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### **IBM 2740/2741 Communications Terminal—Operators Guide**

This publication describes the setup and operating procedures for the IBM 2740 and IBM 2741 Communications Terminals when operating in local and communicate mode. The line-control signals and transmission controls are fully described for each terminal. Removal and replacement procedures for the typewriter are also fully described along with recommended typing procedures to ensure the most efficient operation of the terminals.

## PREFACE

The purpose of this Operator's Guide is to provide the information necessary to enable the user to operate either the 2740 or 2741 Terminal in the most efficient manner, in both local and communicate mode. The reader is assumed to be already familiar with the principles of operation of the terminal(s) as set forth in the SRL publications--IBM 2740 Communications Terminal, Form A24-3403; and IBM 2741 Communications Terminal, Form A24-3415. For information on other IBM Tele-processing products, see IBM Tele-processing Bibliography, Form A24-3089.

The users of this manual are cautioned that specifications are subject to change at any time and without prior notice by IBM. Significant changes or additions to the specifications contained in this publication will be reported in subsequent revisions or Technical Newsletters.

Second Edition, February 1968

This revision combines the 2740/2741 Communications Terminal--Operator's Guide, Form A27-3001-0, and Technical Newsletter N27-3017, but does not obsolete these publications.

The word Reset is used in this edition in place of Restart which was used in the Technical Newsletter in reference to a key and indicator light on the operator's panel for the Model 2 only.

Significant changes or additions to the specifications contained in this publication are continually being made. When using this publication in connection with the operation of IBM equipment, check the latest SRL Newsletter for revisions or contact the local IBM branch office.

Copies of this and other IBM publications can be obtained through local IBM branch offices.

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## CONTENTS

IBM 2740/2741 COMMUNICATIONS TERMINALS OPERATOR'S GUIDE . . . . .	5	Terminal-Mode Switch (Local/Communicate) . . . . .	17
APPLICATIONS . . . . .	7	IBM 2740 TERMINAL OPERATION . . . . .	19
IBM 2740 . . . . .	7	Local Mode (Off-Line) . . . . .	19
Remote Inquiry and Reply . . . . .	7	Point-to-Point Terminal Operation . . . . .	19
Message Storing and Switching . . . . .	7	To Transmit . . . . .	19
IBM 2741 . . . . .	7	To Receive . . . . .	19
On-Line Scientific Computation . . . . .	7	Record Checking (Special Feature) . . . . .	19
Information Retrieval . . . . .	7	Broadcast Operation . . . . .	20
Other Applications . . . . .	7	Dial-Up Operation . . . . .	20
PRINCIPLES OF OPERATION . . . . .	8	To Transmit . . . . .	20
SELECTRIC TYPEWRITER . . . . .	8	To Receive . . . . .	20
SELECTRIC TYPEWRITER CONTROLS AND INDICATORS . . . . .	10	IBM 2740 Terminal and Multiplexer, Point-to-Point . . . . .	21
Paper Insertion and Movement Controls . . . . .	10	To Transmit . . . . .	21
Platen Knobs . . . . .	10	To Receive . . . . .	21
Multiple-Copy Control Lever . . . . .	10	IBM 2740 Terminal and Multiplexer, Point-to-Point with Dial-Up Feature Installed . . . . .	21
Paper-Bail Lever . . . . .	10	To Transmit . . . . .	21
Paper Guide . . . . .	10	To Receive . . . . .	22
Paper-Release Lever . . . . .	10	IBM 2740 Terminal and Multiplexer with Transmit Control Feature Installed . . . . .	22
Line-Space Lever . . . . .	10	IBM 2740 Terminals and Multiplexer, Station Control Special Feature Installed . . . . .	22
Paper-Presence Contact and Lock-Out (2740 Only) . . . . .	10	To Transmit (Polling Operation) . . . . .	23
Margin Stops . . . . .	10	To Receive (Individual Terminal Address Operation) . . . . .	23
Line Gauge and Card Holder . . . . .	10	To Receive (Group-Address Operation) . . . . .	23
Keyboard Controls . . . . .	11	To Receive (All-Call Address Operation) . . . . .	24
On-Off Switch . . . . .	11	Summary of Station Control Addressing Operation . . . . .	24
Return Key . . . . .	11	IBM 2741 TERMINAL OPERATION . . . . .	25
Index Key (2740) . . . . .	11	Local Mode (Off-Line) . . . . .	25
Margin-Release Key . . . . .	11	Communicate Mode . . . . .	25
Shift and Shift-Lock Keys . . . . .	11	To Transmit and Receive . . . . .	25
Tab Key . . . . .	12	Transmit Operation Using the Interrupt Special Feature . . . . .	25
Tab-Set and Tab-Clear Key . . . . .	12	Transmit and Receive with Dial-Up Special Feature Installed . . . . .	25
Backspace Key . . . . .	12	TEST PROCEDURES . . . . .	27
Space Bar . . . . .	12	Operator-Checkout Procedure . . . . .	27
Typing-Position Indicator . . . . .	12	Check-Loop Test (2740) . . . . .	27
Ribbon-Reverse Lever . . . . .	12	Check-Loop Test (2741) . . . . .	27
Ribbon-Position Lever . . . . .	12	IBM 2740 Terminal and Line Adapter Test Procedure (IBM Leased Line or Shared Line Adapter) . . . . .	27
Ribbon-Change Lever . . . . .	12	IBM 2741 Terminal and Line Adapter Test Procedure (IBM Leased Line or Shared Line Adapter) . . . . .	31
Impression-Control Lever . . . . .	12	IBM 2740 Problem Analysis Check List (Keyboard and Status Lights) . . . . .	32
TRANSMISSION CONTROLS AND INDICATORS . . . . .	14	Keyboard Locked . . . . .	32
IBM 2740 . . . . .	14	Standby Light Off . . . . .	32
Local/Communicate Key . . . . .	14	Transmit Light Off . . . . .	32
Standby (S) Light . . . . .	14	Receive Light Off . . . . .	32
Transmit (T) Light . . . . .	14	Bid Light Off . . . . .	32
Receive (R) Light . . . . .	14	Restart Light On . . . . .	33
EOT (End-of-Transmission) Key . . . . .	14	IBM SELECTRIC TYPEWRITER--REMOVAL AND REPLACEMENT PROCEDURES . . . . .	34
Bid Key and Light . . . . .	15	Selective Print Elements . . . . .	34
Restart (RST) Key and Light (Checking Special Feature) . . . . .	15	Changing Print Elements . . . . .	34
Dial-Disconnect (Disc) Key and Dial-Connect Light (Dial-Up Adapter Special Feature) . . . . .	15	Ribbon Carrier . . . . .	35
EOB (End-of-Block) Key (Checking Special Feature) . . . . .	16	Fabric Ribbon . . . . .	35
Automatic EOB (Prerequisite, Checking Feature) . . . . .	16	Ribbon Identification . . . . .	35
Transmit-Control Switch (MTC, Off) Transmit Control Special Feature . . . . .	16	TRANSMISSION CONTROLS . . . . .	17
TRANSMISSION CONTROLS . . . . .	17	IBM 2741 . . . . .	17
IBM 2741 . . . . .	17	Return Key . . . . .	17
Return Key . . . . .	17	Attention Key . . . . .	17
Attention Key . . . . .	17		

To Remove Ribbon Cartridge . . . . .	35
To Install New Cartridge . . . . .	36
Typewriter Platen . . . . .	36
To Remove the Platen . . . . .	37
To Replace the Platen . . . . .	37
To Sweep the Erasure Dustpan . . . . .	37

TYPING GUIDES FOR YOUR IBM 2740/2741 TERMINAL TYPE-

WRITER . . . . .	39
For Your Typing Ease . . . . .	39
Posture . . . . .	39
Typing Touch . . . . .	39
Typing Tips (Local Mode Only) . . . . .	39
Addressing Envelopes . . . . .	39
Typing Cards and Labels . . . . .	39
Variable Line Spacing . . . . .	39
Corrections on Bound Copies . . . . .	39
Crowding and Spreading Characters . . . . .	39
Vertical and Horizontal Lines . . . . .	40
The Rush Message . . . . .	40
Visible Margin Reset . . . . .	40
Centering . . . . .	40
Tab Stops in Forms Typing . . . . .	40
Typing In Corrections . . . . .	40
Crowding Letters . . . . .	40
Spreading Letters . . . . .	40
Two Methods of Spacing Letters . . . . .	41

IBM 2740 COMMUNICATIONS TERMINAL MODEL 2 . . . . .	43
Keys, Lights, and Switches . . . . .	43
Keys . . . . .	43
Indicator Lights . . . . .	44
IBM 2740 Model 2 Terminal Operation . . . . .	45
Local Mode . . . . .	45
Communicate Mode . . . . .	45
Special Features . . . . .	46
Buffered Receive . . . . .	46
Header Control . . . . .	46
Edit . . . . .	46
Document Insertion . . . . .	47
Split Friction-Feed Platen . . . . .	47
Record Checking . . . . .	48
Typing Error Correction Procedure . . . . .	48
Error-Recovery Procedures . . . . .	49

DIAL-UP AND DISCONNECT PROCEDURES FOR THE IBM  
2740 MODEL 1 EQUIPPED WITH THE AUTOMATIC  
DISCONNECT FEATURE (World Trade Only) USING  
THE IBM 3976 MODEM MODEL 2 . . . . .

Dial-Up Connection Procedures (Hand Shaking) . . . . .	53
Manual Answering Procedure . . . . .	53
Auto-Answering Procedure . . . . .	53
Auto-Disconnect Procedure . . . . .	53
INDEX . . . . .	57

The IBM 2740 and IBM 2741 Communications Terminals (Figures 1 and 2) provide the capabilities of the standard Selectric Typewriter combined with the added convenience and flexibility of a communications terminal. Thus, these dual-purpose units can alternately function as:

- A typewriter in a standard typing operation, or
- A data transmitting and receiving unit over communication lines to another 2740 terminal(s)

or to a computer; or in the case of the 2741, to a computer only.

The IBM 2740 and IBM 2741 are typing terminals that can be operated by any typist with a minimum of additional training. The major advantages of the basic Selectric® typewriter are retained, and added to these is the flexibility provided by the ability to communicate between remote locations.



Figure 1. IBM 2740 Communications Terminal

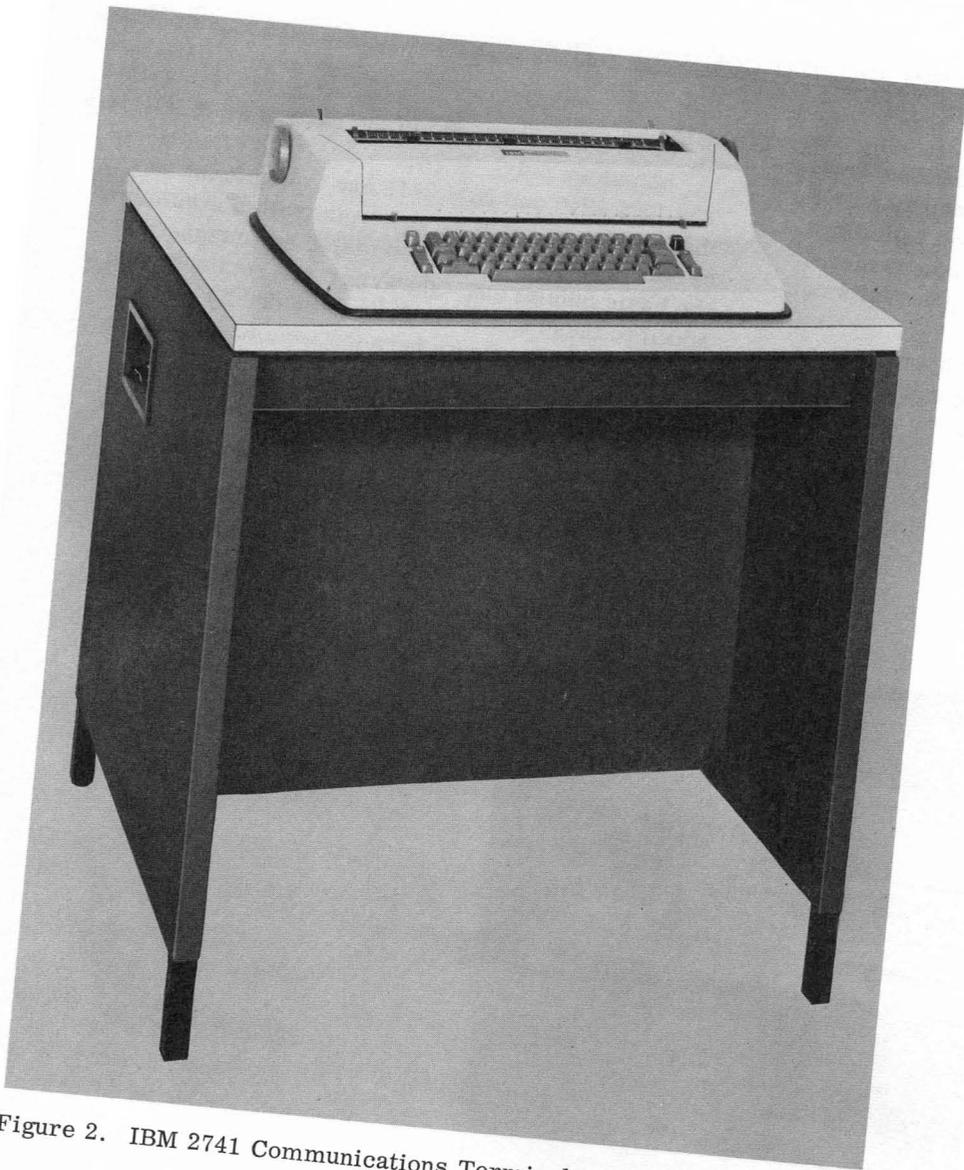


Figure 2. IBM 2741 Communications Terminal

IBM 2740

The 2740 Communications Terminal performs as a conventional typewriter when operating with the Local/Communicate switch in the Local position. When the switch is set to Communicate, each message character keyed at the sending terminal is printed at both the sending and receiving terminal. For example, one 2740 may be located in the purchasing and another in the receiving department. Information typed at the purchasing department terminal is received and printed at the receiving department terminal. The information printed at the receiving terminal could consist of a memorandum copy for departmental distribution, as well as a running log of all received messages for future reference.

As a sales aid to expedite customer orders, a 2740 can be installed in the purchasing department of a customer. To place an order, the customer merely dials your company's number and types his order, which is printed on your 2740. This method of ordering provides, within minutes instead of a day or more, both you and your customer with a complete copy of the order. Confirmation of the order and availability of all ordered items is possible by just reversing the transmission procedure.

Remote Inquiry and Reply

You, as the operator of a 2740 terminal, can have access to the central processing unit of an IBM data processing system, and thereby can prepare inquiries and receive replies regarding information stored in the computer. For example, an engineer using a 2740 can enter desirable variables into a Fortran program (used for processing scientific data) available to the central processing unit, and start the program in operation. When the program has completed its operation, a reply can be returned to the remote (engineer's) terminal. In addition, the engineer can interrogate the program during its operation to determine if the problem is staying within the present limitations.

Message Storing and Switching

Effective two-way communication between terminals can be achieved by originating messages at a 2740 attached to a computer that has been programmed to store and forward the entire messages to any one or more selected terminals connected to the same network.

IBM 2741

The IBM 2741 Communications Terminal is a remote conversational terminal providing direct access to a computer only. Each 2741 terminal is connected to a computer by either privately owned or leased common-carrier communications facilities. The power, versatility, and time-sharing capabilities of a modern IBM data processing system are available to the user of the IBM 2741 Communications Terminal.

One computer can service many IBM 2741 terminals. The maximum number is limited only by the type of communications facilities used and the capacity and equipment of the computer. The optimum number is determined by the specific application.

Because the operation of the 2741 is controlled almost entirely by the computer program, the applications of the terminal are limited only by the imagination and ingenuity of the programmer.

On-Line Scientific Computation

Routines for solving frequently encountered engineering problems can be stored in the core-storage area of a computer. Engineers at remote 2741 terminals can specify the routine to be used and enter the necessary data to be calculated. The computer can then calculate the problem using the data just received and transmit the answer back to the remote terminal.

Information Retrieval

One example of information retrieval would be to have in computer core storage a KWIC (keyword in context) file that would contain a physical location word or document reference. The information you would be looking for need not be converted and present in core storage. However, the KWIC answer could tell you physically where the information is filed. It might be as specific as a file drawer or as general as a building or department.

Other Applications

The applications discussed are just samples of the many that can be performed on an IBM 2741 Communications Terminal. Some other areas of application are:

- Purchase orders
- Engineering change orders
- Personnel records
- Executive correspondence
- Manufacturing orders
- Data file maintenance

The possibilities of the terminal will indeed challenge the imagination.

## PRINCIPLES OF OPERATION

The IBM 2740 and IBM 2741 Communications Terminals can be thought of as consisting of two major parts:

1. A Selectric® Typewriter
2. The necessary controls, switches, buttons, and lights and their associated electronic components that make it possible for the 2740 and 2741 to become communications devices.

## SELECTRIC TYPEWRITER

Instead of typebars and a moving carriage, the IBM Selectric® Typewriter (Figure 3) features a small

globe-shaped print element that contains all the typing graphics. This print element skims across the page typing characters faster than the eye can see. Because there are no typebars, key clash and typebar pileups are completely eliminated. Type styles can also be changed in seconds by simply replacing the print element. The selective print-element capability now lets you select the type style most suitable for each typing application.

Your IBM Selectric® Typewriter offers many other features that help make all typing easier and more effortless. For example, the exclusive stroke-storage system reduces typing errors by storing the second of two rapidly typed characters until the first is printed. The buoyant keyboard and

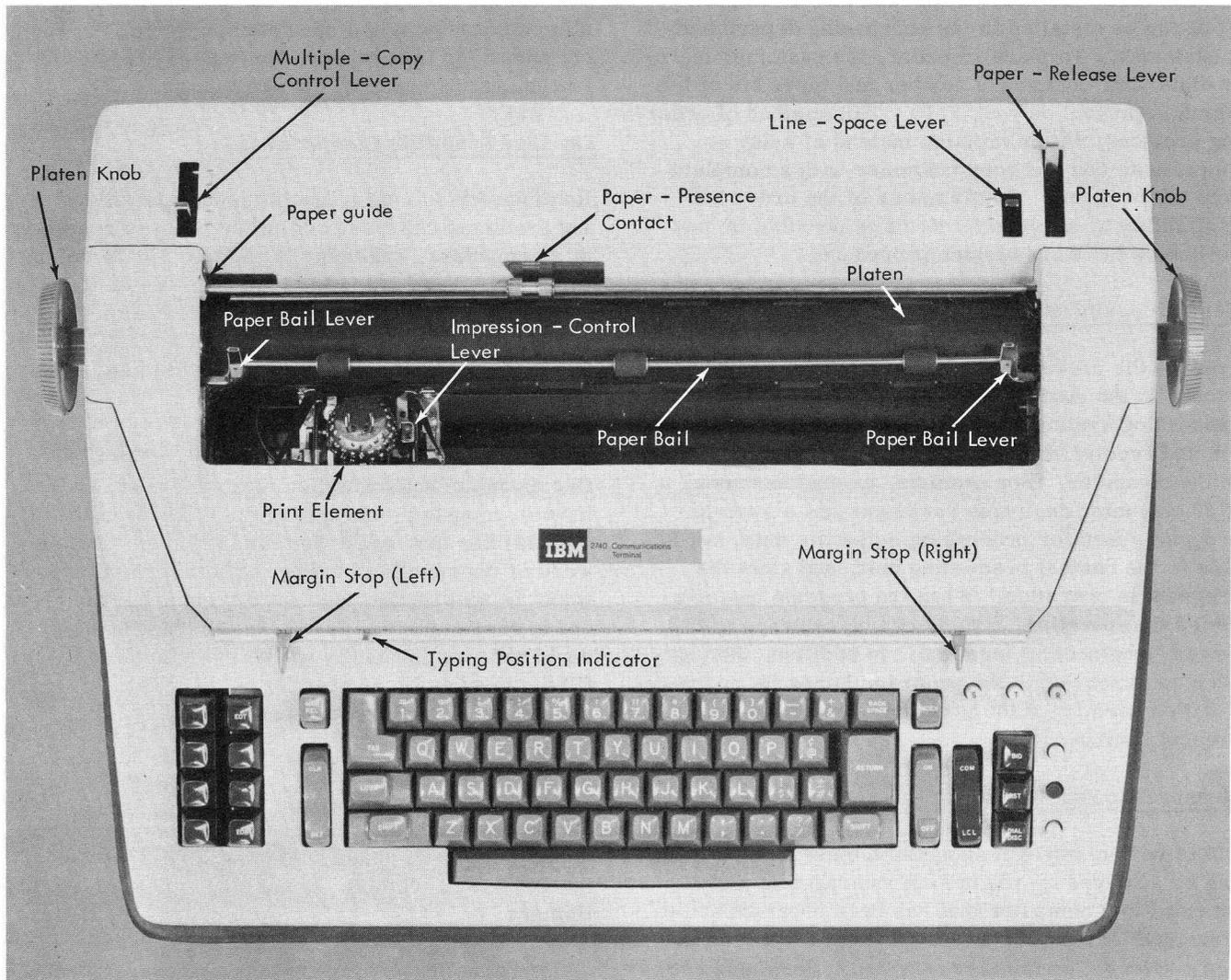


Figure 3. Selectric Typewriter Controls (2740)

sculptured keys provide you with a more confident and sure touch. All service keys are within finger's reach of the keyboard control area (see Figure 3).

