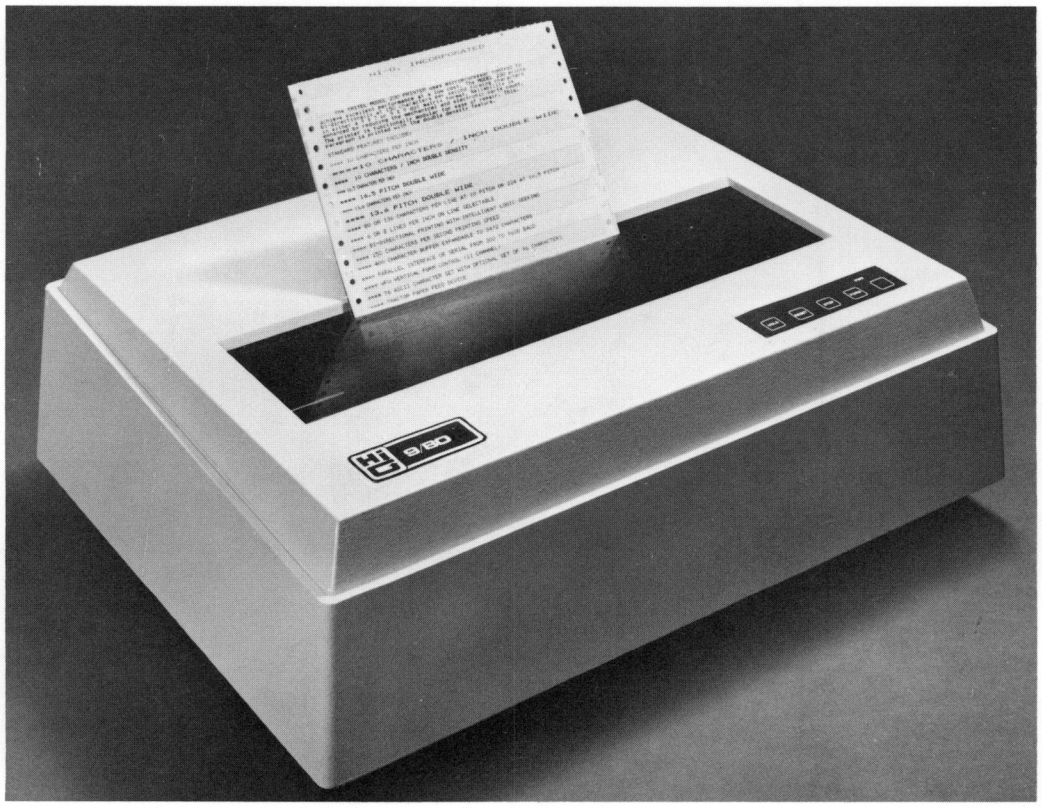
80 COLUMN DOT MATRIX PRINTER

JRJ

Operator's Manual



Hi-G CO., INC.
Printer Products
580 Spring Street
Windsor Locks, Connecticut 06096
(203) 623-3363

DESIGNED TO SURVIVE.

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OPERATOR'S MANUAL
MODEL 9/80 PRINTER

****

HI-G, INCORPORATED

580 Spring Street
Windsor Locks, CT 06096
Service Tel. No.: (203) 623-2481

Date: July 1982

OPERATOR'S MANUAL MODEL 9/80

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LIST OF ILLUSTRATIONS

Installation

Open the cover of the printer and remove the retainer from the carriage-printer head assembly. See Figure II.1. Make sure that the power switch is in the OFF position.

Ribbon Loading:

Set the head gap adjustment knob to the extreme clockwise detent position so that the printhead is moved to the maximum distance away from the platen. See Figure II.1.

Turn the ribbon advance knob on the ribbon cartridge so that the ribbon is tight and the motor drive key is approximately aligned with the slot in the ribbon drive spindle. See Figure II.2. Press the cartridge straight down over the two steel pins while rotating the advance knob. Continue pressing and rotating until the ribbon is properly seated and the ribbon is positioned over the printing end of the printhead. Proper seating of the ribbon is indicated by a drag on the ribbon advance knob.

Paper Loading:

Feed the paper into the slot located on the lower front section of the frame as illustrated in Figure II.3. The paper will appear between the clear plastic pressure pad and the platen. Guide the paper up between the ribbon cartridge and the platen. Open both tractor doors and position the paper on the exposed tractor sprockets. It may be necessary to reposition the right tractor horizontally on the tractor guides. This can be accomplished by raising the locking lever located on the outside of the right tractor and moving it as required to align the sprockets with the paper holes. Be sure to relock the locking lever and close both tractor doors. Next, advance the paper by manually turning the paper advance knob (see Figure II.1). Then guide the paper through the window located in the cover. Paper may also be loaded through the bottom loading slot (see Figure II.3).

Operation

Power Up:

Initiate the operation by plugging the AC cord into an AC outlet and into the recepticle at the rear of the printer. Next, turn on the power using the power switch located on the rear of the printer. The first action you will notice is that the printhead positions itself at the left rest position. After this position has been found, three red lights on the front panel switch will come on: Power, Top-Of-Form and Select (see Figure II.4). Operation of the Reset switch on the front panel will cause the printhead to reposition itself at the left rest position.

Step:

Next, repeatedly operate the Step switch and observe that the paper will feed vertically in small increments. Continuous pressure on the Step switch results in a constant motion of paper at 2.5 inches per second. This switch is normally used to reposition paper and forms.

