

## Systems

### **IBM 3215 Console Printer-Keyboard Component Description**

This reference publication describes the functions and operation of the IBM 3215 Console Printer-Keyboard. Also presented are the printing method, control keys and lights, functional timing, forms controls, specifications, and make-ready procedures.

For system operation (including programming and operating procedures), refer to the *IBM System/360 and System/370 Bibliography*, GA22-6822, for *Functional Characteristics* and *Operating Procedures* manuals for the particular system and model.

**IBM**

*Second Edition* (February, 1971)

This is a major revision of, and obsoletes GA 24-3550-0. The section "Operating Procedures" has been added. This section and other changes to the text are indicated by a vertical line to the left of the change or addition; added illustrations are denoted by the symbol ● to the left of the caption.

Changes are continually made to the information herein; any such changes will be reported in subsequent revisions or Technical Newsletters.

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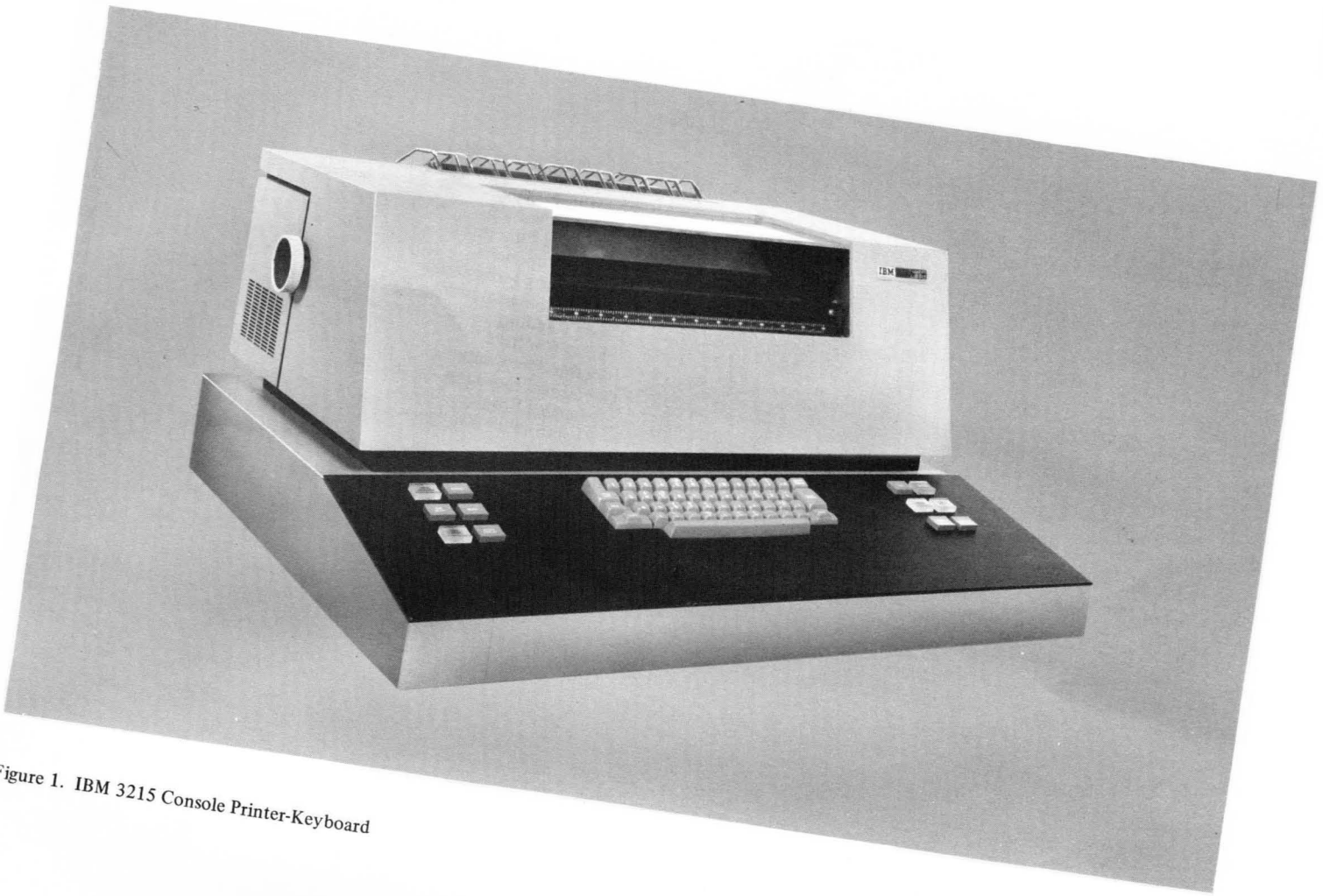


