Line Printer VIII

Radio Shack
TRS-80
MICRO
COMPUTER
SYSTEM

HARDWARE

Catalog Number 26-1168



CUSTOM MANUFACTURED FOR RADIO SHACK TC A DIVISION OF TANDY CORPORATION

Congratulations for Selecting this Radio Shack Computer Product!

The Line Printer VIII is a compact, high-density dot-matrix impact printer which can perform a variety of different printing operations. For instance, it can print:

- Proportional characters (ordinary and elongated).
- Monospaced characters (ordinary, elongated, and condensed).
- Graphic characters

The Line Printer VIII operates in three modes:

- The Data Processing mode for fastest output of program listings or data.
- The Word Processing mode for letter-writing or the creation of any text documentation.
- The Graphics mode for drawing pictures, figures, or graphs.

For word-processing, you'll find that the proportional characters created on a variable dot-matrix (up to 9 x 23) can produce letter-quality results.

If, however, you need a print-out that is produced faster, monospaced characters (created on an 8 x 9 dot-matrix) are just the thing for you!

In the graphics mode, you can use graphic data to draw just about any type of graphic configuration you desire.

You can use three types of paper with the Line Printer VIII:

- Standard (9-1/2" wide) computer fanfold forms with guide holes (Radio Shack Catalog Number 26-1417 or 26-1423). The Printer can also print one original and up to two carbon-copies.
- Roll-paper, (8-1/2" wide) with a 1" core, that is no more than 5" in diameter (26-1402). The printer includes a Roll-paper Holder and Paper Cutter.
- Standard, single-sheet typewriter paper (up to 8-1/2" wide) for use as an ordinary typewriter.

Other software-controlled features include:

- Undirectional, logic-seeking carriage action.
- Full- or half-line forward and reverse (for printing above to below the "current" line) and 3/4 line feed.
- Underline capability.
- Superscript and subscript capability.
- Backspace capability.
- Upper- and lowercase English letters, European and special symbols, and block graphic characters.
- Out-of-Paper sensor that automatically stops the Printer so you can replenish the paper.
- Parallel and serial interface.
- Selectable 600 or 1200 Baud rate for transmission (Serial mode).
- Selectable 7 or 8 bit (Serial mode).
- Selectable Carriage Return or Line Feed with automatic Line Feed.
- Selectabel ASCII or modified ASCII character set.
- Selectable European or Japanese Kana Symbol set.
- Elongated and condensed characters.
- Optimizer function to save printing time.
- Dot column position control capability.
- ON-LINE/OFF-LINE control capability.
- RESTART/RESET function capability which allows you to resume printing after correcting error conditions.

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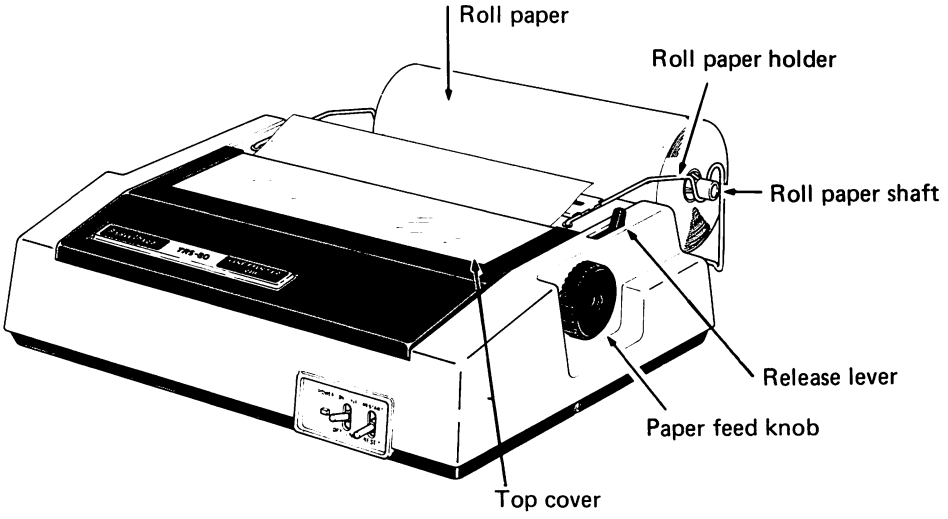
SETTING UP

Carefully unpack the Printer. Be sure to locate the ribbon, fuse, Roll Paper Holder, and Roll Paper Shaft. Keep the empty box and packing material just in case you ever need to transport the Printer. Then, remove the Printer Dust Cover.

Caution: Remove the protective black plastic tube from the rear carriage guide. Be careful never to unfasten the two Ribbon Drive Wires from the Pulley by pushing down or pulling up.

Proper Setting Up Procedure

1. Be sure the POWER switch is OFF.
2. Install the roll paper holder and roll paper, fanfold paper, or single-sheet paper. Adjust the paper guide on the roll paper holder when roll paper is used.
3. Remove Clear Plastic Cover (Top Cover) and check the ribbon cassette. If not set, see "Ribbon Installation and Replacement." Replace Top Cover.
4. Place ON-LINE/OFF-LINE switch in OFF-LINE position.
5. Connect AC power plug to a 3-wire, 120 volt, 60 Hz grounded AC outlet.
6. Connect the interface cable from the Computer to the printer interface connector. (See Figure 6.)
7. Turn the Power ON and check that the LED (power indicator) on the control panel is lit.
8. Set the RESTART/RESET switch to RESET.
9. Place ON-LINE/OFF-LINE switch in ON-LINE position.



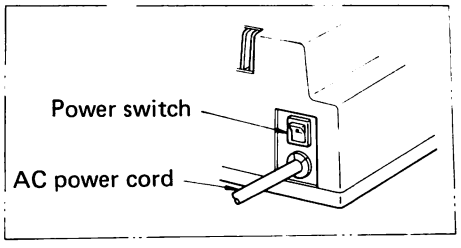


Fig. 1

Ribbon Installation and Replacement (Refer to Figure 2)

If the ribbon is already installed, simply check to see that it is properly threaded between the paper and Print Head. (Compare with Figure 2.)

If the ribbon cassette is not installed, or if it is necessary to replace it because of frayed ribbon, faint printing, etc. follow this procedure.

1. Set Power switch to OFF. (Note: When you turn the power off, any information stored in the printer's buffer will automatically be lost.)
2. Remove the Top Cover and gently pull the Penetration Control Lever away from the paper as far as it will go.
3. Gently grasp the ribbon cassette at the corners that are nearest to the paper and remove the cassette by lifting it upwards.
4. Before inserting the new cassette, tighten its ribbon by turning the knob in the direction indicated by the arrow.
5. Gently press the cassette down until it is firmly secured by the "stopper claws." Do not force the cassette into place!

Caution: If the cassette is not properly fitted, the cassette knob will not match up with the shaft from the carriage. Do not force the cassette down but fit it in gradually while turning the cassette knob in the indicated direction.

6. Once the new cassette is installed, gently slide the ribbon in between the paper and the Print Head. Tighten the ribbon by turning the cassette knob in the indicated direction.
7. Move the carriage back and forth manually to check that the ribbon advances properly.

   Note: If the ribbon has not been properly fitted between the paper and Print Head (i.e., into the Print Head Ribbon Guide Bezel), the ribbon feed will not operate smoothly.

8. Move the Penetration Control Lever towards the paper as specified in "Paper Loading and Penetration Adjustment." Replace the Top Cover.

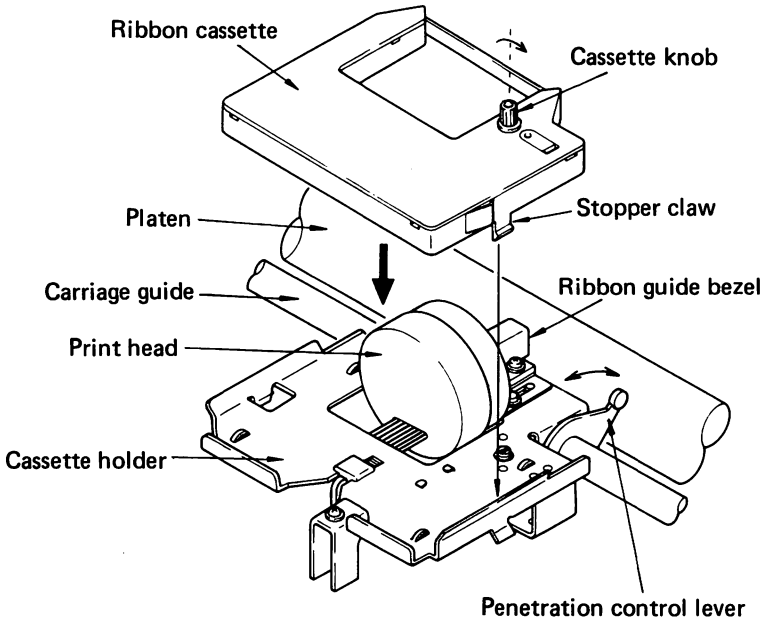


Fig. 2

Roll Paper Holder Installation and Roll Paper Loading

Installing the Roll Paper Holder (See Figure 3)

1. Be sure the Power switch is set to OFF.
2. Set the Printer on a flat, wide surface being sure there is enough space behind the Printer for the Roll Paper Holder.
3. Insert both support arms into the two holes in the top rear of the Printer and place the other end of the Holder onto the flat surface.
4. Remove the core hub from the Roll Paper Shaft.

Loading Roll Paper

1. Be sure the Power switch is set to OFF.
2. Remove the two roll paper core caps (if necessary).
3. Insert the Roll Paper Shaft through the standard 1" paper roll core and put the core hub threading through the shaft. Once the shaft is inserted into the roll paper, place the paper/shaft onto the Holder (see Figure 3).

   Note: The paper must feed from the bottom of the roll.
4. Remove the Top Cover.
5. Gently pull the Penetration Control Lever away from the paper.
6. Gently pull the Release Lever forward (towards the front of the Printer).
7. Tilt the Separator (see Figure 4) forward.
8. Insert the paper into the paper insertion opening (see Figure 4) and push the Release Lever back towards the rear of the Printer. Turn the Paper Feed Knob (see Figure 4) until the paper appears between the platen and paper press.
9. Tilt the Separator backward (towards the rear of Printer).
10. Pull the Release Lever forward. Then pull the paper out about 1-1/2" (3 or 4 cm). Make sure the paper is straight. Then push the Release Lever back.
11. Gently move the Penetration Control Lever towards the paper.
12. Replace the Top Cover.
13. Adjust the paper guide on the Paper Holder so that the paper will feed straight.

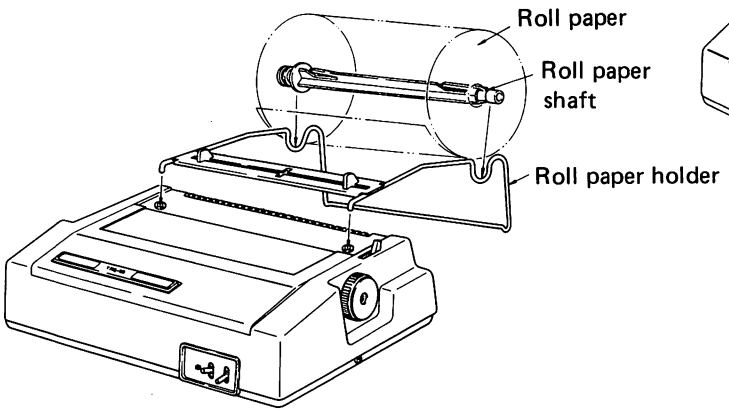


Fig. 3

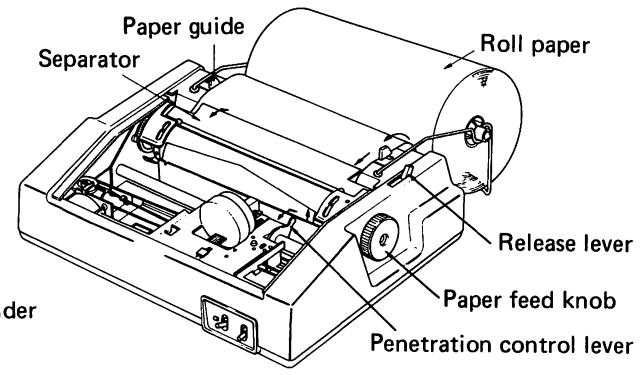


Fig. 4

Fanfold Paper Loading(See Figure 5)

The Line Printer VIII can also use standard computer fanfold paper (9-1/2" wide). The paper can be single or multi-part (up to three parts total – one original and two copies). To load fanfold paper:

1. Be sure the Power switch is set to OFF.
2. Remove the Top Cover.
3. Move the Penetration Control Lever away from the paper.
4. Gently pull the Release Lever forward (towards the front of the Printer).
5. Raise the Pin Feed Paper Holders (see Figure 5).

   Note: The Pin Feed Paper Holders go up and back, not up and to the side!
6. Tilt the Separator (see Figure 5) forward.
7. Insert the paper into the paper insertion opening and turn the Paper Feed Knob until the paper appears.
8. Once the paper has appeared, turn the Paper Feed Knob once more. Then lay the paper's guide holes over the pins. Lower the Pin Feed Paper Holders over the paper.
9. Tilt the Separator backward (towards the rear of Printer).
10. To adjust the Penetration Control Lever for maximum print quality:
    - For single-part paper, gently move the Penetration Control Lever towards the paper as far as it will go.
    - For multi-part paper, gently move the Penetration Control Lever towards the paper one "click" at a time. Move the carriage back and forth between each click. When this causes ink smudges to appear on the paper, move the Penetration Control Lever back slightly until smudging does not appear.

    Warning! The Penetration Control Lever must always be as far forward as possible; otherwise damage to the Print Head may occur.
11. Turn the Paper Feed Knob until the paper is several inches past the Pin Feed Paper Holders. Do not let the paper be fed back into the paper insertion opening! Replace the Top Cover.

Whenever the pin feed is used to advance the paper (i.e., any paper with guide holes), the Release Lever must be forward. If "normal" paper (i.e., paper without guide holes) is used, the Release Lever must be pushed back to allow the platen to apply pressure on the paper.