An impression selector lets you adjust the impact of the print element for each typing application.

## SELECTRIC TYPEWRITER CONTROLS AND INDICATORS

These controls and indicators permit you to properly set up and operate the 2740 and 2741 Selectric typewriters in both local and communicate mode. The following descriptions apply to both the 2740 and 2741, unless otherwise noted.

### PAPER INSERTION AND MOVEMENT CONTROLS

The IBM 2740 and 2741 employ a stationary paper carrier. There is no moving carriage to bump objects on the table top of the terminal. The following controls permit easy insertion and alignment of paper (see Figure 3).

#### Platen Knobs

Turning either of these knobs rotates the platen forward or backward for manual positioning of forms. Pressing in the left platen knob allows the platen to be rotated freely in either direction for variable registration of forms. When a pin-feed platen is installed, the right platen knob must be used.

#### Multiple-Copy Control Lever

To compensate for additional copies, move this lever from the forward position toward the rear. This adjusts the platen to ensure that the print element strikes squarely on the paper. Set the lever to the second position (from front of machine) when typing one original and three carbon copies, and use the third position for one original and five or more copies. The weight of the paper you use will affect the correct setting of this lever.

#### Paper-Bail Lever

Move the paper-bail lever forward to insert paper and move it back to hold the paper against the platen. The three rollers on the paper bail may be moved to any position on the bail. The paper bail may be removed when pin-feed platens are used.

#### Paper Guide

To insert and align paper accurately, move the paper guide to the marking corresponding to the "0" on the visible margin scale. Rest the paper on the paper table with the left edge of the paper against the paper guide and roll the paper into the

platen. This guide may be moved to accommodate margin adjustments for the paper size used.

#### Paper-Release Lever

Move this lever forward (toward front of machine) to release feed-roll pressure when positioning or removing paper. When using a pin-feed platen to feed forms, this lever should be kept in the released position.

#### Line-Space Lever

Move this lever to either single or double space to control the line-space movement of the platen.

#### Paper-Presence Contact and Lock-Out (2740 Only)

This contact is activated when an out-of-paper condition exists on the terminal. When in communicate mode, this situation causes the terminal to switch to a no-status condition. In this condition, all status lights are out and the line connection is dropped. Therefore, before transmission can continue, paper must be placed in the unit and the line connection must be re-established. Use the contact lock-out when individual forms are being used. Slide the lock-out to the left and over the paper-presence contact, thus preventing it from operating at the end of each form.

#### Margin Stops

Position the margin stop (left or right) by pushing it toward the rear and gliding it to the correct reading on the margin scale. You may occasionally have to move the typing-position indicator since the margin stops will not slide past it. When the carrier reaches the right margin stop, the keyboard is locked to prevent overprinting. A warning bell sounds seven spaces before the marginal limit is reached. When receiving from the line, the terminal will type beyond the right margin until a carrier return is received.

#### Line Gauge and Card Holder

The line gauge and card holder acts as an aid when you insert and register paper because of the center guide-line and side calibrations provided for proper

horizontal and vertical alignment. This guide is also used to hold small cards in place for typing.

## KEYBOARD CONTROLS

### On-Off Switch

When you are ready to type (local or communicate mode) press the on portion of this switch (Figure 4). The red area at the base of the switch is visible when the switch is on and is a reminder to turn the typewriter off when not in use. The keyboard locks when this switch is turned off, protecting any work remaining in the machine.

With this switch on and the terminal (2740 only) in standby status (communicate mode), the typewriter motor turns on automatically when your terminal is signaled to receive from the transmitting terminal, or you press the Bid key (without the Station Control special feature). On the 2741, the typewriter motor runs continuously whenever power is supplied to the terminal.

### Return Key

Pressing this key returns the carrier to the left margin stop and advances the platen a single or double line depending on the setting of the line-space lever. The Return key performs an additional function when the 2741 is in the communicate mode. Refer to "Return Key" in the "Transmission Controls (2741)" section of this manual for information regarding this additional function.

### Index Key (2740)

Pressing this key advances the platen a single line or double line depending on the position of the line-space lever (the carrier does not return to the left margin). Holding down the Index key causes repeated line spacing (typamatic action).

### Margin-Release Key

This key releases both margins. To position the carrier to the left of the left margin stop, use the Backspace key while pressing the Margin-Release key. To type beyond the right margin stop, simply hold down the Margin-Release key after the warning bell sounds. When operating in communicate mode to a computer and the text is to be sent back to the terminal, typing should be confined to the area within the margins. This is recommended since the received text can be printed beyond the right-hand margin.

### Shift and Shift-Lock Keys

Pressing either Shift key, located to the left and right of the keyboard, rotates the print element for typing capital letters and associated special characters. Pressing the Shift-Lock key also rotates the print element but locks it in this position until a Shift key is pressed.

Pressing the Shift key when the terminal is in transmit status also causes the transmission of an upshift character. When the key is released,



Figure 4. Keyboard Closeup (2740 BCD Keyboard Arrangement)

a downshift character is transmitted. When operating in communicate mode, the terminal is automatically placed in lower-case shift (if necessary) at each change between transmit status and receive status, and also when the terminal is switched from local to communicate mode. When the 2741 is in communicate mode, operating either the Attention key or the Return key also places the terminal in lower-case.

#### Tab Key

Pressing this key advances the carrier to the next preset tab stop.

#### Tab-Set and Tab-Clear Key

Set tab stops by positioning the carrier to the desired point on the writing line and pressing the Set portion of this key.

Clear tab settings by moving the carrier to the extreme right and, while holding down the CLR (Clear) portion of this key, press the Carrier-Return key. This operation clears all tab stops. Individual stops are cleared by tabulating to that stop and pressing CLR. Every space on the writing line is available for a tab setting.

#### Backspace Key

Operating this key causes the carrier to move left one space. If the Typamatic Keys (2741 special feature) is installed, holding this key down causes repeated backspacing until the key is released.

#### Space Bar

Pressing this bar moves the print element one space to the right. If the Typamatic Keys (2741 special feature) is installed, holding this bar down causes repeated spacing until the bar is released.

#### Typing-Position Indicator

A typing-position guide is located directly above the keyboard. The red typing-position indicator moves along this guide as the carrier moves, indicating

the position of the carrier. The margin guide is graduated in pitch increments (10 or 12 characters per inch) and is also used for locating margin stops.

#### Ribbon-Reverse Lever

Operating this lever reverses the direction of the ribbon prior to reaching the end of the ribbon. The ribbon automatically reverses when either end of the ribbon is reached. This black lever is located directly below the center and slightly in front of the ribbon cartridge (Figure 5).

#### Ribbon-Position Lever

This four-position lever (right to left) permits the ribbon to be positioned so that either the bottom (red), middle (red-black), or top (black) section of the ribbon is used (see Figure 14). The first position (extreme right) is used for stencil operation. Periodic repositioning of this lever extends the life of the ribbon and permits the used portion of the ribbon fabric to be re-inked. This black lever is located directly below and slightly in front of the left-center portion of the ribbon cartridge.

#### Ribbon-Change Lever

Moving this lever to the extreme right lifts the ribbon guides and permits easy removal of the ribbon and ribbon cartridge (see Figure 5). This black lever is located directly below and slightly in front of the right-center portion of the ribbon cartridge.

#### Impression-Control Lever

This red lever, located to the right of the print element, controls the striking force of the print element (see Figure 5). Stencils require light impression; multiple copies require heavy impression. To change the setting, push the lever slightly to the right and slide it to the desired number, one to five (light to heavy impression). For most routine typing, a setting of three is satisfactory.

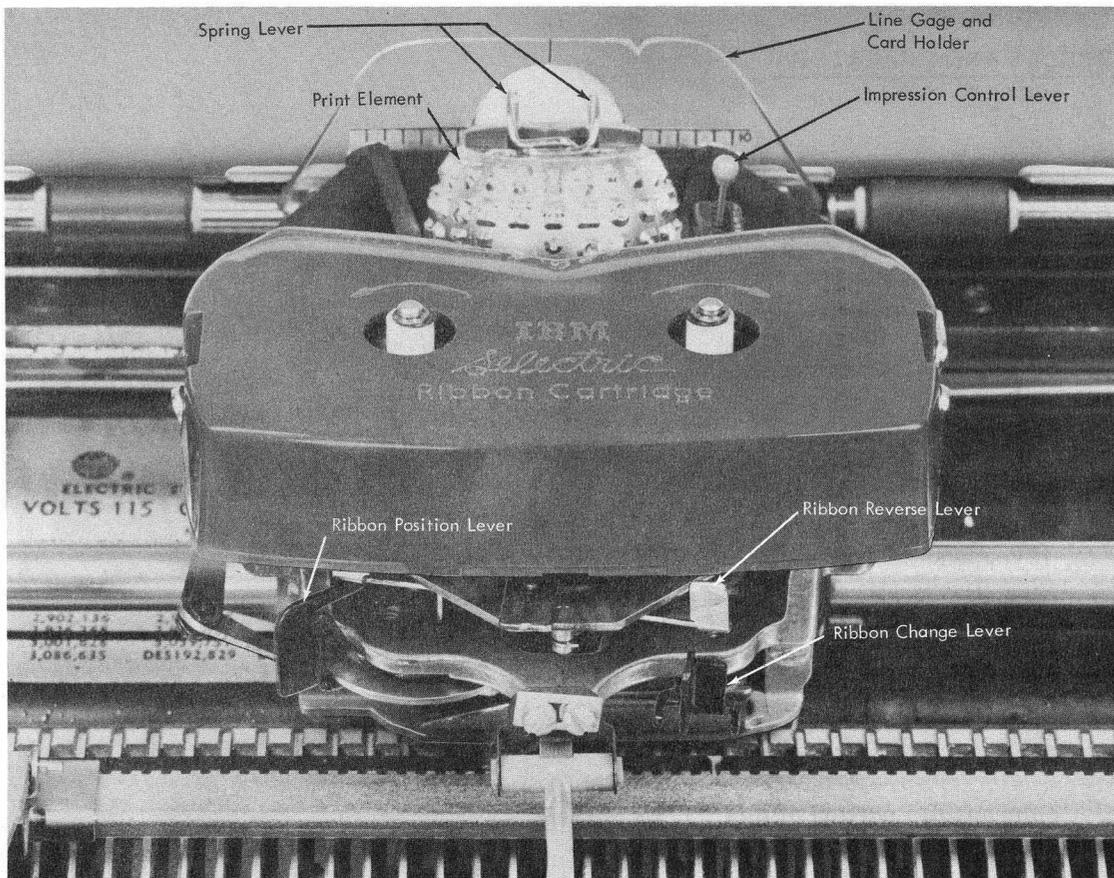


Figure 5. Print Element and Ribbon Controls

## TRANSMISSION CONTROLS AND INDICATORS

IBM 2740

These controls and indicators are located directly adjacent to the left and right of the typing keyboard, as shown in Figure 3. They provide additional controls required for operating in communicate mode. Certain keys are associated with special features (as indicated) and are provided only when that feature is installed.

### Local/Communicate Key

Press the Local, bottom portion of this two-position key (Figure 6), if you wish to operate in local mode (normal typing). If your terminal is signaled to receive a message while in this mode, an alarm sounds automatically. If the alarm sounds, you must press the Com (Communicate) portion of the Local/Communicate key in order to receive the incoming message from the calling terminal or multiplexor.

Pressing the Com (Communicate) portion of this key places the terminal in communicate mode. In this mode the terminal can alternately transmit and receive from the communication line. However, the terminal is switched to a receive status only when signaled to do so by another terminal or computer.

### Standby (S) Light

This light is on when your terminal is in the communicate mode, in a ready condition (paper in), and neither transmitting nor receiving (standby status). The typewriter motor is not running when the terminal is in this status. If the Bid key is operated, or the terminal receives a signal to receive, the terminal automatically shifts to either transmit or receive status and the typewriter motor is automatically turned on. When the terminal changes status, the Standby light is automatically turned off, and either the Transmit or Receive light turns on.

### Transmit (T) Light

This light is on during the time you can transmit information from your keyboard to the communications line and consequently to other terminals or a multiplexor. During this time the keyboard is un-

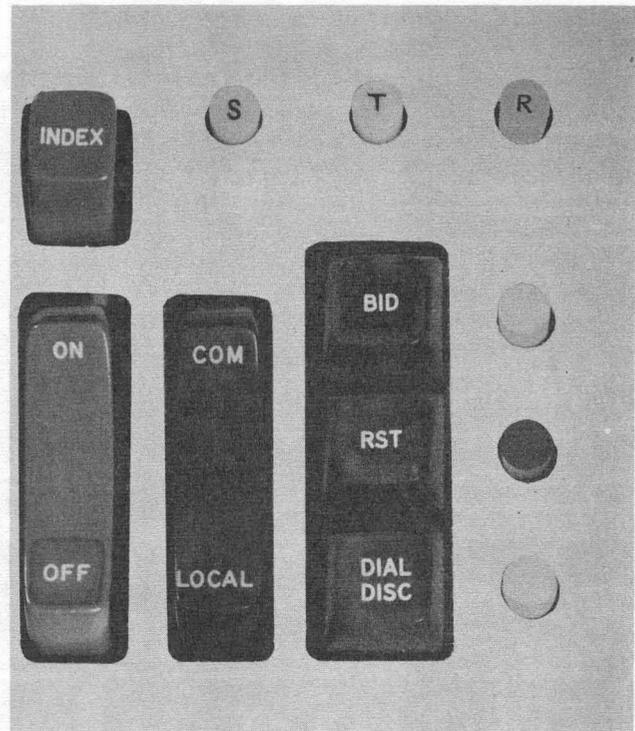


Figure 6. IBM 2740 Transmission Controls (Right Side of Keyboard)

locked and your terminal is controlling the communications line (except when communicating with a multiplexor, in which case the multiplexor controls the line). This light also turns on after any EOB acknowledgment when the Checking special feature is installed.

### Receive (R) Light

This light is on when your terminal is ready to receive a message from another terminal on the line, or from a multiplexor in the communications system. During this time your terminal can receive messages only from the terminal which initiated the call, and your keyboard is locked.

### EOT (End-of-Transmission) Key

After you have typed the contents of a message on your keyboard, it is necessary to signal the other terminals that you have completed your message. Operating the EOT key (Figure 7) transmits a signal to all terminals that have received your

message, causing them to shift to standby status (Standby light turned on and Receive light turned off).

### Bid Key and Light

#### Point-To-Point Operation

Press this key when you wish to obtain the line to transmit a message (see Figure 6). The Bid key can be operated only when your terminal is in a standby status (Standby light on). Operating this key places your terminal in transmit status (Transmit light on), turns the typewriter motor on, and causes a signal to be transmitted to the other terminal on the line. The other terminal recognizes this signal and automatically shifts from standby status to receive status. If a terminal is without paper or operating in local mode it does not shift to receive status, but does sound an alarm alerting the operator that corrective action is required. The Bid light (located to the right of the Bid key) is not operative in a terminal-to-terminal type of operation.

#### Broadcast Operation

When operating in broadcast mode (more than one other terminal on the same communications channel) press the Bid key when you wish to obtain the communications line to transmit a message. The Bid key can be operated only when your terminal is in standby status and the Bid light is on. The Bid light being on indicates that the terminals in the broadcast network are in contention for the line; that is, no other terminal in the broadcast network is on the line and sending a message. Operating the Bid key shifts your terminal to transmit status (Transmit light on, Standby light off), turns the typewriter motor on, and turns the Bid light off (see "Broadcast Operation" in the "IBM 2740 Terminal Operation" section of this manual).

#### Check-Loop Test

The Bid key is also used to test the electronic circuitry of the terminal (see "Test Procedures" section in this manual). Set the local/communicate switch to the local position to perform the test. While holding the Bid key down, a single operation of any one of the character keys on the keyboard (except Shift key) causes that character to print repeatedly. This indicates that the electronic circuitry is functioning properly and that the character would be transmitted if the terminal was operating in communicate mode. Releasing the Bid key stops the repeat printing.

#### Station Control (Special Feature)

When the Station Control special feature is installed, operating the Bid key notifies the multiplexor that you have a message to transmit. The Bid light turns on to remind you that you have made a request to transmit the next time your terminal is polled (called) by the multiplexer. When your terminal is polled and shifts to transmit status, the Bid light turns off, the Transmit light turns on, and an alarm sounds to notify you that transmission can begin from your terminal (see "IBM 2740 Terminals and Multiplexer, Station Control Special Feature Installed" in the "IBM 2740 Terminal Operation" section of this manual).

### Restart (RST) Key and Light (Checking Special Feature)

The Restart light is located to the right of the Restart key (see Figure 6). When in transmit status, the Restart light at your terminal turns on when you perform a checking sequence (press EOB key) and remains on if the message you transmitted was received incorrectly at the receiving terminal. When in transmit status, pressing the Restart key turns the light off, unlocks the keyboard, and allows message transmission to continue, or the error message to be retransmitted. When in receive status, the Restart light turns on as soon as an error is detected and turns off automatically when your terminal sends a negative answer to the transmitting terminal.

### Dial-Disconnect (Disc) Key and Dial-Connect Light (Dial-Up Adapter Special Feature)

Use this key to disconnect the line in a dial-up line connection (see Figure 6). If in transmit status, the EOT key must be operated prior to operating this key.

Pressing this key, following the operation of the EOT key, releases both terminals from the communications line (provided both data sets have the Automatic Disconnect feature installed). Otherwise, this key must be operated at each terminal following the operation of the EOT key.

The Dial-Connect light, when on, indicates that the terminal originating the dial connection is connected to a remote terminal and is in standby status (communicate mode). When the originating terminal goes into the transmit or receive status, this light turns off and the Transmit or Receive light turns on.

