WANG

MODEL 2261W LINE PRINTER USER MANUAL

SYSTEM 2200

MODEL 2261W
LINE PRINTER
USER MANUAL

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HOW TO USE THIS MANUAL

This manual provides answers to questions concerning the operation of the Model 2261W Line Printer. It is designed for users who are already familiar with the available Wang System and its BASIC language.

For users who are not familiar with the operation of their system, the BASIC Programming Manual and the Wang BASIC Reference Manual should be read before proceeding with this manual.

This manual has been divided into several chapters covering all the operational features of the Line Printer. Chapter 1 contains general information on the Printer. Chapter 2 describes device selection and the SELECT statement. Chapter 3 demonstrates how to format printed output. Chapter 4 describes the use of HEX codes, and Chapter 5 describes the Vertical Format Tape. Hexadecimal codes, the Printer character set and specifications are collected in the Appendices.

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

This manual describes the characteristics and operations of the Model 2261W Line Printer (see Figure 1.1). The Model 2261W is an impact printer that generates printer characters in a matrix form, nominally 11 x 8 (for 10 pitch), or 9 x 8 (for 12 pitch). Line length is selectable at 136 characters for 10 pitch or 160 characters for 12 pitch. Characters can be expanded in either pitch for enhanced output as needed (see Chapter 3). The printer operates at a rate of 240 lines per minute. Characters are printed 6 or 8 lines per inch (2.4 lines/cm) and 10 or 11.76 characters per horizontal inch (4.6 characters/cm). The complete 96-character set for the printer is given in Appendix A. A buffer receives a complete line of data transmitted from the system CPU to the printer. A vertical format tape provides control for spacing on special forms. Continuous-form paper of widths from 3.5 to 14.9 inches (8.9 to 37.8 cm) can be used with the printer since the distance between the pinfeed mechanisms is continuously adjustable.

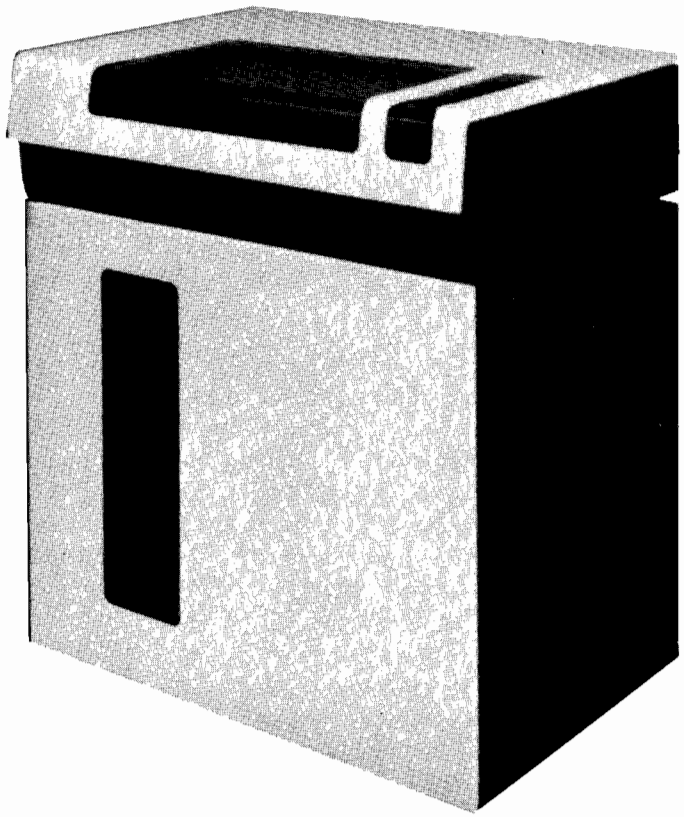

Figure 1.1 Model 2261W Line Printer

1.2 UNPACKING AND INSPECTION

When you receive your equipment, notify your Wang Service Representative; he should unpack and set up your Printer. Failure to notify your Wang Service Representative will void your warranty.

1.3 INSTALLATION

To install your Printer, your Wang Service Representative uses the following procedure:

1. The Printer Controller Board should be installed by a Wang Service Representative in the chassis of your system. Its screws should be fully tightened. Note: In the Portable Computer System and Work Station, the Printer Controller Board is internal to the system.

2. The 36-pin interface connector must be plugged into the Printer Controller Board and its Lock Clips placed in the up (locked) position.

3. The power cord from the Line Printer must be plugged into a wall outlet (see power requirements in Appendix B).

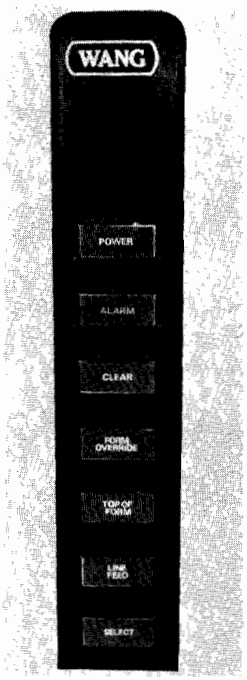

Figure 1.2 Control Panel

1.4 PAPER INSERTION

1. Open the front panel to gain access to the paper cabinet and the ON/OFF switch on the right side of the cabinet frame. Turn the switch to the OFF position. Raise the cover until the end of the cover rod engages the slot on the right side of the printer.

2. Push continuous-form pin-feed paper into the slot in the bottom of the printer until it comes out between the pinfeed mechanisms (see Figure 1.3). If the forms are fed from a carton, be sure the flaps or any ragged edges on the carton do not snag the forms.

3. Open the pin-feed gates, insert the paper holes evenly over the pins, and close the gates. If the distance between the pin-feed mechanisms must be adjusted, unscrew the right-hand lock knob and slide the mechanism to the proper position.

4. Fine horizontal adjustment of forms can be made using the Vernier Knob at the top right of the printer. When the Vernier knob is turned, both pinfeed units move simultaneously. The knob allows fine adjustment of the paper up to one half inch horizontally.

5. Close the cover of the printer. Turn the ON/OFF switch to the ON position. When the printer is on, the power lamp on the Control Panel is illuminated.

6. Press the LINE FEED switch to advance paper in the printer.

7. Press the TOP-OF-FORM switch; this advances the paper until the Vertical Format Unit senses a Top-of-Form hole in the vertical format tape.

8. For proper adjustment of forms, particularly to bring the physical top-of-form and the Top-of-Form hole in the vertical format tape into alignment, align paper in the printer using the Platen Knob and then push in and hold the Platen Knob while pressing the Top-Of-Form switch. This advances the vertical format tape in the Vertical Format Unit to the Top-of-Form hole.

9. NEVER OPERATE THE LINE PRINTER WITHOUT PAPER.

10. If paper runs out while the Printer is being used, your Wang System ceases operation, an audible two-second tone is sounded, and the PAPER OUT lamp is illuminated. To complete printing the current page, press FORMS OVERRIDE which prints one line at a time until the paper (and vertical format tape) advances to Top-of-Form. The paper may now be changed. Press the FORMS OVERRIDE button to continue printing after inserting fresh paper in the Printer.