Important Note:
Do not let paper pile up on top of unprinted paper or printed paper may be pulled back into paper insertion opening. This could jam the paper feed or damage the Printer.

Single-sheet Paper Loading (No Guide Holes)

If you need to load single-sheet paper (without guide holes), refer to "Roll Paper Loading" for installation instructions and "Fanfold Paper Loading" for Penetration Control Lever adjustments.

Remember that the Paper Empty Sensor will put the Printer OFF-LINE when the paper is used-up. To continue printing, just insert another piece of paper and turn the Paper Feed Knob to advance the paper. When the paper is in place, set the RESTART/RESET switch to RESTART and the Printer will start printing where it left off on the previous page.
Don't forget to push the Release Lever back whenever you use paper that doesn't have guide holes.

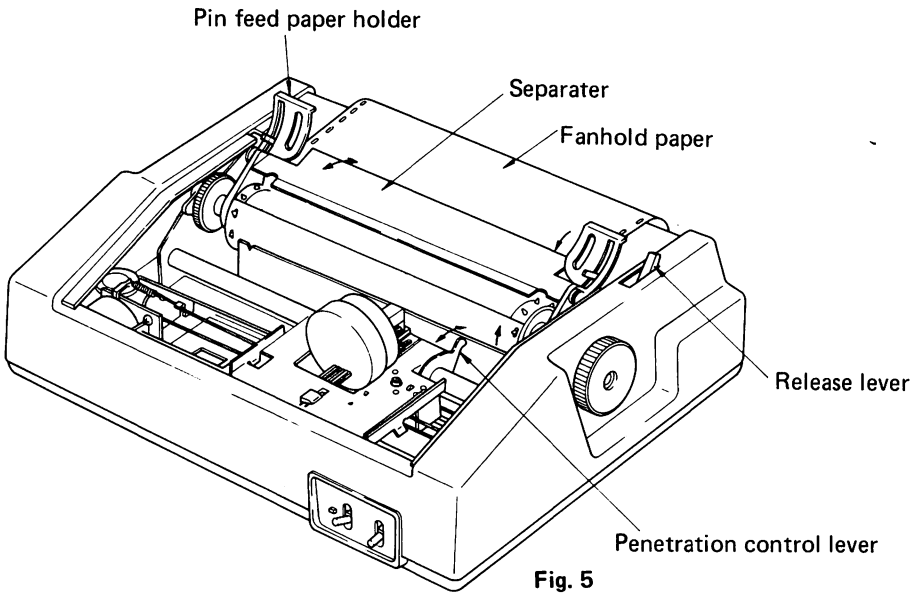


Fig. 5

Connection to Your Computer and Self Test

Before plugging the power cord into an AC power outlet, check the following:

- Is Printer Power switch set to OFF?
- Have you removed the black plastic protective tube from the carriage guide?

Once you've satisfied these requirements, you're ready for a "Self Test" before connecting the Printer to the Computer:

1. Plug the Printer into an AC power outlet.
2. Set the ON-LINE/OFF-LINE switch to OFF-LINE.
3. While holding the RESTART/RESET switch in the RESTART position, turn the Power switch ON. The Printer will begin printing all characters that it's capable of printing.
4. If printing is too light, gently push the Penetration Control Lever towards the paper. If printing is too dark or begins smudging, move the Penetration Control Lever away from the paper slightly.
5. The printing will continue until you turn the Power switch OFF.

Note: If the ON-LINE/OFF-LINE switch is set to ON-LINE hold the RESTART/RESET switch to RESTART and turn the Power switch ON, the Printer will perform the Carriage Movement Test instead of the Self Test. In this mode, the carriage will move back and forth until you turn the power OFF. No printing will be done.

To Connect the Printer to the Computer:

Before connecting the Line Printer VIII to your Computer, be sure you have the right cable:

Computer	Cable
Model I	
Direct to CPU	26-1411
Expansion Interface	26-1401
Model II	26-4401
Model III	26-1401
Color Computer	26-3020

1. The power-up sequence varies for different Computers. For specific power-up sequences, see your Computer's owner's manual. Model I and Model III users, for instance, should turn on the Printer before turning on the Computer. Model II users should turn on the Printer after turning on the Computer but before inserting the system diskette.
2. Attach the molded male end of the cable to the Printer. Do not force the plug. If it won't go one way, turn it over and try again.
3. Connect the other end of the cable to your Computer. See your Computer's owner's manual for specific instructions.

The Power Lamp will remain lit while the Printer is ON.

It is essential that the Printer remain ON when connected to the Computer. If the power is removed or applied, or a Printer is connected but not turned on, erratic operation of the entire system may occur.

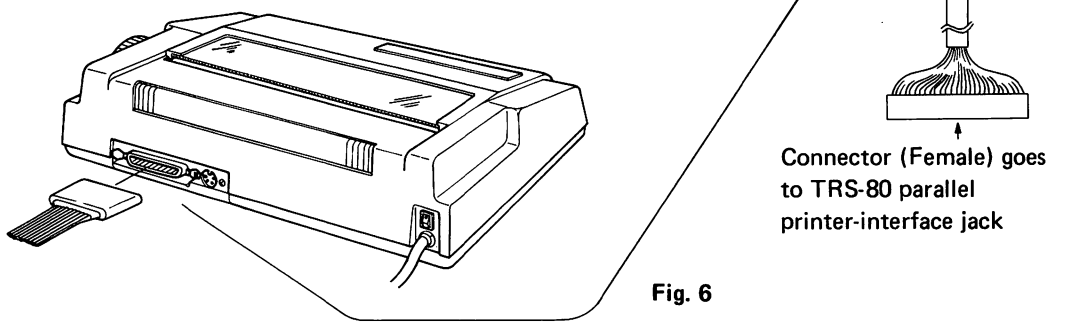


Fig. 6

Power ON/OFF

The power-up sequence varies slightly depending upon the computer system used. For Model III systems, all peripherals (printers included) should be turned on before applying power to the CPU. For Model II systems, turn on the Printer and other peripherals when the "INSERT DISKETTE" message appears. Then insert system diskette.

The Power lamp will remain lit while Printer is on. It is essential that the Printer remain ON while connected to the Computer. Otherwise the Computer may not function properly. Furthermore, don't turn the Power ON or OFF while the Computer is running. Voltage spikes could cause program malfunction and/or loss of RAM memory.

Controls and Indicators

Set to ON-LINE ..... The Printer will be ON-LINE. When loaded with paper, the Printer will be ready to accept data from the Computer.

Note: When the Printer has stopped because it is out of paper, the ALERT lamp (located on the printed circuit board below the carriage) will light and the Printer will go OFF-LINE even though the switch is set to ON-LINE. After inserting paper, set the RESTART/RESET switch to RESTART and the Printer will return ON-LINE. The buffer data will remain fully protected and printing will proceed as normal unless an error (such as clogged paper, etc.) occurred. If this happens, you'll need to set the RESTART/RESET switch to RESET to resume printing. However, the buffered data will be erased and the Printer will not resume printing where it left off.

Special Note for Model II Users: If the Printer goes OFF-LINE because of an ALERT condition, the Computer may stop running the program. If it is a BASIC program, just type CONT [ENTER] after you've put the Printer back ON-LINE. The Printer will then continue printing from the last printing position. However, some printing duplication may occur since the entire current line will be restarted from that position.

Set to OFF-LINE ..... Printer will be OFF-LINE. Information from the Computer will not be received when the ON-LINE/OFF-LINE switch is set to OFF-LINE.

RESTART ..... When the Printer detects the end-of-paper and has stopped printing, replace the paper and set the RESTART/RESET switch to RESTART. The Printer will continue printing without loss of data. RESTART will not function until you install paper.

Special Note: When the Printer is OFF-LINE and you turn the Power switch ON while setting to RESTART, the Self Test will begin. If the Self Test begins with the Printer ON-LINE, the Carriage Movement Test will begin. Turn the Power OFF to stop the test.

RESET ..... If an error (jammed paper, etc.) occurs, set the RESTART/RESET to RESET and the Printer will re-initialized and the buffered data will be lost.

Other Switches and Indicators

Switch/Indicator	Location	Function
POWER switch	Left rear of printer	ON-OFF of Printer Power. (Do not turn off Power switch when using Computer.)
Paper Empty switch	Inside Printer (approximately 1" from the left feed pin)	Notifies printer control logic that paper has run out. When actuated, ALERT lamp lights and Printer goes OFF-LINE.
ALERT lamp	Inside Printer (on the Printed Circuit Board)	Indicates paper empty or carriage fault.
POWER lamp	On Control panel	Indicates Printer is ON.

Special Option Selecting

If any special conditions are needed by your computer, turn off the printer power, remove the Top Cover and change the settings of Function Selection switches. These are located on the Printed Circuit Board inside printer. (See Fig. 7)

Note: When the Printer is shipped, only SW2 is set to CLOSE side and the others are set to OPEN.

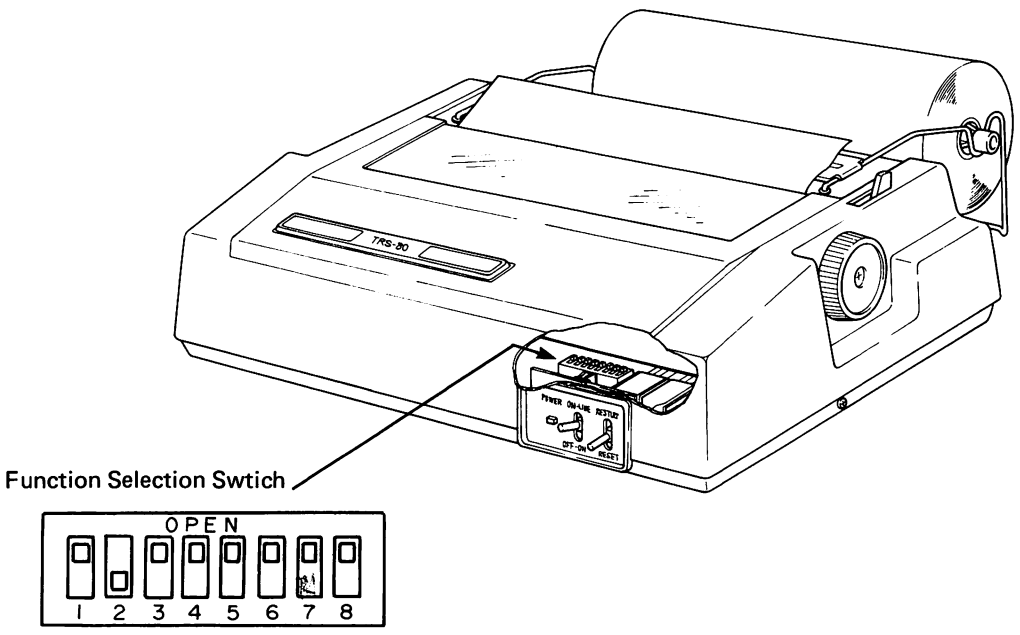


Fig. 7

No.	Symbol	OPEN Side	CLOSE (Opposite from OPEN) Side
1	7/8	Selects 8-bit serial interface mode.	Selects 7-bit serial interface mode.
2	600/1200	Selects 1200 Baud transmission rate, in serial interface mode.	Selects 600 Baud transmission rate, in serial interface mode.
3	Serial/Para	Selects parallel interface mode.	Selects serial interface mode.
4	CR/NL	CR code (0D Hex or 8D Hex) will become "carriage return + line feed" code.	CR code (0D Hex or 8D Hex) will only a carriage return (no line feed) code.
5	CCR/CR	All CR codes (0D Hex or 8D Hex) received will become active codes.	All CR codes received after an initial CR code will be disregarded.
6	NL/LF	LF code (0A Hex or 8A Hex) will become only a Line Feed (no carriage return) Code.	LF code (0A Hex or 8A Hex) will become a "carriage return + line feed" code.
7	TAN/ASC	Normal ASCII character codes 5B (Hex) ~ 5F (Hex) 5B = [, 5C = \ , 5D =] , 5E = ∧, 5F = —	ASCII character set will convert to codes 5B (Hex) ~ 5F (Hex) 5B = ↑, 5C = ↓, 5D = ←, 5E = →, 5F = —
8	KANA/ Europ.	European Symbol Set will be selected in the codes A0 (Hex) ~ BF(Hex).	Japanese KANA will be selected in the codes A0 (Hex) ~ DF (Hex).

Note: The responses to the above code apply to this printer only!
The interpretation of the codes by the computer may cause a different action by the printer.

OPERATION

The Printer can operate in three independent modes: Data Processing mode, Word Processing mode and Graphic mode. The Data and Word Processing modes are both character printing modes, while the Graphic mode is a bit image printing mode. The only difference between Data Processing mode and Word Processing mode is the method of Line Feed. In the Data Processing mode, Line Feed Commands (which decide various feed pitches or directions) are stored in the Printer's memory without any reference to paper motion. When another LF code is received, Line Feed action is performed in accordance with the information in the Printer's memory. In the Word Processing mode, each Line Feed command causes prompt paper advancement. Under Graphic operation, many control codes, which are allowed in the above mentioned two modes, are ignored and Line Feed code generates special feed pitch, performing well-regulated drawings.

The Data Processing or Word Processing mode allows you to use two character set styles. One is the proportional character set and the other is monospaced character set. The proportional character set is very convenient for creating documents such as letters, reports etc. However it takes more than monospaced character set. Generally Output from the computer should be printed out as soon as possible. Therefore, in this case, the monospaced character set (10 character/inch) may be used to complete the printing in a short time.

Control Codes

According to American Standard Code for Information Interchange (ASCII), there are 34 control codes in addition to the printable character codes. Control codes are sent as data which the receiving device interprets as abbreviated instructions communications, status messages, etc. The Line Printer VIII recognizes and executes 23 kinds of control codes and treats all other codes as a special printable code (it identifies the undefined code as"X"). The Line Printer VIII has three separate modes which are classified into independent operating conditions. Several control codes have different functions depending upon the mode you use. For an explanation of the roles of control codes, carefully read the next section.