### EOB (End-of-Block) Key (Checking Special Feature)

This key is used to signal the end of a unit-block of text. Pressing this key (Figure 7) initiates a signal that causes the block of text you just transmitted to be checked at the receiving terminal. This check does not provide an indication of your accuracy as a typist, since you can check your typed copy, but it does ensure that all characters that were typed on your keyboard have reached the receiving terminal correctly.

Immediately following the operation of the EOB key, the status lights will change from transmit to receive momentarily and then back to transmit, indicating that checking has been completed, and the Restart light turns on. If an error occurred, the Restart light remains on and the keyboard locks. Pressing the Restart key turns the light off, unlocks the keyboard, and allows you to retransmit the message (if necessary), or to continue message transmission. If the message was received correctly, the Restart light turns off automatically.

### Automatic EOB (Prerequisite, Checking Feature)

Included with this feature is a three-position switch Auto Ck (auto check) located on the left side of the 2740 cabinet (see Figure 1). The three positions of the switch are: Term (terminal), Mplx (multiplexer), and Off. Set the switch to Term when transmitting to another terminal and to Mplx when

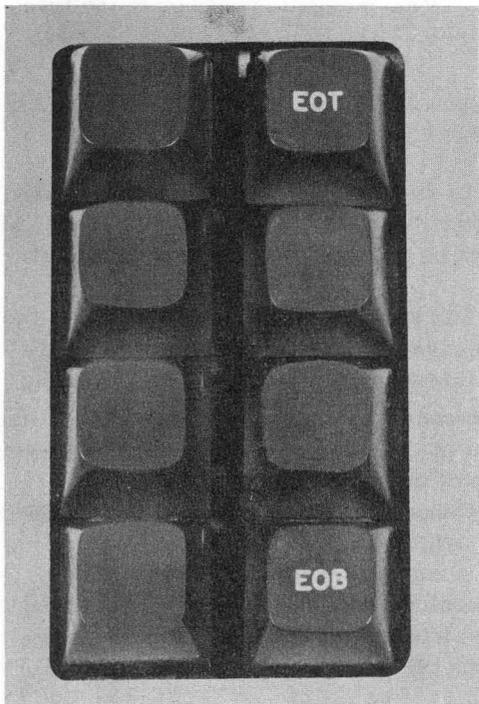


Figure 7. IBM 2740 Transmission Controls  
(Left Side of Keyboard)

transmitting to a multiplexer. With the switch set to Term or Mplx, each operation of the Return key causes the carrier to return and the line just transmitted to be checked automatically at the receiving terminal. Your terminal shifts momentarily from transmit to receive status (Transmit light turns off, Receive and Restart lights turn on) when the answer is received (positive or negative) from the receiving terminal. If the receiving terminal responds with a positive answer, your terminal shifts back to transmit status (Transmit light turns on, Receive and Restart lights turn off, and keyboard unlocks) and you can continue with message transmission.

If the message is received incorrectly, the receiving terminal prints a hyphen in the left margin (below the message block just completed) and a negative response is sent back to your terminal. This negative response causes a hyphen to print in the left margin (below the message block just completed) at your terminal. The negative response also locks your keyboard, turns the Transmit light on, sounds the audible alarm, and causes the Restart light to remain on. The message can be retransmitted by pressing the Restart key. Operating this key turns the Restart light off, causes a CR/LF (carrier return and line feed) to occur at your terminal, and another CR/LF to occur at the receiving terminal if the switch is set to the Term position. If the switch is set to the Mplx position, the CR/LF code is not transmitted to the receiving terminal. The CR/LF operation positions the carrier on a new line (below the hyphen). The message can now be retransmitted.

When the switch is set to Off, the EOB key must be manually operated to initiate a record check; see "EOB (End-of-Block) Key (Checking Special Feature)" in this section of the manual.

### Transmit-Control Switch (MTC, Off) Transmit Control Special Feature.

This switch is located on the left side of the 2740 cabinet (See Figure 1). The two settings of this switch (MTC--Multiplexer Transmit Control, and Off) provide or inhibit the proper line-control signals for the transmit-control feature when operating between a 2740 and a multiplexer. With this switch set to the MTC position, the multiplexer and terminal reverse their send/receive status--that is, the multiplexer goes to receive status and the terminal goes to transmit status--when the multiplexer transmits a special two-character code (/ space). The Off position of this switch places the transmit-control feature in an inactive status. (See "IBM 2740 Terminal and Multiplexer with Transmit Control Feature Installed" in this manual.)

## TRANSMISSION CONTROLS

### IBM 2741

Only two keys (Return and Attention) and a switch are required to control the 2741 terminal when it is transmitting to or receiving from a multiplexer (communicate mode). The Return and Attention keys are located on the keyboard. The Attention key is in the same location as and replaces the Index key on the standard Selectric® Typewriter keyboard (Figure 8). The indexing function (line feed) is initiated only by the multiplexer. The Terminal Mode switch (Local/Communicate) is located on the left side of the 2741 cabinet (see Figure 2).

#### Return Key

This key causes the carrier to move to the left margin and the carriage to space the paper either one or two lines, depending on the setting of the line-space lever. In addition, the Return key sends a carrier-return code, followed by an end-of-transmission code, to the multiplexer if the 2741 is in communicate mode (see "To Transmit and Receive" in the "IBM 2741 Terminal Operation" section of this manual).

#### Attention Key

This key performs two different functions, depending upon the mode of the terminal. When in local mode, this key is used to test the electronic circuitry of the terminal (see "Test Procedures" section in this manual). While holding the Attention key down, a single operation of any one of the character keys

on the keyboard causes that character to print repeatedly. This indicates that the electronic circuitry is functioning properly and that the character would be transmitted if the terminal was operating in communicate mode. (Releasing the Attention key stops the repeat printing).

When in communicate mode, operating the Attention key causes an EOT (end-of-transmission) signal to be sent to the multiplexer. If the Interrupt special feature is installed, this key has a third function (see "Transmit Operation--Using the Interrupt Special Feature" in the "IBM 2741 Terminal Operation" section of this manual). This function is active only in communicate mode and only if the 2741 is in a receive status. Operating the Attention key under these conditions indicates that you wish to interrupt the multiplexer. In the transmit status, this key retains its standard function, sending an EOT (end-of-transmission) signal to the multiplexer.

#### Terminal-Mode Switch (Local/Communicate)

The mode of the terminal is controlled by this switch (located on the left side of the typewriter stand; see Figure 2). When set to Local, the terminal can be used for typing, just as any other Selectric typewriter. Nothing can be transmitted or received from the communications line. When set to Communicate, the terminal is in a control-receive status. The print element is automatically shifted to lower case (if necessary) and the terminal shifts to the communicate-transmit status. In this status the terminal automatically

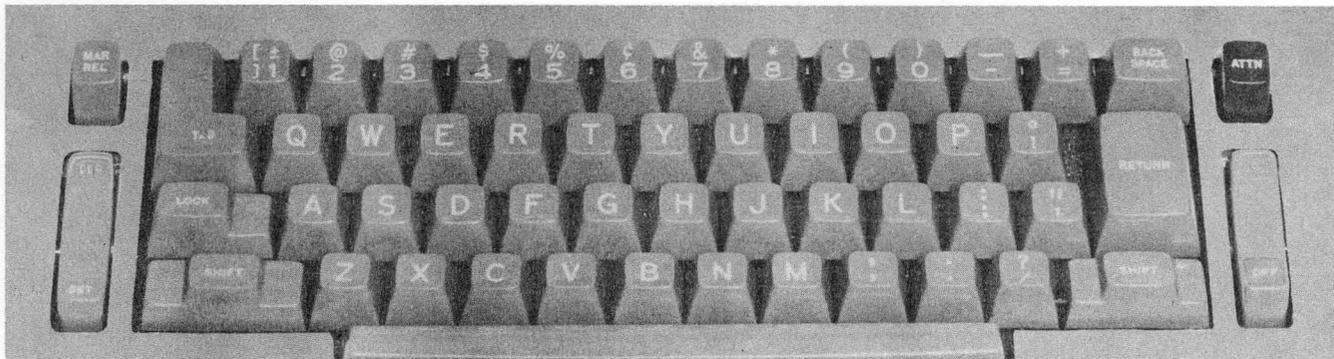


Figure 8. Keyboard Closeup (2741 Standard Selectric Typewriter Keyboard Arrangement)

transmits a signal to the multiplexer indicating that you wish to transmit a message. The keyboard

unlocks and you may now type whatever requests and text are desired.

### LOCAL MODE (OFF-LINE)

The following procedure, when executed, will enable you to use the 2740 Selectric® typewriter for normal day-to-day correspondence and report typing:

- o Turn power on.
- o Set Local/Communicate switch to Local.
- o Insert paper.
- o Start typing.

### POINT-TO-POINT TERMINAL OPERATION

The following procedure is required to place your terminal in communicate mode, regardless of whether you transmit or receive:

- o Turn power on.
- o Set Local/Communicate switch to Com.
- o Insert paper, which closes paper-presence contact.

As the result of the above operations the S (Standby) light is turned on, indicating the status of your terminal.

#### To Transmit

- o Press Bid key (if S light is on).
- o Once your bid has been placed on the communications line, the T (Transmit) status light turns on, the Standby light turns off, and the typewriter motor turns on.
- o Proceed to type; the other terminals on the communications line will receive the information typed at your terminal.
- o Press EOT (End-of-Transmission) key upon completion of your transmission.

The Transmit light now turns off, the Standby light turns on, and the typewriter motor turns off. The terminal that received your message is now in standby status and capable of bidding for the line.

#### To Receive

For your terminal to receive a call, the following conditions must be satisfied:

- Power on
- Local/Communicate switch set to Com (if not, alarm sounds when call is received)
- Paper inserted (if not, alarm sounds when call is received)
- Stand-by light on

When your terminal receives a call, the Standby light turns off, the R (Receive) light turns on, and

the typewriter motor is turned on. At this time your keyboard is locked and you cannot use your terminal until the line is released by the transmission of an EOT signal from the other terminal. Once the EOT signal is received at your terminal, the Standby lights at both terminals are turned on, the keyboards are locked (except for the Bid key and EOT key), and the terminal motors are turned off.

If your terminal runs out of paper while operating in receive mode, it switches to a no-status standby condition (all Status lights off), and the keyboard locks. Thus, a procedural requirement providing for message retransmission should be established for the system when this condition occurs.

### RECORD CHECKING (SPECIAL FEATURE)

If your terminal is equipped with the Record Checking special feature, the EOB (End-of-Block) key is operated before the EOT key is operated. Operating the EOB key causes the message (or part of the message) just transmitted from your terminal to be checked at the receiving terminal.\* After operating the EOB key, your terminal will momentarily switch to receive status (Receive and Restart lights on) in order to accept the checking reply from the receiving terminal. If the reply is positive, your terminal automatically switches back to transmit status (Transmit light on and Restart light off), and you can either continue the transmission or press the EOT key and end the transmission. If the message is received incorrectly, the receiving terminal responds with a negative answer. A dash or underscore symbol is printed in place of the incorrect character and also to the right of the last character in the block at the receiving terminal. A dash or underscore symbol is also printed to the right of the last character in the block at your (transmitting) terminal. A negative response also causes the keyboard to lock, the Restart light to remain on, the Transmit light to turn on, and the alarm to sound at your terminal. Operating the Restart key unlocks the keyboard, turns off the alarm, and turns the Restart light off. You may now either resend the error message, continue transmission, or press the EOT key to end the transmission.

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\* The EOB key can be operated at any time during the transmission of the message; however, it is usually operated at the completion of a unit-block of text or at the end of the message.

## BROADCAST OPERATION

If you are performing a broadcast operation--that is, more than one other terminal connected to the same communications line--the transmit and receive procedures performed by you are the same as those outlined for a point-to-point operation (see "Point-to-Point Terminal Operation" in this section of the manual). The only difference is that all terminals on the line, in a ready condition and in standby status, switch to receive status when the signal (Bid key) from your terminal is received. The Bid and Standby lights are on when your terminal is in standby status. The Bid and Standby lights turn off when your terminal switches to either a transmit or receive status. The Transmit or Receive light, as the case may be, will now be on.

## DIAL-UP OPERATION

A dial-up operation is the same as a point-to-point operation except that the line connection must be established before the Bid key is operated. The procedure for establishing a line connection is as follows:

### To Transmit

- Remove handset from cradle of data set.
- Press Talk button on data set.
- Dial other terminal (telephone number) in the usual telephone manner.
- The data-set bell rings at the receiving terminal; the operator presses the Talk button and answers your call.\* Now that a line connection has been established you and the receiving operator can verbally agree on the procedure to follow.
- Receiving terminal operator presses Data button on his data set. This places a high-pitched tone on the line and indicates that a line connection has been established.
- Press Data button on your data set (Dial-Connect light turns on).
- Place handset in cradle.

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\* If the receiving data set has the Auto-Answer feature installed and if the Auto button on that data set had been pressed prior to your call, the line connection would be established automatically and you would hear a high-pitched tone on the line. This tone indicates that the connection has been established and that the called terminal is in data mode. You can then press the Data button on your data set and proceed with transmission.

- Proceed with transmission from your terminal after Dial-Connect light turns on.
- Press Bid key (Dial-Connect and Standby lights turn off and Transmit light turns on), type message, and press EOT key.
- After sending the EOT signal, both terminals will switch to standby status and turn on their
- Dial-Connect and Standby lights. The line connection is still established and the other terminal can now bid for the line by pressing the Bid key.
- Either terminal can disconnect the line by operating the Dial-Disconnect key, provided both data sets have the Automatic Disconnect feature installed and the terminal is not in a transmit status. Otherwise, the Dial-Disconnect key must be operated at both terminals. See "Dial-Disconnect (Disc) Key and Dial Connect Light" under "Transmission Controls and Indicators" (2740) in this manual.

### To Receive

When the bell on your data-set rings (indicating that another terminal is attempting to establish a connection with your terminal), proceed as follows:

- Allow bell to ring one complete cycle before answering.
- Lift receiver and press Talk button.\*\*
- Verbally establish an agreement with other terminal operator as to procedure for handling transmission of data.
- Press Data button on your data set (Dial-Connect light turns on).
- Transmitting terminal operator presses Data button on his data set.
- Other terminal presses Bid key which places your terminal in receive status (Dial-Connect and Standby lights turn off and Receive light turns on).
- The message, followed by an EOT (End-of-Transmission) signal, is received at your terminal.
- The Standby and Dial-Connect lights turn on and the Receive light turns off.
- You may now bid for the line, or initiate a Dial-Disconnect operation as previously outlined.

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\*\* If your data set has the Auto-Answer feature installed and the Auto button is down, the line connection will be established and your data set will go into data mode automatically when your terminal is called.

## IBM 2740 TERMINAL AND MULTIPLEXOR, POINT-TO-POINT

The operation of the 2740 terminal when operating point-to-point with a multiplexer is basically the same as the operation of a 2740 terminal when operating point-to-point with another 2740 terminal. The following procedure is required regardless of whether you transmit or receive:

- Turn power on.
- Set Local/Communicate switch to Com.
- Insert paper, which closes paper-presence contact.
- As the result of the above operations, the Standby light is turned on indicating the status of the terminal.

### To Transmit

- Press Bid key (shifts multiplexer to receive status).
- Standby light turns off and Transmit light turns on.
- Transmit text to multiplexer.
- Press EOT (End-of-Transmission) key at completion of transmission.
- Transmit light turns off and Standby light turns on.

If the Checking special feature is installed:

- Press EOB key instead of EOT key (Restart light turns on; see "Record Checking Special Feature" in the "IBM 2740 Terminal Operation" section of this manual).
- If message is received correctly, the multiplexer sends a positive response to your terminal and your Transmit light turns on.
- Press EOT key to end transmission or you can transmit another message.
- If message is received incorrectly, the multiplexer sends a negative response to your terminal that causes a hyphen to print, the keyboard to lock, an audible alarm to sound (momentarily), the Restart light to remain on, and the transmit light to turn on.
- Press Restart key (Restart light turns off and the keyboard unlocks).
- You may now retransmit the error message, start another message, or press EOT key to end transmission.
- If the EOT key is operated, the Transmit light turns off and the Standby light turns on.

### To Receive

Your terminal is capable of receiving data transmitted by the multiplexer if the following conditions

are satisfied:

- Power on.
- Local/Communicate switch set to Com.
- Paper inserted.
- Standby light turned on.

The multiplexer initiates a transmission by placing a signal on the line that causes your terminal to shift to receive status. The Standby light turns off, the Receive light turns on, and the keyboard remains locked. The multiplexer proceeds to send the message and when completed transmits an EOT signal. Your terminal now shifts to standby status, the Receive light turns off and the Standby light turns on. If the checking special feature is installed and an EOB signal is transmitted, your terminal will automatically respond with a positive or negative signal, depending upon whether the message was received correctly or not. If a positive response is transmitted by your terminal, the multiplexer may respond with an EOT signaling the end of transmission or transmit additional information. If the message is received incorrectly, a hyphen or underscore symbol prints at your terminal and a negative response is transmitted to the multiplexer. As soon as an initial error is received at your terminal, the Restart light turns on and a hyphen or underscore is printed in place of the incorrect character. The Restart light turns off when your terminal sends the negative response. The multiplexer can now retransmit the error message, start another message, or end the transmission by sending an EOT signal to your terminal. The action taken depends on the computer program controlling the multiplexer.

## IBM 2740 TERMINAL AND MULTIPLEXER, POINT-TO-POINT WITH DIAL-UP FEATURE INSTALLED

The dial-up operation of a 2740 terminal and multiplexer is essentially the same as a point-to-point 2740 terminal and multiplexer operation except that a line connection must be established before the two terminals can communicate with each other. The following procedure is required regardless of whether you transmit or receive:

- Set Local/Communicate switch to Com.
- Insert paper.
- Turn power on.

As the result of these operations, the Standby light is turned on indicating the status of your terminal.

### To Transmit

Before transmitting from your terminal to the multiplexer a communications line connection must be established. Proceed as follows to establish

this connection:

- Remove handset from cradle of data set.
- Press Talk button on data set.
- Dial multiplexer address (telephone number) in the usual telephone manner.
- The data set at the multiplexer will be equipped with the Auto-Answer feature. This feature places a high-pitched tone on the line when the multiplexer is called, provided the Auto button on the multiplexer data set has been previously operated.
- When you hear this tone it indicates that a line connection has been established.
- Press Data button on your data set and place handset in cradle.
- The Dial-Connect light will be on whenever the line is connected and your terminal is in standby status.
- From this point on the operation of your terminal is the same as a point-to-point operation without the Dial-Up feature (see "IBM 2740 Terminal and Multiplexer, Point-to-Point").

At the completion of the transmission the line must be disconnected as follows:

- Press Dial-Disc key at your terminal. This disconnects the line at both your terminal and the multiplexer, provided both data sets have the Automatic Disconnect feature installed. Otherwise, the computer program must issue a Disable command to cause the multiplexer to drop the line connection at its data set.

NOTE: The EOT key must be operated prior to operating the Dial-Disc key.

### To Receive

In order to receive from the multiplexer the following conditions must be satisfied at your terminal:

- Power on.
- Local/Communicate switch set to Com.
- Paper inserted.
- Standby light on.
- Auto button on data set pressed down.