NOTE:

Whenever the cover of the printer is open, printing is interrupted. In case of a paper jam, the circuit breaker switch (located on the left side of the paper cabinet frame) is used to interrupt power to the carriage motor. The heads can be moved manually for adjusting print head gap or disengaging paper.

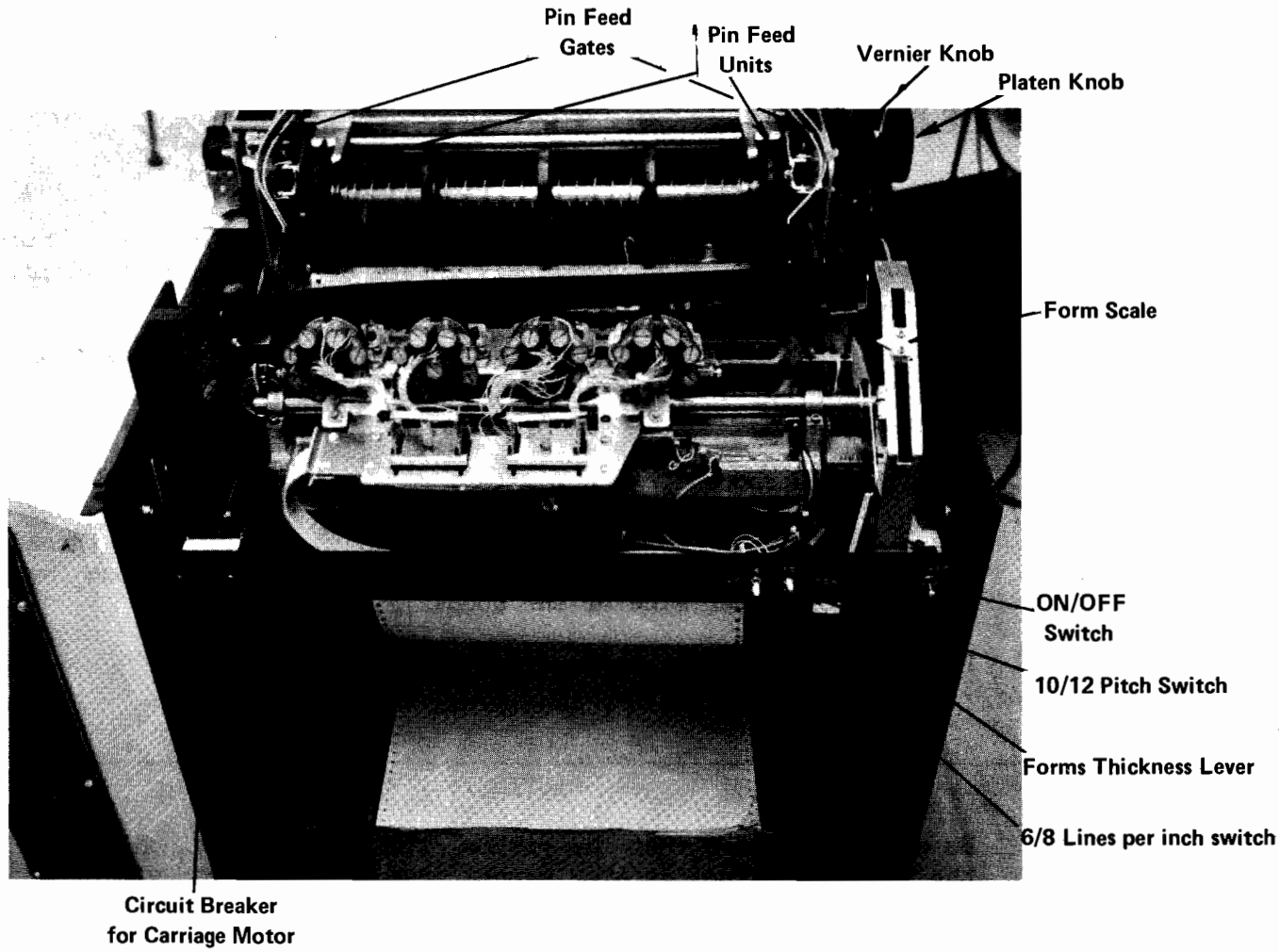

Figure 1.3 The Model 2261W Line Printer, Definition of Terms

1.5 PRINT ADJUSTMENT

To adjust the print blackness, follow the procedure detailed below.

1. The Printer must have paper in it.

2. Open the front panel of the Printer and find the Forms Thickness Lever (see Figure 1.3).

3. Turn the Forms Thickness Lever to move the Print Head carriage in or out - in to accommodate thicker forms, out to provide a blacker imprint.

4. When the print head gap has been properly adjusted, close the front panel of the Printer.

5. If, during Printer operation, the paper does not feed smoothly due to its catching on the front surface of a Print Head; be sure that the Print Head is properly adjusted and locked in place.

1.6 RIBBON REPLACEMENT

1. Turn power to the printer OFF and open the cover.

2. Open the front panel of the Printer and find the Form Thickness Lever. Push the lever completely inward so that the Print Heads are removed from the paper.

3. Compare the Ribbon Mechanism with that in the diagram (Figure 1.4) to find the parts needed and follow the path of the ribbon in the mechanism.

4. Lift the old spools from the axles.

5. Place the full new spool on the right-hand axle, and thread the ribbon through the guides, idlers and rollers. The ribbon must be fed from the inner side of the spool.

6. Place the empty spool on the left-hand axle.

> **CAUTION:**
>
> Be absolutely sure that the ribbon rivets are wound onto the left-hand spool so they cannot come into contact with the Print Heads during printer operation.

7. Readjust the Forms Thickness Lever to the proper print adjustment position.

8. Close the cover of the Printer and turn power ON to resume operation.

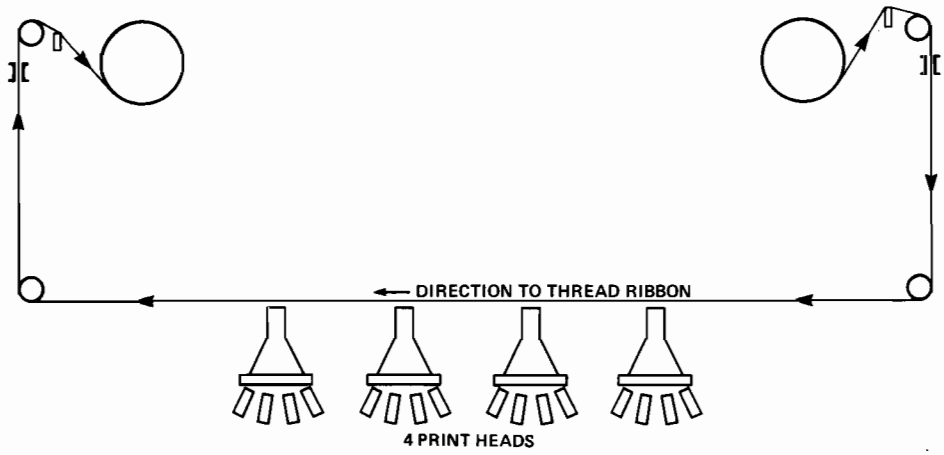

Figure 1.4. Ribbon Feed Mechanism

1.7 VERTICAL FORMAT CONTROL

The mechanism which guides and controls paper movement in the Model 2261W is located on the left side of the Printer. The Vertical Format Unit (Figure 5.2) contains a tape reader which provides Vertical Tab and Top-of-Form spacing control via punched tape with holes punched in channels 5 and 7, respectively. The user also obtains Automatic Page Eject with holes punched in channel 2. With such a tape, paper automatically advances to the next Top-of-Form hole when the end of a document is reached. End of document is normally set at the 66th line of 11-inch forms. Automatic Page Eject passes the perforation in fan-fold paper when forms have been properly aligned. Before operating the Printer, verify that the paper tape is properly seated in the Vertical Format Unit.