· Mode Selection

The Printer can operate under three independent modes.

1. **Data Processing Mode**
   - All commands which decide Line Feed pitch and the direction of movement are latched into the Printer's memory without any reference to motion, and when LF code (0A Hex. or 8A Hex.) is received, the paper advances exactly in accordance with the condition defined in memory.
   - All printable characters (except Graphic information) can be printed in this mode.
   - Under Word Processing mode, receiving a DC3 code (13 Hex. ~ 19 Dec.) takes the Printer into Data Processing mode. In Graphic mode, a received DC3 code will be ignored.

2. **Word Processing Mode**
   - Any Line Feed code (different pitch or direction) is treated as an executive command. When one of these commands is received, it won't be latched and the designated action will be performed.
   - All printable characters (except Graphic information) can be printed in this mode.
   - Under Data Processing mode, receiving a DC4 code (14 Hex. ~ 20 Dec.) sets the Printer into Word Processing mode. In Graphic mode, a received DC4 code will be ignored.

3. **Graphic Mode**
   - This mode is different from the other two modes in printing principle. In Graphic mode, only one Line Feed code (0A Hex. ~ 10 Dec.) is acceptable. Receiving a LF code causes the paper to move approximately 0.1 inch forward. If you select a different pitch or direction, the printer won't respond.
   - In Graphic mode, the following commands can be used:

Hex. Code	Decimal Code	Symbol	Description
0A	10	LF	Line Feed (5/48 inch forward)
0D	13	CR	Carriage Return
1B (+) 0E	27 (+) 14	ESC + SO	Start Elongation
1B (+) 0F	27 (+) 15	ESC + SI	End Elongation
1B (+) 10 (+) n1 (+) n2	27 (+) 16 (+) n1 (+) n2	ESC + POS + Data	Positioning
1C (+) n1 (+) n2	28 (+) n1 (+) n2	FS + Data	Repeat Data
1E	30	RS	End Bit Image Mode

   - To exit from Graphic mode, use an RS (1E Hex. ~ 30 Dec.) code. The Printer will enter Data Processing mode automatically and Full Line Feed forward condition will be designated.

· Character Font Selection

Three styles of character sets are available with the Line Printer VIII. The first is a 9 x 8 dot matrix character set for 10 character-per-inch (CPI) Ordinary character printing, 5 CPI Elongated Ordinary character printing, 16.7 CPI Condensed character printing, and 8.3 CPI Elongated condensed character printing. The second set is a n x 9 dot matrix character set for proportional printing in which dot density is the same as for the 16.7 CPI Condensed character printing. The third is a 12 x 6 dot matrix character set without half column dots for Block graphic printing.

- **Select 10 or 5 CPI Ordinary Character Set (ESC DC3)**
  The first character set is 10 or 5 CPI Ordinary (monospaced), selected by the printer logic during initialization, or by ESC DC3 code (1B 13 Hex. ~ 27 19 Dec.). When data which is to be printed is in the buffer and ESC DC3 code is received under the Condensed character or Proportional character mode, the buffer contents are printed out completely. Subsequent data will be printed successively in the same line unless a CR code is received before receipt of this code. In this case, the style of the last letter of the previous character and the style of the first letter of the new character will be properly spaced. 10 or 5 CPI Ordinary (monospaced) is terminated by selecting another character set (ESC DC1, ESC DC4) or Graphic mode (DC2).

- **Select Proportional Character Set (ESC DC1)**
  The other character set is Proportional. ESC DC1 (1B 11 Hex.~27 17 Dec.) code sequence selects the Proportional set. In the 10 or 5 CPI Ordinary (monospaced) character or 16.7 or 8.3 CPI Condensed character mode, data which is to be printed is in the buffer and when an ESC DC1 code is received, the buffer contents are printed out completely. Subsequent data will be printed continuously in the same line unless a CR code is received in advance. If the previous character set is 10 or 5 CPI Ordinary (monospaced) character, proper spacing will be put in front of the first letter of new Proportional character set. If the previous character set is 16.7 or 8.3 Condensed, the first letter of Proportional character set will be printed successively without any spacing between it and the previous character. Proportional characters are terminated by selecting another character set (ESC DC3, ESC DC4) or Graphic mode (DC2).

- **Select 16.7 or 8.3 CPI Condensed (Monospaced) Character Set (ESC DC4)**
  When ESC DC4 (1B 14 Hex. ~ 27 20 Dec.) is received, all of the text that follows will be printed in 16.7 or 8.3 (in elongated condition) CPI Condensed (monospaced), providing a 133 character-per-line capability. In the 10 or 5 CPI Ordinary (monospaced) character or Proportional character mode, data which is to be printed is in the buffer and when an ESC DC4 code is received, the Printer prints out the buffer contents. Printing of following data that follows successively in the same line (if no CR-code is received before) will begin. If the previous character set is 10 or 5 CPI Ordinary (monospaced) character, proper spacing will be put between the last letter of 10 or 5 CPI Ordinary and the first letter of 16.7 or 8.3 CPI Condensed character. If the former character set is Proportional, no spacing will be put between the letters. Condensed characters are terminated by selecting another character set (ESC DC1, ESC DC3) or Graphic mode (DC2).

- **Elongated Characters (ESC SO = Start, ESC SI = End)**
  When an ESC SO (1B 0E Hex. ~ 27 14 Dec.) code sequence is received, all subsequent characters are printed in double width (elongated). Receiving an ESC SI code sequence or printer initialization terminates Elongation. The start (ESC SO) and end (ESC SI) point of elongated characters may be entered any number of times within a line and can be used with 10 or 5 CPI Ordinary, 16.7 or 8.3 CPI Condensed Proportional character set and Graphic mode.

  Note: A 6 x 12 dot matrix character set is available in 10 or 5 CPI Ordinary Character condition, and 16.7 or 8.3 CPI Condensed Character condition.

· Line Feed

When every LF code in Word Processing mode and one LF code in Graphic or Data Processing mode is received by the Printer, the paper moves at the specified pitch and direction. When printable data is in the buffer and an above mentioned LF code is received, all data in the buffer will be printed out and the Line Feed operation will be performed. If you want the LF code to generate both Carriage Return and Line Feed actions, refer to Special Option Selecting on page (11).

CODE Hex.	CODE Dec.	SYMBOL	Data Processing Mode	Word Processing Mode
0A or 8A	10 or 138	LF	Paper moves in conformity with the information in the buffer. Line Feed information provide Line Feed pitch and Line Feed direction. This is the only active Line Feed code in Data Processing Mode. Text prior to this code is printed before execution of the line feed.	Paper advances one line (one-sixth inch). Text prior to this code is printed before execution of the Line Feed.
1B 0A	27 10	ESC LF	Full (One-sixth inch) Reverse Line Feed information is set in the buffer memory (without paper motion). Data reception continues without pause.	Full (One-sixth inch) Reverse Line Feed is activated. Paper retracts one line. Text prior to this code is printed before execution of the line feed.
1B 1C	27 28	ESC FS	Half (One-twelfth inch) Forward Line Feed information is set in the buffer memory (without paper motion). Data is received continuously.	Half (One-twelfth inch) Forward Line Feed is activated. Paper advances half line. Text prior to this code is printed before execution of the Line Feed.
1B 1E	27 30	ESC RS	Half (One-twelfth inch) Reverse Line Feed information is set in the buffer memory (without paper movement). Data is received continuously.	Half (One-twelfth inch) Reverse Line Feed is performed. Paper retracts half line. Information in the buffer is printed before execution of Line Feed.
1B 36	27 54	ESC 6	Full (One-sixth inch) Forward Line Feed information is set in the buffer memory (without paper movement). Data is received successively without pause.	This sequence is ignored.
1B 38	27 56	ESC 8	3/4 (One-eighth inch) Forward Line Feed information is set in the buffer memory (without paper motion). Data reception continues without pause.	3/4 (One-eighth inch) Forward Line Feed is performed. Paper advances 3/4 line. Information in the buffer is printed before execution of line feed.

Note: In Graphic mode, only LF (0A Hex. ~ 10 Dec.) code is effective.
When this code is received by the Printer, the paper advances 5/48" in forward direction. Other codes are ignored. This information pertains to this printer only.

· Carriage Return

A CR code brings two types of information to the Printer. First it tells the Printer to print, and then to perform carriage return. The Printer can also operate four types of CR which are selected by Function Selection switch (See page 11). The operation of each CR function is as follows. In Graphic mode CR code is assigned to 0A only and in other modes it is permitted to use both 0A Hex. (10 Dec.) and 8A Hex. (138 Dec.).

Symbol	SW4 ON/OFF	SW5 ON/OFF	Description
CR=NL CR≒CCR	Open	Open	When a CR code is received, printable character information is printed before execution of carriage return operation, then a line feed (One line—1/6 inch—forward in Word Processing mode, pitch designated in the memory in Data processing mode and fixed 5/48 inch forward in Graphic mode) is executed. Subsequent printable characters are printed from start of the new line.
CR=NL CR=CCR	Open	Close	Same as above case (CR=NL, CR≒CCR) in operation. But, if several CR codes is received successively without receiving of printable characters, only the first CR code is active and other succeeding CR codes are ignored.
CR=CR CR≒CCR	Close	Open	When a CR code is received, printable character information are printed before execution of Carriage Return operation and subsequent characters are printed from start of the same line (i.e. no Line Feed).
CR=CR CR=CCR	Close	Close	Same as above, but CR code just after another CR code is ignored.

· Backspace

The Printer may be backspaced from one to 255\dot-columns\with the backspace sequence (BS N) in any character set. N is an 8-bit value from one to 255, specifying how many dot-columns are to be subtracted from the current position. If the value of N is zero, no backspacing is done. When you wish to backspace more than 255 dot-spaces, repeat (BS N) code as many times as required. If N exceeds number representing the current \dot-position,\ subsequent characters are printed from the beginning of the line. In Graphic mode, code BS is ignored and code N is treated as independent data.

The backspace command is a print start command at the same time. Receiving the backspace command causes the Printer to print out all of the data in the buffer and to execute a backspace operation.

In general, backspacing is used in the character mode. The code sequences for the six character sets are shown below. The second number in each command represents the dot width of a character (or space) for the character set. If elongated characters are transmitted to the Printer before reception of the backspace command, number N must be doubled.

CH Set	Dots/cha.	CODE	Hex.	DECIMAL	n CHARACTER Backspacing
10 CPI	12	BS, 12	08, 0C	08, 12	08, 12n
5 CPI	24	BS, 24	08, 18	08, 24	08, 24n
16.7 CPI	12	BS, 12	08, 0C	08, 12	08, 12n
8.3 CPI	24	BS, 24	08, 18	08, 24	08, 24n
Proportional	9 ~ 23	BS, N*	08, N*	08, N*	08, X*
Elongated Proportional	18 ~ 46	BS, 2N*	08, 2N*	08, 2N*	08, 2X*

* For the proportional character dot width, refer to page 20.

· Underline (SI = Start, SO = End)

In the Data Processing and Word Processing modes, receiving an SI (15 Dec.) code causes all subsequent characters to be underscored. The 9th head pin creates a continuous underline until an SO code is received. Neither an SI nor an SO code is a print start command.
Once set, even after Carriage Return or Line Feed, underline can't be cancelled. Proportional descenders will be changed to one-dot-descender because the 9th dot will be buried in underscore and these characters cannot be distinguished. The other characters appear above the underline. If the underline is designated, when printhead is moved by Positioning command, the underline will not appear between the Home position and the designated position.

The underline remains after Graphic mode as follows:

Mode	Data Processing or Word Processing	→	Graphic	→	Data Processing
Underline	designated	→	masked	→	designated

· Repeated Printing (FS N Data)

Up to 256 data or graphic code can be printed after receiving three specific bytes of data (including FS (1C Hex.) code under 8-bit interfacing condition). (With 7-bit interfacing, repeated number will be up to 128.) The first byte is the identification code, the second byte is the number of times to be repeated and the last byte is the data to be repeated. The number of repetition N must be a binary number which indicates a count of repetition. If N is zero, it will be treated as 256 in both 7-bit and 8-bit interfacing conditions. Repeating Data should be printable, but if it is underline code or function zone code (0 Hex. ~ 1F Hex., 7F Hex. ~ 9F Hex, FF Hex.) is received, it will be changed to a "X" mark (invalid character code). This code sequence is utilized in all modes (Data Processing, Word Processing and Graphic mode).

ADDENDUM
26-1168 LINE PRINTER VIII

Please add the following item on the page that describes proper setting up procedure.
(Page 4)

NOTE:

After POWER-UP or RESET, the carriage may sometimes remain at the right margin (and the alert lamp will light up).

If this occurs simply set the RESTART/RESET switch to RESET (returning the carriage so the left margin) and resume printing.