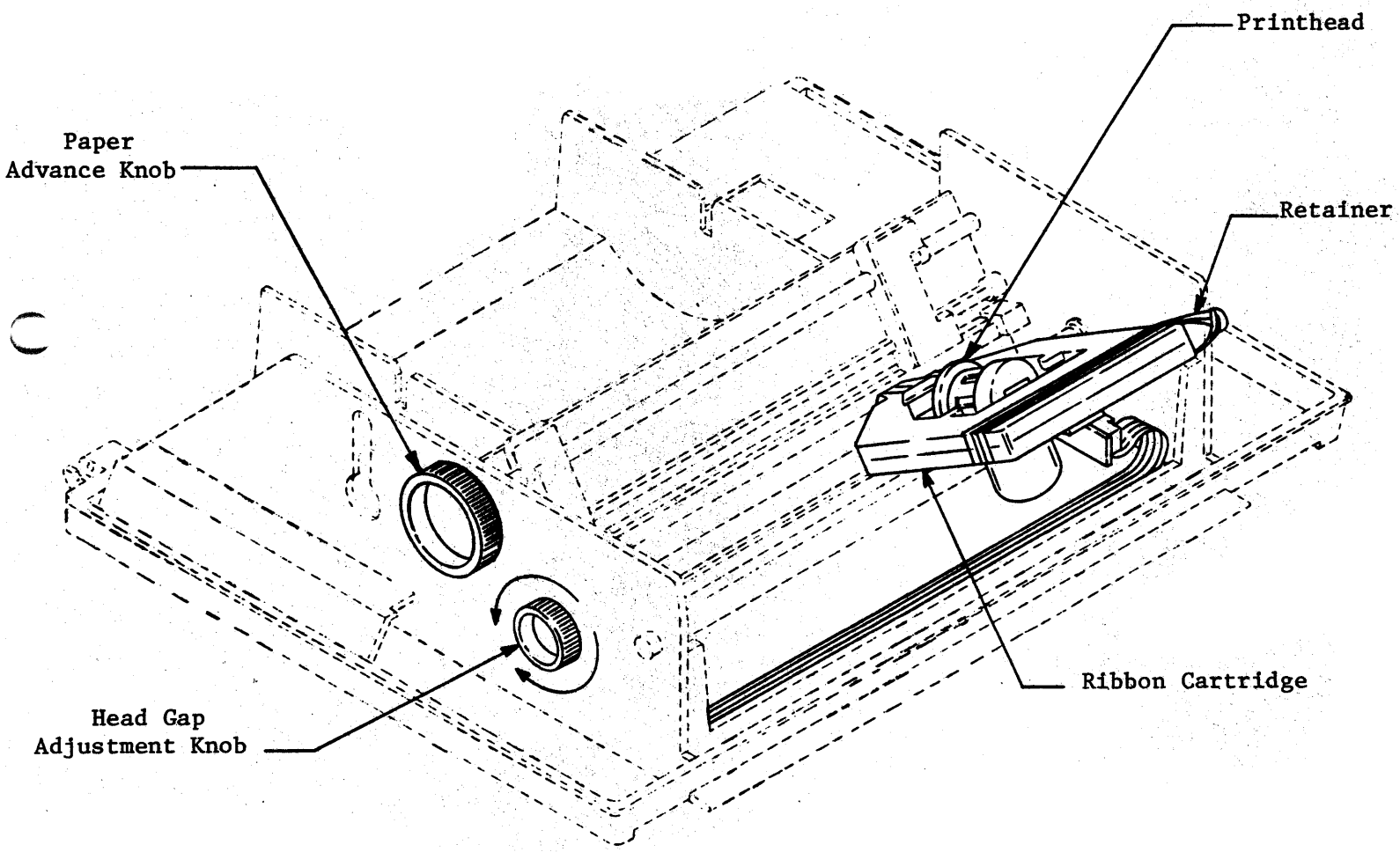
Form:

Now operate the Form switch. The paper will advance to the next Top-Of-Form position.

In order to establish the Top-Of-Form position, first advance the paper to the desired location using the Step switch. Next, operate the Reset switch and the Top-Of-Form position will be established at the current line position.

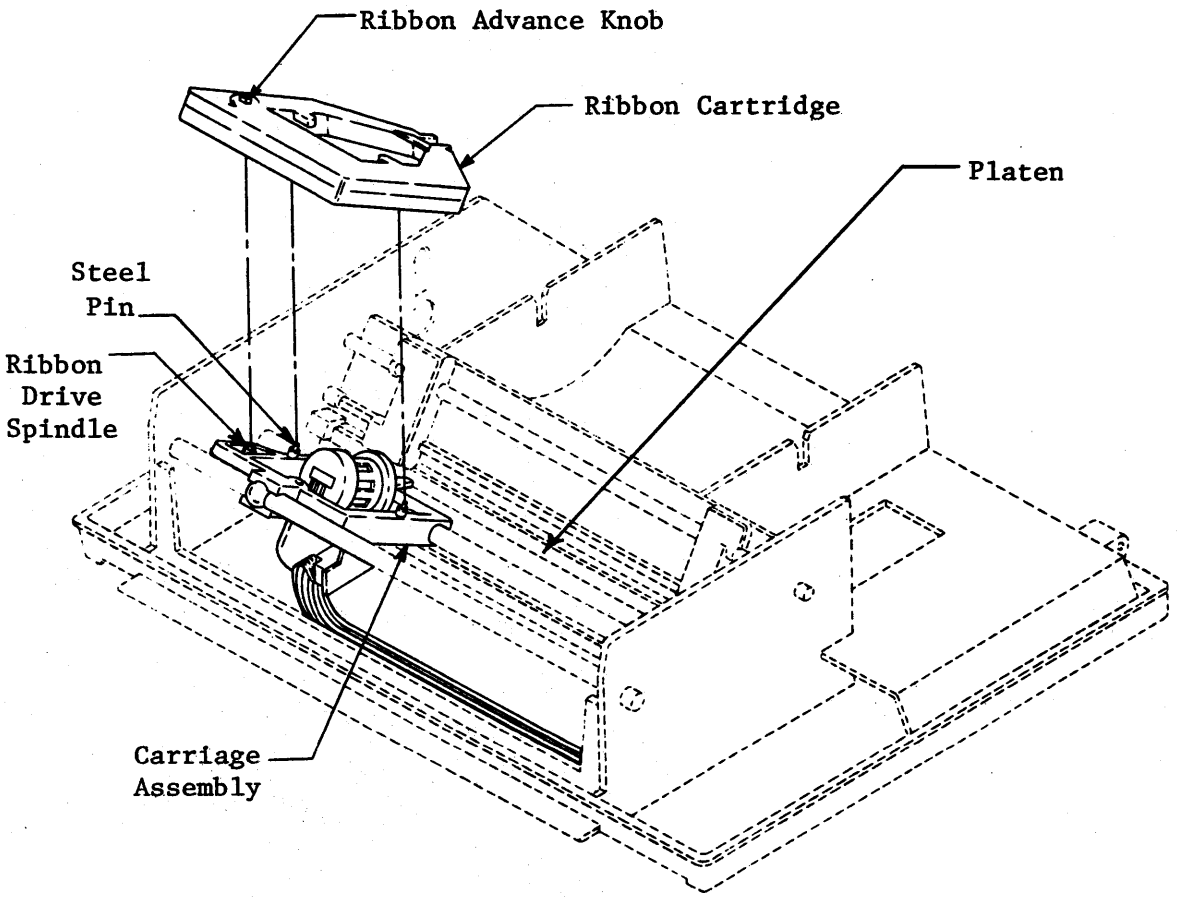
Test (Self-Test Mode):