The Auto-Call capability of the multiplexer data set (special feature) enables the multiplexer (under computer program control) to call your terminal automatically. The Auto button being down on your data set enables the line to be connected automatically and the Dial-Connect light to be turned on. Once the line connection has been established, the multiplexer transmits a signal that places your terminal in receive status. The Standby and Dial-Connect lights turn off, the Receive light turns on, and your keyboard remains locked. From this point on the transmission is the same as a point-to-point operation without the dial-up feature installed

(see "IBM 2740 Terminal and Multiplexer, Point-to-Point"). Your terminal and the multiplexer can alternately transmit and receive as long as the communications line remains connected. You can initiate a transmission from your terminal by merely pressing the Bid key providing the Standby and Dial-Connect lights are on.

At the completion of transmission, the communications line can be disconnected automatically by the multiplexer (if the Automatic Disconnect feature is installed on the multiplexer data set), or by your operation of the Dial-Disc key.

### IBM 2740 TERMINAL AND MULTIPLEXER WITH TRANSMIT CONTROL FEATURE INSTALLED

The Transmit control feature is used in conjunction with the Dial-Up feature (prerequisite) and regardless of whether the terminal or multiplexer originated the call, allows the multiplexer to shift your terminal to a transmit-text status. Once the line connection has been established and the Transmit Control switch on the terminal has been set to the MTC (multiplexer transmit control) position, any time the multiplexer transmits a slash character (/) followed by a space character your terminal automatically shifts to a transmit-text status. When your terminal shifts to the transmit-text status, a signal is automatically sent to the multiplexer, the Transmit light turns on, and an alarm sounds at your terminal. The multiplexer interprets the signal as a positive response to the shift in status and prepares to receive data from your terminal. The alarm sounding notifies you that your terminal is ready for transmission. You must start transmitting from your terminal within 15 seconds after the alarm sounds; otherwise your terminal and the multiplexer time out and shift back to a standby status (Standby light on). Pressing the EOT key at the end of transmission sends an end-of-transmission signal to the multiplexer, which causes both your terminal and the multiplexer to shift to a standby status. Setting the Transmit Control switch to the off position renders the Transmit Control feature inactive.

### IBM 2740 TERMINALS AND MULTIPLEXER, STATION CONTROL SPECIAL FEATURE INSTALLED

When this feature is installed, each 2740 terminal on the communications line has its own unique two-character address. This address is used by the multiplexer to address or poll the terminal. In order to transmit or receive in this type of operation the following conditions must be satisfied:

- Power on.
- Local/Communicate switch set to Com.
- Paper inserted in terminal.
- Standby light on.

#### To Transmit (Polling Operation)

In order to transmit data from your terminal, you must press the Bid key to indicate to the multiplexer that, when your terminal is polled (called), you have data to send. Operating the Bid key turns the Bid light on as a reminder to you that you have a bid in to transmit.

The polling operation is initiated by the multiplexer when it sends a signal over the communications line. This signal alerts all terminals on that line that a two-character terminal identification is to follow. If the identification transmitted is the identification of your terminal (and your Bid key has been operated), your terminal automatically transmits a positive response signal to the multiplexer, indicating that you have data to transmit. The Transmit light turns on, the Bid light turns off, and your keyboard unlocks. From this point on the transmission procedure is the same as usual. If you have no data to transmit, do not operate the Bid key. When your terminal is polled (and the Bid key has not been operated), your terminal will automatically respond with a negative signal indicating to the multiplexer that you have no data to transmit. The multiplexer then proceeds to poll the other terminals on the line.

When transmitting to the multiplexer, pressing the EOT key at the end of transmission signals the multiplexer that the transmission is completed. The multiplexer can then proceed to poll the other terminals on the line. Your terminal shifts to standby status, the Standby light turns on, the Transmit light turns off, the keyboard locks, and the typewriter motor turns off.

#### To Receive (Individual Terminal Address Operation)

If the multiplexer desires to communicate with your terminal, it must address your terminal and establish that it is in standby status before transmitting the message. This is accomplished when the multiplexer sends two line-control signals over the communications line followed by the two-character address of your terminal. The first line-control signal shifts all the terminals on the line to a controlled state to allow them to listen for their address. The second line-control signal indicates that address data will follow. The two-character address of your terminal (unique terminal

address character and the space character) will cause your terminal to send automatically either a positive or negative response to the multiplexer. If your terminal has status (power on, communicate mode, and paper), it transmits a positive response to the multiplexer. If your terminal does not have status, a negative response is transmitted to the multiplexer. When the negative response is received by the multiplexer, it proceeds to address other terminals on the line.

When the positive response is received by the multiplexer, it transmits an end-of-address signal causing your terminal to shift to receive status (Receive light and typewriter motor turn on) and causing any remaining terminals on the line to shift to standby status. The multiplexer transmits the message, concluding with an EOT signal. Upon receipt of the EOT signal, your terminal shifts back to standby status (Receive light turns off, typewriter motor turns off, Standby light turns on, and the keyboard locks), and the multiplexer proceeds to address the other terminals on the line.

#### To Receive (Group-Address Operation)

This operation is the same as the "To Receive (Individual Terminal Address Operation)" just described, except that a group of terminals, instead of just one terminal, receive the message from the multiplexer. In this type of operation, a group of terminals on the same line can be assigned the same first-address character in the two-character address. The second character in the address is always the space character. Also, one terminal must be permanently designated to act as the master terminal for the group. The group-master terminal will perform all answer-back functions required to respond to group addressing. All other terminals within the group are designated as group-subordinate terminals.

Let's assume that your terminal has been designated as master within a group of terminals and that the first character in the two-character group address is the character A. To initiate a group address operation, the multiplexer automatically transmits a signal which causes all terminals on the line to shift to a receive status. The second signal that is transmitted alerts all terminals on the line that address data will follow. When the first character (A) of the address is transmitted, each terminal within the group of terminals assigned the A address (including your own) is checked for status and placed in its preassigned category--your terminal as the group master, the other terminals as the group subordinates. Transmission of the space character following the A character shifts your ter-

minal (group master) to transmit status and it automatically transmits either a positive or negative response depending upon whether it has status or no status. If your (group master) terminal transmits a positive response, the multiplexer in turn transmits an end-of-address signal that shifts all terminals within the group to receive status. If an individual group-subordinate terminal does not have status, it is not shifted to receive status and it will not receive the message transmitted by the multiplexer.

If your terminal transmits a negative response (no-status condition) to the multiplexer, the multiplexer proceeds to address other terminals on the line.

After sending the end-of-address signal, the multiplexer proceeds to transmit the message concluding with an EOT signal. Upon receipt of the EOT signal, your terminal and the group-subordinate terminals that received the message shift back to standby status and the multiplexer proceeds to address the other terminals on the line.

#### To Receive (All-Call Address Operation)

The third method of addressing is called the All-Call method. The two-character terminal address in this type of operation is the slash character (/) followed by the space character. The only difference between this method of addressing and group addressing is that all terminals on the line react to the all-call address (/ space) transmitted by the multiplexer. One terminal on the line must be permanently designated as the all-call master terminal. The master terminal will perform the

answer-back functions, as required, in this type operation. The other terminals on the line are designated as all-call subordinate terminals.

The operation of the all-call master terminal and the all-call subordinate terminals is exactly the same as the operation of the group-master and group-subordinate terminals covered in "Group-Address Operation."

#### SUMMARY OF STATION CONTROL ADDRESSING OPERATION

In summary, the line-control and data-character sequence of a message, transmitted by the multiplexer to a terminal, is as follows:

1. A signal that shifts all terminals on the line to receive status.
2. A signal that notifies all terminals on the line that address data will follow.
3. First character of address.
4. Second character of address (space character).
5. End-of-address signal.
6. Message, concluding with EOT signal.

The assignment of the terminal address, group address, group master, or all-call master is determined by the user, and the terminals are wired accordingly by an IBM Customer Engineer at the time of installation. Two addresses can be assigned to one terminal, a unique address character used for individual terminal addressing and a group-address character used in group addressing. The address character assigned as the group-address character cannot conflict with any of the unique address characters assigned to terminals on the same communications line.

## LOCAL MODE (OFF-LINE)

The following procedure, when executed, will enable you to use the 2741 Selectric<sup>®</sup> Typewriter for normal day-to-day correspondence and report typing:

- Turn power on.
- Set Local/Communicate switch to Local.
- Insert paper.
- Start typing.

## COMMUNICATE MODE

### To Transmit and Receive

In order to transmit from your 2741 terminal to the multiplexer, the Local/Communicate switch must be set to the Communicate position. With this switch set to the Communicate position, turning power on causes the following to take place:

- The print element is automatically shifted to lower case, if necessary.
- The terminal then automatically shifts to a transmit-text status and sends a signal to the multiplexer.
- The keyboard unlocks. The basic indication of the terminal status (transmit or receive) is the keyboard. The keyboard is locked whenever your terminal is not in transmit status.

You may now type whatever requests and text you desire. Press the Attention key when message transmission is completed. This causes an EOT signal to be transmitted to the multiplexer, the keyboard to lock, and your terminal to shift to a receive control status. If the print element is in upper case, it will down shift automatically.

Your terminal remains in a receive control status until the multiplexer transmits a signal that shifts your terminal to a receive status and the keyboard remains locked. The multiplexer can now proceed to transmit its message and when completed transmits an EOT signal to your terminal. If the multiplexer has no data to transmit, it sends an EOT signal immediately following the signal that shifted your terminal to receive status. In either case, the EOT signal transmitted by the multiplexer causes your terminal to shift to a transmit status, unlocks the keyboard, and shifts the print element to lower case (if necessary). When your terminal is shifted to transmit status, it automatically transmits a signal that places the multiplexer in receive status. You may now proceed to transmit data to the multiplexer again. This sequence of operation (alter-

nately sending and receiving) is usually ended by your terminal only by switching to local mode, or by turning your terminal power switch off.

Each time you operate the Return key when transmitting a message to the multiplexer, your terminal automatically transmits the CR/LF (Carrier Return and Line Feed) code followed by an EOT signal. The EOT signal causes the multiplexer to react in the same manner as when it receives an EOT signal generated by operating the Attention key. In other words, each time you operate the Return key the multiplexer is given the opportunity to transmit to your terminal. If the multiplexer has no data to transmit, it sends a signal that shifts your terminal to receive status and immediately thereafter transmits an EOT signal. The EOT signal shifts your terminal back to transmit status and you can continue with your message transmission.

### TRANSMIT OPERATION USING THE INTERRUPT SPECIAL FEATURE

The Interrupt special feature enables you to interrupt the multiplexer while the multiplexer is transmitting to your terminal. The Attention key is active when your terminal is receiving, if this feature is installed.

To cause an interrupt, press the Attention key. This causes a signal to be transmitted from your terminal to the multiplexer. Upon receipt of this signal, the multiplexer transmits an EOT signal that places your terminal in transmit status and unlocks the keyboard. You may now transmit to the multiplexer in the normal manner (see "Interrupt" under "Special Features" in the SRL publication, IBM 2741 Communications Terminal, Form A24-3415).

### TRANSMIT AND RECEIVE WITH DIAL-UP SPECIAL FEATURE INSTALLED

When using the Dial-Up special feature, a line connection must be established before attempting to transmit to the multiplexer. Once the line connection has been made, the transmit and receive procedures are the same as in a point-to-point operation. A line connection can be initiated at your terminal only. The following procedure is required to establish a line connection and initiate a transmission from your terminal:

- Turn power on.
- Set Local/Communicate switch to Com.
- Remove handset from data-set cradle.
- Press Talk button on data set.

- Dial multiplexer address (telephone number) in the usual telephone manner.
- The Auto-Answer feature of the multiplexer data set places a high-pitched tone on the line when the multiplexer is called, provided the Auto button on the data set has been previously operated. When you hear this tone it indicates that a line connection has been established.
- Press Data button on your data set.
- Place handset in cradle.

When the line connection is made, your terminal shifts to transmit status (keyboard unlocks) and automatically sends a signal that places the multiplexer in receive status. From this point on, the transmitting and receiving operations are the same as when not using the dial-up feature.

In order to disconnect the line and terminate the transmission, either switch to local mode or turn the terminal power switch off.

## OPERATOR-CHECKOUT PROCEDURE

The operator-checkout procedure is recommended as an aid in determining the source of trouble in a malfunctioning system. Using the checkout procedure will determine (in most cases) whether the terminal, data set, or communications line is at fault. Figures 9 and 10 illustrate the checkout procedures (in flowchart form) for the 2740 when operating point-to-point and with the Station Control special feature installed. Figure 11 illustrates the checkout procedure (in flowchart form) for the 2741.

### Check-Loop Test (2740)

The check-loop test can be performed separately or as a part of the operator-checkout procedure-- see Figures 9 and 10. This test checks the electronic circuitry of the terminal and is performed with the Local/Communicate switch in the Local position. While holding the Bid key down, a single operation of any one of the character keys or function keys on the keyboard (except Shift key) causes that character to print or the function to occur repeatedly. This indicates that the electronic circuitry is functioning properly and that the character would be transmitted if the terminal was operating in communicate mode. Releasing the Bid key stops the repeat printing.

If the character does not print repeatedly, the electronic circuitry of the terminal is not functioning properly and an IBM Customer Engineer should be notified.

### Check-Loop Test (2741)

The check-loop test can be performed separately or as a part of the operator checkout procedure, see Figure 11. This test checks the electronic circuitry of the terminal and is performed with the Local/Communicate switch in the Local position. While holding the Attention key down, a single operation of any one of the character keys on the keyboard causes that character to print repeatedly. This indicates that the electronic circuitry is functioning properly and that the character would be transmitted if the terminal was operating in communicate mode. Releasing the Attention key stops the repeat printing.

If the character does not print repeatedly, the electronic circuitry of the terminal is not functioning properly and an IBM Customer Engineer should be notified.

## IBM 2740 TERMINAL AND LINE ADAPTER TEST PROCEDURE (IBM LEASED LINE OR SHARED LINE ADAPTER)

This test procedure can be used only on IBM 2740 Terminals using an IBM Line Adapter (Modem). The Test switch is not installed on 2740 Terminals using common-carrier provided data sets. The use of this test procedure is recommended when communications cannot be established with a remote terminal. The test is controlled by the Test switch located on the left side of the 2740 cabinet. The Test switch has three settings: Mod (Modem), Line, and Off.

Using the following procedure will determine (in most cases) whether the 2740 terminal, including the IBM Line Adapter, or the communications line is at fault when you cannot establish communications with a remote terminal:

1. Turn power off and then back on.
2. Set Loc/Com switch to Com.
3. If your terminal has the automatic EOB feature installed, set the AUTO CK (Auto Check) switch to the off position.
4. Set the Test switch to Mod. The Transmit and Receive lights will turn on, the typewriter keyboard unlocks, and the terminal is disconnected from the communications line. Characters can be keyed without them reaching the line.
5. Type various alphabetic and numeric characters and watch the Transmit and Receive lights. Both lights should blink as each character is typed; if not, the 2740 terminal is not functioning properly. If both lights blink as each character is typed, the failure to establish communications with a remote terminal is not caused by the 2740 terminal. If the Bid, EOT, or other special keys are operated accidentally while test-typing, start the test again at step 1.
6. To restore the 2740 Terminal to normal (non-test) condition, turn power off and return the Test switch to the off position. Return all control switches to their original setting.

When the failure to establish communications with a remote terminal is not caused by the 2740 Terminal, the communications company should be notified of the condition. The communications company may request that you place a constant tone on the communications line for troubleshooting purposes. Use the following procedure to provide the requested tone:

1. Turn power off and then back on.

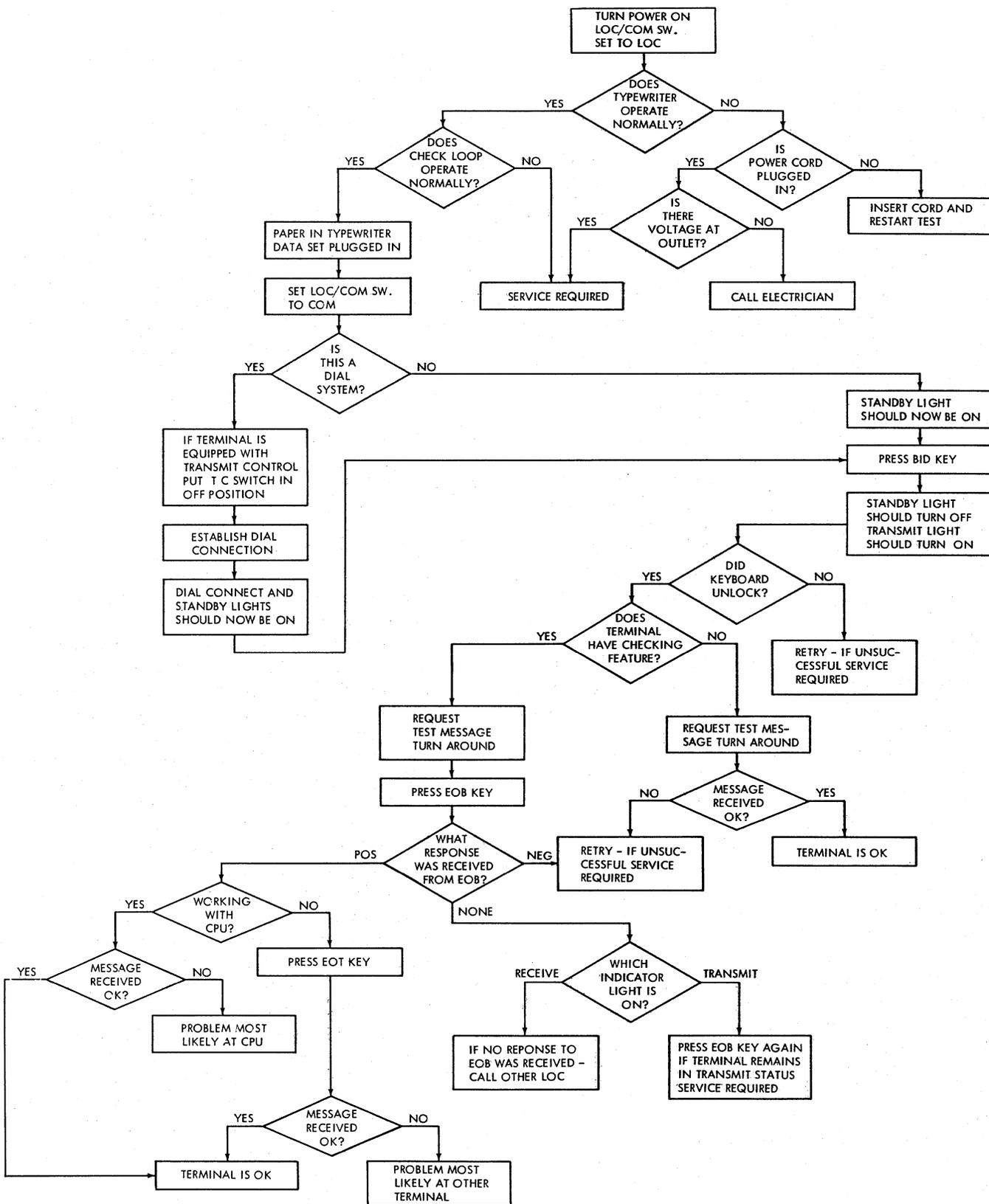


Figure 9. Operator Checkout Procedure--2740 Point-to-Point Operation (Includes Dial, Terminal-to-Terminal, Terminal-to-Multiplexor, and Broadcast)