Radio Shack®

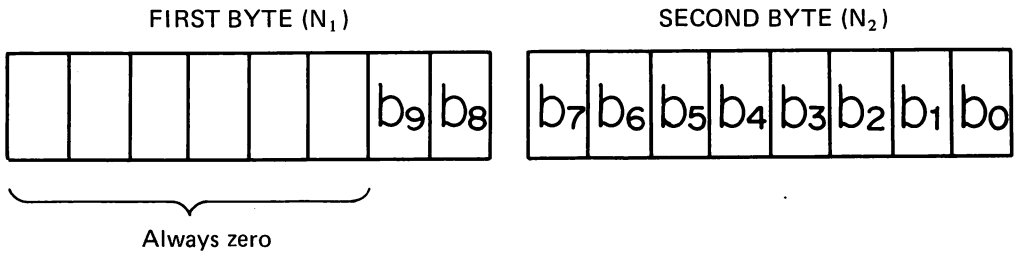
26-1168
HE13B003800
E1-1635 81065000 ©

· Positioning (ESC POS N1 N2)

In any mode, you can position the carriage to a specific dot position. Valid dot positions are given below:

Printing Mode	Valid dot positions	Column number
Graphics	0 ~ 479	0 ~ 958
10 CPI	0 ~ 479	0 ~ 958
5 CPI	0 ~ 479	0 ~ 958
Proportional	0 ~ 799	0 ~ 1598
16.7	0 ~ 799	0 ~ 1598
8.3 CPI	0 ~ 799	0 ~ 1598

To position to a dot position, send ESC, then POS, then a two-byte binary value specifying the desired dot position as follows:



Note that the dot position is represented as a 10-bit (b_0 ~ b_9) value. For example, to specify dot position 400, use these calculations:

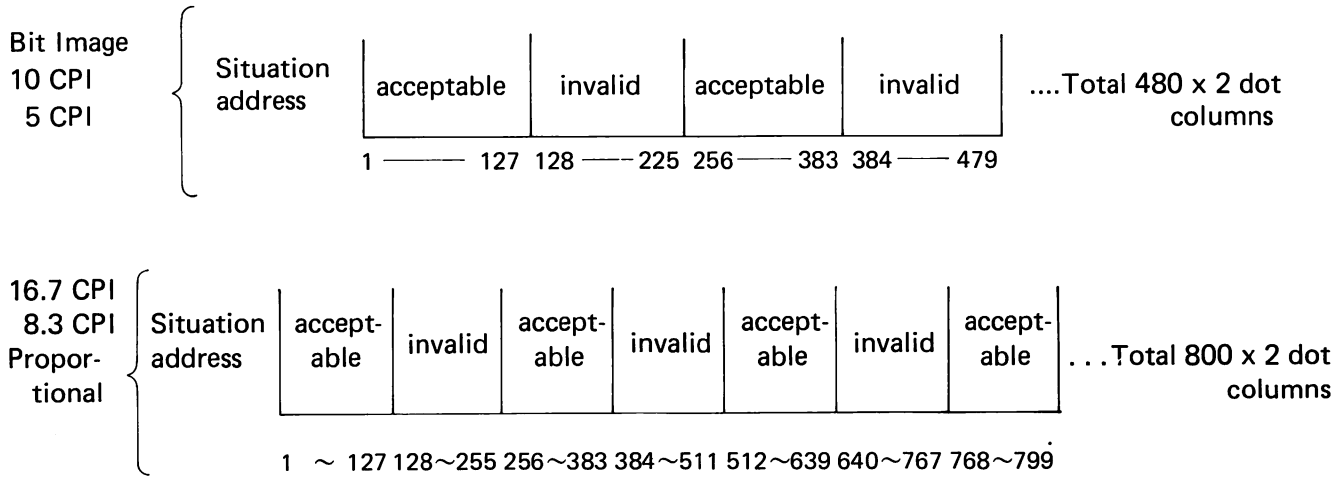
400 decimal = 01 90 hex = 00000001 10010000 binary

So the two-byte sequence would be: 00000001 binary followed by 10010000 binary. Using decimal numbers, this would be: 1 followed by 144.

If you are using a seven-bit serial printer interface, you cannot address all the dot positions, since the most significant bit of the second byte will always be zero. The following table shows which positions may be addressed in this situation.

Note: You cannot send code greater than decimal 255. To send 400, for example, use decimal 255 followed by decimal 145.

Invalid Address Zone in 7-bit Interfacing



· Proportional Spacing

In Data Processing or Word Processing mode, all printing can be left-justified to fit pre-printed forms and may be right-justified for word processing (using proportional spacing commands).
If you use proportional spacing at the start of line, text will move to the right by the amount of proportional spacing dot column. Inserting proportional spaces between words and/or characters, may extend the line length. The proportional spacing commands are as follows:

ASCII Symbol	Decimal	HEX. Code	Function
ESC SOH	27 01	1B 01	One Dot Space
ESC STX	27 02	1B 02	Two Dot Space
ESC ETX	27 03	1B 03	Three Dot Space
ESC EOT	27 04	1B 04	Four Dot Space
ESC ENQ	27 05	1B 05	Five Dot Space
ESC ACK	27 06	1B 06	Six Dot Space
ESC BEL	27 07	1B 07	Seven Dot Space
ESC BS	27 08	1B 08	Eight Dot Space
ESC HT	27 09	1B 09	Nine Dot Space

The following information should be considered when using proportional spacings.

Character Set	Dot Columns/Line	Normal Space (20 Hex.)	Dot Density (Inch/Dot)
Proportional character	1600	9 dot	0.0050
Elongated proportional character	1600	18 dot	0.0050
16.7 CPI character	1600	12 dot	0.0050
8.3 CPI character	1600	24 dot	0.0050
10 CPI character	960	12 dot	0.0083
5 CPI character	960	24 dot	0.0083

If a proportional space command is used at the end of text (exceeding a line length), it generates line-full condition. Printing will start and then proportional spacing command will be begun at the start of next line. If several kinds of proportional spacing commands are used in succession at the end of text, and if the row of proportional spacing commands cause a line-full condition, only the last proportional spacing command is set at the head of next line.

· Ignored or Undefined Code

In all three modes, several undefined codes are ignored or changed to "X" (invalid code). Details are as follows:

	Data Processing Mode	Word Processing Mode	Graphic Mode
Ignored Code	00 Hex. (00 Dec.) 01 Hex. (01 Dec.) 7F Hex. (127 Dec.) FF Hex. (255 Dec.) 13 Hex. (19 Dec.) 1E Hex. (30 Dec.) • Empty control codes and ESC sequence • Over limit POS sequence	00 Hex. (00 Dec.) 01 Hex. (01 Dec.) 7F Hex. (127 Dec.) FF Hex. (255 Dec.) 14 Hex. (20 Dec.) 1B(+)36 Hex.. (27(+)54 Dec.) 1E Hex. (30 Dec.) • Empty control codes and ESC sequence • Over limit POS sequence	All codes between 00 Hex. (00 Dec.) and 7F Hex. (127 Dec.) except LF, CR, ESC(+)SO, ESC(+)SI, ESC(+)POS(+)N1(+)N2, FS(+)N1(+)D and RS. • Empty control codes and ESC sequence • Wrong Repeat sequence data • Over limit POS sequence
Undefine Code (Changed to "X")	All codes between 00 and 1F Hex. (31 Dec.), 80 Hex (128 Dec.) and 9F Hex. (159 Dec.), or wrong Repeat sequence data except active function control code and above codes ignored. In proportional character condition C0 Hex. (192 Dec.) to FE Hex. (254 Dec.) are added to them.		None

Printer Status before Printing Begins

No.	Condition at Printing Start	Operation after Printing
1	Data Buffer receives full dot column data (Total dot counts becomes same as dots per line.) Refer to page 20. Double width (Elongated) character is counted as two characters as compared with ordinary size character.	After printing (unless CR code selected as CR = CR only option is received), subsequent printable characters received will be printed from start of next line. Refer to page 12.
2	Total dot count becomes larger than the limit of dots per line when a new character is added to the text. The text will be printed out in a line without the last character.	After printing, the last character received will be printed at the start position of next line. (Automatic line feed and carriage return will be executed before printing the last character).
3	The Printer has 160 receiving buffer memory location which store printable character data, command of character elongation, and underline information. If the buffer memory becomes full, all characters will be printed and buffer becomes empty.	Following characters will be printed in the same line successively (with no carriage return or line feed).
4	When print data for at least one character is in the buffer and carriage return code is received.	If CR = NL (refer to page 12) has been selected, the subsequent character received will be printed at the start of next line. And if CR = CR only (refer to page 12) option has been selected, the following character will be printed at the start of the same line. It causes overprinting.
5	When print data for at least one character is in the buffer and line feed code is received.	If LF = NL (refer to page 12) setting has been accomplished, the next character received will be printed at the start of next line. If LF = LF only option (refer to page 12) has been set, the subsequent characters will be printed from the next character position in the next line.
6	When print data for at least one character is in the buffer and the next data is not received within approximately one second.	After printing , subsequent characters will be printed in same line successively.
7	When print data for at least one character is in the buffer and POS sequence is received.	After printing, the next character continued from POS sequence will be printed at the designated dot address by POS command in the same line.
8	When print data for at least one character is in the buffer and BS command is received. (In Data Processing or Word Processing mode)	Next characters following BS sequence will be printed at the dot column address indicated by BS command in the same line.

No.	Condition at Printing Start	Operation after Printing
9	When print data for at least one character is in the buffer and the character set selection command is received as ESC DC1, ESC DC3, ESC DC4. If current character set selection code is received, it will be ignored and cause no action. (In Data Processing or Word Processing mode)	Following characters will be printed in the same line successively in the specified style. See page 15 in details.
10	When print data for at least one character is in the buffer and Graphic mode selection code (DC2) is received. (In Data Processing or Word Processing mode)	After printing, Graphic mode is selected and subsequent characters are managed as bit printing information. Then printing is executed from preceding character printed. See page 14 in details.
11	Under Graphic mode operation, when print data for at least one character is in the buffer and End Graphic command (RS) is received.	All data in the buffer is printed and the Printer is set into Data Processing Mode and 10 or 5 CPI character set condition. The next printable character will be printed from the successive position in the same line without Carriage Return or Line Feed.

Note 1:
- In the above table 1 to 7 numbered conditions are common in three independent mode (Data Processing, Word Processing and Graphic mode).
- 8 to 10 numbered conditions are common in both Data Processing and Word Processing mode.
- 11 numbered condition is acceptable only in Graphic mode.

Note 2:
- In the description, "next line" means the new line performed by line feed operation.
- In Data Processing mode, if Reverse Line Feed has been set in the memory, Line Feed operation will cause paper to move in reverse direction.

Note 3:
- Repeat data can cause line-full condition too.

Wrap-around

The Line Printer VIII is a dot-addressable printer, therefore line length is not determined by the number of characters, but by the number of dots. In Data Processing or Word Processing mode where 10 or 5 CPI character set is selected or in Graphic mode, the number of dots per line is 960.
In Data Processing or Word Processing mode where proportional character set and/or 16.7 or 8.3 CPI character set is selected, the number of dots per line is 1600. If the length of text received exceeds the limit of dots per line (by adding a last character size to the length of whole text) one Line Feed is inserted and the last character is printed from the start of new line. If you want to print two different dot density characters in the same line, calculation of line length is very confusing. Therefore, some spacing dots must be set between two different pitched characters. Please remember this when you calculate the total dots number of the text.
In Data Processing mode, Line Feed of Wrap-Around agrees with latched information (direction and pitch).

Control Code Summary

	CODE Hex.	CODE Dec.	SYM-BOL	Data Processing Mode	Word Processing Mode	Graphic Mode	Remarks
	00	00	NUL	Ignored	Ignored	Ignored	
	01	01	SOH				
⊙	08 nn	08 nn	BS	Back Space (nn = Binary) nn ; Back Spaced DOT number	Back Space (nn = Binary) nn ; Back Spaced DOT number	Ignored	
⊙	0A or 8A	10 or 138	LF	Executive Line Feed (Execute LF in accordance with pitch)	Full Line Feed (Executive)	5/48 inch Line Feed (Executive) ..... only 0A Hex.	LF/NL Selectable
	0D or 8D	13 or 141	CR	Carriage Return (When NL, LF pitch is latched one.)	Carriage Return (When NL, LF pitch is 1/6" per line.)	Carriage Return ..... only 0D Hex. (When NL, LF pitch is 10/96" per line.)	NL/CR, CR/CCR Selectable
	0E	14	SO	End Underline	End Underline	Ignored	
	0F	15	SI	Start Underline	Start Underline	Ignored	
	12	18	DC2	Select Graphic Mode	Select Graphic Mode	Ignored	
	13	19	DC3	Ignored	Select Data Processing Mode	Ignored	
	14	20	DC4	Select Word Processing Mode	Ignored	Ignored	
⊙	1B 01~09	27 01~09	ESC 01~09	Proportional Spacing (2nd Byte is dot column number.)	Proportional Spacing (2nd Byte is column number.)	Ignored	
	1B 0E	27 14	ESC SO	Start Elongation	Start Elongation	Start Elongation	
	1B 0F	27 15	ESC SI	End Elongation	End Elongation	End Elongation	
⊙	1B, 10 n1, n2	27, 16 n1, n2	ESC, POS n1, n2	Positioning (2 pitches are available.) (n1, n2 indicate dot position from Home position.)	Positioning (2 pitches are available.) (n1, n2 indicate dot position from Home position.)	Positioning (120 dot/inch) (n1, n2 indicate dot position from Home position.)	n1, n2: Binary value
	1B 11	27 17	ESC, DC1	Select Proportional Character 1	Select Proportional Character 1	Ignored	
	1B 13	27 19	ESC, DC3	Select Ordinary Character	Select Ordinary Character	Ignored	
	1B 14	27 20	ESC, DC4	Select Condensed Character	Select Condensed Character	Ignored	

Note: The computer may handle LF & CR codes differently.
The above information applies only to the printer operation.

CODE Hex.	CODE Dec.	SYM-BOL	Data Processing Mode	Word Processing Mode	Graphic Mode	Remarks
1B 0A	27 10	ESC, LF	Set Full Reverse Line Feed (No motion)	Full Reverse Line Feed (Executive)	Ignored	
1B 1C	27 28	ESC, FS	Set Half Forward Line Feed (No motion)	Half Forward Line Feed (Executive)	Ignored	
1B 1E	27 30	ESC, RS	Set Half Reverse Line Feed (No motion)	Half Reverse Line Feed (Executive)	Ignored	
1B 36	27 54	ESC 6	Set Full Forward Line Feed (No motion)	Ignored	Ignored	
1B 38	27 56	ESC 8	Set 3/4 Forward Line Feed (No motion)	3/4 Forward Line Feed	Ignored	
1C n1, n2	28 n1, n2	FS n1, n2	Repeat Print Data (Undefined Code is changed to " ⧖ ".)	Repeat Print Data (Undefined Code is changed to " ⧖ ".)	Repeat Print Data (If MSB = 0, Data is ignored.)	
1E	30	RS	Ignored	Ignored	End Graphic Mode	
7F	127	DEL	Ignored	Ignored	Ignored	
FF	255	DEL	Ignored	Ignored	(Printing Data)	
Other Codes in Function Area (0~1F Hex.)			Prints " ⧖ " marks	Prints " ⧖ " marks	Ignored	
Other Cords in Function Area (80~9F Hex.)			Prints " ⧖ "marks	Prints " ⧖ " marks	(Printing Data)	

CHARACTER SETS

The Line Printer VIII has 349 dot matrix patterns in the ROM (Read Only Memory). The following is a table of the character codes.