Operate the Test switch on the front panel. The printer will begin printing a test pattern of characters across the page. Turn the Head Gap Adjustment (see Figure II.1) counterclockwise until the characters become clearly visible. Operate the Test switch again and the printer will stop printing the test pattern.



Head Gap Adjustment

Figure II.1
080-03



RIBBON LOADING

FIGURE II.2

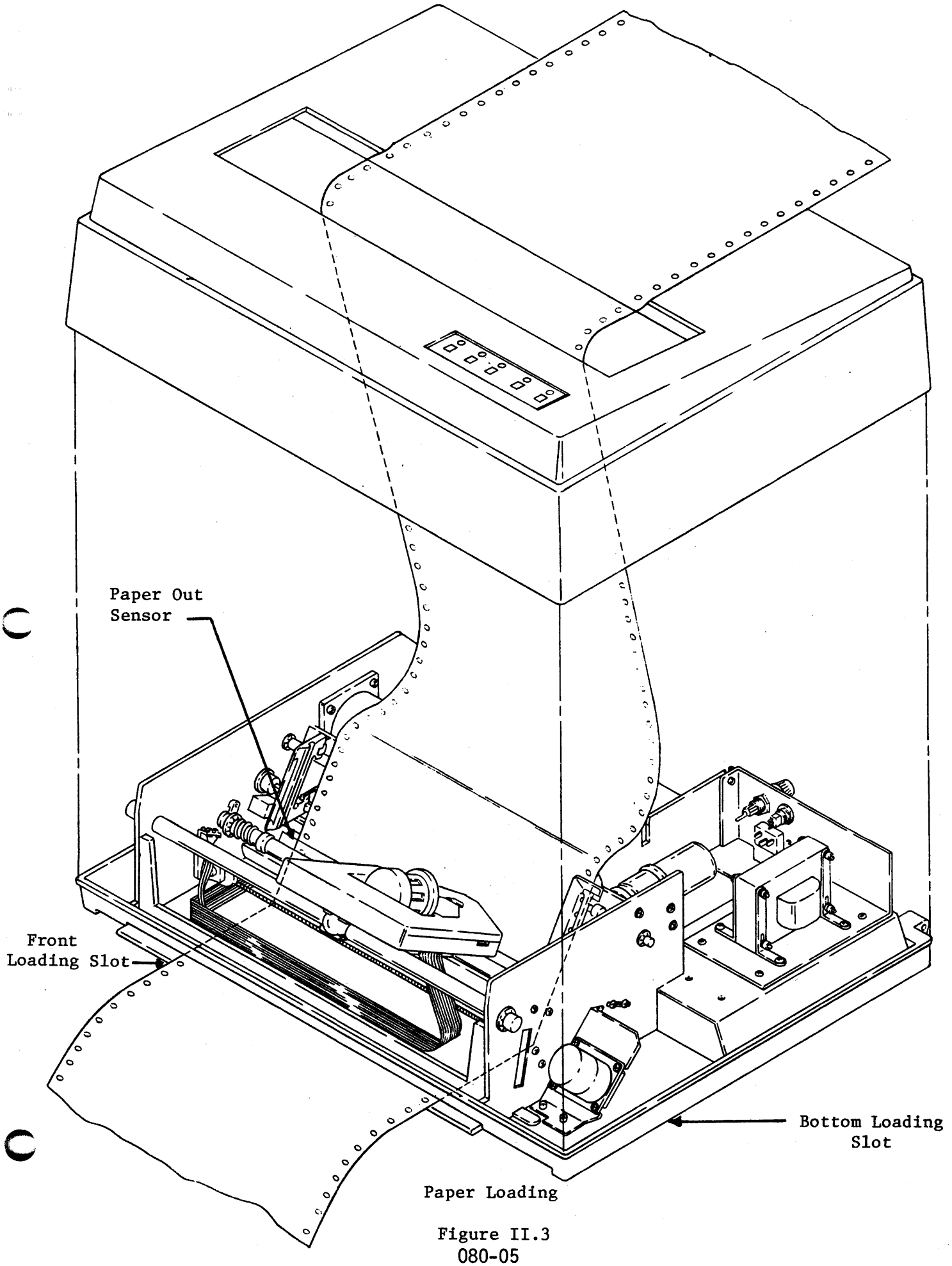
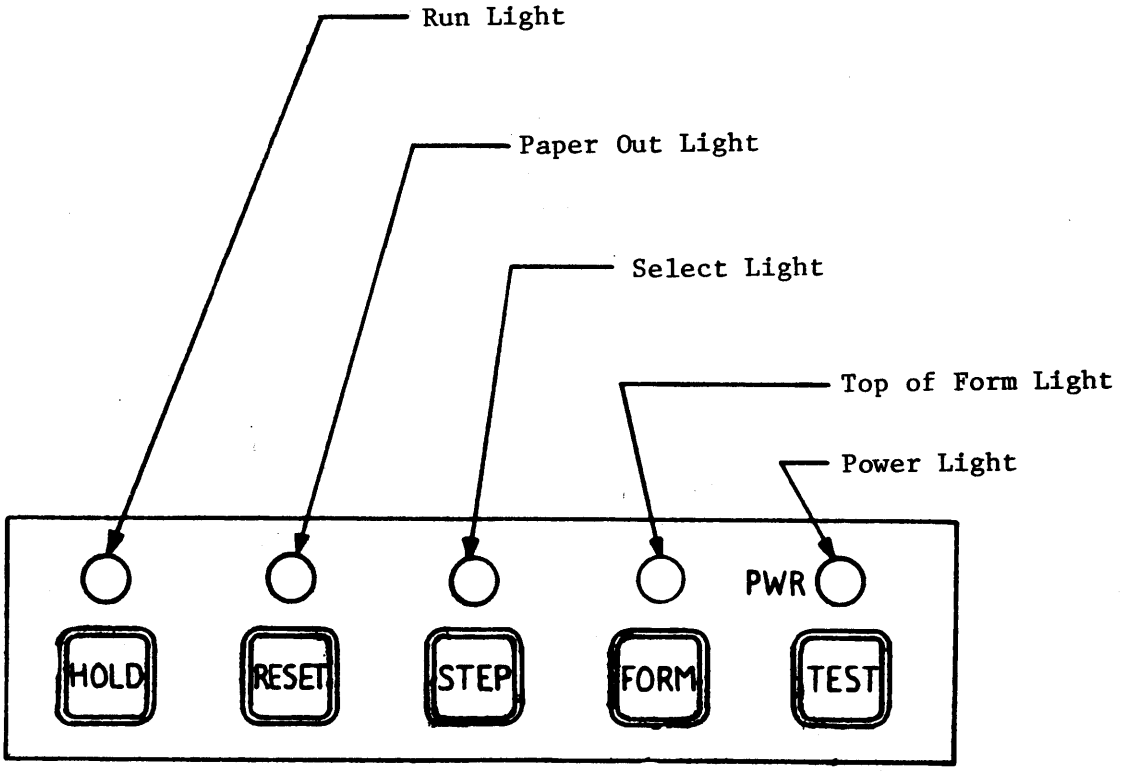