The standard one-inch wide, eight channel, mylar tape has sprocket holes located between channels three and four, holes for Vertical Tab in channel 5, for TOP-OF-FORM in channel 7 and for End-of-Document in channel 2. The sprocket holes have 1/10 inch pitch between holes. The tape reader and paper-feed mechanisms are mechanically linked so that each line feed both advances the paper one line, and the tape one sprocket hole. When the Printer receives a Vertical Tab Code, HEX(0B), the tape is advanced to the next hole in channel 5 and the paper is advanced correspondingly. When the Printer receives a Form Feed code, HEX(0C), or the TOP-OF-FORM switch is pressed, the punched tape is advanced to the next hole in channel 7 and the paper advances correspondingly. On the standard tape, Vertical Tab holes are spaced six sprocket holes apart (corresponding to a one-inch tab (2.54 cm) or six lines), and Form Feed holes, 66 sprocket holes apart (corresponding to an eleven-inch (27.9 cm) form). To position the tape at the Top-of-Form holes, push in and hold the Platen Knob and press the TOP-OF-FORM switch. The tape provided with

the Printer should last the life of the Printer. Special tapes to produce unique printline spacing can be used with the printer; they must be prepared either with a Teletype® tape punch or with manual punching equipment. Problems with Vertical Format Tapes are best resolved by your WANG Service Representative.

1.8 SYSTEM TURN-ON PROCEDURE

1. Verify that all power cords are connected to a source of electrical power and all peripheral cables are connected to your Wang system CPU.

2. Turn on all power switches. At turn-on, the system is Master Initialized i.e., memory is cleared of all programs and variables and the addresses of primary devices are set to their default values.

   No device address is automatically set for the Printer when the system is Master Initialized. The device address for the Printer must be specified using a SELECT statement (see Chapter 2).

1.9 2261W TURN-ON PROCEDURE

The control panel on the right-hand side of the Printer contains a number of switches, buttons and light indicators for controlling the manual operations of the printer (see Figure 1.2).

ON/OFF

The ON/OFF switch is located on the paper cabinet frame behind the front panel of the printer. To turn the Printer on, turn the switch to the ON position. The Power lamp at the control panel is illuminated. To turn the Printer OFF, turn the switch to the OFF position; the Power lamp is extinguished.

SELECT

After turning ON the Printer, press the SELECT switch; the Select lamp is illuminated. SELECT places the Printer in a ready position to receive data from the CPU. The SELECT lamp is also illuminated when the Printer can receive data (referred to as in SELECT Mode). When the SELECT switch is depressed again the SELECT lamp is extinguished and the Printer is (deSELECTed) no longer SELECTED. The SELECT switch can be used to halt printing temporarily (as when aligning forms) without causing loss of data in the print buffer. To accomplish this press SELECT so the SELECT lamp is turned off, align the forms and press SELECT again.

LINE FEED

Paper is advanced one line when this switch is depressed briefly; if the switch is held down, paper advances continuously. This switch operates only when the printer is deSELECTed (SELECT lamp is extinguished).

TOP OF FORM

With the Printer ON (but deSELECTed), paper is manually advanced to top-of-form by pressing this switch. The Paper advance is controlled by the Vertical Format Unit.

FORMS OVERRIDE

When out of paper, the Printer ceases operation, an audible tone is sounded, the PAPER OUT lamp is illuminated and the printer stops. To complete printing the line or the page, press and hold down the FORMS OVERRIDE button. Be sure to insert paper in the printer before continuing operation.

CLEAR IF NOTHING WORKS ? clear

This control Clears the printer line buffer if the printer is deSELECTed.

ALARM LAMP

The alarm lamp indicates mechanical or electronic malfunctioning - generally a paper or ribbon jam. When a malfunction occurs, there is an audible alarm tone for two seconds, then the alarm lamp is illuminated. To recover from this condition, shut power off (push OFF switch), fix the jammed paper or ribbon, reset the carriage motor cirucit breaker and turn the power on again. If neither paper nor ribbon jam is the problem, contact your Wang Service Representative.

PITCH

The Pitch toggle switch is located on the paper cabinet frame behind the front panel of the printer. The switch is labeled 10 and 12. To select 10 characters per inch, turn switch to 10; to select 12 characters per inch, turn switch to 12. This switch operates only when the Printer is in the deselect mode (has not been SELECTED).

LINE DENSITY

The LINE DENSITY toggle switch is located on the paper cabinet frame behind the front panel of the printer. The switch is labeled 6 and 8. To select 6 lines per inch, turn switch to 6; to select 8 lines per inch, turn switch to 8. This switch operates only when the Printer is in the deselect mode (has not been SELECTED).

1.10 POINTS TO BE CHECKED

1. The Printer must be connected to its Controller Board.

2. It must also be plugged into a source of electrical power.

3. The tape in the Vertical Format Unit must be correctly seated.

4. Paper must be inserted in the Printer. (Load paper from the cabinet into slot at the bottom of printer, place holes over pins, and use the Platen Knob to adjust the forms.)

5. The Forms Thickness must be set for good print quality. It can be adjusted as described in Section 1.5 - PRINT ADJUSTMENT.

6. Be sure to turn on the Printer and your Wang system.

7. Push SELECT to enable the Printer to receive data.

8. Your Line Printer is now ready for use.

CHAPTER 2
DEVICE SELECTION

2.1 THE SELECT STATEMENT

The SELECT statement must be used by a programmer to select the Printer as the output device. A SELECT statement can be used either in the immediate mode or as a statement within a program. When used with the Model 2261W, the syntax of the SELECT statement requires that it contain the BASIC verb PRINT, LIST or CO, a Device Type and a Unit Address Code. Line length can also be specified. Each of these SELECT parameters is described below.

Example:

```
100 SELECT PRINT 215 (160)
     Device Type ─┘ ▲
     Unit Address ──┘
     Line Length ──────┘
```

If Line Length is not specified in a SELECT statement, the line length is set to 64, the standard width of the CRT. In a system with an 80 column CRT, the line length defaults to 80. The pitch does not affect line length as specified in the SELECT statement. However, for 10 pitch the line length should not exceed 136, and for 12 pitch it should not exceed 160 characters.

