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Systems

IBM 3767 Models 1, 2, and 3 Communication Terminal Component Description

IBM

Preface

This manual describes the IBM 3767 Communication Terminal, a multipurpose terminal that communicates with an IBM System/360 or IBM System/370. The information it contains is directed to customer executives, systems analysts, and systems engineers already aware of the operating procedures for the applications in which they plan to use the terminal.

The first chapter gives an overview of the 3767. It describes the applications and features of the 3767 and the communication facilities required. Chapters 2 and 3 describe the characteristics and features in detail.

The chapter on operating controls (Chapter 4) follows the chapters on operating characteristics and special features so that the reader can better appreciate the functions of these controls.

Chapter 6 gives SNA/SDLC application information for the 3767. This chapter provides both descriptive information and reference information to enable the user to write his application programs using SNA/SDLC communications.

Detailed operating instructions are given in *IBM 3767 Communication Terminal Operator's Guide,* GA18-2000.

Procedures for problem determination are described in *IBM 3767 Models 1, 2, and 3 Communication Terminal Problem Determination Guide,* GA18-2012.

Instructions to guide the user in the setup of a terminal without the assistance of an IBM Customer Engineer are given in *IBM 3767 Communication Terminal Setup Instructions,* GC30-3026.

Information on installation and physical planning is given in *IBM Remote Multiplexers and Communications Terminals Installation Manual- Physical Planning,* GA27-3006.

This manual does not contain information about the various RPQs (Request for Price Quotation) available for the 3767. Publications for these RPQs are shipped with the 3767. Refer to these manuals for additional information.

Additional information on SNA/SDLC is given in:

IBM Synchronous Data Link Control General Information, GA27-3093
Systems Network Architecture General Information, GA27-3102
DOS/VS VTAM Network Operating Procedures, GC27-0025
OS/VS VTAM Network Operating Procedures, GC27-0027
IBM 3704 and 3705 Control Program Generation and Utilities Guide and Reference Manual, GC30-3008

Fourth Edition (April 1977)

This is a major revision of, and obsoletes, GA27-3096-2, GN18-2041 and GN18-2044. Extensive changes have been made throughout the manual; therefore, no vertical lines appear in the margins, and the manual should be reread in its entirety.

Information in this manual is subject to changes: any such changes will be reported in subsequent revisions or Technical Newsletters. Before using this publication with the operation of IBM systems or equipment, refer to *IBM System/360 Bibliography,* GC20-0360, *IBM System/370 Bibliography,* GC20-0001, and associated Technical Newsletters, for the publications that are current.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

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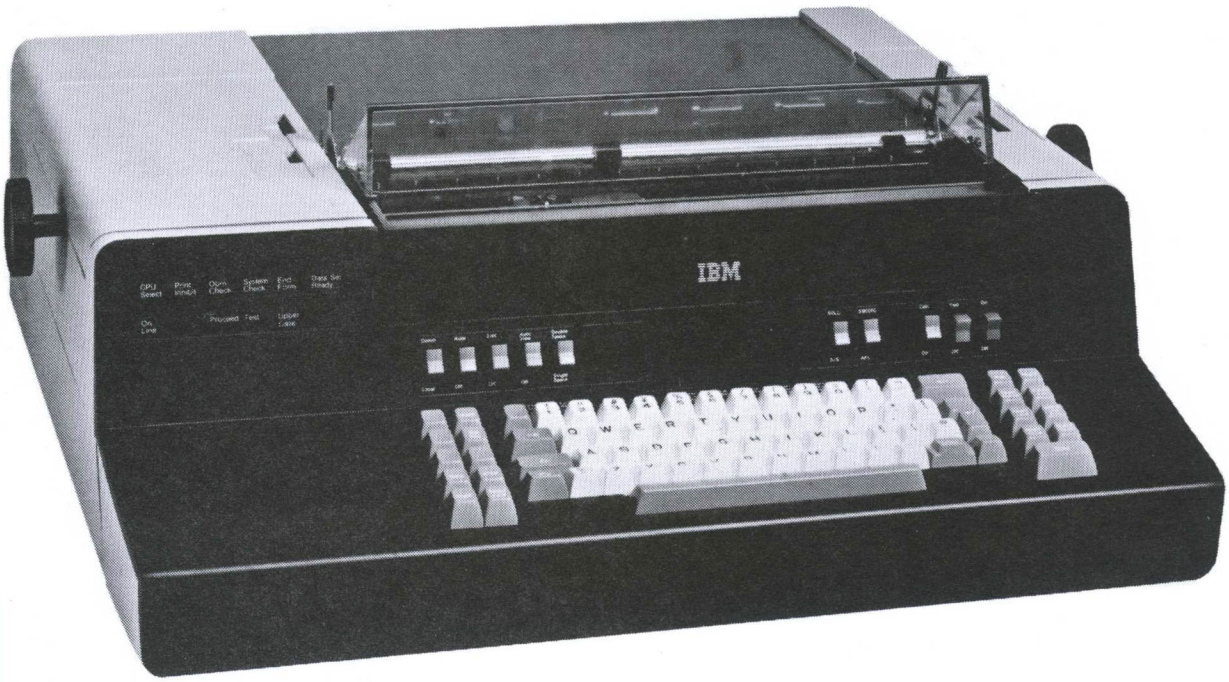


IBM 3767 Communication Terminal

Chapter 1. Introduction

The IBM 3767 Communication Terminal is a compact, movable, desk-top terminal that is available in three models. The 3767 Model 1 prints at an average rate of 40 characters per second. The 3767 Model 2 prints at a maximum rate of 80 characters per second and has a 512-byte buffer. The 3767 Model 3 prints at a maximum rate of 120 characters per second and has a 512-byte buffer. Buffer expansion features are available for all models.

The 3767 provides access to a remote CPU through SDLC (synchronous data link control) line control. SDLC is a new communications line control that increases functional capabilities. SDLC includes comprehensive detection and recovery procedures at the data link level for transmission errors that may be introduced by the communications channel.

In addition, SDLC makes possible the automatic recovery of most transmission errors, without the user's awareness that the error has occurred. It also allows expansion of line control functions, as additional capabilities are required in the future. Refer to the *IBM Synchronous Data Link Control General Information Manual,* GA27-3093, for detailed information about SDLC.

IBM 2741 and 2740 communication terminals Models 1 and 2 start-stop line controls are available as special features on the 3767 Models 1 and 2; 2740 Model 2 start-stop line control is available as a special feature on the 3767 Model 3. These features permit the user to migrate to SDLC line control at his own convenience. The 3767 Communication Terminal with the appropriate Start-Stop Line Control feature will work with existing 2740 or 2741 line control program support. Simply setting a switch changes the 3767 from start-stop line control to SDLC. However, consideration must be given to the total system configuration and programming support at the time of the changeover. For the user's convenience, and to simplify attaching the 3767 to a communications line, both an integrated modem and an acoustic coupler are available as special features. An EIA/CCITT interface is also available for operation of the terminal with a stand-alone modem.

Other special features available for the 3767 are:

- Calculate-Scientific—the 3767, in local (offline) mode, can be used as a 16-digit desk calculator with any keyboard layout other than Katakana.
- Magnetic Stripe Reader—the reader may be used to transmit a terminal operator's identification and to enter data.
- Vertical Forms Control—the user can vertically format his printed output.
- Variable Width Forms Tractor—forms in a wide range of widths can be used.
- Alternate Character Set—the user can change from a primary to a secondary character set by setting a switch.

For a complete list of standard features, specify features, and special features, refer to Figures 1-1 and 1-2.

STANDARD FEATURES

- Double Space/Single Space
- Buffer Full Alarm
- Print Inhibit
- End of Line Alarm
- Auto Switch
- Auto View

SPECIFY FEATURES

- Keyboard Arrangements: EBCDIC, Correspondence, and Katakana
- Line Speed of 300*, 600, or 1200 bps
  (specify when ordering 1200 bps Integrated Modem)
- Line Speed of 200* (except USA and Canada), 300*, 600, 1200, 2400 bps
  (specify when ordering EIA/CCITT Interface)
- Data-Talk Switch (except USA, Canada, and Germany)
- Dial Disconnect Switch (Germany only)
- Terminal ID* (must also have the 2741 Start/Stop Line Control feature)
- Paper Roll Holder and Forms Guide with Paper Bail*

SPECIAL FEATURES

- 2740-1 Point-to-Point Start-Stop Line Control*
- 2740-1 Station Control Start-Stop Line Control*
- 2740-2 Start-Stop Line Control (must also have the Buffer with Edit feature, 512 or 1024 bytes)
- 2741 Start-Stop Line Control*
- 1200 bps Integrated Modem
- 1200 bps Integrated Modem/Interrupt
- Acoustic Coupler (300* or 600 bps) (must also have the Integrated Modem feature)
- EIA/CCITT Interface
- Buffer with Edit (512 bytes) (standard on 3767 Models 2 and 3)
- Buffer with Edit (1024 bytes)
- Alternate Character Set
- Vertical Forms Control (must also have the Variable Width Forms Tractor feature)
- Magnetic Stripe Reader
- ASCII
- Calculate-Scientific
- Security Keylock
- Forms Stand
- Variable Width Forms Tractor

*Not available on 3767 Model 3.

See Figure 1-2 for details about 2740 and 2741 start-stop line control.

Figure 1-1. Features

Start-Stop Line Control Related 3767 Features	2740-1 Point-to-Point (Note 5)	2740-1 Station Control (Note 5)	2740-2	2741 (Note 5)
PTTC/EBCD Line Code	S	S	S	S
Correspondence Line Code	S	S	-	S
1200 bps Integrated Modem	Sp	Sp	Sp	Sp
300 bps	S	S	-	S
600 bps	-	-	S	-
1200 bps	-	-	S	-
Acoustic Coupler (Note 3)	Sp	-	-	Sp
300 bps	S	-	-	S
1200 bps Integrated Modem with Interrupt (Note 4)	-	-	-	S
EIA/CCITT Interface	Sp	Sp	Sp	Sp
200 bps (WT only)	S	S	-	S
300 bps	S	S	-	S
600 bps	-	-	S	-
1200 bps	-	-	S	-
Dial Disconnect Switch (Germany only)	S		-	S
Print Inhibit	St	St	St	St
Record Checking	St	St	St	-
End of Line Alarm	St	St	St	St
Auto Switch	St	St	-	-
Buffer Receive	-	-	St	-
Buffer 120 bytes (Note 1)	-	-	S	-
248 bytes (Note 1)	-	-	S	-
440 bytes (Note 1)	-	-	S	-
Buffer Full Alarm (Note 2)	-	-	I	-
Buffer Edit (Note 2)	-	-	I	-
Auto Terminal ID	-	-	-	S

Legend:

St – Standard (no charge)
I – Included in other Feature
S – Specify Feature (no charge)
Sp – Special Feature (charge)
A dash (-) indicates that a related feature does not apply.

Notes:
1. Buffer 512 or 1024 is a prerequisite for 2740-2.
2. Included in Buffer 120, 248, and 440 byte feature for 2740-2.
3. 1200 bps integrated modem is a prerequisite.
4. Required only for 2-wire communications facilities.
5. Not available on Model 3.

Figure 1-2. 3767 Features Related to 2740 and 2741 Start-Stop Line Control

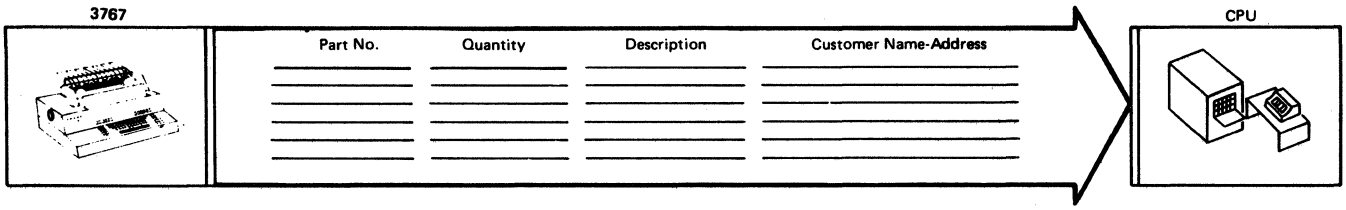
Applications

The flexibility and usefulness of the 3767 Communication Terminal are enhanced by its local mode (offline) capabilities, as follows:

- It can be used as a keyboard-printer for normal secretarial typing. Buffer editing, to ensure the correctness of entered data, is standard on the 3767 Models 2 and 3 and is available with the Buffer feature for the 3767 Model 1.
- Horizontal and vertical (using the Vertical Forms Control special feature) formatting may be done.
- The 3767 can function as a desk calculator, by adding the Calculate-Scientific special feature.

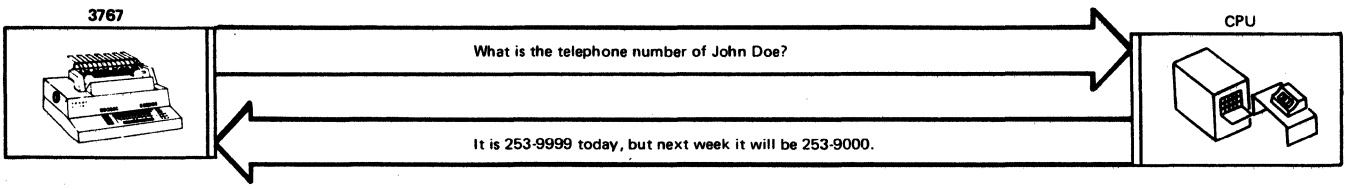
The following illustrations show some of the many applications in which the IBM 3767 can operate in communicate (online) mode.

DATA ENTRY



In this application, the 3767 is used primarily for entering data. Entering an order is a typical example of this type of application.

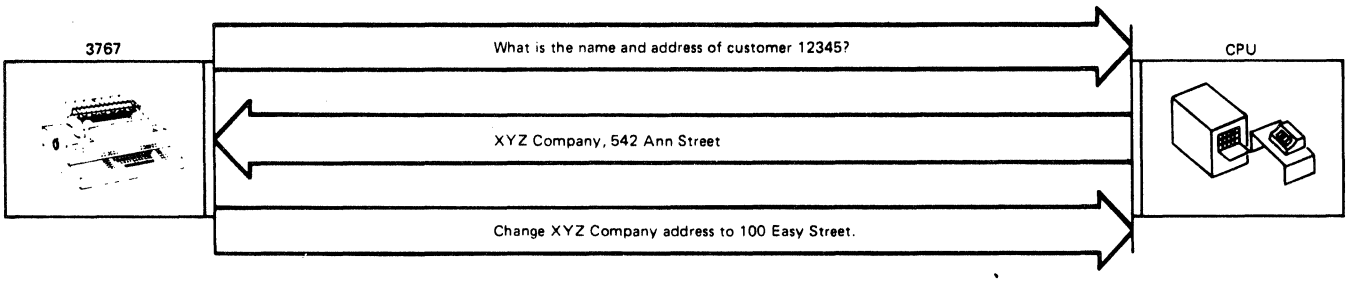
SIMPLE INQUIRY



The user interrogates a data base by presenting a predefined inquiry. This type of inquiry has the following characteristics:

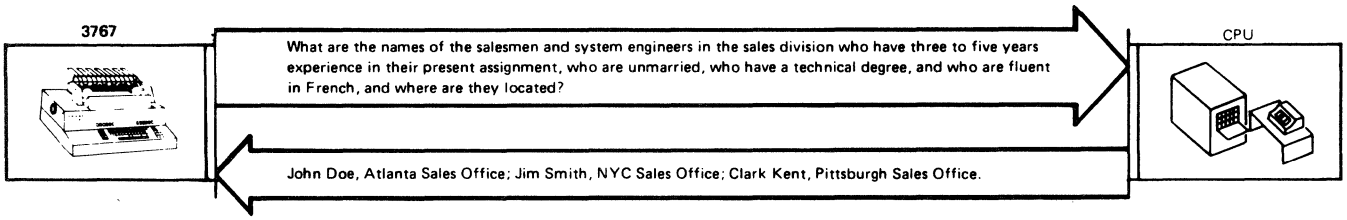
- One logical file per inquiry is searched.
- Operator has limited or no update capability.
- Output is alphameric.

INQUIRY AND UPDATE



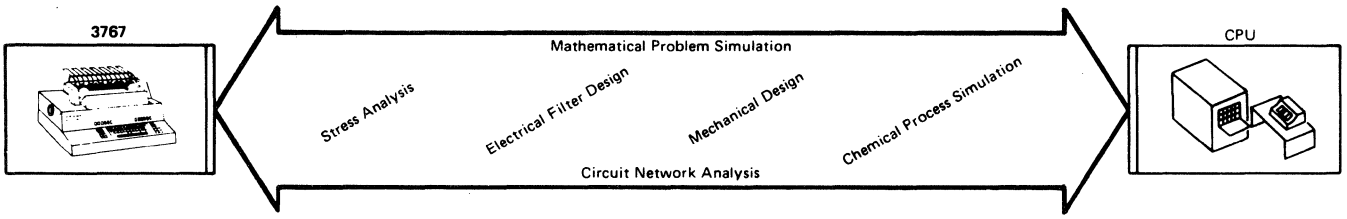
The user interrogates a data base by presenting a predefined inquiry. He then evaluates the response and, if necessary, updates the data base.

COMPLEX INQUIRY



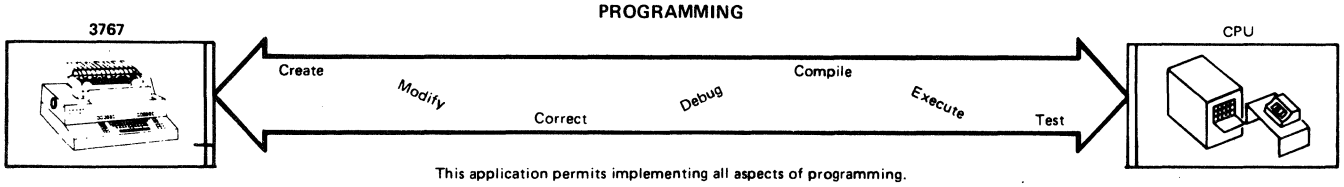
The user may interrogate a data base by presenting several unstructured, complex inquiries. More complex inquiries might involve requests for summaries, trends, and correlations among multiple files.

PROBLEM SOLVING



This application permits the user, through time-sharing, to solve problems using high-level languages such as BASIC and FORTRAN.

PROGRAMMING



This application permits implementing all aspects of programming.

Printer

A fast, versatile, bidirectional matrix printer is incorporated in the 3767 terminal. Printing characteristics of the three models of the 3767 are as follows:

	Model 1	*Model 2*	*Model 3*
Printing Speed– With at least six spaces per print line. (characters per second)	40 (Avg.)	80 (Max.)	120 (Max.)
Print Positions	132	132	132
Character Spacing (characters per inch)	10	10	10
Line Spacing (lines per inch)	6	6	6
Tab Speed (inches per second) Nine or more consecutive spaces	12 (Avg.)	12(Avg.)	12 (Avg.)
Eight or less consecutive spaces	8	8	12

The 3767 printer prints in both the forward and reverse directions to obtain faster output.

Printing speed depends on line speed when the 3767 is operating with 2740-1 or 2741 start-stop line control.

The printing speeds indicated in the table above are based upon having at least six spaces per print line.

Forms

The terminal accepts forms of up to six parts with a total thickness of 0.018 inches (0.46mm). Total forms thickness must not vary more than 0.006 inches (0.15mm) on Models 1 and 2 or 0.003 inches (0.075mm) on Model 3 across the width of the platen. Five and six part continous forms should be tried on an individual basis for acceptable feeding, registration, and print quality. The following table indicates the recommended form feeding method and the recommended device for each.

Form Type	*Feeding Method*	*Forms Handling Devices*
Roll Paper (Mdl 1 & 2 only)	Friction-feed	Paper Roll Holder and Forms Guide (With a paper bail)
Cut forms (up to 4-part)	Friction feed	none
Continuous forms (multi-part or preprinted forms)	Forms Tractor	Variable Width Forms Tractor
Continuous forms (single part)	Forms Tractor or	Variable Width Forms Tractor
	Friction feed (see note)	Paper Roll Holder and Forms Guide (with a paper bail)

Maximum overall forms width is 15 inches (381 mm); card stock forms are not recommended.

Multipart continuous forms should be glued together to provide best results. Metal staples are not permitted, and crimping is not recommended because forms might become separated when wrapped around the platen.

Multipart cut forms must be glued together at the top, and be free of metal staples or crimping.

CAUTION
To prevent print head damage, printing must not occur on the edges or across the prepunched holes of a document.

Refer to *Form Design Reference Guide for Printers,* GA24-3488, for additional form specifications and limitations.

Note: For precise forms control the Variable Width Forms Tractor is recommended for Models 1 and 2. For Model 3, VWFT is required for continuous forms. Friction feeding may be used, but may require occasional readjustment of the form to ensure correct feeding.

Keyboard Character Sets and Transmission Codes

The user may select one of four available keyboard character sets, as follows:

Character Set	*No. of Chars*	*Data Keys*
EBCDIC	88/96*	44/48*
Correspondence (USA only)	88	44
Katakana (Japan only)	128	48
ASCII	96	48

*Non-USA keyboards have 47 data keys (UK has 48). 88 and 44 apply to USA keyboards; 96 and 48 apply to Non-USA keyboards.

See Appendix A for illustrations of keyboard variations.

EBCDIC transmission code is used for data under SDLC. With the ASCII feature, either EBCDIC or ASCII transmission codes may be selected by the CPU. For start-stop line control either the PTTC/EBCD or Correspondence transmission code may be used. See Figure 3-1.

Local Mode Operations (Offline)

The following operations can be performed when the terminal is in local mode:

Keyboard-to-printer	(standard feature)
Keyboard-to-printer with editing	(included in Buffer feature)
Tab setting*	(standard feature)
Vertical Forms Control (VFC) setting*	(special feature)
Offline calculation	(special feature)
Test*	(standard feature)

*This status can be entered when the terminal is in either local or communicate mode.

When the terminal is in local mode, it may be used for normal secretarial typing. To perform other local mode operations, the user needs only to set the Test, Edit, or calculate switch or to press a function key.

Communications Facilities

The customer may choose from the wide variety of communications facilities described in the following text (refer to Figures 1-3 and 1-4).

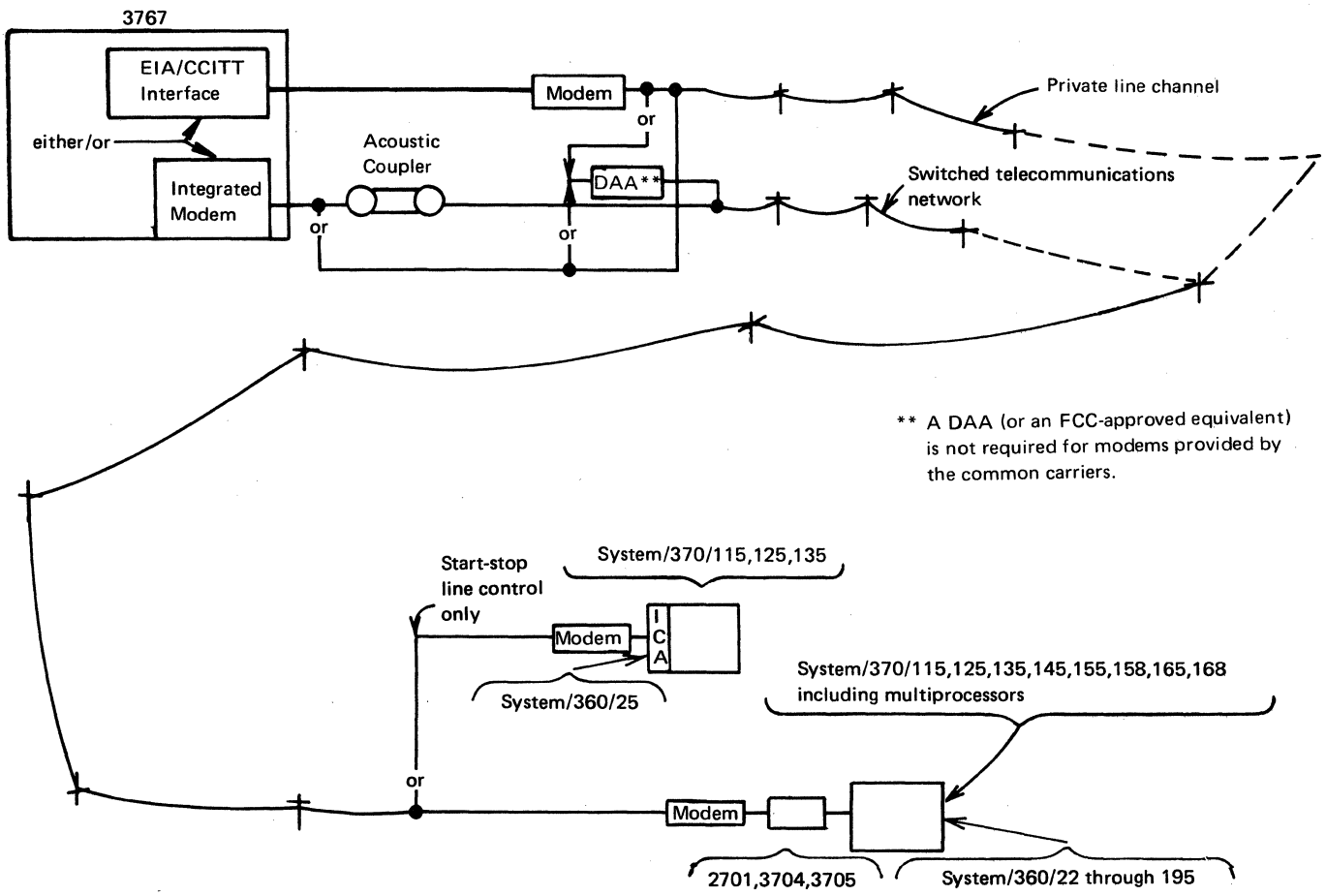


Figure 1-3. Communications Facilities

Line Attachment \ Line Control	SDLC	2740-1*/2741*	2740-2
1200 bps Integrated Modem	600/1200 bps	300 bps	600/1200 bps
1200 bps Integrated Modem plus Acoustic Coupler	600 bps	300 bps	- - - - - - - - -
EIA/CCITT Interface	600/1200/2400 bps	200**/300 bps	600/1200 bps

*Not available on 3767 Model 3
**Non-USA only

Figure 1-4. Line Speeds

SDLC (Basic or Buffered) or Start-Stop, Point-to-Point

In this configuration the 3767 operates in half-duplex mode over the following facilities:

1. Common-carrier-leased (non-switched), private-line service (or an equivalent privately owned service), using an integrated modem or an EIA/CCITT interface with an IBM stand-alone modem (or an equivalent stand-alone modem).
2. Common-carrier switched telecommunications network, using an integrated modem and a DAA† (or an FCC approved equivalent), an integrated modem with an acoustic coupler, or an EIA/CCITT interface with an IBM stand-alone modem and a DAA† (or an FCC approved equivalent), or an equivalent stand-alone modem, or service.
3. Common-carrier-leased (non-switched), private-line digital service (or an equivalent privately owned service) providing an EIA/CCITT interface.

SDLC (Basic or Buffered) or Start-Stop Multipoint

In this configuration the 3767 operates in half-duplex mode over the following facilities:

Common-carrier leased (non-switched) private-line service, (or an equivalent privately owned service), using an integrated modem or an EIA/CCITT interface with an IBM stand-alone modem (or an equivalent stand-alone modem of another manufacturer). Common-carrier-leased (non-switched), private-line digital service (or an equivalent privately owned service) providing an EIA/CCITT interface.

Modems

The customer may consider the following modem configurations for his installation:

- Switched Network††—Integrated modem with DAA or acoustic coupler, or an EIA/CCITT interface for stand-alone modems
- Leased Line—Integrated modem or EIA/CCITT interface for stand-alone modems

Refer to "Chapter 3. Special Features" for more information.

Maintenance Aids

The 3767 is designed to allow fast analysis and repair of malfunctions by service personnel. It is packaged so that failing units can be readily adjusted or replaced. Indicators, printouts, automatic test procedures, online tests, and maintenance analysis procedures are provided to facilitate isolation of the problem or failing unit.

†DAA (Data Access Arrangement) is a protective interface device provided by the common carrier when non-carrier-provided modems are used on the switched telecommunications network.

††Operation over the switched network in most cases will be entirely satisfactory. However, there may be instances or locations where satisfactory data transmission cannot be achieved. The user should carefully consult with his communications supplier prior to the installation of lines and terminals.

Operator Test (Test Switch)

The operator can run the automatic test procedure by momentarily pressing the Test switch. This procedure tests the hardware of the terminal. It (with Problem Determination Procedures described in *IBM 3767 Communication Terminal Models 1, 2, and 3 Problem Determination Guide*) informs the operator, by means of indicators, alarms, and printouts, of the current status of the terminal.

Chapter 2. Operating Characteristics

Modes of Operation

The 3767 has two modes of operation:

Communicate (online)
Local (offline)

In communicate mode, the 3767 communicates with a 3704 or 3705 Communications Controller—or the Integrated Communications Adapter (ICA) in start-stop line control mode—of certain host systems, using one of the following line control methods:

Standard: SDLC

Optional
- 2741 start-stop*
- 2740-1 point-to-point, start-stop*
- 2740-1 station control, start-stop*
- 2740-2 start-stop

*Not available on Model 3.

Communicate Mode

The 3767, while it is in communicate mode, has the following operating characteristics.

Standby

The 3767 enters this state from a power-on reset, or when in neither transmit nor receive state. The 3767 has the following characteristics in the standby state:

- The keyboard is active, and the Proceed light is on.
- The 3767 will accept data entered from the keyboard or the communication line, whichever occurs first.
- The Cancel key is not active.
- The Attention and System Request keys are active.

Transmit

The 3767 enters this state, from the standby state, when the operator enters the first data byte into the buffer. Also, the 3767 enters this state from the receive state when the last (or only) message segment has been printed and the CPU has asked for a change in data flow direction. The 3767 has the following characteristics in the transmit state.

- The keyboard is normally active and the Proceed light is on. The keyboard goes inactive if all buffer segments contain data that is ready to be transmitted or data that is in the process of being transmitted.
- The Cancel, Attention and System Request keys are active.

Receive

The 3767 enters this state, from the standby state, when the first data byte of a message is received from the CPU. Also, the 3767 enters this state from the transmit state when the last (or only) message segment has been transmitted and the 3767 requests a change in data flow direction from the CPU. The 3767 has the following characteristics in the receive state:

- The keyboard is inactive (except for the Attention, Cancel, and System Request keys).
- The Proceed light is off.

Transmit Interrupt

While the terminal is in a transmit state, the CPU can interrupt the transmission and send a message to the 3767. When this occurs, the Proceed light goes off, the CPU Select light comes on (SDLC line control), the entered data is automatically cleared, and the terminal reverts to receive status.

The CPU can also signal the terminal operator by transmitting a bid request. This turns on the CPU Select light. The operator then has two choices, as follows:

1. He can continue entering the message, then press the EOM key to transmit the rest of the message, or
2. He can press the Cancel key, which clears the buffer and causes any part of the message that may have been transmitted previously to be discarded by the CPU.

Receive Interrupt

Under SDLC, the terminal operator wishes to transmit a message and the terminal is in the receive state, he presses the Cancel key. This interrupts the CPU. The 3767 ignores the rest of the message segment being transmitted by the CPU. The operator can also signal the CPU by pressing the Attention key.

Under 2741 start-stop line control, the operator can signal the CPU by pressing the Attention key.

Basic SDLC Transmit

The operator may enter up to 256 bytes before he starts transmission. If the operator has entered less than 129 bytes, additional bytes can be entered while transmission is in progress (after pressing the EOB or EOM key if specified by the CPU).

If the Auto switch is on, pressing the Return key or the Form Feed key also starts the transmission.

If the operator fills the second segment before the first segment's data has been transmitted, the Proceed light turns off (and the keyboard goes inactive) until all of the data in the first segment has been transmitted error free. If the data entered occupies more than one segment, it is transmitted as one message segment, and no overlapped transmission and keyboard entry is possible.

A buffer overflow condition occurs if the operator tries to enter more than 256 bytes before starting transmission. The Proceed light turns off, and a long audible tone sounds. This condition is reset by pressing the Reset, Buffer Return, Buffer Backspace, EOB, or EOM key. A short (250 ms) audible tone sounds when the print position is 10 positions from the right margin and when the buffer is equal to, or less than, 10 bytes from being full.

Buffered SDLC Transmit

The 512-byte buffer in the 3767-2 and 3767-3 (or the 3767-1 with the 512-byte Buffer Expansion feature) is divided into two 256-byte segments. The 1024-byte buffer (Buffer Expansion feature) is divided into four 256-byte segments. The operator may enter up to 512 or 1024 bytes before he starts transmission, if the Edit switch is on. Data can be entered while transmission is in progress, if one of the other buffer segments is empty when the EOB or EOM key is pressed (or the Return or Form Feed key, if the Auto switch is on). If the Edit switch is off, the entered data is automatically transmitted when a buffer segment is filled.

If all of the buffer segments contain data, the Proceed light turns off (and the keyboard goes inactive) until the data from at least one of the segments has been transmitted error-free. A buffer overflow condition occurs if the operator tries to enter more than 512 or 1024 data bytes before starting transmission. This condition must be reset, as has just been described under "Basic SDLC Transmit"; the Buffer Line Return key also performs this reset with buffered SDLC.

Basic or Buffered SDLC Receive

The 3767 can receive a message containing up to 256 data bytes per transmission. The received data is stored, starting at byte 1 of segment 1.

Message printing starts after a message segment has been received without an error. A response is transmitted immediately (with buffered SDLC) if at least one buffer segment is free or when the entire buffer is free (with basic SDLC).

A buffer segment is considered to be free if it is empty or if it has transferred its information to the printer.

Buffer Edit

Total text (buffer) edit, with the 3767 in communicate or local mode (with the Edit switch on), is standard on the 3767 Models 2 and 3, and is included in the Buffer with Edit special feature available for the 3767 Model 1. Single-line editing, with the 3767 in communicate mode and the Auto switch on, is standard on all models. Data that the operator wishes to edit before transmission must be entered while the 3767 is in communicate mode.

Current and Edit Pointers

These pointers are introduced here to explain the buffer editing operation. The current pointer points to the next available buffer position. The edit pointer keeps in step with the current pointer during data entry. However, the edit pointer may be decremented by the Buffer Return, the Buffer Line Return, or the Buffer Backspace key. It may then be incremented by data keys or by the Print Buffer, the Print Line, or the Print Character key until it reaches the current pointer. The data that is transmitted lies between the beginning of the buffer and the edit pointer.

The Buffer Return and Buffer Backspace keys are operative during single-line editing. All of the buffer edit keys are operative during total text edit.

Local Mode

The 3767 can be used as a keyboard-printer for secretarial typing. In addition, the following operations are possible:

- Total text edit—This feature is standard on the 3767-2 and 3767-3 and is included in the Buffer with Edit special feature for the 3767-1. It is operative when the 3767 is in local mode, with the Edit switch on, and allows an operator to verfy, cancel, and reenter data before it is printed. A total text edit may also be made when the 3767 is in communicate mode.
- Vertical format setting—Refer to "Vertical Forms Control" in "Chapter 3. Special Features."
- Offline calculation—Refer to "Calculate-Scientific" in "Chapter 3. Special Features."

Horizontal Formatting

Tabbing is the movement of the carrier to the right, when the Tab key is pressed or when the appropriate control characters are received from the CPU. The tab and left or right margins may be set at any point between print position 1 and 132.

The Tab key is operative when the terminal is in either communicate or local mode. The terminal must be in communicate mode for a tab operation to take place under CPU control.

When a tab operation is initiated, the carrier moves to the right until it encounters a tab stop. The tab and left or right margins may be set by the operator when the terminal is in local or communicate mode, or by the CPU when the terminal is in communicate mode under SDLC line control.

Terminal Identification and Addressing

Terminal ID

Each terminal has a permanent, unique, six-byte SDLC identification that it will transmit in response to a request for its ID when it is operating under SDLC. This identification is fixed at the time of manufacture and is not selectable.

Terminal ID is available with the 2741 Start-Stop Line Control feature. Upon receipt of a "Prefix +" code sequence, the terminal will automatically transmit a four character sequence following the normally transmitted circle D. This ID should be specified when the terminal is ordered, but it can be changed in the field.

SNA Terminal Address

The SNA terminal address (link station address) is a one-byte address that must be selected by the customer when the terminal is ordered. Any two hexadecimal characters may be selected for the byte address, with the exceptions of '00' and 'FF'. The SNA terminal address can be changed in the field.

Paper Roll Holder and Forms Guide with Paper Bail

The paper roll holder and forms guide is available for use with single-part paper rolls or with single-part fan-fold paper, when the Variable Width Forms Tractor is not used.

Roll paper specification:

Maximum paper width	15 inches (381 mm)
Maximum roll diameter	5.5 inches (139.7 mm)
Minimum spool inside diameter	0.40 inches (10.2 mm)
Paper weight	16-20 pounds (7.3-9.1 kg)
Basis	500 sheets, 17 x 22 inches (431.8 x 558.8 mm)

Fan-fold paper specification:

- Refer to *Form Design Reference Guide for Printers,* GA24-3488.

This feature is not available on the 3767 Model 3.

Chapter 3. Special Features

Start–Stop Features

2740-1 Point-to-Point Line Control *

This feature enables the user to communicate with the CPU by the 2740-1 point-to-point, start-stop line control. (See *IBM 2740 Communication Terminal Models 1 and 2 Component Description,* GA27-3403, for detailed 2740 line control information.)

The following 2740-1 functions are standard on the 3767 having this feature:

- Record checking
- Auto EOB

The Transmit Control special feature is not available on the 3767.

2740-1 Station Control Line Control *

This feature enables the user to communicate with the CPU by 2740-1 station control start-stop line control. (See *IBM 2740 Communication Terminal Models 1 and 2 Component Description,* GA24-3403, for detailed 2740 line control information.)

The following 2740-1 functions are standard on the 3767 having this feature:

- Record checking
- Auto EOB

Refer to Appendix B for the terminal and group address.

2740-2 Line Control

This feature enables the user to communicate with the CPU, under 2740-2 start-stop line control. (See *IBM 2740 Communication Terminal Models 1 and 2 Component Description,* GA24-3403, for detailed 2740 line control information.)

The following 2740-2 functions are standard on the 3767 having this feature:

- 2740-2 line control with Record Checking and Buffer Receive
- Buffer edit
- Address Responses

  The two-character response to the addressing from the host when the terminal is ready to receive data is:

  Space Ⓨ No error detected for last message received.

  U Ⓨ Line VRC error for last message received.

  The two-character response to the addressing from the host when the terminal is not in receive status is:

  1 Ⓝ Enter mode and communicate mode.

  2 Ⓝ Bid status.

  4 Ⓝ Buffer print and communicate mode.

  8 Ⓝ Local mode.

  9 Ⓝ Out of paper.

  Absense of a response may indicate to the host that there is no power on the terminal or external modem, that there is a terminal malfunction, or that there is an interruption of the communication link.

---

*Not available on Model 3

The other responses used by the 2740-2 but not mentioned above are not supported by the 3767.

The Header Control special feature is not available on the 3767. Refer to Appendix B for the terminal and group address.

2741 Line Control *

This feature enables the user to communicate with the CPU by 2741 start-stop line control. (See *IBM 2741 Communication Terminal Component Description,* GA24-3415, for detailed 2741 line control information.)

The following 2741 line control features are standard on the 3767:

Receive Interrupt
Transmit Interrupt
Print Inhibit
Terminal ID (Appendix B)

Unlike the 2741 operation, a vertical redundancy check is made on each received character.

1200 bps Integrated Modem

This IBM integrated modem enables a terminal to be attached to a private channel or to the public switched telecommunication network by a data access arrangement (DAA), an FCC-approved equivalent, or acoustic coupler.

The integrated modem permits half-duplex operation at line speeds of up to 1200 bps.

System Considerations (SDLC and start-stop line control)

1. For start-stop operation, when this modem is used on duplex (four-wire) communication facilities, the host should be configured in such a manner that the modem's carrier signal is not turned off (for example, the 370x start-stop sysgen option: DUPLEX = FULL). For SDLC operation, when this modem is used on a four-wire communications facility, DUPLEX = FULL should be specified in the 370x NCP generation. Continuous carrier signal is maintained only if a mult-multipoint line set is used (for example, a 10A line set); continuous carrier signal is not maintained if a half-duplex data line set is used (for example, an 8A line set).
2. When this modem is used on half-duplex (two-wire) communications facilities, the host must be configured in such a manner that the modem's carrier is not continuous but is dropped after each transmission (for example, 370x start-stop sysgen option: DUPLEX = HALF). If 2741 start-stop line control is used a Ⓒ should be sent at the end of the last Write command issued to the 3767 to drop carrier and to terminate the 3767's receive state. If a Ⓒ is not automatically sent, the host must be able to accept an interrupt from the 3767 following the last Write command issued to the 3767. Following this, a Ⓒ must be sent to the 3767.
3. In either half-duplex or duplex configurations, the 3767 always turns off carrier after completing its transmission. This may generate noise on the communication line. The host must be capable of ignoring any possible data errors that may be generated at this time.
4. This modem cannot be used on half duplex (two wire) multipoint networks or four-wire multipoint netwrks with half duplex bridging. Duplex (four-wire) facilities are required for multipoint networks, and continuous carrier must be provided at the hos for start-stop operation.

Note: These system considerations also apply to the 1200 bps integrated modem with interrupt.

*Not available on Model 3.

1200 bps Integrated Modem with Interrupt

This feature is available for the 3767-1 and -2. It is required only with 2741 start-stop line control, when it is used on a half duplex facility. It enables the user to interrupt incoming data by pressing the Attention key. It also enables the CPU to interrupt data being received from the 3767.

Modem Interfaces

The following text briefly describes the modem interfaces available for the 3767.

Data Access Arrangement (DAA)

This interface provides the physical connection between the integrated modem and the switched telecommunications network. A common-carrier-type CDT manual DAA (or an FCC-approved equivalent) may be used.

A data call using the CDT DAA is placed in the same way as placing a call with a conventional telephone set. Calls are made from the 3767, with the manual CDT DAA, to a CPU having either a manual CDT DAA or an auto answer feature and a CBS-type coupler.

Acoustic Coupler

This interface connects the 3767 to an ordinary telephone handset for operation over the switched telecommunications network. It is useful in applications requiring relocation of the terminal. The acoustic coupler is available for use only with an integrated modem.

The handsets of many telephones can be used with the acoustic coupler (novelty handsets are excluded). The following handsets or equivalent are only some of those with which the acoustic coupler can be used.

Automatic Electric:
Type 811 handset, used with the type 800 telephone set
Kellogg-ITT, Stromberg Carlson, Western Electric:
Type G handset, normally supplied with the type 500 telephone set

Under certain conditions acoustic coupling may be more susceptible to communications line impairments than other methods of attaching to the Switched Network. It is also important to eliminate loud, sharp noises near the Acoustic Coupler or tapping the table.

EIA/CCITT Interface

This interface provides the signals and signal conversions required for use with an EIA-type stand-alone modem or digital communications service. Some of the IBM stand-alone modems available for use with the 3767 are:

IBM 3976 Model 1
IBM 3976 Model 2
IBM 3976 Model 3
} World Trade only
IBM 3872 (1200/2400 bps, using SDLC)

Buffer with Edit (512 bytes)

This feature (standard on the 3767 Models 2 and 3) provides the 3767-1 with buffered SDLC capability. It also includes buffer editing, which allows the correcting and manipulating of buffer data before transmission.

Buffer with Edit (1024 bytes)

This feature, available as a special feature for the 3767, expands (to 1024 bytes) the buffer space available for buffered SDLC operation.

Alternate Character Set

This feature gives the customer a second character set. For example, the user whose main application is EBCDIC can also use APL. The selection is made by simply setting EBCDIC/APL switch to the APL position. Nomenclature is provided on a decal card. These decals may be removed from the card and attached to the front of the appropriate keys, or the operator may carry the card for easy reference. Additional cards may be ordered. Refer to Figure 3-1 for available primary and alternate character sets. Only one alternate character set per terminal may be specified.

		SDLC					Start-Stop					
		Graphics				Line Code	Graphics				Line Code	
Primary Char. Set (Keyboard)	Alternate Char. Set	Correspondence	EBCDIC	APL	Mono	EBCDIC	Correspondence	EBCD (note 1)	APL	Mono (note 1)	Correspondence	PTTC/EBCD
Correspondence		X				X	X				X	
	EBCDIC		X			X		X				X
	APL			X		X			X		X	
EBCDIC			X			X		X				X
	Correspondence	X				X	X				X	
	APL			X		X			X			X
	Mono I (note 2)				X	X				X		X
	Mono II (note 3)				X	X				X		X

Notes:
1. Subset of EBCDIC
2. Mono I: When lowercase alphabetic characters are entered from the keyboard, uppercase alphabetic characters are printed and sent out on the communication line. Uppercase and lowercase characters are printed as received.
3. Mono II: When lowercase alphabetic characters are entered from the keyboard, uppercase characters are printed, but lowercase alphabetic characters are sent out on the communication line. Lowercase characters received from the line are printed as the corresponding uppercase characters.

Figure 3-1. Primary and Alternate Character Sets

Vertical Forms Control (VFC)

This feature operates with SDLC line control only and enables the operator (in local or communicate mode) or the CPU (in communicate mode) to arrange the printed output in a desired vertical format.

With this feature, one page can contain up to 102 vertical tab positions. The operator and/or the CPU can perform vertical tab and form feed functions.

Variable Width Forms Tractor

With this feature installed (Figure 3-2), the customer can use pinfeed paper with hole-to-hole dimensions of from 3 to 14 1/2 in. (76.2 to 368.3 mm) and 15 in. (381 mm) overall. This feature must be installed with the Vertical Forms Control (VFC) feature, to ensure continuous-form registration.

Magnetic Stripe Reader

This magnetic stripe reader (Figure 3-2) reads information magnetically encoded on a stripe along the edge of a card, such as a credit card. It operates with SDLC line control only.

The following applications are representative of those that a customer may wish to implement:

- Operator identification
- Client account or transaction code
- Parameter information
- Reader information
- Master record

The magnetic stripe reader is cable-connected to the 3767. The reading mechanism and control logic receive their power from the 3767. Power is on in the reader whenever 3767 power is on and the cable is connected.

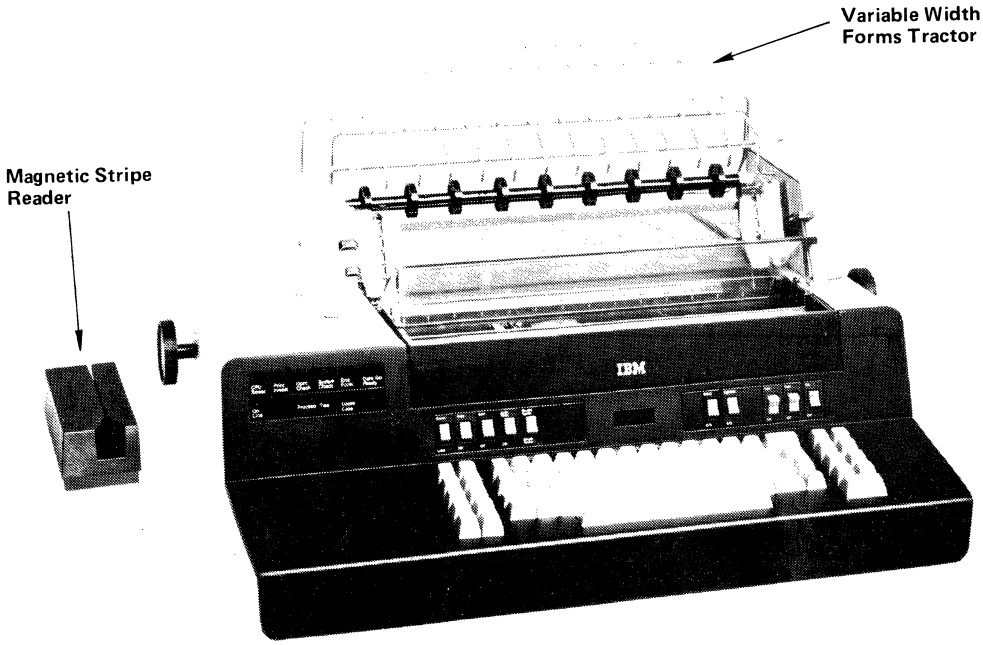


Figure 3-2. Magnetic Stripe Reader and Variable Width Forms Tractor

Using the Magnetic Stripe Reader

The reader is ready to read a magnetic stripe on a card when the 3767 Proceed light is on. Two types of data may be read.

1. An operator ID (Print Inhibit) to be transmitted to the host in the following ways:
   a. If operator ID is encoded on the magnetic stripe then the terminal will inhibit printing of card data.
   b. The CPU may request the terminal operator's ID and send a Print Inhibit code that inhibits the 3767 from printing the operator's ID. The Print Inhibit code also turns on the Print Inhibit light. Print Inhibit status is reset when the 3767 receives the Enable Print code from the CPU.
2. The Magnetic Stripe Reader may also be used as an extension of the keyboard for data entry (non-Print Inhibit).

Transmission Characteristics

The information read from the magnetic stripe card is tested for correct parity, LRC, Start of Message character, document insertion, and reading speed.

Magnetic Code

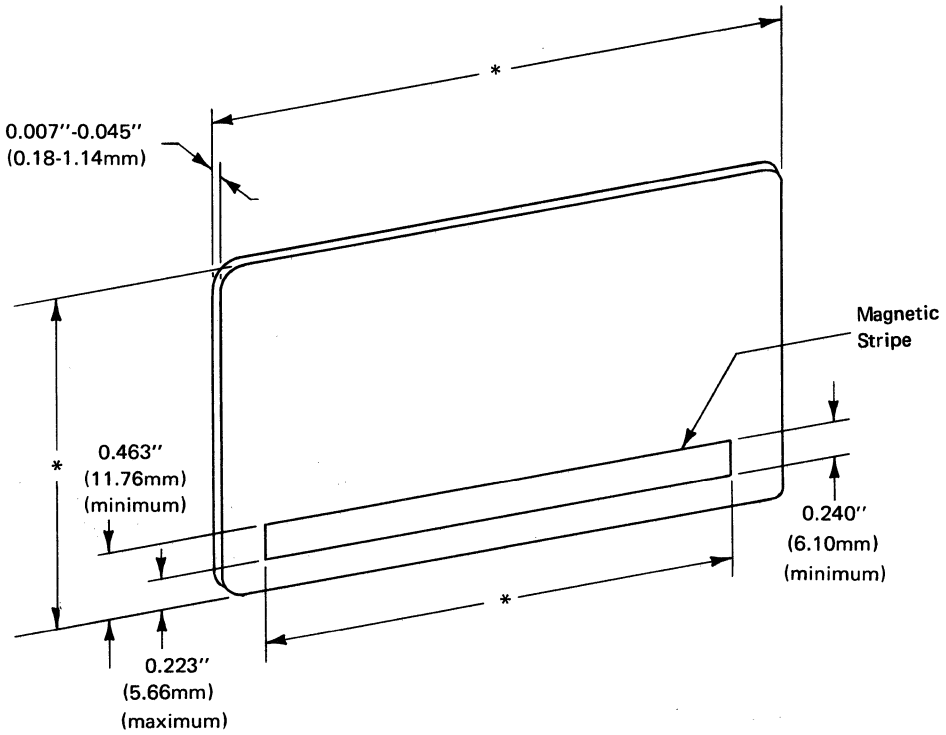
Data must be recorded using the ABA (American Bankers Association) 5-bit code, which is the 4-bit BCD subset with odd parity. The bit density for an ABA track is 75 bits per inch (25.4 mm), and data must be recorded using two-frequency coherent phase recording (F2F).

For details of coding techniques and guidelines, the user should refer to the ABA magnetic stripe credit card specifications.

Magnetic Stripe Card Specifications

The card may be made of card stock or plastic.

The laminated stripe may be of any practical length, but the magnetic track dimensions and the distance from the bottom edge of the card must be as specified in Figure 3-3.



*May be any reasonable dimension.

Figure 3-3. Magnetic Stripe Reader Card Specifications

ASCII

With the ASCII feature, the user can transmit ASCII data over an SDLC communication line using an ASCII keyboard.

An ASCII character consisting of 7 bits (B1 through B7) is transmitted as an 8-bit line code by inserting a 0 into the high order position (B8). See Figures A-3 and A-24 for ASCII keyboard and ASCII graphic characters respectively.

The following are the ASCII function codes.

Function	*ASCII*
IRS	1/14
CR	0/13
NL	1/4
LF	0/10
BS	0/8
FF	0/12
HT	0/9
VT	0/11
SHF	*
SVF	*
SSR	1/3 2/6
INP	1/2
ENP	1/1

* not supported

The ASCII feature and Alternate Character Set feature are mutually exclusive.

Calculate-Scientific

This feature is available with any standard keyboard set other than Katakana. With this feature installed, the terminal can be used as a desk calculator in local mode when the Calc switch is on. Certain keyboard keys change their function when the terminal is in offline calculate status (see Figure 3-4). Nomenclature is provided on a decal card. These decals may be removed from the card and attached to the front of the appropriate keys, or the operator may carry the card for easy reference. Additional cards may be ordered.

