Personal Computer Hardware Reference Library

IBM Graphics Printer

6361480

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Description

The IBM Graphics Printer is a self-powered, stand-alone, tabletop unit. It prints in two directions at 80 characters per second (cps).

A 9-wire print head is used to print characters in a 9-by-9 dot matrix. The IBM Graphics Printer can print in a compressed mode of 132 characters per line, in a standard mode of 80 characters per line, in a double-width compressed mode of 66 characters per line, and in a double-width mode of 40 characters per line. The printer can print double-size characters and double-strike characters.

Besides printing the standard ASCII 96-character uppercase and lowercase character sets, the IBM Graphics Printer has additional capabilities including: an extended character set for international languages, subscript, superscript, an underline mode, and programmable graphics. It can also accept commands setting the line-feed control desired for the application.

The printer unit obtains ac power from a standard 120-Vac wall outlet. A 220-Vac model and a 240-Vac model are also available. A 1.83 m (6 ft) signal cable connects the printer to the system unit's Printer Adapter or combination Monochrome Display and Printer Adapter. The cable is a 25-lead shielded cable with a 25-pin D-shell connector at the system unit end, and a 36-pin connector at the printer end.

Programming Considerations

Printer Control Codes

On the following pages you will find codes for printer characters, controls, and graphics. You may want to keep them handy for future reference. The examples given in the "Printer Function" descriptions are written in the BASIC language. The "Input" description is given when more information is needed for programming considerations.

ASCII decimal values for the printer control codes can be found under "Graphics Printer Character Set."

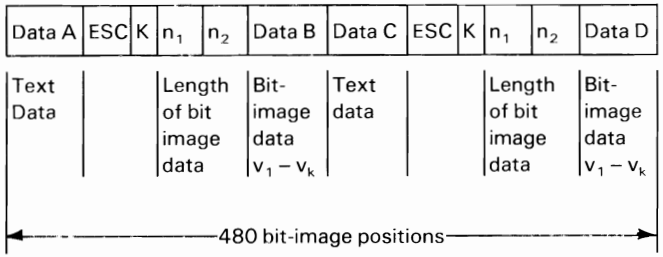
The descriptions that follow assume that the printer dual-in-line package (DIP) switches have not been changed from their factory settings.

Printer Code	Printer Function
BEL	**Bell** Sounds the printer buzzer for 1 second. Example: LPRINT CHR$(7);
CAN	**Cancel** Clears the printer buffer. Control codes, except SO, remain in effect. Example: LPRINT CHR$(24);
CR	**Carriage Return** Ends the line that the printer is on and prints the data remaining in the printer buffer. (No Line Feed operation takes place.) **Note:** IBM Personal Computer BASIC adds a Line Feed unless CHR$(128) is added; for example, CHR$(141). Example: LPRINT CHR$(13);
DC2	**Device Control 2 (Compressed Off)** Cancels the Compressed print mode. Example: LPRINT CHR$(18);
DC4	**Device Control 4 (Double Width Off)** Cancels the Double Width print mode. Example: LPRINT CHR$(20);
ESC	**Escape** Signals the printer that the next data sent is a printer command. Example: LPRINT CHR$(27);

Printer Code	Printer Function
ESC A	**Escape A (Sets Variable Line Feeding)** Format: ESC A;n; Escape A sets the line-feed to n/72 inch. The example that follows sets line feeding to 24/72 inch. ESC 2 must be sent to the printer before the line feeding will change. For example, ESC A;24 (text) ESC 2 (text). The text following ESC A;24 will be at the previously set line-feed increment. The text following ESC 2 will be printed with the new line-feed increment of 24/72 inch. Any increment between 1/72 and 85/72 may be used. Example: LPRINT CHR$(27);CHR$(65);CHR$(24); CHR$(27);CHR$(50); **Note:** How to enter "n": When "n" is actually transferred to the printer as data, it is transferred in the form of a 7-bit binary number. In the case of "ESC A+24," actual output to the printer is performed as <1B>H<41>H<18>H in hexadecimal code.
ESC C	**Escape C (Set Lines per Page)** Format:ESC C;n; Sets the page length. ESC C command must be followed by a value to specify the length of page desired. (Maximum form length for the printer is 127 lines.) The example below sets the page length to 55 lines. The printer defaults to 66 lines per page when powered on or reset. Example: LPRINT CHR$(27);CHR$(67); CHR$(55); **Escape C (Set Inches per Page)** Format:ESC C;n;m; Escape C sets the length of the page in inches (one inch is 25.4 millimeters). This command requires a value of 0 (zero) for n, and a value between 1 and 22 for m. Example: LPRINT CHR$(27);CHR$(67);CHR$(0); CHR$(12);
ESC D	**Escape D (Set Horizontal Tab Stops)** Format: ESC D;n_1;n_2;...n_k;NUL; Sets the horizontal tab stop positions. The example that follows sets the horizontal tab stop positions at printer columns 10, 20, and 40. They are followed by CHR$(0), the Null code. They must be given in ascending numeric order. Tab stops can be set between 1 and 80. When the printer is in the Compressed print mode, tab stops can be set up to 132. The Graphics Printer can have a maximum of 28 tab stops. The HT Code (CHR$(9)) is used to execute a tab operation. Example: LPRINT CHR$(27);CHR$(68);CHR$(10); CHR$(20);CHR$(40);CHR$(0);