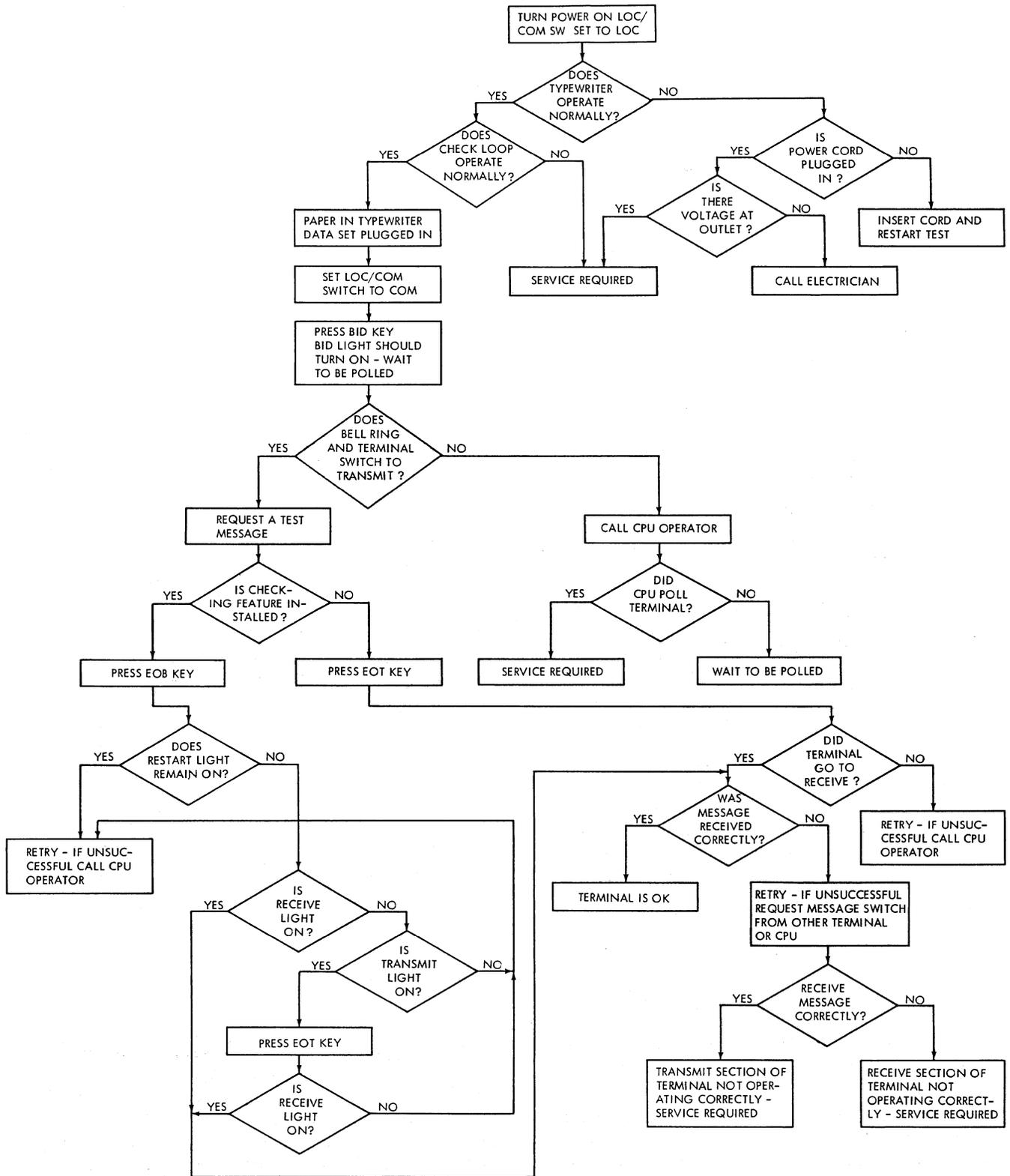


Figure 10. Operator Checkout Procedure--2740 with Station Control (Parts of this Procedure Assume the System Has Message-Switch Capability)

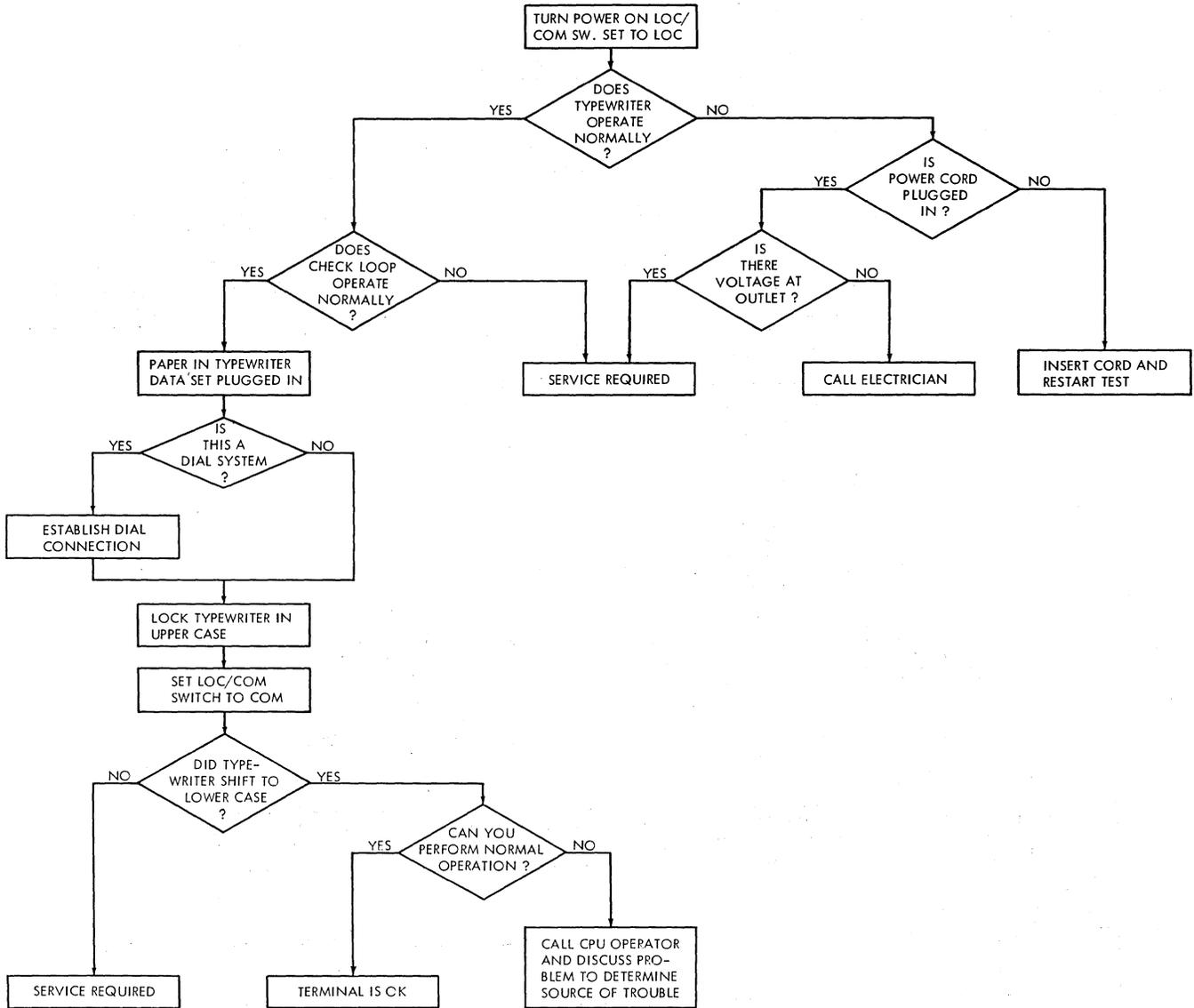


Figure 11. Operator Checkout Procedure--2741

2. If your terminal has the automatic EOB feature installed, set the AUTO CK (Auto Check) switch to the off position.
3. Set the Test switch to the Line position. Your terminal will place the requested constant tone on the communications line automatically, and the Transmit and Receive lights will turn on. Your typewriter keyboard unlocks and alphabetic or numeric characters can be typed, as requested by the communications company

(the blinking of the Transmit and Receive lights is not significant at this time).

Signals sent out on the line during this test procedure are not subject to system controls and the communications company is responsible for preventing these test signals from interfering with system operation.

NOTE: Do not use the Line position of the Test switch except on request from the communications company.

When a four-wire communications line is used with the IBM 2740 Terminal and Leased Line or Shared Line Adapter, the communications company can test the line from their central office location by installing a test switch on their equipment at your terminal. You may be asked to operate this switch to enable the line to be tested.

#### IBM 2741 TERMINAL AND LINE ADAPTER TEST PROCEDURE (IBM LEASED LINE OR SHARED LINE ADAPTER)

This test procedure can be used only on IBM 2741 Terminals using an IBM Line Adapter (Modem). The Test switch is not installed on 2741 Terminals using common-carrier provided data sets. Use this test procedure to determine (in most cases) whether the 2741 Terminal and IBM Line Adapter or the communications line is at fault when communications with a remote terminal cannot be established.

The test is controlled by the Test switch (located on the left side of the 2741 cabinet). Use the following procedure when performing the test:

1. Turn power off and then back on.
2. Set Loc/Com switch to Com.
3. Set Test switch to Mod position. The light adjacent to the Test switch turns on, the keyboard unlocks, and the 2741 terminal is disconnected from the communications line. Characters can now be typed without being transmitted to the multiplexor.
4. Type various alphabetic and numeric characters while watching the light adjacent to the Test switch. If the light does not turn on, or does not blink as each character is typed, the 2741

terminal is not functioning properly. If the light does turn on, and blinks as each character is typed, the failure to establish communications was not caused by the terminal and the communications company should be notified. If it becomes necessary to return the carrier while test-typing, press the Return key to return the carrier to the left margin. However, set the Local/Communicate switch to Local and then back to Communicate before continuing with the test-typing.

5. To restore the terminal to a normal (non-test) condition, turn power off and set the Test Switch to off.

If your terminal is functioning properly, the communications company may request that a constant tone be placed on the communications line for troubleshooting purposes. This constant tone is provided automatically by turning power off and then back on. Your keyboard is unlocked and any character requested by the communications company can be typed. The communications company is responsible for preventing these test signals from interfering with the system operation.

NOTE: If the Return key is operated while test-typing, set the Local/Communicate switch to Local and then back to Communicate before continuing with the typing.

When a four-wire communications line is used with the IBM 2741 Terminals and Leased Line or Shared Line Adapter, the communications company can test the line from their central office location by installing a test switch on their equipment at your terminal. You may be asked to operate this switch to enable the line to be tested.

IBM 2740 PROBLEM ANALYSIS CHECK LIST (KEYBOARD AND STATUS LIGHTS)

Keyboard Locked

Possible Causes

Power off  
Paper-presence contact open  
Machine in receive status  
EOB (end-of-block) error indicated (Restart light on)  
Carrier at right-hand margin  
Machine in standby status  
Other

Remedies

Turn power on  
Replenish paper supply  
Wait for EOT (end-of-transmission)  
Press Restart key  
Press Return key  
Press Bid key  
Call IBM Customer Engineer

Standby Light Off

Possible Causes

Power off  
Machine in local mode  
Data-set power off  
Transmit or Receive light on  
Bulb burned out  
Other

Remedies

Turn power on  
Switch to communicate mode  
Check data-set power cord  
Normal situation  
Call IBM Customer Engineer (continue to operate)  
Call IBM Customer Engineer

Transmit Light Off

Possible Causes

Power off  
Machine in receive status  
Machine in standby status  
Machine in local mode  
Bulb burned out  
Other

Remedies

Turn power on  
Wait for EOT  
Press Bid key  
Switch to communicate mode and press Bid key  
Call IBM Customer Engineer (continue to operate)  
Call IBM Customer Engineer

Receive Light Off

Possible Causes

Power off  
Machine in local mode  
Machine in transmit status  
Machine in standby status  
Bulb burned out  
Other

Remedies

Turn power on  
Switch to communicate mode  
Press EOT key  
Wait for call  
Call IBM Customer Engineer (continue to operate)  
Call IBM Customer Engineer

Bid Light Off

Possible Causes

Power off  
Machine in local mode  
Standby light on  
Receive light on  
Polled by multiplexer  
  
Another terminal has control of line (terminal to terminal)  
Bulb burned out  
Other

Remedies

Turn power on  
Switch to communicate mode  
Press Bid key  
Wait for message  
If Transmit light is on, send data.  
If Transmit light is off, re-bid and wait for poll.  
Wait for message  
  
Call IBM Customer Engineer (continue to operate)  
Call IBM Customer Engineer

Restart Light On

Possible Causes

Error on line  
Other

Remedies

Press Restart key  
Call IBM Customer Engineer

## IBM SELECTRIC TYPEWRITER--REMOVAL AND REPLACEMENT PROCEDURES

### SELECTIVE PRINT ELEMENTS

The selective print elements available for your IBM Selectric® typewriter can be changed in seconds to provide the most appropriate style of type for each kind of typing application.

FOUR ITEMS of information appear on the top of each print element: the name of the type style, such as IBM COURIER 72; an arrow which should point toward the platen whenever the typewriter is in lower-case position; a three-digit number on top of the silver element, and in the left corner, indicating the matching keyboard designed for the element\*; and in the same position on the right, a two-digit number indicating the type pitch of the element (Figure 12).

TYPE PITCH denotes the number of characters that are typed per inch. Your typewriter is either a 10- or 12-pitch machine. To check, look for a 10 or 12 stamped on the right side of the clear-view card holder, or count the number of marks per inch on the visible margin scale.

\* The choice of keyboard design is made when the terminal is ordered: either a standard Selectric keyboard, a PTTC/BCD keyboard, or a PTTC/EBCD keyboard. The PTTC/BCD and PTTC/EBCD print elements are interchangeable, but neither of these print elements is interchangeable with the standard Selectric print element.

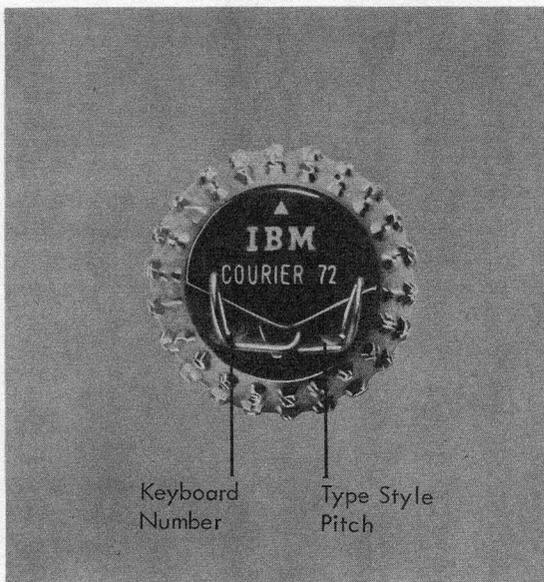


Figure 12. Print Element

### Changing Print Elements

Always make sure your typewriter is turned off and in the lower-case position. When replacing or removing an element, never force it by manually rotating or tilting the element on the post. By doing so you may loosen or break the tape which controls the element.

#### To Remove an Element

1. Turn typewriter off and lift front cover.
2. The arrow on the element cap should point toward the platen when the typewriter is in lower-case position.
3. Press the spring levers together and lift up to release the element from the notch on the element post (Figure 13).
4. Hold one of the spring levers and lift the element off the post.

#### To Replace an Element

1. Make sure the typewriter is in lower-case position.
2. Grasp the spring lever and place the element on the element post. The arrow on top of the cap should be facing the platen (Figure 13).
3. With the thumb and forefinger, squeeze the spring levers together and gently press down until the element slips into place with a click. Always avoid forcing the element.

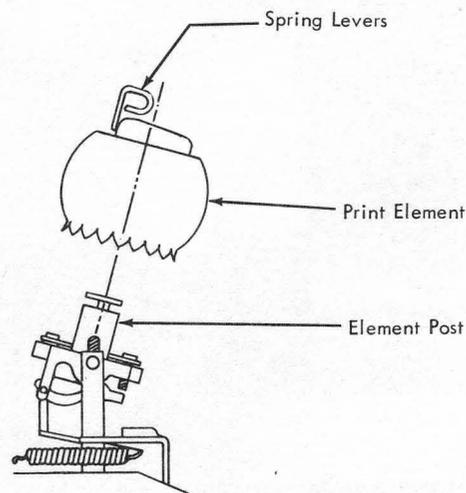


Figure 13. Position of Print Element while Removing and Replacing

## RIBBON CARRIER

Your IBM Selectric® typewriter carrier (Figure 14) holds the print element and ribbon, and also contains the ribbon-control levers. The following information will be helpful in achieving maximum writing performance.

### Fabric Ribbon

Your fabric ribbon (Figure 15) will provide longest life if the ribbon-position lever is changed frequently (see Figure 14). This will allow the ribbon to re-ink itself during these changes. The first setting, on the right, is used for cutting stencils. Settings two, three, and four move the typing line to the top, middle and bottom portions of the ribbon. If you wish to reverse the direction in which the ribbon is winding, move the ribbon-reverse lever to the opposite side.

NOTE: To prevent drying out, keep ribbons in containers until ready to use.

### Ribbon Identification

The name and reorder number of each ribbon is clearly printed on the underside of the ribbon cartridge (Figure 16).

### To Remove Ribbon Cartridge

1. Move ribbon-change lever to the far right (see Figure 21). This will raise the ribbon for easier removal from the ribbon lifts (A), Figure 17.
2. Lift the cartridge upward and off the ribbon-cartridge spindles (B) to free it from the retaining clips (C), Figure 17.
3. Ease the ribbon out of the slots in the ribbon lifts (A), Figure 17.
4. To rewind excess ribbon, insert a pencil in either of the top ribbon holes and turn in the direction of the arrow.