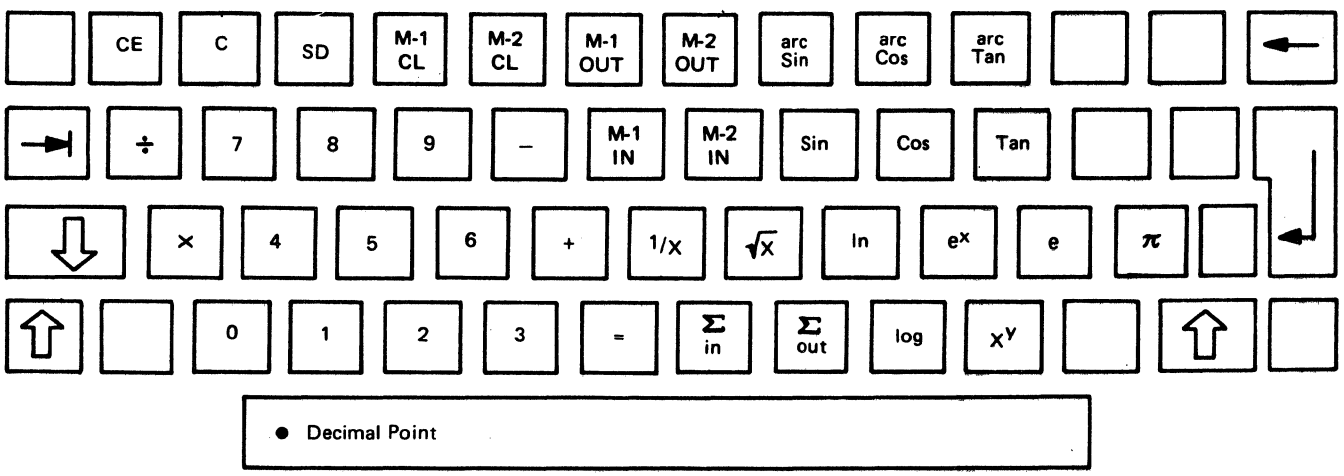


Figure 3-4. Key Arrangement for Calculate-Scientific Feature

Since the terminal is in local mode when it is being used as a desk calculator, calculation results cannot be automatically transmitted, nor can received data be automatically used as input for calculation.

Calculate Functions

The Calculate-Scientific special feature provides the following functions, with 16-digit precision:

addition	Log X	In X	Sin X
subtraction	Cos X	Tan X	Sin^{-1} X
multiplication	Cos^{-1} X	Tan^{-1} X	x^y
division	e^x	e	π
inversion			
square root			
mean/standard deviation			

Entering Calculate Status

The terminal must be in local mode for the Calculate switch to be effective. Place the terminal in local mode by setting the Local/Comm switch to the Local position. Then set the Calculate switch to the Calc position. See the *IBM 3767 Communication Terminal Operator's Guide.*

Offline Calculation Characteristics

The following text describes the characteristics of the terminal when it is used as a calculator.

Maximum and Minimum Values

The maximum absolute value the terminal can handle is a 16-digit number made up of all 9s:

9999999999999999.

The minimum absolute value is this 16-digit fraction:

.0000000000000001

Decimal Point Position

The user can set the decimal point at any of the 17 possible positions. Once set, this position should not be changed during the course of a particular problem.

If the user does not set the decimal point position at the start of offline calculations, the terminal assumes a "default" position for the decimal point. This "default" position provides for a 12-digit integer and a 4-digit fraction.

Sign

Both positive and negative numbers can be used in calculation. The range and precision of entries and answers are independent of the sign.

Error Conditions

If the operator makes an erroneous entry, the following error conditions can occur:

Multiple Pressing of the Decimal Key: When the user enters a number, the first decimal point entry determines the separation of integers and fractions. Any other decimal point entries for the same number are ignored.

Overflow: If a number is entered that has more positions in its integer portion than are allowed by the current decimal point position, the operation is stopped, the overflow is printed, and all registers except memory are cleared.

The operator must then press the Accumulator Clear key to resume calculations.

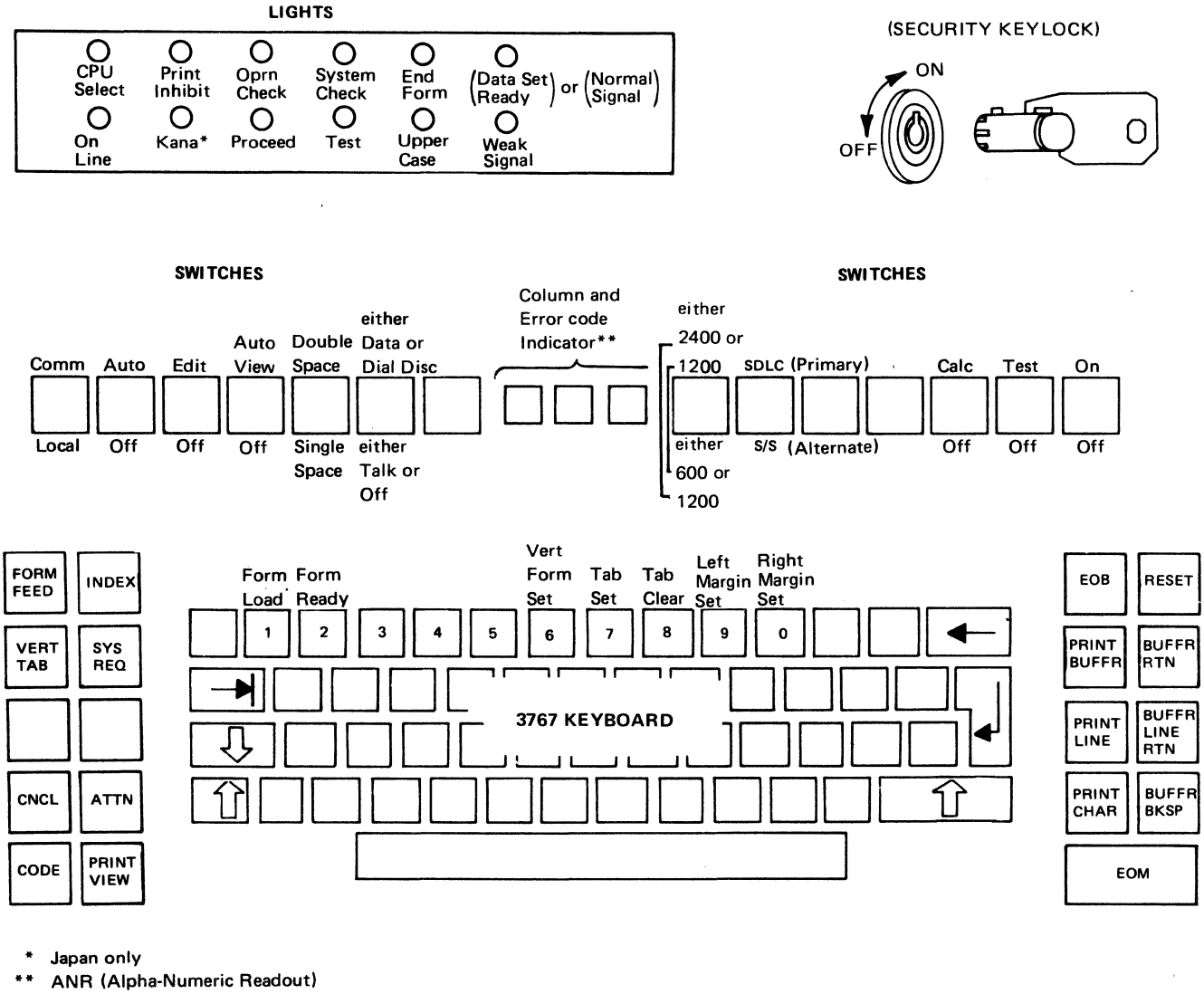
Underflow: If a number is entered that has more positions in its fraction part than are allowed by the current decimal point position, the excess digits are ignored. The operation may be completed, however, using the truncated fraction.

Security Keylock

This feature enables the user to prevent unauthorized use of the terminal. Each terminal has a unique key.

Chapter 4. Operating Controls

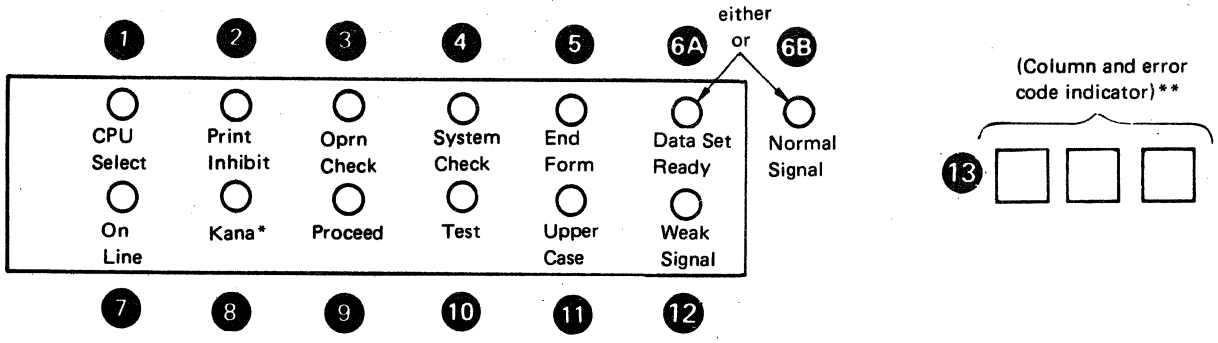
3767 Lights, Switches, Keys, and Security Keylock



* Japan only
** ANR (Alpha-Numeric Readout)

Figure 4-1. Overall View of 3767 Lights, Switches, and Keys

Lights



*Japan only
**ANR (Alpha-Numeric Readout)

Figure 4-2. Detail View of 3767 Lights

1 *CPU Select*

This light indicates the following conditions under the specified line control:

- SDLC—The CPU wishes to send a message to the terminal. The light turns off when the terminal starts to receive the message.
- 2740-1 with Station Control—The terminal was addressed by the CPU while the terminal was out of forms, or while in local mode, or in the bid state of communicate mode. The light turns off when any one of the following occurs:
  - Bid state is terminated by a CPU poll.
  - The terminal is switched from local to communicate mode.
  - Forms are inserted in the machine.
- 2740-2 Start-Stop *—The terminal was addressed by the CPU while the terminal was out of forms or was in the enter, bid, or buffer print state of communicate mode, or while it was in local mode. The light turns off when a positive answer is returned for addressing. This is accomplished when any one of the following occurs:
  - Forms are inserted in the machine.
  - Bid state is terminated by a CPU poll.
  - Buffer print state ends.
  - The terminal is switched from local to communicate mode.
  - Enter state is ended when the RESET key is pressed.

*This light serves the same purpose as the 2740-2 Attention light.

2 *Print Inhibit*

This light indicates that data entered from the keyboard or the magnetic stripe reader will not be printed. The light is turned on by a CPU message. Such a message includes the print inhibit code, to prevent printing. The light turns off when a message from the CPU enables printing. This light is also turned on when a magnetic stripe card encoded with an operator ID character is read.

3 *Oprn Check (Operation Check)*

This light indicates that an operational error has occurred. Operator intervention is required to correct the situation. The following conditions cause this light to turn on:

1. An error is detected while a magnetic stripe card is being read; the Proceed light remains on. Press the Reset key to turn the Operation Check light off, and reread the card.
2. An invalid character or value is detected during a vertical format setting operation; the Proceed light remains on. Press the Reset key and reenter the corrected parameters.
3. The following keyboard operation errors cause the Operation Check light to turn on:
   a. If the Backspace key is pressed when the column indicator shows "1".
   b. If any data key or the Space or the Tab key is pressed when the column indicator shows "133".
   c. If the Horizontal Tab key or the Vertical Tab key is pressed after the final tab stop setting has been passed.
   d. If the Index or the Return key is pressed when the form is at the bottom margin (if the VFC special feature is installed).
   e. If the Buffer Line Return or the Buffer Backspace key is pressed when the edit pointer is at the beginning of the buffer.
   f. If the Buffer Backspace key is pressed when the preceding character is the "New Line" (NL) or "Form Feed" (FF) character.
   g. If invalid function key combinations (Code key plus data keys) are pressed.
   h. If an attempt is made to edit or to print secure data in the buffer; secure data is data that is print-inhibited.
   i. If any inactive key is pressed when the SDLC/Start-Stop switch is in the S/S position.
   j. If the System Request key is pressed at a time when it would cause the data to be lost (SDLC only).

4 *System Check*

This light is turned on by three classes of error conditions:

1. Network errors
2. Line errors
3. Machine checks including printer and keyboard hardware errors.

An ANR error code display also occurs with each of these classes of errors. These error conditions are described in the following text.

Network Errors

The System Check light turns on when the terminal receives network error status sense information from the CPU, in response to the terminal's transmission. The light is turned off when the terminal receives a data message; it can also be turned off by the host. The CPU may transmit a message starting the restart procedure.

Line Errors

The following line errors, under the specified line control, turn on the System Check light:

Line Break (SDLC line control): The 3767 does not detect any SDLC flag pattern over the communication line in more than 20 seconds. The System Check light is turned off by receiving any flag pattern from the CPU.

VRC, no-stop bit, or buffer overflow (2741 line control): Any of these errors turn on the System Check light. An error graphic is also printed, in place of the character in error, for VRC and no-stop bit errors. The audible alarm sounds for approximately 60 seconds when a buffer overflow occurs. The System Check light and the audible alarm are turned off by pressing the RESET key.

VRC/LRC, no-stop bit, a Ⓝ received, or buffer overflow (2740-1 line control): Any of these errors turn on the System Check light. An error graphic is also printed if a Ⓝ is received. (The error graphic is printed in place of the character in error for VRC and no-stop bit errors.) The audible alarm sounds for approximately 60 seconds when a buffer overflow occurs. The System Check light and the audible alarm are turned off by pressing the RESET key. The EOM key will also turn off the light for Ⓝ

VRC/LRC, no-stop bit, buffer overflow, or Ⓒ received (2740-2 line control): Any of these errors turn on the System Check light. The audible alarm sounds for about one quarter of a second if a Ⓒ is received. The light is turned off by pressing the RESET key.

Machine Check

Hardware logic errors turn on the System Check light. To turn the light off under some conditions, a power-on reset is necessary. This is done by turning the Power On/Off switch off momentarily, then turning it on again. Under other conditions, only pressing the RESET key is necessary.

5 *End Form (End of Form)*

This light operates in conjunction with the End-of-Forms detector. When it is on, it indicates that the terminal has run out of forms. To turn off the light, the operator should:

Load the required forms (the light will go off) and then press the CODE key and the Form Ready key simultaneously.

Note: The End of Form light will not turn on when friction-feeding is used unless a paper bail is being used.

6A *Data Set Ready*

This light indicates that the data communications equipment on the non-switched communications line is operational.

6B *Normal Signal*

If you have a 3767 with an acoustic coupler, the Normal Signal indicator is located on the panel instead of Data Set Ready; in acoustic coupler operation, Normal Signal light on while in receive mode (Proceed light off) indicates that the receive signal level is high enough to operate.

7 *On Line*

Under SDLC line control, this light turns on to indicate that communication between the terminal and the CPU has been established; whereas under start-stop line control, the light turns on during transmit and receive operations.

The light turns off when:

1. The terminal is receiving or transmitting a message segment (under SDLC line control).
2. The Communicate/Local switch is set to the Local position.
3. The communication is terminated (under SDLC line control).

8 *Kana*

This light is available with the Katakana keyboard and is on when the keyboard is in either the Katakana or Kana symbol shift.

9 *Proceed*

This light indicates that the operator can enter data from the keyboard or from the magnetic stripe reader. The terminal may be in either communicate or local mode. In local mode under SDLC line control, the light is normally on except when a buffer full condition occurs during data entry. For detailed inforamation on communicate mode operation, refer to *IBM 3767 Communication Terminal Operator's Guide* (GA-18-2000), "Chapter 4, Operating the Terminal in Communicate Mode."

10 *Test*

This light indicates that the automatic test procedure is operating. An error-free test is indicated when the Test light goes off. A test error is indicated when the Test light is on and a combination of other lights remains on. The combination of lights that remain on depends upon the test error.

11 *Upper Case*

This light indicates that the keyboard is in uppercase.

12 *Weak Signal (Acoustic Coupler Feature)*

This light indicates that the communication signal being received via the acoustic coupler is weak. This condition indicates that re-dialing may be necessary.

15 *Three-Position Column and Error Code Indicator (ANR)*

This indicator normally shows the printer's next print position. Under error conditions (when the System Check light or the Test light is on), it shows the error code.

Switches

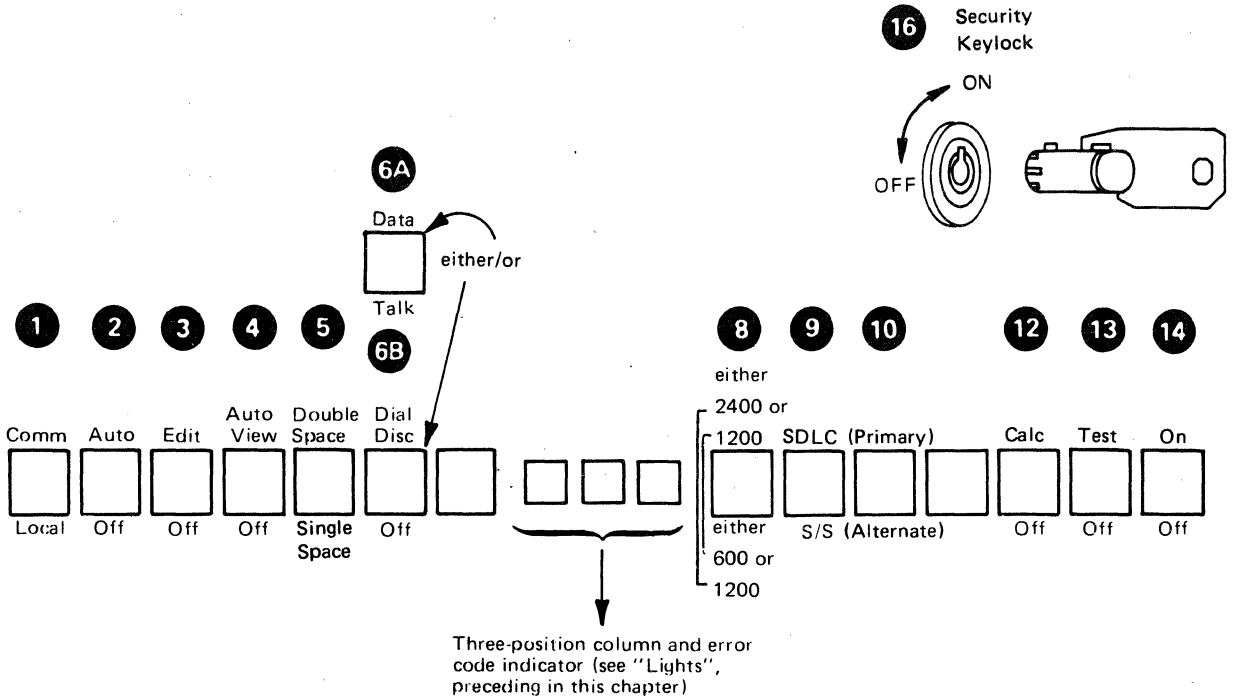


Figure 4-3. Detail View of 3767 Switches

1 *Comm/Local (Communicate/Local)*

This switch places the terminal in either local or communicate mode.

If the terminal has the Calculate-Scientific feature, the Calc switch must first be set to the Off position before the mode is changed from local to communicate.

2 *Auto*

With this switch in the Auto position, the 3767 has the following transmission characteristics in SDLC mode:

- A message containing up to one line of data can be entered from the keyboard.
- The Carrier Return key causes transmission of the buffer contents and the 'end of message' (EOM) signal, in addition to the 'new line' (NL) character.
- The Form Feed key causes transmission of the buffer contents and the 'end of message' (EOM) signal in addition to the 'Form Feed' (FF) character. This is true only if the Vertical Forms Control feature is installed.
- The operation of the EOB and EOM keys are the same as described later in this chapter, under "Keys."
- Single line editing can be performed.

With this switch in the Off position, the 3767 has the following transmission characteristics in SDLC mode:

- Multiple blocks of multiple-line messages can be entered from the keyboard.
- The operation of the EOB and EOM keys are the same as described later in this chapter, under "Keys."

This switch performs the same function as the Auto EOB switch when the 3767 is operating in start-stop mode under 2740-1 line control.

❸ *Edit (Buffer Feature)*

The Edit switch does the following according to the specified line control:

SDLC (Buffered)—This switch enables total text editing during a keyboard-to-printer operation when the terminal is in local mode. Buffered data that is edited when the 3767 is in local mode may be printed to obtain clean copy, but cannot be transmitted. In communicate mode, this switch suppresses automatic transmission of a message segment so that a full buffer segment can be edited before it is transmitted.
2740-2— This switch is not effective. All Buffer Edit Keys are active regardless of Edit switch position.

❹ *Auto View*

When this switch is set to Auto View, the print head moves to the right so that the entered characters are visible. In a key-in operation, the print head moves automatically eight characters to the right of the last character printed. In a receive operation, the print head moves eight characters to the right of the rightmost character among the last three lines at an end of message.

When this switch is set to Off, the print head stays on the last character printed during the key-in operation. The print head automatically moves eight characters to right of the last character printed during the receive operation.

Auto View does not function past print position 124. (See the Print View key.)

❺ *Double Space/Single Space*

This switch causes single (6 print lines per inch) or double (3 print lines per inch) line feed.

❻A *Data/Talk (Non-USA Only—Except Germany)*

This switch is used to disconnect the terminal from a switched network. Either this switch or the Dial Disc switch (described next) may be specified, but not both.

❻B *Dial Disc (Germany Only)*

This switch is a momentary-type (spring-loaded) switch. When it is momentarily set to the Dial Disc position, it causes the terminal to be disconnected from a switched network. Before this switch is operated, the communicating session must be terminated by either the CPU or the terminal.

❽ *Line Speed*

When provided, this switch must be set to the proper communications line speed for the the facilities you are using. Both the host and terminal speeds must be the same. The switch will select either 2400/1200 or 1200/600 bps, depending on your configuration. 1200/600 bps operation is for countries other than USA or Canada.

Note: This switch is provided when (1) an IBM 3872 Modem is attached, or (2) the Line Speed switch is specified (non-USA countries). It is *not* provided if an IBM Integrated Modem is attached.

❾ *SDLC/SS (Start-Stop Feature)*

This switch selects the line control desired, either SDLC or start-stop. It must be set to the desired line control before power is turned on, since it functions to change the line control only during the power-on sequence. After power is up, changing the switch setting has no effect on line control.

❿ *Primary/Alternate (Alternate Character Set Feature)*

This switch enables the user of a 3767 with the Alternate Character Set feature installed to change character sets by setting the switch to the desired position. A card is supplied which illustrates the alternate character set with decals. These decals may be removed from the card and attached to the front of the appropriate keys.

12 *Calculation (Calculate-Scientific Feature)*

This switch is operative when the terminal is in local mode. When it is set to the Calc position, the terminal can be used as a desk calculator.

13 *Test*

This switch is a momentary-type switch and is operative at any time. When it is momentarily set to the Test position, it cause all lights except the Upper Case, Data Set Ready, Weak Signal, and End Form lights to come on, and when it is released, it causes the terminal's automatic test procedure to test the terminal. When the test has been completed, the terminal returns to the same condition as after a power-on reset. This switch should normally be used when the 3767 is in local mode, to avoid possible communication interference.

Note: Paper must be inserted before running this test because printing will occur.

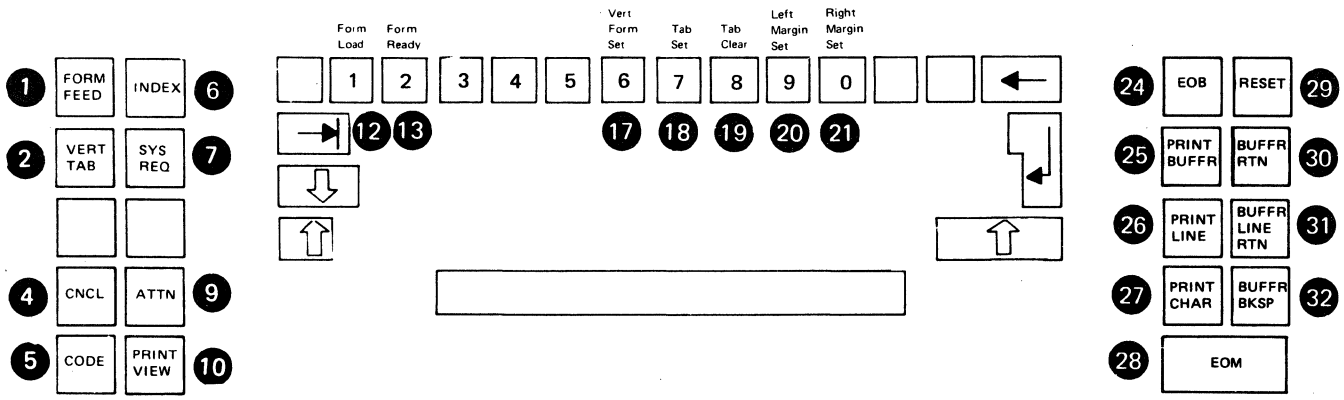
14 *On/Off (Power)*

This switch, when turned on, supplies power to the 3767; it also initiates a power-on reset. After power is turned on, there is a 12 second delay (while terminal self-testing occurs) before the terminal becomes operable. Power is turned off at the terminal when this switch is set to the Off position.

16 *Security Keylock (Special Feature)*

This key-switch, when not turned on, prevents unauthorized use of the terminal. Each terminal has a unique key.

Keys



Print Control Keys
Return (↵)
Space (▭)
Backspace (←)
INDEX
Tab (→|)
FORM FEED
Vertical Tab (VERT TAB)
PRINT VIEW

Communication Control Keys
Return (↵)
FORM FEED
End of Block (EOB)
End of Message (EOM)
Attention (ATTN)
Cancel (CNCL)
System Request (SYS REQ)

Reset Key
RESET

Keyboard Control Keys
Shift (⇧)
Lock (⇩)

Combination Function Key
Press the CODE key and one of the following keys:
- Form Load
- Form Ready
- Vertical Form Set
- Tab Set
- Tab Clear
- Left Margin Set
- Right Margin Set

Buffer Editing Keys
- Print Buffer (PRINT BUFFR)
- Print a Line (PRINT LINE)
- Print a Character (PRINT CHAR)
- Buffer Return (BUFFR RTN)
- Buffer Backspace (BUFFR BKSP)
- Buffer Line Return (BUFFR LINE RTN)

Typamatic Keys
Press and hold to repeat the function:
- Print a Character (PRINT CHAR)
- Space (▭)
- Backspace (←)
- Underscore (_) } Other than United Kingdom and Katakana keyboards
- Hyphen (–)
- Tab (→|) } Katakana keyboard only.
- Return (↵)

Figure 4-4. Detail View of 3767 Keys

❶ *FORM FEED (VFC Feature)*

This key, when pressed, causes the paper to advance to the left margin of the first print line of the next page. It also transmits the form feed code, if the terminal is in transmit status. In SDLC mode with the Auto switch on, this key also performs the function of the EOM key.

❷ *VERT TAB (Vertical Tab)(VFC Feature)*

This key, when pressed, causes the paper to advance to the next vertical tab stop position. It also transmits the vertical tab (VT) code, if the terminal is in transmit status. The print column position does not change. If no vertical tab stop positions are defined, a line feed occurs, and the VT code is transmitted. If this key is pressed when the form is past the last vertical tab stop position, the Operation Check light comes on.

❹ *CNCL (Cancel)*

This key, when pressed, does the following, accoding to the specified line control:

- SDLC—While the terminal is in the receive state, stops the printing and transmits an error response to the CPU; while the terminal is in the transmit state, clears the buffer and causes the CPU to discard previously transmitted message segments.
- 2740-2—During enter operations, clears the buffer.

❺ *CODE*

This key is used in conjunction with certain other data keys. These data keys have their code function printed on the terminal case just above the key, as follows:

Form Load	Tab Set
Form Ready	Tab Clear
Vert Form Set	Left Margin Set
	Right Margin Set

To activate these data key code functions, press the desired data key while pressing the CODE key. Refer to the descriptions of these Keys, following in this chapter.

❻ *INDEX*

This key, when pressed, causes the form to advance one line and also causes the Line Feed (LF) code to be generated. When the VFC feature is installed, if this key is pressed when the form is positioned at the bottom margin, the form does not advance, and the Operation Check light comes on. When pressed during a calculate operation, this key causes a new line function.

❼ *SYS REQ(System Request)*

This key, when pressed, does the following, according to the specified line control that is being used:

- SDLC—Causes the terminal, through predefined procedures, to communicate with the CPU for various services, such as initiating communications and terminating communications.
- 2740-1 Point-to-Point*—Causes the terminal, when it is in standby status, to transmit an 'end of address' signal; the terminal then shifts to transmit status.
- 2740-1 Station Control*—Places the terminal in bid status. An audible tone sounds, and the Proceed light comes on when the terminal is polled.
- 2740-2*—Turns off the Proceed light and causes the buffer contents to be transmitted when the terminal is polled. After completing the transmission, the terminal enters standby status.

*The function of this key is the same as that of the Bid key on the 2740 terminals.

9 *ATTN (Attention)*

This key, when pressed, does the following, according to the specified line control:

- SDLC—Causes special attention information to be transmitted to the CPU, regardless of the terminal's state. The use of this information depends upon the user's application.
- 2740-2—Provides the same function as the 2740-2 Enter key.
- 2741—Causes an 'end-of-transmission' signal (when the terminal is in transmit status) or an 'interrupt' signal (when the terminal is in receive status) to be transmitted.

10 *PRINT VIEW*

This key, when pressed while the Auto View switch is set to Auto View, causes the print head to move eight characters to the right of the rightmost character among the last three lines so that the printed characters are visible. When the Auto View switch is set to Off, the first depression of this key causes the print head to move eight characters to the right of the last character printed. The second depression of this key causes the print head to move eight characters to the right of the rightmost character among the last three lines. Print View does not function past print position 124. The print head returns to the correc printing position when a character key is pressed. (See also the discussion of the Auto Vie switch.)

Additional functions of the Print View key for the following operations are:

- 2740-1 with Station Control—Pressing the Print View key resets a 15-second time-out period and causes a shift character to be transmitted.
- 2740-2—Pressing the Print View key resets a 15-second time-out period. No shift characters are inserted into the buffer.

12 *Form Load*

This key must be used in conjunction with the CODE key. When the CODE and Form Load keys are pressed simultaneously, the print head moves to the left so that a new form can be loaded. To increase ribbon life, these keys should be pressed before power is turne off.

13 *Form Ready*

This key must be used in conjunction with the CODE key. When the CODE and Form Ready keys are pressed simultaneously, the print head moves to the position it occupied before the Form Load key was pressed.

17 *Vertical Form Set (VFC Feature)*

This key must be used in conjunction with the CODE key, to provide the vertical format function. This function is available only with the VFC feature.

When the CODE and Vertical Form Set keys are pressed simultaneously, the terminal enters vertical format setting status. The page size (total number of print lines), VFC vertical tab positions, and the bottom margin may then be specified.

18 *Tab Set*

This key must be used with the CODE key. When the CODE and Tab Set keys are pressed simultaneously, a horizontal tab stop is set at the current position indicated by the column indicator.

19 *Tab Clear*

This key must be used with the CODE key. When the CODE and Tab Clear keys are pressed simultaneously, the horizontal tab stop at the current position indicated by the column indicator is cleared.

20 *Left Margin Set*

This key must be used with the CODE key. When the CODE and Left Margin Set keys are pressed simultaneously, the left margin is set at the current position indicated by the column indicator. This automatically clears any previous setting of the left margin.

21 *Right Margin Set*

This key must be used with the CODE key. When the CODE and Right Margin Set keys are pressed simultaneously, the right margin is set at the current position indicated by the column indicator. This automatically clears any previous setting of the right margin. During receiving or keying operations the print head is not stopped by the right margin.

24 *EOB (End of Block)*

This key, when pressed, does the following, under the specified mode:

- SDLC—Transmits all buffered data and an EOB signal. The operator can continue to key in data as long as the Proceed light is on.
- 2740-1—Transmits an 'end of message block' signal to the CPU, which causes the CPU to check the message block. The operator can key in more data after receiving a positive acknowledgment from the CPU to the previously transmitted data.
- 2740-2—This key is not active.

25 *PRINT BUFFR (Print Buffer) (Buffer Feature)*

This key, when pressed, causes the contents of the buffer between the edit pointer and the current pointer, to be printed. If this key is pressed immediately after the Buffer Return key is pressed, the entire buffer, up to the current pointer, will be printed.

26 *PRINT LINE (Buffer Feature)*

This key, when pressed, causes the contents of the buffer between the edit pointer and the next NL or FF code character to be printed. If the edit and current pointers are on the same line, the printout will stop at the location of the current pointer.

27 *PRINT CHAR (Print Character) (Buffer Feature)*

This key, when pressed, causes the buffer character at the edit pointer's position to be printed. This key is a typamatic (repeating) key.

28 *EOM (End of Message)*

This key, when pressed, does the following, according to the specified line control:

- SDLC—Causes all buffered data and End of Message information to be transmitted to the CPU. The keyboard condition (locked or unlocked) is specified by the CPU at the beginning of communications. For example, a keyboard condition might be specified as:
  - Permitting continuous entry of data from the keyboard, as long as no error or exception condition is detected
  - Permitting additional entry of data from the keyboard when a positive acknowledgment has been received for the previous message segment
  - Remaining locked after receiving a message from the CPU.
- 2740-1—Performs the same functions as the EOT key; informing the CPU that the terminal has completed transmitting. The terminal then enters standby status, and the keyboard is locked.

29 *RESET*

This key, when pressed, does the following, according to the specified line control:

- SDLC and Start-Stop—Turns off the Operation Check light if it is on. And may turn off the system check light.
- 2740-1/2—Performs the same functions as the RST key on the 2740-1 and the RESET key on the 2740-2 but does not clear the buffer during enter operations on the 2740-2 (see Cancel key).
- 2741—Resets error conditions detected while the terminal is receiving data.

30 *BUFFR RTN (Buffer Return)*

This key, when pressed, causes the edit pointer to point to the first position of the buffer. It also causes the printer to start a new line.

31 *BUFFR LINE RTN (Buffer Line Return)(Buffer Feature)*

This key, when pressed, causes the following to occur:

- The edit pointer points to the first position of the current line.
- A new print line is started.

Each additional pressing of this key causes the edit pointer to go back by one line. The Operation Check light comes on if the operator attempts to go back past the beginning of the buffer. The light goes off if the RESET key, any data key, or one of the print keys is pressed.

32 *BUFFR BKSP (Buffer Backspace)*

This key, when pressed, causes the following to occur:

- The edit pointer decrements by one position.
- The print position decrements by one position.

If the operator backspaces over an NL or FF code or past the beginning of the buffer, the Operation Check light comes on. The light goes off if the RESET key, any data key, or any buffer key is pressed.

Chapter 5. International Considerations

Consideration has been given to the unique requirements of countries throughout the world, as described in the following text.

Power Supply

Power supplies for the 3767 are available to match the following power sources:

100 Vac 110/112.5 Vac 123.5 Vac 220 Vac 235/240 Vac	50 Hz
100 Vac 115 Vac 220 Vac	60 Hz

Keyboard and Printer Requirements

The following keyboard nomenclature is available:

- APL (USA)*
- APL (non-USA)*
- ASCII (USA)
- Correspondence (USA)
- EBCDIC
  - Austria/Germany
  - Belgium
  - Brazil
  - Denmark
  - Finland
  - France
  - International (except USA)
  - Italy
  - Japan
  - Norway
  - Portugal
  - Spain
  - Spanish-Speaking
  - Sweden
  - United Kingdom
  - USA
- Katakana
- Mono I (USA)**
- Mono II (USA)**

*Decals only (alternate character set)

**For keyboard layout, use EBCDIC USA.

Refer to Appendix A for illustrations of these keyboards.

Chapter 6. Programming Considerations–SNA/SDLC Communications

This chapter gives information on how to write applications programs that use the 3767 with SNA/SDLC (System Network Architecture/Synchronous Data Link Control). The programmer should understand the concept and applications of the IBM System/370 in a teleprocessing environment and be familiar with SNA and SDLC. (For more information on SNA and SDLC, see *System Network Architecture General Information,* GA27-3102, and *IBM Synchronous Data Link Control General Information,* GA27-3093). He should also be familiar with the 3704/3705 Communications Controllers, Network Control Program, Telecommunications Access Method programs, and the application programs.

Introduction to 3767 SNA

SNA Network Overview

The 3767 SNA network consists of the following components:

- System/370 host processor
- VS Operating System (OS/VS1, OS/VS2, or DOS/VS)
- VTAM or TCAM through VTAM
- 3704 or 3705 Communications Controller with the Network Control Program (NCP)
- Synchronous Data Link Control (SDLC)
- 3767 Communications Terminal

Refer to Figure 6-1 for an example of a 3767 SNA network with VTAM and NCP.

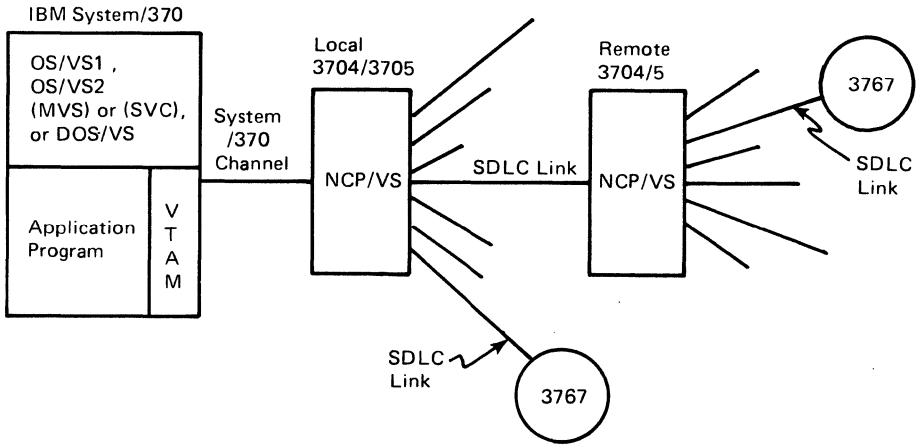


Figure 6-1. Example of an SNA Network with VTAM and NCP

VTAM (Virtual Telecommunications Access Method)

VTAM directs the transmission of data between the host application program and the 3767. It controls all of the network components and allocates their use to meet the needs of the application programs and the 3767, as follows:

- Connects, disconnects, and controls access between the application programs and the 3767
- Controls data transfer between the application programs and the 3767
- Allocates the 3767 and other terminals in the network for use by the application programs.

TCAM through VTAM

When a queued control is required, TCAM (Telecommunications Access Method) can be used as an intermediary between the applications programs and VTAM. TCAM provides general control over transaction activity; for example, data directed to an inactive 3767 can be held in queue until the 3767 is activated.

3704/3705 Communications Controllers

In the 3767 SNA environment, VTAM allocates much of the network management responsibility to the 3704/3705 Communications Controller. In addition to the locally attached communications controller, the network may also have remote communications controllers (see Figure 6-1).

The Network Control Program (NCP/VS) in the 3704/3705 Communications Controllers routes data through the network and furnishes such communications management services as line control, insertion and deletion of line control information, dynamic buffering of data, and recovery from transmission or line errors.

Synchronous Data Link Control (SDLC)

SDLC is a line control discipline used for SNA, designed for efficient control between communicating elements of the network. SDLC features inherent data transparency; therefore, it can convey any eight-bit character code, as well as noncoded information, without restrictions. SDLC accommodates both duplex and half-duplex operations.

3767 SNA/SDLC Characteristics

The 3767 SNA terminal can be characterized by the following SNA architectural parameters.

- Physical Unit (Type 1): All 3767 terminals support 'FID3' transmission and request/response headers (TH and RH). The headers consist of five bytes (TH=2 bytes, RH=3 bytes) as shown in the *3705 Program Reference Handbook,* GY30-3012.
- Logical Unit (Type 1): There is only one logical unit in the 3767 SNA.
- Function Management (Profile 3)
- Transmission Services (Profile 3)
- SCS (SNA Character Strings) used in an SSCP-LU session

From these characteristics, VTAM determines the type of control information required by the terminal. The format identifier (FID) used between VTAM and a communication controller is always FID1, and the format identifier between a communication controller and a 3767 is always FID3, for a 3767 operating under SDLC.

The 3767 can communicate in SNA mode, with the following physical configurations:

1. Half Duplex-Data Switched (Dial-in only)
2. Half Duplex-Data Nonswitched (Point-to-Point, Multipoint)
3. Duplex-Data Nonswitched (Multipoint)
4. Locally attached

SDLC Commands and Responses

The 3767 supports the following SDLC commands and responses:

Command	*Response*
I-format	I-format
RR	RR
RNR	RNR
TEST	TEST
XID	XID
SNRM	NSA
DISC	ROL
	CMDR

An explanation of TEST and XID follow. For information on the remaining commands, see *IBM Synchronous Data Link Control General Information,* GA27-3093.

TEST Command

When the 3767 receives a TEST command, with the poll bit on, it sends back a TEST response and any data that was present in the TEST command. Up to 31 bytes in an information field can be sent with the TEST command. If the data is longer than 31 bytes, only the TEST response is returned.

XID Command

When the 3767 receives the XID command, it responds with an XID response having six bytes of data. The data is as follows:

Bits	*Data*
0-15	X'0100'
16-27	X'007' (block number)
28-47	Unique station ID: bits 28-30 are zero bit 31 is: zero for machines with a serial number below 30000, and one for machines with a serial number of 30000 or above bits 32-47 are set by jumper wires on the 3767.

3767 SNA Protocols

The 3767 is a secondary logical unit (SLU). The 3767 physical unit (PU) services are provided by the Network Control Program in the communications controller. The primary logical unit (PLU) is the host application program. The application program is a PLU, and it communicates with the network via VTAM macros; for example, Send/Receive.

Before the 3767 and the application program can begin communicating, certain protocol requirements must be met:

Note: ACTPU and DACTPU requests must be sent by the host to establish and terminate the SSCP-PU session. These requests are handled by the Network Control Program in the communication controller.

1. An SSCP-SLU session must be established. The SSCP issues an activate logical unit (ACTLU) request to the 3767. This establishes the SSCP-SLU session and turns on the 3767 On Line light. The light remains on until a deactivate logical unit (DACTLU) request is received by the 3767.

2. A PLU-SLU session must be established. This session is established when a BIND request is issued to the 3767. Subsequent to the BIND request, a Start Data Traffic request is issued to the 3767 to allow the start of message traffic.

After all messages have been exchanged, the sessions are terminated and the UNBIND request is sent to the 3767 to terminate the PLU-SLU session. The SSCP-SLU session is terminated when the DACTLU request is sent to the 3767.

The following paragraphs explain the major SNA protocols used between the application program and the 3767 (PLU-SLU session).

Data Chaining

In some cases, it is desirable to send or receive a group of related requests through the network as a single entity. In SNA, this is done by data chaining. A data chain begins with a first-in-chain request. This first-in-chain request may be followed by one or more middle-in-chain requests, and the chain ends with a last-in-chain request.

A chain may consist of only one request unit. In this case, the request is called an only-in-chain request.

The different elements of the chain are identified by flags in the request header (RH) as shown in Figure 6-2.

RH Byte 0 Bits 6 and 7	Element of Chain	To Set the Element from the 3767
B'10'	First-in-Chain (FIC)	Press the EOB key at the end of the message when no other elements of the chain have been previously sent.
B'00'	Middle-in-Chain (MIC)	Press the EOB key at the end of the message after one or more elements of the chain have already been sent.
B'01'	Last-in-Chain (LIC)	Press the EOM key at the end of the message after one or more elements of the chain have already been sent.
B'11'	Only-in-Chain (OIC)	Press the EOM key at the end of the message when no other elements of the chain have been previously sent.
Note: When the Auto/Off switch is in the Auto position, the Return/Form Feed key performs the same function as the EOM key in addition to the print control function.		

Figure 6-2. Request Header Chaining Flags

The following rules apply to 3767 data chaining:

- The maximum length of the elements in a chain is 256 bytes.
- If the 3767 receives a Cancel command while it is receiving a multiple-element chain, it discards all previously received elements of the chain.
- If the 3767 receives a negative response to an element in a chain (FIC or MIC), the 3767 sends a Cancel command.
- If the 3767 sends a negative response to an element in a chain, it purges all further elements until it encounters a last-in-chain element or a Cancel command.
- The change direction indicator must be used in flip/flop mode. The 3767 sets the change direction indicator on for last-in-chain or only-in-chain elements, when it is operating in flip/flop mode.

Chaining Response Modes

A response convention is used to assure the sender that the request unit was received and that it is acceptable to the receiver.

The following two chaining response modes are supported by the 3767. (See the **BIND** control function request to determine the chaining response mode.)

1). Exception Response Mode: All elements of a chain carry definite response bit(s) (RH byte 1, bit 0 and/or 2) and the exception response bit (RH byte 1, bit 3) which asks the receiver to send a negative response only when an error is found in the chain. If an error is found in the chain, then RH byte 1, bits 0 and/or 2 and 3 (error bit) are set on in the negative response.

2). Definite Response Mode: The last-in-chain element (or only-in-chain element) does not carry the exception response bit. In this mode, the receiver always responds with either a positive response or a negative response. If an error is found in the chain, then RH byte 1, bits 0 and/or 2 and 3 are set on in the negative response. For a positive response RH byte 1, bit 0 and/or 2 are set on.

The selection of response modes should be made based on the type of applications. The exception response mode may improve the overall performance and the definite response mode confirms transmission of each individual message.

HDX-Contention and HDX-Flip/Flop Protocols

The 3767 buffer has a capacity of 256, 512, or 1024 bytes, depending upon the model and the features specified. This buffer is allocated to either keyboard input operations or printer output operations. While the operator is keying data, the host cannot send data to the 3767; or while the host is sending data to be accepted, the keyboard is locked. The 3767 has the following basic operational states: STBY (standby), RCV (receive), DR WAIT (definite response wait), and SEND'. The transition from one to another of these states is made according to the transaction modes specified in the BIND request. These states are defined as follows:

- SEND: The buffer and the printer are allocated for an inbound operation. The keyboard is normally unlocked, and the Proceed light is on.
- RCV: The buffer and the printer are allocated for an outbound operation. Outbound data requests will be accepted. The keyboard is locked except for the ATTN, CNCL, and SYS REQ keys. The Proceed light is off.
- DR WAIT: The buffer is not allocated to any particular operation. Only the receipt of a positive or negative response causes a transition from this state. The keyboard is locked except for the ATTN and SYS REQ keys. The Proceed light is off. Outbound data requests are rejected and the chain is purged.
- STBY: The buffer and printer are not allocated. The keyboard is normally unlocked, and the Proceed light is on. The buffer and printer can accept either inbound or outbound data, whichever comes first. When the data is being received, the terminal goes into the RCV state.

There are two half-duplex protocols supported by the 3767 in the in-bracket (INB) state. (Refer to "Bracket Protocol", following, for a description of the in-bracket state.) They are HDX-contention and HDX-flip/flop protocols, respectively. The 3767 is in STBY state when it is "between brackets", when using either HDX contention protocol or HDX-flip/flop protocols.

HDX Contention Mode

The 3767 goes into STBY state at the end of every chain, either inbound or outbound. In this state, the operator and the host are in contention for the 3767 buffer. Thus, when there is contention, the 3767 is available for either an input or an output operation.

Since keyboard entry is possible while a message response from the host is pending, using contention mode should be examined in view of operator procedures.

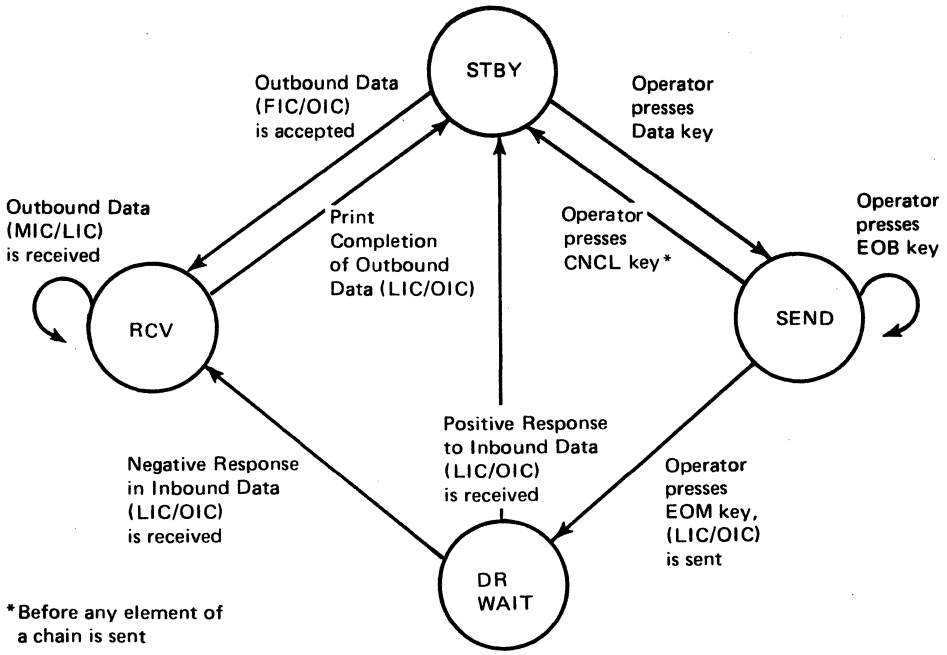


Figure 6-3. State Transition Diagram for HDX-Contention and Definite Response Mode with Brackets

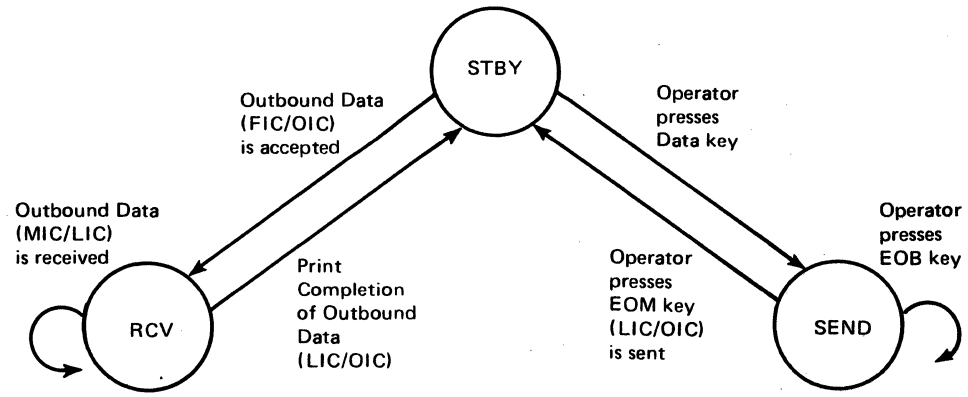


Figure 6-4. State Transition Diagram for HDX-Contention and Exception Response Mode within Brackets

As shown in Figure 6-3 and 6-4, after the processing of LIC or OIC in the RCV state, the 3767 goes into the STBY state. After the operator presses the EOM key, the data in the buffer is transmitted to the application program, and the terminal goes into the STBY state. From the STBY state, the 3767 goes to the SEND state when the operator presses any data key, or it goes to the RCV state, upon receipt of the outbound data.

HDX-Flip/Flop Mode

There is no STBY state in this mode. The flow can change direction (flip/flop) at the end of any chain by setting the change direction indicator (CD) in the RH (RH byte 2, bit 2). The 3767 sets the CD bit when the EOM key is pressed at the end of the messages.

The conceptual state diagram for the flip/flop transaction mode is shown in Figures 6-5 and 6-6. Figures 6-3 through 6-6 show the transitions between states of HDX-contention or HDX-flip/flop protocol.

When messages are predominantly inbound, such as in data entry applications, the HDX-contention protocol eliminates unnecessary line turnarounds. When the message flow in both directions approaches a conversational mode between the 3767 and the host, the HDX-flip/flop protocol may be more suitable.

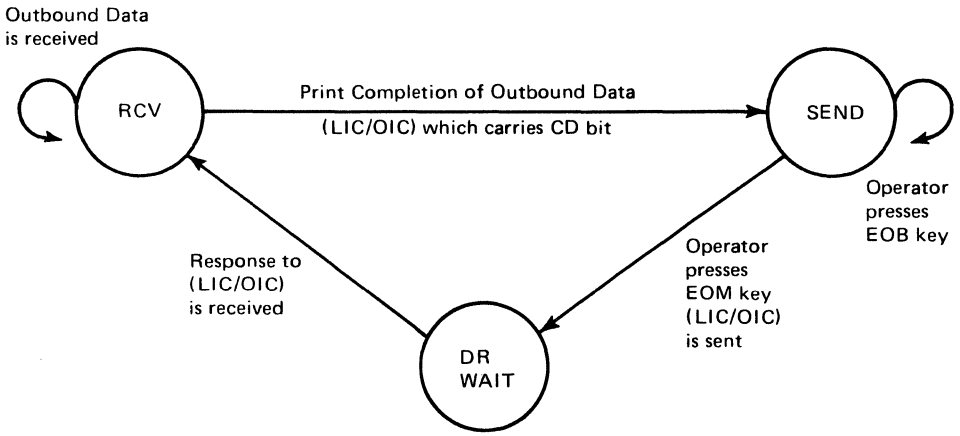


Figure 6-5. State Transition Diagram for HDX-Flip/Flop and Definite Response Mode within Brackets

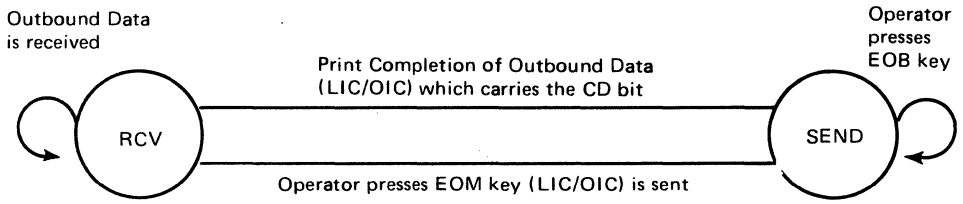


Figure 6-6. State Transition Diagram for HDX-Flip/Flop and Exception Response Mode within Brackets

Bracket Protocol

SNA bracket protocol is used by the 3767 to resolve contention between the host application program and the 3767. Brackets are used to prevent a series of requests of chains called a conversation, from being interrupted.