Figure II.3
080-05



or
"ON LINE"

FRONT PANEL SWITCH

FIGURE II.4
080-06

Dip Switches

Turn the power switch off and face the front side of the printer. Raise the cover and look down into the left rearmost quarter of the printer and you will find three switch assemblies called "Dip Switches". White letters on the circuit board label each of the switch assemblies U9, U10 and U11 (see Figure III.1).

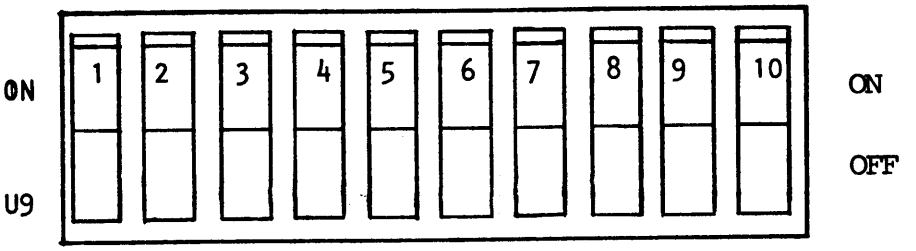
When discussing the Dip Switches, a switch will be considered "ON" when the numbered side is down.

The Dip Switch assembly closest to the rear of the printer is labeled U9. When shipped, switches 6 and 8 of U9 are ON and the others are all OFF. The middle set of Dip Switches is labeled U10 and switches 1, 4 and 8 are ON. The Dip Switch set closest to you is labeled U11, and switch 4 is ON. Verify that the Dip Switch positions just described match what you can see.

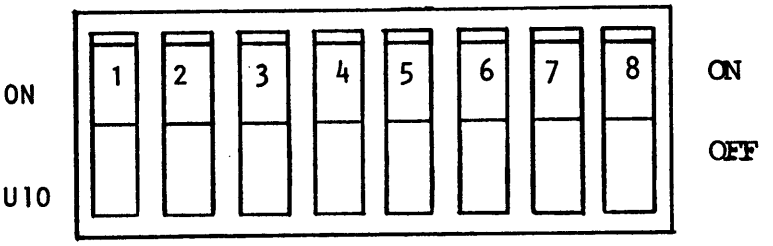
FCC Compliance

Warning: This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference with operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

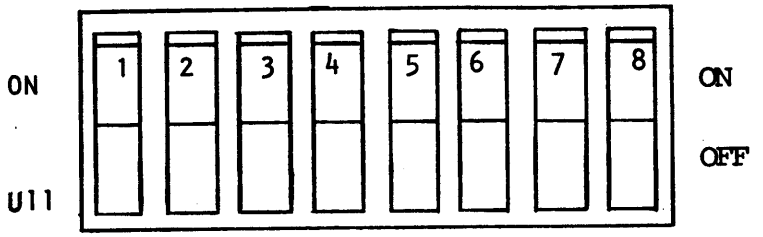
The "ON" position of a DIP switch can be confirmed by observing that the "numbered" side is in the down position.



ONLY SWITCH 6 & 8 ON



ONLY SWITCH 1, 4, 8 ON



ONLY SWITCH 4 ON

MAIN PRINTED CIRCUIT BOARD

WITH "AS SHIPPED" SWITCH POSITIONS

FIGURE III.1

080-08

Serial Interface

The serial interface is selected by the ON position of switch 1 of U10.

Baud Selection:

The "as-shipped" baud selection for the serial interface is 1200 baud. The selection was made be setting switch 8 of U10 on and switches 6 and 7 of U10 OFF. Operating at this baud rate, the 9/80 printer will seldom overfill its buffer. Operation of the printer at other baud rates is possible. If 1200 baud is not correct, please refer to the Appendix for settings to select the appropriate baud rate.

Serial Word Bit Structure:

It is important that the bit structure selected for the printer is the same as the transmitted structure.

The "as-shipped" configuration calls for one start bit, eight data bits, no parity bit and one stop bit. This configuration is made by setting switch 8 ON and 7, 9 and 10 OFF of U9.

If this configuration is incompatible with your data source, either the data source or the printer may be changed. To change the printer configuration, refer to the Appendix.

Connector Pin Designations:

The connector used is a standard TRW/CINCH DB25S or equivalent. The connector pinouts conform to industry standards:

Pin	Signal	Description
1	AA	Frame Ground (Common)
2	BA	Transmit Data (Output)
3	BB	Receive Data (Input)
4	CA	Request to Send (Output)
7	AB	Signal Ground (Common)
11	SA	Auxiliary Busy (Output)
20	DC	Data Terminal Ready (Output)
22	+5V	Ext Power (1000 Ohm pull up)

On Pin 2, the printer may transmit the following serial codes:

X-ON (CNTL Q; HEX 11) when the printer can accept data

X-OFF (CNTL S; HEX 13) when the printer buffer is within 100 characters of being full.