Printer Code	Printer Function
ESC E	**Escape E (Emphasized)** Sets the printer to the Emphasized print mode. The speed of the printer is reduced to half speed during the Emphasized print mode. Example: LPRINT CHR$(27);CHR$(69);
ESC F	**Escape F (Emphasized Off)** Cancels the Emphasized print mode. Example: LPRINT CHR$(27);CHR$(70);
ESC G	**Escape G (Double Strike)** Sets the printer to the Double Strike print mode. The paper is spaced 1/216 inch before the second pass of the print head. Example: LPRINT CHR$(27);CHR$(71);
ESC H	**Escape H (Double Strike Off)** Cancels the Double Strike mode. Example: LPRINT CHR$(27);CHR$(72);
ESC J	**Escape J (Sets Variable Line Feeding)** Format: ESC J;n; When ESC J is sent to the printer, the paper will advance in increments of n/216 inch. The value of n must be between 1 and 255. The example that follows sets the line feed to 50/216 inch. ESC J is canceled after the line feed takes place. Example: LPRINT CHR$(27);CHR$(74);CHR$(50);

Printer Code	Printer Function
ESC K	**Escape K (480 Bit-Image Graphics Mode)** Format ESC K;n_1;n_2;v_1;v_2;...v_k; Changes from the Text mode to the 480 Bit-Image Graphics mode. n_1 and n_2 are one byte each, and together specify the number of bit-image data bytes ($_k$) to be transferred. v_1 through v_k are the bytes of the bit-image data. The number of bit-image data bytes ($_k$) is equal to $n_1 + 256n_2$ and cannot exceed 480 bytes. At every horizontal position, each byte can print up to 8 vertical dots. The least significant bit of the byte corresponds to the bottom dot; the most significant bit of the byte corresponds to the top dot. Bit-image data may be mixed with text data on the same line. **Note:** Assign values to n_1 and n_2 as follows: n_1 represents values from 0 through 255. n_2 represents the values of either 0 or 1 with a weight of 256. The (z)s in the following description of n_1 and n_2 can be either 1's or 0's. n_2 0 0 0 0 0 0 0 Z 2^{15} 2^{14} 2^{13} 2^{12} 2^{11} 2^{10} 2^9 2^8 n_1 Z Z Z Z Z Z Z Z 2^7 2^6 2^5 2^4 2^3 2^2 2^1 2^0

Printer Code	Printer Function
ESC K Cont.	Data sent to the printer.  **Note:** Assume a total of 20 characters of text data (data A and data C). In Text mode, 20 characters correspond to 120 bit-image positions (20 x 6 = 120). The printable portion left for Bit-Image Graphics data (data B and data D) is 360 bit-image positions (480 - 120 = 360). Example: 1 'OPEN PRINTER IN RANDOM MODE WITH LENGTH OF 255 2 WIDTH "LPT1:",255 3 OPEN "LPT1:" AS #1 4 PRINT #1,CHR$(13);CHR$(10); 5 SLASH$=CHR$(1)+CHR$(02)+ CHR$(04)+CHR$(08) 6 SLASH$=SLASH$+CHR$(16)+CHR$(32)+ CHR$(64)+CHR$(128)+CHR$(0) 7 GAP$=CHR$(0)+CHR$(0)+CHR$(0) 8 NDOTS=480 9 'ESC K N1 N2 10 PRINT #1,CHR$(27);"K";CHR$(NDOTS MOD 256); CHR$ (FIX (NDOTS/256)); 11 'SEND NDOTS NUMBER OF BIT IMAGE BYTES 12 FOR I=1 TO NDOTS/12 'NUMBER OF SLASHES TO PRINT USING GRAPHICS 13 PRINT #1,SLASH$;GAP$; 14 NEXT I 15 CLOSE 16 END This example will give you a row of slashes printed in the Bit- Image Graphics mode.