A conversation begins with a begin bracket and ends with an end bracket. These brackets are identified by flags in the request header (RH):

RH byte 2, bits 0 and 1

- B'1x' - Begin Bracket (BB) - Identifies the first request of a conversation
- B'x1' - End Bracket (EB) - Identifies the first request in the last chain of a conversation

A request header may indicate both a begin bracket and an end bracket. This is called a single chain bracket, and it indicates that it is the first request of the only chain in the conversation.

The 3767 is the first speaker. The first speaker either begins a conversation with a bracket or gives permission to the application program to begin a bracket. The host application program requests permission to begin a bracket by sending a BID request to the 3767.

The 3767 gives permission to the host application program by returning a positive response to the BID request. The application program then begins the conversation with a begin bracket request.

The host application program can also request permission to begin a bracket by sending a begin bracket request to the 3767. If the 3767 accepts the begin bracket, it returns a positive response. Otherwise, it returns a negative response to the host application program, and the begin bracket request is ignored.

Note: If the host requests permission to begin brackets by sending a begin bracket request, a definite response must be requested from the 3767. The 3767 rejects a begin bracket request on an only-in-chain (OIC) or last-in-chain (LIC) request with the exception response requested.

The 3767 has three bracket states:

Between Brackets (BETB)—No conversation is taking place.

1. All outbound data requests without a BB from the host are rejected.
2. An outbound data request with a BB is accepted.
3. A BID control function request is accepted, and the 3767 goes to the BBP (begin bracket pending) state. The CPU Select light is turned on, and the keyboard is locked.
4. The terminal is in the STBY state in the HDX-protocol.

Begin Bracket Pending (BBP) – The 3767 has given permission to the application program to begin a bracket, by previously sending a positive response to a BID request.

1. The keyboard is locked, and the CPU Select light is on.
2. An outbound data request with a BB is accepted.
3. Other data requests are rejected.
4. A BID control function request receives a positive response.

In Bracket (INB)—A conversation is taking place.

1. All outbound data requests with a BB are rejected.
2. An outbound data request without a BB is accepted.
3. Upon receiving an outbound data request with an EB:
   a. The 3767 goes to BETB when
      (1) the data request is processed without any error, or
      (2) the data request is processed with an error and the request asks for an exception response bit, or
      (3) the data request carries both BB and EB bits, regardless of the error conditions.
   b. The 3767 stays in INB when the data request is processed with an error, and the request asks for a definite response.
4. The 3767 stays in the INB state for inbound/outbound data requests that have neither BB nor an EB.

Figure 6-7 shows 3767 bracket management decisions for accepting or rejecting bracket requests. Figure 6-8 shows examples of request/response sequences using bracket protocol.

		Bracket State	
		BETB and BBP	INB
REQUEST UNIT	Not Begin Bracket Not End Bracket	Reject	Accept
	Begin Bracket Not End Bracket	Accept	Reject
	Not Begin Bracket End Bracket	Reject	Accept
	Begin Bracket End Bracket	Accept	Reject
	Bid	Accept	Reject

Figure 6-7. Bracket Request Accept/Reject Table

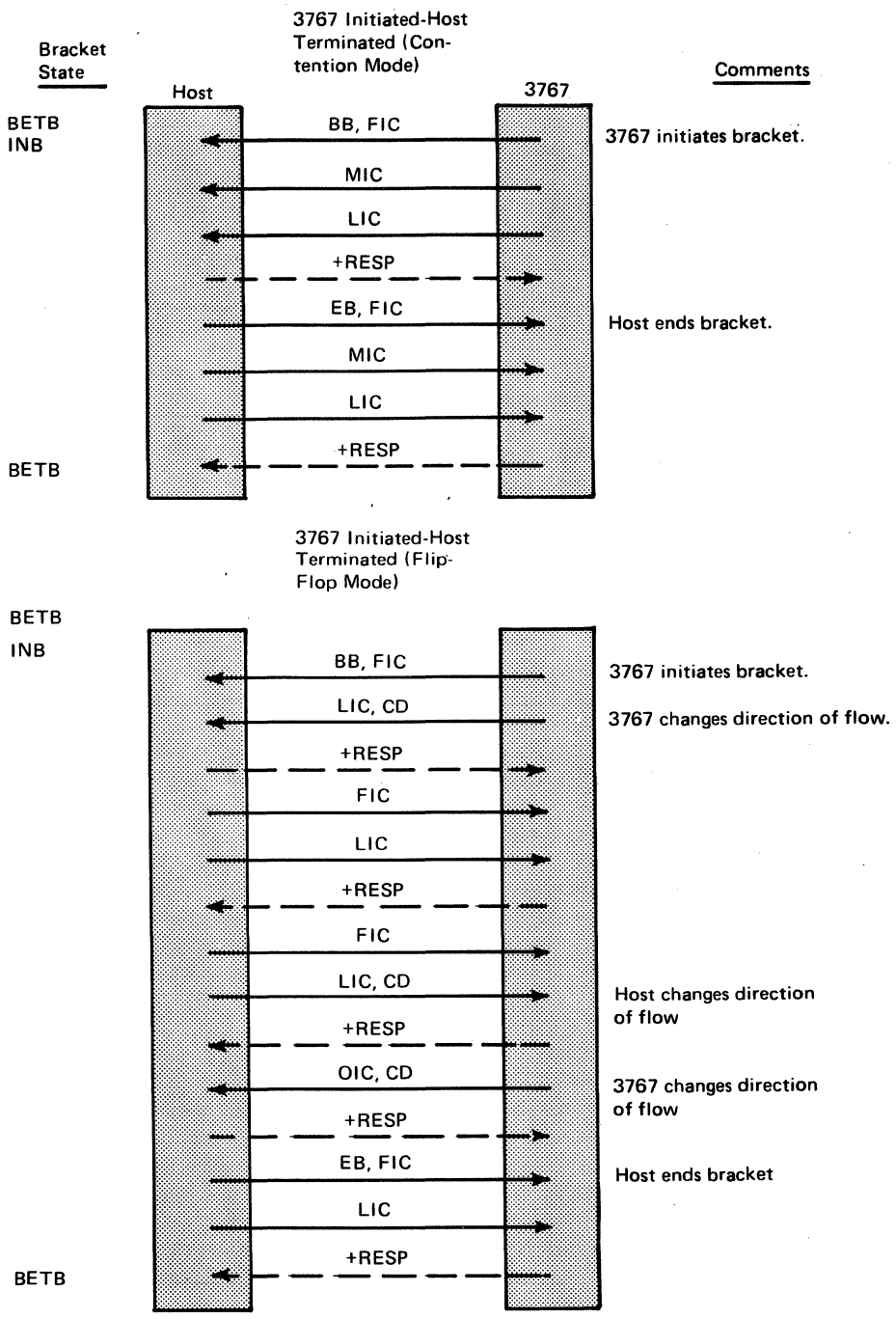
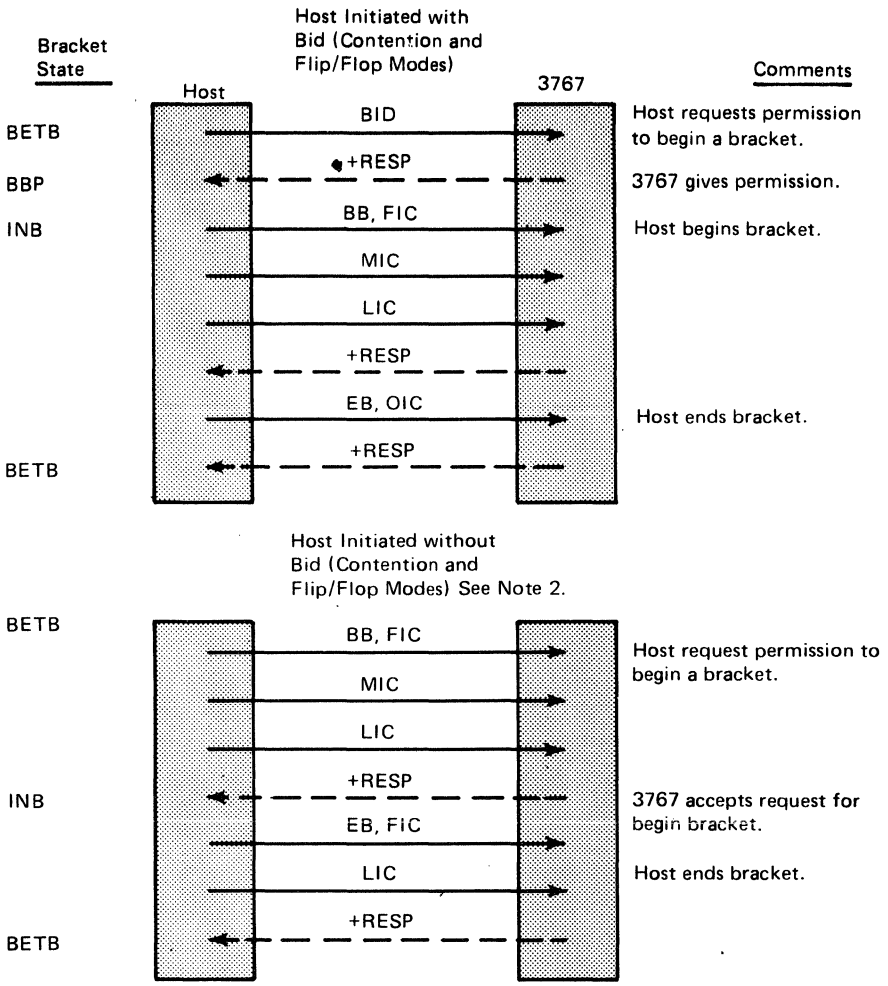


Figure 6-8. (Part 1 of 2). Examples of Bracket Protocol



LEGEND			
BB	Begin Bracket	INB	In Bracket
BBP	Begin Bracket Pending	LIC	Last-in-Chain
BETB	Between Bracket	OIC	Only-in-Chain
CD	Change Direction	MIC	Middle-in-Chain
EB	End Bracket	RESP	Response
FIC	First-in-Chain		

Note 1: These examples are shown with a definite response. If an exception response is used, a response would be required only when the message is in error or unacceptable.

Note 2: If the host requests permission to begin brackets by sending a begin bracket request, a definite response must be requested from the 3767. The 3767 rejects a begin bracket request on an only-in-chain (OIC) or last-in-chain (LIC) request with the exception response requested.

Figure 6-8 (Part 2 of 2). Example of Bracket Protocol

3767 SNA Control Functions

Figure 6-9 gives a list of the SNA control function requests that are supported by the 3767.

CONTROL FUNCTION	TO 3767	FROM 3767
Session Control		
ACTLU	Yes	No
ACTPU*	No	No
DACTLU	Yes	No
DACTPU*	No	No
BIND	Yes	No
UNBIND	Yes	No
SDT	Yes	No
CLEAR	Yes	No
Data Flow Control		
CANCEL	Yes	Yes
SIGNAL	Yes	Yes
BID	Yes	No
CHASE	Yes	No
SHUTD	Yes	No
SHUTC	No	Yes
LUSTAT	No	Yes
*These are processed by the NCP.		

Figure 6-9. 3767 SNA Control Functions Supported

ACTLU

The ACTLU (activate logical unit) request is sent by the SSCP to establish a SSCP-SLU session between the SSCP and the LU of the 3767. After the 3767 receives the ACTLU request, the 3767 turns on the On Line light and all pending conditions are cleared. The pending conditions cleared are buffer contents, bracket state, positive response pending, pacing pending, chaining state, and the error status associated with SNA. The 3767 then returns a positive response. The keyboard is locked until the SYS REQ key is pressed for the LOGON or LOGOFF procedure.

DACTLU

The DACTLU (deactivate logical unit) request is sent by the SSCP to terminate the SSCP-SLU session between the SSCP and the LU of the 3767. After the 3767 receives the DACTLU request, the 3767 turns off the On Line light and all pending conditions are cleared (as for the ACTLU request) the 3767 then returns a positive response. All data keys and function keys associated with SNA are locked until an ACTLU request has been received.

BIND

The BIND (bind session) request is sent from the host to the 3767 to establish a session between the logical units (PLU-SLU). For example, the VTAM application program issues the OPNDST macro to initiate the BIND request. After it receives the BIND request, the 3767 locks the keyboard and clears all pending conditions (as it does for the ACTLU request). The 3767 then returns a positive response. (See "BIND Parameters for the 3767", following, for further details.)

UNBIND

The UNBIND (unbind session) request is sent from the host to terminate the session between the logical units. For example, the VTAM application program issues the CLSDST macro instruction to initiate the UNBIND request. After it receives the UNBIND request, the 3767 locks the keyboard, clears all pending conditions (as it does for the ACTLU) and returns a positive response.

SDT

The SDT (Start Data Traffic) command unlocks the keyboard and turns on the Proceed light. The 3767 then returns a positive response. This should be used only to complete a data traffic recovery or an initialization sequence. For example, the VTAM application program issues an OPNDST or SEND CONTROL=SDT macro to initiate the SDT.

CLEAR

The Clear command clears outstanding requests and responses in the network. After it receives the Clear command, the 3767 stops printing, locks the keyboard, clears the buffers, and clears all other pending conditions (as it does for the ACTLU request), and sends a positive response. For the 3767, the sequence number is reset to zero by the NCP.

CANCEL

The Cancel command aborts a partially sent chain of data messages. When the 3767 receives a Cancel command, it discards a partially received chain and returns a positive response. The 3767 sends a Cancel command when the CNCL key is pressed or when the 3767 receives a negative response to a first-in-chain or middle-in-chain.

SIGNAL

The Signal command is sent by the 3767 when the ATTN key is pressed. When a Signal command is received by the 3767, the keyboard is locked, the CPU Select light is turned on, and a positive response is sent. If the 3767 was in the Send state, all buffer contents are sent with a change direction indication.

BID

The BID command indicates that the host wishes to begin brackets. The 3767 gives a positive response to a BID and turns on the CPU Select light only when it is in the between-brackets state. The CPU Select light is turned off when the Data request with BB (begin brackets) is received. If the 3767 receives a BID command when it is in the in-bracket state, it returns a negative response. The 3767 turns on the CPU Select light whenever a BID command is received.

CHASE

The Chase command causes the 3767 to process all previously received requests, return the appropriate responses, and then return a positive response to the Chase command.

SHUTD

The SHUTD (Shutdown) request causes the 3767 to terminate all operations at the end of the current bracket, to send a SHUTC request and to remain in the same state until an UNBIND request is received. When the SHUTD request is received, the CPU Select light is turned on and a positive response is sent.

SHUTC

The SHUTC (Shutdown Complete) request is sent by the 3767, in reply to a SHUTD request, to indicate that it is ready to receive the UNBIND request. If a SHUTD request is received when the 3767 is in the between-brackets state, the 3767 sends a SHUTC request immediately after the response to the SHUTD request is returned. If a SHUTD request is received when the 3767 is in the in-bracket state, the 3767 sends a SHUTC

request after the current bracket is terminated. When the UNBIND request is received, the CPU Select light goes off.

LUSTAT

The LUSTAT (Logical Unit Status) request is sent by the 3767 under certain conditions, after it rejects a message from the host with a X'081B' (receiver in transmit mode) error. It is issued as a notification to the host that the host application program may retransmit the previously rejected message because the 3767 buffer can now be allocated to that message.

Examples are:

1. If the 3767 operator keys-in data when the terminal is in the STBY state (the 3767 is now in the SEND state) and presses the CNCL key before the EOB or EOM key is pressed (the 3767 now goes to the STBY state), and if the host message is rejected during this keying period, the LUSTAT is sent to the host.
2. If the 3767 operator does a LOGOFF procedure or a vertical tab setting procedure in STBY state and the host message is rejected during this operation, then, after the operator finishes the operation, LUSTAT is sent and the terminal returns to the STBY state.

BIND Parameters for the 3767

The following BIND request parameters must be specified when the host issues a BIND request to a 3767 terminal. The BIND request format must equal 0, and the BIND request type must equal 1 for the 3767, or the BIND request is rejected. A summary of BIND request parameters is shown in Figure 6-10.

For more information on the BIND request, and for the format of the IBM-supplied BIND request parameter, see the *VTAM Macro Language Reference* manual, GC27-6995.

Function Management (FM) Profile

The function management profile for the 3767 must be defined as FM Profile 3, or the 3767 rejects the BIND request.

Transmission Services (TS) Profile

The transmission services profile for the 3767 must be defined as TS Profile 3, or the 3767 rejects the BIND request.

Primary Logical Unit Protocol Request Mode

The primary (host application) request mode selection must specify immediate request mode or delayed request mode.

Chain Response

Any one of the following three chaining response modes can be specified:

1. Exception response
2. Definite response
3. Both exception and definite response.

In both exception and definite response modes the primary station may send a chain asking for a definite response or an exception response. The chain response protocol must not specify "no response mode", or the 3767 rejects the BIND request.

BYTE	BIT	CHECKED BY 3767	VALUE	MEANING
0	All	Yes	X'31'	BIND code
1	0-3	Yes	B'0000'	BIND format=0
	4-7	Yes	B'0001'	BIND type=1
2	All	Yes	X'03'	Function management profile=3
3	All	Yes	X'03'	Transmission subsystem profile=3
4				Primary protocols
	0	No	B'1'	Multiple request chains
	1	No	B'0'	Request mode
	2-3	Yes	Not B'00'	Chain response
			B'01'	Exception response
			B'10'	Definite response
			B'11'	Both responses
	4-5	No	DC	Not used
	6	Yes	B'0'	Compression not used
	7	Yes	B'1'	End bracket sent
5				Secondary protocols
	0	Yes	B'1'	Multiple request chains
	1	No	B'0'	Request mode
	2-3	Yes	Not B'00'	Chain response
			B'01'	Exception response
			B'10'	Definite response
			B'11'	Default to exception response
	4-5	No	B'0'	Not used
	6	Yes	B'0'	Compression not used
	7	Yes	B'0'	End bracket not sent
		Yes	B'1'	End bracket sent
6				Common protocols
	0	No		Not used
	1	Yes	B'0'	FM header not used
	2	Yes	B'1'	Brackets used
	3	Yes	B'1'	Bracket termination rule 1
	4	Yes	B'0'	EBCDIC
			B'1'	ASCII
	5-7	No	B'0'	Not used
7				Common protocols
	0-1	Yes	B'01'	Contention mode
			B'10'	Flip-flop mode
	2	Yes	B'0'	Primary LU recovery responsibility
	3	Yes	B'0'	First speaker is secondary
	4-7	No	B'0'	Not used

Figure 6-10. Summary of BIND Parameters

Compression

Compression must not be specified or the 3767 rejects the BIND request.

End Bracket Sent

End bracket sent must be specified or the 3767 rejects the BIND request.

Secondary Logical Unit Protocol

The following protocols for chain request mode or bracket mode must be specified for the 3767 as a secondary logical unit.

Chaining Mode

The secondary (3767) chaining selection must specify that multiple request unit chains be used or the 3767 rejects the BIND request.

Request Mode

The secondary (3767) request mode selection must specify immediate request mode or delayed request mode.

Chaining Response: Any one of three types of responses may be selected for chaining with the BIND request:

1. Exception response: If the BIND request to the 3767 specifies an exception response, the 3767 asks only for exception responses to request units sent to the host.
2. Definite response: If the BIND request to the 3767 specifies a definite response, the 3767 requests a definite response on the last-in-chain (LIC) or only-in-chain (OIC) request unit. For all other request units sent to the host, the 3767 requests only the exception response.
3. Both exception and definite responses: If both responses are specified in the BIND request, the 3767 assumes (defaults to) the exception response protocol. It should not specify "no response mode".

End Bracket (EB)

If the BIND request allows the 3767 to send the end-of-bracket indicator, the 3767 always sends an inbound chain with both BB and EB bits on (a single chain bracket). Thus a conversation, when it is initiated by the 3767, consists of a chain. The 3767 does not terminate a host-initiated bracket. If the BIND request does not permit the 3767 to send the end-of-bracket indicator, the 3767 does not terminate any brackets. If HDX-FF is specified and the EB bit is 1, then BIND will be rejected.

Compression

Compression must not be specified or the 3767 rejects the BIND request.

Common Protocols

The following protocols, common to both logical units, must be observed when the host issues a BIND request.

FM Header Usage

No FM Header is allowed.

Bracket Protocol

The 3767 Logical Unit requires that the bracket protocol be specified.

Bracket Termination Rule 1

Bracket termination rule 1 is used, as follows:

1. For a single chain bracket or exception response chain with EB, the end-of-bracket indicator causes unconditional termination of the bracket.
2. For all other sequences, the EB indicator causes conditional termination of the bracket.

Data Transmission Code

If the alternate code is specified in the BIND request, the 3767 is prepared to use either EBCDIC or ASCII code for data transmission. If the alternate code is not specified, the 3767 assumes that EBCDIC is used for data transmission. If the alternate code is specified in the BIND request, but if ASCII is not available in the 3767, the BIND request is rejected.

Function Management Transaction Mode

The 3767 may operate either in HDX-flip/flop mode or HDX-contention mode, on a per-session basis. If both modes, or neither, are specified, the BIND request is rejected.

Recovery Responsibility

The 3767 requires that the primary logical unit (the host application program) be responsible for error recovery.

First Speaker in Brackets

The 3767 requires that the BIND request specify the secondary logical unit (the 3767) as the first speaker for bracket protocol, or the BIND request is rejected. To resolve a contention situation when the host and the 3767 simultaneously issue a begin bracket (BB) request, the host must accept the 3767 BB request. The 3767 may reject a BB request unit from the host.

3767 Sense Codes

When the 3767 detects an exceptional condition, it sets the error response bit (RH byte 1, bit 3) and sense included bit (RH byte 0, bit 5) on in the response header. The error response contains four bytes of sense code.

The first byte is the major code; the second, the modifier; and the last two bytes are not set. See Figure 6-11 for the sense bytes and their meaning. For additional information, see the *VTAM Macro Language Reference* manual, GC27-6995.

MAJOR CODE Hex	MAJOR CODE Meaning	MODIFIER CODE Hex	MODIFIER CODE Meaning	CONDITIONS
80	Path error	05*	No Session	a. A request other than ACTLU was received from SSCP, before ACTLU or after DACTLU was received. b. A request other than BIND was received from PLU, before BIND or after UNBIND was received, while LU was active
		07	Segmenting error	a. The mapping field of transmission header was '10' (first segment). '01' (last segment) and '00' (middle segment) are discarded.
		09*	LU not active	a. A request not from SSCP was received before ACTLU or after DACTLU was received.
20	State error	02	Chaining	a. There was an error in the sequence of the chain indicator settings, such as: first, middle, first.
		03	Bracket	a. FM data without begin bracket indicator setting was received during between bracket state or begin bracket pending state. b. Chase or Cancel, with an end bracket indicator setting, was received during begin bracket pending state.
10	Request error	02	RU length error	a. The length of the received RU exceeded 256 bytes.
		03	Function not supported	a. A session control request or a data flow control request not supported by the 3767 was received. (Refer to Figure 6-9.) b. A network control request was received.

Figure 6-11. Sense Bytes (Part 1 of 2)

MAJOR CODE Hex	Meaning	MODIFIER CODE Hex	Meaning	CONDITIONS
				c. SCS control function not supported by the 3767 was received. (Refer to Figure 6-12.) d. A Set Vertical Format code was received by a 3767 without the Vertical Format Control feature. e. A request, with the code selection indicator set to alternate, was received by a 3767 without an ASCII keyboard. f. An SCS graphic character not supported by the 3767 was received. (Refer to Figures A-22 through A-44 for the valid graphic character codes.)
		05	Parameter	a. For SHF: o The maximum print position is greater than 132. o The left margin is greater than the maximum print position. o The right margin is greater than the maximum print position or less than the left margin. o The tab stop is less than the left margin or greater than the right margin. b. For SVF: o The maximum print line is greater than 102. o The top margin is greater than the maximum print line. o The bottom margin is greater than the maximum print line or less than the top margin. o The tab stop is less than the top margin or greater than the bottom margin.
08	Request reject	02	Intervention required	a. An end of form condition was detected.
		11	Break	a. CNCL key was pressed while a message from the host was being printed.
		13	Bracket bid reject	a. No RTR (ready-to-receive) was forthcoming. BID or begin bracket was received during the bracket state.
		1B	Receiver in transmit mode	a. A normal flow request was received while the 3767 was in the send state or the definite response wait state. b.* A normal flow request from the PLU was received while the 3767 was sending to, or receiving from, the SSCP. c.* A request from SSCP was received while the 3767 was in other than the between bracket standby state.
		1C	Request not executable	a. A permanent printer error was detected.
		21	Invalid session parameters	a. A parameter setting in the BIND request was unacceptable by the 3767. (Refer to Figure 6-10.)

* Only for machines with a serial number of 30000 or above.

Figure 6-11. Sense Bytes (Part 2 of 2)

Note that the 3767 expects a "New Line" code to be transmitted from the host at the beginning of recovery procedures after a "Break" caused by pressing the CNCL key is transmitted from the 3767.

3767 SNA Character Strings

Figure 6-12 gives the SNA character string (SCS) format control functions used by the IBM 3767 Communication Terminal. A detailed discussion of each format control function follows.

Control Function	Code Hex	Code ASCII	To 3767	From 3767	3767 Key
Set Horizontal Format	2BC1	N/A	Y	N	
Set Vertical Format	2BC2	N/A	Y*	N	
Horizontal Tab	05	0/9	Y	Y	TAB
Vertical Tab	0B	0/11	Y*	Y*	VERT TAB
Line Feed	25	0/10	Y	Y	INDEX
Form Feed	0C	0/12	Y*	Y*	FORM FEED
Record Separator	1E	1/14	Y	Y*	
New Line	15	1/4	Y	Y	RETURN
Carriage Return	0D	0/13	Y	N	
Backspace	16	0/8	Y	Y	BACKSPACE
Inhibit Print	24	1/2	Y	N	
Enable Print	14	1/1	Y	N	
Secure String Reader	0450	1/32/6	N	Y*	
*Optional Feature					

Figure 6-12. SNA Character String Format Control Functions

Set Horizontal Format (SHF)

This function sets the horizontal formatting controls: maximum print position, left margin, right margin, and horizontal tab stops. The one-byte value following the SHF code is a binary count of the parameters that follow the SHF code (including the count parameter itself). The next three one-byte values are parameters that define the maximum print position (MPP), the left margin (LM), and the right margin (RM), respectively.

The one-byte binary tab-stop column values start in the fifth byte following the SHF code. When only the SHF code and count parameter (with a value of 1) are specified, all horizontal formatting controls are set to their default values. If specific parameters are not specified, or if they have a value of zero, the default values for these parameters are used. The following sequences (and only these) are valid:

```
SHF count
SHF count  MPP
SHF count  MPP  LM
SHF count  MPP  LM  RM
SHF count  MPP  LM  RM  T1 . . . Tn
```

The first data printed after the SHF function uses the new horizontal forms control.

Note: SHF is only a formatting function and does not physically move the print head. Because the printer starts printing where it left off after the previous printing operation, it is recommended that you send a new line (NL) code before sending any print data. This will ensure that the printer is positioned at the left margin you specified in the SHF function.

Maximum Print Position Parameter (MPP)

This one-byte binary value (Default=132) specifies the maximum print position, as follows:

- If the value is greater than zero and less than, or equal to 132, the maximum print position is set to that value.
- If the value is zero, the maximum print position is set to 132.
- If the value is greater than 132, an error response (with sense data included) is sent, and the processing of the request unit (RU) is terminated. All horizontal format controls take on their default values, following the error detection.

The maximum print position is used as follows:

Output Data to the 3767: If an attempt is made to print a graphic character beyond the maximum print position (MPP) +1, a new line function is automatically performed, and the character is printed at the left margin. If an attempt is made to perform a control function (VT, HT, IRS, . . .) at MPP +1, the result depends upon the function attempted; it is discussed in the description of that function.

Input Data from the 3767: If an attempt is made by the terminal operator to print a graphic character at MPP +1, an error condition occurs. If an attempt is made to perform a control function, the result depends upon the function attempted; it is discussed in the description of that function.

Left Margin Parameter (LM)

This one-byte binary value (default=1) specifies the left most print position, as follows:

- If the value is greater than zero and less than, or equal to, the maximum print position, the left margin is set to the specified value.
- If the value is zero, the left margin is set to one.
- If the value is greater than the maximum print position, an error response is generated, and the processing of the request unit containing the error is immediately terminated. All horizontal formats except the maximum print position remain at their default values.

The left margin is used as follows:

Output data to the 3767: The left margin determines the normal left most boundary for printed output.

Input data from the 3767: Same as output data to the 3767.

Right Margin Parameter (RM)

This one-byte binary value (default=MPP) specifies the right most print position as follows:

- If the value is greater than the value of the left margin and less than, or equal to, the maximum print position,the right margin is set to the specified value.
- If the value is zero, the right margin is set to the maximum print position.
- If the value is greater than the value of the maximum print position, or if it is less than the left margin, an error response is generated, and the processing of the request unit containing the error is immediately terminated. All horizontal formats except the maximum print position and the left margin take on their default values, following the error detection.

The right margin is used as follows:

Output data to the 3767: Ignored.

Input data from the 3767: An audible tone sounds when the operator prints a graphic character (or space) in the right margin minus 10 position.

Horizontal Tab Stop Parameter

Each one-byte binary value (default=all positions) specifies a column value for use with the horizontal tab stop function. This tab stop column value must be equal to, or greater than, the left margin (LM) and equal to, or less than, the maximum print position (MPP).

The tab stop parameters do not have to be in any special sequence, and there is no check to determine if equal tab stop values have been specified. The first unique tab stop value sets the stop; all subsequent identical values are nonoperational.

If any tab stop column value is specified outside the valid range, an error response is generated in reply to the request unit (RU) and the processing of the RU containing the error is immediately terminated. The maximum print position, left margin, and right margin remain as specified. The resulting tab stops are in an undetermined state.

Set Vertical Format (SVF)

This function sets vertical format controls for the maximum print line, top margin, bottom margin, and vertical tab (T1 . . Tn) stops. The one-byte value following the SVF code is a binary count of the parameters that follow the SVF code (including the count parameter itself). The next three one-byte values are parameters that define the maximum print line (MPL), top margin (TM), and bottom margin (BM), respectively.

The one-byte binary vertical tab stop values start in the fifth byte following the SVF code. When only the SVF code and the count parameter are specified, all vertical format controls are set to their default values. If specific parameters are not specified, of if they have a value of zero, the default value for those parameters are used. The following sequences (and only these) are valid:

```
SVF count
SVF count   MPL
SVF count   MPL  TM  BM
SVF count   MPL  TM  BM  T1 . . . . Tn
```

Since it is possible for the current line number to be outside the bounds specified in the SVF sequence, after the new vertical formats are established, the current line number is reset to line 1 when an SVF code is detected. In this case, the SVF sequence does not result in any forms movement.

Maximum Print Line (MPL)

This one-byte binary value (default=1) specifies the last usable line of a page (form) and is used to calculate the number of line feeds required when a form feed (FF) function is performed. The maximum print line value can be from 1 to 102.

Top Margin (TM)

This one-byte binary value (default=1) specifies the top margin of the page. It is assumed that the forms are positioned at the top margin when the SVF sequence is received, and any subsequent forms feed function causes a skip to the top margin of the next page.

Bottom Margin (BM)

This one-byte binary value (default=MPL) specifies the print line from which an automatic skip to the top margin of the next page takes place. That is, the skip function is executed whenever a line positioning function occurs that would cause the current line value to exceed the bottom margin. The bottom margin value must be less than, or equal to, the maximum print line.

If an invalid bottom margin value is detected, an error response is generated, and processing of the request unit is immediately terminated. The vertical format parameter for the maximum print line remains as specified, but the bottom margin is set the same as for MPL, and the tab stops remain equal to their default values.

Vertical Tab Stop Parameters (T1 . . . Tn)

Each one-byte binary value (default=all lines) specifies a line number for use with the vertical tab (VT) function. The tab stop line values must be equal to, or between, the top margin and the bottom margin. The maximum number of stops that can be set is 102. If the number of tab stops exceeds 102, only the first 102 are set and the remaining ones are ignored, with no error indicated.

Example of SHF and SVF

Figure 6-13 shows an 8 1/2-by-11-inch (21, 6-by-27, 9-cm) form being used with a 1 1/2-inch (3,88-cm) margin around the entire form. Tabs are set at positions 5 and 10 from the left margin. The printer prints at 10 characters per inch (2,5 cm) with 6 lines per inch (2,5 cm). Thus, there are 85 possible characters per line, with 66 possible lines per page. Figure 6-14 gives the coding for the "Set Horizontal Format" command in hexadecimal.

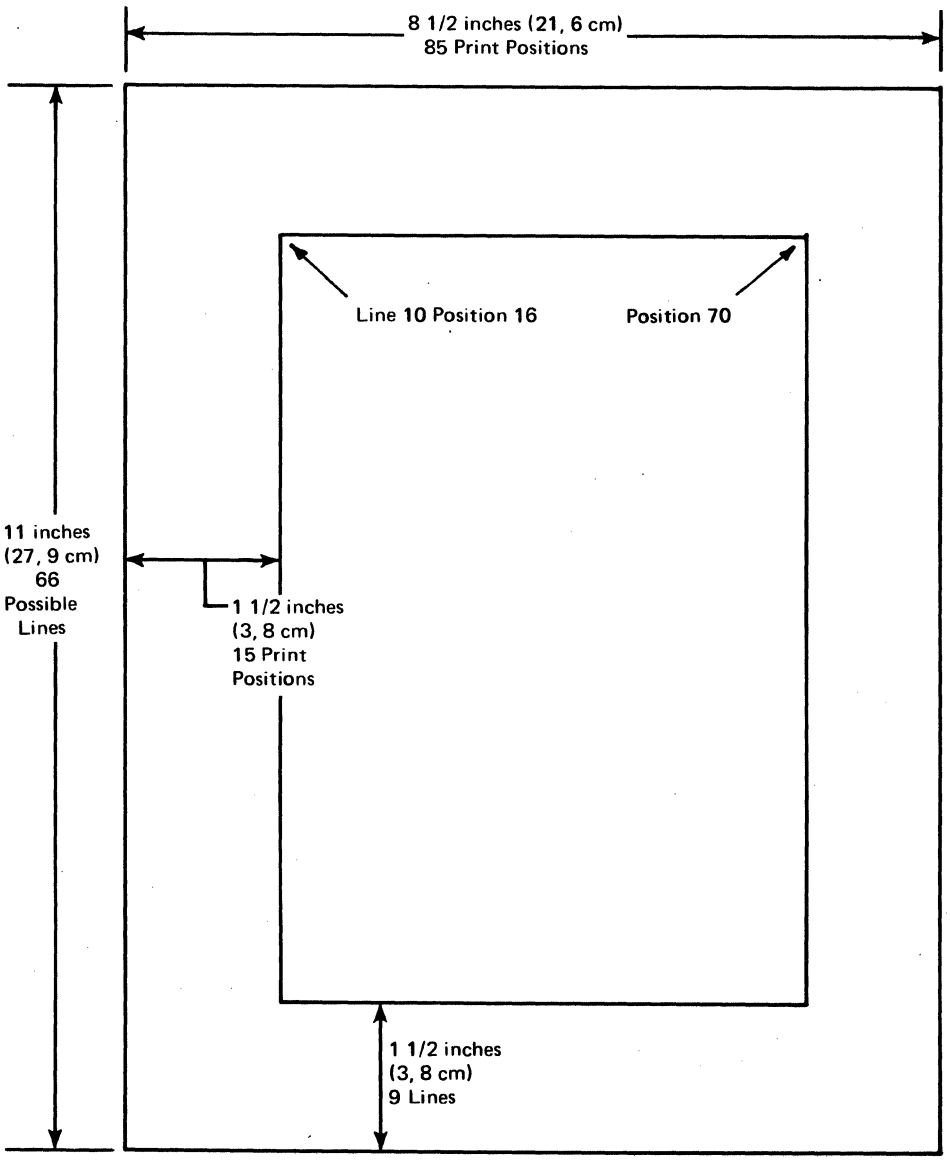


Figure 6-13. Example of SHF and SVF

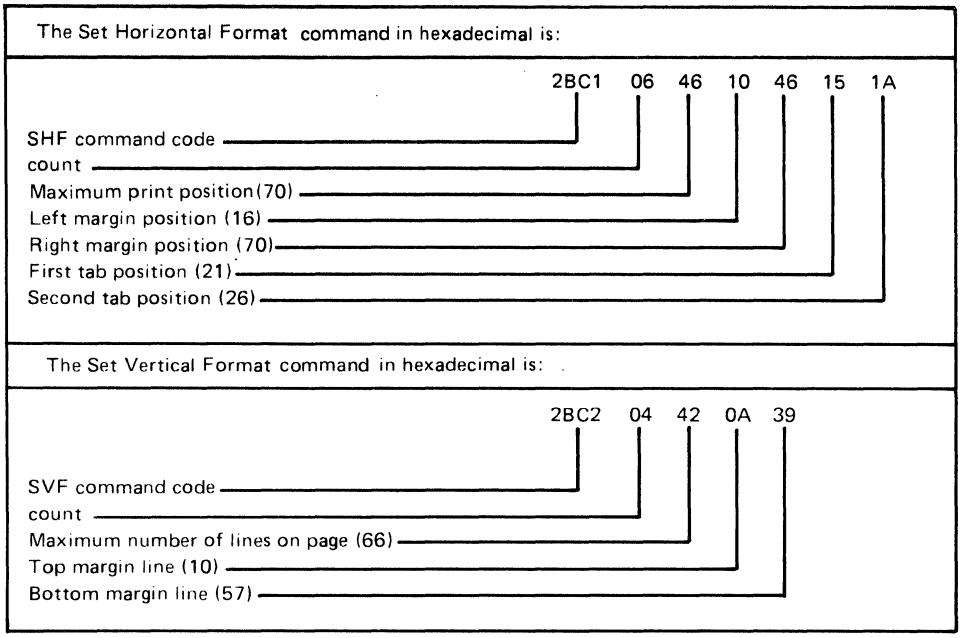


Figure 6-14. Example of Set Horizontal/Vertical Format Command Coding

Horizontal Tab (HT)

This function moves the print position from its current position to the column value specified by the next higher tab stop setting. If a tab stop is set in the current print position, that stop is ignored, and the print head is positioned to the next tab position.

Output Data to the 3767

If the current print position column value is equal to, or greater than, the highest tab stop setting (or if no stops have been set), the horizontal tab function moves the print position one space to the right.

If the horizontal tab function is executed at MPP +1, the next print position is moved to the left margin +1, on the next line, unless:

a. The current line number equals the bottom margin and the bottom margin is not less than, or equal to, the maximum print line; then the next print position is moved to the left margin +1, on the top margin of the next page.

b. The current line number equals the maximum print line; then the print position is moved to the left margin +1, on the top margin of the next page.

Input Data from the 3767

If the current print position is equal to, or greater than, the highest tab stop, pressing the Horizontal Tab key results in a space. If no horizontal tab stops are set, the horizontal tab function moves the print position one space to the right. Pressing the Tab key at print position MPP +1 causes an error condition.

Vertical Tab (VT)

This function moves the print position vertically from its current line number to the line value specified by the next higher vertical tab stop setting. If a vertical tab stop function is set for the current line number, that stop is ignored, and the next print position is moved to the next tab position, if one has been set.

Output Data to the 3767

If no vertical tab stops have been set, or if the current line number is equal to, or greater than, the highest tab stop value, the vertical tab function executes a single line feed and the print position is moved to the next line, unless:

a. The current line number equals the bottom margin, and the bottom margin is not equal to the maximum print line; then the print position is moved to the top margin of the next page.

b. The current line number equals the maximum print line; then the print position is moved to the top margin of the next page.

Input Data from the 3767

If the current line number is equal to, or greater than, the highest tab stop value, a stop condition occurs. If no stops have been set, pressing the Vertical Tab key results in a line feed, with the same results as those explained in "Output Data to the 3767", preceding.

Line Feed (LF)

This function moves the print position vertically from its current position to the same column position of the next line.

Output Data to the 3767

The print position is moved to the same column in the next line, unless:

a. The current line number equals the bottom margin, and the bottom margin is not equal to the maximum print line; then the print position is moved to the top margin of the next page.

b. The current line number equals the maximum print line; then the print position is moved to the top margin of the next page.

Input Data from the 3767

Same as in the preceding paragraph, "Output Data to the 3767".

Form Feed (FF)

This function moves the print position to the top margin line, and to the left margin print position, of the next page.

Output Data to the 3767

If default forms control has been specified (maximum print line=1), the form feed function executes the equivalent of a new line (NL) function. Since the bottom margin must equal 1, if the maximum print line=1, the new line function moves the print line=1, the new line function moves the print position to the left margin of the next line.

Input Data from the 3767

Same as in the preceding paragraph, "Output Data to the 3767".

Interchange Record Separator (IRS)

This control function terminates a line of print, or a secure data string. The IRS is a record delimiter and, in ordinary text, is interpreted as a new line function code. The following is a description of its use in terminating a line of print

Output Data to the 3767

The interchange separator (IRS) function code causes a carriage return (CR) and the line feed (LF) function to be performed. The print position is moved to the left margin of the next line, unless the current line number equals either the bottom margin value or the maximum print line value, in which case the print position is moved to the left margin print position and to the top margin line of the next page.

Input Data from the 3767

The 3767 generates a pair of SSR and IRS codes only when the magnetic stripe reader is used.

New Line (NL)

Output Data to the 3767

The new line function code causes the print position to be moved to the left margin on the next line. It is functionally the same as a carriage return (CR) and line feed (LF). A new line function is performed unless the current line number equals either the bottom margin value or the maximum print line value, in which case the print position is moved to the left margin print position and to the top margin line of the next page.

Input Data from the 3767

Same as in the preceding paragraph, "Output Data to the 3767".

Carriage Return (CR)

Output Data to the 3767

This function moves the print position from the current position to the left margin. If the current position equals the left margin, the function is nonoperational. This function does not move the print position to a new line.

Backspace (BS)

Output Data to the 3767

This function moves the current print position one column position to the left. If the current print position equals the left margin, the backspace is performed. If the current print position equals column one, the backspace function is nonoperational.

Input Data from the 3767

Same as in the preceding paragraph, "Output Data to the 3767".

Inhibit Print (INP)

Output Data to the 3767

This function disables the printing of data entered from the keyboard and causes the Print Inhibit light to be on when a keyboard operation is in progress. Although INP inhibits printing, it does not inhibit input from the keyboard, nor does it inhibit the normal advancement of the print position.

Enable Print (ENP)

Output Data to the 3767

This function restores the printing of data entered from the keyboard.

Secure String Reader (SSR)

Input Data from the 3767

If the badge reader is used, and if an operator ID (OID) code is detected following the start of record (SOR) code on the magnetic tape, the 3767 precedes the data from the card with a secure string reader (SSR) and attaches a record separator (IRS) code to the reader data. This prevents printing of the data.

3767 SNA Operational Characteristics

Proceed Light

This light is on when the 3767 is not in the receive state and when the buffer is available for key-in operation. It is also turned on by the SYS REQ key for a LOGON/LOGOFF procedure. This light is turned off when the buffer becomes unavailable for key-in operation or by an end-of-form (EOF) condition.

Note: The Proceed light is on for both the send and standby states and off for the receive and FME wait states. Refer to "HDX-Contention and HDX-Flip/Flop Protocols", preceding in this chapter.

On Line Light

This light comes on by an Activate Logical Unit (ACTLU) request and is turned off by a Deactivate Logical Unit (DACTLU), request. It is also off during the period when the 3767 is transmitting or receiving a message on the line.

CPU Select Light

This light comes on when a Bid, Signal, or Shutdown request is received. It goes off when:

1. Data Request with BB is accepted following a BID request.
2. Data Request is accepted following a Signal request
3. Bind/Unbind/Clear is received following a Shutdown request.

OPRN (Operation) Check Light

When this light comes on, it indicates that one of the following errors has occurred:

- Error was made during a badge read operation.
- Invalid form-setting parameter was set.
- Data was entered outside the range of printing.
- Secure data was edited in the buffer.
- SYS REQ key was pressed in other than BETB standby state.

A long audible tone sounds when the Operation Check light comes on.

System Check Light

When this light comes on, it indicates a check condition in the network system or in the terminal. See *IBM 3767 Communication Terminal Operator's Guide,* GA18-2000 for description of the ANR--displayed codes related to the System Check light conditions.

Print Inhibit Light

This light comes on when the 3767 receives a print inhibit (INP) code from the host, or when the magnetic stripe card with an operator ID is read.

Audible Tone

Two audible tones are produced: a short tone (250 ms) and a long tone (750 ms). The short tone occurs when the print position equals the right margin minus 10 or when the 3767 buffers are 10 characters from being full or when the SYS REQ key is pressed

when the terminal is in BETB standby state. A long audible tone sounds when the Operation Check light comes on or when a buffer full condition occurs.

EOB (End of Block) Key

This key initiates the transmission of either a first-in-chain or a middle-in-chain type message from the buffer.

EOM (End of Message) Key

This key transmits either a last-in-chain or an only-in-chain type message from the buffer.

ATTN (Attention) Key

This key generates the SNA signal request.

CNCL (Cancel) Key

This key causes the chain being transmitted or received to be cancelled. The SNA Cancel request is transmitted when this key is pressed during a transmit operation and at least one element of the chain has already been sent. Pressing it during a receive operation causes an error response with a "break error" indication to be transmitted.

Form Ready Key

This key generates an LU status message (LUSTAT) that is sent to the host specifying that the terminal has been reloaded with forms and is now operational.

Form Feed Key

If the Auto/Off switch is set to the Auto position, this key performs the same function as the EOM key.

Return Key

If the Auto/Off switch is set to the Auto position, this key performs the same function as the EOM key.

Auto/Off Switch

When this switch is off, the Return key generates a new-line code. When it is on, the Return key and the Form Feed key also perform the function of the EOM key. The EOM key transmits a message from the buffer.

Edit/Off Switch

This switch is only on machines with the Buffer with Edit feature. When it is off, data entered at the keyboard is transmitted automatically as a chined RU when the buffer segment (see note) is full. When this switch is set to Edit, the data can be edited in the buffer before it is transmitted. Data is not transmitted automatically when the Edit switch is set to the Edit position.

Note: A buffer segment is 256 bytes for a 3767 with 512 or 1024 bytes of buffer.

Single Versus Multiple Buffers

Buffer Size Considerations

The buffer management aspects of the 3767 have been discussed in a previous chapter of this manual (see "Buffered SDLC Terminal" and "Buffered SDLC Receive", in Chapter 2). However, to optimize performance and editing capabilities, the advantages of multiple buffers versus a single buffer should be considered in configuring the 3767. The table shown in Figure 6-15 will assist in making this determination for the particular applications for which the 3767 has been designed.

The 3767 has the following various buffer sizes:

	256	256	256	256	
Model 1 (basic)	⌊⌋				Single Buffer
Model 2/3 (basic)	⌊⌋	⌊⌋			Multiple Buffers
Model 1 and #1481	⌊⌋	⌊⌋			"
Model 1 and #1481 & #1482	⌊⌋	⌊⌋	⌊⌋	⌊⌋	"
Model 2/3 and #1482	⌊⌋	⌊⌋	⌊⌋	⌊⌋	"

Note: #1481/#1482 is a feature of the 3767, 'Buffer with Edit'.

The comparison of single buffer (model 1 basic) and multiple buffers is summarized as follows;

	Single Buffer (Model 1, basic)	Multiple Buffers (others)
1) Inbound operation		
—Edit capability	Available keys for use with the edit function (Comm mode only) —BUFFR RTN —BUFF R BKSP Unit for editing —Current line	—BUFFR RTN —BUFFR BKSP —BUFFR LINE RTN —PRINT LINE —PRINT CHAR —Any character in the buffer. up to 1024 bytes.
—Overlapped operation between keyboard and line transmission	Based on 128 character length (If a message is longer than 128 characters, no overlap is done.)	Based on 256 character length
—Auto transmission	No	With Edit switch off, keyed-in data in 256 bytes lengths is automatically transmitted to the line without pressing the EOB key
2) Outbound operation		
—Overlapped operation between line and printer	No	Yes (Note: Minimum 512 byte buffer is a prerequisite for the 80/120 cps printer.)

Figure 6-15. Single versus Multiple Buffer Considerations

Buffer Size Operations

The following text provides examples of data flow to enable the reader to understand how the 3767 operates under HDX or bracket protocols when the lights are turned on or off. Refer to Figure 6-16 for the operational differences between single and multiple buffers.

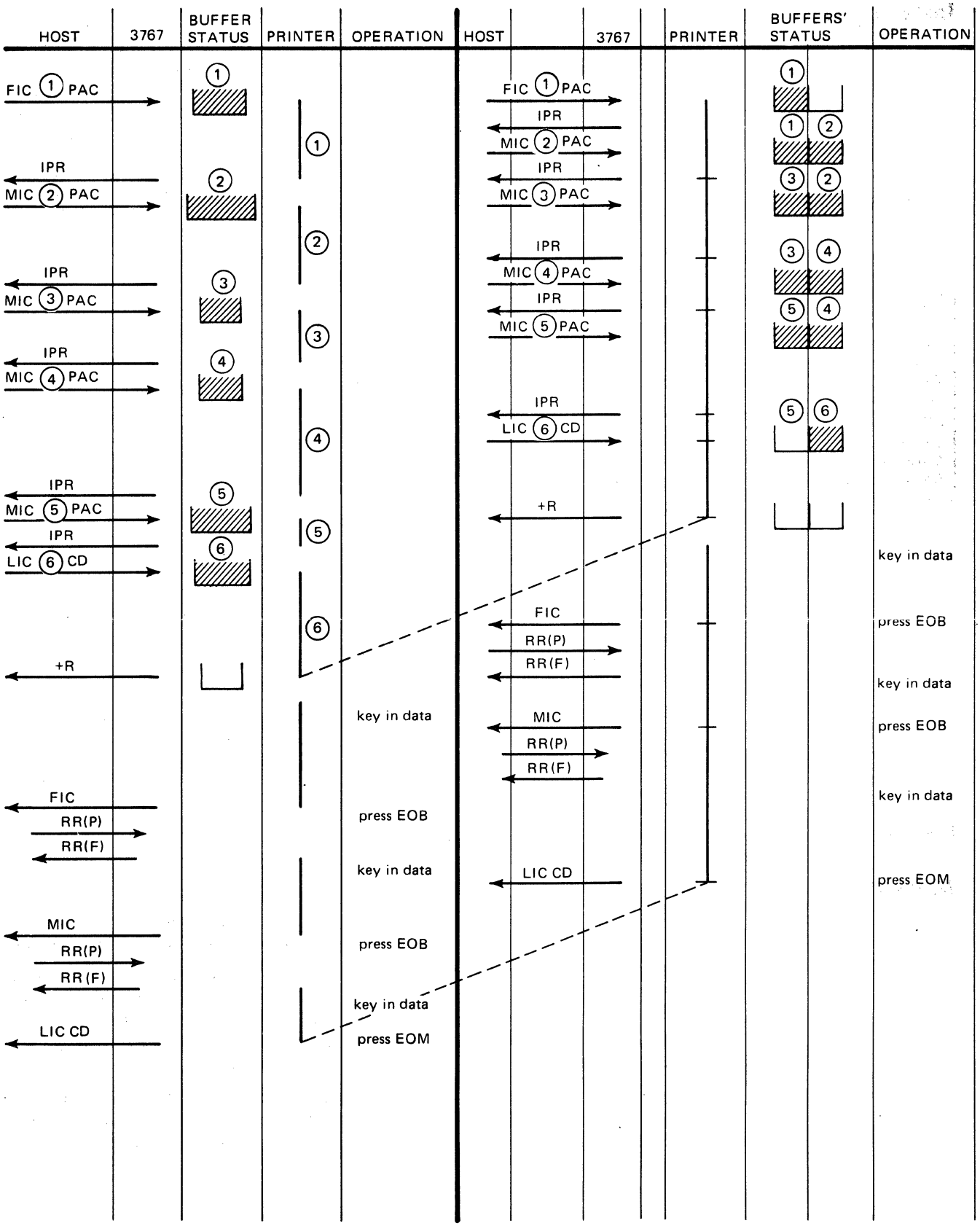


Figure 6-16. Single versus Multiple Buffer Operation

Installing an IBM 3767/SNA System with NCP and VTAM

The following text describes the aspects of the installation process that are unique to the 3767. It describes the steps required to install the 3767 in an SNA/SDLC telecommunications network (refer to Figure 6-17) using: (1) an IBM 3704 and 3705 Communications Controller with Network Control Program/Virtual Storage (NCP/VS), and (2) an IBM System/370-VS with the Virtual Telecommunications Access Method (VTAM).