Character Code Table

b8	b7	b6	b5	b4	b3	b2	b1	H / L	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
				0	0	0	0	0	NUL	POS	(Space)	0	@	P	`	p			/ (¥)	¥ (−)	(タ)	(ミ)	(Blank)	⌐
				0	0	0	1	1	SOH	DCI	!	1	A	Q	a	q			á (◦)	Ä (ア)	(チ)	(ム)	▪	−
				0	0	1	0	2	STX	DC2	"	2	B	R	b	r			ç (「)	Ö (イ)	(ツ)	(メ)	▪	¬
				0	0	1	1	3	ETX	DC3	#	3	C	S	c	s			£ (」)	Ü (ウ)	(テ)	(モ)	▪	⊤
				0	1	0	0	4	EOT	DC4	$	4	D	T	d	t			◀ (・)	¢ (エ)	(ト)	(ヤ)	▪	⊢
				0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u			μ (・)	~ (オ)	(ナ)	(ユ)	▚	+
				0	1	1	0	6	ACK	SYN	&	6	F	V	f	v			° (ヲ)	ä (カ)	(ニ)	(ヨ)	▞	└
				0	1	1	1	7	BEL	ETB	'	7	G	W	g	w			▼ (ア)	ö (キ)	(ヌ)	(ラ)	▬	┘
				1	0	0	0	8	BS	CAN	(	8	H	X	h	x			† (イ)	ü (ク)	(ネ)	(リ)	▂	┴
				1	0	0	1	9	HT	EM	)	9	I	Y	i	y			§ (ウ)	ß (ケ)	(ノ)	(ル)	▌	┤
				1	0	1	0	10	LF	SUB	*	:	J	Z	j	z	LF		® (エ)	TM (コ)	(ハ)	(レ)	▌	+
				1	0	1	1	11	VT	ESC	+	;	K	[(↑)	k	{			© (オ)	é (サ)	(ヒ)	(ロ)	▛	◤
				1	1	0	0	12	FF	FS	,	<	L	\ (↓)	l	¦			¼ (ヤ)	ù (シ)	(フ)	(ワ)	▜	◢
				1	1	0	1	13	CR	GS	−	=	M	] (←)	m	}	CR		¾ (ユ)	è (ス)	(ヘ)	(ン)	▙	◥
				1	1	1	0	14	SO	RS	.	>	N	^ (→)	n	~			⅛ (ヨ)	¨ (セ)	(ホ)	(゛)	▟	◣
				1	1	1	1	15	SI	US	/	?	O	− (−)	o	(DEL)			¶ (ツ)	f (ソ)	(マ)	(゜)	■	(DEL)

NOTE: Mask parts are function codes area.

The printable characters may be classified as follows.

- **Proportional**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 32 characters
- **Elongated Proportional**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 32 characters
- **Condensed (16.7 CPI)**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 25 characters
  - Japanese Kana . . . . . 64 characters
  - Block Graphic . . . . . 30 characters

  > Selectable by switch
- **Elongated Condensed (8.3 CPI))**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 25 characters
  - Japanese Kana . . . . . 64 characters
  - Block Graphic . . . . . 30 characters

  > Selectable by switch
- **Ordinary (10 CPI)**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 25 characters
  - Japanese Kana . . . . . 64 characters
  - Block Graphic . . . . . 30 characters

  > Selectable by switch
- **Elongated Ordinary (5 CPI)**
  - ASCII . . . . . 94 characters
  - European Symbol . . . . . 25 characters
  - Japanese Kana . . . . . 64 characters
  - Block Graphic . . . . . 30 characters

  > Selectable by switch

96 ASCII Code

ASCII Character Sets

Code			Char.	Code			Char.	Code			Char.
Dec.	Hex	Oct.		Dec.	Hex	Oct.		Dec.	Hex	Oct.	
32	20	40	(Space)	64	40	100	@	96	60	140	`
33	21	41	!	65	41	101	A	97	61	141	a
34	22	42	"	66	42	102	B	98	62	142	b
35	23	43	#	67	43	103	C	99	63	143	c
36	24	44	$	68	44	104	D	100	64	144	d
37	25	45	%	69	45	105	E	101	65	145	e
38	26	46	&	70	46	106	F	102	66	146	f
39	27	47	'	71	47	107	G	103	67	147	g
40	28	50	(	72	48	110	H	104	68	150	h
41	29	51	)	73	49	111	I	105	69	151	i
42	2A	52	*	74	4A	112	J	106	6A	152	j
43	2B	53	+	75	4B	113	K	107	6B	153	k
44	2C	54	,	76	4C	114	L	108	6C	154	l
45	2D	55	–	77	4D	115	M	109	6D	155	m
46	2E	56	.	78	4E	116	N	110	6E	156	n
47	2F	57	/	79	4F	117	O	111	6F	157	o
48	30	60	0	80	50	120	P	112	70	160	p
49	31	61	1	81	51	121	Q	113	71	161	q
50	32	62	2	82	52	122	R	114	72	162	r
51	33	63	3	83	53	123	S	115	73	163	s
52	34	64	4	84	54	124	T	116	74	164	t
53	35	65	5	85	55	125	U	117	75	165	u
54	36	66	6	86	56	126	V	118	76	166	v
55	37	67	7	87	57	127	W	119	77	167	w
56	38	70	8	88	58	130	X	120	78	170	x
57	39	71	9	89	59	131	Y	121	79	171	y
58	3A	72	:	90	5A	132	Z	122	7A	172	z
59	3B	73	;	91	5B	133	[(↑)	123	7B	173	{
60	3C	74	<	92	5C	134	\ (↓)	124	7C	174	¦
61	3D	75	=	93	5D	135	] (←)	125	7D	175	}
62	3E	76	>	94	5E	136	∧ (→)	126	7E	176	~
63	3F	77	?	95	5F	137	– (–)				

NOTE: 1. Codes 5B Hex (91 Dec) through 5F Hex (95 Dec) can be changed to the characters within parentheses by setting the Function Selection switch 7 to CLOSE (opposite to OPEN). See page 12.

2. The number of dots comprising the following characters are reduced by one dot in 10, 5, 16.7, 8.3 CPI character set and by one or two dots in proportional character set.

   Small letter g, j (one dot), p,q,y, – (underscore)

3. The different Character sizes of proportional characters are shown on page .

4. In Proportional Character set condition, all descenders are reduced only one dot when continuous underscore is printed at a time.

32 European Symbol Code

10, 5, 16.7, 8.3 CPI Character Set

Code			Char.
Dec.	Hex	Oct.	
160	A0	240	(Blank)
161	A1	241	á
162	A2	242	ç
163	A3	243	£
164	A4	244	(Blank)
165	A5	245	μ
166	A6	246	°
167	A7	247	▼
168	A8	250	†
169	A9	251	§
170	AA	252	(Blank)
171	AB	253	©
172	AC	254	¼
173	AD	255	(Blank)
174	AE	256	½
175	AF	257	¶
176	B0	260	¥
177	B1	261	Ä
178	B2	262	Ö
179	B3	263	Ü
180	B4	264	¢
181	B5	265	(Blank)
182	B6	266	ä
183	B7	267	ö
184	B8	270	ü
185	B9	271	β
186	BA	272	(Blank)
187	BB	273	e
188	BC	274	ù
189	BD	275	è
190	BE	276	(Blank)
191	BF	277	f

Proportional Character Set

Code			Char.
Dec.	Hex	Oct.	
160	A0	240	'
161	A1	241	á
162	A2	242	ç
163	A3	243	£
164	A4	244	`
165	A5	245	μ
166	A6	246	°
167	A7	247	▼
168	A8	250	†
169	A9	251	§
170	AA	252	®
171	AB	253	©
172	AC	254	¼
173	AD	255	¾
174	AE	256	½
175	AF	257	¶
176	B0	260	¥
177	B1	261	Ä
178	B2	262	Ö
179	B3	263	Ü
180	B4	264	¢
181	B5	265	~
182	B6	266	ä
183	B7	267	ö
184	B8	270	ü
185	B9	271	β
186	BA	272	TM
187	BB	273	é
188	BC	274	ù
189	BD	275	è
190	BE	276	¨
191	BF	277	f

NOTE: 1. The "optimizer function" allows the following: If a spacing code (fixed space and/or proportional space) is received, the carriage moves only the shortest distance, and the action will take place without unnecessary movement. This saves printing time. When the character data (SP, proportional space or printable code) are sent to the Printer within a 1 sec interval, the Printer automatically stores them until: (1) Function codes are sent (2) when the interval is greater than 1 sec. The printing is then executed. (See page 22). If a blank code (in the left table) is received under 10, 5, 16.7, 8.3 CPI character set condition, the carriage will move in the same manner as when receiving a printable character. When printing, the use of blank code can be very convenient, and produce attractive/useful printouts.

2. The number of dots comprising the following characters are reduced by one dot in 10, 5, 16.7, 8.3 CPI.

   ç , §

3. The number of dots comprising the following characters are reduced by one or two dots in proportional character set. But all of them are reduced only one dot when continuous underscore is printed at a time.

   ç , μ , § (one dot), β (one dot) , f (one dot)

32 Block Graphic Code

10, 5, 16.7, 8.3 CPI Character Set

Code			Char.	Code			Char.
Dec.	Hex	Oct.		Dec.	Hex	Oct.	
224	E0	340	(Blank)	240	F0	360	
225	E1	341		241	F1	361	
226	E2	342		242	F2	362	
227	E3	343		243	F3	363	
228	E4	344		244	F4	364	
229	E5	345		245	F5	365	
230	E6	346		246	F6	366	
231	E7	347		247	F7	367	
232	E8	350		248	F8	370	
233	E9	351		249	F9	371	
234	EA	352		250	FA	372	
235	EB	353		251	FB	373	
236	EC	354		252	FC	374	
237	ED	355		253	FD	375	
238	EE	356		254	FE	376	
239	EF	357					

NOTE: 1. When Proportional character set condition is selected, these character will be changed to "X" mark (invalid code).

2. These characters are composed of six vertical dots. When using these codes to prepare diagrams, line feed should be set to "half line in forward". If other paper feed pitch is used, the diagram will not be accurate.

64 Japanese Kana Code

10, 5, 16.7, 8.3 CPI Character Set

Code			Char.	Code			Char.
Dec.	Hex.	Oct.		Dec.	Hex.	Oct.	
160	A0	240	¥	192	C0	300	タ
161	A1	241	。	193	C1	301	チ
162	A2	242	「	194	C2	302	ツ
163	A3	243	」	195	C3	303	テ
164	A4	244	、	196	C4	304	ト
165	A5	245	・	197	C5	305	ナ
166	A6	246	ヲ	198	C6	306	ニ
167	A7	247	ア	199	C7	307	ヌ
168	A8	250	イ	200	C8	310	ネ
169	A9	251	ウ	201	C9	311	ノ
170	AA	252	エ	202	CA	312	ハ
171	AB	253	オ	203	CB	313	ヒ
172	AC	254	ヤ	204	CC	314	フ
173	AD	255	ユ	205	CD	315	ヘ
174	AE	256	ヨ	206	CE	316	ホ
175	AF	257	ツ	207	CF	317	マ
176	B0	260	−	208	D0	320	ミ
177	B1	261	ア	209	D1	321	ム
178	B2	262	イ	210	D2	322	メ
179	B3	263	ウ	211	D3	323	モ
180	B4	264	エ	212	D4	324	ヤ
181	B5	265	オ	213	D5	325	ユ
182	B6	266	カ	214	D6	326	ヨ
183	B7	267	キ	215	D7	327	ラ
184	B8	270	ク	216	D8	330	リ
185	B9	271	ケ	217	D9	331	ル
186	BA	272	コ	218	DA	332	レ
187	BB	273	サ	219	DB	333	ロ
188	BC	274	シ	220	DC	334	ワ
189	BD	275	ス	221	DD	335	ン
190	BE	276	セ	222	DE	336	゛
191	BF	277	ソ	223	DF	337	゜

NOTE: 1. If you want to generate Japanese Kana in 10, 5, 16.7, and 8.3 CPI Character Set condition, set the Function Selection switch 8 to CLOSE (opposite to OPEN).

2. European Symbol set codes are overlapped in Codes A0 Hex (160 Dec) through BF Hex (191 Dec). You must select one set from two character sets.

Proportional Character Set

Propotional characters are selected by using ESC DC1 control code sequence. The characters are composed by 9xN dot matrix. These widths (N) vary from 9 dot columns to 23 dot columns. Since all proportional numerals are composed of the same number of dots the horizontal axis (15 dot columns), tabulation of numbers are aligned vertically.