2.2 DEVICE TYPE CODES

Every peripheral attached to your Wang System is assigned a three-character Device Selection Code. The Device Selection Code is in the form (xyy), where x is the Device Type and yy is the Unit Address. The Device Type (x) determines which internal system I/O routines are used to control the Printer. The Model 2261W automatically executes a line feed (i.e., advances the paper to a new line) following the execution of a carriage return; it is thus usually selected with a device type of 2 (see device types below). Generally, carriage return commands are initiated from the Wang system CPU. The printer automatically prints characters in the buffer and reverses printing direction at the end of a full character line (136 or 160 characters).

Type — Operation

0 — This Device Type addresses devices that do not automatically execute a line feed after a carriage return; therefore with this Device Type, your Wang system CPU supplies a line feed after each system-generated carriage return. When this Device Type is selected for the Model 2261W, output which is normally single spaced is double spaced.

Example:

```
:SELECT PRINT 015(132)
:10 FOR J = 1 TO 5
:20 PRINT "HAVE TICKETS READY WHEN BOARDING"
:30 NEXT J
:RUN (EXECUTE)
```

Output:

```
HAVE TICKETS READY WHEN BOARDING
HAVE TICKETS READY WHEN BOARDING
HAVE TICKETS READY WHEN BOARDING
HAVE TICKETS READY WHEN BOARDING
HAVE TICKETS READY WHEN BOARDING
```

2 — This Device Type addresses devices that automatically execute a line feed after a carriage return; it is the Device Type normally used with the Printer. With this Device Type, output is single spaced.

NOTE:

This is the standard Device Type used with the Model 2261W.

Example:

```
:SELECT PRINT 215
:10 FOR I = 1 TO 5
:20 PRINT "A SMALL AMOUNT SAVED REGULARLY WILL ADD UP
 SIGNIFICANTLY"
:30 NEXT I
:RUN (EXECUTE)
```

Output:

```
A SMALL AMOUNT SAVED REGULARLY WILL ADD UP SIGNIFICANTLY
A SMALL AMOUNT SAVED REGULARLY WILL ADD UP SIGNIFICANTLY
A SMALL AMOUNT SAVED REGULARLY WILL ADD UP SIGNIFICANTLY
A SMALL AMOUNT SAVED REGULARLY WILL ADD UP SIGNIFICANTLY
A SMALL AMOUNT SAVED REGULARLY WILL ADD UP SIGNIFICANTLY
```

This Device Type normally addresses devices such as plotters which do not have an automatic carriage return. When addressing a printer, it suppresses the character count in the CPU and the automatic carriage return issued by the CPU at the end of PRINT, PRINTUSING and HEXPRINT statements that contain no trailing punctuations. Normally when the number of characters in the buffer equals the line length in a SELECT statement, a carriage return is executed. Device 4, however, suppresses this feature by not executing a carriage return when the number of characters equals the line length. The carriage return is not executed until the print buffer is full (and a line is printed) or when the carriage return code HEX (0D) is encountered in the program.

Example:

```
:SELECT PRINT 415
:10 FOR I = 1 TO 5
:20 PRINT "NOW IS THE TIME,"
:30 PRINT HEX (OD)
:40 NEXT I
:RUN (EXECUTE)
```

Output:

```
NOW IS THE TIME,
NOW IS THE TIME,
NOW IS THE TIME,
NOW IS THE TIME,
NOW IS THE TIME,
```

The unit address (yy) of the Model 2261W Printer Controller is preset to 15 by Wang Laboratories before the unit is shipped, and must be the address used in SELECT statements used with the Printer. If a second Wang printer is connected to the same CPU, it is assigned unit address 16 by a Wang Service Representative therefore, device address 15 is used in all further examples in this manual.

2.3 PRINT

:SELECT PRINT 215

This statement selects the Printer with Device Type Code 215 for all program output resulting from the execution of PRINT, PRINTUSING or HEXPRINT statements. Printout resulting from PRINT statements entered in the immediate mode appear on the CRT unless the Printer is selected for CO (see SELECT CO 215).

> **NOTE:**
>
> When your system is first turned on, PRINT operations are seen on the CRT, the primary device for such operations. Therefore, it is necessary to execute a SELECT statement in the program to direct the output of PRINT statements to the Printer. Also the Printer SELECT switch must be depressed.

Example:

```
:10 SELECT PRINT 215(40)  or    :SELECT PRINT 215(40)
:20 PRINT "N","2 to the Nth"    :20 PRINT "N","2 to the Nth"
:25 PRINT                       :25 PRINT
:30 FOR X=0 TO 8                :30 FOR X=0 TO 8
:40 PRINT X, 2↑X                :40 PRINT X, 2↑X
:50 NEXT X                      :50 NEXT X
```

When either of these programs is executed, the printed output is:

```
N                2 to the Nth

 0                1
 1                2
 2                4
 3                8
 4                16
 5                32
 6                64
 7                128
 8                256
```

Example:

```
:10 SELECT PRINT 215(40)
:20 X=7:Y=2:Z=.5
:30 PRINTUSING 40,X;Y;Z
:40 %  ##.#
:RUN
```

Output:

```
 7.0   2.0   0.5
```

Example:

```
:10 SELECT PRINT 215(40)
:15 DIM A$23
:20 A$ = "THE MODEL 2261W PRINTER"
:30 HEXPRINT A$
RUN
```

Output:

```
544845204D4F44454C20323236315720505249 4E544552
```

2.4 LIST

```
:SELECT LIST 215
```

This statement selects the Printer with Device Type Code 215 for all program listings (LIST operations).

> **NOTE:**
>
> The default address for LIST operations is 005, the CRT.

Example:

To list the program in the first example above on the Printer, key in the following as immediate mode statements:

```
:SELECT LIST 215
:LIST
```

The printed output is:

```
10 SELECT PRINT 215(40)
20 PRINT "N", "2 to the Nth"
30 FOR X=0 TO 8
40 PRINT X, 2↑X
50 NEXT X
```

2.5 CO (Console Output)

```
:SELECT CO 215
```

This statement selects the Printer with Device Type Code 215 for all console output. This includes all system displays, such as the READY message and output from STOP and END statements, any data keyed in on the keyboard and entered into the CPU, and all output from immediate mode operations, TRACE statements, and error messages.

Example:

Key in as an immediate mode statement SELECT CO 215, and touch the RETURN/EXECUTE Key and the RESET key. The output on the printer is:

```
:READY
```

All information entered into the CPU via the keyboard is now printed on the Printer.

2.6 LINE LENGTH

The maximum number of characters per line that can be printed on the Model 2261W is 136 with 10 pitch or 160 with 12 pitch. To accommodate various paper widths and special forms of less width, the length of the output line can be specified by selecting the pitch and by enclosing the desired line length in parentheses following the Device Type Code in the SELECT statement. This code is stored in the CPU and indicates the effective line length of the selected device to the System.