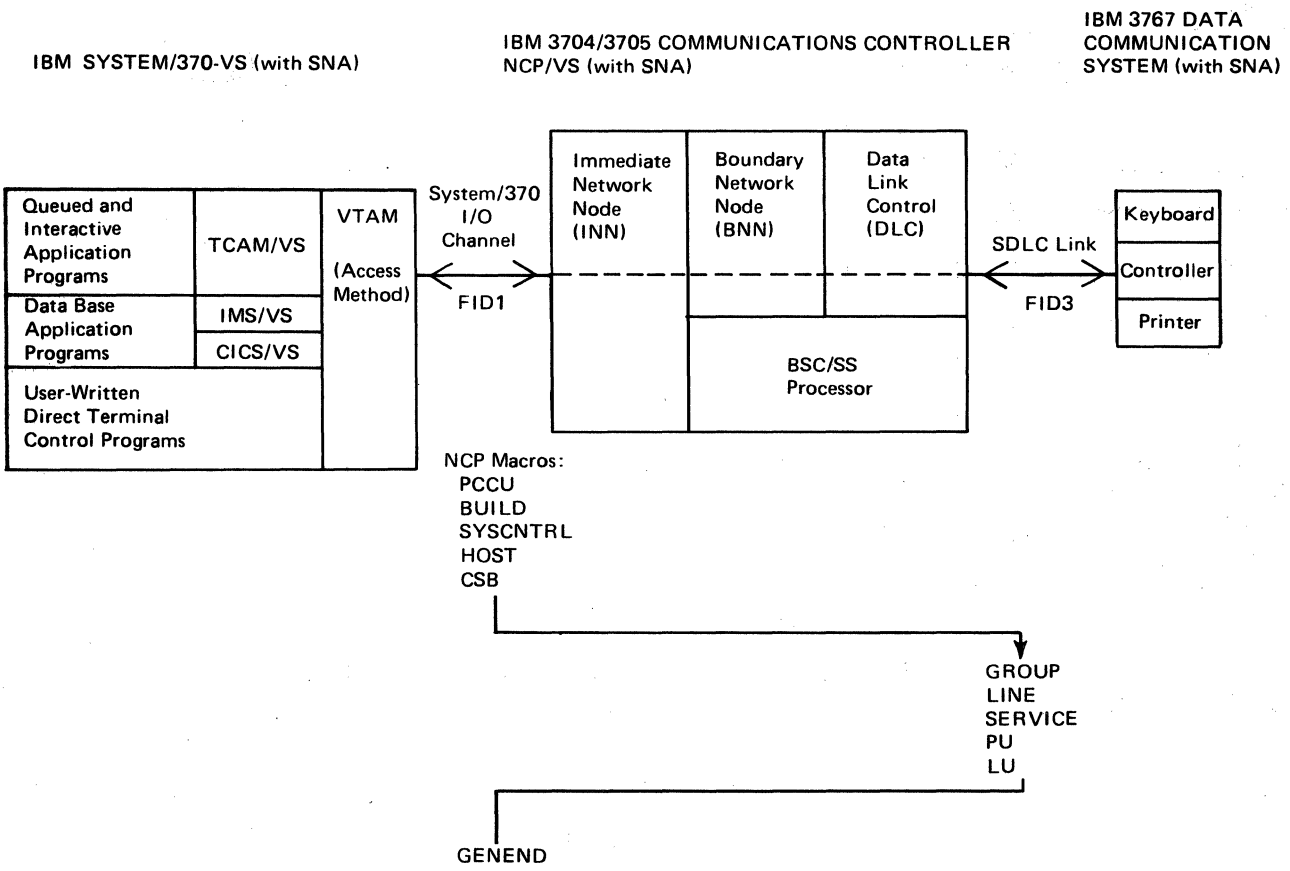


Figure 6-17. IBM 3767 Communication Terminal in an SNA/SDLC Network

NCP SYSGEN Macro

NCP macro instructions are used in two ways. First, they are used to generate the NCP load modules. They are used then by VTAM to obtain information about the network.

Most of the parameters specified in the NCP generation macro instructions are used only for generating the Network Control Program, but some parameters are used both in generating the NCP and again in defining the NCP network to VTAM. The jointly used parameters and the VTAM-only parameters are made available to VTAM when the NCP generation deck is filed during the network definition process.

Placing the VTAM-only macros in the deck before generating the NCP load module is recommended because in this case, the syntax of the macros is checked. Adding them to the deck after generating the program can cause errors (such as misspelled operands or misplaced cards).

System and Configuration Definition Macro Instructions

PCCU (VTAM only)
BUILD
SYSCNTRL
HOST
CSB

For more information on these required NCP macro instructions, see *IBM 3704 and 3705 Control Program Generation and Utilities Guide and Reference Manual,* GC30-3008.

Note: When the NEWNAME parameter is written in the BUILD macro, the name *must be the same* as the file name of the generated NCP phase (DOS/VS) or the member name of the NCP (OS/VS).

Additional NCP/3767 Definition Considerations

Code the operands as indicated below:

GROUP Macro Instruction

Parameter	*Meaning*
DIAL=Yes or No	Type of line
LNCTL=SDLC	Type of line control

LINE Macro Instruction

Parameter	*Meaning*
SPEED=600, 1200, or 2400 bps	Line speed
DUPLEX=FULL or HALF	Half-duplex or full duplex

PU Macro Instruction (Nonswitched)

Parameter	*Meaning*
ADDR=characters	SDLC station address
PUTYPE=1	Type of station
MAXDATA=261	Maximum PIU size
MAXOUT=1	Number of PIUs outstanding
PASSLIM=1	Service order table limit
MODETAB=name	Name of LOGON mode table
SSCPFM=USSSCS	Network services procedure error - error request

LU Macro Instruction (for Nonswitched links only)

Parameter	*Meaning*
VPACING=(value 1, value 2)	VTAM to NCP pacing
PACING=1, 1	Pacing the logical unit
MODETAB=name	Name of LOGON mode table
SSCPFM=USSSCS	Network services procedure error request
LOCADDR=0	Local address
	VTAM-only operands

PU Macro Instruction (Switched)

Parameter	*Meaning*
ADDR=characters	SDLC station address
PUTYPE=1	Type of station
MAXDATA=261	Maximum PIU size
MAXOUT=1	Number of PIUs outstanding
PASSLIM=1	Service order table limit

MODETAB=name	Name of LOGON mode table
SSCPFM=USSSCS	Network services procedure error request
IDBLK=007	Identification block
IDNUM=XXXXX*	Identification number

*IDNUM can be obtained from the 3767 address label found under the hinged front cover of the terminal or from the terminal serial number (SN) converted to hexadecimal.

LU Macro Instruction (Switched)

Parameter	*Meaning*
VPACING= (value 1, value 2)	VTAM to NCP pacing
PACING=1, 1	Pacing the logical unit
MODETAB=name	Name of LOGON mode table
SSCPFM=USSSCS	Network services procedure error request
LOCADDR=0	Local address
ISTATUS=active	Initially activates terminal

VTAM Network Operator Commands

Before VTAM can transmit to a 3767, both the 3767 physical unit (PU) and its logical unit (LU) must be active. There are two ways to activate physical and logical units with VTAM:

1. Specify ISTATUS=ACTIVE in the NCP macro instructions that describe the 3767 logical units. This indicates that each physical or logical unit is automatically activated when the NCP is activated.
2. Issue VTAM's VARYNET command to activate each 3767 physical or logical unit individually.

LOGON and LOGOFF Procedures

When the On Line light is on (ACTLU command received), the LOGON or LOGOFF procedures may be used. These procedures involve:

1. Pressing the SYS REQ key.
2. Entering the LOGON or LOGOFF message.
3. Pressing the EOM key.

The format of the LOGON message varies for each installation; it is defined by the USS Definition Table.

Standard format is:

LOGON [APPID (name)] [LOGMODE (name)] [DATA (user data)]

LOGON mode tables are also defined as part of the VTAM definition. The name of the table is specified as the parameter of LOGMODE. The table defines BIND parameters that define characteristics of the session.

The format of the LOGOFF message is also defined by the USS Definition Table. Standard format is:

LOGOFF [APPLID (name)] [TYPE (COND/UNCOND)]

If the SYS REQ key causes the Oprn Check condition, press the RESET key.

Refer to "Chapter 4. Operating the Terminal in Communication Mode" in *IBM 3767 Communication Terminal Operator's Guide,* GA18-2000,for further details.

Sequence Charts for Data Flow and Control

The sequence charts shown in Figures 6-18 through 6-39 are provided as an aid to understanding the data flow and control sequences between the 3767 and the host.

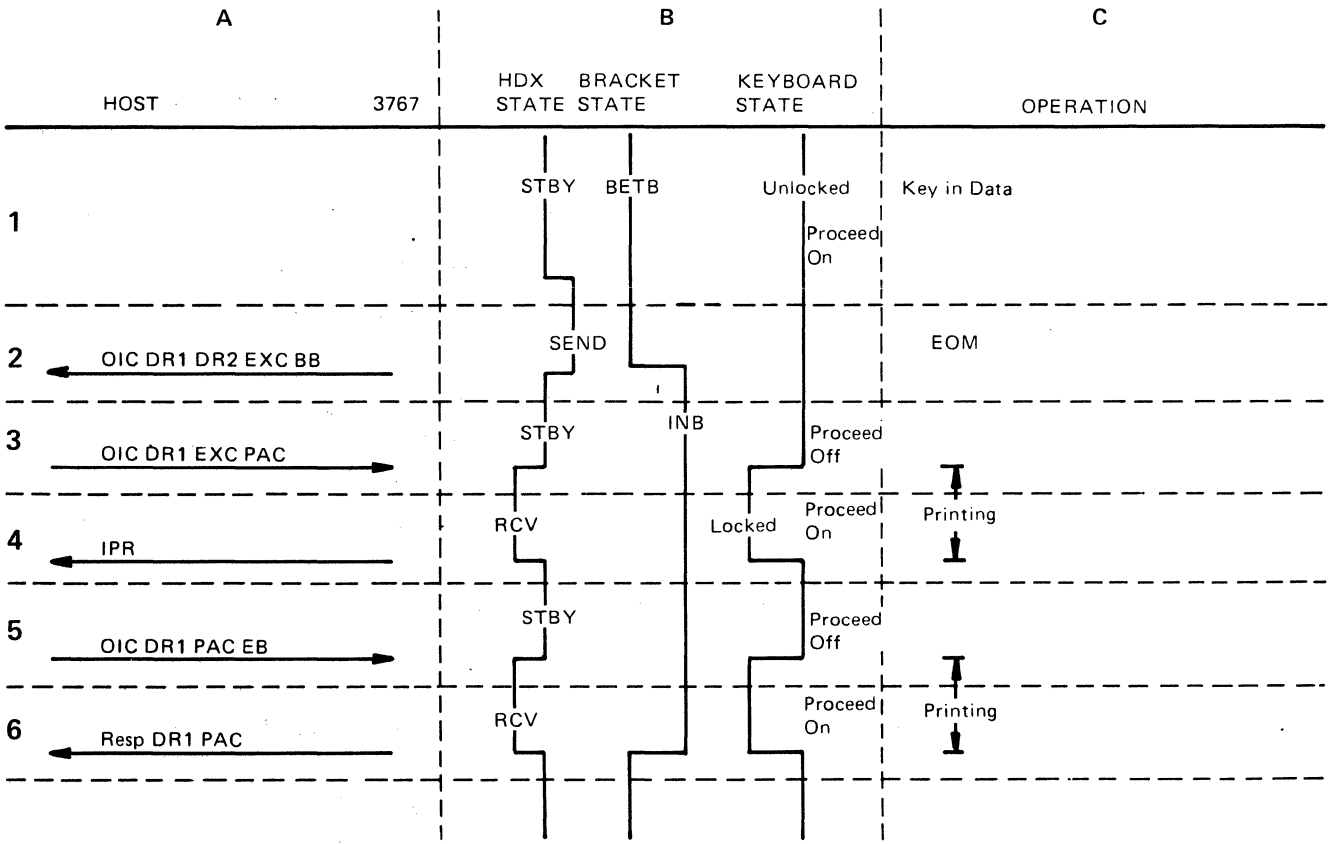
The following chart is a representative example of the sequence charts. Each chart is divided into three vertical columns: A, B, and C.

Column **A** shows the sequence of commands, responses, data requests, etc. that pass between the host and the 3767.

Column **B** gives the HDX state of the terminal (STBY, SEND, RCV, WAIT), the bracket state (in-bracket or between brackets), the keyboard state (locked or unlocked), and the state of the Proceed Light (on or off).

Column **C** gives the operator keying activities for each sequence, the 3767 activity (such as printing), and the condition of various lights.

The example shown in Figure 6-40 consists of six sequence lines (1 through 6); each is interpeted individually, as follows:



Example of Sequence Charts (Bracket Protocol as Initiated by Terminal, Terminated by Host)

1. This sequence represents the operator beginning to key data into the 3767 buffer. The keyboard is unlocked, and the Proceed light is on.
   - The 3767 goes into the send state after the first data key has been pressed.
2. After data entry is complete, the operator presses the EOM key to initiate transmission of data. The keyboard remains unlocked, the Proceed light remains on, and the bracket state changes from BETB to INB.

- The 3767 goes into the STBY state.
- The next time the terminal is polled, the chain is transmitted to the host. The RH and TH bit settings of this chain indicate:
  a. That this is an only-in-chain (OIC) element
  b. That an EXC has been requested (DR1, EXC)
  c. That a bracket session (BB) has been initiated.

3. The host responds, and the following actions occur:
   - The RH and TH settings of this chain indicate:
     a. That this is an only-in-chain (OIC) element
     b. That an EXC has been requested (DR1, EXC).
     c. That a pacing response has been requested (PAC).
   - The 3767 goes into the RCV state
   - The bracket state remains in-bracket (INB)
   - The keyboard is locked, and the Proceed light goes off
   - The 3767 starts to print the message.
4. The next time the 3767 is polled, an isolated pacing response (IPR) is sent.
   - The printing occurring at the terminal ends
   - The 3767 goes into the STBY state
   - The bracket state remains in-bracket (INB)
   - The keyboard is unlocked, and the Proceed light comes on.
5. The host responds to the IPR with a second chain to the 3767.
   - The RH and TH settings of this chain indicate:
     a. That this is an only-in-chain (OIC) element
     b. That a definite response has been requested (DR1)
     c. That a pacing response has been requested (PAC)
     d. That this chain will end the bracket state (EB)
   - The 3767 goes into the RCV state
   - The bracket state remains in-bracket (INB)
   - The keyboard is locked, and the Proceed light goes off
   - Printing begins at the terminal.
6. The next time the 3767 is polled, a definite response is sent. The RH and TH bit settings indicate:
   a. That a definite response has been returned (DR1)
   b. That a pacing response has been returned to the host (PAC)
   - The printing occurring at the terminal ends
   - The 3767 goes into the STBY state
   - The bracket state changes to BETB
   - The keyboard is unlocked, and the Proceed light comes on.

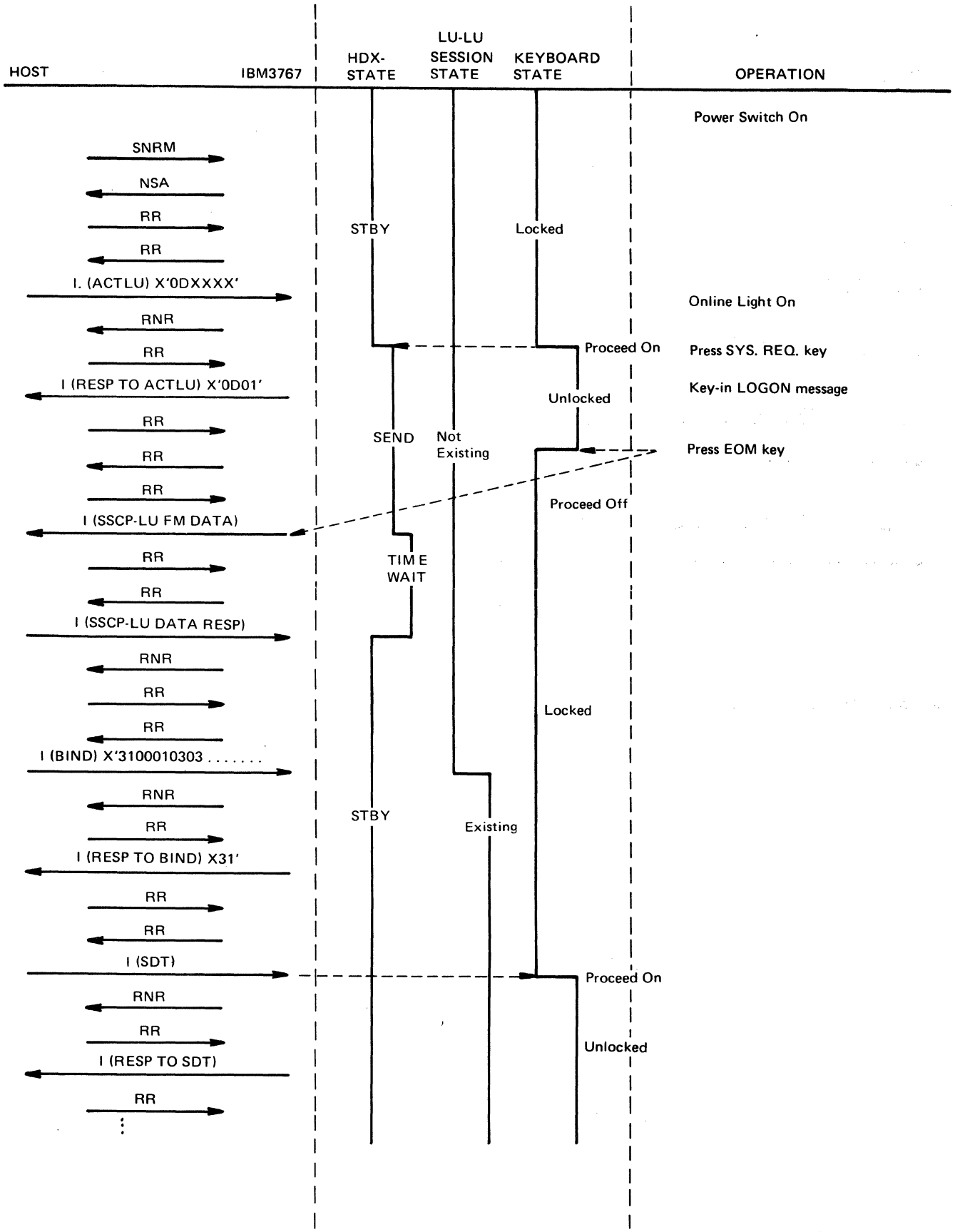


Figure 6-18. Start-Up Sequence

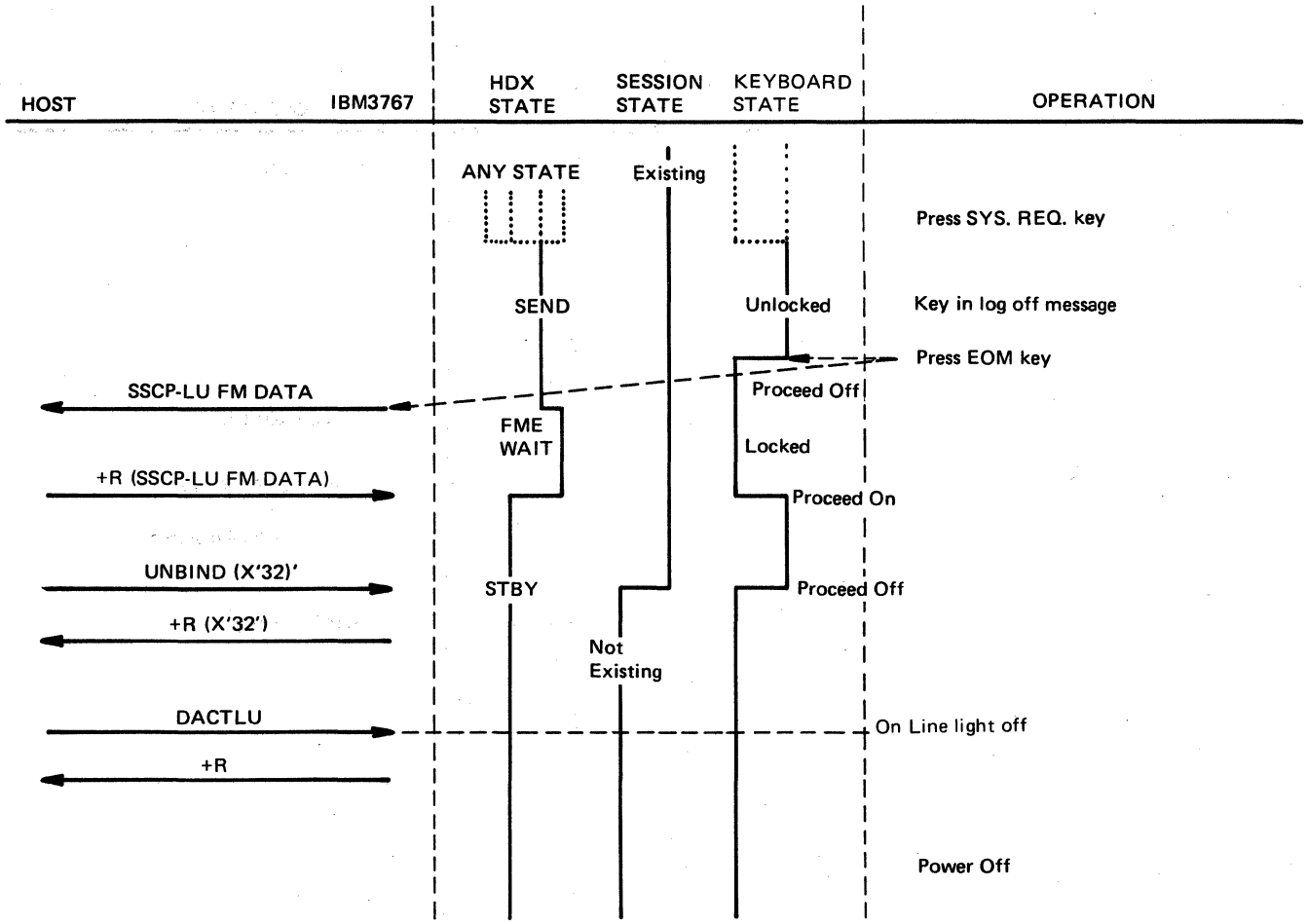


Figure 6-19. Shutdown Sequence

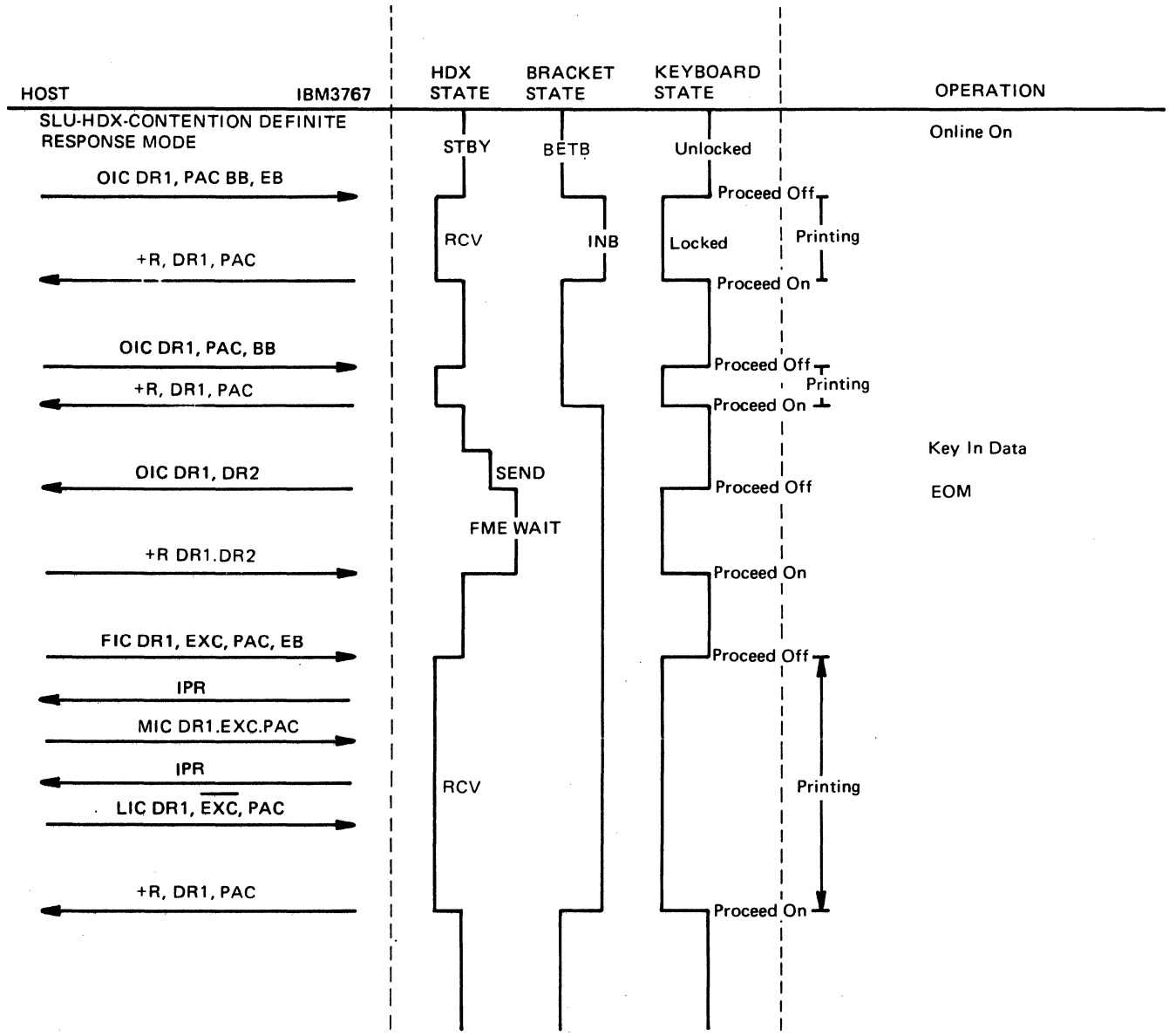


Figure 6-20. Bracket Protocol (Initiated/Terminated by Host) Sequence

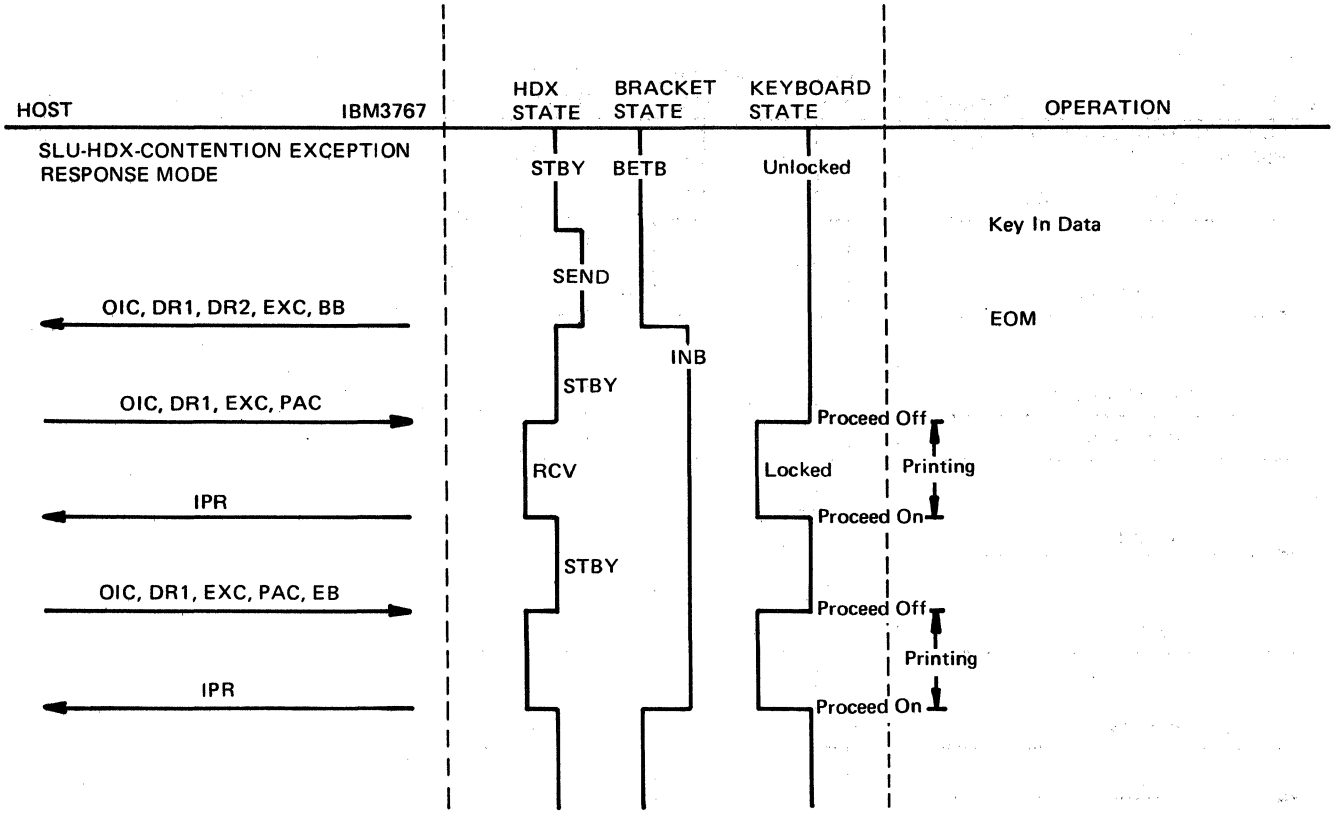


Figure 6-21. Bracket Protocol (Initiated by Terminal, Terminated by Host) Sequence

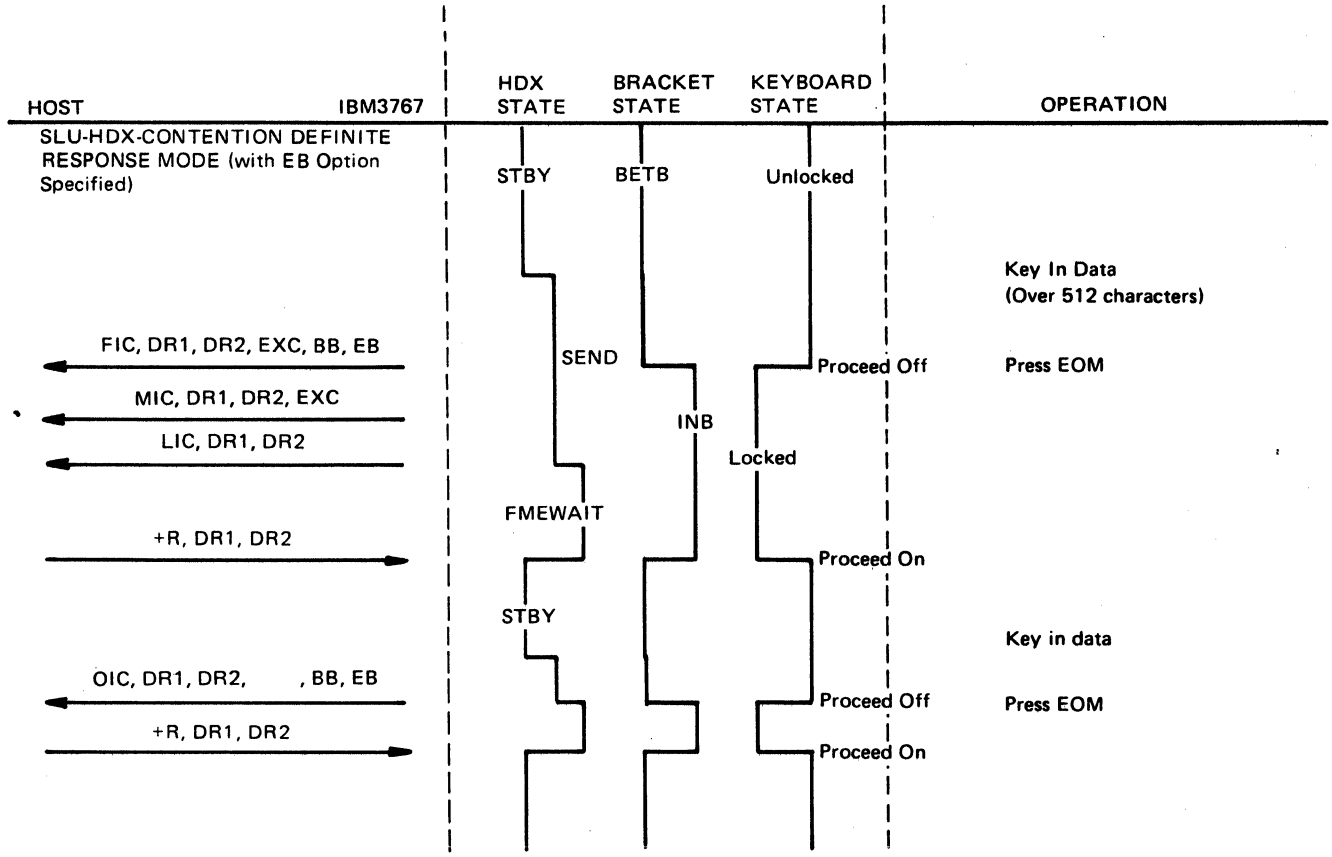


Figure 6-22. Bracket Protocol (Initiated/Terminated by Terminal) Sequence

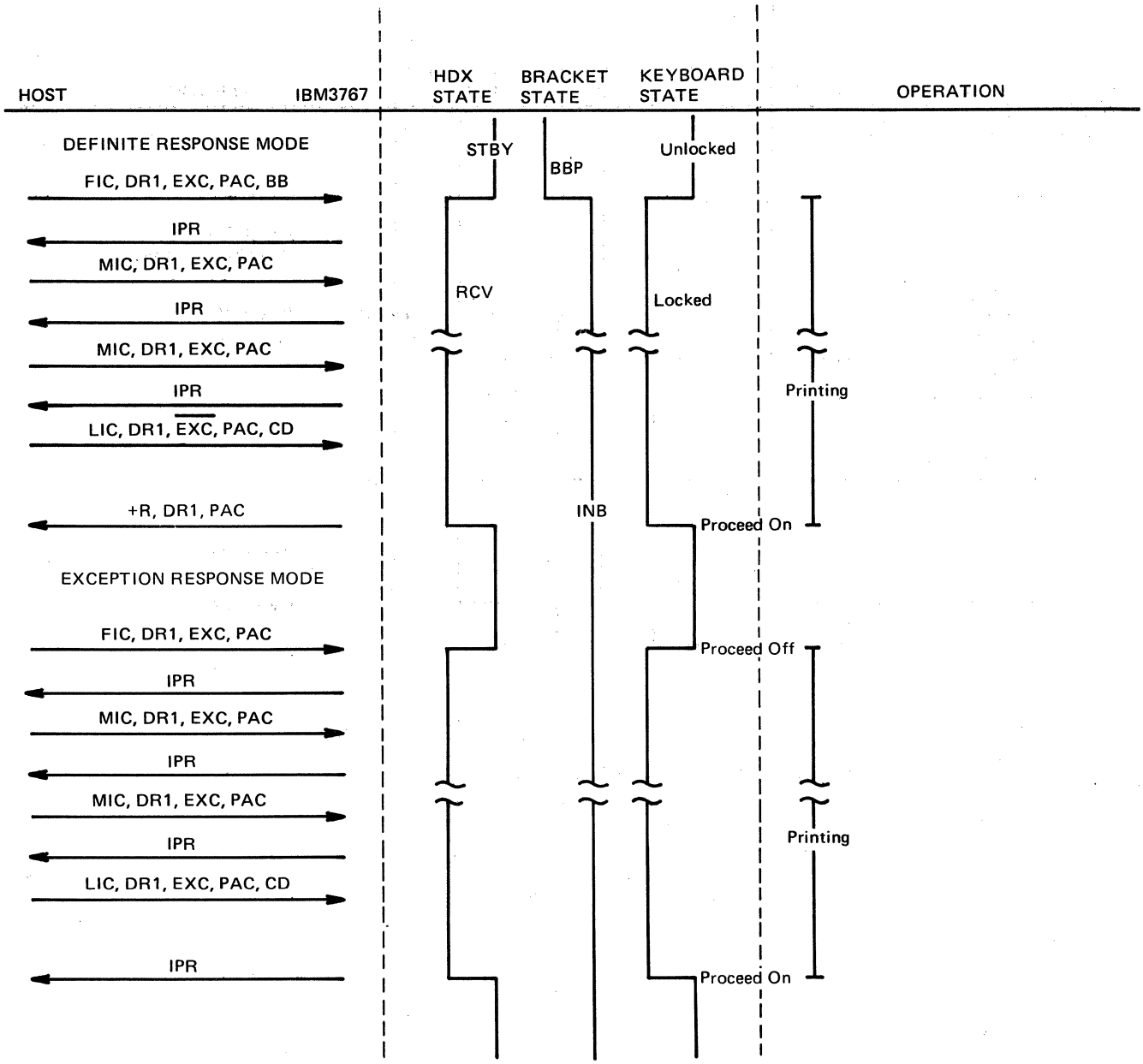


Figure 6-23. Host Sends Data (SLU- HDX-Contention Operation) Sequence

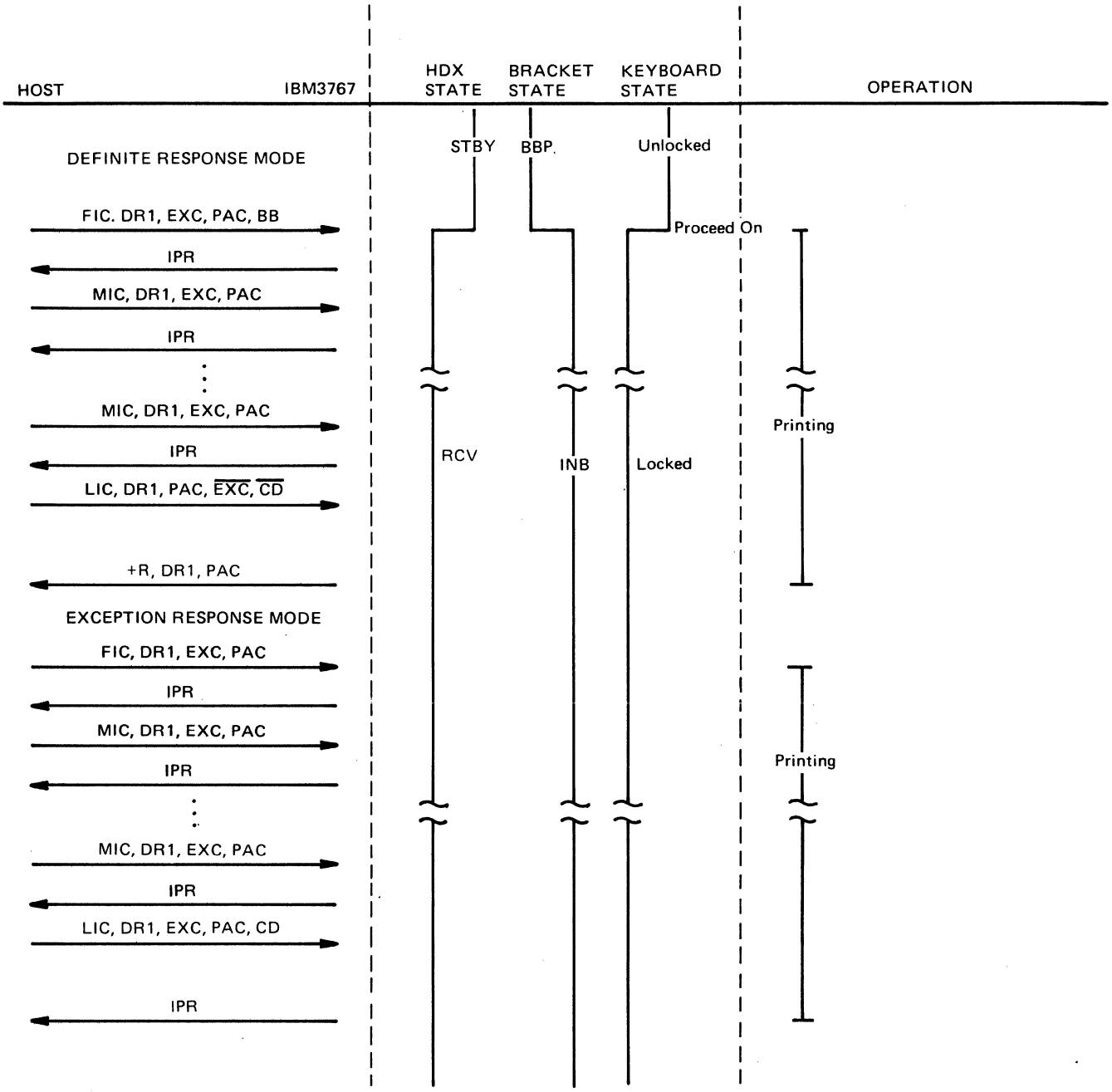


Figure 6-24. Host Sends Data (SLU-HDX-FF Operation, Host does not send CD) Sequence

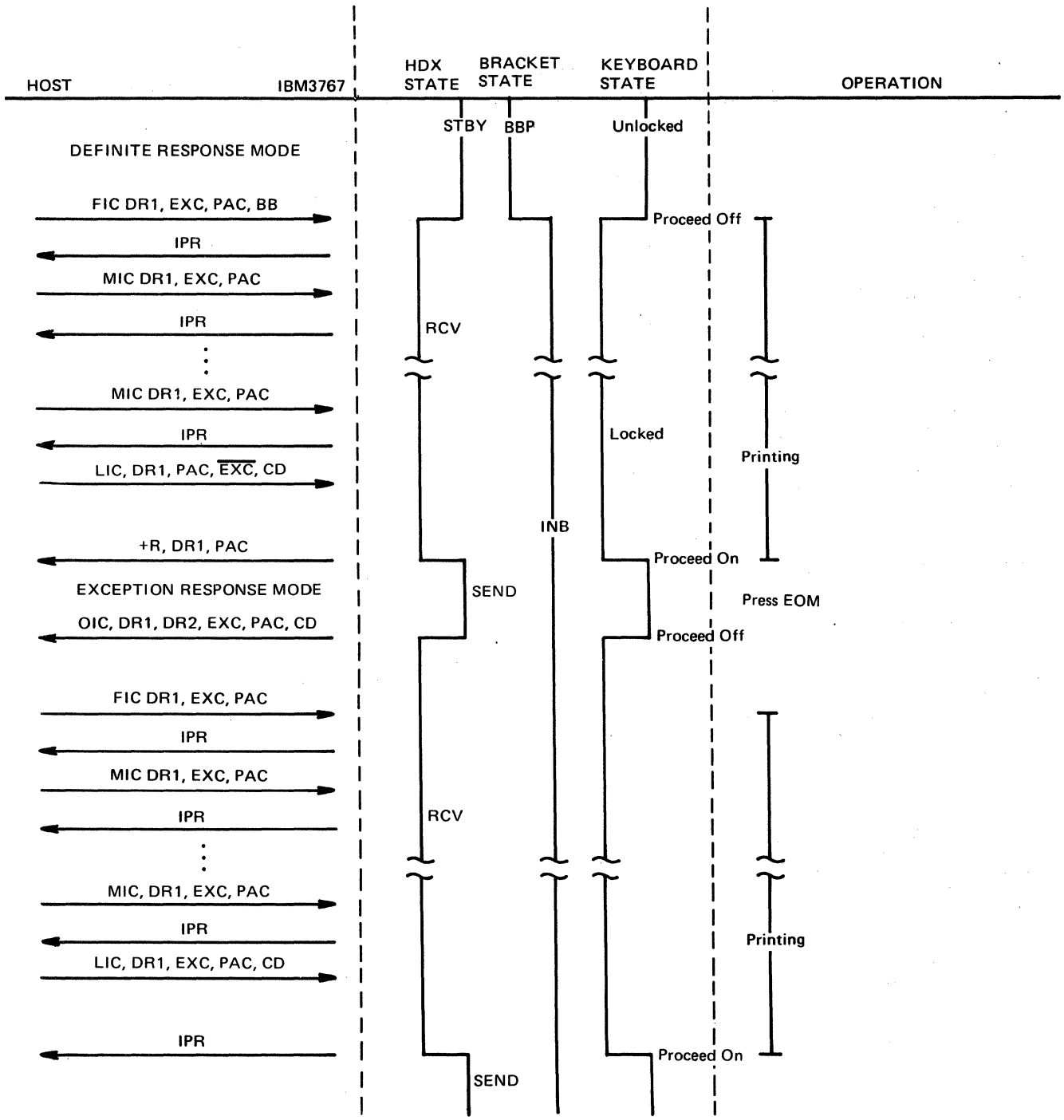


Figure 6-25. Host Sends Data (SLU-HDX FF EXCEPTION RESPONSE MODE Operation, Host sends CD) Sequence