Printer Code	Printer Function
ESC L	**Escape L (960 Bit-Image Graphics Mode)** Format: ESC L;n_1;n_2;v_1;v_2;...v_k; Changes from the Text mode to the 960 Bit-Image Graphics mode. The input is similar to ESC K. The 960 Bit-Image Graphics mode prints at half the speed of the 480 Bit-Image Graphics mode, but can produce a denser graphic image. The number of bytes of bit-image data ($_k$) is $n_1 + 256n_2$ but cannot exceed 960. n_1 is in the range of 0 to 255.
ESC N	**Escape N (Set Skip Perforation)** Format ESC N;n; Sets the Skip Perforation function. The number following ESC N sets the value for the number of lines of Skip Perforation. The example shows a 12-line skip. This will print 54 lines and advance the paper 12 lines. The value of n must be between 1 and 127. ESC N must be reset anytime the page length (ESC C) is changed. Example: LPRINT CHR$(27);CHR$(78);CHR$(12);
ESC O	**Escape O (Cancel Skip Perforation)** Cancels the Skip Perforation function. Example: LPRINT CHR$(27);CHR$(79);
ESC S	**Escape S (Subscript/Superscript)** Format: ESC S;n; Sets the printer to the Subscript print mode when ESC S is followed by a 1, as in the example that follows. When ESC S is followed by a 0 (zero), the printer will print in the Superscript print mode. Example: LPRINT CHR$(27);CHR$(83);CHR$(1);
ESC T	**Escape T (Subscript/Superscript Off)** Cancels printing in the Subscript or Superscript print mode. Example: LPRINT CHR$(27);CHR$(84);
ESC U	**Escape U (Unidirectional Printing)** Format: ESC U;n; The printer will print from left to right when ESC U is followed by a 1. When ESC U is followed by a 0 (zero), the left to right printing operation is canceled. The unidirectional printing (ESC U) ensures a more accurate print-start position for better print quality. Example: LPRINT CHR$(27);CHR$(85);CHR$(1);

Printer Code	Printer Function
ESC W	**Escape W (Double Width)** Format: ESC W;n; Sets the printer to the Double Width print mode when ESC W is followed by a 1. This mode must be canceled with ESC W followed by a 0 (zero) Example: LPRINT CHR$(27);CHR$(87);CHR$(1);
ESC Y	**Escape Y (960 Bit-Image Graphics Mode Normal Speed)** Format: ESC Y n_1;n_2;v_1;v_2;...v_k; Changes from the Text mode to the 960 Bit-Image Graphics mode, at normal speed. The printer cannot print dots on consecutive dot positions. The input of data is similar to ESC L.
ESC Z	**Escape Z (1920 Bit-Image Graphics Mode)** Format: ESC Z;n_1;n_2;v_1;v_2;...v_k; Changes from the Text mode to the 1920 Bit-Image Graphics mode. The input is similar to the other Bit-Image Graphics modes. ESC Z can print only every third dot position.
ESC 0	**Escape 0 (1/8-Inch Line Feeding)** Sets paper feeding to 3.175 mm (1/8 in.). Example: LPRINT CHR$(27);CHR$(48);
ESC 1	**Escape 1 (7/72-Inch Line Feeding)** Sets paper feeding to 2.47 mm (7/72 in.). Example: LPRINT CHR$(27);CHR$(49);
ESC 2	**Escape 2 (Start Variable Line Feeding)** ESC 2 is an execution command for ESC A. If no ESC A command is given, line feeding returns to 4.23mm (1/6 in.). Example: LPRINT CHR$(27);CHR$(50);
ESC 3	**Escape 3 (Variable Line Feeding)** Format: ESC 3;n; Changes the paper feeding to n/216 inch. The example that follows sets the paper feeding to 1/4 inch The value of n must be between 1 and 255. Example: LPRINT CHR$(27);CHR$(51);CHR$(54);
ESC 6	**Escape 6 (Select Character Set 2)** Selects Character Set 2. (See "Graphics Printer Character Set 2" later in this section.) Example: LPRINT CHR$(27);CHR$(54);

Printer Code	Printer Function
ESC 7	**Escape 7 (Select Character Set 1)** Selects character set 1. (See "Graphics Printer Character Set 1" later in this section.) Character set 1 is automatically selected when the printer is set to on or reset. Example: LPRINT CHR$(27);CHR$(55);
ESC 8	**Escape 8 (Ignore Paper End)** Allows the printer to print to the end of the paper. The printer ignores the Paper End switch. Example: LPRINT CHR$(27);CHR$(56);
ESC 9	**Escape 9 (Cancel Ignore Paper End)** Cancels the Ignore Paper End command. ESC 9 is automatically selected when the printer is set to on or reset. Example: LPRINT CHR$(27);CHR$(57);
ESC -	**Escape Minus (Underline)** Format: ESC -;n; ESC - followed by a 1, prints all of the following data with an underline. ESC - followed by a 0 (zero), cancels the Underline print mode. Example: LPRINT CHR$(27);CHR$(45);CHR$(1);
ESC <	**Escape Less Than (Home Head)** The print head will return to the left margin to print one line following ESC <. Example: LPRINT CHR$(27);CHR$(60);
FF	**Form Feed** Advances the paper to the top of the next page. **Note:** The location of the paper when the printer is set to on, determines the top of the page. The next top of page is 279.4 mm (11 in.) from that position. ESC C can be used to change the page length. Example: LPRINT CHR$(12);
HT	**Horizontal Tab** Tabs to the next horizontal tab stop. Tab stops are set every 8 columns when the printer's power is applied and can be changed with ESC D. Example: LPRINT CHR$(9);

Printer Code	Printer Function
LF	**Line Feed** Advances the paper up one line. Line spacing is 4.23 mm (1/6 in.) unless reset by ESC A, ESC 0, ESC 1, ESC 2 or ESC 3. Example: LPRINT CHR$(10);
NUL	**Null** Used with ESC B and ESC D as a list terminator. NUL also is used with other printer control codes to select options (for example, ESC S). Example: LPRINT CHR$(0);
SI	**Shift In (Compressed)** Changes the printer to the Compressed print mode. Example: LPRINT CHR$(15);
SO	**Shift Out (Double Width)** Changes the printer to the Double Width print mode.