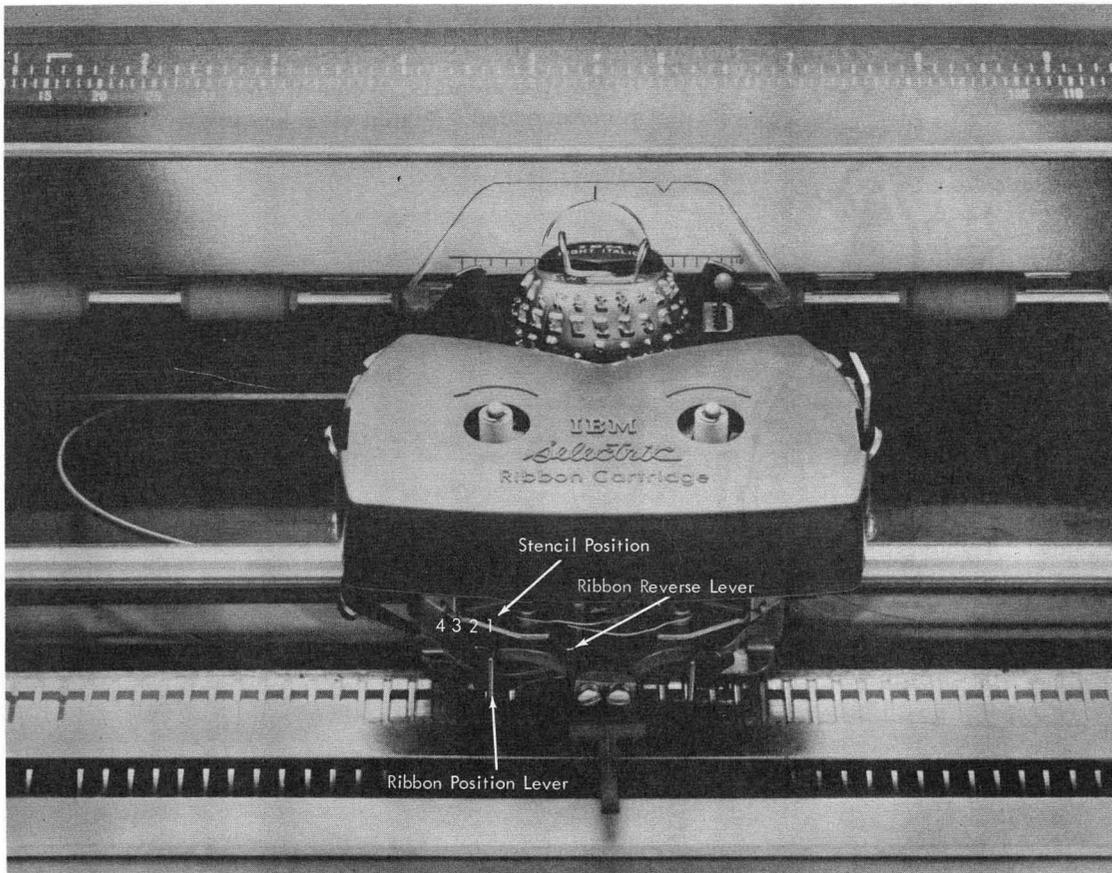


Figure 14. Ribbon Carrier

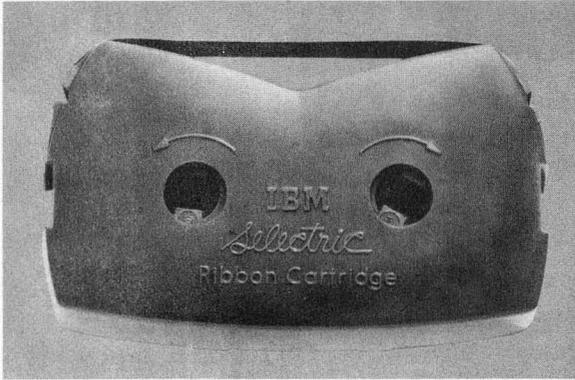


Figure 15. IBM Fabric Ribbon Cartridge

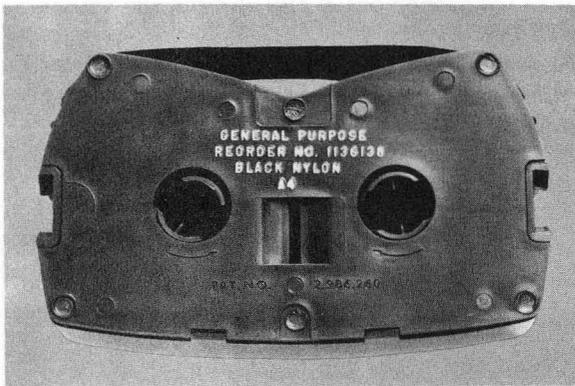


Figure 16. Ribbon Identification

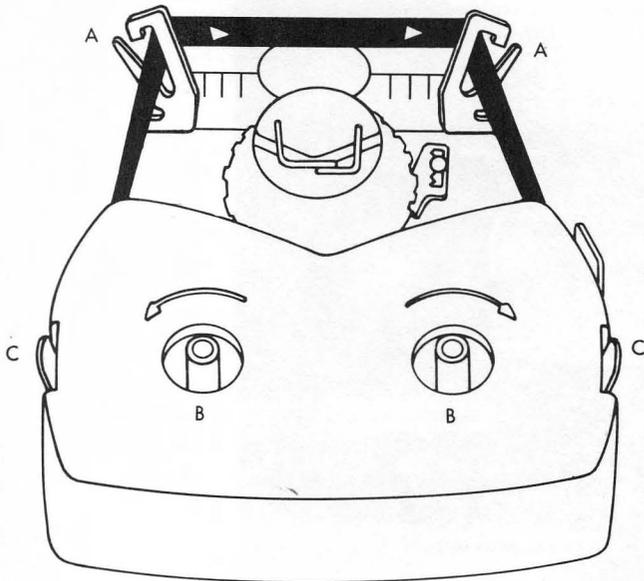


Figure 17. Removing Ribbon Cartridge

### To Install New Cartridge

Whenever you wish to switch ribbon colors or change to a new ribbon, the IBM ribbon cartridge makes ribbon changes quick, easy, and clean. First, center the carrier and then turn off the motor. Lift the front cover. Keep the paper bail against the platen.

1. Make sure ribbon-change lever is at far right (see Figure 21).
2. Pull out several inches of ribbon and position the cartridge in front of the ribbon lifts. Slide the ribbon through the right ribbon lift, Figure 18.
3. Slide the exposed ribbon down between the card holder and element, and then through the left ribbon lift, Figure 19.
4. Then place the cartridge on the two ribbon spindles and press down evenly and firmly, Figure 20.
5. Move the ribbon-change lever back to the left (Figure 21).
6. This will lower the ribbon into typing position.
7. To rewind excess ribbon, turn either spindle in the direction of the arrow. Close cover, turn on motor, and continue typing.

### TYPEWRITER PLATEN

If you type stencils, frequent cleaning of the platen is recommended. Platen cleaners are available from

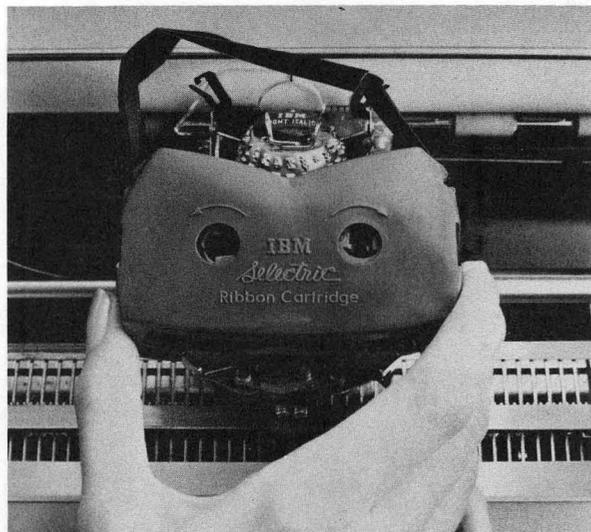


Figure 18. Slide Ribbon Through Right Ribbon Lift

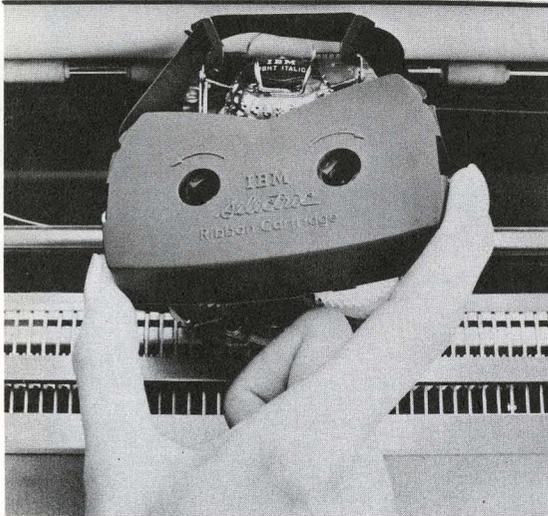


Figure 19. Slide Ribbon Down Between Card Holder and Element and Through Left Ribbon Lift

stationery suppliers. Use this liquid sparingly and apply with a soft cloth.

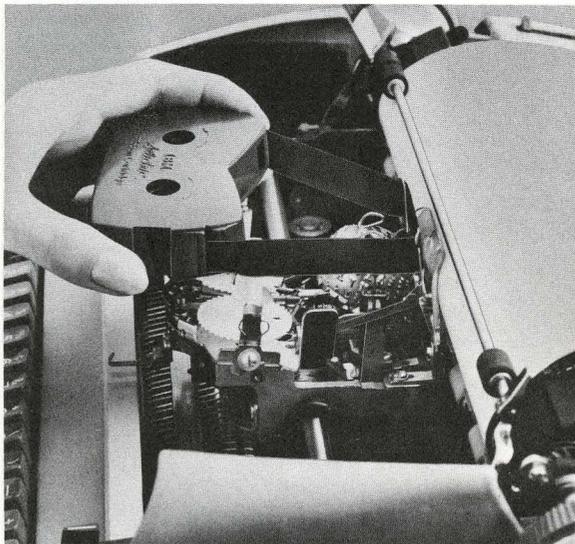


Figure 20. Place Cartridge on Two Ribbon Spindles

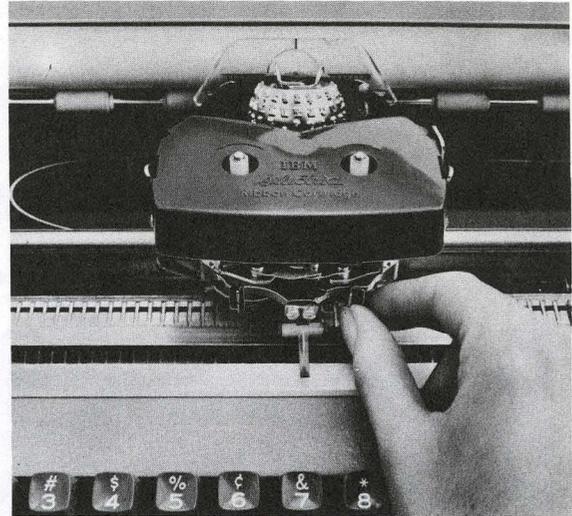


Figure 21. Positioning Ribbon Change Lever

To Remove the Platen:

1. Turn the motor off.
2. Pull paper-release lever and paper bail forward (Figure 22).
3. Lift the cover.
4. Press the right and the left platen-release levers (Figure 22).
5. Lift the platen from typewriter.

To Replace the Platen:

1. Hold the platen with the ratchet end to the right.
2. Place the groove of the platen in the right platen latch.
3. Press down on both platen knobs. The platen will snap into place.

To Sweep the Erasure Dustpan

1. Tab the carrier to the far right.
2. Turn the motor off.
3. Lift the cover.
4. With the pencil-shaped dual-purpose brush, sweep lightly toward the left side of the typewriter (Figure 22).

NOTE: Do not allow your brush to interfere with the tapes located above the dustpan.

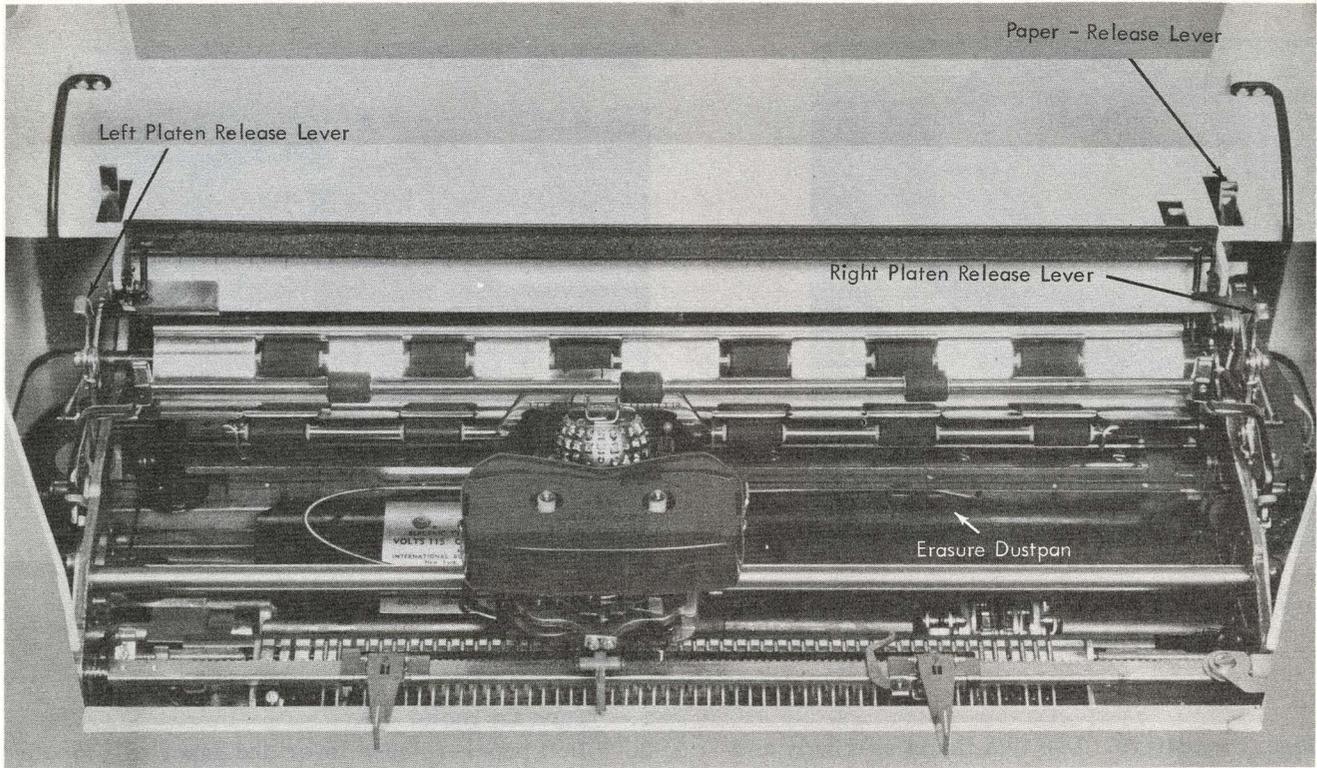


Figure 22. Platen Removed from Typewriter

## TYPING GUIDES FOR YOUR IBM 2740/2741 TERMINAL TYPEWRITER

1. Be sure the electric cord is plugged all the way into the outlet and that there is a flow of electricity.
2. Set Local/Communicate switch to Local position.
3. Press On portion of Motor Control switch.
4. If print element does not print, make certain ribbon-position lever is not in the stencil position, and that multiple-copy control lever is pulled toward you.
5. If carrier will not move:
  - o Turn motor off for a few seconds, then on.
  - o With switch on, press Margin Release key or Tab key.

### FOR YOUR TYPING EASE

#### Posture

1. Upper arms sloped slightly forward (Figure 23).
2. Forearms on same slope as keyboard.
3. Back erect, supported by backrest.
4. Feet flat on the floor.

#### Typing Touch

When you start typing, begin slowly. Keep your fingertips close to the keys in a natural, curved position. Tap the keys squarely in the center, using a quick, resilient touch, and relax finger pressure the instant you contact the keys. Practice this with familiar words or sentences.

### TYPING TIPS (LOCAL MODE ONLY)

#### Addressing Envelopes

Before removing the typewritten letter, drop the envelope between the letter and platen. When you remove the letter, the envelope will come to the typing position.

#### Typing Cards and Labels

Make a horizontal pleat-fold across the center of a sheet of bond paper. Insert the sheet around the platen and line up the edge of the pleat with the edge of the line scale. Place the card or label in the pleat, roll back, and type.

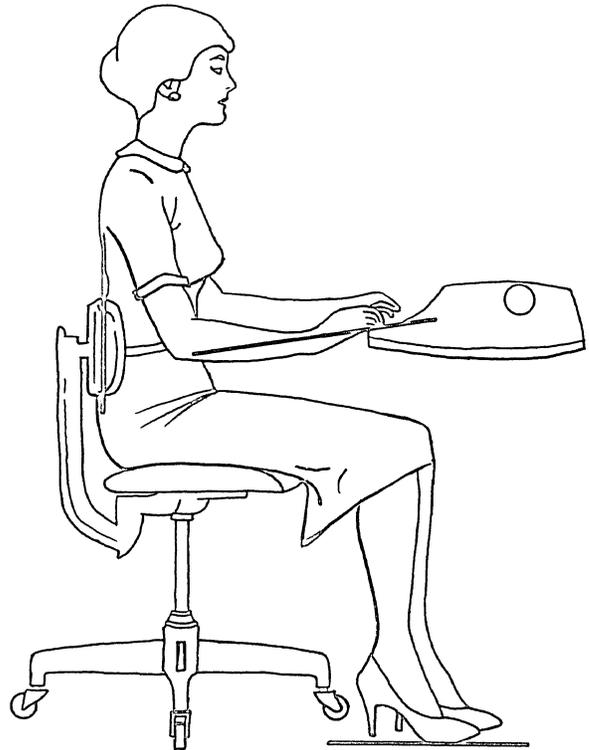


Figure 23. Correct Posture when Typing

#### Variable Line Spacing

When the spacing of printed forms does not correspond to typewriter line spacing, the platen may be removed and reversed so that it rolls freely for manual positioning.

#### Corrections on Bound Copies

Manuscripts stapled across the top can be corrected without removing staples. Insert a sheet of paper into the typewriter. When the paper is an inch or so above the card holder, place the page of bound material to be corrected between this sheet and the platen. Roll the page backward and make the correction.

#### Crowding and Spreading Characters

Backspace until the black line of the clear-view card holder is directly over the character preceding the point where you wish to squeeze in or spread the letter. Reach under the cover and with slight pressure hold the carrier position post (located at

right rear corner of ribbon cartridge) and press the Space bar. You will then be able to guide the carrier to the half-space position and type in the character.

### Vertical and Horizontal Lines

Place pen, pencil, or ball-point pen in the notch of the clear-view card holder. Vertical lines may be drawn by rolling the platen manually or using the Index key. Horizontal lines can be drawn by using the Space bar or Backspace key. The paper bail also provides a horizontal ruling edge.

### The Rush Message

To type a rush telegram when you have a transcript in the typewriter, roll the transcript backward until one inch or so remains in front of the platen. Place a telegram blank against the paper table and behind each carbon. Add carbons if necessary. Advance the material to typing position on the telegram and type the message. Then roll the material backward and remove the telegraph blanks and extra carbons. Reposition the transcript and continue to type.

### Visible Margin Reset

The new visible margin scale and visible margin stops are located directly above the keyboard on the front of your IBM Selectric typewriter (see Figure 3). The red arrow, called the typing-position indicator, locates the exact position of the carrier. These features contribute such simplicity to margin resetting that the operation will be but a pause in your typing. To reset right or left margin, simply press in on the appropriate margin stop and glide it to the correct reading on the margin scale. You may occasionally have to move the typing-position indicator (connected to the carrier) first, since the stops will not slide past it.

### Centering

Position the paper in the typewriter so that its extreme left edge is at "0" on the margin scale. Space the clear-view card holder to the right edge of the paper and note the reading on the scale. Dividing this number by 2 determines the center of the page.

1. Move the carrier to the center point of the paper and set a tab stop.
2. From this center point, backspace one space for each two spaces to be typed. Disregard single spaces left over in the count. You may prefer

to clear all other tab stops before setting the stop you will use as your centering guide.

### TAB STOPS IN FORMS TYPING

The unique tab action of the IBM Selectric typewriter enables you to type forms and all multitab jobs faster and more conveniently.

To speed forms typing, first set your margins. Next, set tabs at the points on the form where data is to be inserted most frequently. Also set a tab a few spaces to the left of your right margin to prevent unnecessary tab action through it. The tab stops will save you time by allowing you to move the carrier to frequently used points quickly.

To type information on the form where there is no tab set, tab to the nearest tab stop, then use the Space bar or Backspace key to reach the desired location. The typomatic action of the Index key (2740 only) is a fast way to line space vertically to any point along the form.

### TYPING IN CORRECTIONS

When making corrections, you may locate the horizontal position of the print element by using either the black line on the clear-view card holder or the red arrow on the margin scale. If you use the card holder as your indicator, position the black line at the point on the paper at which you want to insert the new character. Then simply return to the line of type and insert the correction.

### Crowding Letters

Example:

Send the ordr today.  
Send the order today.

To crowd the "e" into "ordr," erase the final "r." Backspace until the black line on the card holder is over the space formerly occupied by the final "r." Place the palm of the right hand on the top of the front cover. Reach under the cover and press left against the carrier-position post (located at the right rear corner of ribbon cartridge) with your finger until the black line is moved back one-half space. Hold the carrier in this position and type the "e." Repeat the procedure for the "r."