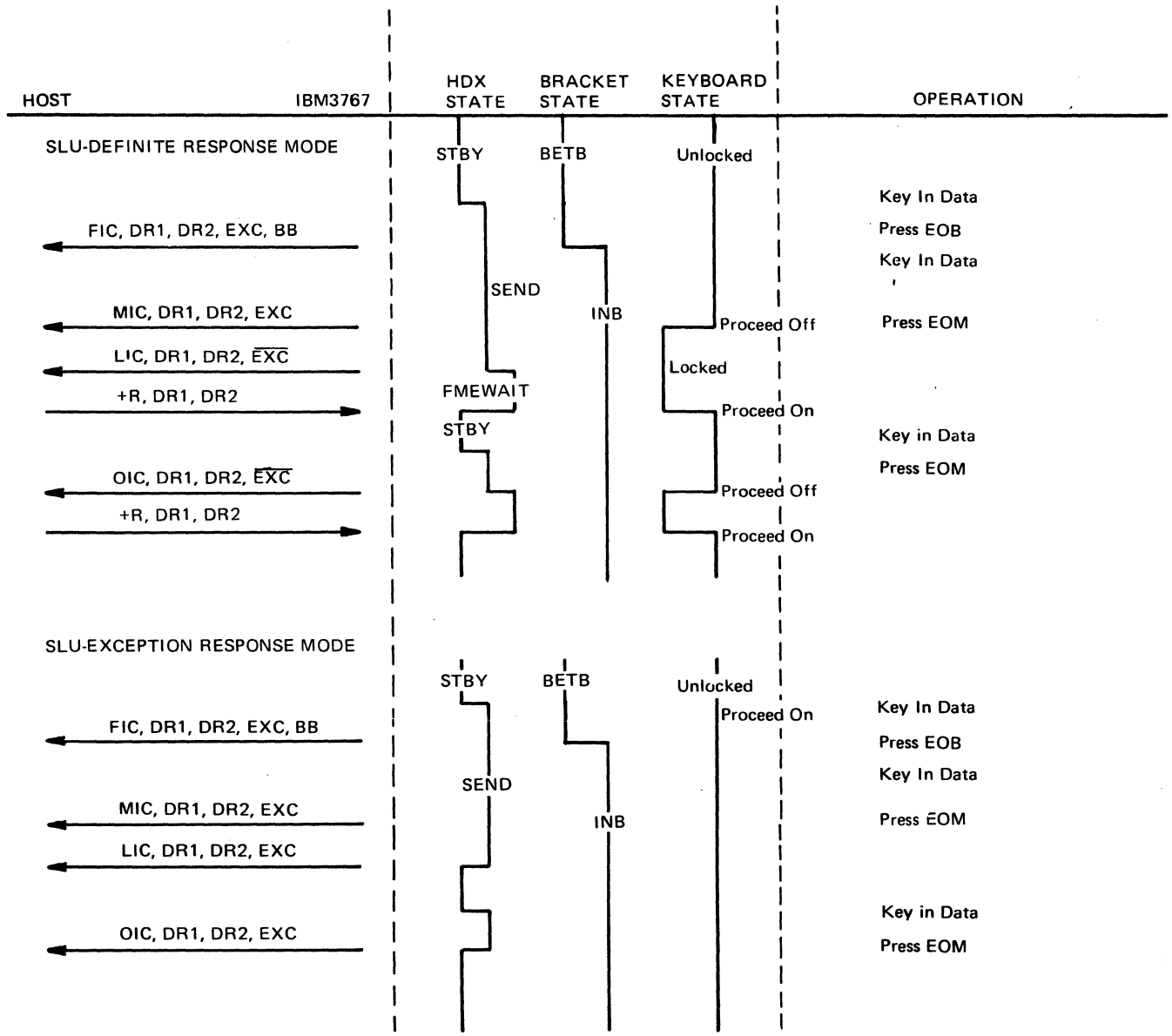


Figure 6-26. Terminal Sends Data (HDX-Contention Operation) Sequence

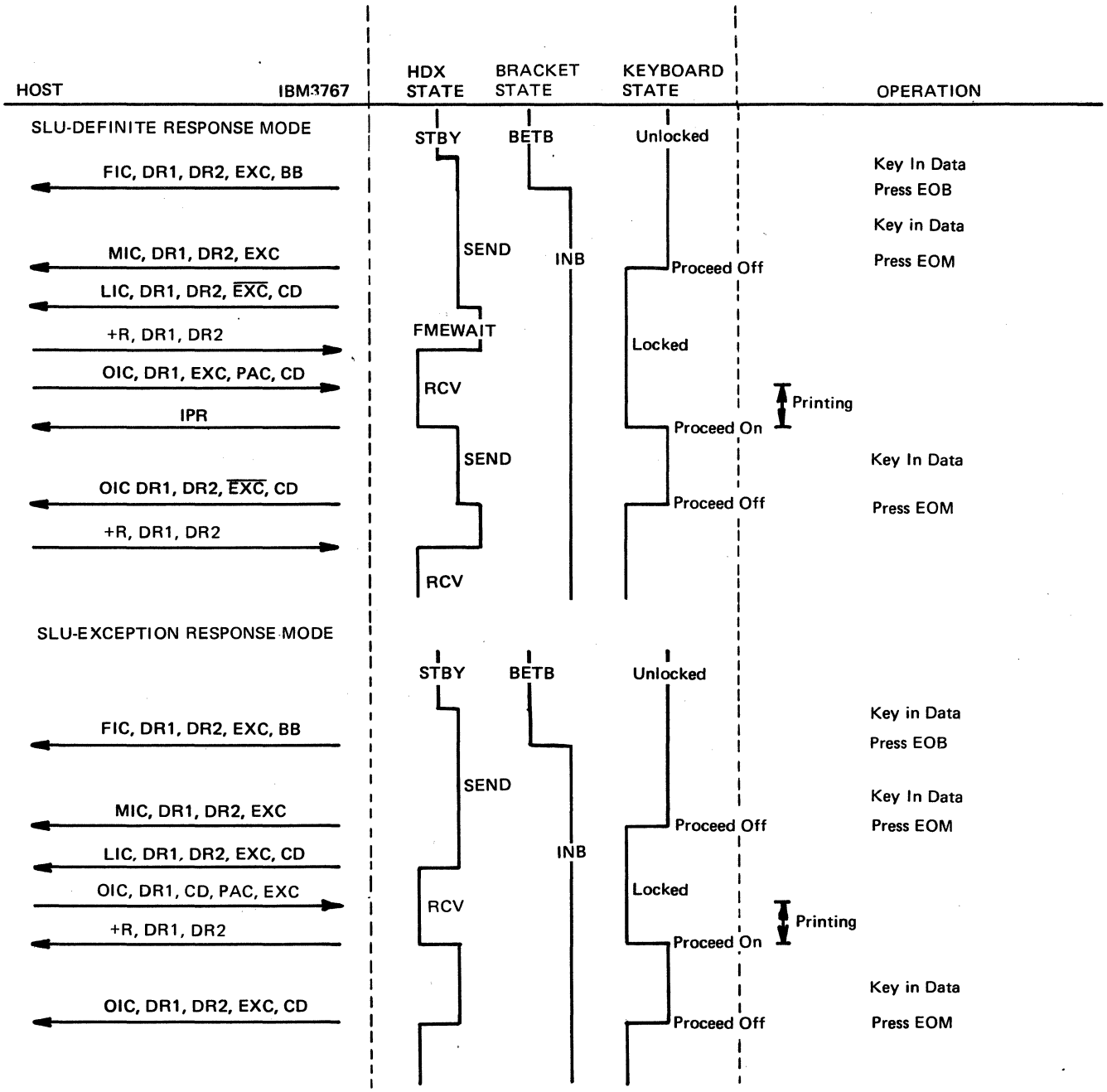


Figure 6-27. Terminal Sends Data (HDX FF Operation) Sequence

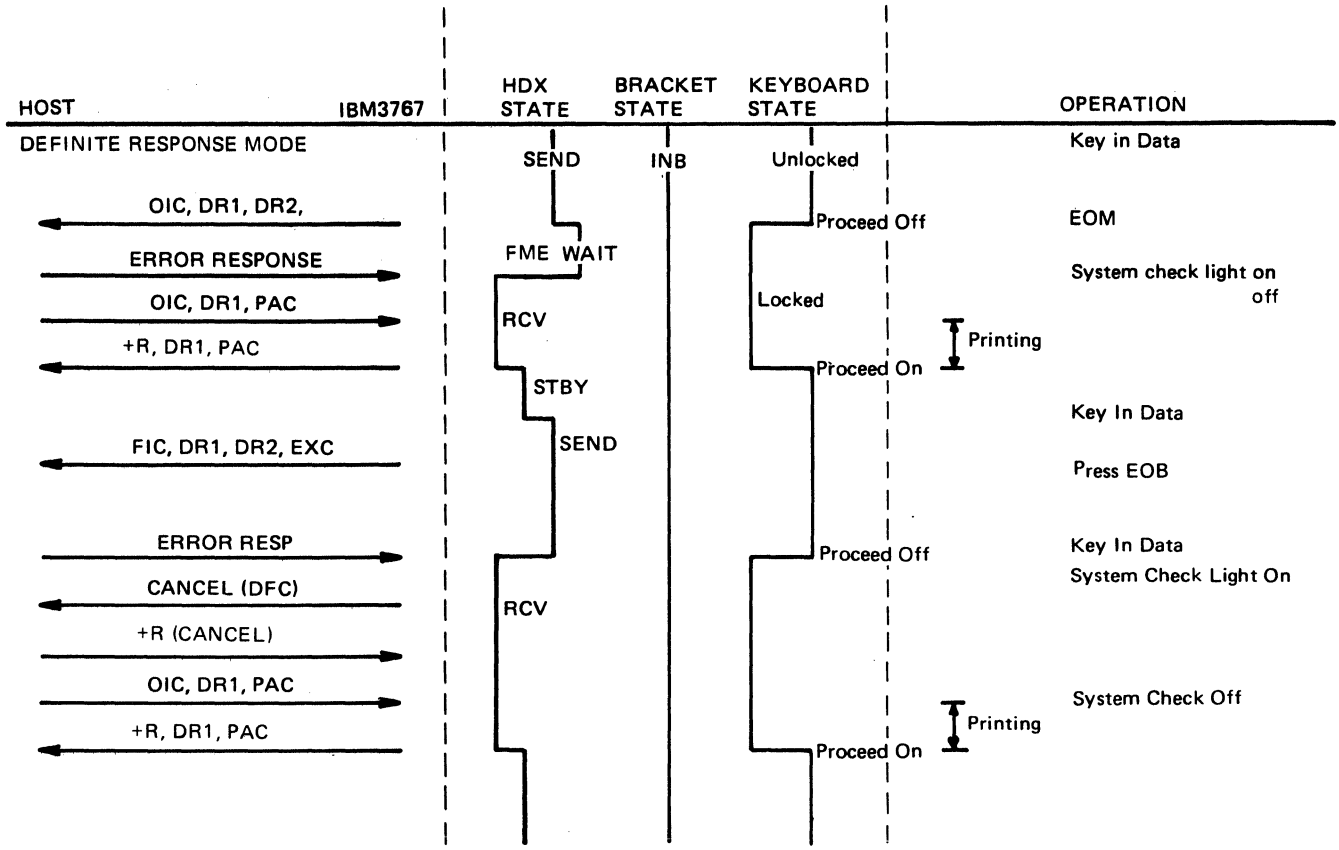


Figure 6-28. Host Sends Negative Response Sequence

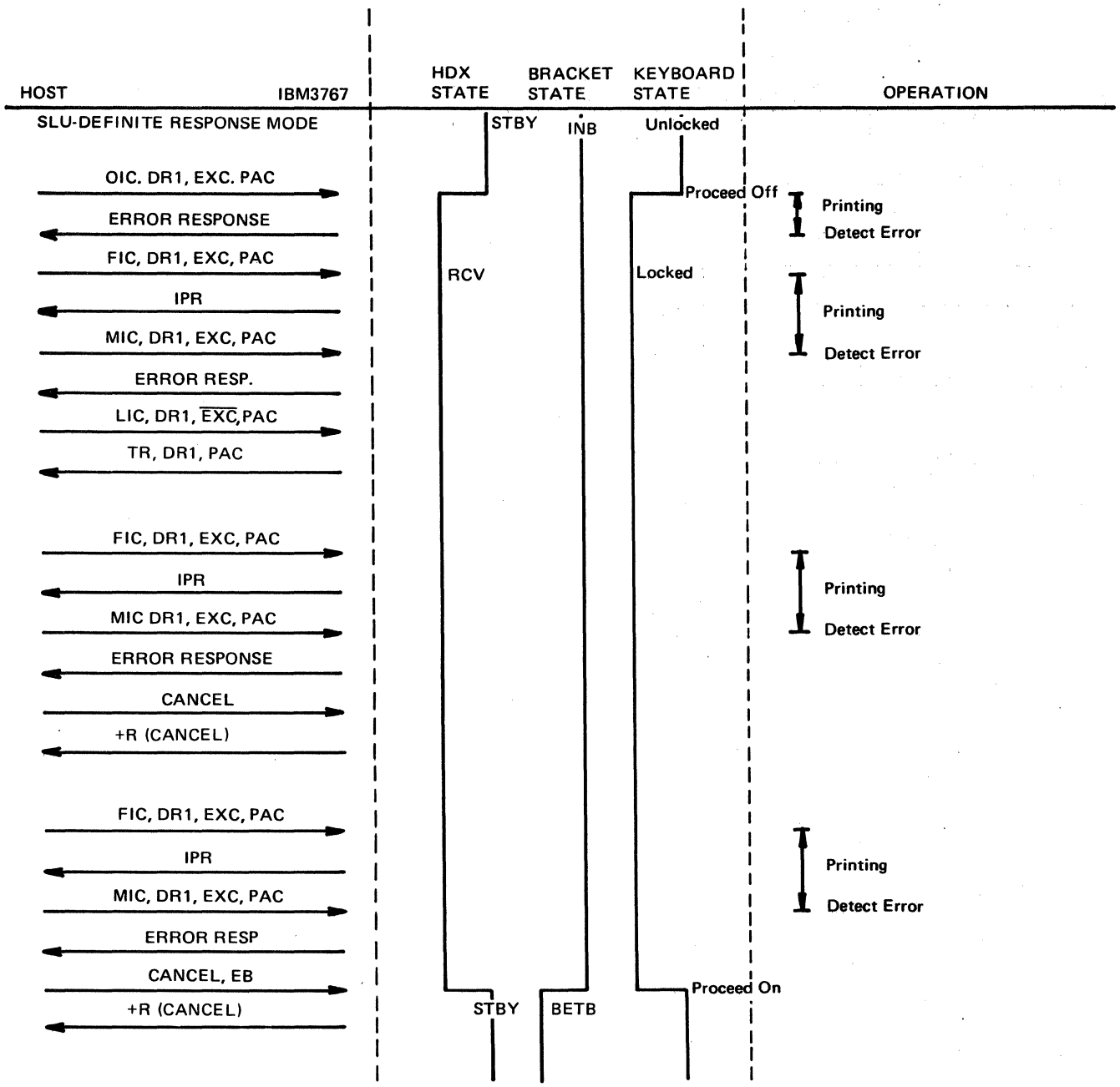


Figure 6-29. Terminal Sends Negative Response Sequence

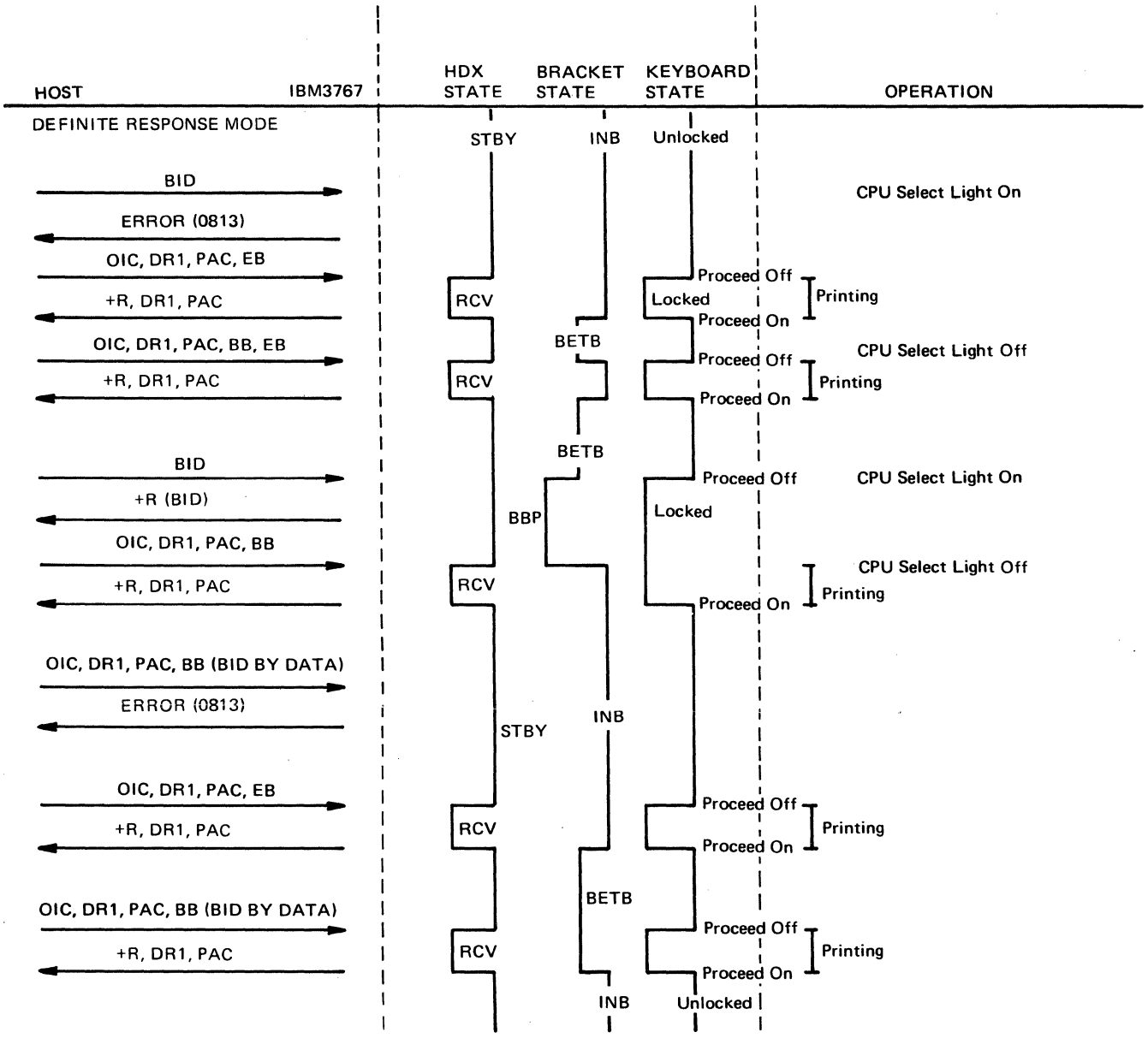


Figure 6-30. Bid and Bid by Data Sequence

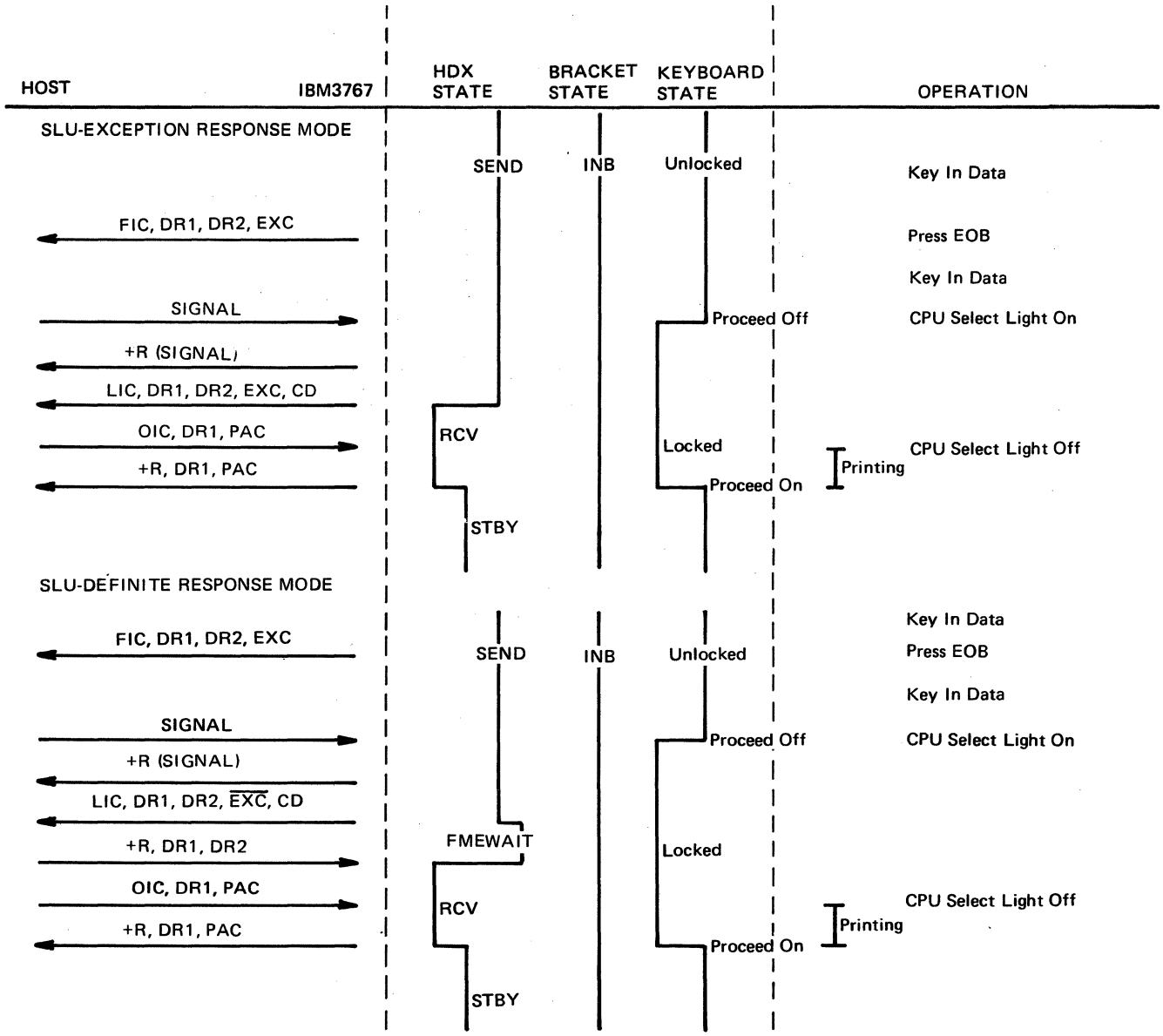


Figure 6-31. Signal from Host Sequence

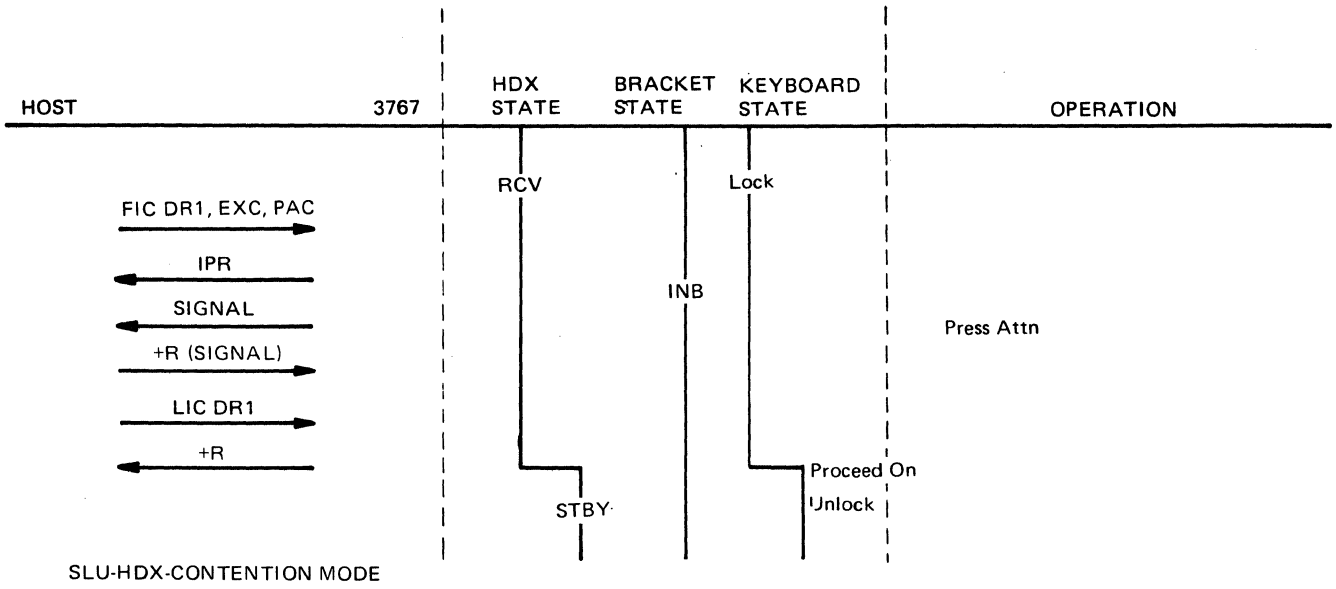


Figure 6-32. Signal from Terminal Sequence

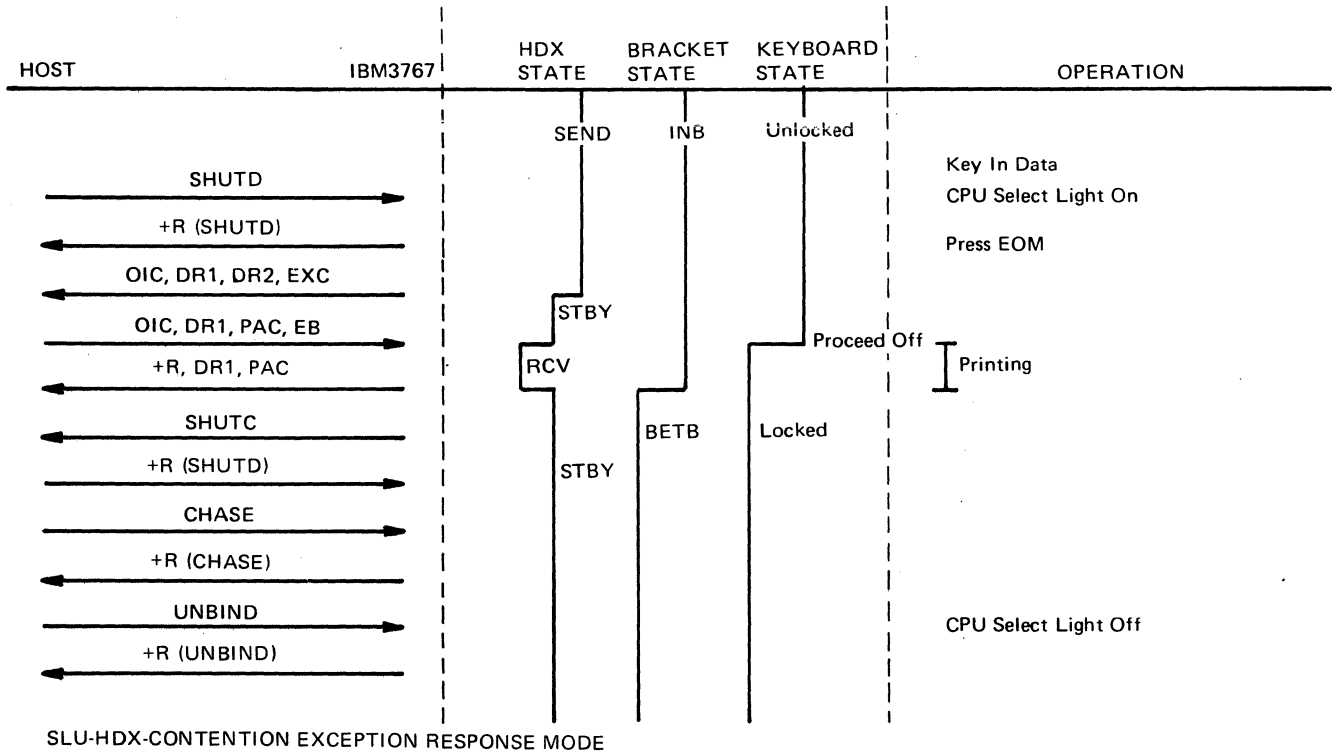


Figure 6-33. SHUTD, SHUTC, and CHASE Sequence

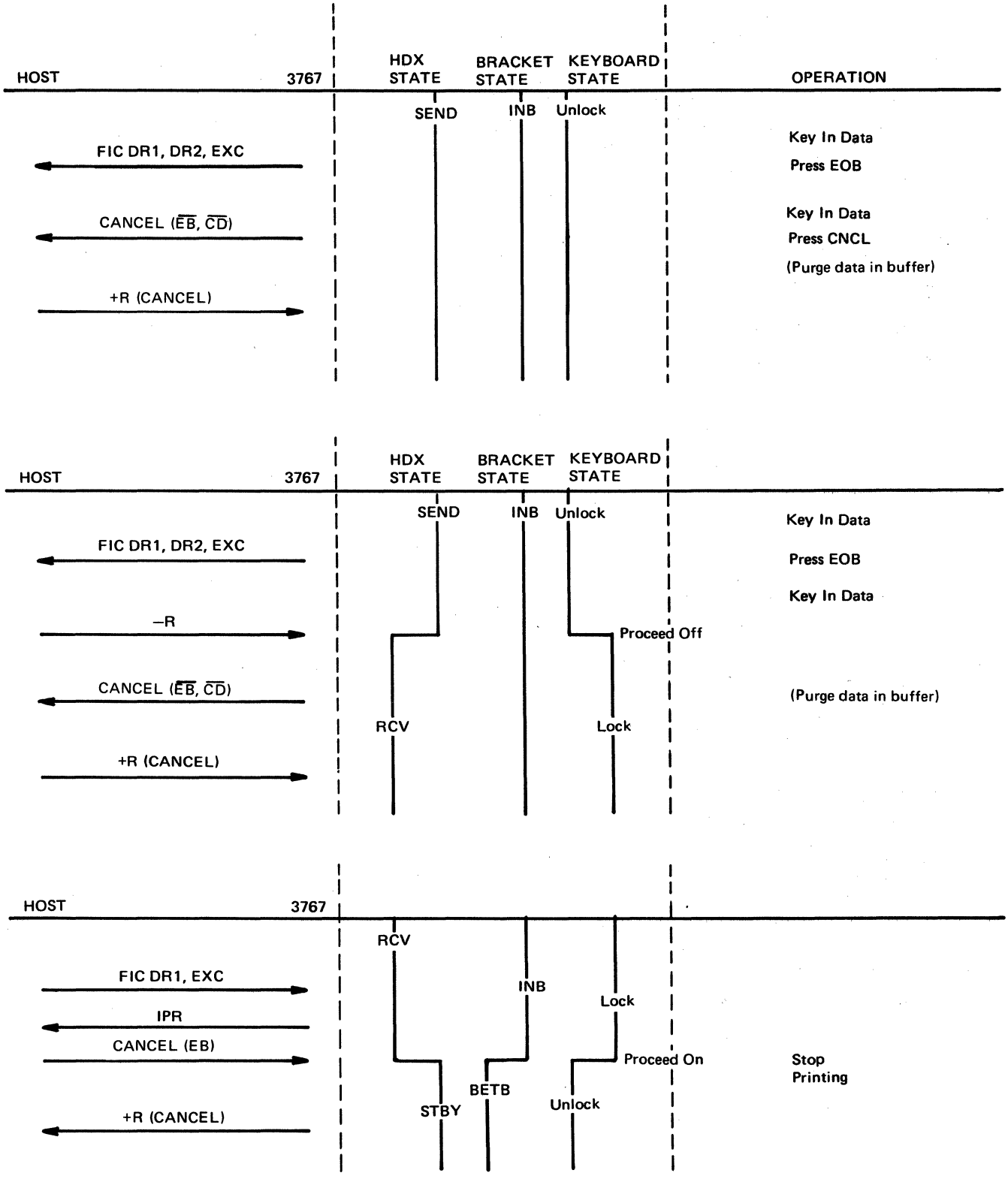


Figure 6-34. CANCEL Sequence

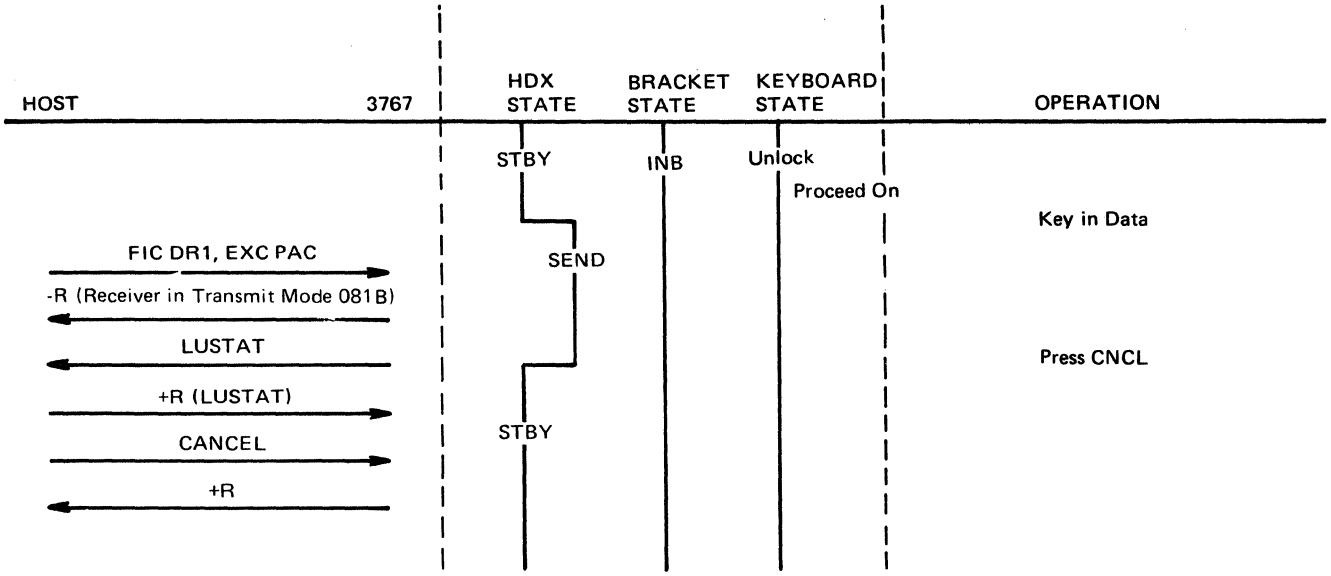


Figure 6-35. LUSTAT Sequence

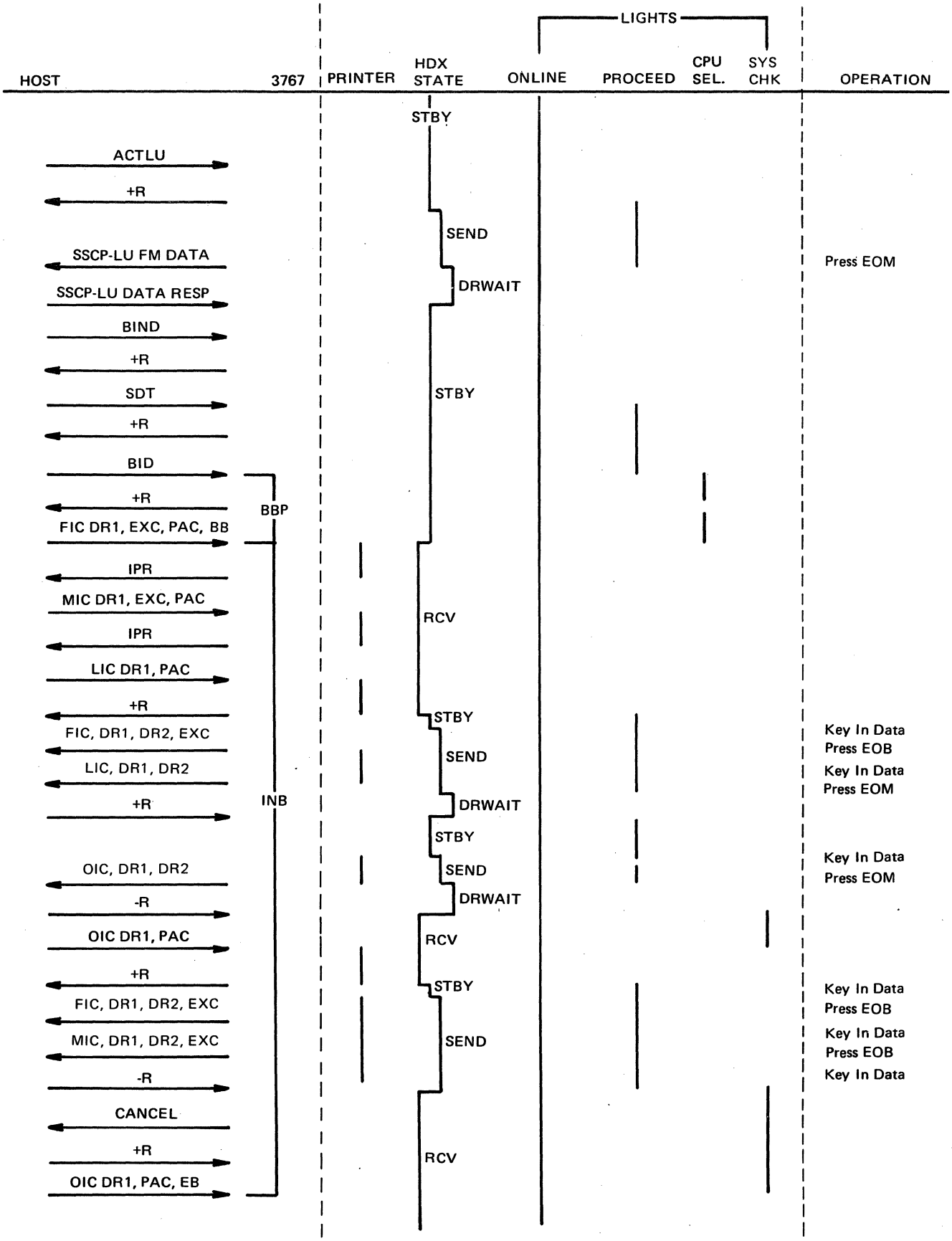


Figure 6-36 (Part 1 of 3). Data Flow Example - -HDX-Contention and Definite Response Mode Sequence

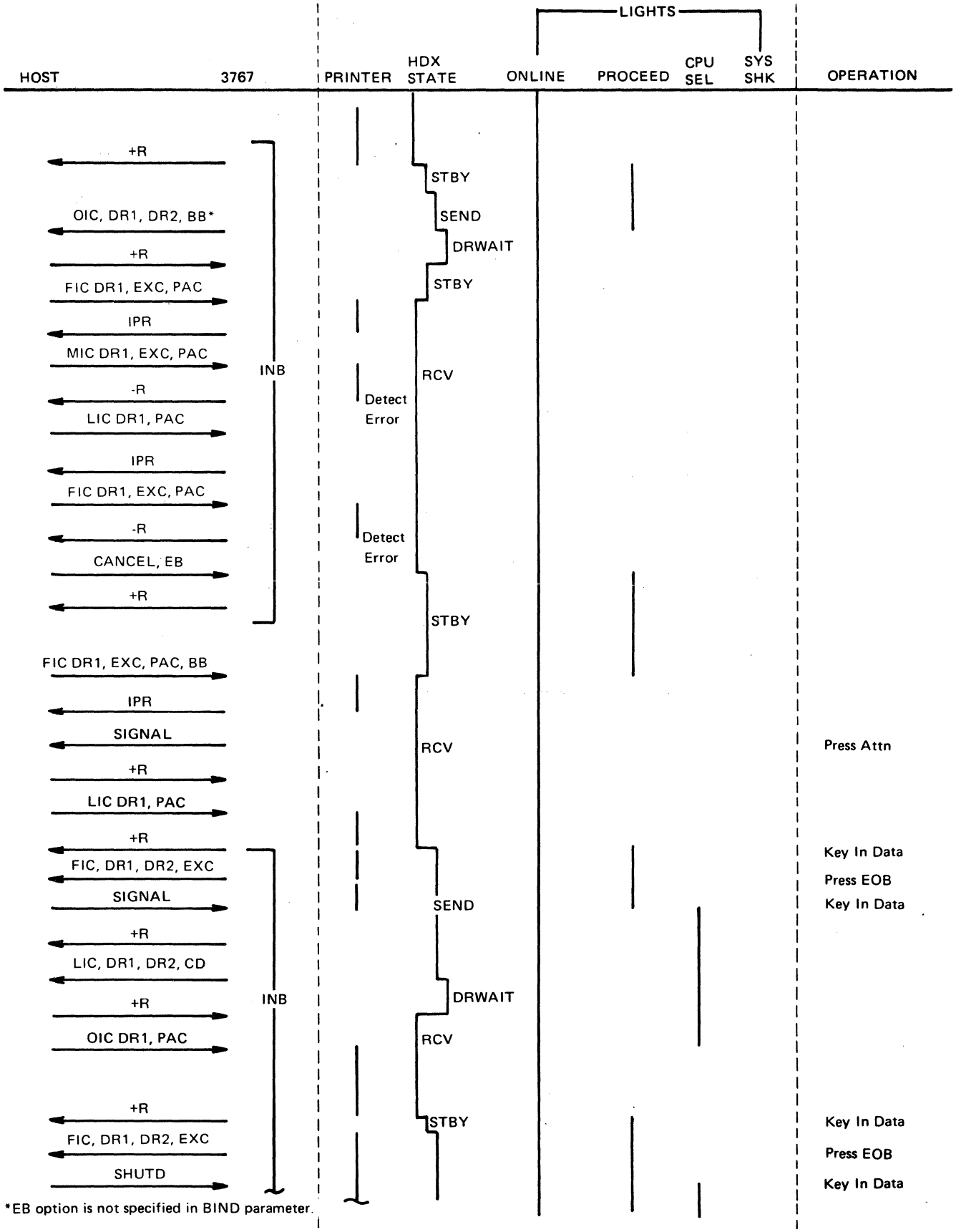


Figure 6-36 (Part 2 of 3). Data Flow Example–HDX-Contention and Definite Response Mode Sequence

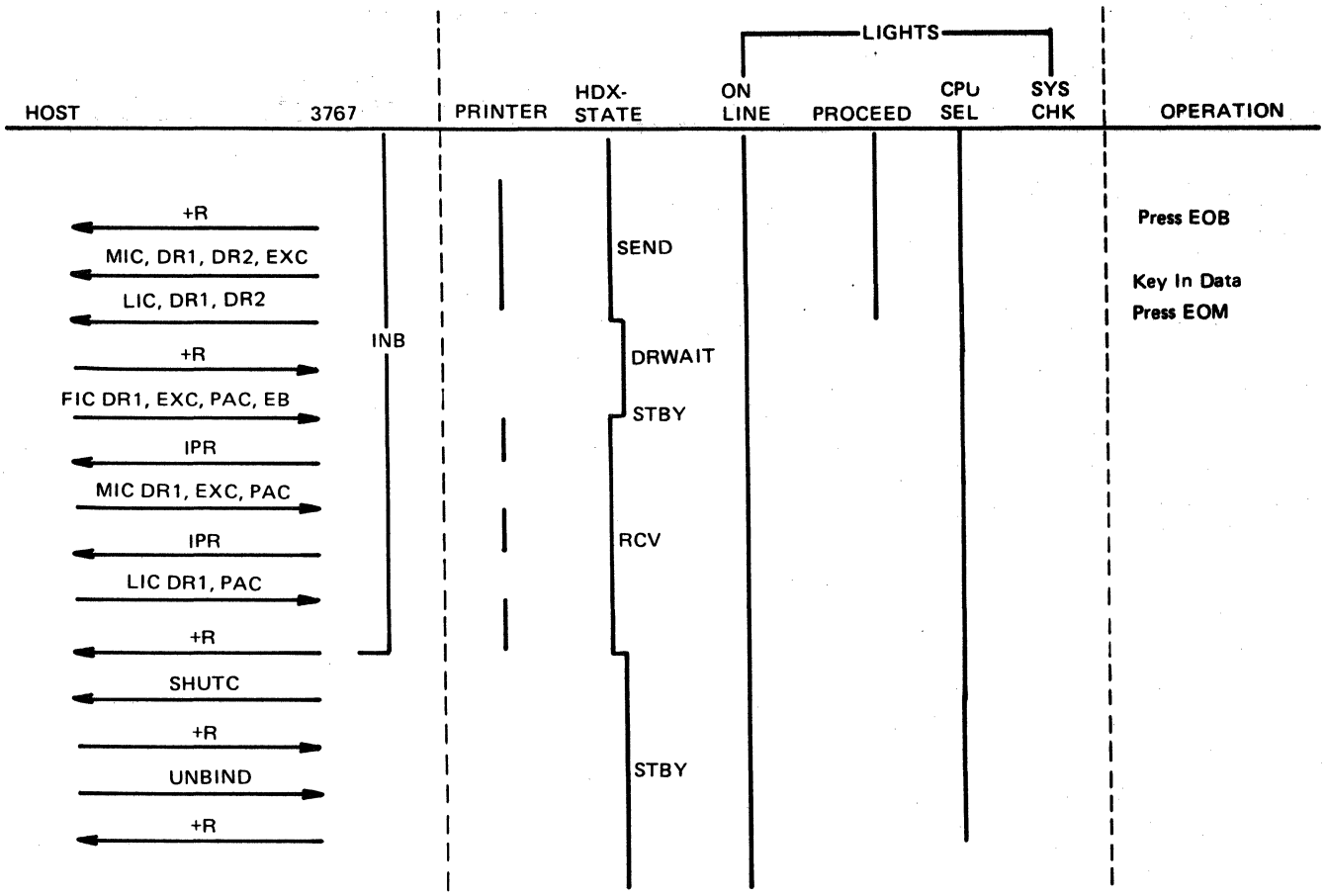
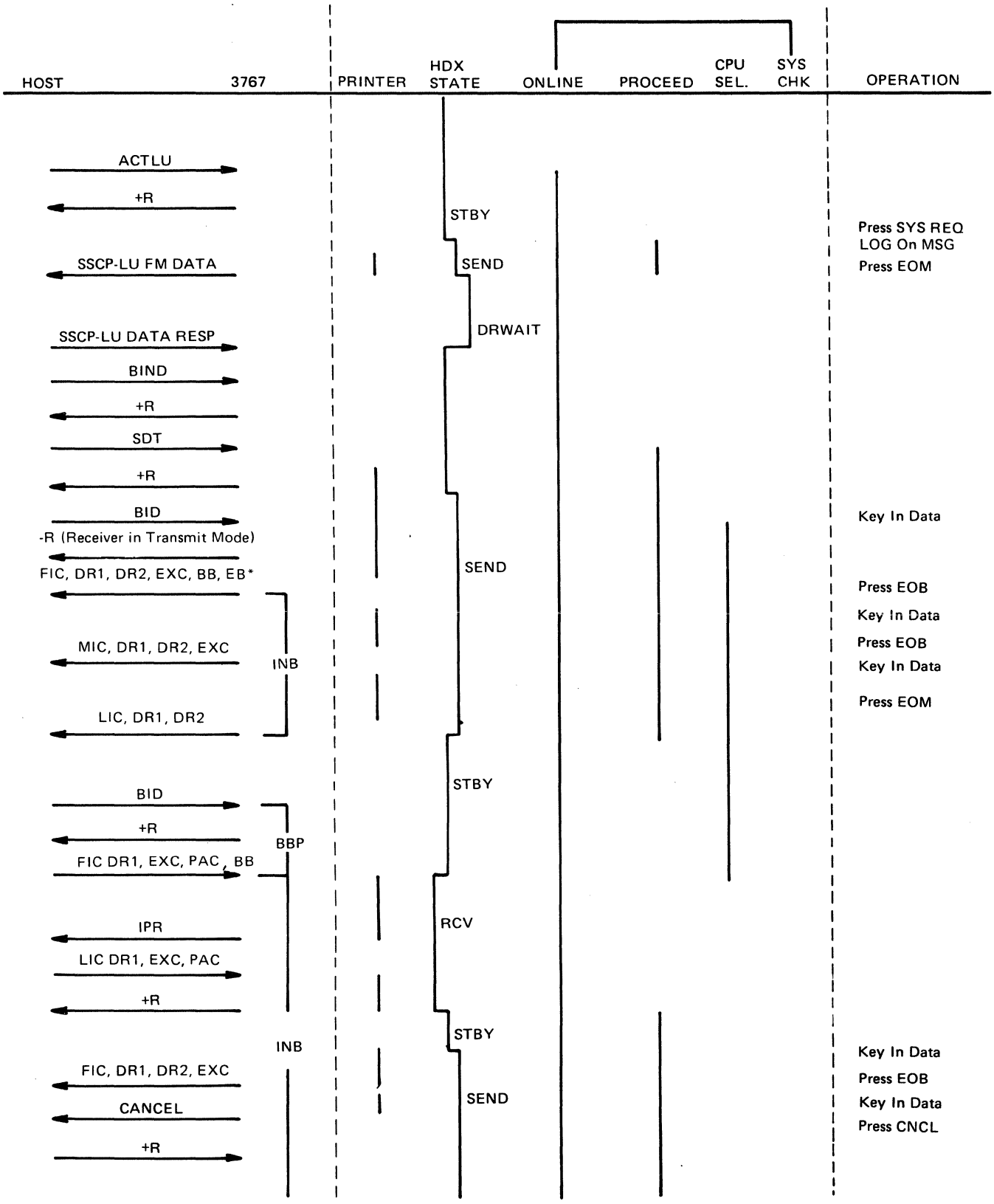


Figure 6-36 (Part 3 of 3). Data Flow Example - -HDX-Contention and Definite Response Mode Sequence



*HEB Option is specified in the BIND parameter.

Figure 6-37 (Part 1 of 3). Data Flow Example - -HDX-Contention and Exception Response Mode Sequence

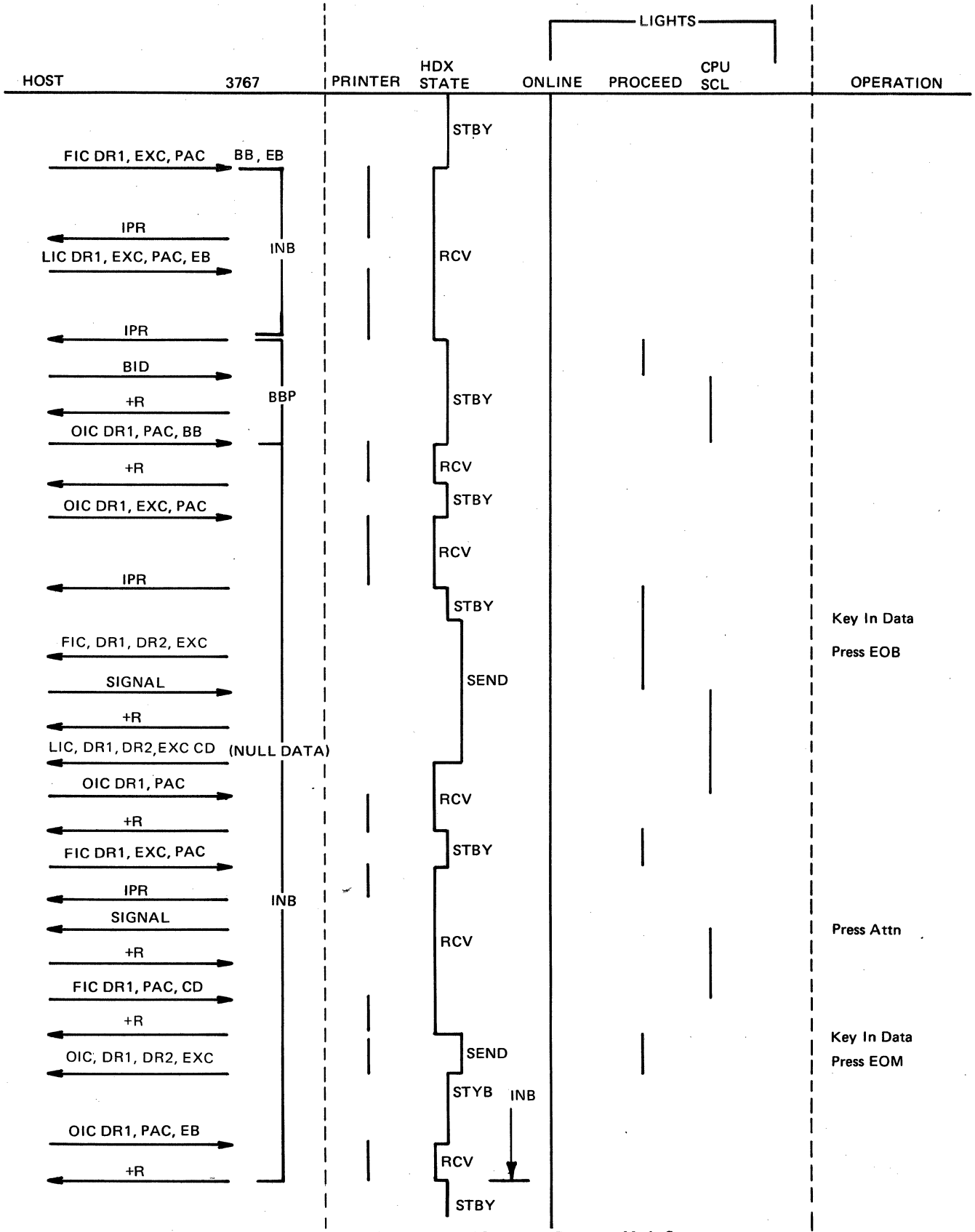


Figure 6-37 (Part 2 of 3). Data Flow Example - -HDX-Contention and Exception Response Mode Sequence

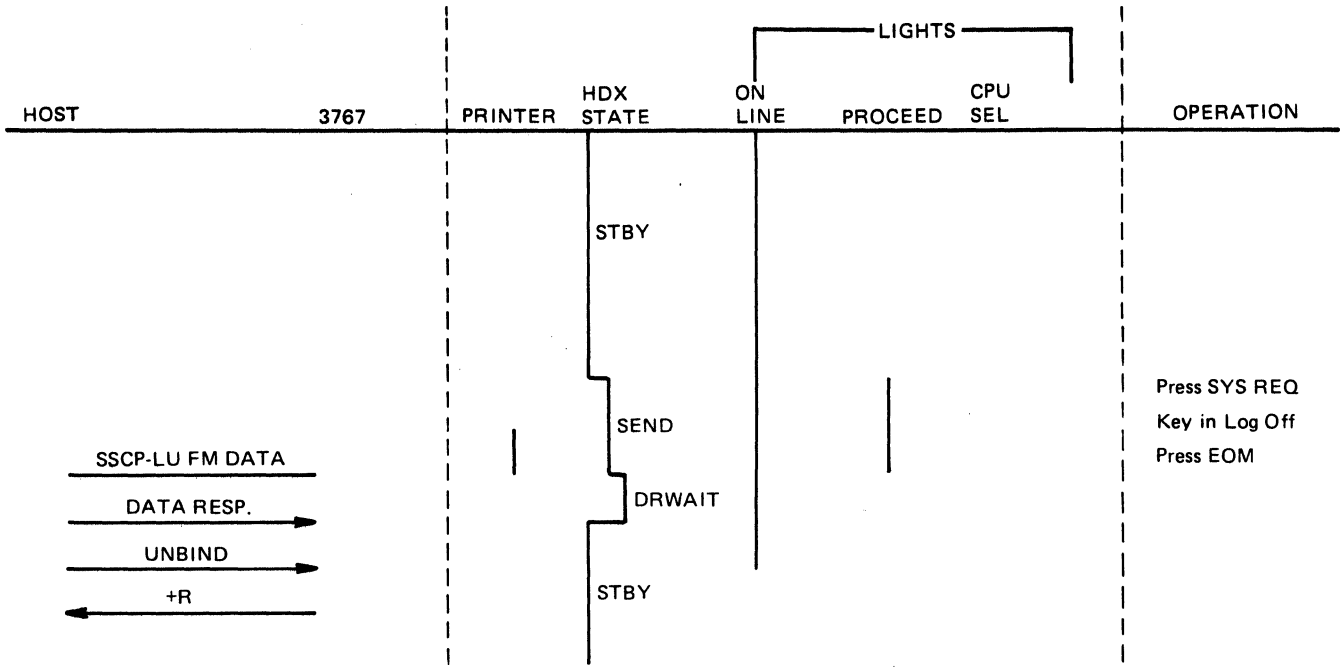


Figure 6-37 (Part 3 of 3). Data Flow Example - -HDX-Contention and Exception Response Mode Sequence