· Proportional Character Code Table

The following lists all printable proportional characters:

Code			Char.	Width	Code			Char.	Width	Code			Char.	Width	Code			Char.	Width
Dec.	Hex	Oct.			Dec.	Hex	Oct.			Dec.	Hex	Oct.			Dec.	Hex	Oct.		
32	20	40	(Space)	09	64	40	100	@	17	96	60	140	`	09	160	A0	240	´	10
33	21	41	!	09	65	41	101	A	19	97	61	141	a	16	161	A1	241	á	16
34	22	42	"	12	66	42	102	B	18	98	62	142	b	15	162	A2	242	ç	14
35	23	43	#	18	67	43	103	C	17	99	63	143	c	12	163	A3	243	£	21
36	24	44	$	17	68	44	104	D	19	100	64	144	d	15	164	A4	244	\	10
37	25	45	%	19	69	45	105	E	17	101	65	145	e	15	165	A5	245	µ	19
38	26	46	&	17	70	46	106	F	17	102	66	146	f	12	166	A6	246	°	10
39	27	47	'	09	71	47	107	G	19	103	67	147	g	15	167	A7	247	▼	09
40	28	50	(	09	72	48	110	H	19	104	68	150	h	15	168	A8	250	†	15
41	29	51	)	09	73	49	111	I	12	105	69	151	i	10	169	A9	251	§	17
42	2A	52	*	15	74	4A	112	J	17	106	6A	152	j	09	170	AA	252	®	19
43	2B	53	+	15	75	4B	113	K	19	107	6B	153	k	15	171	AB	253	©	19
44	2C	54	,	09	76	4C	114	L	17	108	6C	154	l	10	172	AC	254	¼	19
45	2D	55	–	15	77	4D	115	M	21	109	6D	155	m	19	173	AD	255	¾	22
46	2E	56	.	09	78	4E	116	N	19	110	6E	156	n	15	174	AE	256	½	19
47	2F	57	/	15	79	4F	117	O	19	111	6F	157	o	15	175	AF	257	¶	15
48	30	60	0	15	80	50	120	P	18	112	70	160	p	15	176	B0	260	¥	19
49	31	61	1	15	81	51	121	Q	17	113	71	161	q	16	177	B1	261	Ä	19
50	32	62	2	15	82	52	122	R	19	114	72	162	r	12	178	B2	262	Ö	19
51	33	63	3	15	83	53	123	S	15	115	73	163	s	15	179	B3	263	Ü	19
52	34	64	4	15	84	54	124	T	17	116	74	164	t	12	180	B4	264	¢	17
53	35	65	5	15	85	55	125	U	19	117	75	165	u	15	181	B5	265	~	15
54	36	66	6	15	86	56	126	V	19	118	76	166	v	15	182	B6	266	ä	16
55	37	67	7	15	87	57	127	W	23	119	77	167	w	19	183	B7	267	ö	15
56	38	70	8	15	88	58	130	X	19	120	78	170	x	15	184	B8	270	ü	15
57	39	71	9	15	89	59	131	Y	19	121	79	171	y	15	185	B9	271	ß	19
58	3A	72	:	09	90	5A	132	Z	13	122	7A	172	z	13	186	BA	272	TM	19
59	3B	73	;	09	91	5B	133	[(↑)	15(15)	123	7B	173	{	12	187	BB	273	e	15
60	3C	74	<	13	92	5C	134	\ (↓)	15(15)	124	7C	174	¦	09	188	BC	274	ù	15
61	3D	75	=	15	93	5D	135	] (←)	15(19)	125	7D	175	}	12	189	BD	275	è	15
62	3E	76	>	13	94	5E	136	^ (→)	17(19)	126	7E	176	~	15	190	BE	276	¨	15
63	3F	77	?	15	95	5F	137	_ (–)	19(15)						191	BF	277	ƒ	15

· Proportional Character Set Dots Per Column

(Codes are in Decimal and Hexadecimal.)

9 DOTS	10 DOTS	12 DOTS	13 DOTS	14 DOTS
Space – 32/20	i – 105/69	" – 34/22	< – 60/3C	ç – 162/A2
! – 33/21	l – 108/6C	I – 73/49	> – 62/3E	
acute – 39/27	° – 166/A6	c – 99/63	Z – 90/5A	
(– 40/28		f – 102/66	z – 122/7A	
) – 41/29		r – 114/72		
comma – 44/2C		t – 116/74		
. – 46/2E		{ – 123/7B		
: – 58/3A		} – 125/7D		
; – 59/3B				
' – 96/60				
j – 106/6A				
¦ – 124/7C				
' – 167/A7				

15 DOTS			
* – 42/2A	S	– 83/53	s – 115/73
+ – 43/2B	[	– 91/5B	u – 117/75
– – 45/2D	\	– 92/5C	v – 118/76
/ – 47/2F	]	– 93/5D	x – 120/78
0 – 48/30	↑	– 91/5B (TANDY)	y – 121/79
1 – 49/31	↓	– 92/5C (TANDY)	∿ – 126/7E
2 – 50/32	underline(2)	– 95/5F (TANDY)	† – 168/A8
3 – 51/33	b	– 98/62	‖ – 175/AF
4 – 52/34	d	– 100/64	~ – 181/B5
5 – 53/35	e	– 101/65	ö – 183/B7
6 – 54/36	g	– 103/67	ü – 184/B8
7 – 55/37	h	– 104/68	é – 187/BB
8 – 56/38	k	– 107/6B	ù – 188/BC
9 – 57/39	n	– 110/6E	è – 189/BD
= – 61/3D	o	– 111/6F	¨ – 190/BE
? – 63/3F	p	– 112/70	*f* – 191/BF

16 DOTS

a – 97/61
q – 113/71
' – 160/A0
à – 161/A1
` – 164/A4
ä – 182/B6

17 DOTS

$ – 36/24
& – 38/26
@ – 64/40
C – 67/43
E – 69/45
F – 70/46
J – 74/4A
L – 76/4C
Q – 81/51
T – 84/54
^ – 94/5E
§ – 169/A9
¢ – 180/B4
☒ – (Undefined code)

18 DOTS

– 35/23
B – 66/42
P – 80/50

19 DOTS

% – 37/25
A – 65/41
D – 68/44
G – 71/47
H – 72/48
K – 75/4B
N – 78/4E
O – 79/4F
R – 82/52
U – 85/55
V – 86/56
X – 88/58
Y – 89/59
Underline(1) – 95/5F
← – 93/5D (TANDY)
→ – 94/5E (TANDY)
m – 109/6D
w – 119/77

20 DOTS

µ – 165/A5
® – 170/AA
© – 171/AB
¼ – 172/AC
½ – 174/AE
¥ – 176/B0
Ä – 177/B1
Ö – 178/B2
Ü – 179/B3
ß – 185/B9
™ – 186/BA

21 DOTS

M – 77/4D
£ – 163/A3

22 DOTS

¾ – 173/AD

23 DOTS

W – 87/57

Printing Samples

○ Proportional Normal

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~´áçÆ` µ°†§®©¼¾½¶¥ÄÖÜ¢~äöüßᵀᴹéùè¨ƒ
```

○ Proportional Elongated

```
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
´áçÆ` µ°†§®©¼¾½¶¥ÄÖÜ¢~äöüßᵀᴹéùè¨ƒ
```

○ 16.7 CPI (Condensed Normal)

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~ áçÆ µ°†§ ©¼ ½¶¥ÄÖÜ¢ äöüß éùè ƒ
```

○ 8.3 CPI (Condensed Elongated)

```
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
 áçÆ µ°†§ ©¼ ½¶¥ÄÖÜ¢ äöüß éùè ƒ
```

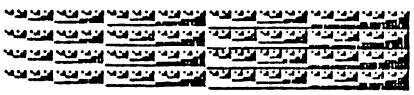
○ 10 CPI (Ordinary Normal)

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~ áçÆ µ°†§ ©¼ ½¶¥ÄÖÜ¢ äöüß éùè ƒ
```

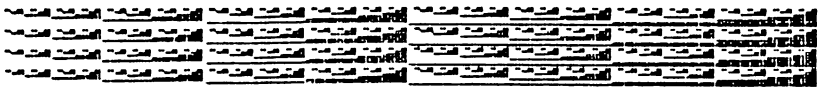
○ 5 CPI (Ordinary Elongated)

```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~
 áçÆ µ°†§ ©¼ ½¶¥ÄÖÜ¢ äöüß éùè ƒ
```

○ Graphic (Bit Image)



○ Graphic (Elongated)



PROGRAMMING INFORMATION

The following items should be considered when you program the Computer.

1. When Printer Power is turned on;
   - Data Processing Mode is selected.
   - Full Forward Line Feed is selected.
   - 10 CPI (Ordinary Normal) monospaced character set is selected (8x9 Matrix).
   - Underline is not set.
   - Buffer memory is completely cleared.
2. Ordinary (10 or 5 CPI) characters can be intermixed with proportional or condensed characters in the same line. However, the printer will insert dot spaces to ensure that the new dot position is valid for the current character size. This may cause unexpected auto-wrap-around. To prevent this, intermix characters only on short lines, or don't mix character sizes on the same line.
3. Since a proportional spacing command may be used in any character set condition, right-justification can be performed. You must consider that proportional spacing commands can indicate up to 9 dot spacing while using ordinary (10 or 5 CPI) or condensed (16.7 or 8.3) characters, therefore, a normal space 20 Hex (32 Dec) gives 12 or 24 dot spaces. For instance, if you want to set additional 11 dot spaces between letters, you must use two proportional spacing commands as ESC HT and ESC STX.
4. Elongated (Double-width) characters and Underline are not terminated at the end of the line and Printing them continues until a terminating command is received.
5. You should avoid wrap-around. Wrap-around will disturb the dot count of the text in a line.
6. Back space is performed in the same manner under any character set condition. This command indicates the number of dots to back space.
7. If block graphic character codes (EO Hex thru FE Hex — 224 Dec through 254 Dec) is accessed in proportional character mode, these codes will be converted to an invalid code (X mark).
8. For CR or LF function, refer to page 16, 17.
9. In the Repeat Data command, printable characters can be repeated as many times as provided for in the count number. If any function code is received for repetition, it will be considered an invalid symbol (X-mark).
10. POS command can be used at any carriage position. If designated dot column address is in the current text which is already printed out, over print will occur.
11. Under block graphic printing, Half Line Feed Forward should be used for printing of diagrams.
12. Line Feed in Graphic mode is different from Line Feed pitches in Data Processing or Word Processing mode. It will generate an odd vertical spacing in Graphic mode while the other modes intermix in a form. Consider the following relationship between Line Feed pitches.

    5 times of Full Line Feed = 8 times of Graphic Line Feed
    5 times of 3/4 Line Feed = 6 times of Graphic Line Feed
    5 times of Half Line Feed = 4 times of Graphic Line Feed

106 graphic lines = 106/48 in = 53/24 in = 11 1/24 = 11 1/2 in (1 in out in 24 check)

Programming Examples

Note to Model II Programmers:
If the Printer goes off-line during a print operation, and remains off-line for a certain period of time, Model II TRSDOS will present an error message to the applications program should be written to trap such errors, inform the operator of the error condition, and give the operator a chance to correct the condition and continue printing. If it is a BASIC applications program, an I/$\overline{O}$ error will occur, and the operator may type CONT [ENTER]

The BASIC statements LPRINT and LLIST output to the Line Printer. See Your Computer's Reference Manual for syntax details. If you have a Color Computer, read all LPRINT as PRINT #−2.

Examples:

LLIST

Lists the resident program to the Printer.

LPRINT "THIS IS A TEST"

Prints the message in quotes and tells the Printer that the next printable character brings a new line.

LPRINT "THIS IS PART OF A LINE"; : LPRINT "THIS IS THE REST"

Prints both messages on the same line (because of the semicolon).
The next printable character received starts a new line.

LPRINT "SMALL"; CHR$(27); CHR$(14); "LARGE"; CHR$(27); CHR$(15); "SMALL AGAIN"

Prints both normal and elongated characters on the same line.

LPRINT CHR$(27); CHR$(17); "PROPORTIONAL"; CHR$(27); CHR$(20); "CONDENSED"; CHR$(27); CHR$(19); "ORDINARY AGAIN"

Prints proportional, condensed, and ordinary characters in the same line.

LPRINT "X"; CHR$(20); CHR$(27); CHR$(30); "2"; CHR$(26); CHR$(28); "+ X = Y"

Prints an algebraical function expression $X^2 + X = Y$.

LPRINT "H"; CHR$(27); CHR$(28); "2"; CHR$(27); CHR$(30); "0"

Prints the formula of water (H_2O).

LPRINT CHR$(19); "START"; CHR$(27); CHR$(56); CHR$(138); "ONE LINE"; CHR$(138); "TWO LINE"

Prints these letters at 3/4 line pitch.

LPRINT CHR$(15); "UNDERLINE"; CHR$(14); "WITHOUT UNDERLINE"

Prints both messages underlined and non-underlined in the same line.

LPRINT "BOLD LETTERS"; CHR$(08); CHR$(143); "BOLD LETTERS"

Prints Bold letters by using Back Space command.

LPRINT CHR$(28); CHR$(9); "ABC"

Prints 9 characters of "A" and one characters "BC"

LPRINT CHR$(13); CHR$(27); CHR$(16); CHR$(01); CHR$(44); "300TH POSITION"

Prints above message from 300th column address.

LPRINT CHR$(27); CHR$(17); "A"; CHR$(27); CHR$(09); "B"; CHR$(27); CHR$(06); "C"; CHR$(27); CHR$(03); "DE"

Prints ABCDE by using proportional spacing.

LPRINT CHR$(18); CHR$(255); CHR$(247); CHR$(227); CHR$(193); CHR$(227); CHR$(247); CHR$(255); CHR$(30)

Prints a special symbol in Graphic mode.

Superscript and Subscript

Since the Line Printer VIII can a operate bi-directional paper feed, it can print superscript and subscript (above and below the line). When you want to use these printing, set the mode to Word Processing.

Printing and Programing Example

Note: Set the Function Selection switch 6 to OPEN, and 7 to CLOSE.

○ Printing Example

$$2MnO_4^- + 3Mn^{++} + 7H_2O \rightarrow 5H_2MnO_3 \downarrow + 4H^+$$

○ Programing Example (BASIC)