Figure 1. IBM 3215 Console Printer-Keyboard

# IBM 3215 Console Printer-Keyboard

The 3215 Console Printer-Keyboard (Figure 1) is a table-top printer and keyboard that provides independent keyboard entry and printed output for the IBM data processing system to which it is attached. The keyboard (Figure 2) permits rapid and flexible communication between the operator and the data processing system, for manual entry into storage and alter/display functions. Eighty-eight (88) graphic characters can be sent to the system at a rate up to 15 characters per second.

Characters are printed as a pattern of dots formed by wires striking the ribbon and paper as the print head moves. Under program control, printing can occur at a rate up to 85 characters per second. Character spacing is 10 per inch (25,4 mm) and up to 126 per line. Both left and right

margins are fixed according to the width of the pin-feed platen installed. Vertical single spacing is six lines per inch; double spacing is three lines per inch. Depending on the paper and carbon used, an original and up to five legible copies can be made. A three-part form is recommended as maximum.

The 3215 prints the 88 graphics (upper and lower case) currently in use on the 1052 Printer-Keyboard in the IBM System/360 Data Processing System. The underscore corresponds to the bottom row of dots, and therefore, cannot be used with other characters.

Data signals to the printer and all power and control for the 3215 come from the system processing unit.

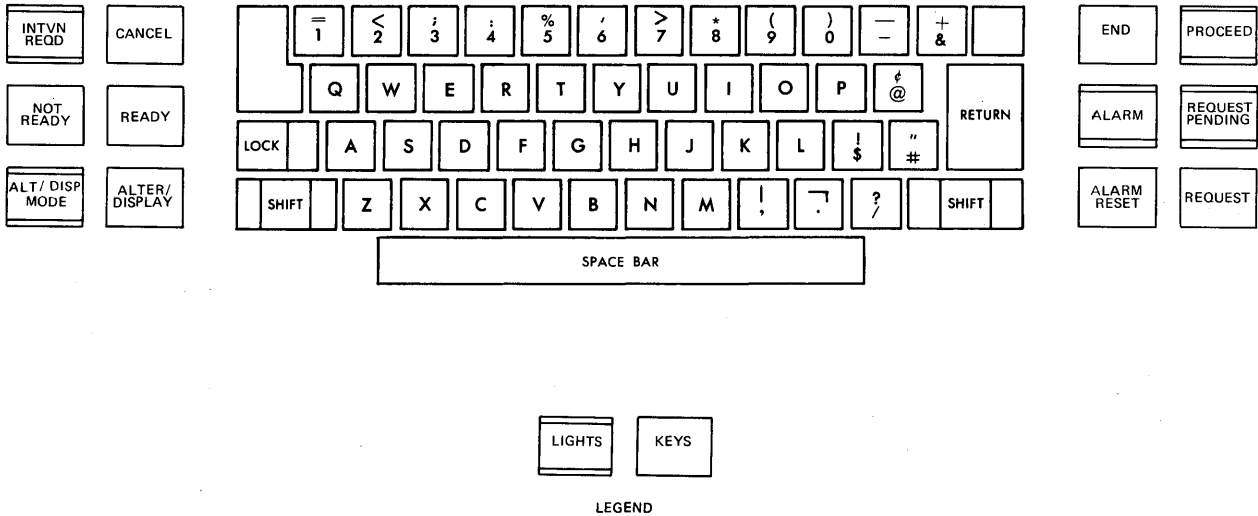


Figure 2. Keyboard Schematic

### Printing Method

Printing on the 3215 is done by seven wires arranged vertically in the print head (Figure 3). Decoded signals from the system selectively allow the print wires to strike the ribbon and paper. The pattern of dots formed by the ends of the wires corresponds to a stored matrix in the system processing unit.