### Spreading Letters

Example:

He will send it.  
He c a n send it.

To replace "will" with "can," first erase "will."  
Type the "c" in place of the "w" and type "n" in  
place of the final "l."

Position the black line on the card holder over  
the position occupied by the first "l." Place the  
palm of the right hand on the top of the front cover.  
Reach under the cover and press left against the  
carrier-position post with your finger until the black  
line of the card holder is directly between the "i"  
and "l." Type "a."

Release the carrier and continue to type.

#### Two Methods of Spacing Letters

Example:

He could go.

He c a n go.

He could go.

He can go.



The IBM 2740 Communications Terminal Model 2 is a buffered version of the IBM 2740 Communications Terminal. The IBM 2740 Model 2 enables key input from the typewriter keyboard to be printed, stored in a buffer, visually verified, and subsequently transmitted to an IBM System/360. The basic buffer in the IBM 2740 Model 2 can accommodate up to 120 characters (248 and 440 characters are available as special features), and is capable of reading out without destroying its contents. Station control is a standard function in the basic IBM 2740 Model 2 terminal, and the line-control signals presently being used by IBM 2740 terminals remain unchanged for the Model 2.

**KEYS, LIGHTS, AND SWITCHES (Figures 24 and 25)**

Only the additional keys, lights, and switches, or those keys, lights, and switches whose functions are altered in the Model 2, are described.

The (B) EOB key and (C) EOT key have been removed from the IBM 2740 Model 2 keyboard since those signals are provided automatically; however, the (B) EOB signal is provided only if the Record Checking special feature is installed.

Keys

Enter Key (Additional Key). The Enter key, when operated, enables keyboard-initiated data to enter

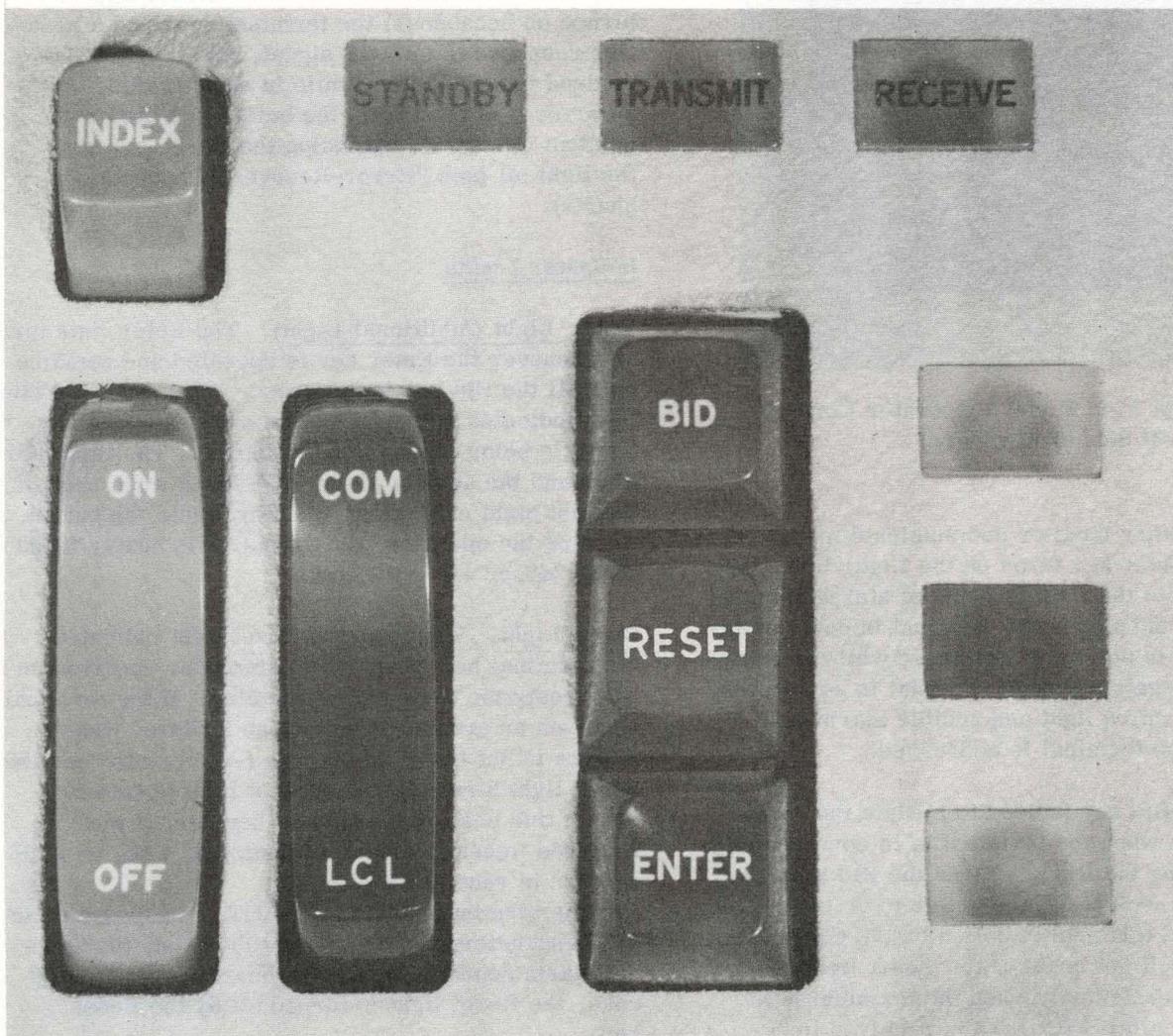


Figure 24. IBM 2740 Model 2 Operator Controls (Right Side of Keyboard)

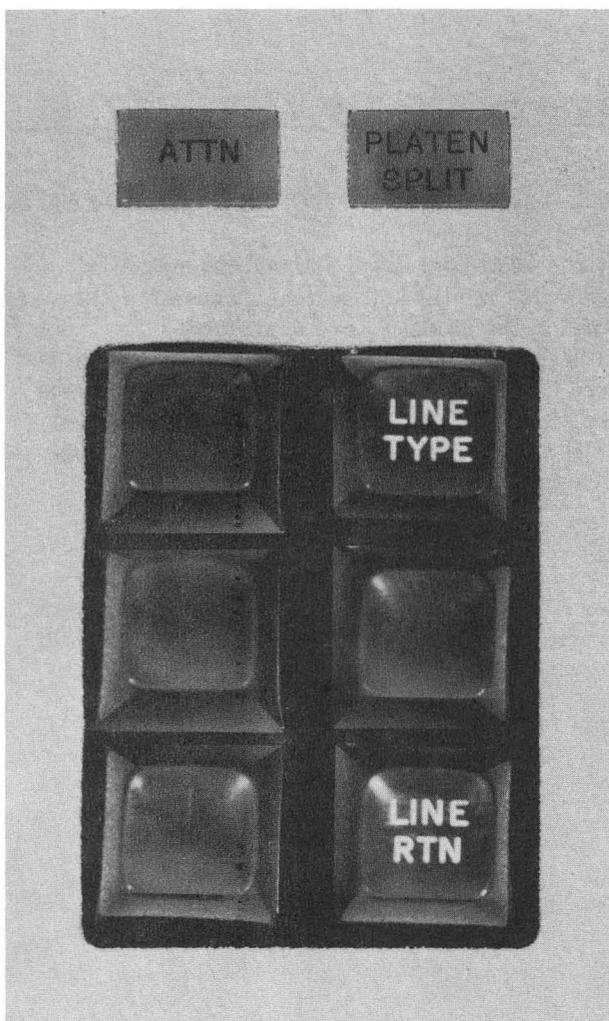


Figure 25. IBM 2740 Model 2 Operator Controls  
(Left Side of Keyboard)

the buffer in either local or communicate mode. Pressing the Enter key turns on the Enter light, resets the buffer to the first position of storage, unlocks the keyboard, and places the terminal in enter status. If the terminal is polled or addressed while in enter status, a **(N)** negative-response signal is sent to the CPU. The Attention light and audible alarm also turn on when the terminal is addressed.

**Bid Key.** The Bid key is used to initiate the transmission of data when the terminal is in communicate mode. Pressing the Bid key turns the Bid light on and causes the contents of the buffer to be transmitted when the terminal is polled by the CPU. The bid operation will not occur if the Reset light is on. The Bid key operates only when the terminal is in enter status or after a **(C)** EOT is received in response to a **(B)** EOB signal. The key is operated

after the **(C)** EOT is received when it is desirable to retransmit a message.

After the operator has completed keying a message, made any corrections, and pressed the Bid key, the terminal shifts to lower case and a **(B)** EOB or **(C)** EOT is entered in the buffer in the position following the last keyed character. The **(B)** is entered only if the Record Checking special feature is installed. When the terminal is polled by the CPU, the contents of the buffer (starting with the first position of storage and ending with the EOB or EOT character) is transmitted. The contents of the buffer will not be printed during transmission, since printing occurred as the buffer was loaded. When operating in local mode, each operation of the Bid key causes the contents of the buffer to print out.

**Reset Key.** When operating in enter status and communicate mode, pressing the Reset key resets the buffer to its first storage position and shifts the terminal to standby status. If the Reset light is turned on because (1) the terminal received a negative response to an EOB signal, (2) an error was entered into the buffer while in enter status, or (3) an error was read from the buffer in a buffer-printout operation, operating the Reset key turns the light off (see "Error-Recovery Procedure" charts).

#### Indicator Lights

**Enter Light (Additional Light).** The Enter light turns on whenever the Enter key is operated and remains on until the Bid key is operated. When on, the Enter light indicates that information entered at the keyboard is being loaded into the buffer. The light will blink and the audible alarm will sound when each of the last eight characters is entered into the buffer, warning the operator that the buffer is nearly filled (120, 248, or 440 positions).

**Reset Light.** When on, the Reset light indicates the terminal has received an error, or received an EOT response to an EOB character. If the terminal receives an error in text and the Buffered Receive feature is not installed, a dash (-) is printed and the Reset light turns on. The Reset light is turned off, in this case, by the Reset key, or, if the Buffered Receive feature is installed, when an EOB or EOT is received.

If the terminal receives an EOT in response to an EOB character, the Reset light turns on, the audible alarm sounds, and the keyboard locks. In this case, the Reset light is turned off by the Reset key.

The Reset light also turns on if an error character is loaded into the buffer when the terminal is in enter-local or enter-communicate status. The keyboard will lock and the bid function (while in communicate mode) will be suspended. Operating the Reset key turns the Reset light off, restores the buffer, and terminates the enter operation.

If an error is detected during a buffer-printout operation, the Reset light turns on and the keyboard locks; however, the printout will be completed. Operating the Reset key turns the Reset light off and restores the buffer. This light being on also indicates that the buffer capacity has been exceeded when receiving data from the line and the Buffered Receive feature is installed.

Attn (Attention) Light. The Attention light turns on and the audible alarm sounds momentarily if the terminal is addressed while in enter, local, or buffer-print status condition, or if the terminal typewriter is without paper. The Attention light turns off when the condition that caused the light to turn on is corrected.

Platen Split Light (Special Feature). The Platen Split light is on whenever the platen is in a split condition. See "Split Friction-Feed Platen" in the "Special Features" section of this manual.

## IBM 2740 MODEL 2 TERMINAL OPERATION

### Local Mode

When operating in local mode, the information typed at the keyboard can also enter the buffer, if so desired, provided the Enter key is operated prior to typing. Pressing the Bid key after typing is completed causes the contents of the buffer to be printed. The information stored in the buffer can also be transmitted at a later time by switching the terminal to communicate mode and pressing the Bid key. In normal local-mode operation, no indicator lights are on; in local-enter mode, the Enter light is on. If a terminal is addressed or polled while operating in local mode, a negative response is sent to the CPU. The Attention light and audible alarm are also turned on to alert the operator when the terminal is addressed.

### Communicate Mode

When operating in communicate mode, pressing the Enter key unlocks the keyboard, turns the Enter light on, turns the Standby light off, and enables the information typed at the keyboard to enter the buffer.

The Enter light blinks and the audible alarm sounds as each of the last eight character positions of the buffer is filled, to warn the operator that the buffer is nearly filled. The keyboard locks when the capacity of the buffer (120, 248, or 440 characters) is exceeded. After the message has been typed (or the buffer has been filled), operating the Bid key turns the Enter light off and the Bid light on. The message stored in the buffer is transmitted and the Transmit light turns on after the Bid key is operated and the terminal is polled by the CPU. If the terminal is addressed after the Bid key is operated, the terminal responds automatically with a negative response and turns on the Attention light and audible alarm. An EOT signal is included automatically at the end of message transmission if the terminal does not have the Record Checking special feature installed. If the terminal is equipped with the Record Checking special feature, an EOB signal is transmitted instead of the EOT signal. The EOT signal is transmitted automatically after a positive response is received from the CPU.

If the CPU responds to checking with a  $\text{\textcircled{d}}$  (positive answer, inquiry), the terminal shifts automatically to receive status (Receive light on) in order to receive the incoming message. A negative response to checking from the CPU causes the terminal to shift back to transmit status (Transmit light on) and retransmit the contents of the buffer automatically. If no response to checking is received from the CPU, the CPU will time out and send an EOT to the terminal, which clears the line. An EOT response from the CPU will shift the terminal to standby status and turn on the Reset and Standby lights. You can retransmit the message by pressing the Reset key and then the Bid key. The message will be transmitted automatically when your terminal is polled. The EOT response from the CPU is received only after a predetermined number of retransmissions have been unsuccessful. The number of retransmissions is specified by the CPU program.

When operating in communicate mode, the typewriter keyboard is locked under the following conditions:

- If terminal is in communicate mode, but not in enter status.
- When a buffer VRC error is detected.
- When a buffer overflow occurs.
- During a carrier-return or tab operation.
- If terminal is in standby status.

To return the carrier to the left margin, when the keyboard is locked because of one of the conditions just listed, shift to local mode, and press the Reset key and Return key.

## SPECIAL FEATURES

### Buffered Receive

This feature permits the IBM 2740 Model 2 terminal to receive data into the buffer from the communications line.

#### Operation

The printout of the buffer takes place after the message (EOT signal) is received, thereby reducing the time that the transmission line is in use. The Receive light is on and the keyboard is locked during the buffer-printout operation. The terminal switches from a receive status to a standby status after the buffer printout has been completed. Idle characters are not required after function codes (CR, Tab, and Index), as the Buffered Receive feature will stop to allow the function to be completed before continuing the printout. This reduces the number of characters to be transmitted. The length of transmission cannot exceed the capacity of the buffer (120, 248, or 440 positions). If a buffer overflow occurs, the Reset light and audible alarm turn on, and the terminal responds with an EOT signal (see "Error-Recovery Procedures").

### Header Control

This feature allocates up to 28 positions of the buffer for the storage of repetitive header information. Starting with position 1, increments of four positions (up to a maximum of 28) can be specified at the time of ordering.

#### Operation

With the Header switch in the OFF position, data typed at the keyboard can be entered into the header area of the buffer (Enter key operated). This data is available every time the buffer reads out to the line. Changes in data in the header area of the buffer must be made by retyping the entire area. Once header data has been entered, turning the Header switch to the ON position allows subsequent data entered to automatically start at the end of the header area of the buffer. Transmission will be from the beginning of the header area to the end of information stored in the buffer. All positions of the header area must be

filled with characters and/or spaces. If the terminal power is turned off, the buffer information will be lost. Data keyed into the buffer (including the header area) can be printed out for verification by entering the data while in local-enter mode (with the Header switch in the OFF position) and pressing the Bid key after all data has been entered. If the Buffered Receive feature is installed, the positions used for header control are not available to receive data from the line when the Header switch is set to the ON position.

### Edit

The Edit feature simplifies the method of correcting typing errors entered into the buffer; however, the backspace-retype and Reset-retype methods of correction (described under "Typing Error Correction Procedure") may still be used. The Edit feature is controlled by the following keys:

- Line Return Key. This key is operative only when the terminal is in the enter-local or enter-communicate mode. Pressing the Line Return key immediately following the operation of the Line Type key or keyboard operation causes the buffer to back up and erase all characters up to and including the first character of the present line.
- Line Type Key. This key is operative only in enter-local or enter-communicate mode. Operating this key immediately after the buffer is restored to position 1 by operating the Enter key causes the buffer to print out to, and perform, the next carrier return stored in the buffer. The Line Type key becomes inoperative after typing a character or reaching the character where the Enter key was operated.
- Enter Key. Pressing this key while in the enter mode causes the buffer address to be reset to the first position and the terminal to remain in enter mode.

#### Operation

If an error occurred in the present line of typing, the correction procedure is as follows:

1. Press CR/LF key (moves print element to left margin and next line).
2. Press Line Return key to back up the buffer to the beginning of the line.
3. Rekey the entire line.

If the error is not in the present line of typing, the correction procedure is as follows:

1. Press CR/LF key (moves print element to left margin and next line).
2. Press Enter key (restores buffer to position 1). This is the second operation of the Enter key since this key was operated before typing was started.
3. Press Line Type key, and advance the buffer line-by-line until the end of the line to be corrected is reached.
4. Press Line Return key.
5. Retype the line in error and all succeeding lines of the message.

The stored information can be verified by switching to local mode and pressing the Bid key or by repeating the Line Type key operation. This causes the contents of the buffer to be printed. If the message is correct, switch to communicate mode and press the Bid key; transmission will occur when the terminal is polled.

#### Document Insertion

The Document Insertion feature provides a means of inserting ledger cards in front of the typewriter platen without using the platen knobs (see Figure 26)

#### Operation

To insert the ledger card, push down on the Release button (Figure 26, Part A), and simultaneously pull the post toward the front of the terminal (Part B). When the feature is tilted forward, the feed rolls are open and the card can be inserted (Part C). A pressure arm pushes the card against the left card guide while the feed rolls are open.

After the card is inserted, the feature can be moved toward the rear of the machine. This action requires very little effort as the device is spring loaded. The card can still be moved at this time, and can now be positioned for printing by aligning the desired print-line number (printed on the right side of the card) between the two lines of the Line-Position Indicator located on the right side of the plastic guide (Part D). The feature is locked in position by again pushing down on the Release button. The spring-loaded mechanism returns the feature to its home position, and the card is held securely in place and is ready to receive the printed data. The card is removed by repeating the Release button and tilt-forward action. An interlock locks the keyboard if the feature is not in home position.