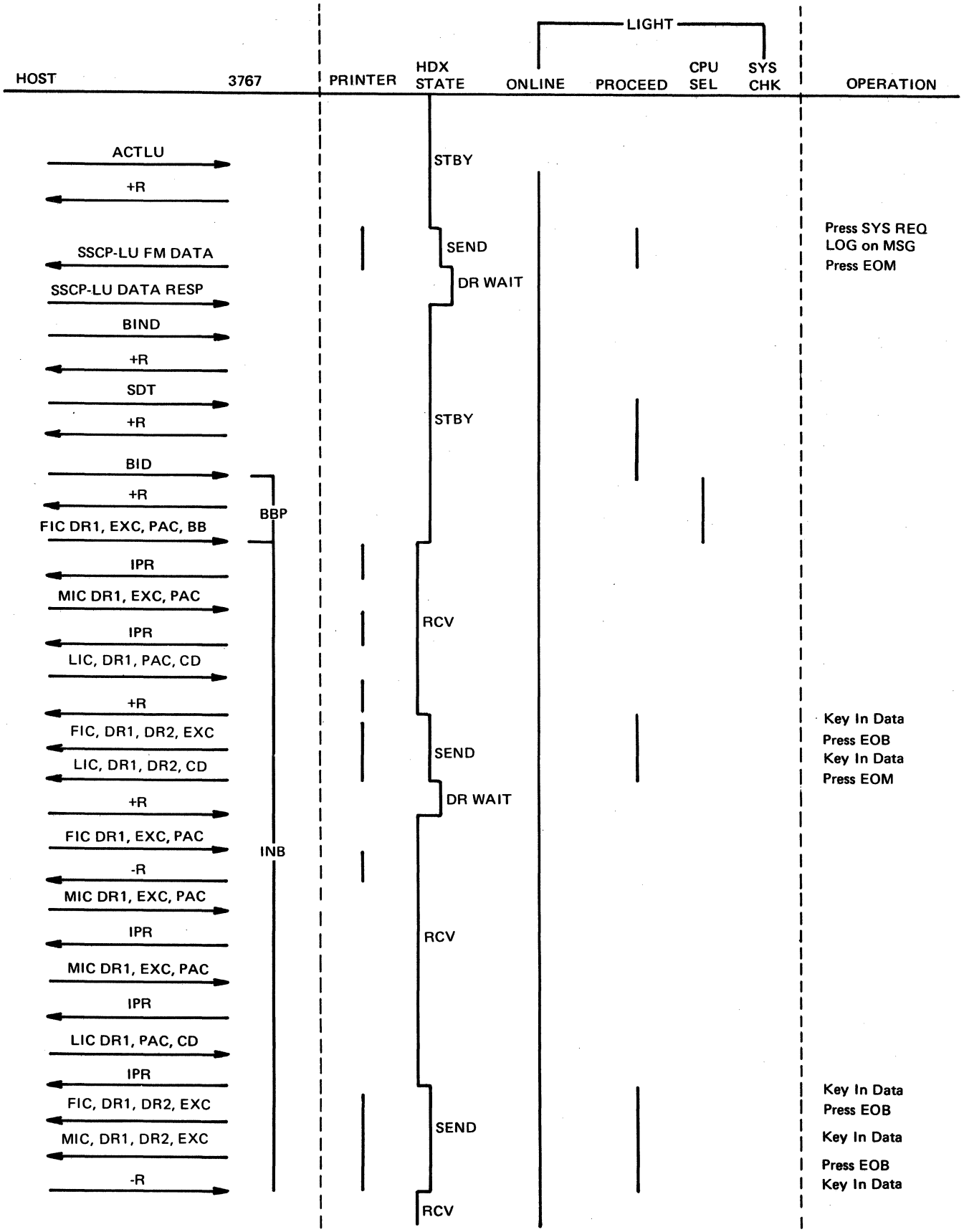


Figure 6-38 (Part 1 of 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

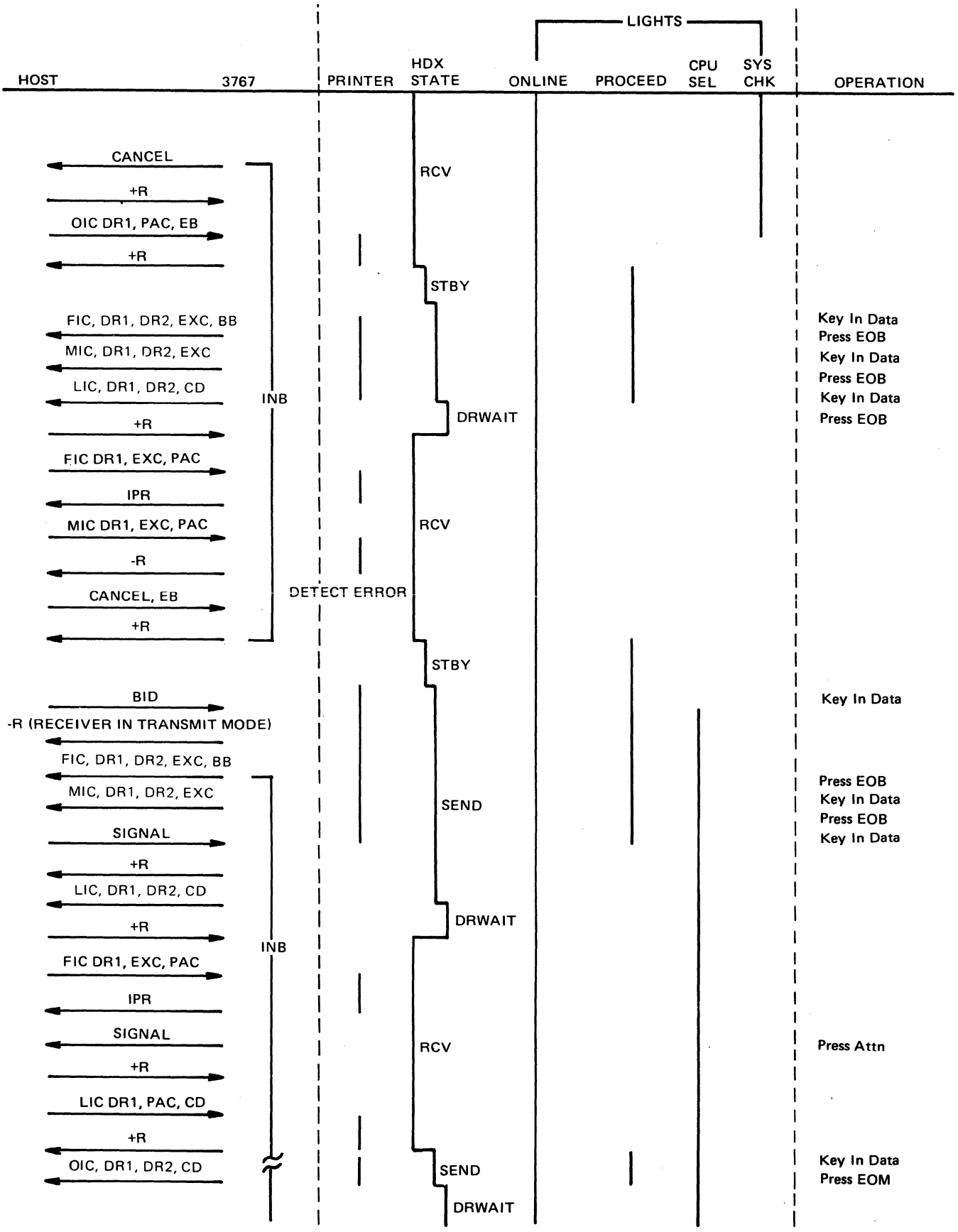


Figure 6-38 (Part 2 of 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

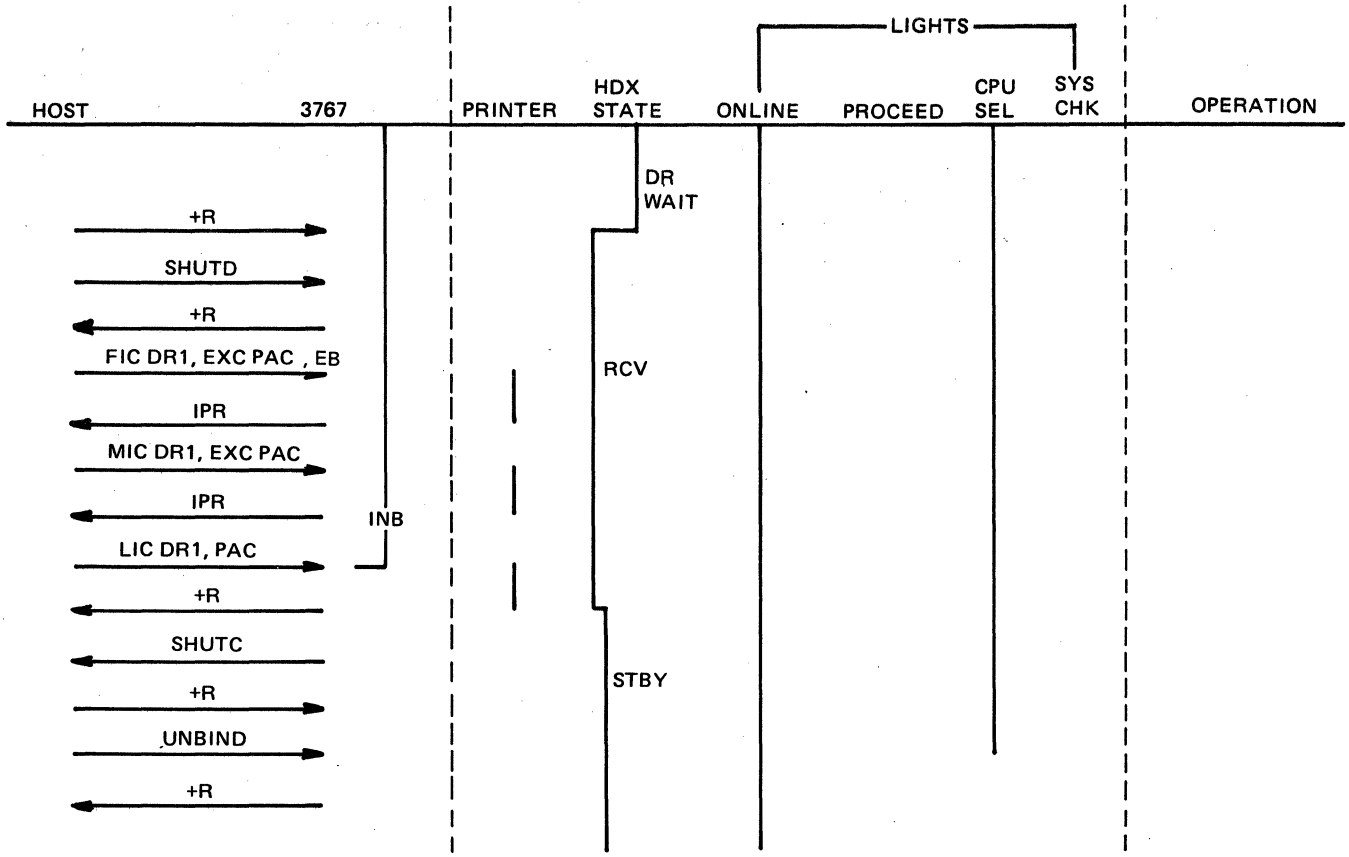


Figure 6-38 (Part 3 fo 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

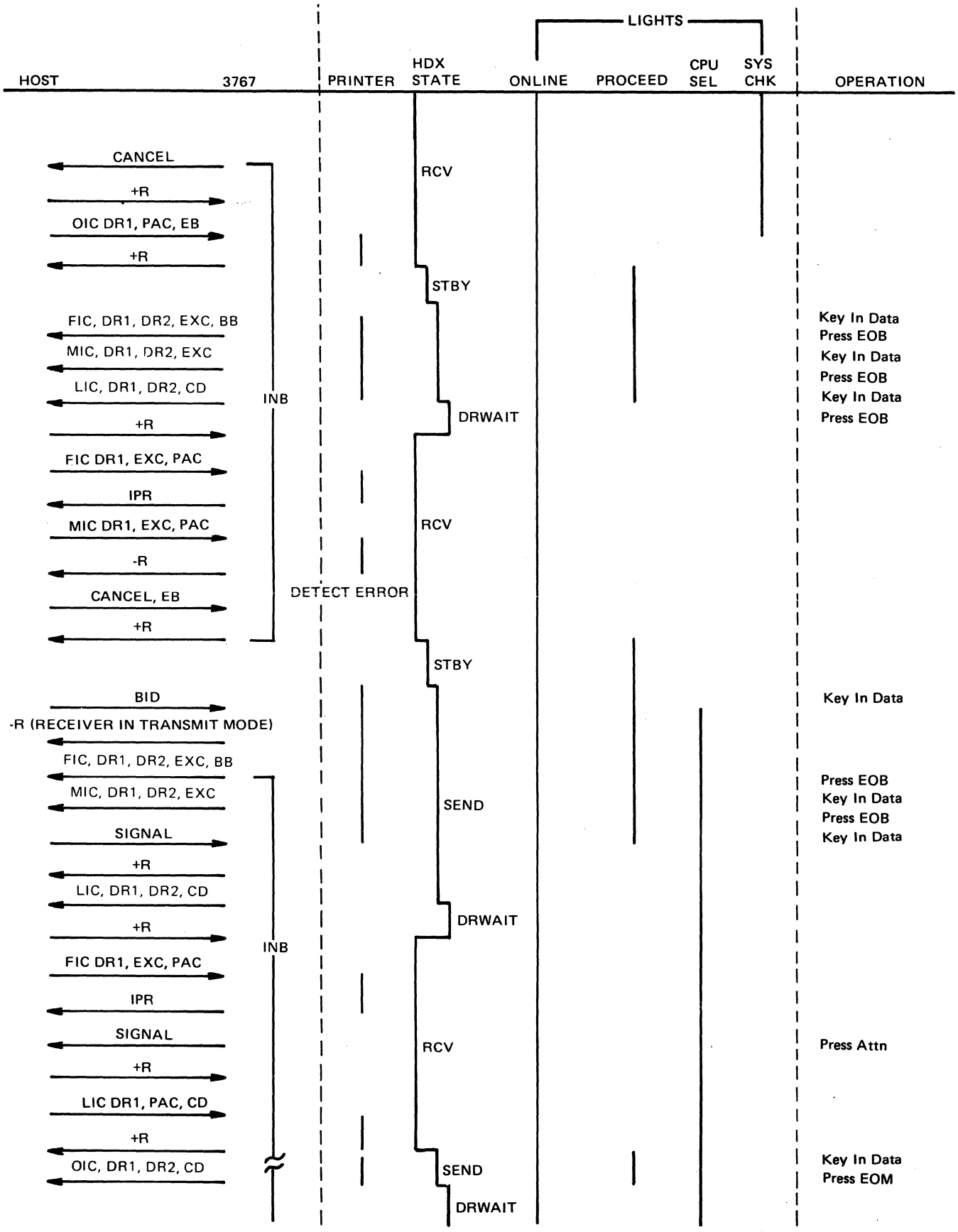


Figure 6-38 (Part 2 of 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

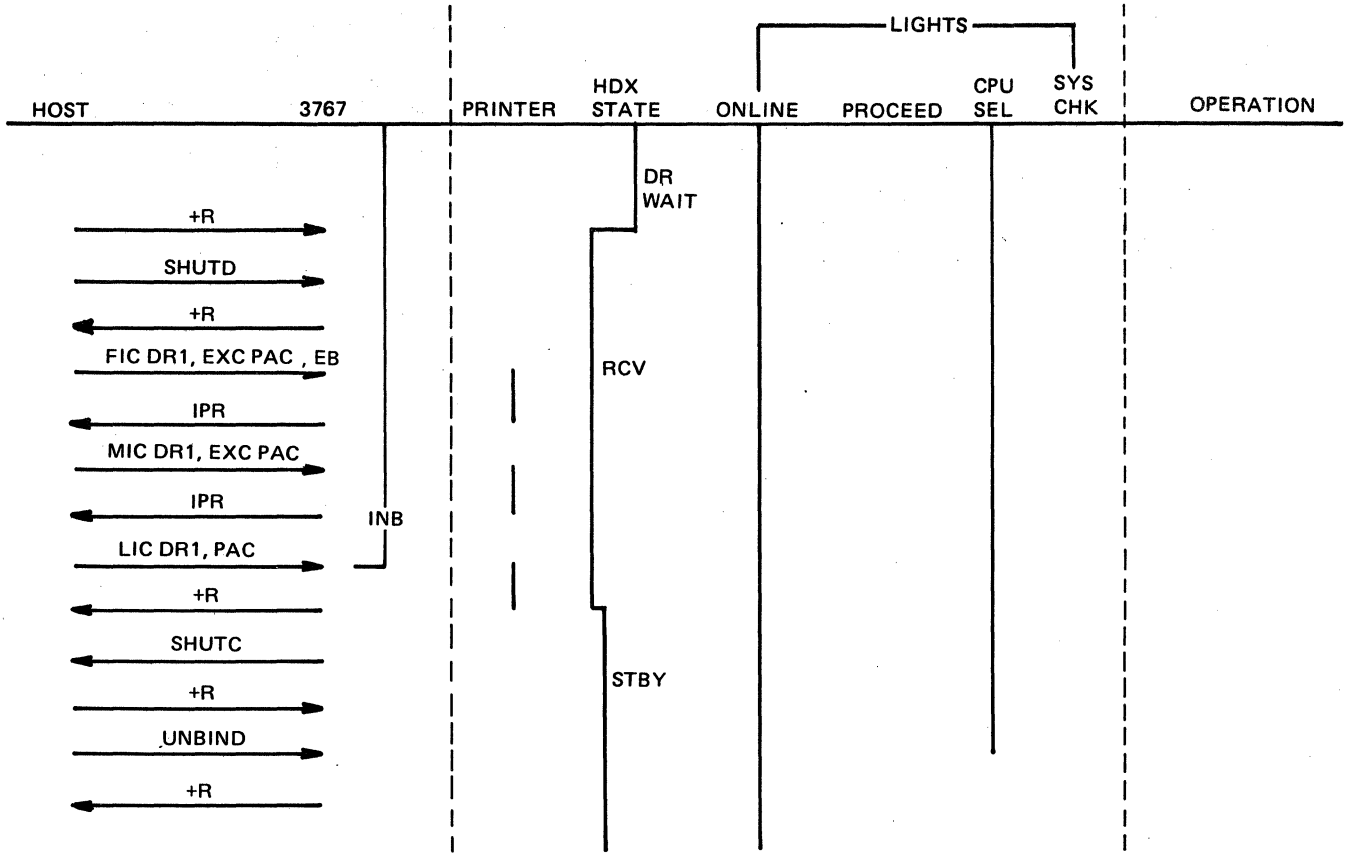


Figure 6-38 (Part 3 fo 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

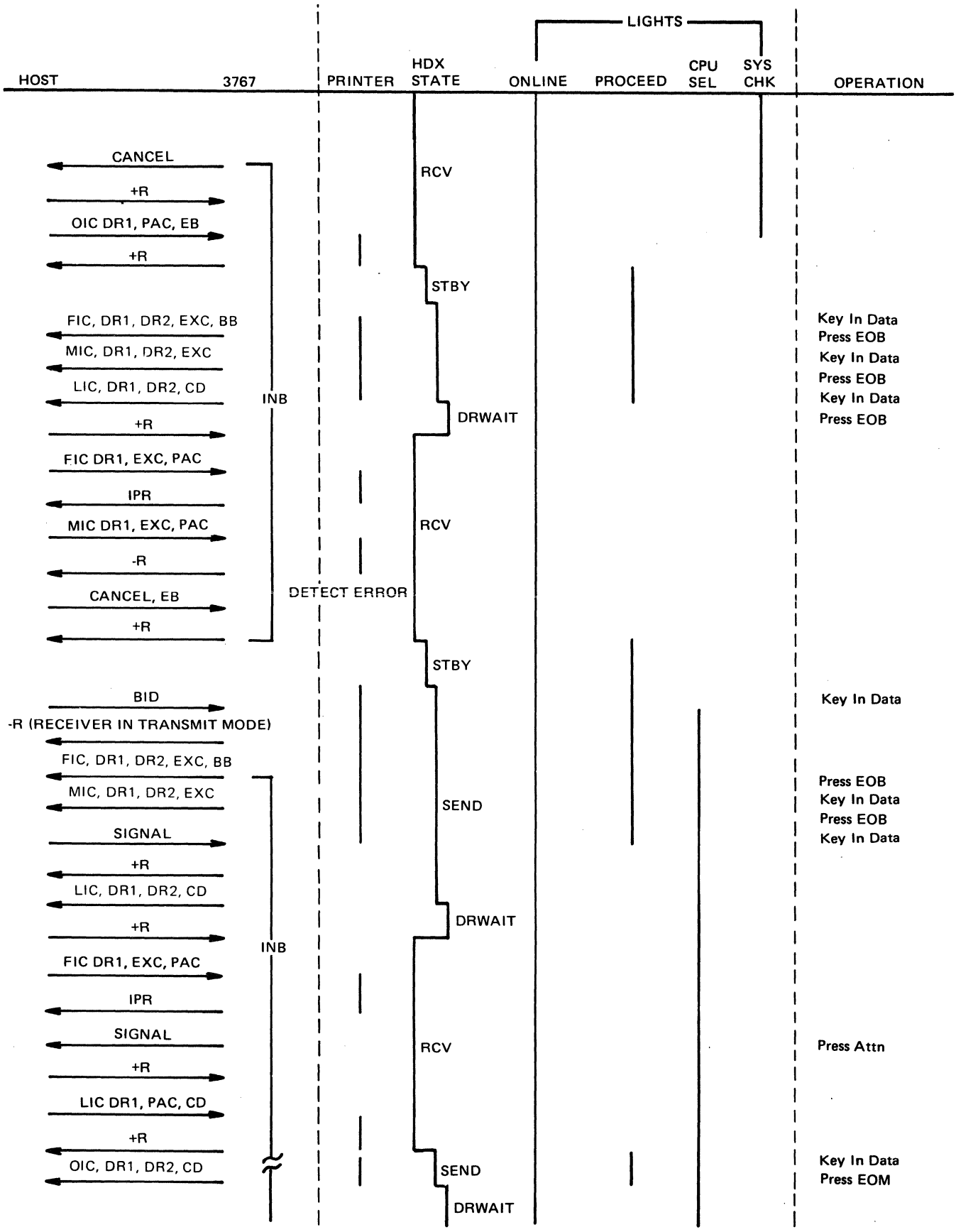


Figure 6-38 (Part 2 of 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

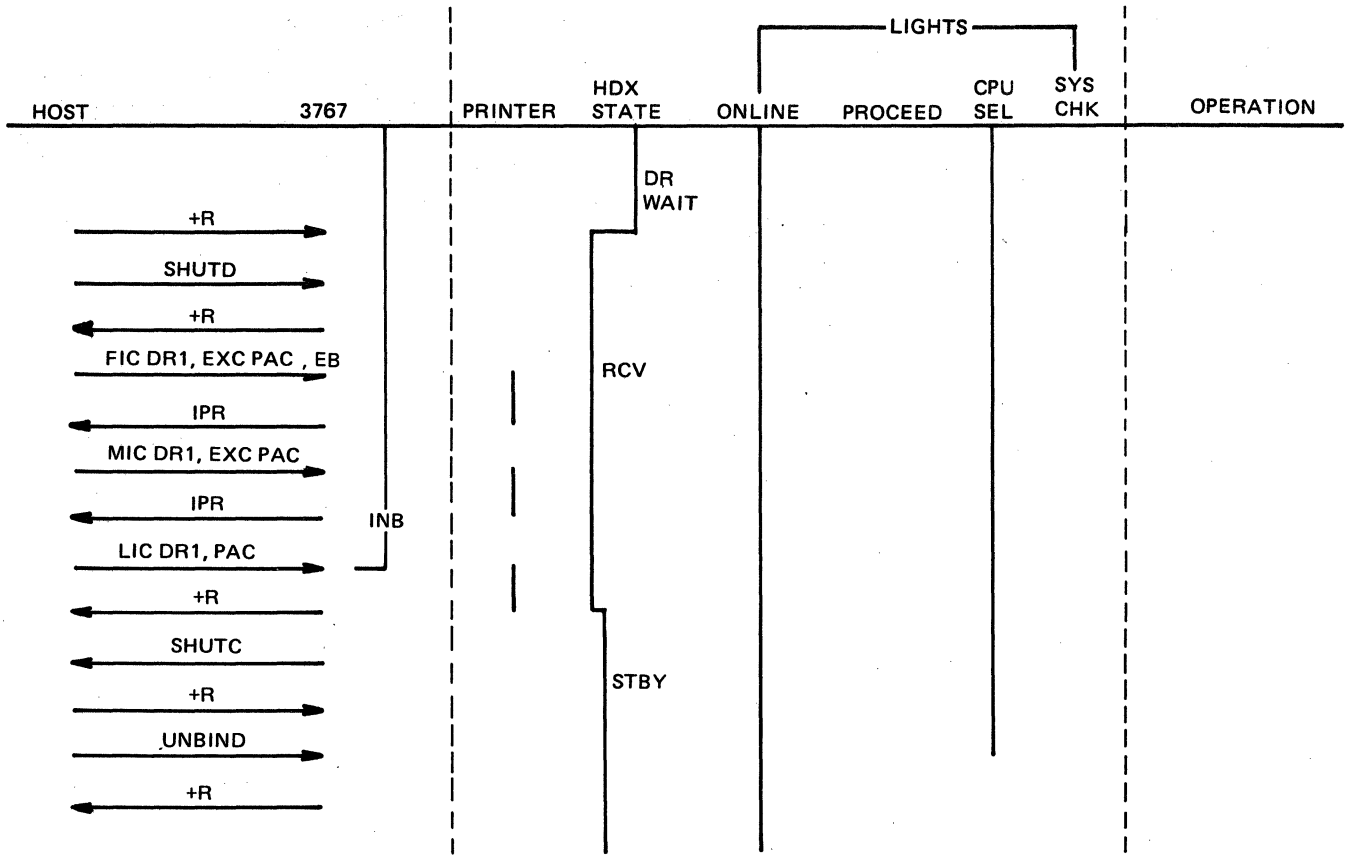


Figure 6-38 (Part 3 fo 3). Data Flow Example - -HDX FF and Definite Response Mode Sequence

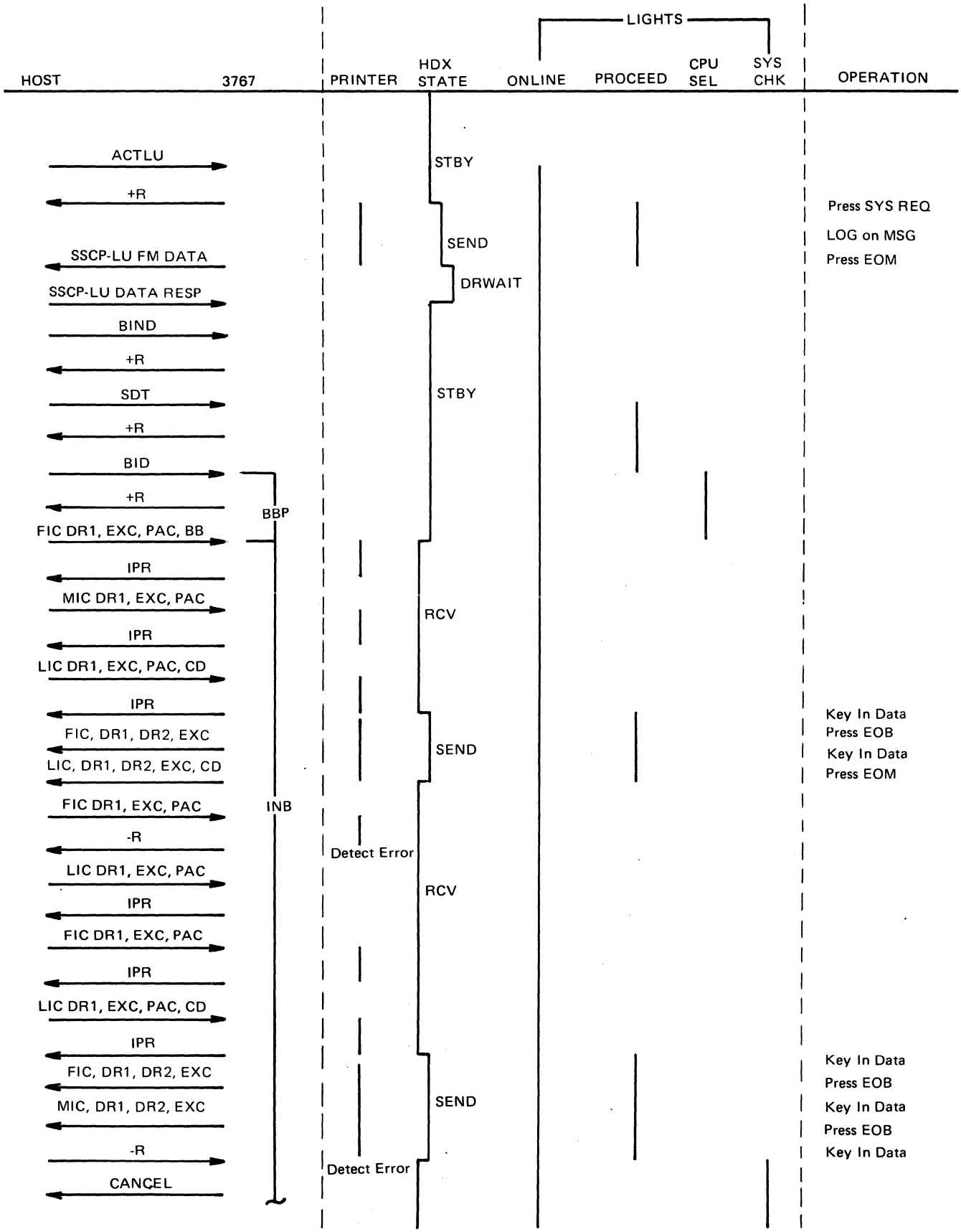


Figure 6-39 (Part 1 of 3). Data Flow Example–HDX/FF and Exception Response Mode Sequence

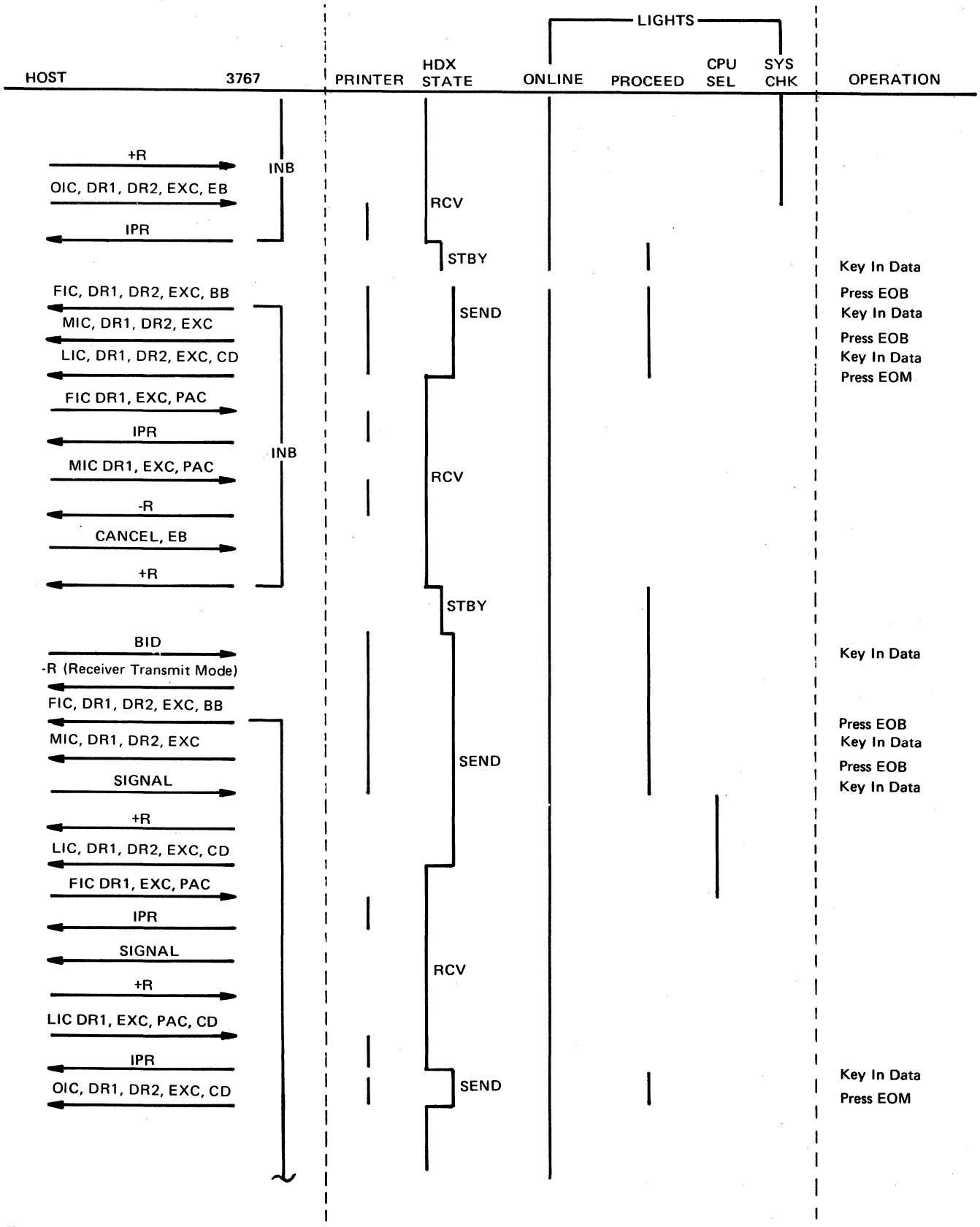


Figure 6-39 (Part 2 of 3). Data Flow Example–HDX/FF and Exception Response Mode Sequence

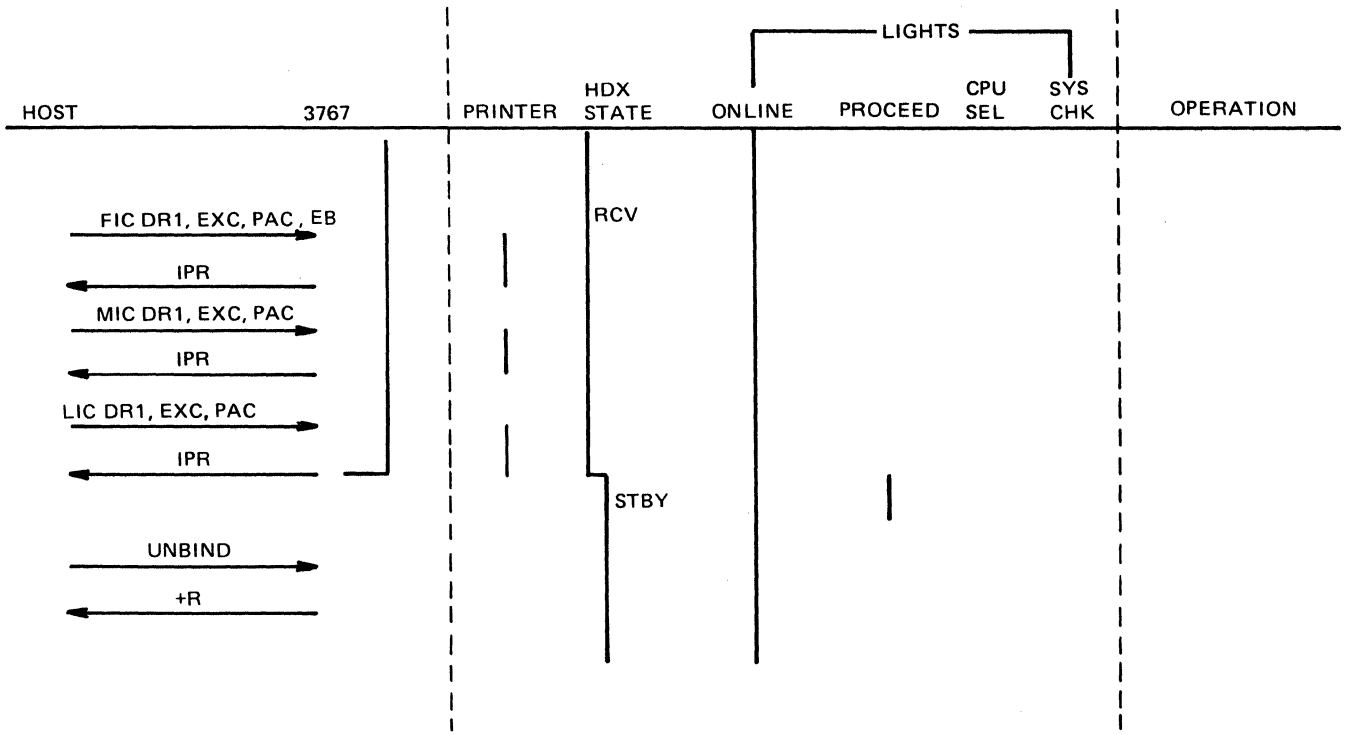


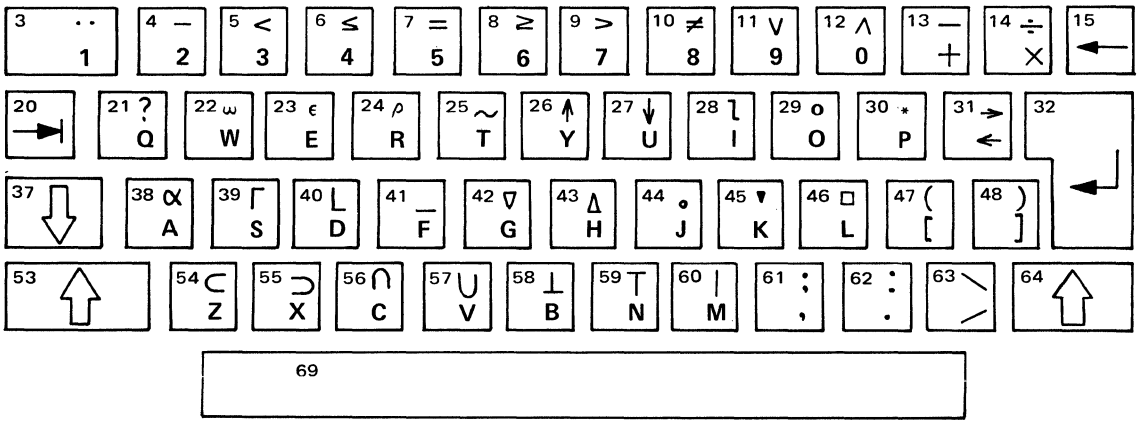
Figure 6-39 (Part 3 of 3). Data Flow Example--HDX/FF and Exception Response Mode Sequence

Appendix A. Keyboard Layouts and Code Charts

Keyboards

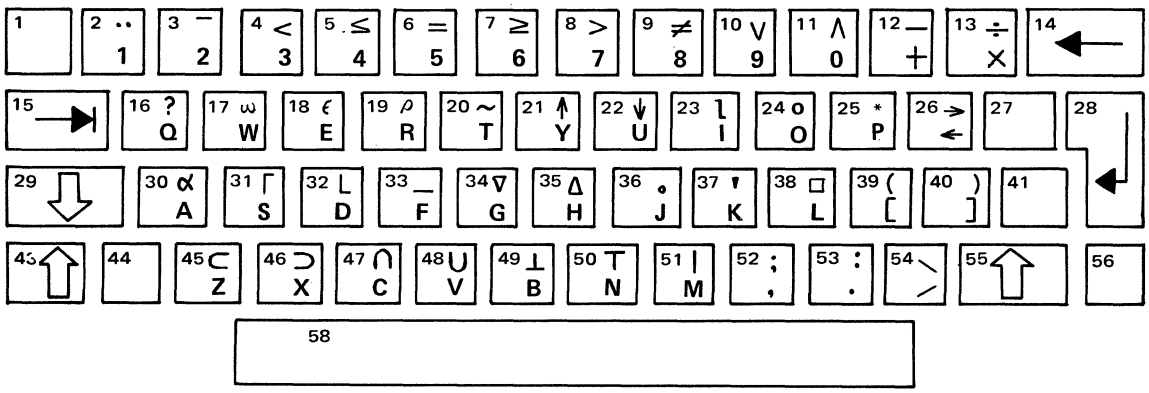
Variations in keyboard layout are shown on the following pages.

On some keyboards for non-USA countries, certain keys generate two different print graphics; i.e., these keys have dual assignments for printing graphics, one for start-stop line control, and the other for SDLC control. This is to provide the same character set on the 3767 start-stop as is used on the current IBM 2740/41 Communication Terminal in non-USA countries. These keys are called Dual Assignment Keys.



Dual Assignment Keys: none

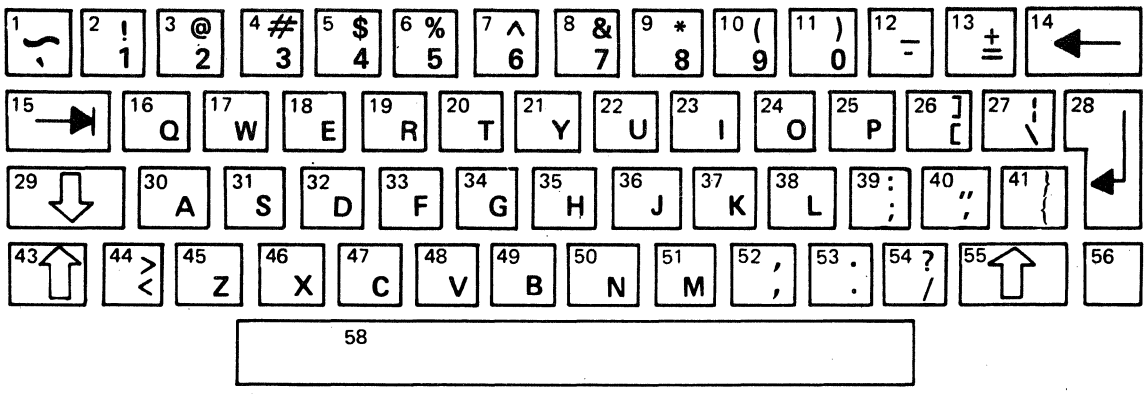
Figure A-1. APL (USA)



Dual Assignment Keys: none

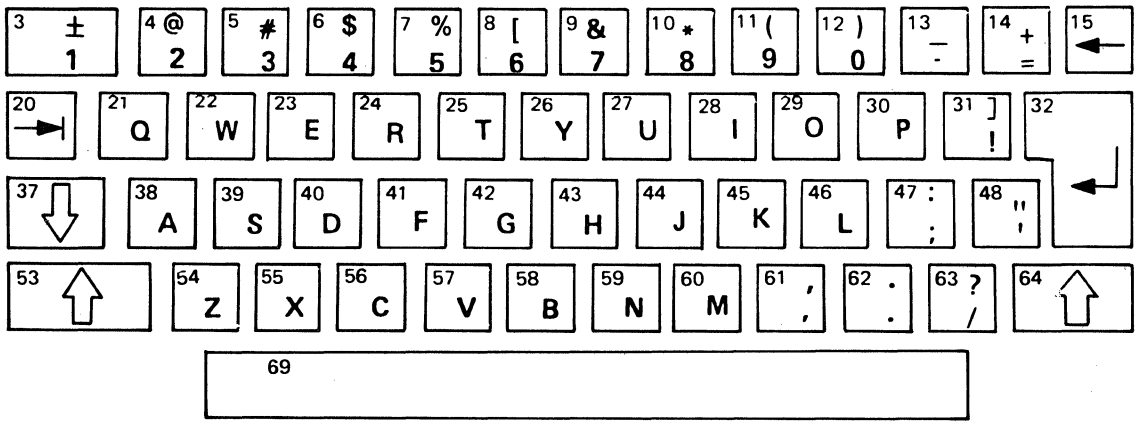
Figure A-2. APL (non-USA)

Note: Figures A-1 and A-2 are not intended to illustrate the keyboard engravement for APL: These two figures show the graphic characters assigned to each key on the keyboard when APL code is specified as an alternate character set. Nomenclature of APL is provided on a decal card.



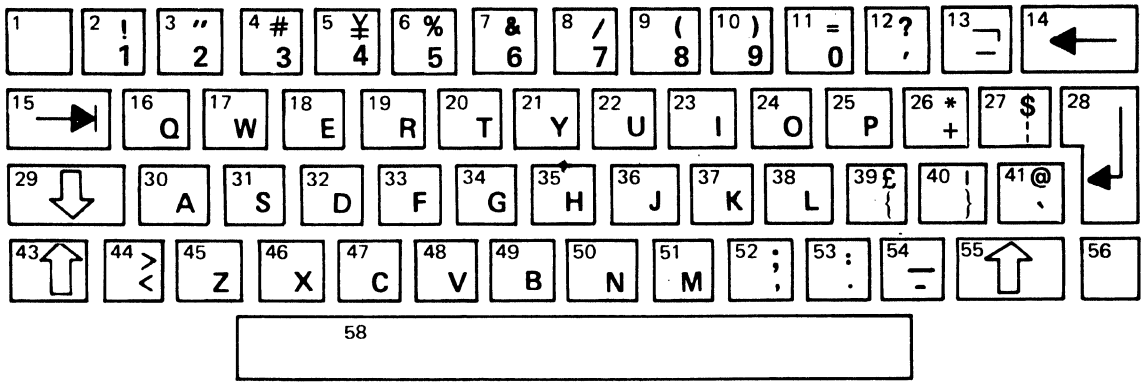
Dual Assignment Keys: none

Figure A-3 ASCII (USA)



Dual Assignment Keys: none

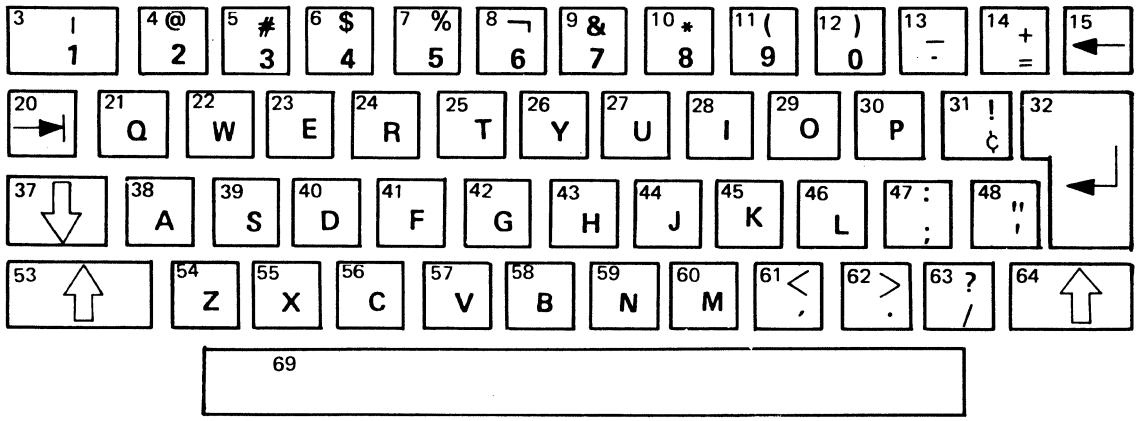
Figure A-4. Correspondence (USA)



Inactive Graphics in start-stop line control: — $: ` { }

Dual Assignment Keys: none

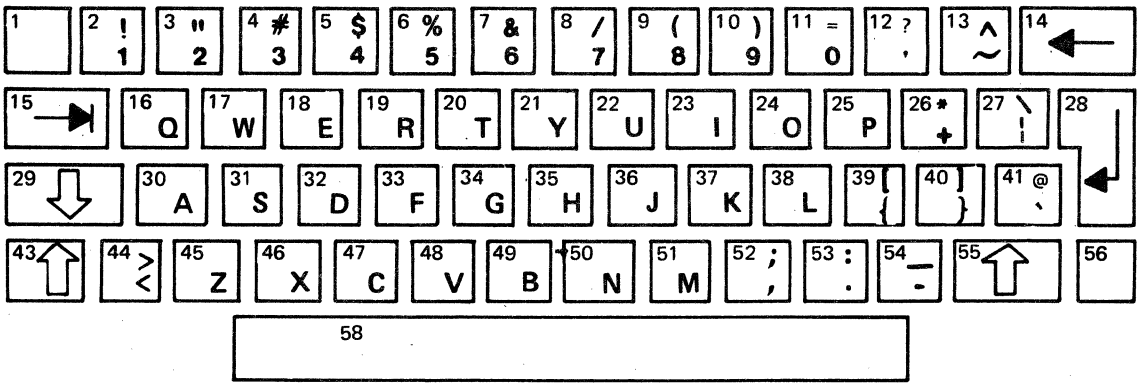
Figure A-5. EBCDIC (Japan)



Dual Assignment Keys: none

Note: This keyboard layout is also used for Mono I and Mono II.

Figure A-6. EBCDIC (USA)

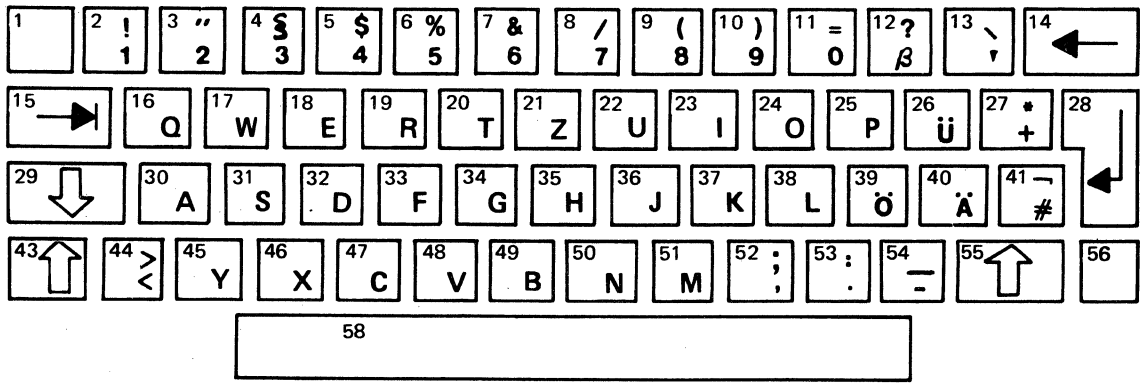


Inactive Graphics in start-stop line control: ~ \ ¦ { } `

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
13U	Λ	¬
39U	[	Ç
40U	]	¦

Figure A-7. International EBCDIC (Countries other than USA & Canada)



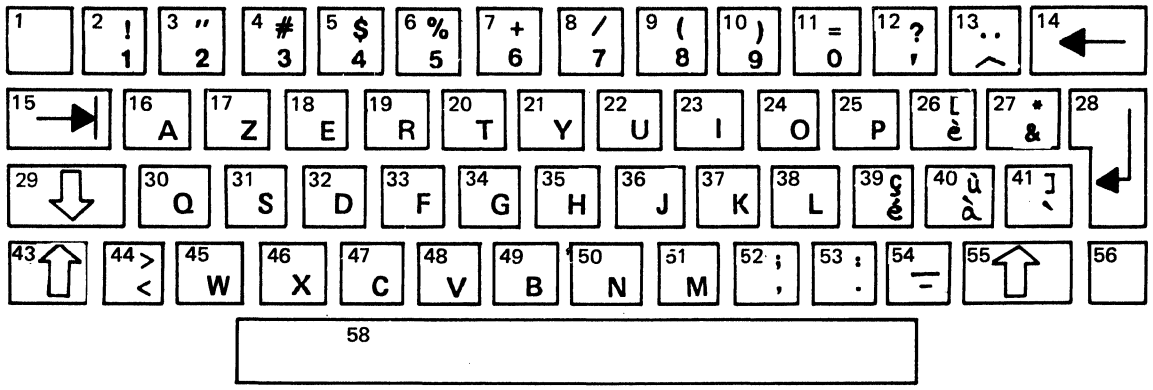
Inactive Graphics in start-stop line control: ß ` Ä ü Ü ä

Dual Assignment Keys: none

The following graphics used on the IBM 2740/41 Communication Terminal are replaced with other special graphics on the 3767 Communication Terminal in start-stop control:

Key Position	Start-Stop Code	S	Print Graphic on the 3767 S/S	Print Graphic on the 2740/2741
4U	A821C	U	§	¦
39L	A	L	ö	@
39U	A	U	ö	Ç

Figure A-8. Austria/Germany



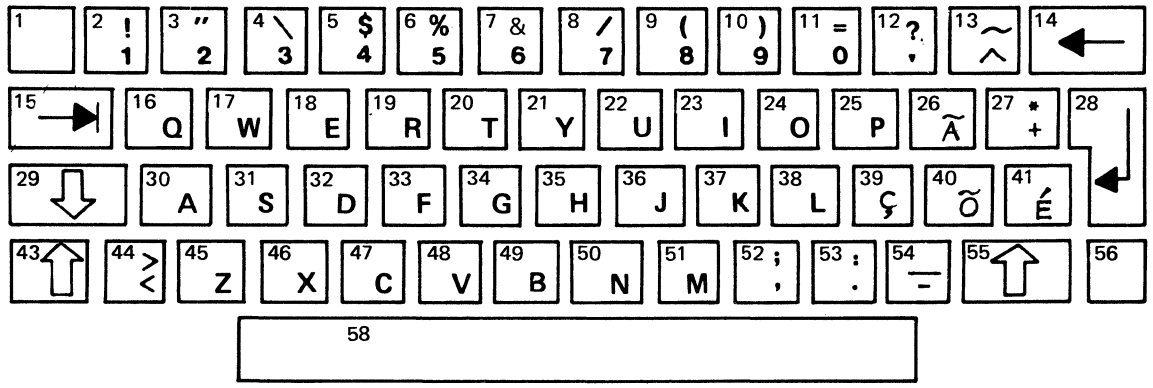
Inactive Graphics in start-stop line control: .. é ç è à ¨

Dual Assignment Keys: none

The following graphics used on the IBM 2740/41 Communication Terminal are replaced with other special graphics on the 3767 Communication Terminal in start-stop control:

Key Position	Start-Stop Code	S	Print Graphic on the 3767 S/S	Print Graphic on the 2740/2741
2U	A821C	U	!	|
13L	BA821	L	^	¬
26U	A	U	[	Ç
40L	A	L	à	@
41U	B821C	U	]	]

Figure A-9. Belgium

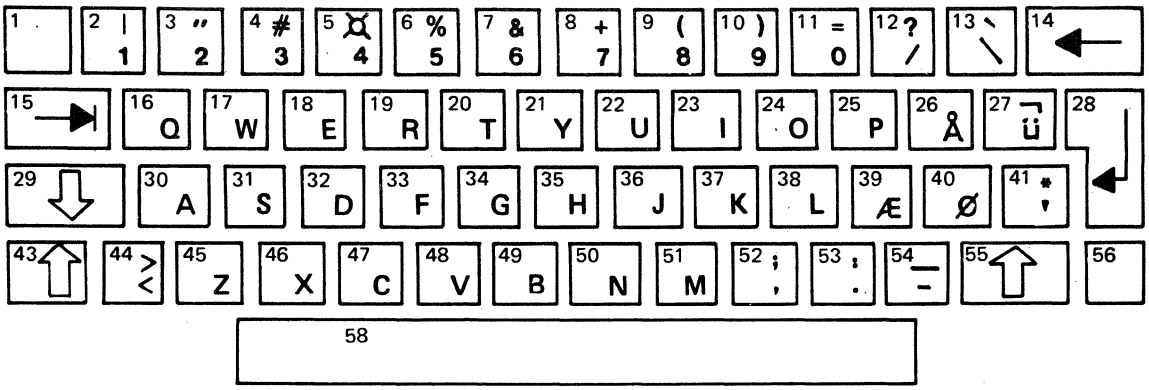


Inactive Graphics in start-stop line control: \ ~ " $ É é

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
2U	!	|
13L	^	¬

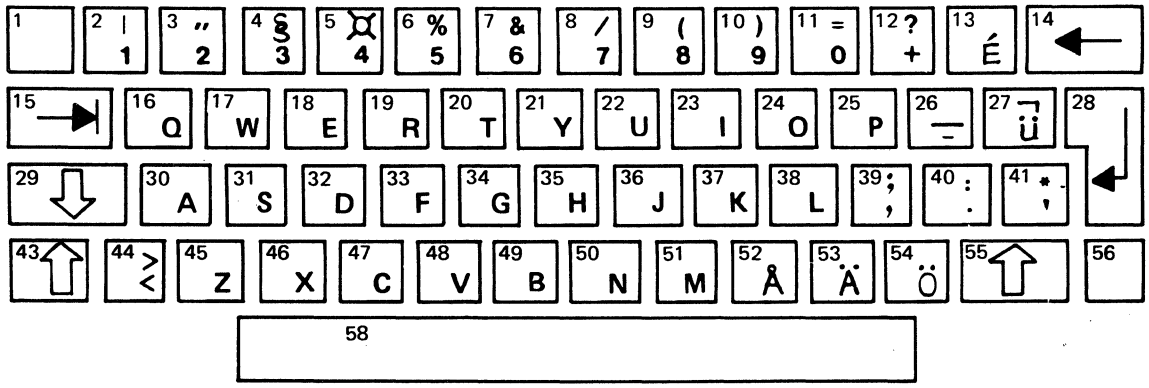
Figure A-10. Brazil



Inactive Graphics in start-stop line control: \ ' ü " # ¤

Dual Assignment Keys: none

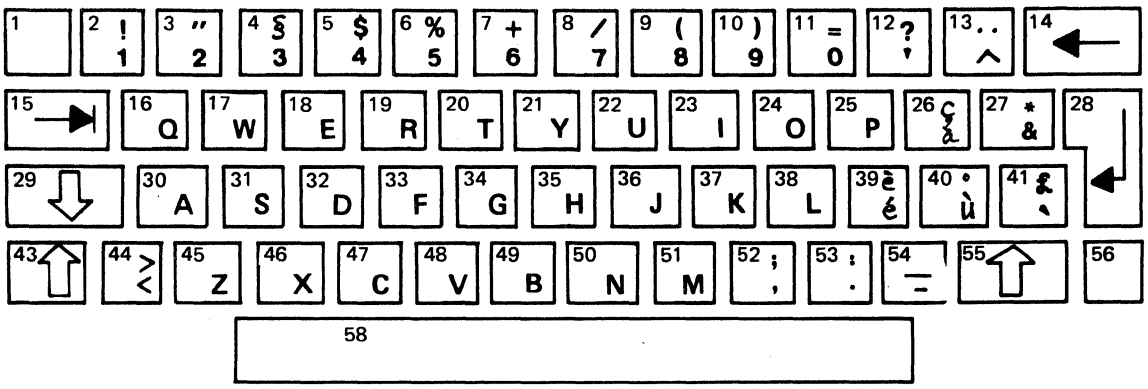
Figure A-11. Denmark



Inactive Graphics in start-stop line control: É ü " § ¤ é

Dual Assignment Keys: none

Figure A-12. Finland

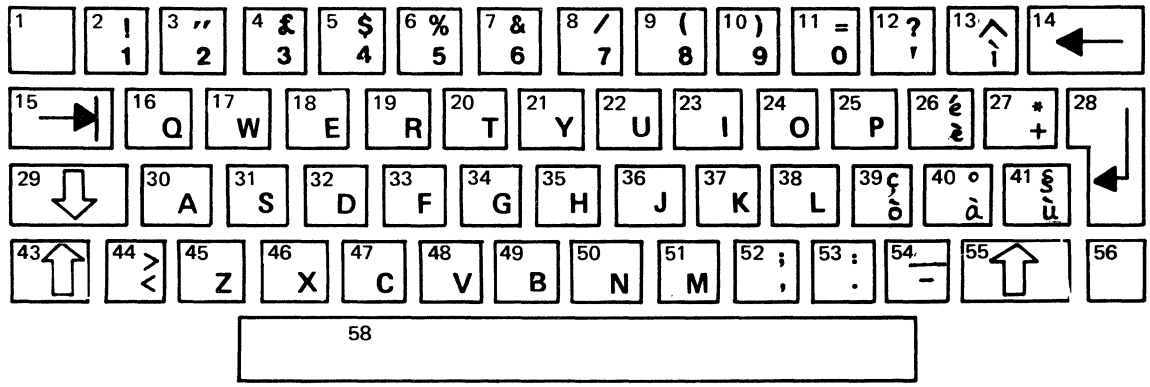


Inactive Graphics in start-stop line control: ç é ù è ¨ '