The print head moves across each character to form a 7 x 7 dot matrix. As required by the character pattern, each wire may strike up to four times per character (for example, wire No. 5 in Figure 3). Three alternate positions allow for curved and diagonal elements (wire No. 3 in Figure 3).

The print head moves across the print line at a rate up to 8.5 inches (215,9 mm) per second whether printing or spacing. An indicator on the front of the printer designates the next print position for the print head.

A maintenance monitor indicates to service personnel when maintenance should be scheduled.

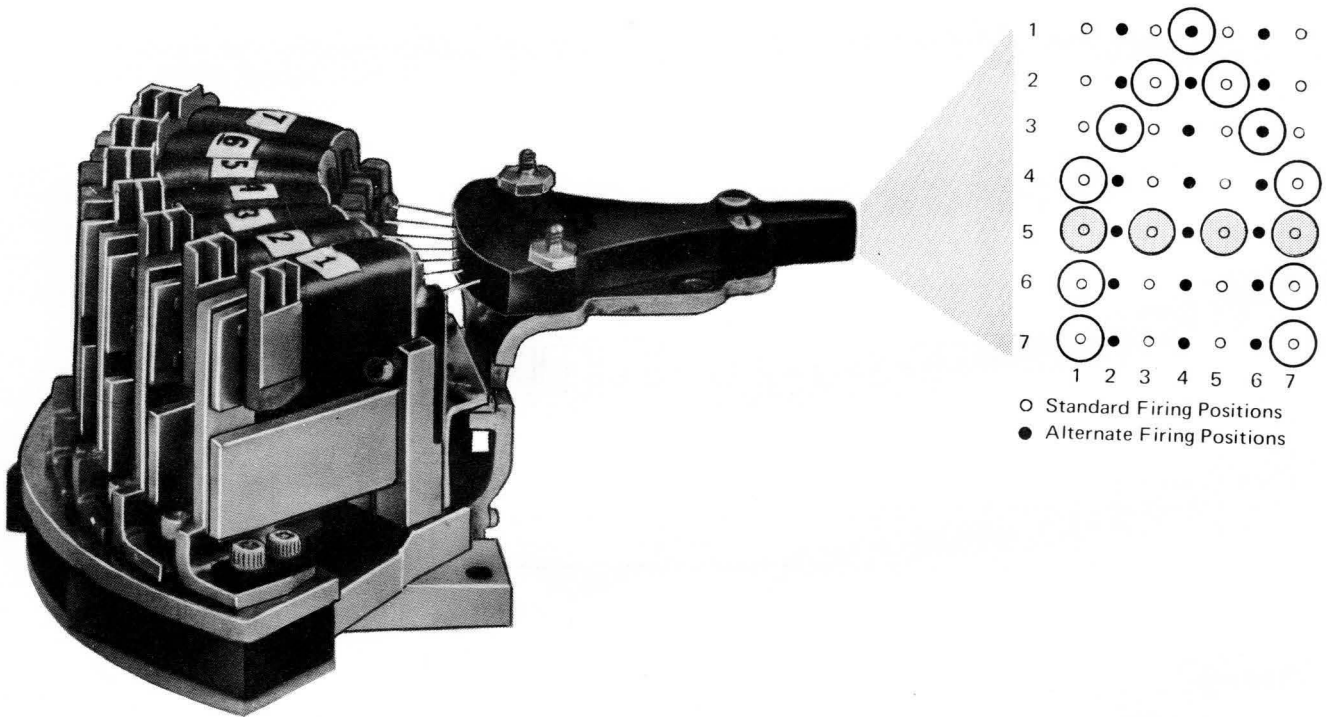


Figure 3. Print Mechanism and Character Construction

## MACHINE OPERATION

### Keyboard Functions

The keyboard has 44 character keys and the normal shift, shift lock, return keys, and space bar that perform normal typewriter functions. Figure 2 shows the control keys and indicator lights for the keyboard.