(In the "as-shipped" configuration, the above codes are not transmitted. Switch 2 of U11 is OFF.)

On Pin 3, the printer receives all incoming serial data.

On Pin 4, the printer always transmits a high level.

On Pin 11, the printer may transmit a level indicating printer busy. In the "as-shipped" configuration, this is disabled (switch 3 of U9 is OFF).

On Pin 20, the printer may transmit a level indicating either printer busy or Data Terminal Ready (DTR). In the "as-shipped" configuration, this is disabled (switches 1, 2, 4 and 5 of U9 are OFF).

Parallel Interface

The parallel interface can be selected by setting switch 1 of U-10 OFF. The interface is designed to conform to the Centronics parallel printer interface. See the Parallel I/O timing diagram (Figure V.2).

Connector Pin Designations:

The connector used is a standard AMP 552235-1 or equivalent. The connector pinouts conform to industry standards:

Pin	Signal	Description
1	Data Strobe	Data Strobe (Input)
2	Data 1	Input Data (Input)
3	Data 2	Input Data (Input)
4	Data 3	Input Data (Input)
5	Data 4	Input Data (Input)
6	Data 5	Input Data (Input)
7	Data 6	Input Data (Input)
8	Data 7	Input Data (Input)
10	ACK	Acknowledge (Output)
11	BUSY	Printer is Busy (Output)
12	GND	Signal Ground
13	SLCT	Printer is Selected (Output)
14	GND	Signal Ground
16	GND	Signal Ground
17	GND	Frame Ground
18	+5V	5 Volts DC
19	GND	Signal Ground
20	GND	Twisted Pair Return for Data 1 (Output)
21	GND	Twisted Pair Return for Data 2 (Output)
22	GND	Twisted Pair Return for Data 3 (Output)
23	GND	Twisted Pair Return for Data 4 (Output)
24	GND	Twisted Pair Return for Data 5 (Output)
25	GND	Twisted Pair Return for Data 6 (Output)
26	GND	Twisted Pair Return for Data 7 (Output)
28	GND	Twisted Pair Return for Acknowledge (Output)
29	GND	Twisted Pair Return for Busy (Output)
30	Open	Optional +5V
32	Fault	+5 Volts DC
33	GND	Signal Ground

On Pin 1, the printer receives a level for the Data Strobe (DS). In the "as-shipped" configuration, DS is active low (switch 6 of U9 is ON, see Figure V.2).

On Pins 2 through 8, the printer receives parallel input data with the least significant bit (LSB) of the data on Pin 2.

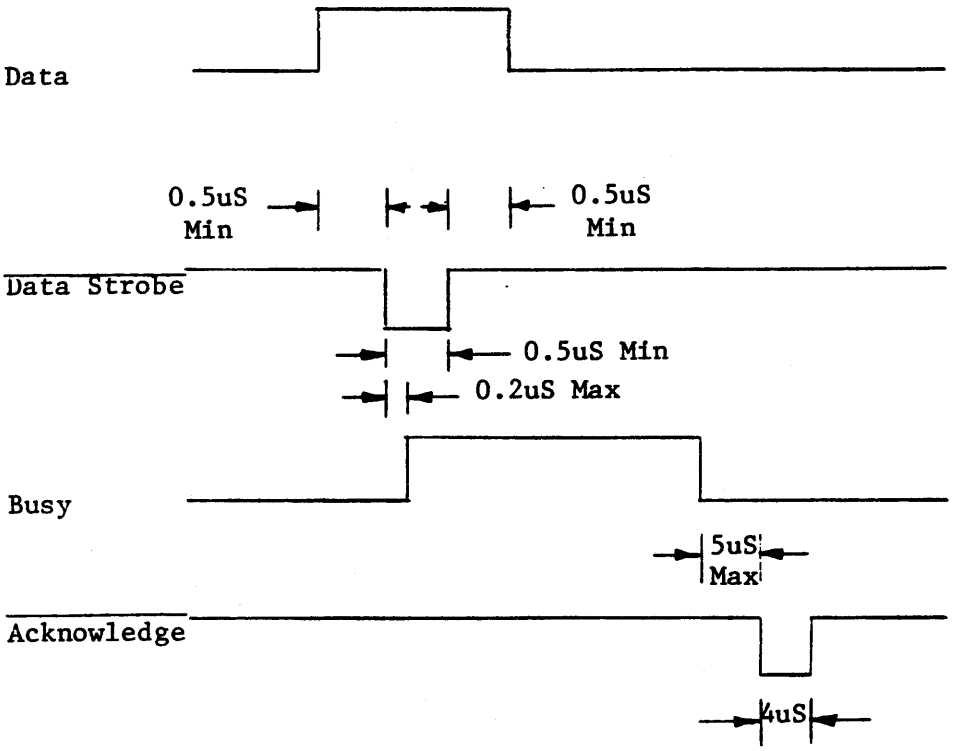
On Pin 10, the printer transmits a level for the Acknowledge (ACK), which is active low. See the Parallel I/O Timing diagram (Figure V.2).

On Pin 11, the printer transmits a level for the Busy, which is active high. See Figure V.2.

On Pin 13, the printer transmits an active high level when the printer is selected.

On Pin 18, the printer is internally tied to +5 volts DC.

On Pin 32, the printer is internally tied to +5 volts DC.



Data lines terminated by 1K Ω to +5V
Strobe line terminated by 470 Ω to +5V
Printer can source to 0.320 MA at +2.4V
Printer can sink to 14 MA
Input device to source to 0.320 MA at +2.4V
Input device to sink to 14 MA

Parallel I/O Timing Diagram

Figure V.2

Printing Data Using Either Interface

(1) The data source and printer must be configured exactly the same (see Sections IV or V).

(2) Connect the interfacing cable to the proper (serial or parallel) connector at the rear of the printer.

(3) Power up and/or Reset the printer.