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
2U	!	|
4U	§	!
13L	^	¬
26L	a	@
40U	°	ç
41U	£	#

Figure A-13. France

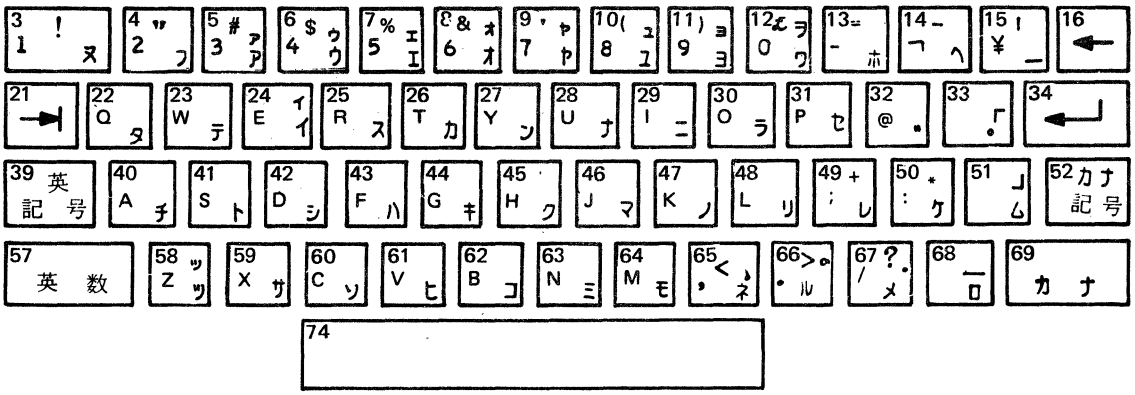


Inactive Graphics in start-stop line control: ì é è ò à ù

Dual Assignment Keys:

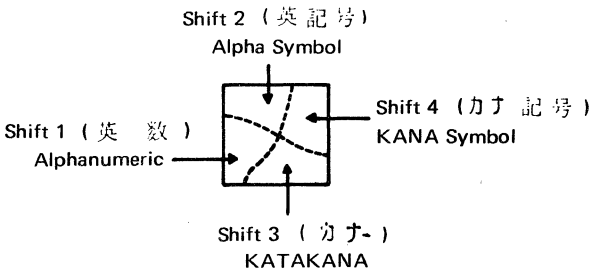
Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
4U	£	#
13U	^	¬
39U	ç	ç
40U	°	@
41U	§	|

Figure A-14. Italy



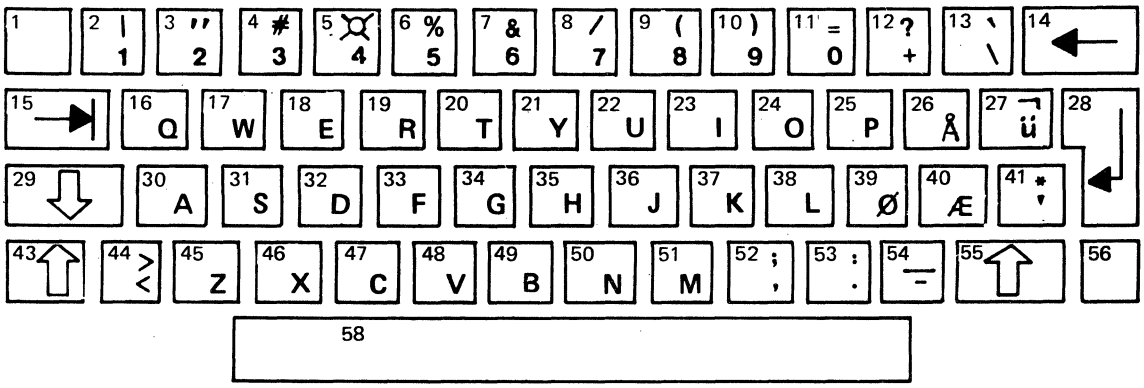
16 Back Space
34 New Line
39 Alpha Symbol Shift
52 Katakana Symbol Shift
57 Alphanumeric Shift
69 Katakana Shift
74 Space

9 Apostrophe
13 Minus
14 Over Line
15 Cho-on
68 Under Line
65 Comma
66 Katakana Period



Dual Assignment Keys: none

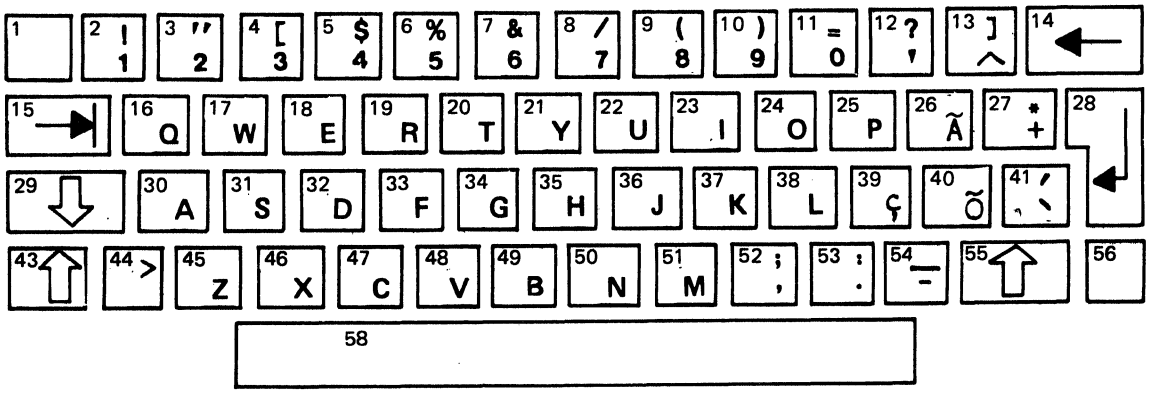
Figure A-15. Katakana



Inactive Graphics in start-stop line control: \ ' ü " # ¤

Dual Assignment Keys: none

Figure A-16. Norway

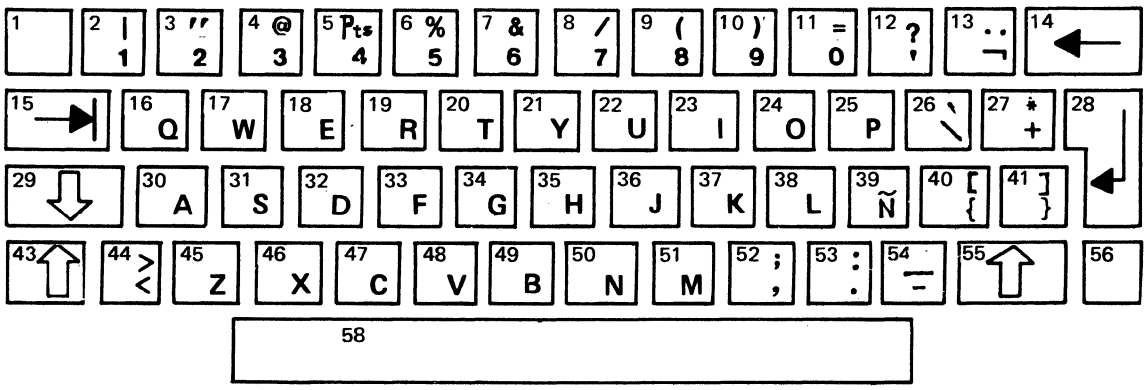


Inactive Graphics in start-stop line control: ` ´ ç ã õ

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-stop
4U	[	Ç
13L	^	¬
13U	]	|

Figure A-17. Portugal

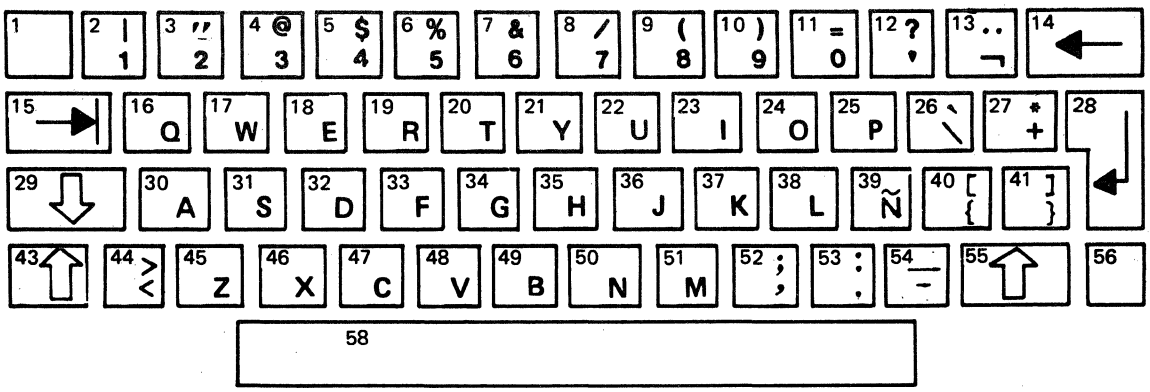


Inactive Graphics in start-stop line control: { } .. ' \ "

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
40U	[	Ç
41U	]	!

Figure A-18. Spain

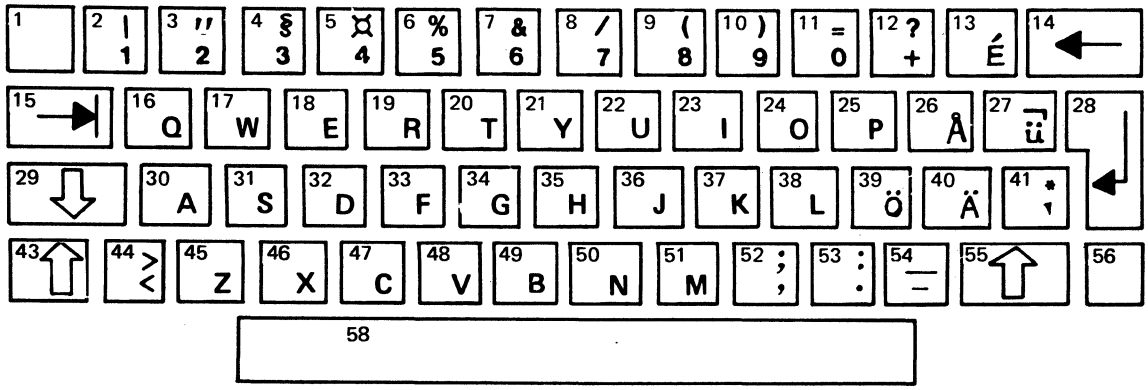


Inactive Graphics in start-stop line control: { } ¨ ` \ "

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
40U	[	Ç
41U	]	!

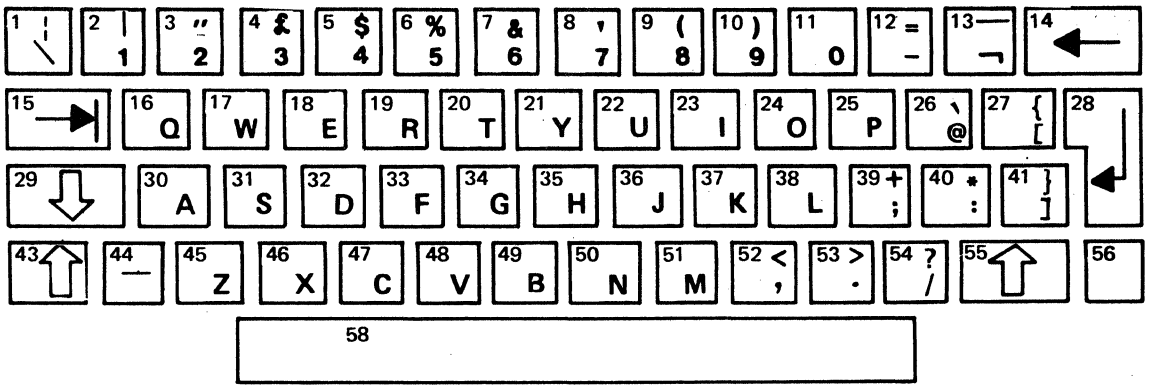
Figure A-19. Spanish Speaking



Inactive Graphics in start-stop line control: É ü " § ¤ é

Dual Assignment Keys:

Figure A-20. Sweden



Inactive Graphics in start-stop line control: { } ` \ — ¦

Dual Assignment Keys:

Key Position	Print Graphic in SDLC	Print Graphic in Start-Stop
27L	[	#
41L	]	!

Figure A-21. United Kingdom

Code Charts

Legend:

KBD = Key Position
EBCDIC = EBCDIC Line Code (Hex)
S = Shift
L = Lower Case
U = Upper Case
S-S LC = Start-Stop Line Code
NU = Not Used
IA = Inactive
⁂ = Print Graphic of Start-Stop Line Control

	Lowercase					Uppercase				
KBD	GRAPHIC	EBCDIC	S	S-S-LC	S-SLC*	GRAPHIC	EBCDIC	S	S-S-LC	S-SLC*
3	1	F1	L	1	1	¨	72	U	1	1
4	2	F2	L	2	2	¯ overline	A0	U	2	2
5	3	F3	L	21C	21C	<	4C	U	21C	21C
6	4	F4	L	4	8	≤	8C	U	4	8
7	5	F5	L	41C	4	=	7E	U	41C	4
8	6	F6	L	42C	42C	≥	AE	U	42C	42C
9	7	F7	L	421	41C	>	6E	U	421	41C
10	8	F8	L	8	421	≠	BE	U	8	421
11	9	F9	L	81C	821	∨	78	U	81C	821
12	0	F0	L	82C	81C	∧	71	U	82C	81C
13	+	4E	L	B	BA821	− hyphen	60	U	B	BA821
14	x	B6	L	BAC	BA2	÷	B8	U	BAC	BA2
21	Q	D8	L	B8C	BA42C	?	6F	U	B8C	BA42C
22	W	E6	L	A42	B821C	ω	B4	U	A42	B821C
23	E	C5	L	BA41C	A4C	∈	B1	U	BA41C	A4C
24	R	D9	L	B81	B41	ρ	B3	U	B81	B41
25	T	E3	L	A21	A	~	80	U	A21	A
26	Y	E8	L	A8C	BA81C	↑	8A	U	A8C	BA81C
27	U	E4	L	A4C	A21	↓	8B	U	A4C	A21
28	I	C9	L	BA81C	B42	ι	B2	U	BA81C	B42
29	O	D6	L	B42	B8C	o	9D	U	B42	B8C
30	P	D7	L	B421C	BA4	*	5C	U	B421C	BA4
31	←	9F	L	A	B	→	8F	U	A	B
38	A	C1	L	BA1	B421C	α	B0	U	BA1	B421C
39	S	E2	L	A2C	B81	⌈	8D	U	A2C	B81
40	D	C4	L	BA4	A41	⌊	8E	U	BA4	A41
41	F	C6	L	BA42C	BA21C	_ underline	6D	U	BA42C	BA21C
42	G	C7	L	BA421	BA1	∇	BA	U	BA421	BA1
43	H	C8	L	BA8	A81	Δ	BB	U	BA8	A81
44	J	D1	L	B1C	BAC	∘	AF	U	B1C	BAC
45	K	D2	L	B2C	A42	' apostrophe	7D	U	B2C	A42
46	L	D3	L	B21	A8C	□	90	U	B21	A8C
47	[	AD	L	B821C	BA41C	(	4D	U	B821C	BA41C
48	]	BD	L	821	B4C	)	5D	U	821	B4C
54	Z	E9	L	A81	82C	⊂	9B	U	A81	82C
55	X	E7	L	A421C	A1C	⊃	9A	U	A421C	A1C
56	C	C3	L	BA21C	A421C	∩	AA	U	BA21C	A421C
57	V	E5	L	A41	B21	∪	AB	U	A41	B21
58	B	C2	L	BA2	A821C	⊥	AC	U	BA2	A821C
59	N	D5	L	B41	A2C	T	BC	U	B41	A2C
60	M	D4	L	B4C	B1C	|	BF	U	B4C	B1C
61	' comma	6B	L	A821C	BA421	;	5E	U	A821C	BA421
62	• period	4B	L	BA821	B2C	:	7A	U	BA821	B2C
63	/	61	L	A1C	BA8	\	B7	U	A1C	BA8

* This Start Stop line code is used when Correspondence character set is installed as the primary.

Figure A-22. Code Chart–APL (USA)

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	–	–	– – – – –	NU	–	–	– – – – –
2	1	F1	L	1	¨	72	U	1
3	2	F2	L	2	¯ overline	A0	U	2
4	3	F3	L	21C	<	4C	U	21C
5	4	F4	L	4	≤	8C	U	4
6	5	F5	L	41C	=	7E	U	41C
7	6	F6	L	42C	≥	AE	U	42C
8	7	F7	L	421	>	6E	U	421
9	8	F8	L	8	≠	BE	U	8
10	9	F9	L	81C	∨	78	U	81C
11	0	F0	L	82C	∧	71	U	82C
12	+	4E	L	B	– minus	60	U	B
13	x	B6	L	BAC	÷	B8	U	BAC
16	Q	D8	L	B8C	?	6F	U	B8C
17	W	E6	L	A42	ω	B4	U	A42
18	E	C5	L	BA41C	∈	B1	U	BA41C
19	R	D9	L	B81	ρ	B3	U	B81
20	T	E3	L	A21	~	80	U	A21
21	Y	E8	L	A8C	↑	8A	U	A8C
22	U	E4	L	A4C	↓	8B	U	A4C
23	I	C9	L	BA81C	ι	B2	U	BA81C
24	O	D6	L	B42	o	9D	U	B42
25	P	D7	L	B421C	*	5C	U	B421C
26	←	9F	L	A	→	8F	U	A
27	NU	–		–	NU	–		–
30	A	C1	L	BA1	α	B0	U	BA1
31	S	E2	L	A2C	⌈	8D	U	A2C
32	D	C4	L	BA4	⌊	8E	U	BA4
33	F	C6	L	BA42C	_ underline	6D	U	BA42C
34	G	C7	L	BA421	∇	BA	U	BA421
35	H	C8	L	BA8	Δ	BB	U	BA8
36	J	D1	L	B1C	∘	AF	U	B1C
37	K	D2	L	B2C	' apostrophe	7D	U	B2C
38	L	D3	L	B21	□	90	U	B21
39	[	AD	L	B821C	(	4D	U	B821C
40	]	BD	L	821	)	5D	U	821
41	NU	–		–	NU	–		–
44	NU	–		–	NU	–		–
45	Z	E9	L	A81	⊂	9B	U	A81
46	X	E7	L	A421C	⊃	9A	U	A421C
47	C	C3	L	BA21C	∩	AA	U	BA21C
48	V	E5	L	A41	∪	AB	U	A41
49	B	C2	L	BA2	⊥	AC	U	BA2
50	N	D5	L	B41	⊤	BC	U	B41
52	M	D4	L	B4C	|	BF	U	B4C
52	, comma	6B	L	A821C	;	5E	U	A821C
53	. period	4B	L	BA821	:	7A	U	BA821
54	/	61	L	A1C	\	B7	U	A1C
56	NU	–		–	NU	–		–

Figure A-23. Code Chart–APL (non-USA)

KBD	Lowercase GRAPHIC	Lowercase ASCII	Uppercase GRAPHIC	Uppercase ASCII
1	` grave accent	6/0	~	7/14
2	1	3/1	!	2/1
3	2	3/2	@	4/0
4	3	3/3	#	2/3
5	4	3/4	$	2/4
6	5	3/5	%	2/5
7	6	3/6	^	5/14
8	7	3/7	&	2/6
9	8	3/8	*	2/10
10	9	3/9	(	2/8
11	0	3/0	)	2/9
12	- minus	2/13	_ underline	5/15
13	=	3/13	+	2/11
16	q	7/1	Q	5/1
17	w	7/7	W	5/7
18	e	6/5	E	4/5
19	r	7/2	R	5/2
20	t	7/4	T	5/4
21	y	7/9	Y	5/9
22	u	7/5	U	5/5
23	i	6/9	I	4/9
24	o	6/15	O	4/15
25	p	7/0	P	5/0
26	[	5/11	]	5/13
27	\	5/12	¦	7/12
30	a	6/1	A	4/1
31	s	7/3	S	5/3
32	d	6/4	D	4/4
33	f	6/6	F	4/6
34	g	6/7	G	4/7
35	h	6/8	H	4/8
36	j	6/10	J	4/10
37	k	6/11	K	4/11
38	l	6/12	L	4/12
39	;	3/11	:	3/10
40	' apostrophe	2/7	"	2/2
41	{	7/11	}	7/13
44	<	3/12	>	3/14
45	z	7/10	Z	5/10
46	x	7/8	X	5/8
47	c	6/3	C	4/3
48	v	7/6	V	5/6
49	b	6/2	B	4/2
50	n	6/14	N	4/14
51	m	6/13	M	4/13
52	, comma	2/12	, comma	2/12
53	. period	2/14	. period	2/14
54	/	2/15	?	3/15

Figure A-24. Code Chart–ASCII

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
3	1	F1	L	1	±	9E	U	1
4	2	F2	L	2	@	7C	U	2
5	3	F3	L	21C	#	7B	U	21C
6	4	F4	L	8	$	5B	U	8
7	5	F5	L	4	%	6C	U	4
8	6	F6	L	42C	[	4A	U	42C
9	7	F7	L	41C	&	50	U	41C
10	8	F8	L	421	*	5C	U	421
11	9	F9	L	821	(	4D	U	821
12	0	F0	L	81C	)	5D	U	81C
13	– minus	60	L	BA821	– underline	6D	U	BA821
14	=	7E	L	BA2	+	4E	U	BA2
21	q	98	L	BA42C	Q	D8	U	BA42C
22	w	A6	L	B821C	W	E6	U	B821C
23	e	85	L	A4C	E	C5	U	A4C
24	r	99	L	B41	R	D9	U	B41
25	t	A3	L	A	T	E3	U	A
26	y	A8	L	BA81C	Y	E8	U	BA81C
27	u	A4	L	A21	U	E4	U	A21
28	i	89	L	B42	I	C9	U	B42
29	o	96	L	B8C	O	D6	U	B8C
30	p	97	L	BA4	P	D7	U	BA4
31	!	4F	L	B	]	5A	U	B
38	a	81	L	B421C	A	C1	U	B421C
39	s	A2	L	B81	S	E2	U	B81
40	d	84	L	A41	D	C4	U	A41
41	f	86	L	BA21C	F	C6	U	BA21C
42	g	87	L	BA1	G	C7	U	BA1
43	h	88	L	A81	H	C8	U	A81
44	j	91	L	BAC	J	D1	U	BAC
45	k	92	L	A42	K	D2	U	A42
46	l	93	L	A8C	L	D3	U	A8C
47	;	5E	L	BA41C	:	7A	U	BA41C
48	' apostrophe	7D	L	B4C	"	7F	U	B4C
54	z	A9	L	82C	Z	E9	U	82C
55	x	A7	L	A1C	X	E7	U	A1C
56	c	83	L	A421C	C	C3	U	A421C
57	v	A5	L	B21	V	E5	U	B21
58	b	82	L	A821C	B	C2	U	A821C
59	n	95	L	A2C	N	D5	U	A2C
60	m	94	L	B1C	M	D4	U	B1C
61	, comma	6B	L	BA421	,	6B comma	U	BA421
62	. period	4B	L	B2C	.	4B period	U	B2C
63	/	61	I	BA8	?	6F	U	BA8

Figure A-25. Code Chart–Correspondence (USA)

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
3	1	F1	L	1	| logical OR	4F	U	A821C
4	2	F2	L	2	@	7C	L	A
5	3	F3	L	21C	#	7B	L	821
6	4	F4	L	4	$	5B	L	B821C
7	5	F5	L	41C	%	6C	U	41C
8	6	F6	L	42C	¬	5F	U	BA821
9	7	F7	L	421	&	50	L	BAC
10	8	F8	L	8	*	5C	U	8
11	9	F9	L	81C	(	4D	U	81C
12	0	F0	L	82C	)	5D	U	82C
13	- minus	60	L	B	_ underline	6D	U	B
14	=	7E	U	1	+	4E	U	BAC
21	q	98	L	B8C	Q	D8	U	B8C
22	w	A6	L	A42	W	E6	U	A42
23	e	85	L	BA41C	E	C5	U	BA41C
24	r	99	L	B81	R	D9	U	B81
25	t	A3	L	A21	T	E3	U	A21
26	y	A8	L	A8C	Y	E8	U	A8C
27	u	A4	L	A4C	U	E4	U	A4C
28	i	89	L	BA81C	I	C9	U	BA81C
29	o	96	L	B42	O	D6	U	B42
30	p	97	L	B421C	P	D7	U	B421C
31	¢	4A	U	A	!	5A	U	B821C
38	a	81	L	BA1	A	C1	U	BA1
39	s	A2	L	A2C	S	E2	U	A2C
40	d	84	L	BA4	D	C4	U	BA4
41	f	86	L	BA42C	F	C6	U	BA42C
42	g	87	L	BA421	G	C7	U	BA421
43	h	88	L	BA8	H	C8	U	BA8
44	j	91	L	B1C	J	D1	U	B1C
45	k	92	L	B2C	K	D2	U	B2C
46	l	93	L	B21	L	D3	U	B21
47	;	5E	U	21C	:	7A	U	4
48	' apostrophe	7D	U	42C	"	7F	U	821
54	z	A9	L	A81	Z	E9	U	A81
55	x	A7	L	A421C	X	E7	U	A421C
56	c	83	L	BA21C	C	C3	U	BA21C
57	v	A5	L	A41	V	E5	U	A41
58	b	82	L	BA2	B	C2	U	BA2
59	n	95	L	B41	N	D5	U	B41
60	m	94	L	B4C	M	D4	U	B4C
61	, comma	6B	L	A821C	<	4C	U	2
62	. period	4B	L	BA821	>	6E	U	421
63	/	61	L	A1C	?	6F	U	A1C

Figure A-26. Code Chart–EBCDIC (USA)

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	------	NU	-----	-	-----
2	1	F1	L	1	!	5A	U	B821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	=	7B	L	821
5	4	F4	L	4	¥	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	— overline	A1		IA	¬	5F	U	BA821
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	+	4E	U	BAC	*	5C	U	8
27	¦	6A		IA	$	E0		IA
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	{	C0		IA	£	4A	U	A
40	}	D0		IA	|	4F	U	A821C
41	`	79		IA	@	7C	L	A
44	< grave accent	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	— minus	60	L	B	— underline	6D	U	B
56	NU	--	-	------	NU	--	-	-----

Figure A-27. Code Chart–EBCDIC (Japan)

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	-----	-	-----
2	1	F1	L	1	!	4F	U	B821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	#	7B	L	821
5	4	F4	L	4	$	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	~ tilda	A1		IA	^ ¬	5F	U	BA821
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	+	4E	U	BAC	*	5C	U	8
27	¦	6A		IA	\	E0		IA
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	{	C0		IA	[¢	4A	U	A
40	}	D0		IA	] ¦	5A	U	A821C
41	`	79		IA	@	7C	L	A
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	- underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-28. Code Chart–International EBCDIC

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	B821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	§	E0	U	A821C
5	4	F4	L	4	$	5A	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	ß	A1		IA	?	6F	U	A1C
13	' apostrophe	7D	U	42C	` grave accent	79		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	z	A9	L	A81	Z	E9	U	A81
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	ü	D0		IA	Ü	5B		IA
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ö	6A	L	A	Ö	7C	U	A
40	ä	C0		IA	Ä	7B		IA
41	#	4A	L	821	¬	5F	U	BA821
44	<	4C	U	2	>	6E	U	421
45	y	A8	L	A8C	Y	E8	U	A8C
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-29. Code Chart–Austria/Germany

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	A821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	#	7B	L	821
5	4	F4	L	4	$	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	+	4E	U	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	^	5F	U	BA821	¨ umlaut	A1		IA
16	a	81	L	BA1	A	C1	U	BA1
17	z	A9	L	A81	Z	E9	U	A81
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	e	D0		IA	[	4A	U	A
27	&	50	L	BAC	*	5C	U	8
30	q	98	L	B8C	Q	D8	U	B8C
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	é	C0		IA	Ç	E0		IA
40	à	7C	L	A	ù	6A		IA
41	`	79		IA	]	5A	U	B821C
44	<	4C	U	2	>	6E	U	421
45	w	A6	L	A42	W	E6	U	A42
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-30. Code Chart–Belgium

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	! ※ ¦	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	\	E0		IA
5	4	F4	L	4	$	5A		IA
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	^ ※ ¬	5F	U	BA821	~ tilda	A1		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	ã	79	L	A	Ã	7C	U	A
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ç	6A	L	B821C	Ç	5B	U	B821C
40	õ	C0	L	821	Õ	7B	U	821
41	é	D0		IA	É	4A		IA
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-31. Code Chart–Brazil

	Lowercase					Uppercase				
KBD	GRAPHIC		EBCDIC	S	S-SLC	GRAPHIC		EBCDIC	S	S-SLC
1	NU		--	-	-----	NU		--	-	-----
2	1		F1	L	1	¦		4F	U	A821C
3	2		F2	L	2	"		7F		IA
4	3		F3	L	21C	#		4A		IA
5	4		F4	L	4	¤		5A		IA
6	5		F5	L	41C	%		6C	U	41C
7	6		F6	L	42C	&		50	L	BAC
8	7		F7	L	421	+		4E	U	BAC
9	8		F8	L	8	(		4D	U	81C
10	9		F9	L	81C	)		5D	U	82C
11	0		F0	L	82C	=		7E	U	1
12	/		61	L	A1C	?		6F	U	A1C
13	\		E0		IA	`	grave accent	79		IA
16	q		98	L	B8C	Q		D8	U	B8C
17	w		A6	L	A42	W		E6	U	A42
18	e		85	L	BA41C	E		C5	U	BA41C
19	r		99	L	B81	R		D9	U	B81
20	t		A3	L	A21	T		E3	U	A21
21	y		A8	L	A8C	Y		E8	U	A8C
22	u		A4	L	A4C	U		E4	U	A4C
23	i		89	L	BA81C	I		C9	U	BA81C
24	o		96	L	B42	O		D6	U	B42
25	p		97	L	B421C	P		D7	U	B421C
26	å		D0	L	B821C	Å		5B	U	B821C
27	ü		A1		IA	¬		5F	U	BA821
30	a		81	L	BA1	A		C1	U	BA1
31	s		A2	L	A2C	S		E2	U	A2C
32	d		84	L	BA4	D		C4	U	BA4
33	f		86	L	BA42C	F		C6	U	BA42C
34	g		87	L	BA421	G		C7	U	BA421
35	h		88	L	BA8	H		C8	U	BA8
36	j		91	L	B1C	J		D1	U	B1C
37	k		92	L	B2C	K		D2	U	B2C
38	l		93	L	B21	L		D3	U	B21
39	æ		C0	L	821	Æ		7B	U	821
40	ø		6A	L	A	Ø		7C	U	A
41	'	apostrophe	7D	U	42C	*		5C	U	8
44	<		4C	U	2	>		6E	U	421
45	z		A9	L	A81	Z		E9	U	A81
46	x		A7	L	A421C	X		E7	U	A421C
47	c		83	L	BA21C	C		C3	U	BA21C
48	v		A5	L	A41	V		E5	U	A41
49	b		82	L	BA2	B		C2	U	BA2
50	n		95	L	B41	N		D5	U	B41
51	m		94	L	B4C	M		D4	U	B4C
52	,	comma	6B	L	A821C	;		5E	U	21C
53	.	period	4B	L	BA821	:		7A	U	4
54	-	minus	60	L	B	_	underline	6D	U	B
56	NU		--	-	-----	NU		--	-	-----

Figure A-32. Code Chart–Denmark

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	§	4A		IA
5	4	F4	L	4	¤	5A		IA
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	+	4E	U	BAC	?	6F	U	A1C
13	é	79		IA	É	E0		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	- minus	60	L	B	_ underline	6D	U	B
27	ü	A1		IA	¬	5F	U	BA821
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	, comma	6B	L	A821C	;	5E	U	21C
40	. period	4B	L	BA821	:	7A	U	4
41	' apostrophe	7D	U	42C	*	5C	U	8
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	å	D0	L	B821C	Å	5B	U	B821C
53	ä	C0	L	821	Ä	7B	U	821
54	ö	6A	L	A	Ö	7C	U	A
56	NU	--	-	-----	NU	--	-	-----

Figure A-33. Code Chart–Finland

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!※¡	4F	U	A821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	§·※!	5A	U	B821C
5	4	F4	L	4	$	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	+	4E	U	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	^※¬	5F	U	BA821	¨ diaeresis	A1		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	à※@	7C	L	A	Ç	E0		IA
27	&	50	L	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	é	C0		IA	è	D0		IA
40	ù	6A		IA	°※ç	4A	U	A
41	` grave accent	79		IA	£※#	7B	L	821
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	

Figure A-34. Code Chart–France

KBD	Lowercase GRAPHIC	EBCDIC	S	S-SLC	Uppercase GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	B821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	£ ※ #	7B	L	821
5	4	F4	L	4	$	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	ì	A1		IA	^ ※ ¬	5F	U	BA821
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	è	D0		IA	é	5A		IA
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ò	6A		IA	ç ※ ¢	E0	U	A
40	à	C0		IA	° ※ @	4A	L	A
41	ù	79		IA	§ ※ ¦	7C	U	A821C
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-35. Code Chart—Italy

	Alphameric				Alpha Symbol			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
3	1	F1	U	1	!	5A		IA
4	2	F2	U	2	"	7F		IA
5	3	F3	U	21C	#	7B		IA
6	4	F4	U	4	$	E0		IA
7	5	F5	U	41C	%	6C		IA
8	6	F6	U	42C	&	50		IA
9	7	F7	U	421	' apostrophe	7D		IA
10	8	F8	U	8	(	4D		IA
11	9	F9	U	81C	)	5D		IA
12	0	F0	U	82C	£	4A		IA
13	– minus	60	U	B	=	7E		IA
14	¬	5F		IA	¯ overline	A1		IA
15	¥	5B	U	A3	| logical OR	4F		IA
22	Q	D8	U	B8C	NU	---		---
23	W	E6	U	A42	NU	---		---
24	E	C5	U	BA41C	NU	---		---
25	R	D9	U	B81	NU	---		---
26	T	E3	U	A21	NU	---		---
27	Y	E8	U	A8C	NU	---		---
28	U	E4	U	A4C	NU	---		---
29	I	C9	U	BA81C	NU	---		---
30	O	D6	U	B42	NU	---		---
31	P	D7	U	B421C	NU	---		---
32	@	7C		IA	NU	---		---
33	NU	---		---	NU	---		---
40	A	C1	U	BA1	NU	---		---
41	S	E2	U	A2C	NU	---		---
42	D	C4	U	BA4	NU	---		---
43	F	C6	U	BA42C	NU	---		---
44	G	C7	U	BA421	NU	---		---
45	H	C8	U	BA8	NU	---		---
46	J	D1	U	B1C	NU	---		---
47	K	D2	U	B2C	NU	---		---
48	L	D3	U	B21	NU	---		---
49	;	5E		IA	+	4E		IA
50	:	7A		IA	*	5C	U	BAC
51	NU	---		---	NU	---		---
58	Z	E9	U	A81	NU	---		---
59	X	E7	U	A421C	NU	---		---
60	C	C3	U	BA21C	NU	---		---
61	V	E5	U	A41	NU	---		---
62	B	C2	U	BA2	NU	---		---
63	N	D5	U	B41	NU	---		---
64	M	D4	U	B4C	NU	---		---
65	, comma	6B	U	A821C	<	4C		IA
66	. period	4B	U	BA821	>	6E		IA
67	/	61		IA	?	6F		IA
68	NU	---		---	– underline	6D		IA

Figure A-36. Code Chart–Katakana (Part 1 of 2)

KBD	Katakana GRAPHIC	EBCDIC	S	S-SLC	Kana Symbol GRAPHIC		EBCDIC	S	S-SLC
3	ヌ	98	L	1	NU		---		---
4	フ	9F	L	2	NU		---		---
5	ア	81	L	21C	ァ	smaller	47		IA
6	ウ	83	L	4	ゥ	smaller	49		IA
7	エ	84	L	41C	ェ	smaller	51		IA
8	オ	85	L	42C	ォ	smaller	52		IA
9	ヤ	A9	L	421	ャ	smaller	53		IA
10	ユ	AA	L	8	ュ	smaller	54		IA
11	ヨ	AC	L	81C	ョ	smaller	55		IA
12	ワ	BC	L	82C	ヲ		46		IA
13	ホ	A3	L	B	NU		---		---
14	ヘ	A2	L	BAC	NU		---		---
15	ー chō-on	58		IA	NU		---		---
22	タ	91	L	B8C	NU		---		---
23	テ	94	L	A42	NU		---		---
24	イ	82	L	BA41C	ィ	smaller	48		IA
25	ス	8E	L	B81	NU		---		---
26	カ	86	L	A21	NU		---		---
27	ン	BD	L	A8C	NU		---		---
28	ナ	96	L	A4C	NU		---		---
29	ニ	97	L	BA81C	NU		---		---
30	ラ	AD	L	B42	NU		---		---
31	セ	8F	L	B421C	NU		---		---
32	゛	BE	L	A	NU		---		---
33	゜ han-daku-ten	BF	U	A	｢		42		IA
40	チ	92	L	BA1	NU		---		---
41	ト	95	L	A2C	NU		---		---
42	シ	8D	L	BA4	NU		---		---
43	ハ	9D	L	BA42C	NU		---		---
44	キ	87	L	BA421	NU		---		---
45	ク	88	L	BA8	NU		---		---
46	マ	A4	L	31C	NU		---		---
47	ノ	9A	L	B2C	NU		---		---
48	リ	AE	L	B21	NU		---		---
49	レ	BA	L	B821C	NU		---		---
50	ケ	89	L	821	NU		---		---
51	ム	A6	U	B821C	｣		43		IA
58	ツ	93	L	A81	ッ	smaller	56		IA
59	サ	8C	L	A421C	NU		---		---
60	ソ	90	L	BA21C	NU		---		---
61	ヒ	9E	L	A41	NU		---		---
62	コ	8A	L	BA2	NU		---		---
63	ミ	A5	L	B41	NU		---		---
64	モ	A8	L	B4C	NU		---		---
65	ネ	99	L	A821C	､	tō-ten	44		IA
66	ル	AF	L	BA821	｡	ku-ten	41		IA
67	メ	A7	L	A1C	･	chu-ten	45		IA
68	ロ	BB	U	821	NU		---		---

Figure A-36. Code Chart–Katakana (Part 2 of 2)

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	#	4A		IA
5	4	F4	L	4	¤	5A		IA
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	+	4E	U	BAC	?	6F	U	A1C
13	\	E0		IA	` grave accent	79		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	å	D0	L	B821C	Å	5B	U	B821C
27	ü	A1		IA	¬	5F	U	BA821
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ø	6A	L	A	Ø	7C	U	A
40	æ	C0	L	821	Æ	7B	U	821
41	' apostrophe	7D	U	42C	*	5C	U	8
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-37. Code Chart–Norway

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	B821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	[※ ¢	4A	U	A
5	4	F4	L	4	$	5B	L	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	^ ※ ¬	5F	U	BA821	] ※ !	5A	U	A821C
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	ã	C0		IA	Ã	7B	L	821
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ç	A1		IA	Ç	4C	U	2
40	õ	6A		IA	Õ	7C	L	A
41	` grave accent	79		IA	´ acute accent	D0		IA
44	NU	--	-	-----	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-38. Code Chart–Portugal

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	— — —	—	— — — — —	NU	— —	—	— — — — —
2	1	F1	L	1	¦ logical OR	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	@	7C	U	A
5	4	F4	L	4	₧ peseta	5B	U	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	¬	5F	U	BA821	¨ umlaut	A1		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	\	E0		IA	`	79		IA
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ñ	6A	L	821	Ñ	7B	U	821
40	{	C0		IA	[※¢	4A	L	A
41	}	D0		IA	] ※!	5A	L	B821C
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	— minus	60	L	B	_ underline	6D	U	B
56	NU	— —	—	— — — — —	NU	— —	—	— — — — —

Figure A-39. Code Chart–Spain

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	¦	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	@	7C	U	A
5	4	F4	L	4	$	5B	U	B821C
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	' apostrophe	7D	U	42C	?	6F	U	A1C
13	¬	5F	U	BA821	¨ umlaut	A1		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	\	E0		IA	` grave accent	79		IA
27	+	4E	U	BAC	*	5C	U	8
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ñ	6A	L	821	Ñ	7B	U	821
40	{	C0		IA	[※ ¢	4A	L	A
41	}	D0		IA	] ※ !	5A	L	B821C
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-40. Code Chart–Spanish-Speaking

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
2	1	F1	L	1	!	4F	U	A821C
3	2	F2	L	2	"	7F		IA
4	3	F3	L	21C	§	4A		IA
5	4	F4	L	4	¤	5A		IA
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	/	61	L	A1C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	=	7E	U	1
12	+	4E	U	BAC	?	6F	U	A1C
13	´	79		IA	`	E0		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	å	D0	L	B821C	Å	5B	U	B821C
27	¨	A1		IA	^	5F	U	BA821
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	ö	6A	L	A	Ö	7C	U	A
40	ä	C0	L	821	Ä	7B	U	821
41	' apostrophe	7D	U	42C	*	5C	U	8
44	<	4C	U	2	>	6E	U	421
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	;	5E	U	21C
53	. period	4B	L	BA821	:	7A	U	4
54	- minus	60	L	B	_ underline	6D	U	B
56	NU	--	-	-----	NU	--	-	-----

Figure A-41. Code Chart–Sweden

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	\	E0		IA	¦	6A		IA
2	1	F1	L	1	|	4F	U	A821C
3	2	F2	L	2	"	7F	U	821
4	3	F3	L	21C	£	7B	L	B821C
5	4	F4	L	4	$	5B	U	A
6	5	F5	L	41C	%	6C	U	41C
7	6	F6	L	42C	&	50	L	BAC
8	7	F7	L	421	'	7D	U	42C
9	8	F8	L	8	(	4D	U	81C
10	9	F9	L	81C	)	5D	U	82C
11	0	F0	L	82C	NU	--	-	-----
12	- minus	60	L	B	=	7E	U	1
13	¬	5F	U	BA821	- overline	A1		IA
16	q	98	L	B8C	Q	D8	U	B8C
17	w	A6	L	A42	W	E6	U	A42
18	e	85	L	BA41C	E	C5	U	BA41C
19	r	99	L	B81	R	D9	U	B81
20	t	A3	L	A21	T	E3	U	A21
21	y	A8	L	A8C	Y	E8	U	A8C
22	u	A4	L	A4C	U	E4	U	A4C
23	i	89	L	BA81C	I	C9	U	BA81C
24	o	96	L	B42	O	D6	U	B42
25	p	97	L	B421C	P	D7	U	B421C
26	@	7C	L	A	` grave accent	79		IA
27	[※ #	4A	L	821	{	C0		IA
30	a	81	L	BA1	A	C1	U	BA1
31	s	A2	L	A2C	S	E2	U	A2C
32	d	84	L	BA4	D	C4	U	BA4
33	f	86	L	BA42C	F	C6	U	BA42C
34	g	87	L	BA421	G	C7	U	BA421
35	h	88	L	BA8	H	C8	U	BA8
36	j	91	L	B1C	J	D1	U	B1C
37	k	92	L	B2C	K	D2	U	B2C
38	l	93	L	B21	L	D3	U	B21
39	;	5E	U	21C	+	4E	U	BAC
40	:	7A	U	4	*	5C	U	8
41	] ※ !	5A	U	B821C	}	D0		IA
44	NU	--	-	----	_ underline	6D	U	B
45	z	A9	L	A81	Z	E9	U	A81
46	x	A7	L	A421C	X	E7	U	A421C
47	c	83	L	BA21C	C	C3	U	BA21C
48	v	A5	L	A41	V	E5	U	A41
49	b	82	L	BA2	B	C2	U	BA2
50	n	95	L	B41	N	D5	U	B41
51	m	94	L	B4C	M	D4	U	B4C
52	, comma	6B	L	A821C	<	4C	U	2
53	. period	4B	L	BA821	>	6E	U	421
54	/	61	L	A1C	?	6F	U	A1C
56	NU	--	-	-----	NU	--	-	-----

Figure A-42. Code Chart–United Kingdom

KBD	Lowercase GRAPHIC	EBCDIC	S	S-SLC	Uppercase GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
3	1	F1	L	1	¦ logical OR	4F	U	A821C
4	2	F2	L	2	@	7C	L	A
5	3	F3	L	21C	#	7B	L	821
6	4	F4	L	4	$	5B	L	B821C
7	5	F5	L	41C	%	6C	U	41C
8	6	F6	L	42C	¬	5F	U	BA821
9	7	F7	L	421	&	50	L	BAC
10	8	F8	L	8	*	5C	U	8
11	9	F9	L	81C	(	4D	U	81C
12	0	F0	L	82C	)	5D	U	82C
13	- minus	60	L	B	_ underline	6D	U	B
14	=	7E	U	1	+	4E	U	BAC
21	Q	D8	U	B8C	Q	D8	U	B8C
22	W	E6	U	A42	W	E6	U	A42
23	E	C5	U	BA41C	E	C5	U	BA41C
24	R	D9	U	B81	R	D9	U	B81
25	T	E3	U	A21	T	E3	U	A21
26	Y	E8	U	A8C	Y	E8	U	A8C
27	U	E4	U	A4C	U	E4	U	A4C
28	I	C9	U	BA81C	I	C9	U	BA81C
29	O	D6	U	B42	O	D6	U	B42
30	P	D7	U	B421C	P	D7	U	B421C
31	¢	4A	U	A	!	5A	U	B821C
38	A	C1	U	BA1	A	C1	U	BA1
39	S	E2	U	A2C	S	E2	U	A2C
40	D	C4	U	BA4	D	C4	U	BA4
41	F	C6	U	BA42C	F	C6	U	BA42C
42	G	C7	U	BA421	G	C7	U	BA421
43	H	C8	U	BA8	H	C8	U	BA8
44	J	D1	U	B1C	J	D1	U	B1C
45	K	D2	U	B2C	K	D2	U	B2C
46	L	D3	U	B21	L	D3	U	B21
47	;	5E	U	21C	:	7A	U	4
48	' apostrophe	7D	U	42C	"	7F	U	821
54	Z	E9	U	A81	Z	E9	U	A81
55	X	E7	U	A421C	X	E7	U	A421C
56	C	C3	U	BA21C	C	C3	U	BA21C
57	V	E5	U	A41	V	E5	U	A41
58	B	C2	U	BA2	B	C2	U	BA2
59	N	D5	U	B41	N	D5	U	B41
60	M	D4	U	B4C	M	D4	U	B4C
61	, comma	6B	L	A821C	<	4C	U	2
62	. period	4B	L	BA821	>	6E	U	421
63	/	61	L	A1C	?	6F	U	A1C

Note 1: This chart is for the Mono I transmit operation only. The code chart for the receive operation is the same as that for EBCDIC (USA).

Note 2: The Keyboard layout for Mono I is the same as that for EBCDIC (USA).

Figure A-43. Code Chart–Mono I

	Lowercase				Uppercase			
KBD	GRAPHIC	EBCDIC	S	S-SLC	GRAPHIC	EBCDIC	S	S-SLC
1	NU	--	-	-----	NU	--	-	-----
3	1	F1	L	1	| logical OR	4F	U	A821C
4	2	F2	L	2	@	7C	L	A
5	3	F3	L	21C	#	7B	L	821
6	4	F4	L	4	$	58	L	B821C
7	5	F5	L	41C	%	6C	U	41C
8	6	F6	L	42C	¬	5F	U	BA821
9	7	F7	L	421	&	50	L	BAC
10	8	F8	L	8	*	5C	U	8
11	9	F9	L	81C	(	4D	U	81C
12	0	F0	L	82C	)	5D	U	82C
13	- minus	60	L	B	_ underline	6D	U	B
14	=	7E	U	1	+	4E	U	BAC
21	Q	98	L	B8C	Q	D8	U	B8C
22	W	A6	L	A42	W	E6	U	A42
23	E	85	L	BA41C	E	C5	U	BA41C
24	R	99	L	B81	R	D9	U	B81
25	T	A3	L	A21	T	E3	U	A21
26	Y	A8	L	A8C	Y	E8	U	A8C
27	U	A4	L	A4C	U	E4	U	A4C
28	I	89	L	BA81C	I	C9	U	BA81C
29	O	96	L	B42	O	D6	U	B42
30	P	97	L	B421C	P	D7	U	B421C
31	¢	4A	U	A	!	5A	U	B821C
38	A	81	L	BA1	A	C1	U	BA1
39	S	A2	L	A2C	S	E2	U	A2C
40	D	84	L	BA4	D	C4	U	BA4
41	F	86	L	BA42C	F	C6	U	BA42C
42	G	87	L	BA421	G	C7	U	BA421
43	H	88	L	BA8	H	C8	U	BA8
44	J	91	L	B1C	J	D1	U	B1C
45	K	92	L	B2C	K	D2	U	B2C
46	L	93	L	B21	L	D3	U	B21
47	;	5E	U	21C	:	7A	U	4
48	' apostrophe	7D	U	42C	"	7F	U	821
54	Z	A9	L	A81	Z	E9	U	A81
55	X	A7	L	A421C	X	E7	U	A421C
56	C	83	L	BA21C	C	C3	U	BA21C
57	V	A5	L	A41	V	E5	U	A41
58	B	82	L	BA2	B	C2	U	BA2
59	N	95	L	B41	N	D5	U	B41
60	M	94	L	B4C	M	D4	U	B4C
61	, comma	6B	L	A821C	<	4C	U	2
62	. period	4B	L	BA821	>	6E	U	421
63	/	61	L	A1C	?	6F	U	A1C

Note: The keyboard layout for Mono II is the same as that for EBCDIC (USA).

Figure A-44. Code Chart–Mono II

Appendix B. Terminal Identification and Address

SDLC Terminal Identification

Each terminal operating under SDLC has a permanent, unique, six-byte identification that it will transmit in response to a request for its ID. This identification is fixed at the time of manufacture and is not selectable.

Terminal ID

Terminal ID is a specify feature that may be installed only with the 2741 Start-Stop Line Control special feature. It provides a four-character response to a request for its ID. These four characters may be selected by the customer; however, they must be specified at machine order time.

Any of the following characters may be used:

- If the EBCDIC keyboard arrangement is being used, select from:

  A through Z; 0 through 9; #; /; $; &; @; comma; period; hyphen; C/R; space.

- If the Correspondence keyboard arrangement is being used, select from:

  A through Z; 0 through 9; =; /; apostrophe; hyphen; semi-colon; period; comma; C/R; space.

  Note: The C/R character may be used only as the last (4th) character of the terminal identification. If the space character is used, enter % instead. If C/R is used enter * instead.

If the Alternate Character Set is installed on the terminal, the terminal ID line code bit configuration remains the same for either switch setting.