#### *Intervention Required*

This light indicates that the not-ready key has been pressed, the printer has run out of forms, or the cover is open. Loading forms, closing the cover, and/or pressing the ready key turns off this light.

#### *Cancel*

Pressing this key terminates a read operation and signals the system to disregard the data being transmitted. If this key is used to end an alter/display operation, an error condition results.

#### *Ready*

Pressing this key places the printer-keyboard in a ready state when forms are in the printer and the cover is closed.

#### *Not Ready*

Pressing this key places the printer-keyboard in a not-ready state.

#### *Alter/Display*

Pressing this key submits a request for an alter/display operation. The proceed (and alter/display mode lights) must be on before input data can be typed at the keyboard.

#### *Alter/Display Mode*

This light indicates that a request for an alter/display operation has been accepted.

#### *End*

Pressing this key terminates a read, write, or alter/display operation.

#### *Proceed*

This light indicates that input data can be typed at the keyboard.

#### *Alarm*

This light indicates that an alarm command was issued to alert the operator that the system requires manual attention. An audible tone sounds for about 1-1/2 seconds.

#### *Alarm Reset*

Pressing this key turns off the alarm light.

#### *Request*

Pressing this key indicates to the system that the operator is ready to key information. The request pending light turns on if the system is busy.

#### *Request Pending*

This light indicates that the request key has been pressed, but that the system is not yet ready to accept data. This light turns off and the proceed light turns on when the system is ready to accept data.

### Printer Functions

All functions of the 3215 are controlled by the system either manually from the keyboard or by program control. In addition to printing, the functions are:

#### *Space*

This function moves the print head one character space to the right without printing.

#### *New Line*

This function combines the carrier-return and line-feed operations. A new-line signal returns the print head to the left margin at 15 inches (381 mm) per second minimum and advances the platen a single or double line space according to the setting of the line-feed select lever. This function can be initiated manually, from the program, or when the right margin is sensed. Using this function successively provides variable vertical spacing.

#### *Test Switches*

Three switches facilitate servicing the printer.

*Off-Line, On-Line.* This switch places the printer off-line. The two other switches operate only when this switch is in the off-line position.

*Reset Off-Line.* Operating this spring-loaded switch resets the circuitry for the printer.

*Continuous, Off/Keyboard, Stop-Start.* Placing this switch in its top position causes the machine to print a line of H's for testing printer operation in continuous mode. With the switch in the bottom position, the machine prints a line of H's in stop-start mode. In the middle position, the action of the switch depends upon the attached system:

System/370 Model 145 - Off, no action

System/370 Model 155 - printer responds to the key pressed on the keyboard.

## PROGRAMMING INFORMATION

Functions and data initiated from the keyboard are transmitted to the system by an 8-bit EBCDIC code.

All printing, carrier operations, and forms-movement controls are initiated in the system by program control, or manually by keyboard operation.

For programming information, refer to *IBM System/360 and System/370 Bibliography*, GA22-6822, for the *Functional Characteristics* manual for the particular system and model.

### Timing Considerations

Figure 4 shows the time in milliseconds required for printer operations. In a new-line operation, line feed is overlapped with carrier return if the return is more than 16 print positions.

Operation	Time (milliseconds)
Print or Space	12 ms/Print Position
New-Line	
Carrier Return	6.67 ms/Print Position (Less than 7 spaces, 12 ms/Print Position)
Line Feed	140 ms/Line

Figure 4. Timing for Printer Operations

## FORMS HANDLING

Forms placed on the lower platform of the forms stand enter the rear of the printer, pass up through a channel, and up over the platen. Forms are stacked on the top platform.

### Form Controls

#### Paper-Advance Knobs

Rotating the knob on either end of the platen moves the form for coarse vertical positioning.