For example:

SELECT PRINT 215 (136)	(Selects the Model 2261W for printing and sets line length to 136.)
SELECT LIST 215 (80)	(Selects the Model 2261W for listing programs and sets line length to 80.)
SELECT CO 215 (112)	(Selects the Model 2261W for console output, sets line length to 112.)

If a line length is not specified for PRINT, LIST or CO, the last line lengths selected for these operations are used. Note: the default line length set during Master Initialization is 64 characters (80 characters with an 80 column CRT). The maximum line length which can be specified in a SELECT statement is 255. However, the use of a line length greater than the physical carriage width of the device is not recommended.

The Line Printer does not print each character as it is received from the CPU. The Printer has a buffer for storing each character until the CPU directs it to print a line with a carriage return code.

The line length setting is used by your Wang system to generate an automatic carriage return when a line exceeds the specified line length or when no carriage return is supplied by the program. This prevents printout from being lost. As a line of output is printed on the Model 2261W, the CPU keeps a count of the number of characters sent. If this line count equals the current value of the line length before the output line is complete, a carriage return is transmitted to the printer, the line count is reset to zero, and the unfinished output is continued on the next line. If the output is completed and a carriage return is transmitted before the line count equals the line length, the system automatically resets the line count to zero for the start of a new line (a PRINT statement with no trailing comma or semicolon causes a carriage return to be executed at the end of the output). The line count is reset to zero under any one of the following conditions:

1. The line count equals the line length.

2. A carriage return is output when a PRINT, PRINTUSING or HEXPRINT statement is executed.

3. The system is RESET.

4. A CLEAR command is executed.

5. The system is Master Initialized.

6. A SELECT PRINT statement is executed.

The following example illustrates the automatic carriage return generated by the selected line length. With the following program in memory (note line length is set to 5):

```
:10 SELECT PRINT 215(5)
:20 PRINT "THIS IS A SAMPLE OF THE MODEL 2261W LINE PRINTER OUTPUT."
```

the following output is produced at execution time:

```
THIS
IS A
SAMPL
E OF
THE M
ODEL
2261W
 LINE
 PRIN
TER O
UTPUT
```

Note that embedded spaces in the line are included in the line count.

2.7 SPECIAL TECHNIQUES

The normal Device Type used with the Model 2261W is type 2. When the Printer is selected with this device type for LIST, PRINT, or CO, normal single spaced output is produced. Device Type 0 can also be used with the Model 2261W. In this case printed output is double spaced. This is because both the CPU and the Printer execute line feed commands following each system-generated carriage return (see example Figure 2.2).

Device Type 4 is intended for use with Wang plotter peripherals and has limited application with other types of peripherals. It can be of use with the Model 2261W Printer in the production of double spaced program listings.

When LISTing a program with Device Type 4, a program statement which overlaps onto more than one print line is single spaced; however, each new program statement is double spaced. Thus, a more readable double spaced output is achieved with Device Type 4 (see example below). However, for normal PRINTing of a program output Device Type 4 should not be used.

With the exception of using Device Type 4 for LISTing it is recommended that the Model 2261W normally be selected with Device Type 2 or 0 for PRINT, LIST, and CO operations.

Example:

```
:10 REM THIS PROGRAM DEMONSTRATES DEVICE TYPE 4 FOR LISTING
:20 FOR I=1 TO 10
:30 PRINT "00000000001111111111222222222233333333334444444444
          55555555556666666666777777777788888888899999999999
          AAAAAAAAAABBBBBBBBBBCCCCCCCCCCDDDDDDDDDDEEEEEEEEEE
          FFFFFFFFFF"
:40 NEXT I
:SELECT LIST 415
:LIST (EXECUTE)
```

Output:

```
10 REM THIS PROGRAM DEMONSTRATES DEVICE TYPE 4 FOR LISTING
20 FOR I=1 TO 10
30 PRINT "00000000001111111111222222222233333333334444444444555555555566666666677777777778888888888999999999AAAAAAAAAABBBBBBBBBCCCCCC
CCCCDDDDDDDDDDEEEEEEEEEEFFFFFFFFFF"
40 NEXT I
```

2.8 COMBINED PARAMETERS

It is possible to combine parameters in a SELECT statement;

EXAMPLE:

```
SELECT PRINT 215 (100), LIST 215(80), CO215 (136)
```

but it is not possible to select two output devices with the same parameter, e.g., the statement

```
SELECT LIST 215, LIST 005
```

produces listing of programs on the CRT only.

2.9 DESELECTING THE MODEL 2261W

To deselect the Printer, use one of the following methods:

1. Select another device for PRINT, LIST or CO by using the SELECT statement.

2. Master Initialize (turn power supply OFF, then ON). Master Initialization selects the CRT for all LIST, PRINT and CO operations.

3. Key in CLEAR and touch the RETURN/EXECUTE key. PRINT and LIST operations are returned to the device currently selected for Console Output (CO). If the Printer is currently the CO device, either method 1 or 2 must be used to deselect it.

4. Turn off the SELECT lamp (i.e., deSELECT the printer).

CHAPTER 3
FORMATTING OUTPUT

3.1 PRINT, PRINTUSING AND HEXPRINT STATEMENTS

The PRINT, PRINTUSING and HEXPRINT statements are used with the Model 2261W in the same manner as they are used with the CRT, although more printing zones are available on the printer than on the CRT. For instance, the 64 column CRT is divided into four zones of 16 characters each whereas the printer can have up to ten zones of 16 characters each.

When the 10 pitch format is selected, the Model 2261W has a line length of 136 characters which is divided into eight zones of 16 characters each and one zone of 8 characters. The zones constitute columns 0-15, 16-31, 32-47, 48-63, 64-79, 80-95, 96-111, 112-127, 128-135 respectively.

When the 12 pitch format is selected, the Model 2261W has a line length of 160 characters which is divided into ten zones of 16 characters each. The zones constitute columns 0-15, 16-31, 32-47, 48-63, 64-79, 80-95, 96-111, 112-127, 128-143, and 144-159, respectively.

If commas separate elements in a PRINT statement, each element begins at the start of a new zone. If semicolons separate elements in a PRINT statement, the output appears in packed format, with no spaces between items. (See the Wang Basic Reference Manual for a discussion of zoned and packed format.)