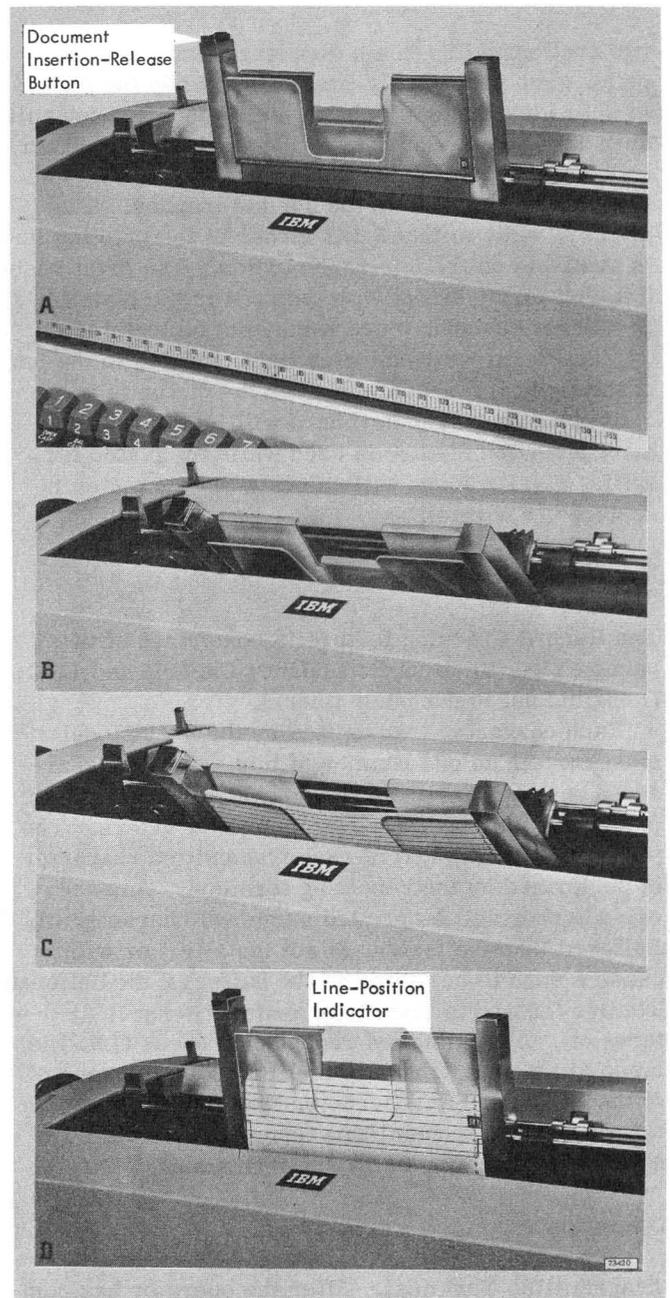


Figure 26. Document Insertion Feature

#### Split Friction-Feed Platen

A Split Friction-Feed Platen is available to further enhance the forms-handling capability of the IBM 2740 Model 2 terminal (provided the Document Insertion feature is installed).

#### Operation

The two sections of the platen may be manually disengaged by pulling out on the left platen knob. The

two sections will remain disengaged until the left platen knob is manually pushed in. When the platen is split (disengaged), only the right-hand portion will be indexed by the Index key, the CPU, or the platen knobs. When the platen is not split (engaged), both sections are indexed in the normal manner. The platen is split so that 5 1/2 inches of the printing line is available on the left-hand portion. The print position that prints directly on the split in the platen should not be used, since it may not be legible.

The Platen Split indicator light, located to the left of the keyboard, is on whenever the platen is in the split condition. The keyboard will lock if the Document Insertion feature is used while the platen is split. The keyboard will unlock when the platen is restored to normal.

### Record Checking

The Record Checking feature is comprised of two parts--VRC (Vertical Redundancy Check), and LRC (Longitudinal Redundancy Check).

Each character transmitted by the 2740 Model 2 must contain an odd number of bits. As each character is generated at the keyboard, an additional bit (c-bit) is inserted into all even-bit characters. The parity checking (VRC) of each transmitted character is performed by the receiving terminal. Any received error will be printed as a dash character (if Buffered Receive feature is not installed) or will cause a dash to be stored in the buffer (if the Buffered Receive feature is installed), and the Reset light turns on. A longitudinal redundancy check (LRC) is made at the receiving terminal following the receipt of the EOB and LRC character from the transmitting terminal. The transmitting terminal then waits for a response from the receiving terminal.

### Operation

Transmitting Terminal. After the operator has completed keying a message, made any necessary corrections, and pressed the Bid key, the terminal is shifted to lower case and an EOB code is entered in the buffer automatically. The contents of the buffer, starting with the first position of storage and ending with the EOB character, will be transmitted when the terminal is polled. If the CPU acknowledgment indicated an error condition (negative response), the terminal will retransmit the message automatically. Retransmission of the message will continue until a positive response (Y or d) is received, or until an EOT code is received by the transmitting terminal.

An EOT code indicates that the CPU has not received the message correctly and wishes to terminate the transmission. The transmitting terminal shifts to standby status with the Reset and Standby lights on and the keyboard locked to indicate to the operator that the message was in error. The rejected message may be transmitted again, without rekeying, by pressing the Reset key and then the Bid key, and waiting for the terminal to be polled by the CPU.

If the CPU receives the message correctly, it will respond with either a Y or d. If a Y response is received, the terminal automatically sends an EOT code and shifts to standby status. If a d response is received, the terminal shifts to receive status automatically and awaits the inquiry message to be transmitted by the CPU. If any character other than C, d, or Y is received in response to an EOB, it is treated as a negative response N and the message is retransmitted.

Receiving Terminal. After the message is received, the receiving terminal compares its accumulated LRC character with the one received from the transmitting terminal. The accumulated LRC character is transmitted after the EOB character. If the two LRC characters do not compare or a VRC error occurred previously, a negative response N is sent to the transmitting terminal. If the Buffered Receive feature is installed, no printing would occur until the message is received correctly. If a VRC error occurs in text and the Buffered Receive feature is not installed, a dash (-) is printed in place of the error character.

### TYPING ERROR CORRECTION PROCEDURE (IBM 2740 Model 2)

If an error is made when typing the message and the operator wishes to correct the contents of the buffer, she may backspace to the error, strike over the error, and then rekey all the characters that were backspaced over. The backspace character is not stored but will cause the print element and buffer-storage address to back up one position each time the Backspace key is operated, until the left margin of the form is reached. The operator may start rekeying at the beginning of the buffer by first pressing the Reset key and then operating the Enter key. When error correction involves typewriter functions such as tab, carrier return, index, or case shift, the recommended procedure is to Reset and re-enter the entire message.

ERROR-RECOVERY PROCEDURES (IBM 2740 Model 2)

The charts in Tables 1 through 7 summarize the various error conditions that could arise during the following operations. The charts also indicate the line responses (if any), the indicator(s) turned on, and the procedure for recovery.

1. Receive Operation--without Record Checking
2. Receive Operation--with Record Checking
3. Transmit Operation--Buffer to Communications Line
4. Enter Status--Local or Communicate Mode
5. Buffer Printout--Local Mode
6. Terminal Addressed by CPU
7. Terminal Polled by CPU

Table 1. Receive Operation--without Record Checking Feature

Type of Error	Buffered Receive	Indicator	Terminal Response	Recovery
Parity error (buffer).	Yes	Reset light on, character may or may not be printed, and alarm sounds.	None	Press Reset key and send message to request retransmission.
Incorrect case.	Yes	Print hyphen.		
Buffer overflow.	Yes	Reset light on.		
Lose forms while receiving from line.	With or Without	Receive light turns off and Standby light fails to turn on.	None	Insert forms and send message to request retransmission.
Lose forms while printing out from buffer.	Yes	Standby light fails to turn on after message is printed out.	None	Same as preceding condition.
Incorrect case.	No	Print hyphen.	None	Press Reset key and send message to request retransmission.
Overflow printer.	No	Characters omitted.		

Table 2. Receive Operation--with Record Checking Feature

Type of Error	Buffered Receive	Indicator	Terminal Response	Recovery
Parity error.	Yes	Reset light on until response is sent and alarm sounds. Insert hyphen in buffer.	Ⓝ	CPU retransmits message.
No stop bit.				
LRC error.				
Parity error.	No	Reset light on until response is sent. Print hyphen.	Ⓝ	CPU retransmits message.
No stop bit.				
LRC error.				
Lose forms while receiving data from line.	With or Without	Receive light turns off and Standby light fails to turn on.	None (CPU times out)	Insert forms. CPU retransmits message.
Lose forms while printing out from buffer.	Yes	Standby light fails to turn on after message has printed out.	None	Insert forms and send message to request retransmission.
Buffer overflow.	Yes	Reset light on.	Ⓢ	Post error message to user.
Overflow printer.	No	Reset light on. Print hyphen.	Ⓢ	Post error message to user.
Buffer parity error while printing out message.	Yes	Reset light on. Print hyphen. Alarm sounds.	None	Press Reset key and request retransmission.
Incorrect case (detect during print-out).	Yes	Reset light on. Print hyphen.	None	Same as preceding condition.
Incorrect case.	No	Reset light on. Print hyphen.	Ⓢ	Post error message to user.
Buffer error.	Yes	Reset light on. Alarm sounds.	Ⓝ	CPU retransmits message.

Table 3. Transmit Operation--Buffer to Communications Line

Type of Error	Record Checking	Indicator	Response from CPU	Recovery
Buffer VRC error.	Yes	Reset light on. Alarm sounds.	Ⓝ or Ⓢ	Press Local switch, then Reset key. Switch back to communicate mode and rekey message.
Buffer VRC error.	No	Reset light on. Alarm sounds.	None	Press Local switch, then Reset key. Switch back to communicate mode and rekey message. Post system error to user.
No error detected in 2740.	Yes	None.	Ⓝ	Automatic retransmission of message.
		Alarm sounds. Reset light on and Receive light off.	Ⓢ or garbled answerback	Press Reset key, press Bid key, and wait to be polled.
		Reset light on and Receive light on.	No response	Press Local switch, then Reset key, and switch back to communicate mode.

Table 4. Enter Status--Local or Communicate Mode

Type of Error	Indicator	Recovery
Buffer parity error.	Reset light on. Keyboard locked. Alarm sounds.	Press Reset key, press Enter key, and rekey message.
Buffer overflow.	Alarm sounds eight characters before end of buffer, and keyboard locks at end of buffer.	Message can be sent as is, or press Reset and Enter keys to reload message.
Lose forms while entering data.	None.	Load forms if hard copy is desired.
No forms.	Enter light fails to turn on when Enter key is pressed.	Load forms.

Table 5. Buffer Printout--Local Mode

Type of Error	Indicator	Recovery
Buffer parity error.	Reset light on and keyboard locked. Alarm sounds.	Press Reset key, press Enter key, and rekey message.
Incorrect case.	Print hyphen.	Same as preceding condition.

Table 6. Terminal Addressed by CPU

Terminal Status	Indicator	Terminal Response	Recovery
<ol style="list-style-type: none"> <li>1. No forms.</li> <li>2. Not in communicate mode.</li> <li>3. Bid key operated.</li> <li>4. Enter mode.</li> <li>5. Buffer printout.</li> </ol>	Attention light on and alarm sounds.	Ⓝ	<p>Press Reset key to reset Attention light and wait to be addressed again.</p> <ol style="list-style-type: none"> <li>1. Load forms.</li> <li>2. Press Communicate switch.</li> <li>3. Wait to be polled or go to local mode and press Reset key.</li> <li>4. Complete entry and wait to be polled; or abort enter mode by switching to local mode, pressing Reset key, and switching back to communicate mode, and wait to be readdressed.</li> </ol> <p>System should readdress terminal. After two retries should post the error condition to user.</p>
No power on terminal or data set.	None.	None (CPU times out)	Turn terminal power on. System should readdress terminal. After two retries should post the error condition to user.

Table 7. Terminal Polled by CPU

Terminal Status	Terminal Response to Poll	Recovery
Enter or buffer print.	Ⓝ	Press Communicate switch, press Bid key, and wait to be polled. Normal condition. System should continue polling.
Not in communicate mode.	Ⓝ	Press Enter key and key message. Press Communicate switch. Press Bid key and wait to be polled. Normal condition. System should continue polling.
Bid key not operated.	Ⓝ	Press Communicate switch. Press Bid key if message has been entered. Normal condition. System should continue polling.
No power on terminal or data set.	None	Turn power on. System should repoll twice. After second retry, post condition to user.

DIAL-UP AND DISCONNECT PROCEDURES FOR THE IBM 2740 MODEL 1 EQUIPPED  
WITH THE AUTOMATIC DISCONNECT FEATURE (World Trade Only)  
USING THE IBM 3976 MODEM MODEL 2

**DIAL-UP CONNECTION PROCEDURES (HAND SHAKING)**

A dial-up connection can be established by answering a call either manually or automatically.

NOTE: The 3976 contains three lighted pushbuttons (Data, Answer, and Tel).

Manual Answering Procedure

Station 1

- Lift handset and dial.
  
- High-pitched tone is heard (indicates line connection has been established).
- Press Data button --3976 (Data light turns on).
- Hang up handset and wait for Dial Connect light (2740) to turn on.
- Press Bid key (must be within 15 seconds after Dial Connect light turns on).
- Key data.

Station 2

- Phone rings.
- Press Data button--3976 (Data light turns on).
- Press Answer button--3976 (Answer light turns on).

Auto-Answering Procedure

Station 1

- Lift handset and dial.
  
- High-pitched tone is heard (indicates line connection has been established).
- Press Data button --3976 (Data light turns on).
- Hang up handset and wait for Dial Connect light to turn on.
- Press Bid key (must be within 15 seconds after Dial Connect light turns on).
- Key data.

Station 2

- Answer light turns on--3976.
- Data light turns on --3976.
- Phone rings.

**AUTO-DISCONNECT PROCEDURE**

Once a connection is established, automatic disconnection of the line is caused by:

- No bid within 15 seconds after a connection is established;
- No character sent within a 15-second period;
- No character received within a 15-second period;
- or
- No bid within 15 seconds after EOT.

Manual disconnect can be initiated by either terminal operator (by pressing the Dial Disconnect key).

When automatic disconnect occurs, it causes:

The Transmit and Receive lights to turn on;  
The Dial Connect light to turn off;  
The alarm to ring; and  
The Data light (3976) to turn off.

NOTES:

1. The alarm rings only momentarily, but the lights remain as described until:  
The EOT key is pressed (this turns off the Transmit and Receive lights); or  
A new connection is established--without the EOT key being actuated (this also turns off the Transmit and Receive lights).
2. Normally, the disconnection procedure is initiated by the sending terminal. If, however, the operator at the receiving terminal initiates the disconnection procedure by pressing the Dial Disconnect key, the Dial Connect light at the sending terminal turns off, and, after 15 seconds, the sending terminal disconnects and its Transmit and Receive lights turn on.



IBM 2740 MODEL 1 AND IBM 2741

- Addressing Envelopes 39
- Applications 7
- Attention Key (2741) 17
- Auto-Disconnect Procedure (2740 Model 1) 54
- Auto EOB (2740) 16
  
- Backspace Key 12
- Bid Key and Light (2740) 15
- Broadcast Operation (2740) 20
  
- Changing Print Elements 34
- Check-Loop Test (2740) 27
- Check-Loop Test (2741) 27
- Communicate Mode Operation (2741) 25
- Corrections on Bound Copies 39
- Crowding and Spreading Characters 39
- Crowding Letters 40
  
- Determining Center of Page 40
- Dial-Disconnect Key and Dial-Connect Light (2740) 15
- Dial-Up and Disconnect Procedures for the IBM 2740 Model 1  
Equipped with the Automatic Disconnect Feature (World  
Trade Only) Using the IBM 3976 Modem Model 2 54
- Dial-Up Connection Procedures (2740 Model 1) 54
- Dial-Up Operation (2740) 20
  
- EOB Key (2740) 16
- EOT Key (2740) 14
- Erasure Dustpan 37
  
- Fabric Ribbon 35
  
- IBM 2740 Terminal Operation 19
- IBM 2741 Terminal Operation 25
- Impression-Control Lever 12
- Index Key (2740) 11
  
- Keyboard Controls 11
  
- Line Gauge and Card Holder 10
- Line-Space Lever 10
- Local/Communicate Switch (2740) 14
- Local/Communicate Switch (2741) 17
- Local Mode Operation (2740) 19
- Local Mode Operation (2741) 25
  
- Margin-Release Key 11
- Margin Stops 10
- Multiple-Copy Control Lever 10
  
- On-Off Switch 11
- Operator-Checkout Procedure (2740/2741) 27
  
- Paper-Bail Lever 10
- Paper Guide 10
- Paper Insertion and Movement Controls 10
- Paper-Presence Contact and Lock-Out (2740 Only) 10
- Paper-Release Lever 10
- Platen Knobs 10
- Platen Removal 37
- Platen Replacement 37
- Point-to-Point Operation (2740 and Multiplexor) 21
- Point-to-Point Operation (2740 and Multiplexor with  
Dial-Up Feature Installed) 21
- Point-to-Point Terminal Operation (2740) 19
- Principles of Operation 8
- Problem Analysis Check List (2740) 32
  
- Receive (R) Light (2740) 14
- Record Checking Operation (2740) 19
- Restart (RST) Key and Light (2740) 15
- Return Key 11, 17
- Ribbon Carrier 35
- Ribbon Cartridge Installation 36
- Ribbon Cartridge Removal 35
- Ribbon-Change Lever 12
- Ribbon Identification 35
- Ribbon-Position Lever 12
- Ribbon-Reverse Lever 12
  
- Selective Print Elements 34
- Selectric Typewriter Controls and Indicators 10
- Selectric Typewriter--Removal and Replacement  
Procedures 34
- Shift and Shift-Lock Keys 11
- Space Bar 12
- Spacing Letters 41
- Spreading Letters 40
- Standby (S) Light (2740) 14
- Station Control Operation (2740 Terminals and Multiplexor) 22
- Summary of Station Control Addressing Operation (2740) 24
  
- Tab Key 12
- Tab-Set and Tab-Clear Key 12
- Tab Stops in Forms Typing 40
- Terminal and Line Adapter Test Procedure (2740) 27
- Terminal and Line Adapter Test Procedure (2741) 31
- Test Procedures (2740/2741) 27
- Transmission Controls (2741) 17
- Transmission Controls and Indicators (2740) 14
- Transmit and Receive Operation with Dial-Up Special  
Feature Installed (2741) 25
- Transmit Control Operation (2740 and Multiplexor) 22
- Transmit-Control Switch (2740) 16
- Transmit Operation Using the Interrupt Special  
Feature (2741) 25
- Transmit (T) Light (2740) 14
- Typewriter Platen 36
- Typing Cards and Labels 39
- Typing Guides For Your IBM 2740/2741 Terminal  
Typewriter 39
- Typing In Corrections 40
- Typing-Position Indicator 12
- Typing Posture 39
- Typing Tips (Local Mode) 39
- Typing Touch 39
  
- Variable Line Spacing 39
- Vertical and Horizontal Lines 40
- Visible Margin Reset 40

IBM 2740 MODEL 2

Attn (Attention) Light	45	Platen Split Light	45
Bid Key	44	Record Checking Feature	48
Buffered Receive Feature	46	Reset Key	44
Communicate Mode Operation	45	Reset Light	44
Document Insertion Feature	47	Special Features	46
Edit Feature	46	Split Friction-Feed Platen	47
Enter Key	43,46	Table 1. Error-Recovery Procedure (Receive Operation-- Without Record Checking Feature)	49
Enter Light	44	Table 2. Error-Recovery Procedure (Receive Operation-- With Record Checking Feature)	50
Error-Recovery Procedures	49	Table 3. Error-Recovery Procedure (Transmit Operation-- Buffer to Communications Line)	51
Header Control Feature	46	Table 4. Error-Recovery Procedure (Enter Status-- Local or Communicate Mode)	51
Indicator Lights	44	Table 5. Error-Recovery Procedure (Buffer Printout-- Local Mode)	52
Keys	43	Table 6. Error-Recovery Procedure (Terminal Addressed by CPU)	52
Keys, Lights, and Switches	43	Table 7. Error-Recovery Procedure (Terminal Polled by CPU)	53
Line Return Key	46	Terminal Operation	45
Line Type Key	46	Typing Error Correction Procedure	48
Local Mode Operation	45		

READER'S COMMENT FORM

2740/2741 Communications Terminal--  
Operator's Guide

Form A27-3001-1

- Your comments, accompanied by answers to the following questions, help us produce better publications for your use. If your answer to a question is "No" or requires qualification, please explain in the space provided below. Comments and suggestions become the property of IBM.

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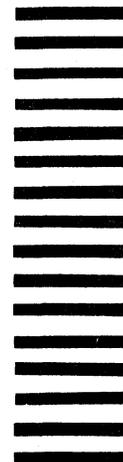
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