#### Vertical Alignment Vernier

Pressing in and rotating the paper-advance knob on the right end of the platen provides fine vertical adjustment of the form with the print line.

#### Line-Feed Select Lever

The line-feed select lever allows the operator to select single or double vertical line spacing.

### Copy-Control Lever

The copy-control lever adjusts the clearance between the platen and the print head to accommodate the thickness of the forms used. Five positions of the lever allow adjustments for forms of thickness up to a maximum of .018 inch (0,46 mm).

### End-of-Forms Switch

The end-of-forms switch signals the system that the end of the form is within 4-1/4 inches (107,9 mm). On the system console, the keyboard-printer lights show not-ready and intervention required.

### Forms Specifications

The 3215 accepts marginally punched, continuous-form paper. Forms can be one to six parts depending on the weight of paper and carbon used. For optimum feeding and stacking, no more than three parts are recommended. Total thickness cannot exceed .018 inch (0,46 mm). Staped forms cannot be used.

Form width must correspond to the pin-feed platen installed. See Figure 5. Form length can be 3 to 14 inches (76,2 to 355,6 mm). For optimum stacking, 11 inches (279,4 mm) is recommended. Forms should not be longer than the depth of the forms stand provided.

The special ribbon cartridge (part 1136906, or equivalent) has a ribbon life of at least two million characters.

For more complete specifications, refer to the Systems Reference Library Manual, *Form-Design Considerations--System Printers*, GA24-3488.

Overall Width		Hole-to-Hole Width		Print Positions
in.	mm	in.	mm	Maximum
13	330,2	12 1/2	317,5	120
13 5/8	346,1	13 1/8	333,4	126

Figure 5. Available Pin-Feed Platens

## OPERATING PROCEDURES

For operating the 3215 as part of a particular system, refer to the *IBM System/360 and System/370 Bibliography*, GA22-6822, for the *Operating Procedures* manual for the particular system or model. Figure 6 shows the operating controls used for making the printer ready.

### Inserting Forms

1. Raise the printer cover.
2. Set the copy-control lever to position 5 for maximum clearance between the print head and the platen.
3. Raise both doors covering the pin-feed mechanism at the ends of the platen.



From the rear of the machine:

4. Place the forms on the lower rack of the forms stand.
5. Insert forms (side to be printed down) in the paper feed slot. The form enters easily if started with one corner entering the feed slot first.
6. Work the form up in front of the platen.

From the front of the machine:

7. Grasp the form and position it on the platen pin-feed mechanism.
8. Close the doors over the feed pins.
9. Set the copy-control lever to one of the four positions determined by the number of parts in the form being used.

Position	Type of Form Used
1	1 Part
2	2 or 3 Parts
3	4 Parts
4	5 or 6 Parts

10. Set the line-feed select lever for single or double spacing.
11. Press in and rotate the right paper-advance knob for vertical alignment of the form with the print line.