Printer Control Code Quick Reference

This is an alphabetic listing of the descriptions of the printer control codes. You will find it helpful to locate the code you need to perform a certain job, or determine the ASCII decimal value quickly, once you are familiar with the control codes.

Note: ASCII values greater than 27 must be preceded by the ESC code (ASCII value 27).

Description	Code	ASCII Value
Alarm	BEL	7
Audible alarm	BEL	7
Bell	BEL	7
Buzzer	BEL	7
Cancel	CAN	24
Cancel data	CAN	24
Cancel double-strike printing	ESC H	72
Cancel double-width by line	DC4	20
Cancel double-width (lines)	ESC W	87
Cancel emphasized printing	ESC F	70
Cancel ignore paper end	ESC 9	57
Cancel perforation skip	ESC O	79
Cancel subscript/superscript	ESC T	84
Carriage return	CR	13
Character set 1 select	ESC 7	55
Character set 2 select	ESC 6	54
Character spacing 10 per inch	DC2	18
Character spacing 17.1 per inch	SI	15
Clear printer buffer	CAN	24
Command designator	ESC	27
Command end	NUL	0
Command prefix	ESC	27
Command start	ESC	27
Command terminator	NUL	0
Compressed On	SI	15
Compressed print	SI	15
Condensed print	SI	15
Data cancel	CAN	24
Double-strike printing	ESC G	71
Double-strike printing Off	ESC H	72

Description	Code	ASCII Value
Double-width-by-line Off	DC4	20
Double-width-by-line On	SO	14
Double-width On (lines)	ESC W	87
Double-width printing (lines)	ESC W	87
Eject form	FF	12
Eject paper	FF	12
Emphasized printing	ESC E	69
Emphasized printing Off	ESC F	70
Escape	ESC	27
Feed line	LF	10
Form feed	FF	12
Graphics, 480 bit-image	ESC K	75
Graphics, 960 bit-image, 1/2 speed	ESC L	76
Graphics, 960 bit-image, full speed	ESC Y	89
Graphics 1920 bit-image	ESC Z	90
Head, home	ESC <	60
Home head	ESC <	60
Horizontal tab	HT	9
Horizontal tab stops set	ESC D	68
Ignore paper end	ESC 8	56
Ignore paper end, cancel	ESC 8	56
Length-of-page set in inches	ESC C	67
Length-of-page set in lines	ESC C	67
Line-feed, set 1/6 inch	LF	10
Line-feed, set 1/8 inch	ESC 0	48
Line-feed, set 7/72 inch	ESC 1	49
Line-feed, set variable	ESC 3	51
Line-feed, set variable	ESC A	65
Line-feed, set variable	ESC J	74
Line-feed, start variable	ESC 2	50
Line-feed, set variable	ESC J	74
Null	NUL	0
Page eject	FF	12
Page length, set in inches	ESC C	67
Page length, set in lines	ESC C	67
Paper eject	FF	12
Paper end, ignore	ESC 8	56
Perforation skip Off	ESC O	79
Perforation skip set	ESC N	78

Description	Code	ASCII Value
Print double-width one line	SO	14
Print double-width multiple lines	ESC W	87
Print emphasized	ESC E	69
Print emphasized Off	ESC F	70
Print 10 characters per inch	DC2	18
Print unidirectional On/Off	ESC U	85
Printer buffer, clear	CAN	24
Return carriage	CR	13
Select character set 1	ESC 7	55
Select character set 2	ESC 6	54
Set 1 (character set 1)	ESC 7	55
Set 1/8-inch line feed	ESC 0	48
Set 2 (character set 2)	ESC 6	54
Set 7/72-inch line feed	ESC 1	49
Set variable line feed	ESC 3	51
Set horizontal tab stops	ESC D	68
Set page length in lines	ESC C	67
Set page length in inches	ESC C	67
Set perforation skip	ESC N	78
Set variable line feed	ESC A	65
Skip perforation Off	ESC O	79
Skip perforation On	ESC N	78
Start 7/72 inch line feed	ESC 1	49
Start double-strike print	ESC G	71
Start double-width print by line	SO	14
Start double-width print (lines)	ESC W	87
Start emphasized print	ESC E	69
Start perforation skip	ESC N	78
Start subscript/superscript	ESC S	83
Start variable line feed	ESC 2	50
Start underline	ESC –	45
Stop double-strike print	ESC H	72
Stop double-width by line	DC4	20
Stop double-width print (lines)	ESC W	87
Stop emphasized print	ESC F	70
Stop perforation skip	ESC O	79
Stop subscript/superscript	ESC T	84
Stop superscript/subscript	ESC T	84
Stop underline	ESC –	45