Example 1:

```
:10 REM PRINTING IN ZONED FORMAT WITH COMMAS
:20 SELECT PRINT 215(136)
:30 PRINT "COLUMNS 0-15", "COLUMNS 16-31", "COLUMNS 32-47"
:RUN (EXECUTE)
```

Output:

```
COLUMNS 0-15     COLUMNS 16-31    COLUMNS 32-47
```

Example 2:

```
:10 REM SKIPPING OVER ZONES WITH COMMAS
:20 SELECT PRINT 215(160)
:30 PRINT "SAMPLE #",,, "CONCENTRATION-%"
:40 PRINT 251,,, .015
:RUN (EXECUTE)
```

Output:

```
SAMPLE #                              CONCENTRATION-%
 251                                   1.50000000E-02
```

Example 3:

```
:10 REM PRINTING IN PACKED FORMAT WITH SEMICOLONS
:20 SELECT PRINT 215 (136)
:30 A$="1976 OLDS" :B$=" TORONADO 4 DR"
:40 PRINT "MAKE:"; A$; B$
:RUN (EXECUTE)
```

Output:

```
MAKE:1976 OLDS TORONADO 4 DR
```

Example 4:

```
:10 REM PRINTUSING FORMAT
:20 SELECT PRINT 215(160)
:30 A$="4-BEDROOM CAPE" :P=45000
:40 PRINTUSING 50, A$, P
:50% ############## PRICE=$##,###
:RUN (EXECUTE)
```

Output:

```
4-BEDROOM CAPE  PRICE=$45,000
```

Example 5:

```
:10 REM PRINTING WITH HEXPRINT STATEMENT
:15 SELECT PRINT 215(136)
:20 A$="ABC DEF GHI JKL"
:30 HEXPRINT A$
:RUN (EXECUTE)
```

Output:

```
41424320444546204748492O4A4B4C20
```

NOTE:

In zone printing on the Model 2261W, it is important to make sure that information supplied to the last zone does not exceed the legal length of the last zone. For instance, in a 10 pitch format, if the information for the last zone exceeds 8 columns, that zone is omitted and the information is presented in the first zone of the next line.

Example:

```
:10 SELECT PRINT 215(136)
:20 PRINT 1.2, 3.4, 5.6, 7.8, 9.0, 5.2, 8.4, 0.5, "END OF DATA"
:RUN (EXECUTE)
```

Output:

```
1.2   3.4   5.6   7.8   9.0   5.2   8.4   0.5
END OF DATA
```

In the above example the 9th element in line 20 exceeded 8 characters in length and thus was printed in the next line.

3.2 THE TAB(FUNCTION

The TAB(function is used in the same manner with the Printer as it is used with the CRT. When a PRINT statement containing a TAB(function is executed, the Model 2261W prints at the column specified by the integer portion of the TAB(expression.

Example:

```
:SELECT PRINT(160)
:10 PRINT TAB(75); "MASTER SCHEDULE"
:20 PRINT :PRINT
:30 PRINT TAB(40); "EMPLOYEE"; TAB(70);
"DEPARTMENT";  TAB(110); "SHIFT";
TAB(140); "OVERTIME"
:RUN (EXECUTE)
```

Output:

```
                    MASTER SCHEDULE

EMPLOYEE            DEPARTMENT                                  SHIFT
```

In the above example "MASTER SCHEDULE" is printed starting at column 75; likewise the subtitles in line 30 are printed at the specified TAB settings.

If the value of TAB(expression is greater than the selected line length, the Printer moves to the next line and completes the PRINT statement starting at column 0.

Example:

```
:10 SELECT PRINT 215(60)
:20 A=20
:30 PRINT TAB( A); "MODEL";
TAB (3*A); "HORSEPOWER"
:RUN (EXECUTE)
```

Output:

```
                              MODEL
HORSEPOWER
```

When using the TAB(function to print numeric values, an additional column (to the left of the value) is allocated for the sign (+ or -). If not used (for positive numbers), actual printing begins at the column specified plus one.

Example:

```
:10 SELECT PRINT 215(100)
:20 PRINT TAB(10); "POWER"
:30 FOR N=1 TO 10
:40 PRINT TAB(10); (-2)↑N
:50 NEXT N
:RUN (EXECUTE)
```

Output:

```
POWER
-2
 4
-8
 16
-32
 64
-128
 256
-512
 1024
```

3.3 EXPANDED PRINT

It is possible to print expanded characters for enhanced or highlighted output on the Line Printer. This method uses HEX code (0E) (see Chapter 4 for a more detailed discussion of HEX codes).

Example:

```
:SELECT PRINT 215 (160)
:10 PRINT HEX(0E), "THIS IS EXPANDED PRINT"
:RUN
```

Executing the above example causes the following to appear on the Line Printer:

THIS IS EXPANDED PRINT

The PRINT HEX(0E) command expands the print for only one line.

The printer performs an automatic carriage return and line feed after 68 expanded characters for 10 pitch or 80 expanded characters for 12 pitch. If more characters are sent, they are stored in the buffer but never printed, and are erased upon completion of the line.

The HEX code (0E) can also be used with the PRINTUSING statement. For example, the following program

```
:10 A$ = HEX(0E)
:20 PRINTUSING 30, A$
:30 CODE NO. = ####
```

prints 'CODE NO. = ' in expanded print.

CHAPTER 4
HEX CODES

4.1 THE HEX FUNCTION

The HEX function is used in a BASIC program to output characters on the Printer (both those that appear and do not appear on the standard keyboards) and to output special Printer Control Codes. The HEX function has the form:

HEX(hh [hh] [..] .)

where h = a hex digit 0 to 9 or a letter A to F. An even number of hexdigits must always appear in a HEX statement, spaces are not allowed. (See the Wang BASIC Reference Manual for hexadecimal characters and codes.) HEX codes can also be combined. For example, the following program in memory,

```
10 SELECT PRINT 215
20 PRINT HEX(410D0A42)
RUN(EXEC)

produces: A
          B
```

when run, since the code for 'A' is HEX(41), 'carriage return' is HEX(0D), 'line feed' is HEX(0A), and 'B' is HEX(42). (See Appendix A.)

4.2 CONTROL CODES

When the 2261W Printer receives a hex code for a printable character, it simply places the code into its buffer. Unless the buffer is full, no immediate action is taken. However, certain special hex codes do not enter the buffer, and instead cause immediate action by the printer. These special codes are the printer control codes.

The special Control Codes for the Printer are:

Function	Hex Code	Description
ALARM	HEX(07)	Generates an audible tone about two seconds in duration in the speaker at the rear of the printer.
LINE FEED	HEX(0A)	Advances paper one line.
VERTICAL TAB	HEX(0B)	Advances paper until the next hole in channel 5 of the Vertical Format Unit paper tape is reached.
FORM FEED	HEX(0C)	Advances paper until the next hole in channel 7 of the Vertical Format Unit paper tape is reached.
CARRIAGE RETURN	HEX(0D)	Causes the line of characters stored in the printer buffer to be printed. An automatic line feed occurs after the line has been printed.
ELONGATED CHARACTER	HEX(0E)	Prints a line up to 80 characters as expanded (double-width) characters. (See Chapter 3.)
DELETE	HEX(7F)	Clears buffer of characters sent before the '7F'.

> NOTE:
>
> When hex codes are combined in a single statement line, control codes are executed as they occur.

Example:

```
10 PRINT HEX(57414E47200D0A4C414253)
```

Output:

```
WANG
LABS
```

CHAPTER 5
THE VERTICAL FORMAT TAPE

5.1 TO COPY A VERTICAL FORMAT TAPE

To produce a copy of the tape supplied with your Printer, either a Teletype or a manual punch can be used. To use a Teletype punch, insert master tape into the reader and lock it in; turn the switch to START.