```
LPRINT "2M"; CHR$(110); "0"; CHR$(27); CHR$(28); "4"; CHR$(27); CHR$(30); CHR$(27);
CHR$(30); "−"; CHR$(27); CHR$(28); "+3M"; CHR$(110); CHR$(27); CHR$(30); "++"; CHR$
(27); CHR$(28); "+7H"; CHR$(27); CHR$(28); "2"; CHR$(27); CHR$(30);
LPRINT "0"; CHR$(94); "5H"; CHR$(27); CHR$(28); "2"; CHR$(27); CHR$(30); "M"; CHR$
(110); "0"; CHR$(27); CHR$(28); "3"; CHR$(27); CHR$(30); CHR$(92); "+4H"; CHR$(27);
CHR$(30); "+"; CHR$(27); CHR$(28); CHR$(27); CHR$(28)
```

Right Justification

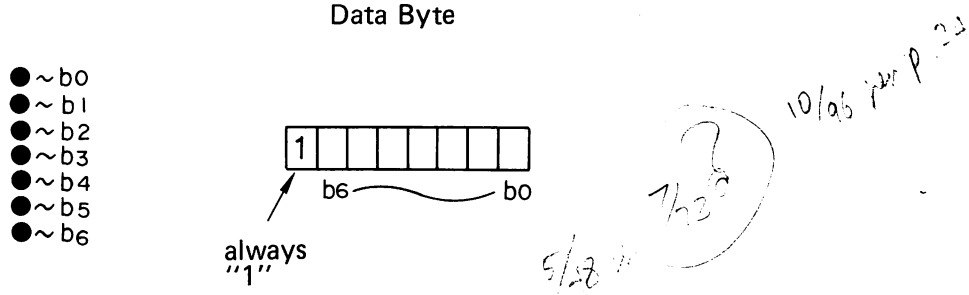
Data printed using any character set may be justified by the Computer program. The justification control is set by using proportional spacing commands anywhere within a line of data either between words or between characters. The proportional spacing commands are shown on page 20.

Line length can be increased by inserting dot spaces between words and/or characters within a line of data. Line length can be shorten by replacing normal space (20 Hex – 32 Dec) with proportional spacing. You should notice the number of dots per line when you attempt to justify text. Details are mentioned on page 20.

NOTE: When preparing the Computer for right-justification programs, be careful not to let the text exceed the number of dots per line. This causes wrap-around and the length of the next line will be increased.

Graphic Printing

In the graphics mode, printable data must be in the range 128 — 255 (i.e., the high bit is always "on"). This mode allows you to print any combination of seven dots in a dot column. Each dot is controlled by one bit in the data byte:



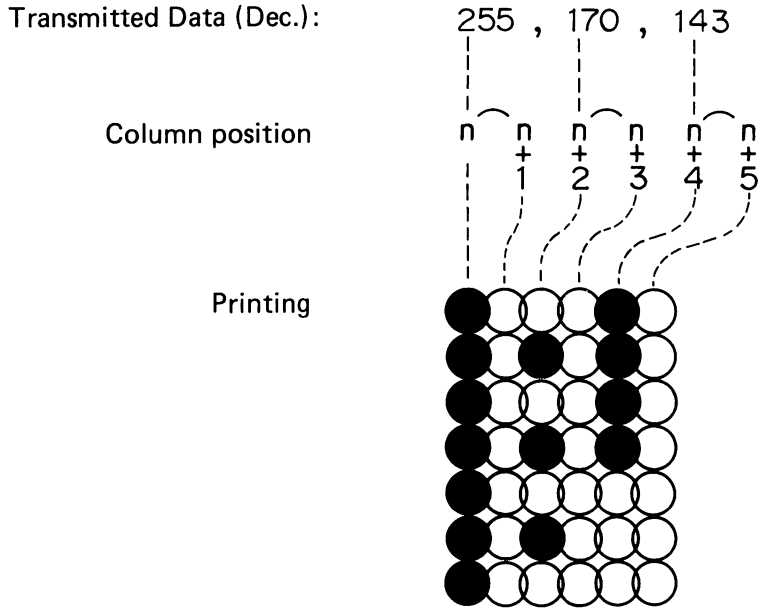
In this mode, the line advance moves the paper up approximately 0.1 inch. This small paper advance allows for continuous printing without unwanted space between lines.

The POS and REPEAT control functions are especially useful in the graphics mode, as when plotting a few points on a line.

There are 480 addressable dot columns in the graphics mode, numbered from 0 — 479. See Positioning, page 19, for further details.

In this mode, the dot density is set to 960 dots-per-line. All printable data received are regarded as 2-dot-column data in the Printer, so they are printed at even dot-column position. See following example.

Example



When you exit from the graphics mode, the previous on/off conditions of the underline switches are restored.

INTERFACING

The Line Printer VIII has two kinds of interface. The primary is 8-bit parallel interface with strobe signal. The secondary is 8-bit or 7-bit 3-wire serial interface. Each interface will be selected by setting of Function Selection switch 3. Refer to page 12.

Parallel Interface

A 36-pin plastic female connector located at the right rear of the printer provides the means for connecting the printer to a Computer.
The pin arrangement of the connector, signal summary, and the interface timing are shown below.

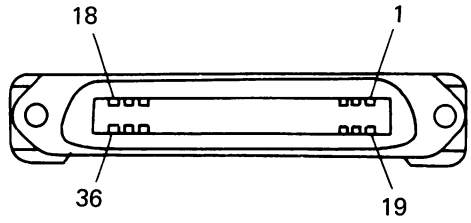
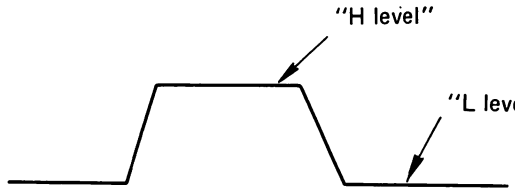


Fig. 8 Pin Arrangement

SIGNAL PIN	RETURN PIN	DESCRIPTION
1	19	$\overline{\text{STROBE}}$
2	20	DATA 1
3	21	DATA 2
4	22	DATA 3
5	23	DATA 4
6	24	DATA 5
7	25	DATA 6
8	26	DATA 7
9	27	DATA 8
10	28	$\overline{\text{ACK}}$
11	29	BUSY
12	—	PE
13	—	SELECT
14	—	OV
15	—	NC (Not Used)
16	—	OV
17	—	CHASSIS GROUND
18	—	5V (80 mA)
30	—	OV
31	—	NC
32	—	$\overline{\text{FAULT}}$
33	—	NC
34	—	NC (Not Used)
35	—	NC
36	—	NC

○ Signal Level



"H level" . . . . . 2.4 ~ 5.0V
"L level" . . . . . 0 ~ 0.4V

○ Allowable Cable Length

Twisted pair cable	Up to 5m
Flat cable	Up to 2m (refer to page 9)

○ Parallel Interface Timing

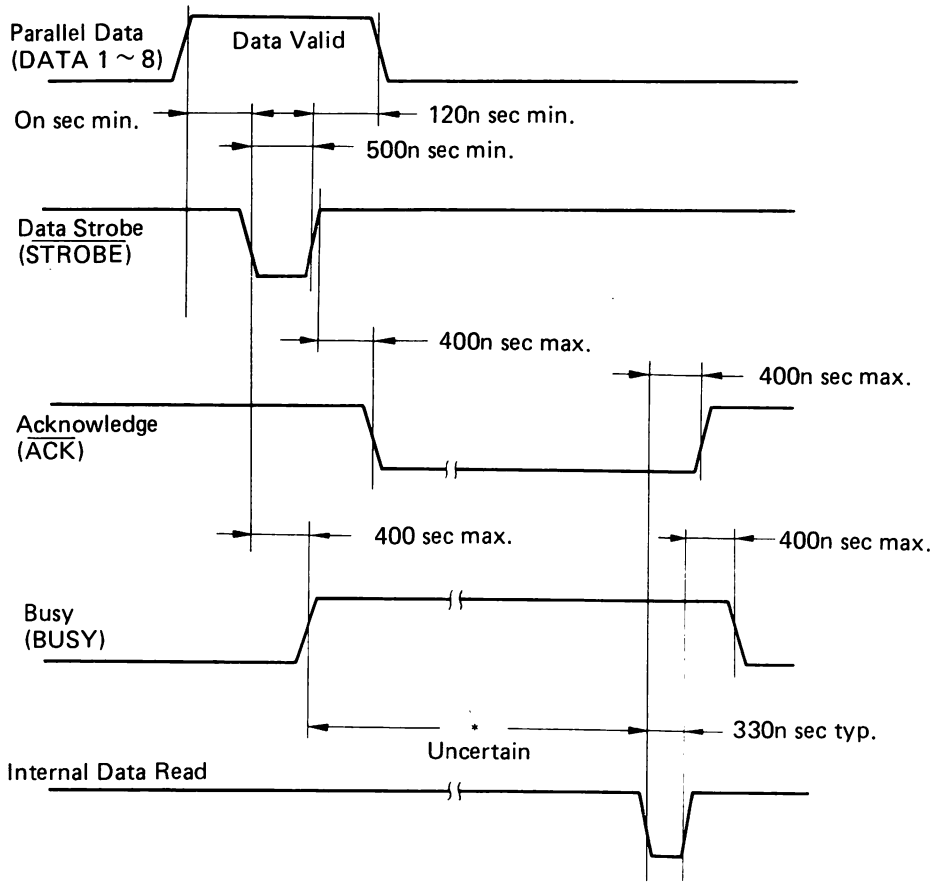


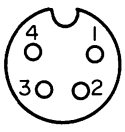
Fig. 9 Parallel Interface Timing

* 250 μsec minimum
  In the case of discontinuous transmission or Function Code transmission, the Busy Condition occupies much time.

Serial Interface

A four-pin plastic female connector located at center rear of the printer provides the means for connecting the printer to a Computer. The serial interface will be selected by setting of Function Selection switch 3 (to the CLOSE side) from two rates (600 BPS and 1200 BPS) by Function Selection switch 2 which OPEN side designates 1200 BPS and CLOSE side designates 600 BPS. Other than above mentioned selection, 7-bit serial or 8-bit serial may be selected by Function Selection switch 1 which OPEN side designates 8-bit serial and CLOSE side designates 7-bit serial. Function Selection switch 1 and 2 are activated only in the serial interface condition.

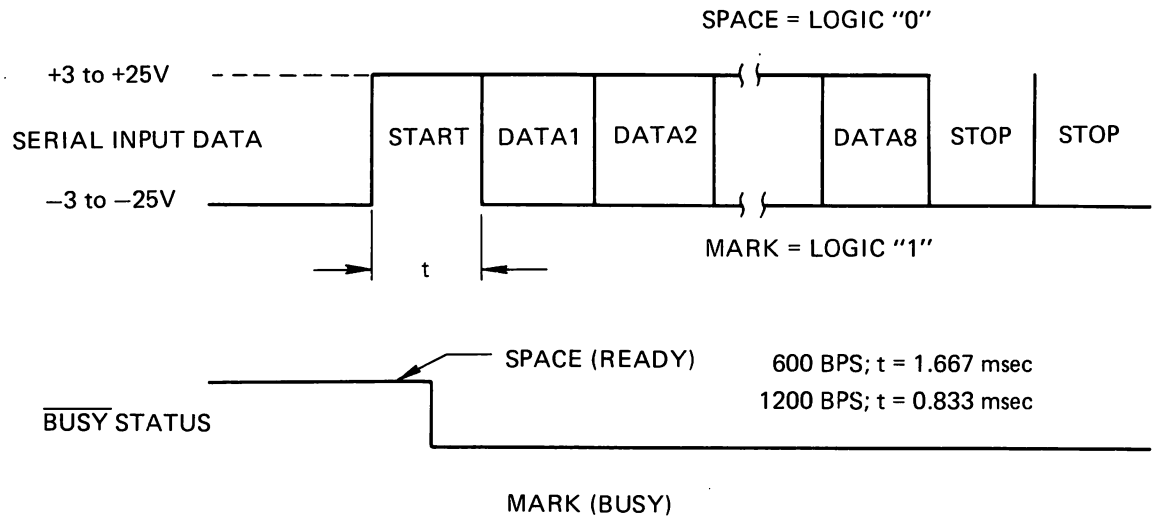
○ **Pin-Configuration of serial RS-232C DIN Jack**



DIN Jack

Pin No.	Signal	
1	NOT USED	white
2	$\overline{\text{BSY}}$	Blue
3	GND	Green
4	$\overline{\text{DATA}}$	white

○ **Timing Chart of Serial Interface**



- 8 bit mode: 8-bit data, no parity, one or two stop bits
- 7 bit mode: 7-bit data, 8th bit = 0, one or two stop bits

NOTE:
1. When stop bit ERROR is detected, the Printer will change the received code to a "⧖" mark code (invalid code) in character printing mode (Data Processing and Word Processing modes). If in Graphic mode, the data received will be ignored.
2. In 7-bit serial mode, if 8th bit received is logic "1", the Printer will change it to logic "0".
3. In the serial interface mode, the Printer will check only 1st stop bit and give no heed to the 2nd stop bit when two stop bit condition.
4. In 7-bit serial mode, since MSB (Most Significant Bit) must be set to logic "0", Graphic data and upper case characters cannot be handled by the printer logic.
5. When the Serial Interface is selected and the Printer connected to a Computer with cable, and if the host is powered OFF, the printer may receive uncertain character code. Printing will be performed without any control. In these case ON-LINE/OFF-LINE Switch should be set to OFF-LINE side.

HINTS AND TIPS

1. Always plug printer into a 3-wire grounded receptacle.
2. Be sure that Top Cover is closed and secured while in operation.
3. Never operate Printer without paper. If paper used is less than 8" wide, take care to see that printing does not exceed paper width.
4. Avoid leaning objects against printer or placing anything on top. If any object is accidentally dropped into the machine, turn power off and carefully remove object.
5. Be sure to turn off power before adjusting the penetration or replacing ribbon.

   NOTE: When you turn power off, all data stored in Printer's buffer will be lost; keep this in mind as you perform routine maintenance. Remember that toggling the printer's power can also cause erratic operation of the CPU.
6. Use only lint-free cloth to clean printer surface. Do not use solvents or harsh cleaning agents. Mild detergent solution or desk top cleanser may be used sparingly.
7. Keep hands away from carriage mechanism while Printer is in operation. Since carriage moves with considerable force, inserting hand would be extremely hazardous.
8. Printer must be kept dry. If water is accidentally spilled on machine, turn power OFF immediately and wipe dry. Do not turn power ON until completely dry.
9. If printed material is too light or too dark, check to see if the Print Head is adjusted properly. See the section entitled "Fanfold Paper Loading" for specific details on adjusting the Print Head.

CARE AND MAINTENANCE

Caution

- Do not use organic solvents or alcohol when cleaning the cover.
- Never operate Printer when upper plastic cover is opened because this is very dangerous.
- Never set the Printer where it is exposed to direct sunlight.
- Prevent the Printer from vibrating during operation.
- When continuous graphics or some specific dots printing must be performed, be sure to pause the printing for at least one minute after each 10 minutes printing. If duty of printing is less than ½ (Impact: Non-impact = 1 : 1), continuous printing may be performed with safty.

MAINTENANCE

- If the print head becomes clogged with ribbon material or paper lint, carefully remove such material with a finely pointed tool (preferrably a toothpick). This should be regularly checked.
- A print head's life expectancy is approximately 1000 hours (in other words, if you use the printer two hours a day on the average, the print head should be changed every 16 months.). When poor print quality, sticking ribbon, or bent character printing occurs, you should have the print head replaced by a Radio Shack service technician. (See Figure 8.)