Description	Code	ASCII Value
Stops, horizontal tabs, set	ESC D	68
Subscript/superscript Off	ESC T	84
Subscript/superscript On	ESC S	83
Tab horizontal	HT	9
Tab stops, horizontal, set	ESC D	68
Tabs horizontal set	ESC D	68
Underline On	ESC –	45
Unidirectional printing Off	ESC U	85
Unidirectional printing On	ESC U	85
Variable line feed	ESC 3	54
Variable line feed set	ESC 3	65
Variable line feed set	ESC J	74
Vertical tabs set	ESC B	66

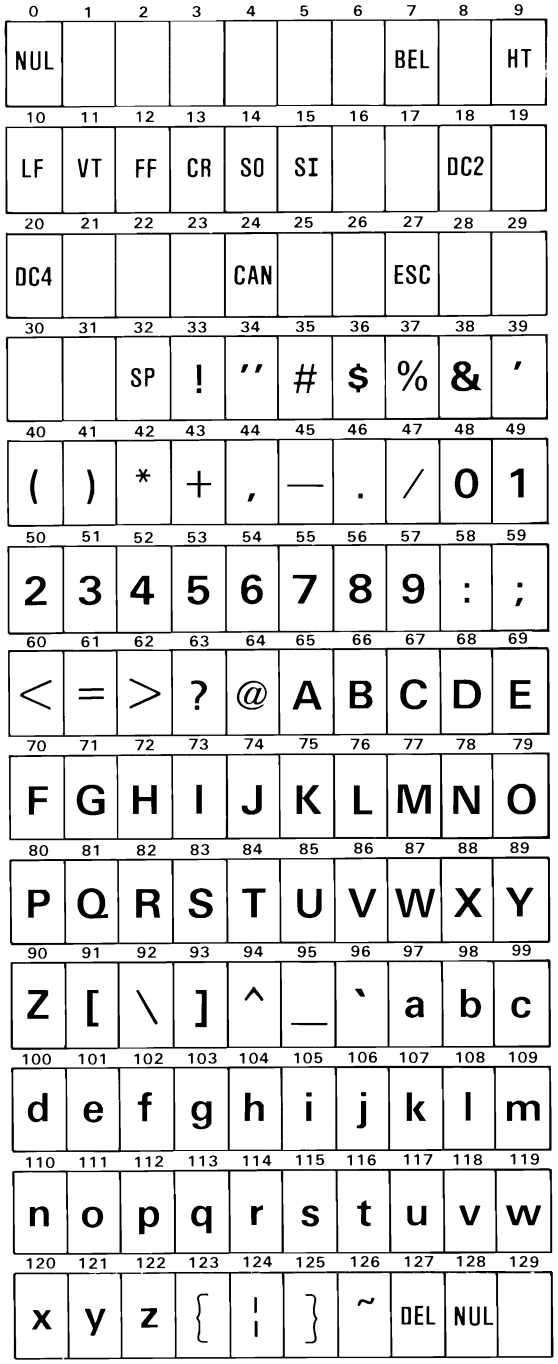
Print Mode Combinations

The IBM Graphics Printer can use any of the combinations of print modes listed in the following table. The print mode can be changed at any place within a line. Modes can be selected and combined if they are in the same vertical column.

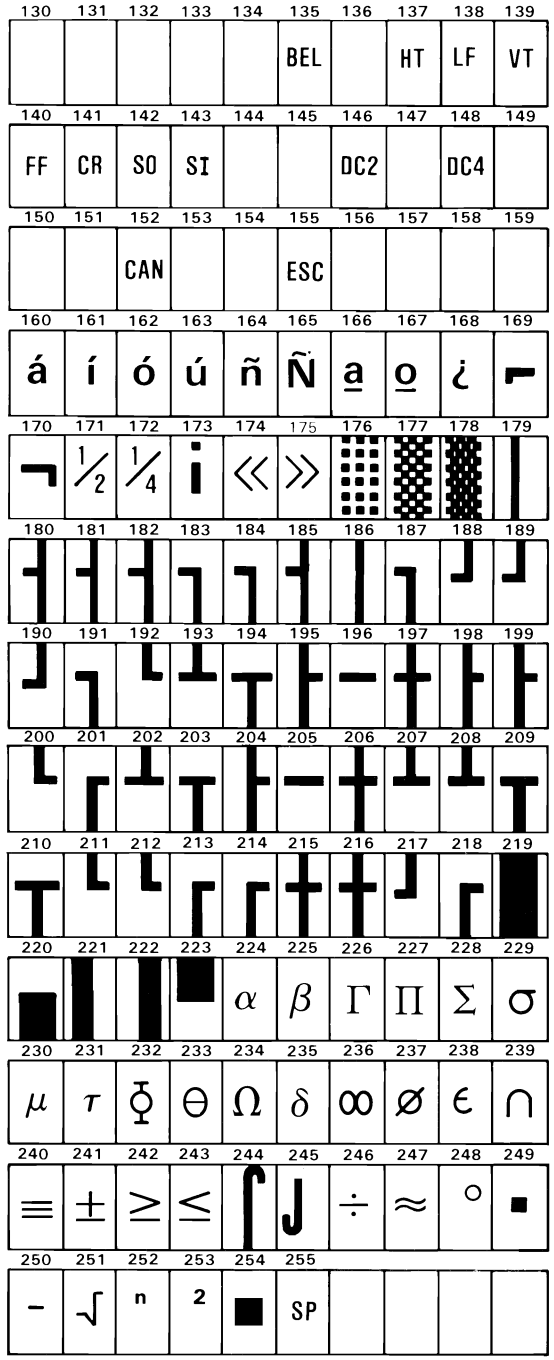
Printer Modes											
Normal	X	X	X		X	X	X				
Compressed									X	X	X
Emphasized									X		
Double Strike	X				X				X		
Subscript		X				X				X	
Superscript			X				X				X
Double Width	X	X	X		X	X	X		X	X	X
Underline	X	X	X		X	X	X		X	X	X