To produce a new master tape on a Teletype:

1. Turn the LOCAL switch to extreme clockwise position.

2. Turn the PUNCH switch ON.

3. Press the HERE IS key several times (to generate leader).

4. For a Vertical Tab hole (in channel 5), press and hold the CONTROL key; then press P. For a Vertical Tab and Top-of-Form holes (in channels 5 and 7), press the P key alone. To generate sprocket holes (one space at a time) press and hold CONTROL and SHIFT, then press P for each hole.

5. For an End-of-Document hole (in channel 2), press and hold the CONTROL key; then press B (see Figure 5.1).

6. When the new tape is complete, press the HERE IS key to generate ending trailer; remove tape from reader.

	End-of Document (Channel 2)	Vertical Tab (Channel 5)	Top-of Form (Channel 7)
CONTROL SHIFT P			
SHIFT P			X
CONTROL P		X	
CONTROL B	X		
P		X	X
CONTROL R	X	X	

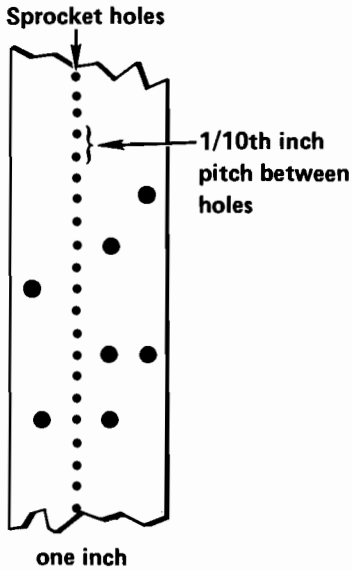

Figure 5.1 Vertical Format Tape

5.2 VERTICAL FORMAT TAPE READER

This is the control mechanism for Top of Form, End-of-Document and Vertical Tabulation settings.

To replace Vertical Format Tape, open the cover of the printer to gain access to the Tape Reader (see Figure 5.2). Open reader cover and install the tape in the tray provided, ensuring that the sprocket teeth protrude through the paper tape. Close the Reader cover.

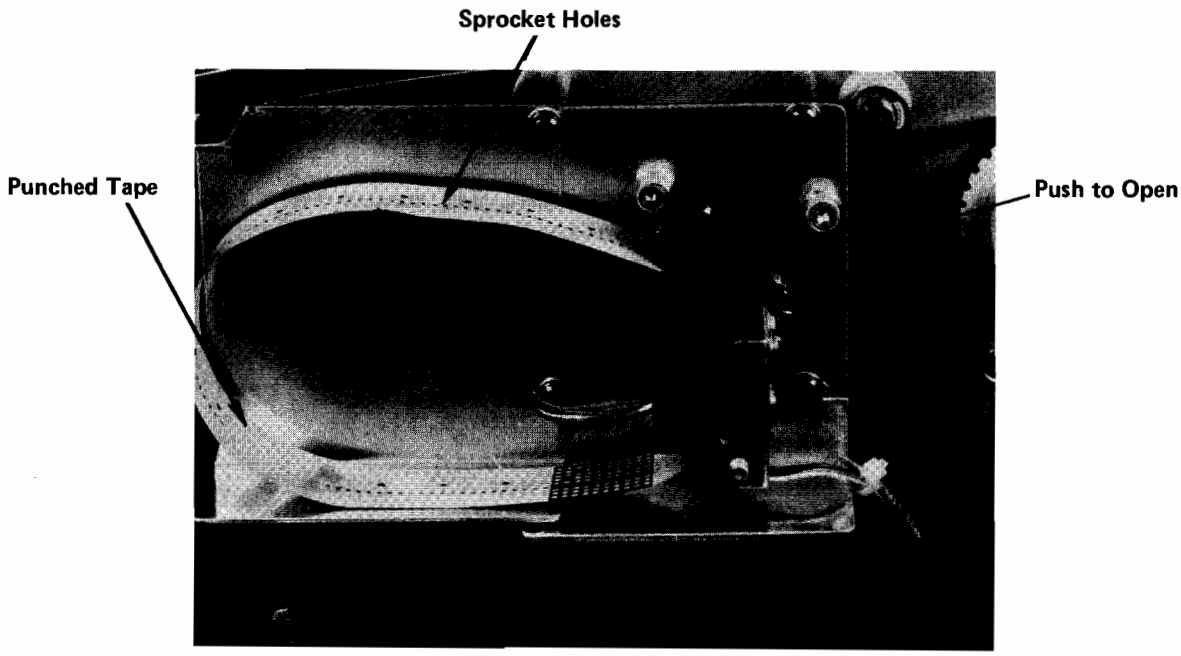

Figure 5.2 Tape Reader

5.3 TO SPLICE PREPARED TAPE

Overlay ends of prepared tape so that punched holes are properly spaced (see Figure 5.3); then use perforated splicing tape to hold the ends together.