(4) Operate the Hold switch. The Run light will turn ON and the printer is now ready to print data as it is received.

Modes of Operation

(1) Reset Mode:

This mode is entered from any of the other modes via operation of the Reset switch and immediately after power is turned off. The character buffer is cleared, the options (Dip Switches) are read, the printhead seeks the left rest position and the Top of Form is reset to the current line. Upon the completion of the reset operations, the printer is in the Hold mode.

(2) Hold Mode:

This is the printer mode entered following reset. From this mode, all other modes can be entered. While in this mode, data can be stored in the character buffer as it is received.

(3) Run Mode:

This is the normal operating mode of the printer. This mode can be entered from the Hold mode by operation of the Hold switch. Any data in the character buffer will be printed while in the Run mode. A data line must be full or properly terminated for printing to ensue.

(4) Form Mode:

This mode can only be entered from the Hold mode. Operating the Form switch at this time will cause the paper to advance to the next Top of Form. The Form length is defined by the operator selected options or by software control codes. The Reset switch may be used to define the current line as Top of Form.

(5) Step Mode:

This mode can only be entered from the Hold mode. Operation of the Step switch results in a paper advance.

(6) Test Mode:

This mode can only be entered from the Hold mode. Operation of the Test switch results in the printing of test pattern of characters across the paper. The Test mode may be exited by operating the Test switch again which will place the printer back in the Hold mode.

Printer Configurations - Operator Selected

The operator may establish the power up printer configuration via Dip Switches U9, U10 and U11. The power up configuration can be modified via downloaded control codes.

In the "as-shipped" configuration, the 9/80 is set to operate with the following selected features:

- 11 inch form
- 10 characters per inch at normal density
- Auto Line Feed on Carriage Return
- Standard Character Set
- 6 lines per vertical inch
- No skip at the bottom of form

For example, let's say that you wanted to use the serial interface at 1200 Baud with one stop bit and no parity, but wanted to print at 16.5 characters per inch (CPI) instead of 10 CPI. Power off the unit, then locate U11. Using an appropriate instrument, push on the numbered side of switch #1 until it clicks. Close the cover, apply power to the unit, connect a serial interface cable from a computer or other device to the serial jack on the rear of the printer. Operate the Hold switch on the front panel, then begin to send serial data. You should see small characters (16.5 CPI) being printed.

The Appendix lists the operator selectable options and their corresponding Dip-Switch positions.

Indicator Lights

Power Light:

Located above the Test switch, this light indicates that the unit is powered.

Top-Of-Form Light:

Located above the Form switch, this light indicates when the paper is at top-of-form.

Select Light:

Located above the step switch, this light when illuminated indicates that the printer is in a normal run or "Selected" mode. A control code may be transmitted to the printer which will "Deselect" the printer and turn this light off (see Appendix). In this condition, the printer will not accept any data or commands until it is "Selected" by the receipt of a special control code or is manually reset.

Paper-Out Light:

The paper out light is controlled by a paper sensor. If the light is on, you have run out of paper and the printer will stop printing. Replenish the paper and press Hold. Operation will continue with no loss of data.

Run Light:

The light is located above the Hold switch. When on this light indicates that the printer is able to print data from its memory buffer. If the buffer is empty, it will print any data coming through the selected interface, or will wait for such data. When the light is off the printer may be receiving data and storing it in its memory buffer, but will not print it out. If this is the case, depressing the Hold switch will turn on the light and the unit will resume printing data.

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Error Indications

Flashing panel lights in any combination indicate an error. Reset the printer to bring it back to a normal operating mode again after the problem has been cleared if this is necessary.

Light	Condition								
Step	Off	Off	Off	Off	Off	Off	Off	Flash	
Paper-Out	Off	Off	Flash	Flash	Off	Off	Flash	Off	
Hold	Off	Flash	Off	Flash	Off	Flash	Off	Off	
Top-of-Form	Off	Flash	Flash	Off	Flash	Off	Off	Off	Cause
									RAM error.
									SW5 of U11 on with insufficient RAM (4K)
									Not used
									ESC L detected w/o SW5 of U11 on
									ESC D detected w/o switch 5 of U11 on
									ESC G detected with insufficient RAM
									Graphics line too long
									Totally incorrect Z80-CPU micro-processor operation

Troubleshooting

In many cases of printer malfunction, a visual check of the control switches, wiring connections or mechanical adjustments can isolate the malfunction. If the printer is operational, you should run the self-test program to establish the degree of malfunction.

Examples of common problems, causes and remedies follow:

Problems	Possible Causes	Remedy
(1) Select light is off	Printer has been de-selected probably via Control Codes in the Data Stream.	Transmit the Select Control Code (CNTL Q) or "Reset".
(2) Paper Out light is on	(a) Printer is out of paper, or (b) Paper out sensor is not recognizing the paper. (c) Paper out sensor is dirty.	(a) Replenish paper supply. (b) Try different paper. (c) Vacuum around the paper sensor.
(3) Lights flash	Improper data within a graphics sequence, or transmission of improper control codes.	(a) Correct graphics sequence being transmitted. (b) Make sure dip-switch positions match the operations desired.
(4) Hold light is off	Printer has been placed in the Hold mode.	Press "Hold" key.
(5) Form light is off	Normal	Will come on when Top of Form is reached.
(6) Power light or other lights are off yet printer continues to operate normally.	Light has burned out.	Repair as required.
(7) Power light is off, printer fails to operate	(a) AC power is disconnected (b) Power overload	(a) Connect power (b) Check power fuse. If fuse continues to go, return for repair.
(8) Printhead and carriage assembly are not moving freely	(a) Binding on the shaft, cables or motor assembly. (b) Obstruction present.	(a) Turn power off, then move the carriage assembly back and forth (assembly cannot be moved with the power on). Inspect and clean the drive shafts and cables. See Preventative Maintenance. (b) Remove the obstruction.

Error Symptoms	Possible Causes	Remedy
(9) Print quality is light	(a) Printhead is too far from platen. (b) Ribbon has exceeded life.	(a) Readjust head gap. (b) Replace ribbon.