- After cleaning with a soft cloth, lightly oil the two carriage guides with a high-grade ester lubrication oil or with high-grade sewing machine oil. (This should be done at lease every six months.) Lubricate the platen removing shaft, the left wire pulley shaft, the right wire pulley shaft, the ribbon feed revolving shaft and the gear revolving shaft, using molybdenum disulfide compound or other high grade lubricating grease.

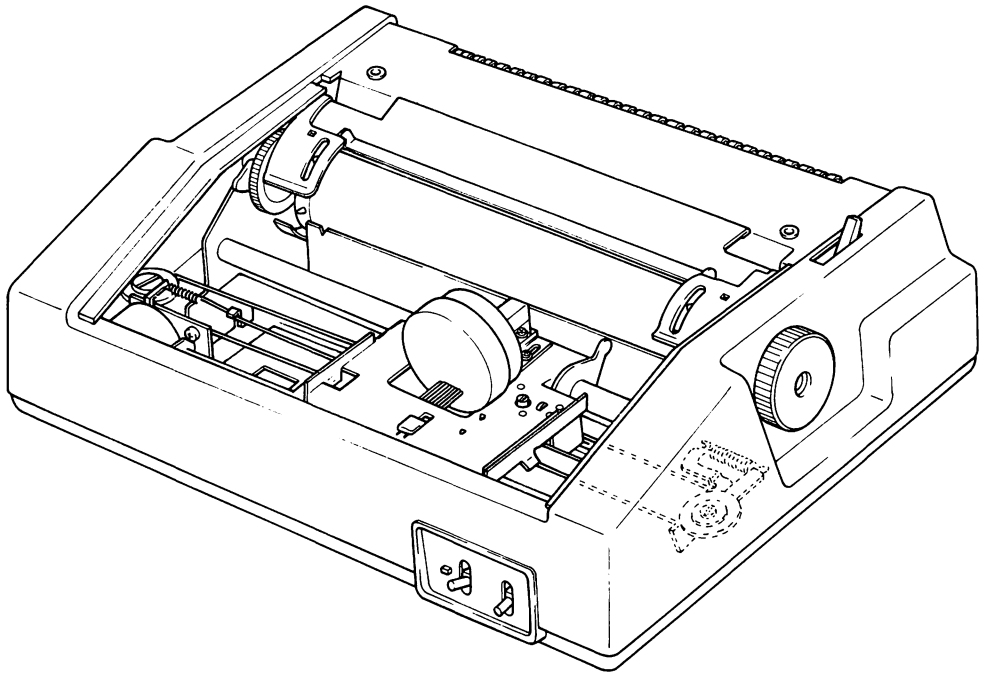


Fig. 10

IF YOU HAVE PROBLEMS

If the Printer fails to operate properly, try to solve the trouble by using the following table.

SYMPTOM	INSPECTION and ADJUSTMENT
Printer does not operate when POWER switch is turned ON. Printer stops before paper runs out.	• Is power cord properly connected? • Is power source voltage too low? Printer should stop if below 90% of rated voltage. • If you cannot hear any sound or see any movement, remove Top Cover and check three fuses. (Even if DC driver power fuse is broken, the indicator on the control panel will be lit when power is ON.) Refer to page 10.
Printer stops with ALERT indicator lit.	• Is paper loaded properly? • Is carriage guide dirty? If so, clean it by using soft cloth and lubricate high-grade ester lubricating oil or high-grade sewing machine oil. • Has some object dropped inside the Printer? • If nothing is wrong, press RESET Key.
Ribbon fails to track properly.	• Is ribbon cassette properly set? • Has ribbon come off from print head ribbon guide and is loose? • Is ribbon so worn that it does not feed smoothly from cassette? • Has the print head reached to its life? Worn out head will stick to ribbon and interfere with smooth movement. Replace the print head with a new one. See page 44.
Poor Print Quality or smudging on paper.	• Is ribbon old and/or worn? • Is Penetration Control Lever set at proper position? If not, refer to page 5~8. • Is tip of print head dirty? If dirty, clean off with a toothpick or needle.
Erratic operation or wrong character printing.	• Is Interface cable and/or connector dammaged? • Are Interface connectors inserted properly to the Computer or to the Printer?
The paper cannot be advanced smoothly.	• Is paper loaded properly into entrance of insertion opening? • Is any obstacle preventing smooth paper motion? • Does paper stick or tear because of side guide pins?

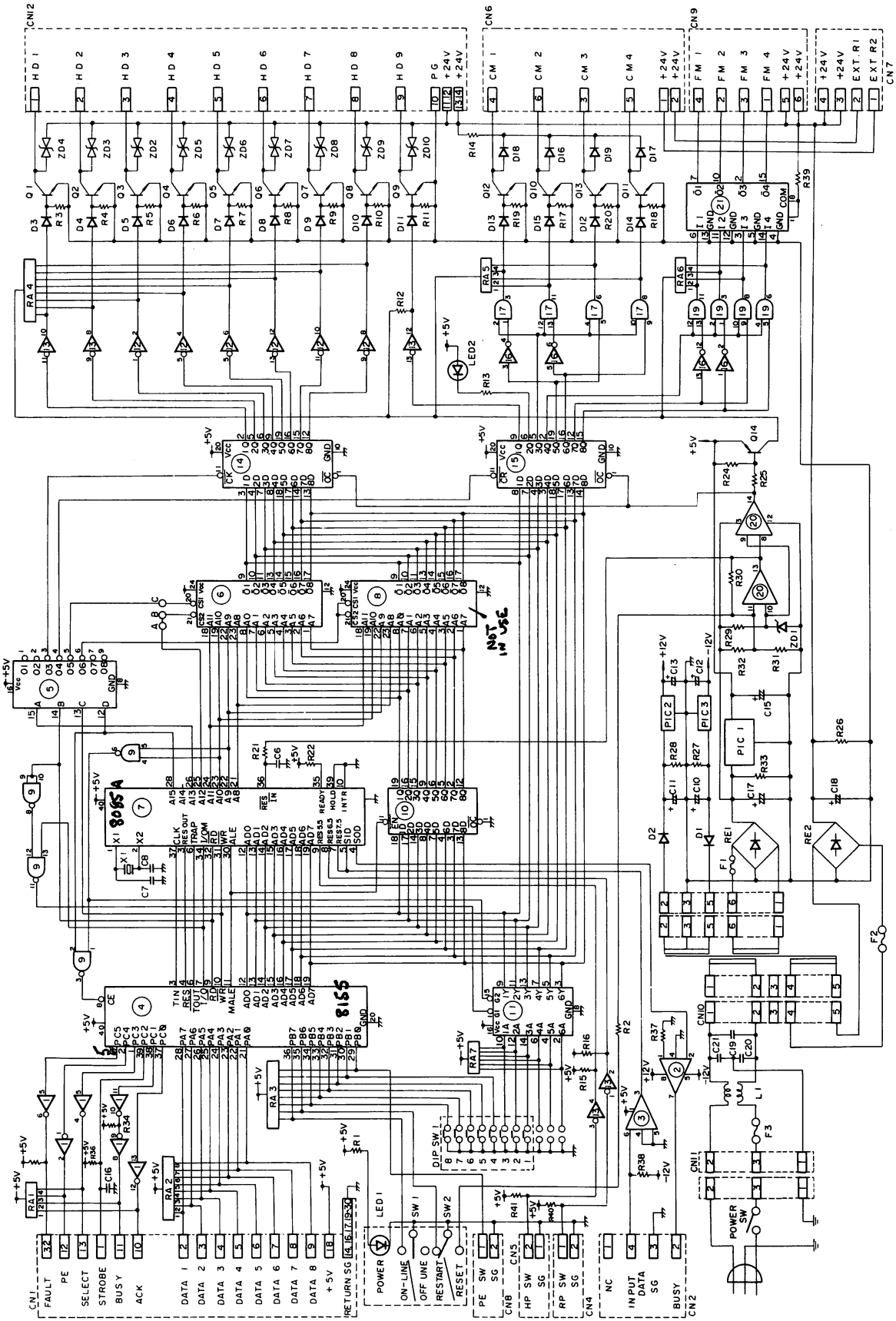
If the trouble cannot be corrected after making the above check-up and adjustment, check for secure contacts of all connectors. If the Printer Self Test works okay, some other component in the system may be at fault. If you can't eliminate the problem, take the unit to your Radio Shack Store or Computer Center for repair. We'll have it back to you ASAP!

SPECIFICATIONS

Printing Speed	
Proportional	80 characters per second (When printing numerals)
Elongated Proportional	40 characters per second (When printing numerals)
Condensed	100 characters per second
Elongated Condensed	50 characters per second
Ordinary	80 characters per second
Elongated Ordinary	40 characters per second
Graphic	480 dot per second
Character Per Line	
Proportional	69.6 ~ 177.8 characters per line
Elongated Proportional	34.8 ~ 88.9 characters per line
Condensed	133 characters per line
Elongated Condensed	66 characters per line
Ordinary	80 characters per line
Elongated Ordinary	40 characters per line
Dots Per Character	
Proportional	9 ~ 23 dots per character
Condensed or Ordinary	12 dots per character
Vertical Spacing	12, 6, 8 lines per inch (Computer selectable) (Bi-directional feed available when 12 or 6 lines per inch is selected.)
Dots Per Line	
Proportional	1600 dots
Elongated Proportional	1500 dots
Condensed	1600 dots
Elongated Condensed	1600 dots
Ordinary	960 dots
Elongated Ordinary	960 dots
Graphic	960 dots

Character Set	
Proportional	ASCII or modified ASCII 94, European Symbol 32
Condensed or Ordinary	ASCII or modified ASCII 94, European Symbol 26 or Japanese Kana 64, and Block Graphics 30
Interface	
Parallel	8-bit Data and 4 bit Status
Serial	7-bit Unit / 8-bit Unit > Selectable, 600 Baud / 1200 Baud > Selectable
Print Head Life	1000 Hours typical
Preventive Maintenance	Normally every 6 months
Temperature and Humidity Range	
Operating	41°F (5°C) to 104°F (40°C), 40 to 80%
Storage	–40°F (–40°C) to 160°F (71°C), 20 to 90%
Paper	
Fan Fold Paper	Continuous business paper (9–1/2" wide) with feed holes
Copy Paper	1 original + 2 copies (34 kg (75 lbs) non-carbon paper)
Single Sheet Paper	40 ~ 60 (88 ~ 132 lbs) kg good quality paper
Roll Paper	8–1/2" wide, 1" core, and up to 5" diameter paper
Ribbon	Radio Shack Catalog Number 26-1418
Size	15.4 "x4.7" x 11.0" 39.0 cm x 12.0 cm x 28.0 cm
Weight	16.5 lbs. (7.5 kg) maximum
Power Requirement	120V AC, 60 Hz, (for USA/Canada), or 220V/240V AC, 50 Hz (for European and Australian models). 85W maximum

SCHEMATIC DIAGRAMS



Safety Approval and Service Policy

Safety Approval

1. UL, CSA Standard ..... Approved
2. FCC Standard ..... Authorized

IMPORTANT INFORMATION

This equipment generates and uses radio frequency energy. If it is not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technicial for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: **How to Identify and Resolve Radio-TV Interference Problems.** This booklet is available from the United States Government Printing Office, Washington, DC20402, Stock No. 004-000-0035-4.

Warning: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) that are certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

Service Policy

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer equipment, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack computer products are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.
2. If any Radio Shack computer equipment has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the equipment, void any remaining warranty, remove and replace any non-Radio Shack part found in the equipment, and perform whatever modifications are necessary to return the equipment to original factory manufacturer's specifications.
3. The cost for the labor and parts required to return the Radio Shack computer equipment to original manufacturer's specifications will be charged to the customer in addition to the normal repair charge.

Memo

Compucolor

CPU EDGE CONNECTOR			LPVIII
3	BA	Transmit DATA	4
14	AB	Signal ground	3
15	CD	DTR	2

full - 1/6 = 16/96
1/2 = 1/12 8/96
3/4 = 1/8 = 12/96
graphics = 12/96



LIMITED WARRANTY

For a period of 90 days from the date of delivery, Radio Shack warrants to the original purchaser that the computer hardware unit shall be free from manufacturing defects. This warranty is only applicable to the original purchaser who purchased the unit from Radio Shack company-owned retail outlets or duly authorized Radio Shack franchisees and dealers. This warranty is voided if the unit is sold or transferred by purchaser to a third party. This warranty shall be void if this unit's case or cabinet is opened, if the unit has been subjected to improper or abnormal use, or if the unit is altered or modified. If a defect occurs during the warranty period, the unit must be returned to a Radio Shack store, franchisee, or dealer for repair, along with the sales ticket or lease agreement. Purchaser's sole and exclusive remedy in the event of defect is limited to the correction of the defect by adjustment, repair, replacement, or complete refund at Radio Shack's election and sole expense. Radio Shack shall have no obligation to replace or repair expendable items.

Any statements made by Radio Shack and its employees, including but not limited to, statements regarding capacity, suitability for use, or performance of the unit shall not be deemed a warranty or representation by Radio Shack for any purpose, nor give rise to any liability or obligation of Radio Shack.

EXCEPT AS SPECIFICALLY PROVIDED IN THIS WARRANTY OR IN THE RADIO SHACK COMPUTER SALES AGREEMENT, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RADIO SHACK BE LIABLE FOR LOSS OF PROFITS OR BENEFITS, INDIRECT, SPECIAL, CONSEQUENTIAL OR OTHER SIMILAR DAMAGES ARISING OUT OF ANY BREACH OF THIS WARRANTY OR OTHERWISE.

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