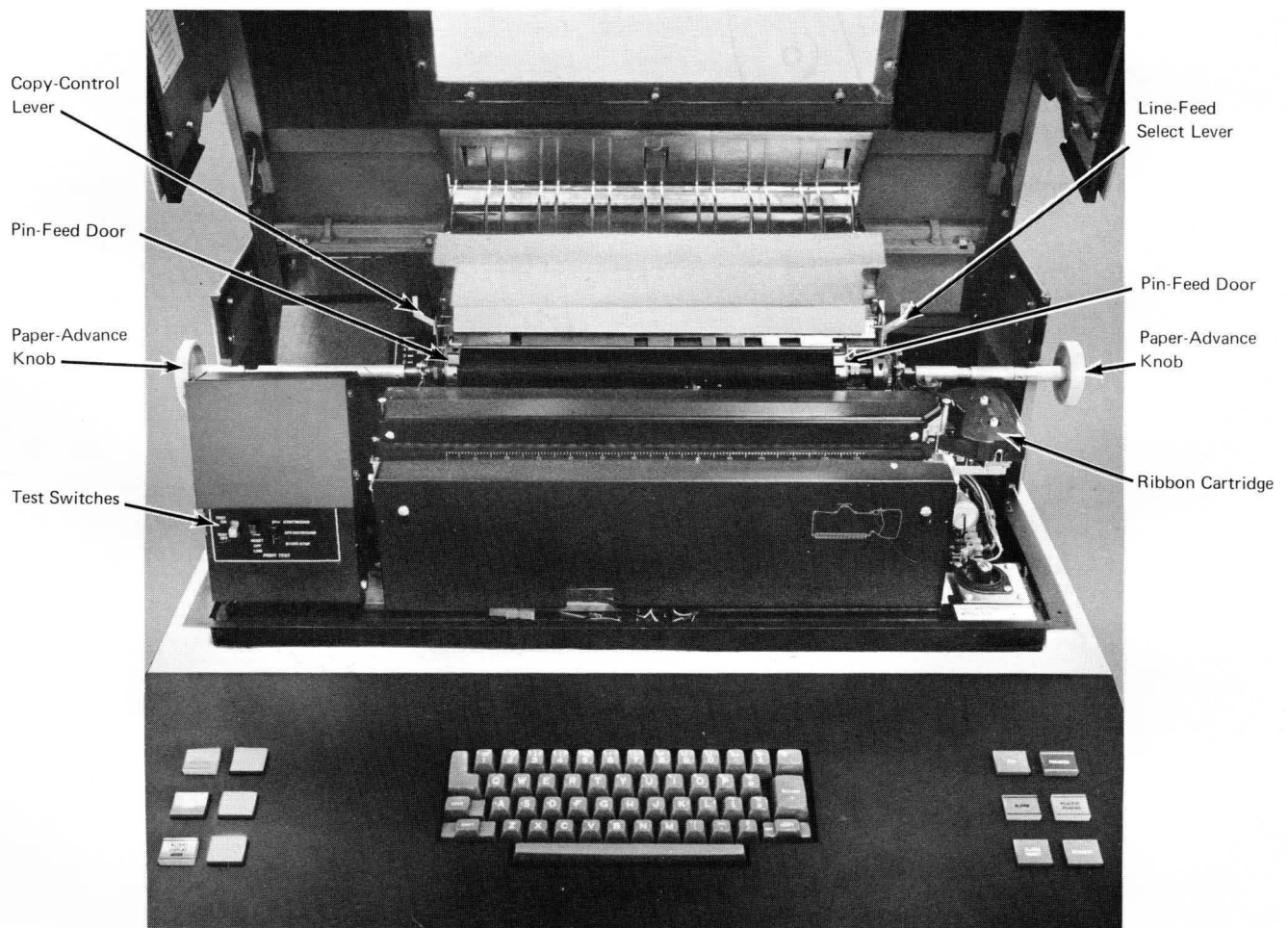
*Note 1:* To move the form backward, rotate the paper-advance knob backward and pull the form from behind the machine to keep the form from buckling at the print head.

*Note 2:* If checking for precise alignment is necessary:

- a. Set the left of the test switches to OFF-LINE and the right switch to CONTINUOUS (a continuous line of H's prints),
- b. Press in and rotate the right paper-advance knob to align the print line, and
- c. Return the left service switch to ON-LINE.

12. Rotate the paper-advance knob to feed the form through the form exit slot in the cover.

13. Close the cover.



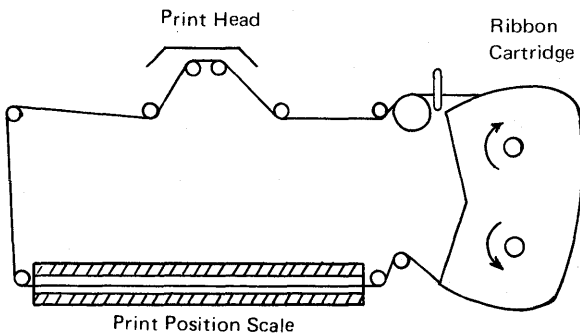
● Figure 6. Printer Operating Controls

14. Press the ready key on the keyboard.
15. When printing starts, check that the forms stack properly on the forms stand. For efficient stacking, the fold should be in the same direction as the original fold.