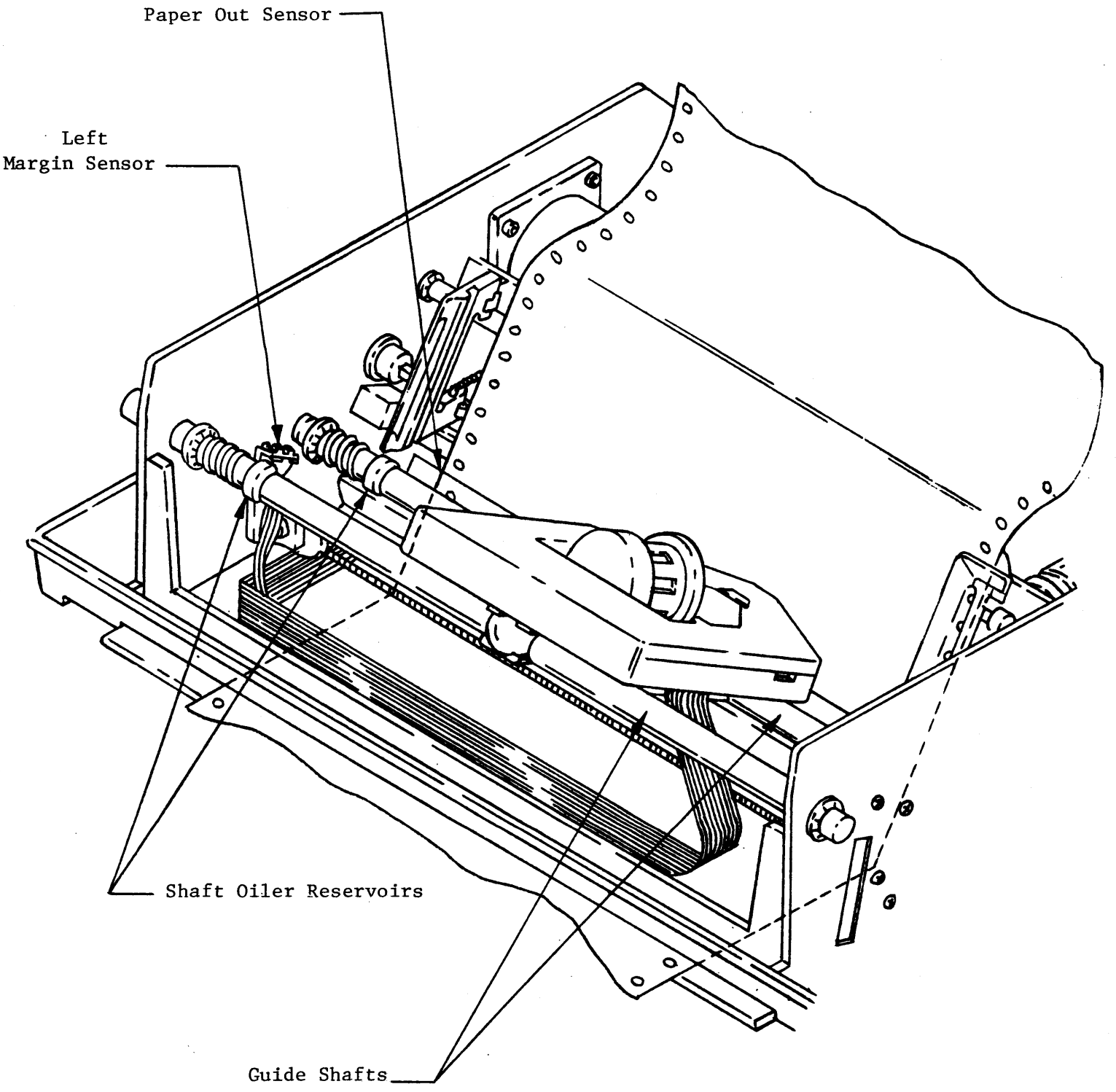
Preventative Maintenance

This section contains the on-site maintenance necessary to guarantee long life.

Preventative maintenance necessary to ensure proper operation of the printer in normal usage consists of inspection and cleaning at regular intervals of about 500 hours of operation:

A. Remove the power cord.
B. Remove the ribbon cartridge.
C. Vacuum the inner compartment of the printer and around the left margin sensor, the paper out sensor and the paper tractors.
D. Clean the two-guide shafts with a clean, dry, lint-free cloth.
E. Inspect the guide shafts for any damage.
F. Inspect the drive cable and the tractor belts for any damage.
H. Assure that each shaft oiler reservoir is "wet". Add light machine oil (sewing machine oil) to saturate felt.
I. Replace the ribbon cartridge.
J. Operate the carriage by hand to insure free movement.
K. Reinsert the power cord.

Run the self-test program to verify the operation of the printer.



Preventative Maintenance

Figure XII.1

Factory Options

Special interface options are available that will adapt special communications protocols to the standard printer parallel or serial interfaces. Additional options include:

- Expandable input buffer size (up to 4000 characters)
- Reverse paper advance
- Graphics:
  - Vertical resolution - 72 dots per inch
  - Horizontal resolution - 72 dots per inch
  - Dot size - 0.14 nominal
  - Speed - 12 IPS horizontal
  - Dots per column - 6
- Alternate character sets

APPENDIX

9/80 SWITCH SETTINGS

Selectable Function	Switch Bank	Position	Status
Serial Interface	U10	1	On
Parallel Interface	U10	1	Off
10 CPI - Normal	U11	1	Off
		2	Off
10 CPI Double-Density	U11	1	On
		2	On
12 CPI	U11	1	Off
		2	On
16.5 CPI	U11	1	On
		2	Off
6 LPI	U11	7	Off
8 LPI	U11	7	ON
Skip 6 Lines at Bottom of Page	U11	8	On
No Skip at Bottom of Page	U11	8	Off
Auto LF on CR	U11	4	On
No LF on Cr	U11	4	Off
Standard Character Set	U11	6	Off
Use Alternate Character Set	U11	6	ON
Enable Download Character Set Feature	U11	5	On
Disable Download Character Set	U11	5	Off
Printer to Transmit XON/XOFF	U11	3	On
Disable XON/XOFF	U11	3	Off
Logic Controlled Busy on Pin 11	U9	3	On
Logic Controlled Busy on Pin 20	U9	4	ON
		5	Off

