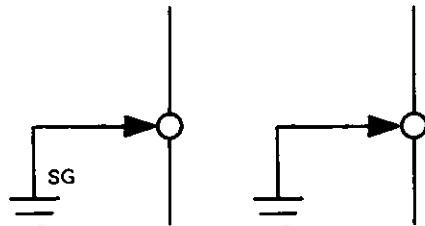
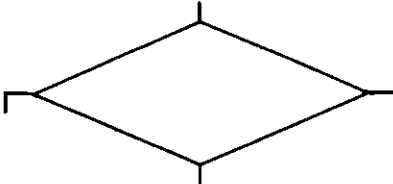
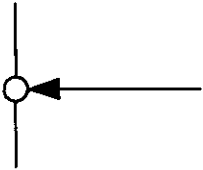
System test equipment is that designed for use with a specific system and includes items such as test consoles, test desks, maintenance consoles, test panels, test sets, and attendant or operator turrets or consoles. The symbols for such equipment and the associated designations are the same as those described and illustrated in paragraph 5.33. In a test equipment setup diagram, these symbols direct test personnel to connect the designated equipment to the system as shown before proceeding with the test procedures.

INDEX

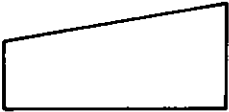
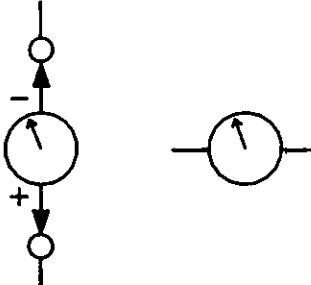
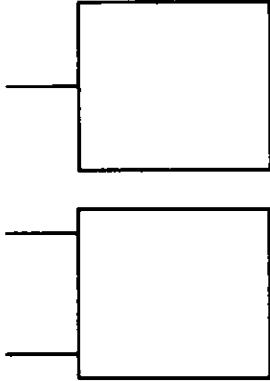
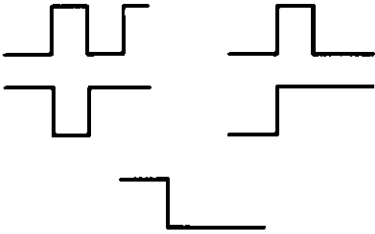
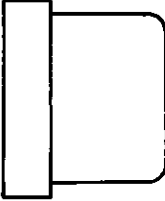
Part I. Index of Test Procedure Symbols

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Alarm, Audible	5.02
	Circuit Breaker, Nonalarm-Type	5.03
	Dial, Rotary or Key Pad	5.04
	End, Action	5.05
	Hard-Copy Printout or Display	5.06
	Fuse, Alarm-Type	5.07
	Fuse, Nonalarm-Type	5.08

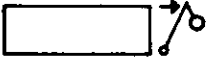
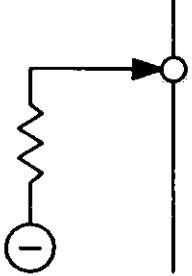
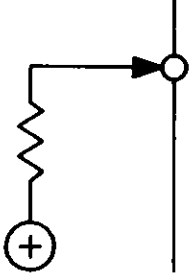
Part I. Index of Test Procedure Symbols (Cont)

SYMBOL	INTERPRETATION	PARAGRAPH REFERENCE
	Ground, Momentary Application	5.09
	Ground, Solid Application	5.10
	Interrogation or Decision	5.11
	Jack	5.12
	Key or Key-Lamp	5.13
	Lamps	5.14
	Lead	5.15

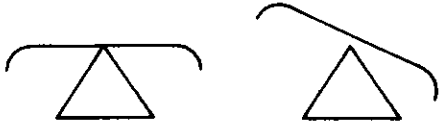
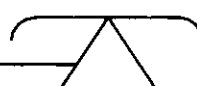
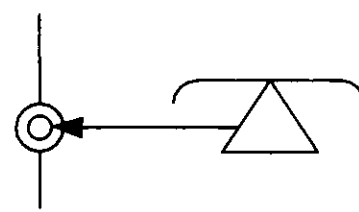
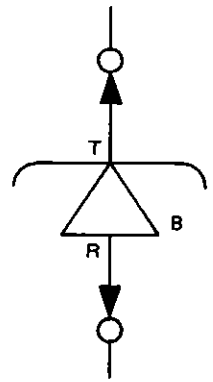
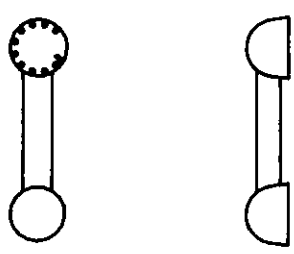
Part I. Index of Test Procedure Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Manual Input	5.16
	Meter	5.17
	Oscilloscope	5.18
	Oscilloscope Traces, Standard	5.19
	Printed Wiring Board Assembly and Gate Connector	5.20 (Refer also to par. 7.13, 7.14, and 7.15)