Graphics Printer Character Set

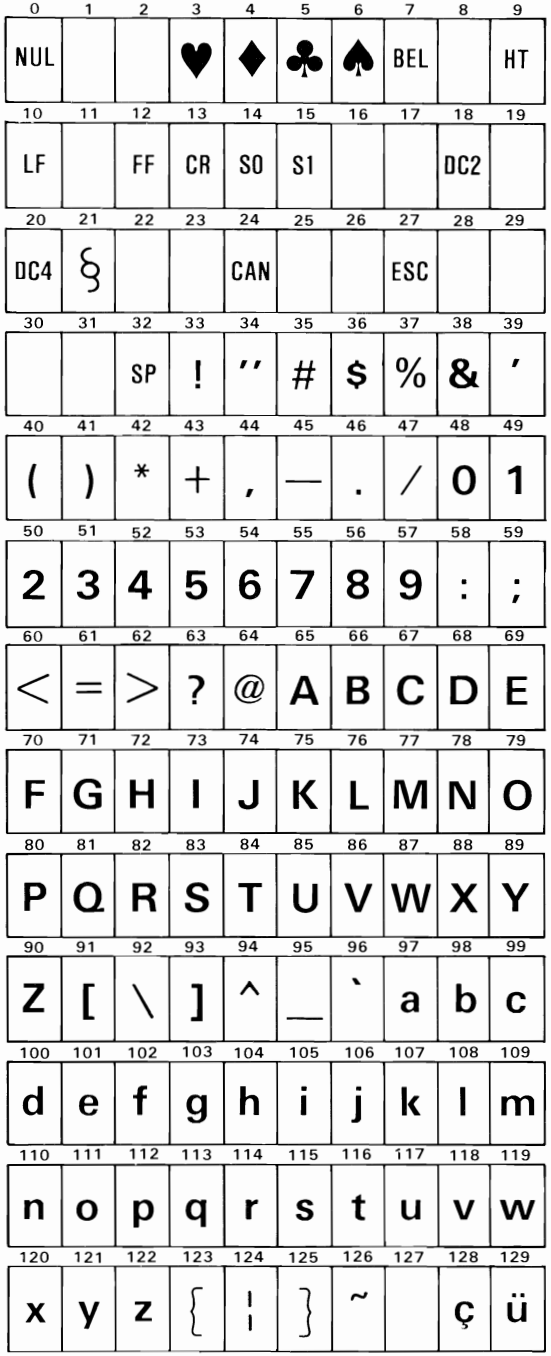
The tables on the following pages show each character with its respective ASCII value.



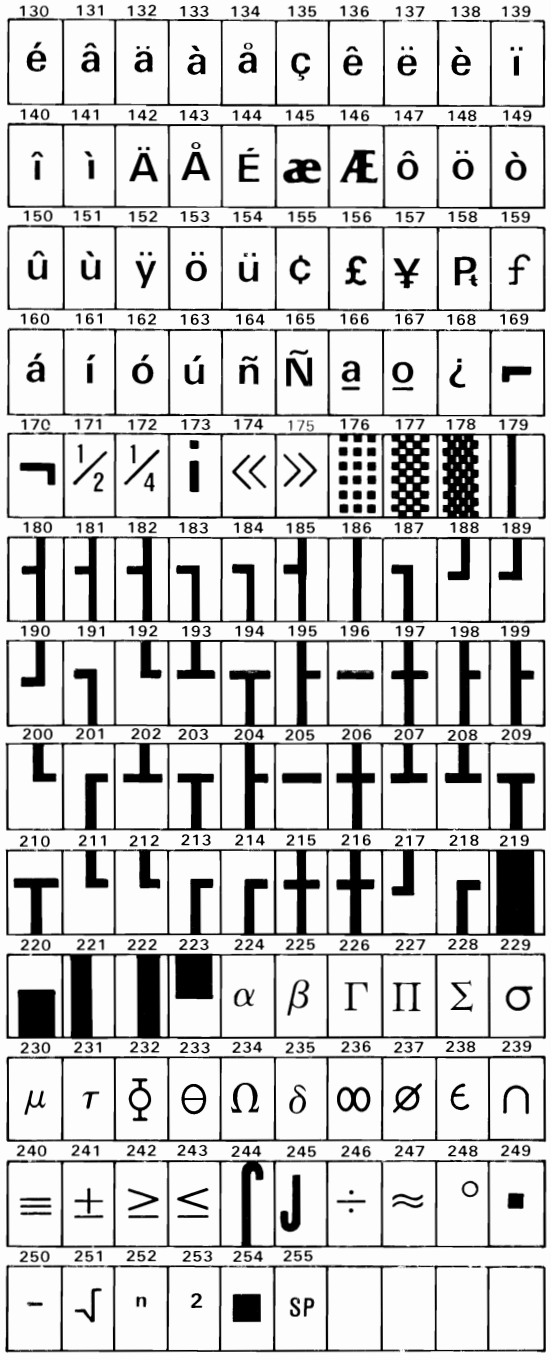
Graphics Printer Character Set 1 (Part 1 of 2)