9/80 SWITCH SETTINGS

Selectable Function	Switch Bank	Position	Status
DTR on Pin 20	U9	4 5	Off On
Busy (Negative)	U9	1 2	On Off
Busy (Positive)	U9	1 2	Off On
Data Strobe Negative	U9	6	On
Data Strobe Positive	U9	6	Off
No Parity Serial Parity 1 Stop Bit 2 Stop Bits Odd Parity Even Parity 7 Data Bits/Char 8 Data Bits/Char	U9 U9 U9 U9 U9 U9 U9 U9	7 7 8 8 9 9 10 10	Off On On Off On Off On Off
300 BAUD	U10	6 7 8	Off On Off
600 BAUD	U10	6 7 8	On On Off
1200 BAUD	U10	6 7 8	Off Off On
2400 BAUD	U10	6 7 8	On Off On
4800 BAUD	U10	6 7 8	Off On On
9600 BAUD	U10	6 7 8	On On On

9/80 SWITCH SETTINGS

Selectable Function Form Length	Switch Bank	Position Status 2	 3	 4	 5
3	U10	ON	ON	ON	ON
3.5	U10	OFF	ON	ON	ON
4.0	U10	ON	OFF	ON	ON
4.5	U10	OFF	OFF	ON	ON
5.0	U10	ON	ON	OFF	ON
5.5	U10	OFF	ON	OFF	ON
6.0	U10	ON	OFF	OFF	ON
7.0	U10	OFF	OFF	OFF	ON
8.0	U10	ON	ON	ON	OFF
8.5	U10	OFF	ON	ON	OFF
9.0	U10	ON	OFF	ON	OFF
11.0	U10	OFF	OFF	ON	OFF
11.5	U10	ON	ON	OFF	ON
12.0	U10	OFF	ON	OFF	OFF
14.0	U10	ON	OFF	OFF	OFF
17.0	U10	OFF	OFF	OFF	OFF

Control Codes

The Model 9/80 Printer will recognize the following control codes:

		HEX	DEC	
ESC 4		1B, 34	27, 52	SET 6 LPI VERTICAL FOR LINE FEED
ESC 5		1B, 35	27, 53	SET 8 LPI VERTICAL FOR LINE FEED
ESC 6		1B, 36	27, 54	SET 10 CPI BASIC PRINT DENSITY
ESC 7		1B, 37	27, 55	SET 16.6 CPI BASIC PRINT DENSITY
ESC 8		1B, 38	27, 56	SET 12.0 CPI BASIC PRINT DENSITY
ESC 9		1B, 39	27, 57	SET 10 CPI DOUBLE PRINT DENSITY
ESC @		1B, 40	27, 64	SELECT STANDARD CHARACTER SET
ESC A		1B, 41	27, 65	SELECT OPTIONAL CHARACTER SET
ESC B		1B, 42	27, 66	ADVANCE PAPER TO SUPERSCRIPT POSITION
ESC C		1B, 43	27, 67	ADVANCE PAPER TO SUBSCRIPT POSITION
ESC D		1B, 44	27, 68	DOWN LOADED CHARACTER SET SELECT
ESC G		1B, 47	27, 71	GRAPHICS MODE SELECT
ESC L		1B, 4C	27, 76	CHARACTER SET DOWNLOAD
ESC R		1B, 52	27, 82	RESET TO ALL DEFAULT OPTION SELECTIONS
CNTL G	BEL	07	7	SOUND AUDIBLE ALARM
CNTL M	CR	0D	13	CARRIAGE RETURN, TERMINATES LINE (See Note)
CNTL J	LF	0A	10	LINE FEED
CNTL N	SO	0E	14	ELONGATED CHARACTERS (DOUBLE WIDE)
CNTL O	SI	0F	15	END OF ELONGATED CHARACTERS
CNTL ^	RS	1E	30	START VFU LOAD SEQUENCE
CNTL L	FF	0C	12	FORM FEED (SLEW TO CHANNEL 1)
CNTL K	VT	0B	11	VERTICAL TAB (SLEW TO VFU CHANNEL 6)
CNTL Q	DC1	11	17	SELECTS PRINTER
CNTL S	DC3	13	19	DESELECTS PRINTER
CNTL T	DC4	14	20	DEFINE LINE OR SLEW PAPER TO CHANNEL 1
CNTL U	NAK	15	21	DEFINE LINE OR SLEW PAPER TO CHANNEL 2
CNTL V	SYN	16	22	DEFINE LINE OR SLEW PAPER TO CHANNEL 3
CNTL W	ETB	17	23	DEFINE LINE OR SLEW PAPER TO CHANNEL 4
CNTL X	CAN	18	24	DEFINE LINE OR SLEW PAPER TO CHANNEL 5
CNTL Y	EM	19	25	DEFINE LINE OR SLEW PAPER TO CHANNEL 6
CNTL Z	SUB	1A	26	DEFINE LINE OR SLEW PAPER TO CHANNEL 7

Note: The function of CR is modified by U11-4 on the Main Board. Undefined control codes are ignored.

ASCII CHARACTER SET

Bits b_7 b_6 b_5 / b_4 b_3 b_2 b_1 / ROW / COLUMN	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0 0 0 0 / 0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1 / 1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0 / 2	STX	DC2	"	2	B	R	b	r
0 0 1 1 / 3	ETX	DC3	#	3	C	S	c	s
0 1 0 0 / 4	EOT	DC4	$	4	D	T	d	t
0 1 0 1 / 5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0 / 6	ACK	SYN	&	6	F	V	f	v
0 1 1 1 / 7	BEL	ETB	'	7	G	W	g	w
1 0 0 0 / 8	BS	CAN	(	8	H	X	h	x
1 0 0 1 / 9	HT	EM	)	9	I	Y	i	y
1 0 1 0 / 10	LF	SUB	*	:	J	Z	j	z
1 0 1 1 / 11	VT	ESC	+	;	K	[	k	{
1 1 0 0 / 12	FF	FS	,	<	L	\	l	|
1 1 0 1 / 13	CR	GS	-	=	M	]	m	}
1 1 1 0 / 14	SO	RS	.	>	N	^	n	~
1 1 1 1 / 15	SI	US	/	?	O	_	o	DEL