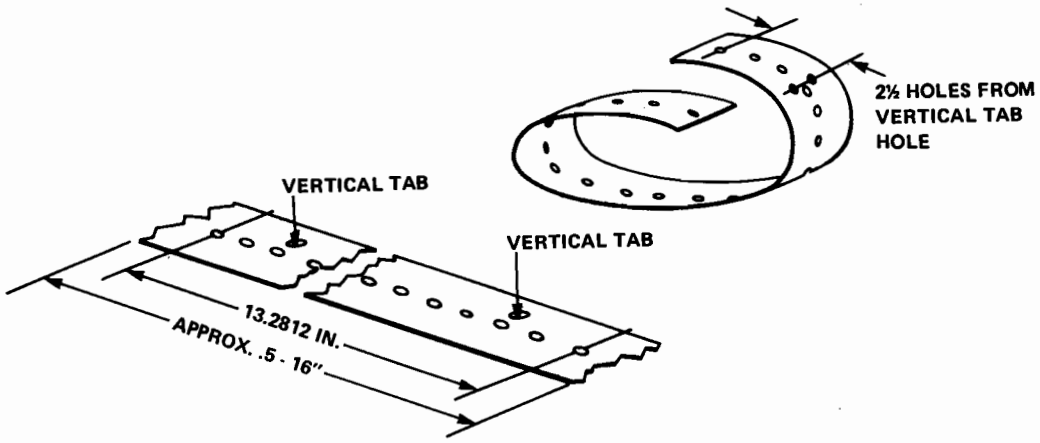

Figure 5.3 Splicing Prepared Tape

APPENDICES

APPENDIX A

HEXADECIMAL CODES

HEX CODE	PRINTER CHARACTER	HEX CODE	PRINTER CHARACTER	HEX CODE	PRINTER CHARACTER
HEX(07)	Alarm	HEX(3F)	?	HEX(63)	c
HEX(0A)	Line Feed	HEX(40)	@	HEX(64)	d
HEX(0B)	Vertical Tab	HEX(41)	A	HEX(65)	e
HEX(0C)	Form Feed	HEX(42)	B	HEX(66)	f
HEX(0D)	Carriage Return	HEX(43)	C	HEX(67)	g
HEX(0E)	Elongated Character	HEX(44)	D	HEX(68)	h
HEX(20)	Space	HEX(45)	E	HEX(69)	i
HEX(21)	!	HEX(46)	F	HEX(6A)	j
HEX(22)	"	HEX(47)	G	HEX(6B)	k
HEX(23)	#	HEX(48)	H	HEX(6C)	l
HEX(24)	$	HEX(49)	I	HEX(6D)	m
HEX(25)	%	HEX(4A)	J	HEX(6E)	n
HEX(26)	&	HEX(4B)	K	HEX(6F)	o
HEX(27)	'	HEX(4C)	L	HEX(70)	p
HEX(28)	(	HEX(4D)	M	HEX(71)	q
HEX(29)	)	HEX(4E)	N	HEX(72)	r
HEX(2A)	*	HEX(4F)	O	HEX(73)	s
HEX(2B)	+	HEX(50)	P	HEX(74)	t
HEX(2C)	,	HEX(51)	Q	HEX(75)	u
HEX(2D)	-	HEX(52)	R	HEX(76)	v
HEX(2E)	.	HEX(53)	S	HEX(77)	w
HEX(2F)	/	HEX(54)	T	HEX(78)	x
HEX(30)	0	HEX(55)	U	HEX(79)	y
HEX(31)	1	HEX(56)	V	HEX(7A)	z
HEX(32)	2	HEX(57)	W	HEX(7B)	§
HEX(33)	3	HEX(58)	X	HEX(7C)	£
HEX(34)	4	HEX(59)	Y	HEX(7D)	é
HEX(35)	5	HEX(5A)	Z	HEX(7E)	ç
HEX(36)	6	HEX(5B)	[	*HEX(7F)	Clear Buffer
HEX(37)	7	HEX(5C)	ß		
HEX(38)	8	HEX(5D)	]		
HEX(39)	9	HEX(5E)	↑		
HEX(3A)	:	HEX(5F)	←		
HEX(3B)	;	HEX(60)	°		
HEX(3C)	<	HEX(61)	a		
HEX(3D)	=	HEX(62)	b		
HEX(3E)	>				

*ASCII DEL, a non-printable control character

APPENDIX B SPECIFICATIONS

Printout Speed	240 lines per minute.
Character Configuration	Dot Matrix: 10 pitch: 11(wide) x 8(high) - (nominal) 22(wide) x 8(high) - (expanded) 12 pitch: 9(wide) x 8(high) - (nominal) 18(wide) x 8(high) - (expanded) 6/8 lines/in. (2.4/cm); 10/12 characters/in.(4.3/ cm)
Line Width	10 pitch: 136 characters, 68 expanded 12 pitch: 160 characters, 80 expanded
Character Set	Full alphanumeric
Duplicate Copies	The printer can generate a maximum of four duplicate copies in addition to the original.
Printer Size: Width	27 in. (74 cm)
Depth	26 in. (64 cm)
Height	36 in. (31 cm)
Weight	210 lb (105 kg)
Site Width	not less than 50 in. (1.3m)
Site Depth	Must extend 16 in. (41 cm) behind printer to accommodate paper rack; rack extends 6 in. (16 cm) below bottom of printer.
Fuses	5A(SB) for 115 VAC, 2 1/2A(SB) for 230 VAC
Power Requirements	115 or 230 VAC $\pm$ 10%, 50 or 60 Hz $\pm$ 1 Hz, 460 watts
Cable	12 ft (3.66m) cable with connector for the CPU plug jack. 6 ft (1.8m) power cord
Operating Environment	50°F to 90°F (10°C to 32°C), 40% to 60% relative humidity, non-condensing

APPENDIX C - PAPER SPECIFICATIONS

(If paper does not conform to these specifications, degraded forms handling can occur). No specifications are given for card stock. (Try a sample before purchasing.)

1. Material must be margin-perforated fanfold paper or card stock; perforations are used for guiding by pinfeed units.

2. Maximum form length is not to exceed 11 in. (27.9 cm).

3. Paper Stock:

   a. for single part forms use 15 to 20 lb bond (20 lb for improved forms handling)

   b. for multipart forms use:

      2 ply: 15/15 lb bond, 7 lb carbon
      3 ply: 15/12/15 lb bond, 7 lb carbon
      4 ply: 12/12/12/15 lb bond, 7 lb carbon
      5 ply: 12/12/12/12/15 lb bond, 5 lb carbon
      (up to four copies in addition to the original can be used.)

   c. form width must be:

      5.0 in. (12.7 cm) minimum
      14.9 in. (37.8 cm) maximum

4. Fastening of multipart forms:

   a. improved multipart paper handling can be achieved with glued margins.

   b. multipart forms must otherwise be fastened with crimps every two inches (5.1 cm) along both edges of the forms.

   c. crimps must not come closer to the fanfold than 0.50 in. (1.27 cm).

   d. each crimp must have four prongs, two to enter both form and carbon, and two to enter forms only.

5. Forms thickness:

   a. maximum in the print area: 0.018 in. (0.046 cm) (allows for four 12 lb, one 15 lb and four 7 lb carbon parts).

   b. over crimps in the pinfeed margin: 0.030 in. (0.076 cm.)

6. Sprocket holes:

   a. must run along both margins 0.25 $\pm$ .03 in. (0.635 $\pm$ 0.076 cm) from paper edge to the hole center lines.

b. distance between hole centers along the margins must be 0.5 ± 0.005 in. (1.27 ± 0.013 cm) non-accumulative in any five in. (12.7 cm) length.

c. hole diameters must be 0.156 + 0.005 in. (0.396 + 0.013 cm) (the two top and bottom drive holes on each sheet (four per sheet) can be up to 0.200 in. (0.508 cm) in diameter to permit post or ring binding of output).

d. distance between hole centers across the sheet must be uniform without 0.015 in. (0.038 cm) to a maximum of 14-1/2 in. (36.83 cm).

7. When using forms with wide and narrow copies in the same set, the top copy should always be fullest width.

8. For preprinted forms:

pin-hole center to left side of left-most character not less than 3/8 ± 1/16 in. (1.0 ± 0.2 cm).

pin-hole center to right side of last character not less than 3/8 ± 1/16 in. (1.0 ± 0.2 cm)

INDEX

PREVENTIVE MAINTENANCE INFORMATION

MAINTENANCE

It is recommended that your equipment be serviced quarterly. A Maintenance Agreement is available to provid this servicing automatically. If no Maintenance Agreement is acquired, any servicing must be arranged for by the customer. A Maintenance Agreement protects your investment and offers the following benefits:

Preventive Maintenance: Your equipment is inspected quarterly for worn parts, lubricated, cleaned and updated with engineering changes, if any. Preventive maintenance minimizes "downtime" by anticipating repairs before they are necessary.

Fixed Annual Cost: When you buy a maintenance agreement, you issue only one purchase order for service for an entire year and receive one annual billing; more frequent billing can be obtained, if desired.

Further information regarding Maintenance Agreements can be acquired from your local Sales Service Office.

NOTE:

Wang Laboratories, Inc. does not guarantee or honor maintenance agreements for any equipment modified by the user. Damage to equipment incurred as a result of this is the financial responsibility of the user.

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