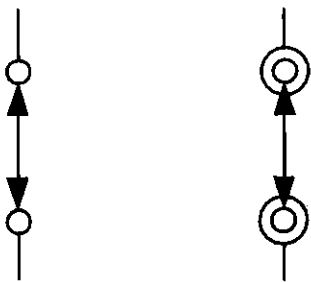
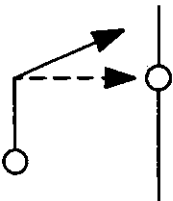
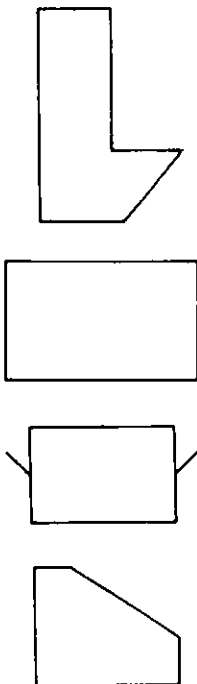
Part I. Index of Test Procedure Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Pushbutton	5.21
	Register	5.22
	Relay	5.23
	Resistor, Pull-Down	5.24
	Resistor, Pull-Up	5.25
	Reverse Directive or Reverse Operation	5.26
	Start, Actions	5.27
	Switch	5.28

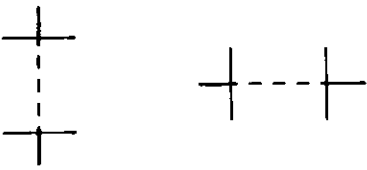
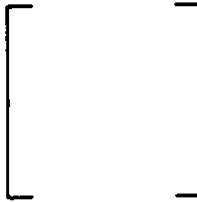
Part I. Index of Test Procedure Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Telephones	5.29
	Station	
	Station Telephone Connections	
		
	Hand Test	Handset
	Operator Headset	

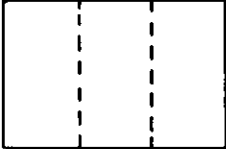
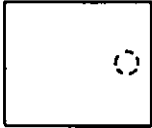
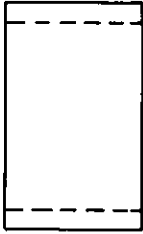
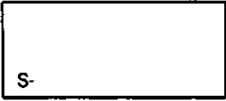
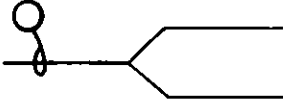
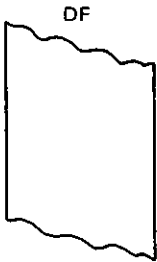
Part I. Index of Test Procedure Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Temporary Connections	5.30
	Terminal	5.31
	Terminals, Momentary Connection	5.32
	Test Equipment Switchboard, Test Console, Test Desk, or Maintenance Console Test Panel Test Set (Portable) Current or Console, Attendant or Operator	5.33

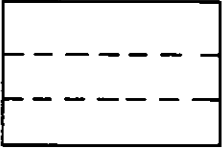
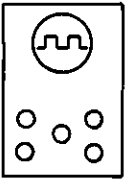
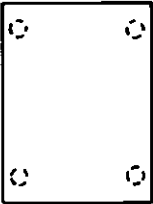
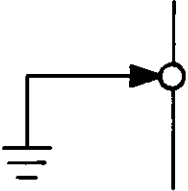
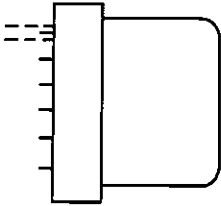
Part I. Index of Test Procedure Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Time Delays	5.34
	Tone or Ringing Signal	5.35
	Transmission Path (Voice)	5.36
	Variable Adjustment	5.37

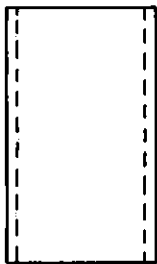
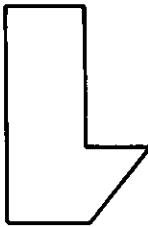
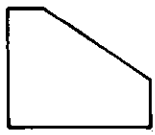
Part II. Index of Test Setup Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Bay	7.02
	Cabinet, Auxiliary	7.03
	Cabinet, Equipment	7.04
	Circuit	7.05
	Cord, Patching (Two-Conductor Shown)	7.06
	Frame, Distributing	7.07

Part II. Index of Test Setup Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	Gate	7.08
	Jack	7.09
	Oscilloscope	7.10
	Panel	7.11
	Post, Binding	7.12
	PWBA Contact Ground	7.13
	PWBA Contact Insulation	7.14 (Refer also to par. 5.20)

Part II. Index of Test Setup Symbols (Cont)

<i>SYMBOL</i>	<i>INTERPRETATION</i>	<i>PARAGRAPH REFERENCE</i>
	PWBA Contact Short	7.15
	Rack	7.16
	Telephones	7.17 (Refer also to par. 5.29)
 BANANA PLUG  PIN PLUG  ALLIGATOR CLIP  SPADE LUG  CONNECTOR, WIRE-WRAP TYPE	Terminations, Cord	7.18
   	Test Equipment, System System Switchboard, Test Console, Test Desk, or Maintenance Console Test Panel Test Set (Portable) Turret or Console, Attendant or Operator	7.19 (Refer also to par. 5.33)