Graphics Printer Character Set 1 (Part 2 of 2)



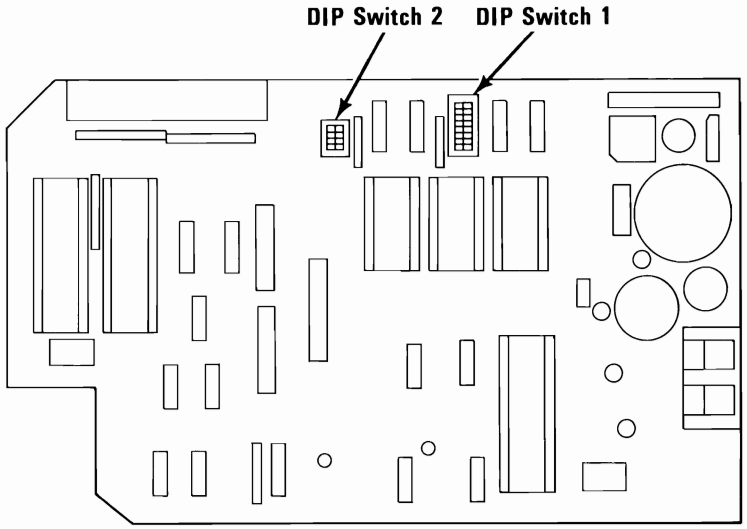
Graphics Printer Character Set 2 (Part 1 of 2)



Graphics Printer Character Set (Part 2 of 2)

DIP-Switch Settings

There are two DIP switches on the control circuit board. In order to satisfy the user's specific requirements, desired control modes are selectable by the DIP switches. The functions of the switches and their preset conditions at the time of shipment are as shown in the following figures.



Location of Printer DIP Switches

Switch Number	Function	On	Off	Factory-Set Condition
1-1	Not Applicable	—	—	On
1-2	CR	Print Only	Print & Line Feed	On
1-3	Buffer Full	Print Only	Print & Line Feed	Off
1-4	Cancel Code	Invalid	Valid	Off
1-5	Not Applicable	—	—	On
1-6	Error Buzzer	Sound	Does Not Sound	On
1-7	Character Generator	Set 2	Set 1	Off
1-8	SLCT IN Signal	Fixed Internally	Not Fixed Internally	On

Functions and Conditions of DIP Switch 1 (Graphics)

Switch Number	Function	On	Off	Factory-Set Condition
2-1	Form Length	304.8 mm (12 inches)	279.4 mm (11 inches)	Off
2-2	Line Spacing	3.175 mm (1/8 inch)	4.23 mm (1/6 inch)	Off
2-3	Auto Feed XT Signal	Fixed Internally	Not Fixed Internally	Off
2-4	1 Inch Skip Over Perforation	Valid	Not Valid	Off

Functions and Conditions of DIP Switch 2 (Graphics)

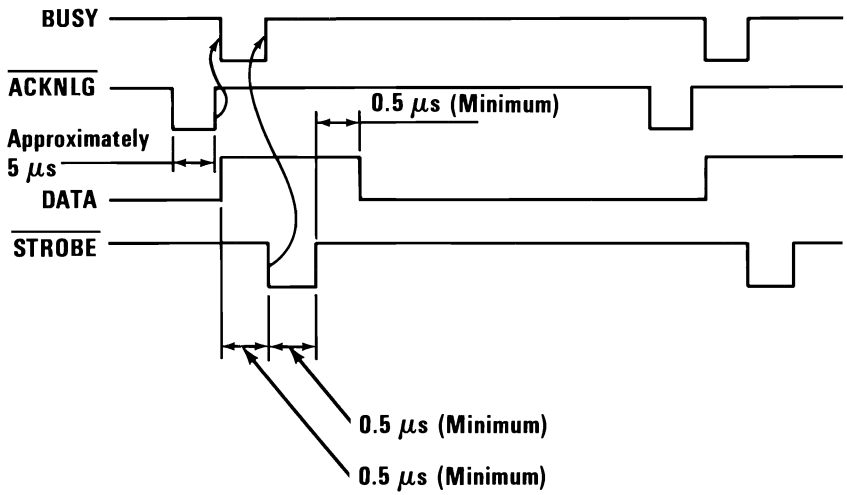
Interface

Specifications:

- Data transfer rate: 1000 cps (maximum)
- Synchronization: By externally-supplied –STROBE pulses.
- Handshaking –ACKNLG or BUSY signals.
- Logic level: Input data and all interface control signals are compatible with the TTL level.