#### Replacing the Ribbon

1. Raise the printer cover.
2. Remove the used ribbon and cartridge. (Before removing the used ribbon, observe how the ribbon is threaded so

- as to be familiar with the ribbon schematic shown on the machine and also in Figure 7.
3. Press the new ribbon cartridge in place. Locating pin assures correct cartridge and proper positioning.
  4. Draw out some ribbon and thread it around guide pins and print head as shown in the schematic. Do not twist the ribbon.
  5. Rewind any slack ribbon back into the cartridge by rotating either of the ribbon feed hubs in the direction shown on top of the cartridge.
  6. Close the cover.
  7. Press the ready key on the keyboard.



● Figure 7. Ribbon Schematic

**A**

alarm 7  
 alarm reset 7  
 alignment vernier 8  
 alter/display 7  
 alter/display mode 7

**C**

cancel 7  
 carrier return  
   function 7  
   timing 8  
 cartridge, ribbon 8  
 channel 8  
 character construction 6  
 character spacing 5  
 continuous-form paper 8  
 continuous mode 7  
 continuous switch 7  
 control signals 5  
 controls, forms 8  
 copies 5  
 copy-control lever 8  
 copy-control lever position 9

**D**

data signals 5

**E**

EBCDIC 8  
 end 7  
 end of forms  
   intervention required 7  
   switch 8

**F**

firing positions 6  
 forms  
   controls 8  
   handling 8  
   insertion 8  
   movement 8  
   platform 8  
   specifications 8  
   stacking 8  
   stand 8  
   width 8  
 functions  
   keyboard 7  
   printer 7

**G**

graphic characters 5

**H**

hole-to-hole width 8

**I**

indicator, print position 6  
 input rate 5  
 inserting forms 8  
 intervention required 7

**K**

keyboard functions 7  
 keyboard schematic 5  
 keyboard switch 7  
 keys 7

**L**

legible copies 5  
 lights 7  
 line feed  
   function 7  
   timing 8  
 line-feed select lever  
   function 8  
   setting 7  
 loading forms 8

**M**

machine operation 7  
 maintenance monitor 6  
 manual entry 5  
 margins 5  
 matrix 6  
 mode alter/display 7  
 monitor, maintenance 6  
 multiple-part forms 8

**N**

new line  
   function 7  
   timing 8  
 not ready 7

**O**

off-line 7  
 off/keyboard switch 7  
 on-line 7  
 operating procedures 8  
 output rate 5  
 overall width 8

**P**

paper 8  
 paper advance knobs 8  
 pin-feed platen 8  
 pitch, character 5  
 platen pin-feed 8  
 platform, forms 8  
 position, copy-control lever 9  
 power 5  
 print head 6  
 print line 5  
 print mechanism 6  
 print-position indicator 6  
 print positions  
   pin-feed platen 8  
   print line 5  
 print timing 8  
 print wires 5  
 printer functions 7  
 printer timing 8  
 printing method 6  
 printing rate 5  
 proceed 7  
 program control 8  
 programming information 8

**R**

rate  
   carrier return 7  
   print head 6  
   printing output 5  
   typing input 5  
 ready 7  
 request 7  
 request pending 7  
 reset, alarm 7  
 reset off-line 7  
 ribbon  
   replacement 10  
   specifications 8

**S**

signals 6  
 space  
   function 7  
   timing 8  
 spacing 5  
 spacing, character 5  
 specifications, forms 8  
 staples 8  
 stop/start mode 7  
 stop/start switch 7  
 switches 7

**T**

test switches 7  
 thickness 8  
 timing considerations 8  
 typing rate 5

**U**

underscore 5

**V**

vertical alignment vernier 8  
 vertical spacing 5

**W**

width, form 8

8-bit code 8  
 44 character keys 7  
 88 graphics 5  
 1052 Printer-Keyboards 5

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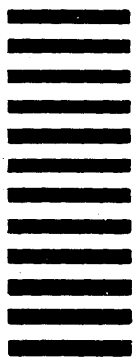
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