Terminal and Group Address

Two characters are used for terminal and group address for the 2740-2 Line Control feature, or the 2740-1 Station Control Line Control feature. The first character must be the terminal address and the second character must be the group address.

Any of the following characters may be used:

- If the EBCDIC keyboard arrangement is being used, select from:

  A through Z; 0 through 9; @; $; &; hyphen; period.

- If the correspondence keyboard arrangement is being used, select from:

  A, C through W, Y, Z; 0 through 8; =; /; semi-colon; comma; period; apostrophe; hyphen.

If the Alternate Character Set is installed on the terminal, the terminal and group address line code bit configuration remains the same for either switch setting.

Appendix C. Throughput Considerations

This appendix provides information that will be helpful in calculating the estimated throughput for the IBM 3767 Communication Terminal and the application to be used.

Throughput, in the 3767, depends upon operator keying time, system response time, and output print time. The first two dependencies are highly device-independent. The third dependency, output print time, which applies to the 3767 device, is discussed in the following text.

Throughput Dependencies

Operator Keying Time

Operator keying time depends upon various operator-oriented factors, including the complexity of the input information and the experience of the operator.

System Response Time

System response time, as used in this discussion, is defined as the time between the pressing of the last key, at the end of the keying operation, and the printing of the first character of the response. The major elements of this time period are: line speed, the number of the control and data characters that are to be transmitted to the CPU, the time required for line turnaround for the acknowledgment response, the CPU processing time, the number of characters in the response from the CPU, and another turnaround delay before the next block of data can be transmitted. Line propagation delay (30 to 40 ms per 200 miles) should also be included, as necessary, in this time period.

The effect of response time is minimized when the 3767 operates in buffered SDLC mode, because as data from the line is being loaded into one buffer, data previously loaded into another buffer is being printed.

Output Print Time

Output print time is the time required to print output data on the printer. It is variable, depending upon the printer model, the communication line control (SDLC or Start-Stop), and the structure of the buffer. The following throughput considerations describe output print time in terms of these three elements.

Because of differences in buffering arrangements, basic SDLC, buffered SDLC, and 2740-2 mode fall into a different category than 2741/2740-1 mode. The former are categorized as buffered mode, the latter as unbuffered mode.

Modes of Operation

Unbuffered Mode (2741 or 2740-1 Mode)

When the 3767 operates in 2741 or 2740-1 mode (unbuffered mode), the print speed is determined by the line speed (line-dependent throughput), except when mechanical operations (such as carrier return, tab, and index) are used.

Insertion of idle codes may be required in the data text from the CPU. These are used to make timing adjustments between the line speed and the print speed when mechanical operations take place. The 3767 uses the same number of idle codes as required in the 2741 and 2740 Communications Terminals if the terminal operating speed is 300 bps or less.

Estimating the Number of Idle Codes to Insert

The number of idle codes required for each mechanical operation can be determined as follows:

- Carrier return: C = T + 1.5
- Tab: C = T + 1.5
- Index: C = 1

Where:
C = the number of idle codes required
T = the number of inches of carrier travel.

The result should be rounded off to the next whole number.

Estimating the Total Output Print Time for Unbuffered Mode

The total output print time is approximately equal to the product of:
M x N

Where:
M = 45 milliseconds for a line speed of 200 bps (World Trade Countries)
or
= 30 milliseconds for a line speed of 300 bps

N = Total number of print characters, including spaces, idle codes (C), and uppercase and lowercase shift codes (transmitted characters).

Buffered Mode (Basic SDLC or Buffered SDLC or 2740-2 Mode)

When the 3767 operates in buffered mode, the print head moves horizontally from the last printed position on the current line to the nearest left or right printing position on the next line. The user may, therefore, design his data format to take advantage of this capability.

Output Print Time

Using the following algorithm, the user can estimate the print time for various format designs, and choose the one that is most efficient.

$$T = T_A + T_C + T_L + T_V* + T_O$$

* If the Vertical Forms Control (VFC) feature is installed.

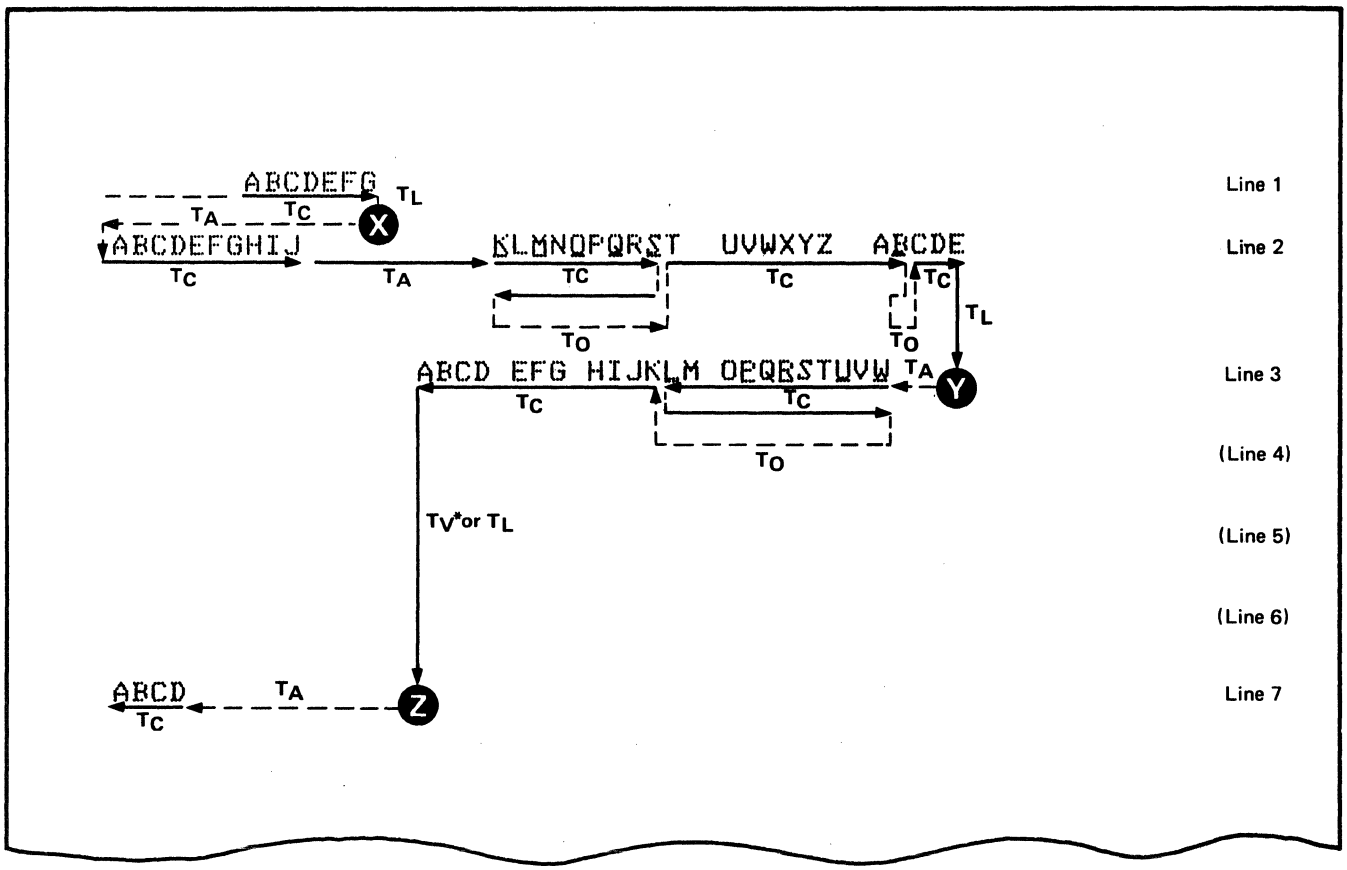
Where:
T = Estimated total output print time

T_A = Total time required for the print head to move horizontally to the nearest left or right position to be printed on the next line; or, total time required for tabbing.

After printing G on line 1 (refer to Figure C-1), line feed occurs, and the print head moves back to the first print position of line 2.

T_A, in this example, includes the time required for the print head to move horizontally from X following line 1 to A on line 2,—that is, 13 character positions. Similarly, following line 2, the print head moves 4 character positions from Y to W on line 3 and so forth.

Also on line 2, T_A includes character spaces between J and K that have been skipped over by tabbing.



If the Vertical Forms Control (VFC) feature is installed.

Figure C-1. Example Showing Sequence of Printing Operation

T_C = Total time required to print characters and spaces.

Note: Nine or more consecutive spaces are treated as a tab.

On Line 3 in Figure C-1, for example, T_C is the time required to print backward from W through A (25 characters), including the spaces between 0 and M, H and G, and E and D.

T_L = Estimated total time required for line feeding. The line feed takes place after the last character on a line has been printed.

In Figure C-1, for example, the last character printed is G on line 1, E on line 2, and A on line 3.

T_V = Estimated total time required for vertical tabbing with the VFC feature.

In Figure C-1, the paper is advanced from line 3 to line 7 by vertical tabbing. A vertical tab is set at line 7 either by the CPU (in communicate mode), or by an operator (in local or communicate mode).

Note: If multiple line feeds are received together, they are added and treated as a vertical tab.

T_O = Estimated total time required for overprinting or overstriking, assuming that the data is transmitted as: character, backspace, character.

If multiple overstrike sequences (character, backspace, character; character backspace, character;...) are received in a line, they are grouped together and printed as a group.

A group is formed when an overstrike sequence is detected, and terminated when 10 consecutive non-overstrike characters (or spaces) are detected. A group is also terminated when the sum of the non-overstrike (or space) characters and overstrike characters exceeds 124. There may be multiple overstrike groups within any given line. Timings are the same for underscoring as for single-character overstriking.

If the data is transmitted in any other format, the total print time is additive.

Output Print Time Estimation Example

The estimation of output print time using the three buffered modes (basic SDLC, buffered SDLC, and 2740-2) is shown in Figures C-3 through C-7. Using these figures and the following procedures, the user can estimate the output print time required for the particular print format being used.

Example Terminal:
3767 Model 2 operating in buffered SDLC mode

Procedure:
1. Prepare the data format. (Refer to the example data format in Figure C-2.)
2. Determine the number of individual operations in each line.
3. Refer to the appropriate figures and find the time required for each operation in each line.
4. Add the individual times obtained in step 3 according to the following formula:

$$T = T_A + T_C + T_L + T_V + T_O$$

Assumption:
The print head is ready to print column 1 on line 1. (The print head is two columns to the left of column 1.)

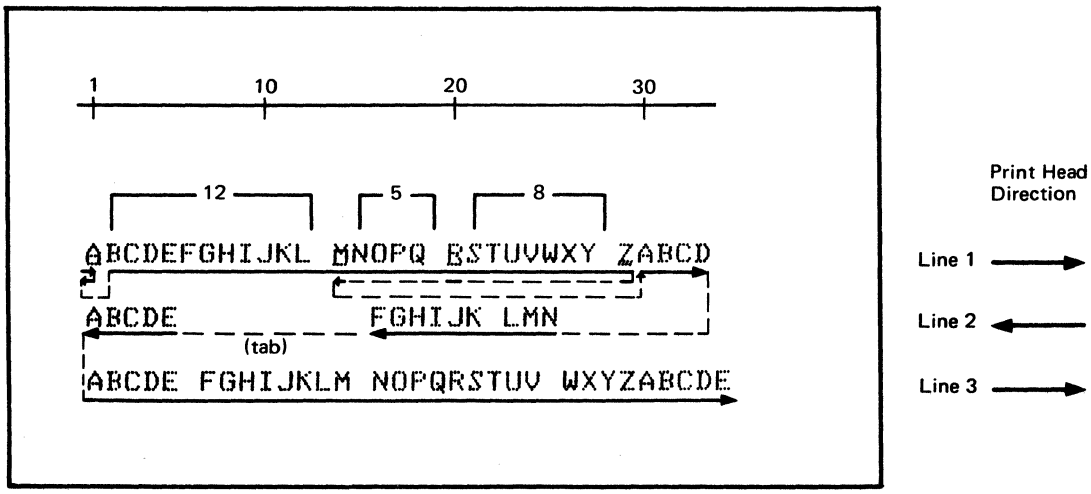


Figure C-2. Example of Data Format

Estimation:
Use Figures C-4 through C-7:

Line 1:

T_C The number of printed characters is 33 (including spaces).

Refer to Figure C-5; find the Y coordinate when the X coordinate is 33. It is approximately 410 milliseconds.

T_O There are four underscored characters on line 1 (see Figure C-2); A, M, R, and Z. The character positions between A and M, M and R, and R and Z are 12, 5, and 8, respectively, and no character is overprinted in the remainder of line 1. This indicates that A belongs to an overprinted group (group 1), with a length of 1; and M, R, and Z form another overprint group (group 2), 16 characters in length, extending from M through Z.

Refer to Figure C-6; the X coordinate represents the length of the group. For group 1 (group length = 1), the Y coordinate corresponding to the X coordinate of 1 is approximately 225 ms. Similarly, for group 2, the Y coordinate corresponding to the X coordinate of 16 is approximately 600 ms.

T_L One line is advanced from line 1.

Refer to Figure C-7; when the X coordinate is 1 (one line), the Y coordinate is approximately 125 ms; this is the time required for feeding one line.

Line 2:

T_A After a line has been fed, the print head travels backward eight positions before printing the first character on line 2, which is N.

Refer to Figure C-4; the X coordinate represents the number of character positions the head travels—in this case eight. By finding the corresponding Y coordinate, approximately 90 ms is obtained as the time required for the print head to return to the first print position of line 2.

On line 2, there are ten spaces between F and E that have been skipped over by tabbing.

Refer to Figure C-4; when the X coordinate that represents the number of tabbed positions is 10, the Y coordinate is approximately 110 ms.

T_C The number of characters and spaces on line 2 is 15, excluding 10 spaces between F and E.

Refer to Figure C-5; when the X coordinate that represents the number of characters and spaces on a line is 15, the Y coordinate is approximately 185 ms.

T_L One line is advanced from line 2.

Refer to Figure C-7; when the X coordinate is 1 (line), the Y coordinate is approximately 125 ms; this is the time required for feeding one line.

Similarly for Line 3:

T_C When X=34, Y=approximately 425 ms (see Figure C-5)

T_L When X=1, Y=approximately 125 ms (see Figure C-7)

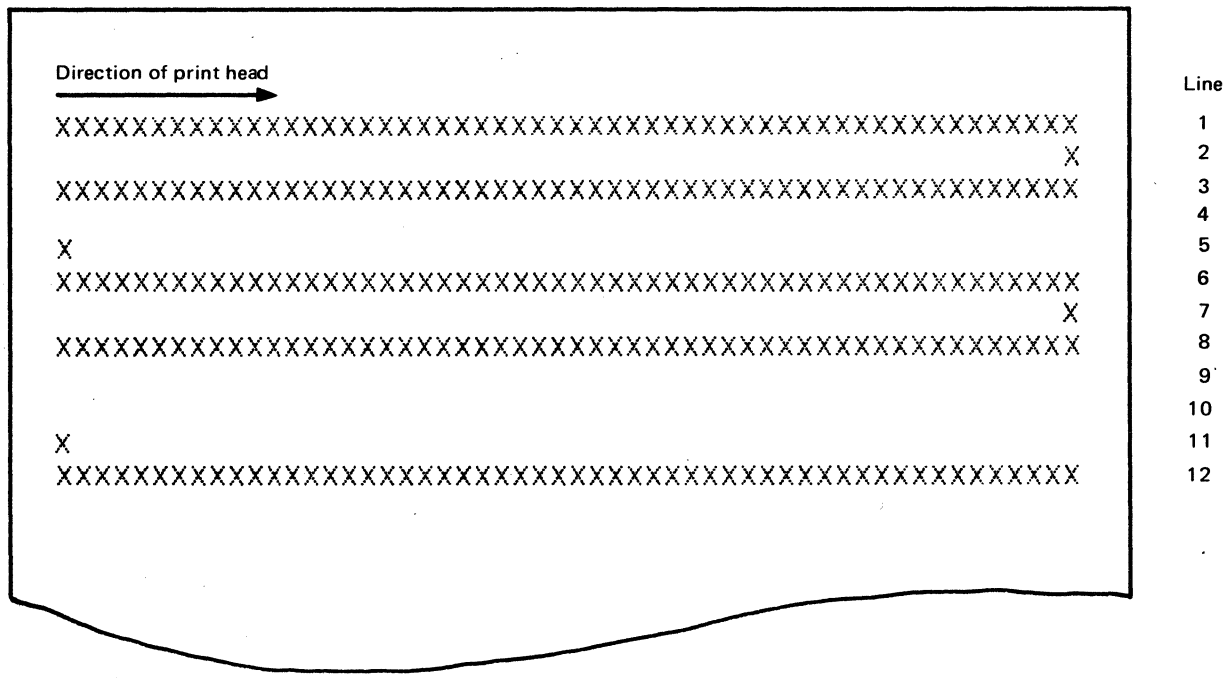
The total estimated print time of approximately 2400 milliseconds for printing lines 1 through 3 may be obtained by adding the required timings for each line.

$$T = T_C + T_O + T_O + T_L + T_A + T_C + T_A + T_L + T_C + T_L$$
$$= 410 + 225 + 600 + 125 + 90 + 185 + 110 + 125 + 425 + 125$$
$$= 2420 \text{ (milliseconds)}$$

Note: The print head may pause after line feeding (Models 2 and 3 only). This occurs when the following three conditions occur simultaneously.

1. The first print position of line *n* is horizontally very close to the last print position of line *n-1*.
2. Line *n* is extremely short.
3. Line *n+1* is extremely long.

Multiple lines may be fed between line *n-1* and line *n*, and also between line *n* and line *n+1*.



The print head pauses after printing lines 2, 5, 7 and 11.

Figure C-3. Print Example when the Print Head Pauses

This pause is normally negligible and need not be considered in estimating throughput, unless the output format is highly formatted as in the case of alternating short print lines and long print lines. In this case, the time required for this pause should be added to the summation of the total print time; refer to "Estimation of the Print Head Pause Time" described in the last part of this Appendix.

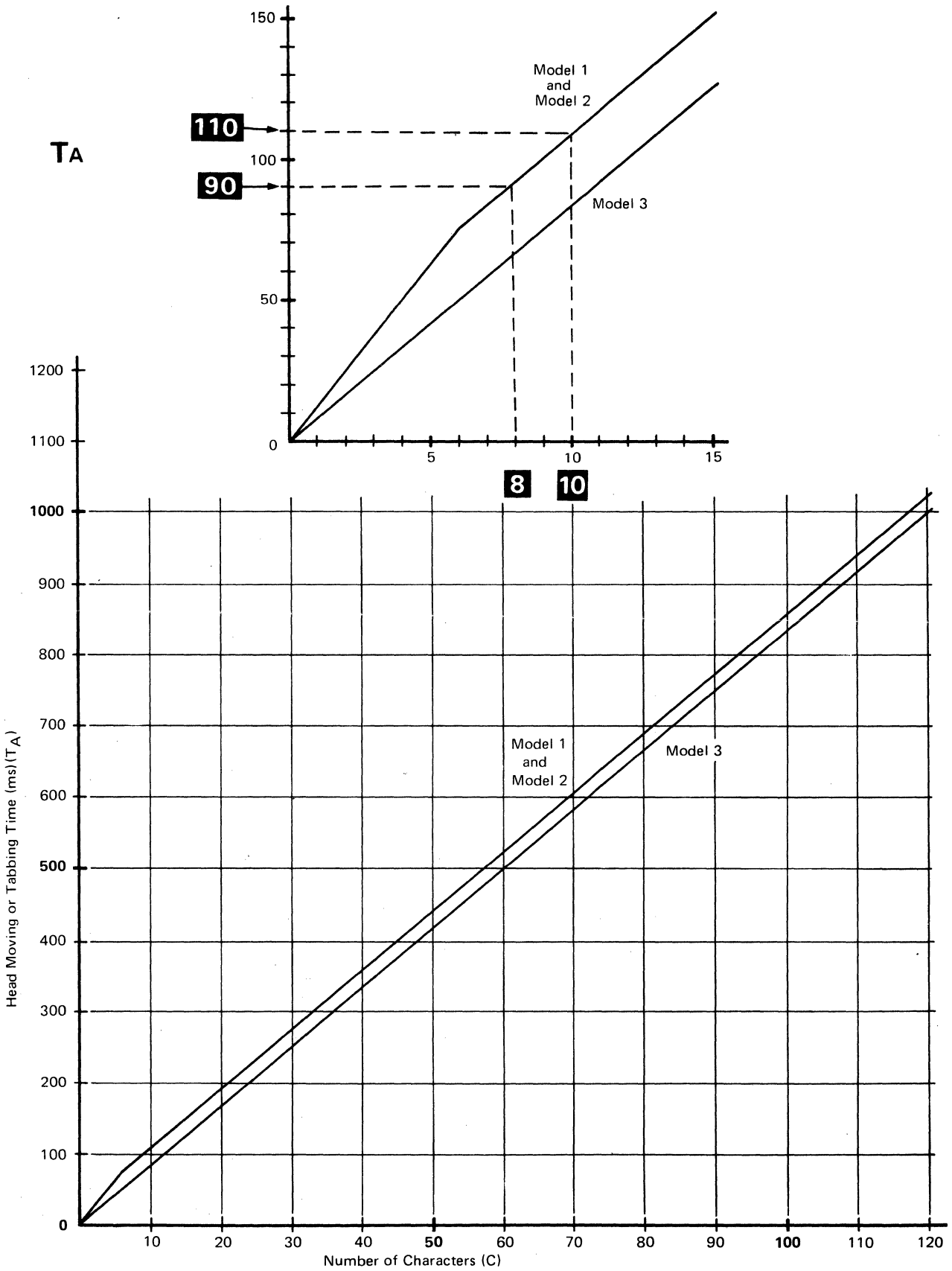


Figure C-4. Total Time Required for the Print Head to Move to the Next Line or for Tabbing

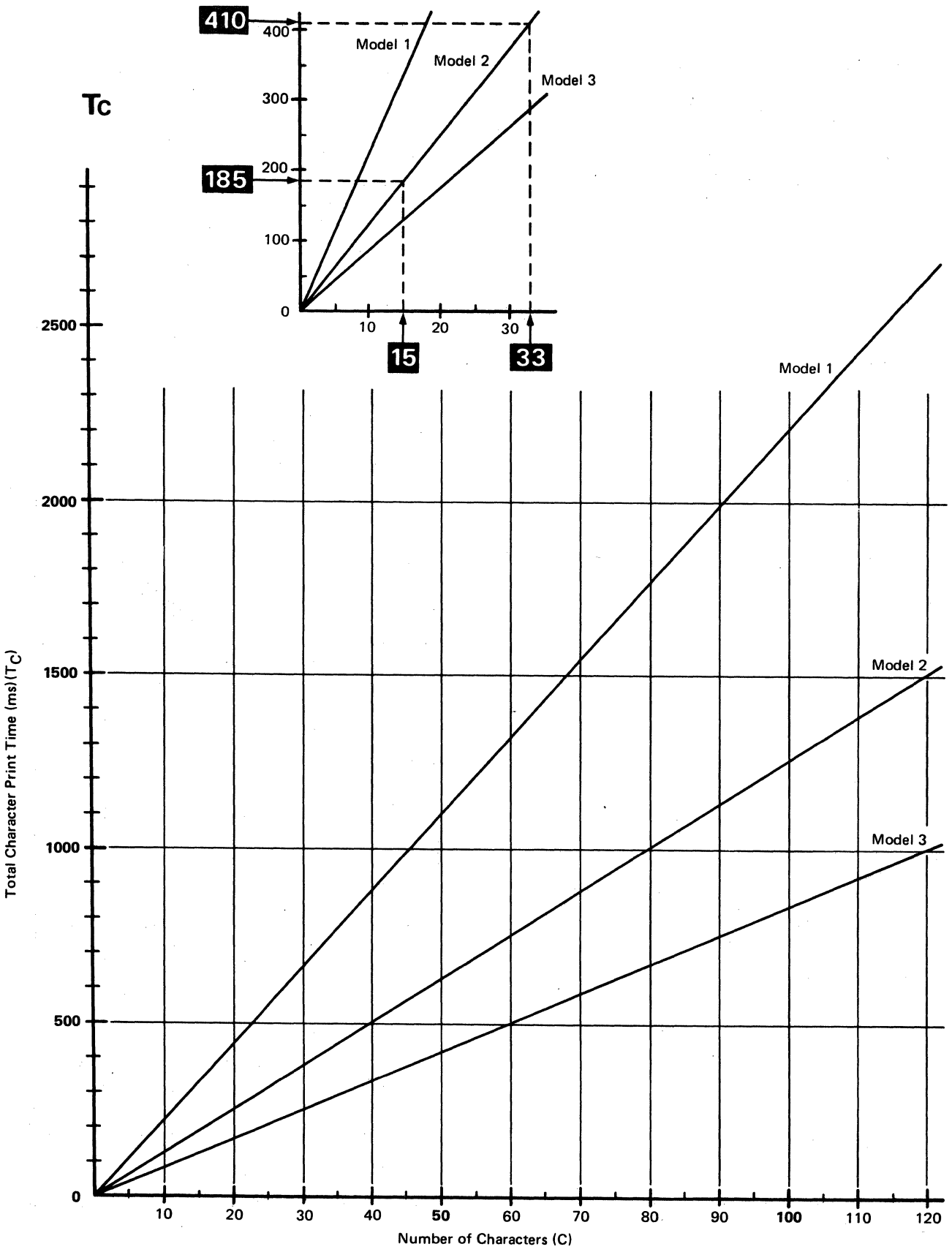


Figure C-5. Total Character Print Time

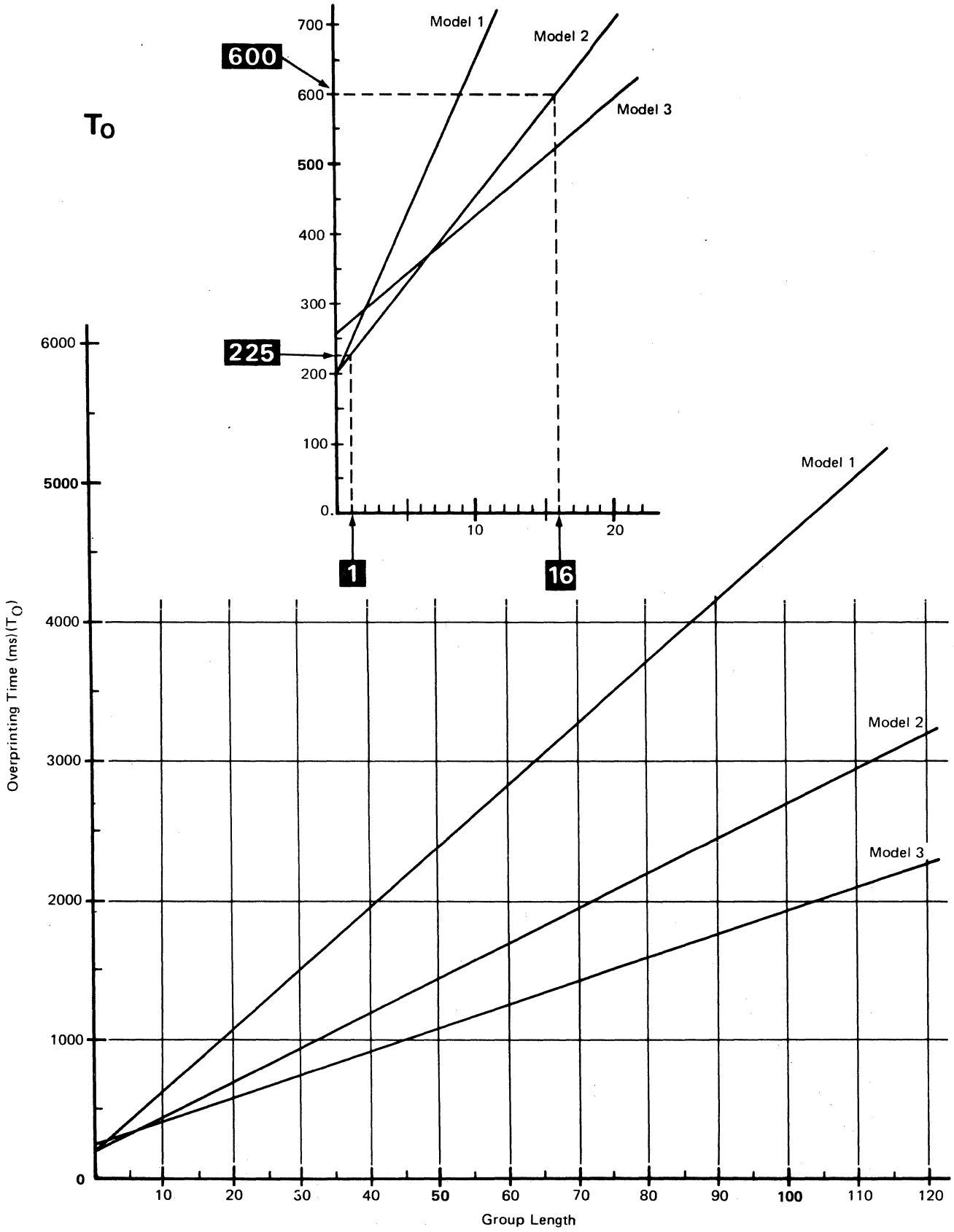


Figure C-6. Total Time Required for Overprinting

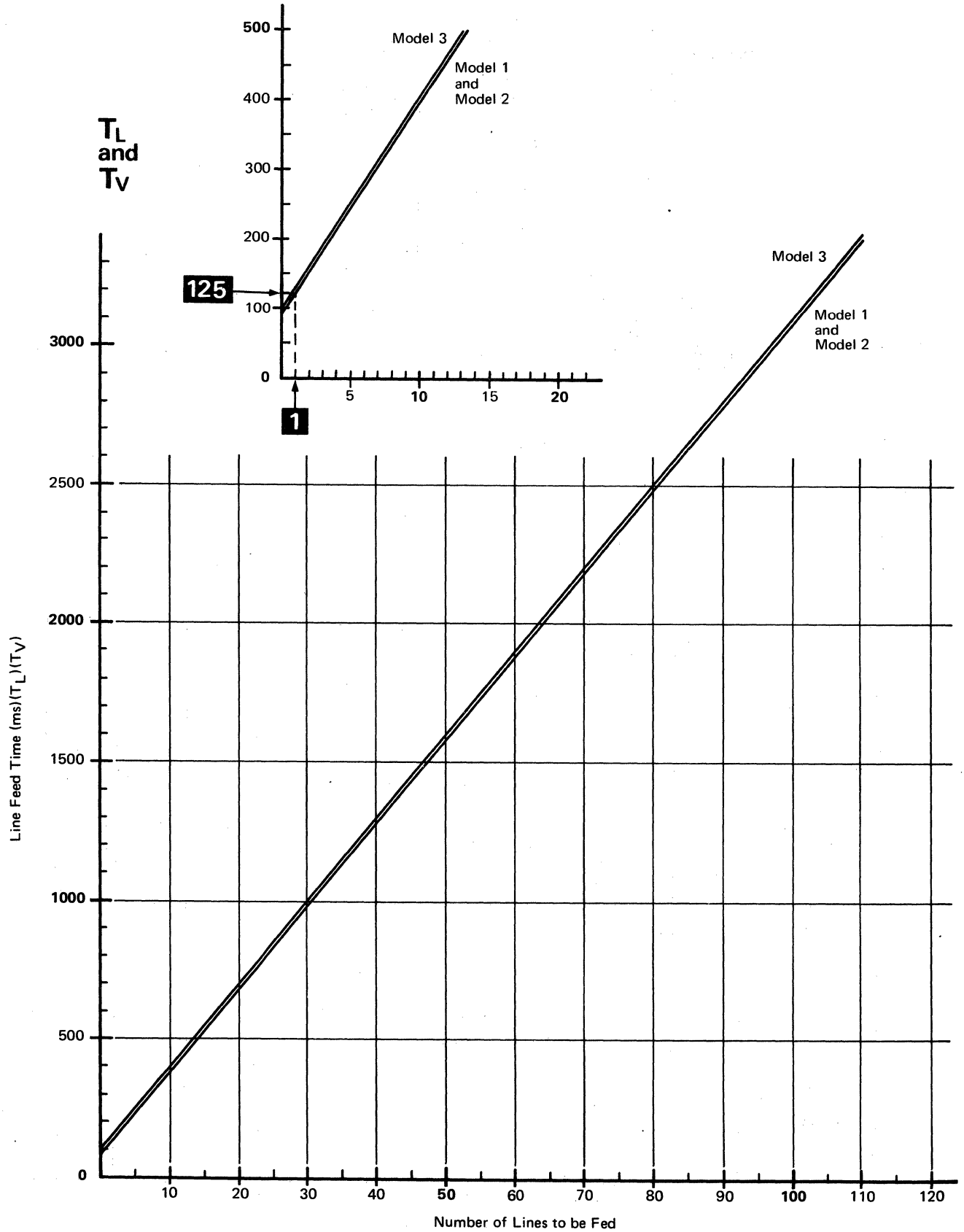


Figure C-7. Total Time Required for Feed or Vertical Tabbing

Estimation of the Print Head Pause Time

In Figure C-8, find the intersection of X and Y coordinates which correspond to the numbers of characters of lines *n* and *n+1* in your print form: X coordinate represents the number of characters to be printed on line *n*; Y coordinate represents the number of characters to be printed on line *n+1*. If the point of intersection falls above the line corresponding to your terminal environment, it is most likely that the print head pauses after printing line *n*.

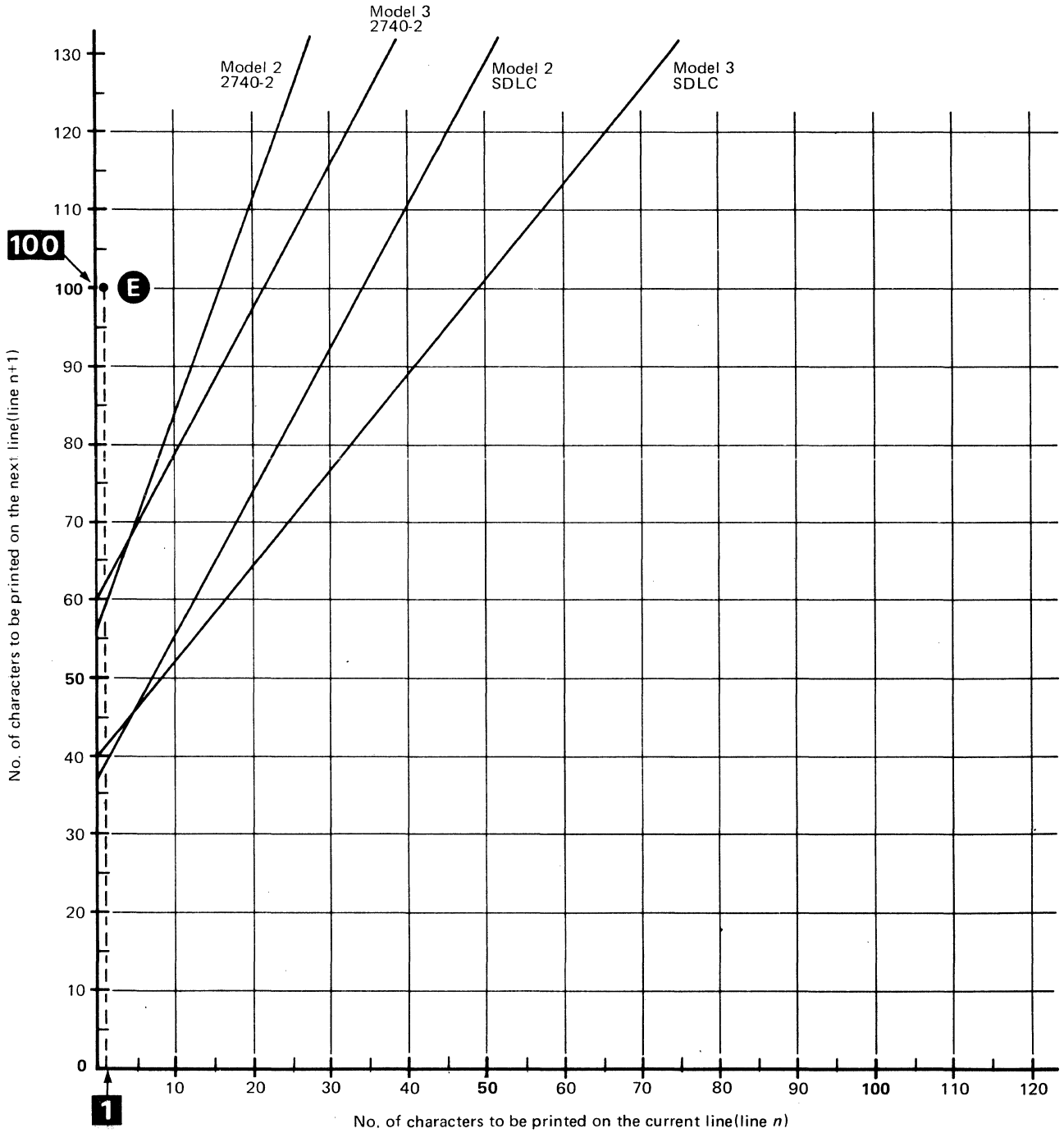


Figure C-8. Condition in which the Print Head Pauses

For Model 1, the print head may pause when less than 20 characters are printed on line n, regardless of the number of characters to be printed on line $n+1$.

The head pause time can be estimated by using the following formula:

$$T_p = P_{n+1} - O_n - L_n$$

where: T_p = Estimated print head pause time (ms)

P_{n+1} = Time to prepare the data to be printed on line $n+1$ (ms)

O_n = Time to print out the data on line n (ms)

L_n = $250 + 35\ (l+m-2)$ for Models 1 and 2

= $270 + 35\ (l+m-2)$ for Model 3

where: l: No. of lines to be fed from line $n-1$ to line n

m: No. of lines to be fed from line n to line $n+1$

P_{n+1} is the summation of the required timings for each data type and is estimated using Figure C-9. O_n is the output print time of line n and is estimated using Figures C-4 through C-7.

	SDLC	S/S: 2740-2
Graphic char; Horizontal or Vertical tab; or Line feed	6.8 ms/char., tab, lf	4.5 ms/char., tab, lf
Overstrike char.	7.5 ms/char.	6.0 ms/char.

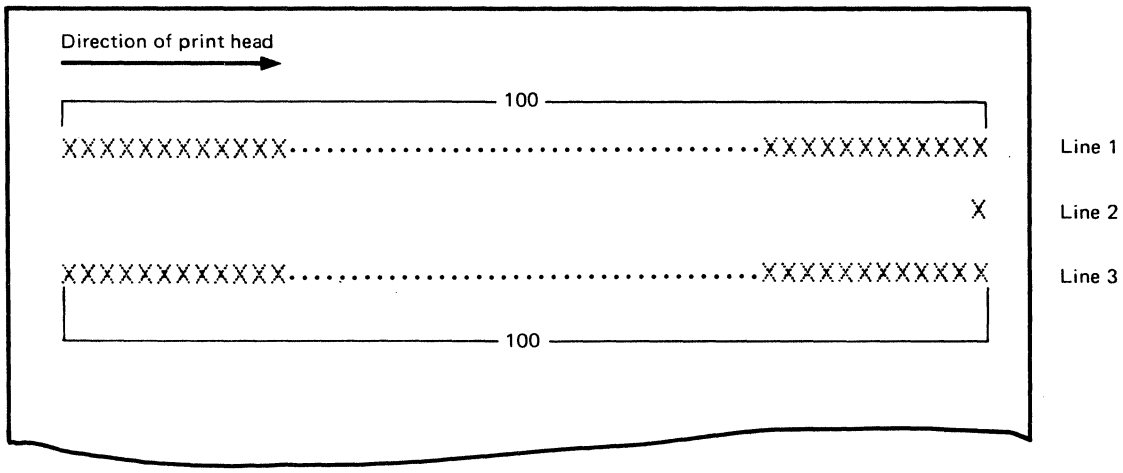
lf: line feed

Figure C-9. Time Required to Prepare the Data to be Printed

Example of Print Head Pause Time Estimation

Assumption:

1. 3767 Model 2 operates under SDLC.
2. Prnting format



Printing Sequences:

1. 100 characters are printed on line 1.
2. 1 line is fed after line 1.
3. 1 character is printed on line 2.
4. 1 line is fed after line 2.
5. 100 characters are printed on line 3.

With this print format, the head pauses after printing line 2.

Estimation:

In Figure C-8, the point of intersection of [X=1, Y=100] falls above the line corresponding Model 2 under SDLC (E). This means the print head pauses after printing line 2. Use the formula described earlier:

P_3 Get the time to prepare the data of 100 characters and 1 line feed. (Figure C-9)

6.8 x 101 (ms)

O_2 Get the time to print 1 character and feed 1 line. Refer to Figure C-5; when X coordinate is 1, Y coordinate is 13. Refer to Figure C-7; when X coordinate is 1, Y coordinate is 125.

m 125 ms

Therefore,

T_p = (6.8 x 101) - (13 + 125) - 125
= 424 (ms)

The head pause time in this example is estimated as 424 ms.

Appendix D. Function Codes for 2740-1/2740-2/2741 Line Control

The function codes in the following chart can be sent from the host when the 3767 operates under 2740-1 start-stop line control, 2740-2 start-stop line control, or 2741 start-stop line control

Function Codes	*System/360 System/370 Code*	*Line Code*	*Bit Value*	*Meaning*
RES	OF 14*	58	B84	Restore
LF	25	3B	AC841	Line Feed
NL	OD 15*	5B	BC841	New Line (Carrier Return and Line Feed)
HT	05	7A	BA841	Horizontal Tab
UC	36	1C	842	Uppercase
EOB	03 26*	3D	AC842	End of Block
BS	16	5D	BC842	Backspace
LC	06	7C	BA842	Lowercase
EOT	37	1F	C8421	End of Transmission
PRE	27	3E	A8421	Prefix
IL	17 32*	5E	B8421	Idle
DEL	07	7F	BAC8421	Delete
SP	40	01	C	Space
BYP	0E 24*	38	A84	Bypass

* System codes normally used for 3767/274x devices in translation tables. (Refer to your specific translation table for translation of System/360 and System/370 code to the proper line code.

To invoke print inhibit function for start-stop line control: send Bypass code to inhibit printing; and send Restore code to put back to the print mode.

Appendix E. Abbreviations

ACTLU	Activate Logical Unit
ACTPU	Activate Physical Unit
ANR	alpha numeric readout
APL	A Programming Language
ASCII	American National Standard Code for Information Interchange
ATTN	attention
BB	begin bracket
BBP	begin bracket pending
BETB	between bracket state
BKSP	backspace
BM	bottom margin
BNN	boundary network node
bps	bits per second
BS	backspace
BUFFR	buffer
CD	change direction
$\overline{CD}$	not change direction
char	character
CICS	Customer Information Control System
CLSDST	close data set
cm	centimeter
CMDR	command reject
CNCL	cancel
CPU	central processing unit
CR	carriage return
DAA	data access arrangement
DACTLU	Deactivate Logical Unit
DACTPU	Deactivate Physical Unit
DISC	Disconnect command
DOS	Disk Operating System
DR	definition response
DLC	data link control
DR1 (2)	definite response 1 (2)
EB	end bracket
ENP	enable print
EOB	end of block
EOF	end of form
EOM	end of message
EXC	exception
$\overline{EXC}$	not exception
FCC	Federal Communications Commission
FF	form feed
	flip-flop
FIC	first-in-chain
FID	format identification (field)
FM	function manager
FME	function management end state
HDX	half duplex
Hex	hexadecimal
HT	horizontal tab
ID	identification
IMS	Information Management System
INB	in bracket state
INN	intermediate network node
INP	inhibit print
IPR	isolated pacing response
IRS	interchange record separator
KBD	keyboard
LF	Line feed
LIC	Last-in-chain
LM	Left margin
LU	Logical unit
LUSTAT	Logical unit status
MIC	middle-in-chain
MPL	maximum print line
MPP	maximum print position
MVS	multiple virtual storage
NCP	Network Control Program
NL	new line
NSA	non-sequenced acknowledgment
OIC	only-in-chain
OID	operator identification
OPNDST	open data set
PAC	pacing
PIU	path information unit
PLU	primary logical unit
proc	proceed
PU	physical unit
R+ (-)	response positive (negative)
RCV	receive
resp	response
req	request
RH	request header
RM	right margin
RNR	receive not ready (busy)
RR	receive ready
RTN	return
RU	request unit
SDLC	Synchronous Data Link Control
SDT	Start Data Traffic command
SHF	set horizontal format
SLU	secondary logical unit
SNA	System Network Architecture
SNRM	set normal response mode
SOR	start of record
SS	start/stop
SSCP	system services control point
SSR	secure string reader
STBY	standby
SVC	supervisor call instruction
SVF	set vertical format
SW	switch
SYS	system
TCAM	Telecommunications Access Method
TH	response header
TM	top margin
vert	vertical
VS	virtual storage
VT	vertical tab
VTAM	Virtual Telecommunications Access Method
XID	transmit ID

Appendix G. Glossary

Terms preceded by an asterisk indicate American National Standards Institute (ANSI) definitions. IBM is grateful to ANSI for permission to reprint its definitions from the American National Standard Vocabulary for Information Processing (Copyright 1970 by American National Standards Institute, Inc.), which was prepared by Subcommittee X3K5 on Terminology and Glossary of American National Standards Committee X3.

Activate Logical Unit (ACTLU) command: (SNA) The command sent by VTAM to a logical unit that begins the SSCP-LU session.

addressing: The means whereby the originator or control station selects the unit to which it is going to send a message.

alphametic: Pertaining to a character set that contains letters, digits, and usually other characters such as punctuation marks; synonymous with "alphanumeric".

APL: A programming language. A problem solving language designed for use at remote terminals; it offers special capabilities for handling arrays and for performing mathematical functions.

ASCII:* (American National Standard Code for Information Interchange, X3.4-1968) The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, communications systems, and associated equipment. The ASCII set consists of control characters and graphic characters. Synonymous with USASCII.

BASIC: An algebra-like language used for problem-solving by engineers, scientists, and others who may not be professional programmers.

bid: In the contention form of invitation or selection, an attempt by the computer or a station to seize control of a line so that it can transmit data.

Bid command: (SNA) A command used to determine whether a new bracket can be started. The receiver of the Bid command sends a positive response if a new bracket can be started or sends a negative response if a new bracket cannot be started. A Bid command is sent when a SEND macro instruction is issued with CONTROL=BID set in its RPL.

Bind command: (SNA) The command sent by VTAM to a logical unit that begins a VTAM application-program-to-LU session.

bps: Bits per second. In serial transmission, the instantaneous bit speed within one character, as transmitted by a machine or a channel.

Bracket: An exchange of one or more messages between a VTAM application program and a logical unit that accomplishes some task defined by the user as uninterruptable.

buffer: (1)* A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transmitting data from one device to another. (2)* An isolating circuit used to prevent a driven circuit from influencing the driving circuit. (3) An area of storage that is temporarily reserved for use in performing an input/output operation, into which data is read or from which data is written. Synonymous with I/O area.

byte: The presentation of a character; eight binary digits (bits), in System/360 or System/370.

Cancel command: (SNA) A command that signifies to its receiver that the current chain being received should be discarded. A Cancel command is sent when a SEND macro instruction is issued with CONTROL=CANCEL set in its RPL.

CBS: Data access arrangement (DAA) model used with terminals that automatically originate or answer data calls.

CCITT: The Consultative Committee on International Telegraphy and Telephony is one of three main organizations within the International Telecommunications Union which is centered in Switzerland. This committee studies world telegraphy and telephony and makes recommendations for standardization.

CDT: Data access arrangement (DAA) model used with terminals that require manual operation for originating, or originating and answering, data calls.

Chase command: (SNA) A command that signifies that all responses have been received. A Chase command is sent by issuing a SEND macro instruction with CONTROL=CHASE set in its RPL.

Clear command: (SNA) A command sent from a VTAM application program to a logical unit indicating that no further messages and responses are to be exchanged and resetting sequence numbers to zero.

common carrier: See "communications common carrier."

communicate (online): Pertaining to equipment or devices that are under control of the central processing unit.

communication line: Any medium, such as a wire or a telephone circuit, that connects a remote station with a computer.

communications common carrier: A government-regulated private company that furnishes the general public with telecommunications service facilities; for example, a telephone or telegraph company.

Contention mode: (SNA) This describes a timing relationship between two Function Managers (FM). When one FM request to be the Requester, the other becomes the Responder – if it does not simultaneously want to send. This relationship stays in effect until the Requester completes a chain, at which point both FM's again enter contention mode.

DAA: Data access arrangement. A protective interface device provided by the common carrier when non-carrier-provided modems are used on the switched telecommunications network.

Deactivate Logical Unit (DACTLU) command: (SNA) The command sent by VTAM to a logical unit that terminates the SSCP-LU session.

Definite response: (SNA) In sending a message, a request that a psoitive response or a negative response be returned to acknowledge how the message was received. In sending a response, any kind of response, whether positive or negative, and whether definite response 1, definite response 2, or both.

EBCDIC: Extended binary coded decimal interchange code.

EIA interface: A set of signal characteristics (function, voltage, and current) specified by the Electronic Industries Association for business machine/data set connections. Officially defined in "Interface between Data Terminal Equipment and Data Communication Equipment, RS232", and revisions thereto.

Exception Request (EXR): (SNA) This is sent to a 3767 from the controller when it detects an exception in a request from the host to the 3767.

Flip-flop mode: (SNA) This describes the Requester/Responder relationship between two Function Managers (FM). At first, one FM and then the other becomes the Requester. The Requester issues FM Data Requests and the Responder issues Responses. When the Requester completes its requests, it transfers the control to the other FM by setting the CD indicator.

half duplex: A communication channel that is capable of transmitting in both directions, but in only one direction at a time.

integrated communication adapter (ICA): Performs the same functions as a multiplexer, but it is integrated into the CPU.

interrupt: (1)* To stop a process in such a way that it can be resumed. (2) In data transmission, to take an action at a receiving station that causes the transmitting station to terminate a transmission.

IPR: (SNA) Isolated pacing response. Used when an Function Manager (FM) response does not flow because the flow is operating with exception responses and no exception occurred. The pacing response to the last (or only) Request/Response Unit (RU) of a chain is returned after the RU is processed, while the pacing response to the first or the middle of a chain is returned whenever the terminal can accept an additional RU.

leased facility: A facility reserved for sole use of a single leasing user.

line control: The scheme of operating procedures and control signals by which a telecommunications system is controlled.

local (offline): Pertaining to equipment or devices that are not under control of the central processing unit.

Logical Unit Status (LUSTAT): (SNA) This signifies to the host that a 3767 changed from the send state to the standby state without notifing the host of the change while it was rejecting an outbound request.

LRC character:* The longitudinal redundancy check character.

modem: A device that modulates and demodulates signals transmitted over communications facilities.

multiplexer: A device for collecting the input from many communications lines and transferring it to the CPU; also, a device for receiving information from the CPU and transferring it to one of many communications lines without forcing the CPU's timing to match that of the connected terminals.

multipoint line: A line or circuit interconnecting several stations. Synonymous with multidrop line.

offline:* Pertaining to equipment or devices not under control of the central processing unit.

online: Associated with a processor, either directly or through a transmission control unit. The physical connection is either by multiwire cable or a communications line.

Option code: A value supplied by the OPTCD operand of the RPL macro instruction that indicates how a given connection or data transfer request is to be performed by VTAM.

overflow: (1)*That portion of the result of an operation that exceeds the capacity of the intended unit of storage. (2) A condition caused by entering a number, during offline calculation, that has more integer positions than are allowed by the current decimal point position.

point-to-point line: A line that connects a single remote station to the computer; it may be either switched or non-switched.

private line: A communications line without interexchange switching arrangements, furnished to a customer for his exclusive use.

SDLC: Synchronous data link control. A discipline for the management of synchronous, transparent, serial-by-bit information transfer over a communications channel. SDLC includes comprehensive detection and recovery procedures for transmission errors introduced by the communications channel.

Shutdown (SHUTD) command: (SNA) A command that requests a 3767 to stay in a null state at the termination of the current bracket, until an Unbind command is received or the new bracket is initiated by the host.

Shutdown Complete (SHUTC) command: (SNA) A command that a 3767 sends to indicate that the 3767 has come into a null state.

Signal command: (SNA) A command that signifies that the Attention key is pressed or that, if received, turns on the CPU Select light.

SNA: Systems Network Architecture.

SNA Character String (SCS): (SNA) This provides SNA devices control functions for keyboard/printer.

Start Data Traffic (SDT) command: (SNA) A command that allows data and data-flow control messages and responses to be exchanged between a VTAM application program and a logical unit.

Start-stop transmission: Asynchronous transmission in which each group of code elements corresponding to a character signal is preceded by a start signal which serves to prepare the receiving mechanism for the reception and registration of a character, and is followed by a stop signal which serves to bring the receiving mechanism to rest in preparation for the reception of the next character.

switched line: A telecommunications line in which the connection between the computer and a remote station is established by dialing.

terminal: A machine or group of machines capable of generating and/or receiving signals transmitted and/or received from a communications line.

Unbind command: (SNA) The command sent by VTAM to a logical unit that terminates a VTAM application-program-to-LU session.

underflow: A condition caused by entering a number, during offline calculation, that has more fractional positions than are allowed by the current decimal point position.

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