Connector type: 57-30360 (Amphenol)

Data Transfer Sequence:



Parallel Interface Timing Diagram

Specifications

Size	
Height	107 mm (4.2 in.)
Width	400 mm (15.7 in.)
Depth	305 mm (12 in.)
Weight	5.5 kg (12 lb)
Power Cable	
Length	1.83 m (6 ft)
Size	18 AWG
Signal Cable	
Length	1.83 m (6 ft)
Size	22 AWG

Physical Specifications

Voltage (Vac)			**Frequency (Hz)**	**Current (Amps)**	**Power (Watts)**
Nominal	Minimum	Maximum	± 3 Hz	Maximum	Maximum
120	104	127	60	1.0	100
220	198	242	50/60	0.5	100
240	216	264	50/60	0.5	100

Electrical Specifications

Print Method	Serial-impact wire matrix		
Print Speed	80 cps		
Print Direction	Bidirectional with logical seeking		
Number of Pins in Head	9		
Line Spacing	4.23 mm (1/6 in.) or programmable		
Printing Characteristics			
Matrix	9 x 9		
Graphic Character	See "Graphics Printer Character Set" tables.		
Printing Sizes			
	Characters per inch	Maximum characters per line	
Normal	10	80	
Double Width	5	40	
Compressed	17.1	132	
Double Width-Compressed	8.25	66	
Subscript	10	80	
Superscript	10	80	
Media Handling			
Paper Feed	Adjustable sprocket pin feed		
Paper Width Range	101.6 mm (4 in.) to 254 mm (10 in.)		
Copies	One original plus two carbon copies (total thickness not to exceed 0.3 mm (0.012 in.)). Minimum paper thickness is 0.064 mm (0.0025 in.).		
Paper Path	Rear		
Interfaces			
Standard	Parallel 8-bit Data and Control Lines		
Inked Ribbon			
Color	Black		
Type	Cartridge		
Life Expectancy	3 million characters		
Environmental Conditions			
Operating Temperature	5 to 35°C (41 to 95°F)		
Operating Humidity	10 to 80% non-condensing		
Heat Output	341 BTU/hr (maximum)		

Printer Specifications

Connector Pin Assignments

Signal Pin No.	Return Pin No.	Signal	Direction	Description
1	19	$\overline{\text{STROBE}}$	In	STROBE pulse to read data in. Pulse width must be more than 0.5 µs at receiving terminal. The signal level is normally "high"; read-in of data is performed at the "low" level of this signal.
2	20	DATA 1	In	These signals represent information of the 1st to 8th bits of parallel data respectively. Each signal is at "high" level when data is logical "1" and "low" when logical "0."
3	21	DATA 2	In	
4	22	DATA 3	In	
5	23	DATA 4	In	
6	24	DATA 5	In	
7	25	DATA 6	In	
8	26	DATA 7	In	
9	27	DATA 8	In	
10	28	$\overline{\text{ACKNLG}}$	Out	Approximately 5 µs pulse; "low" indicates that data has been received and the printer is ready to accept other data.
11	29	BUSY	Out	A "high" signal indicates that the printer cannot receive data. The signal becomes "high" in the following cases: 1. During data entry. 2. During printing operation. 3. In "offline" state. 4. During printer error status.

Connector Pin Assignment and Descriptions of Interface Signals (Part 1 of 3)

Signal Pin No.	Return Pin No.	Signal	Direction	Description
12	30	PE	Out	A "high" signal indicates that the printer is out of paper.
13	—	SLCT	Out	This signal indicates that the printer is in the selected state.
14	—	$\overline{\text{AUTO FEED XT}}$	In	With this signal being at "low" level, the paper is automatically fed one line after printing. (The signal level can be fixed to "low" with DIP SW pin 2-3 provided on the control circuit board.)
15	—	NC		Not used.
16	—	OV		Logic GND level.
17	—	CHASSIS-GND	—	Printer chassis GND. In the printer, the chassis GND and the logic GND are isolated from each other.
18	—	NC	—	Not used.
19-30	—	GND	—	"Twisted-Pair Return" signal; GND level.
31	—	$\overline{\text{INIT}}$	In	When the level of this signal becomes "low" the printer controller is reset to its initial state and the print buffer is cleared. This signal is normally at "high" level, and its pulse width must be more than 50 µs at the receiving terminal.

Connector Pin Assignment and Descriptions of Interface Signals (Part 2 of 3)

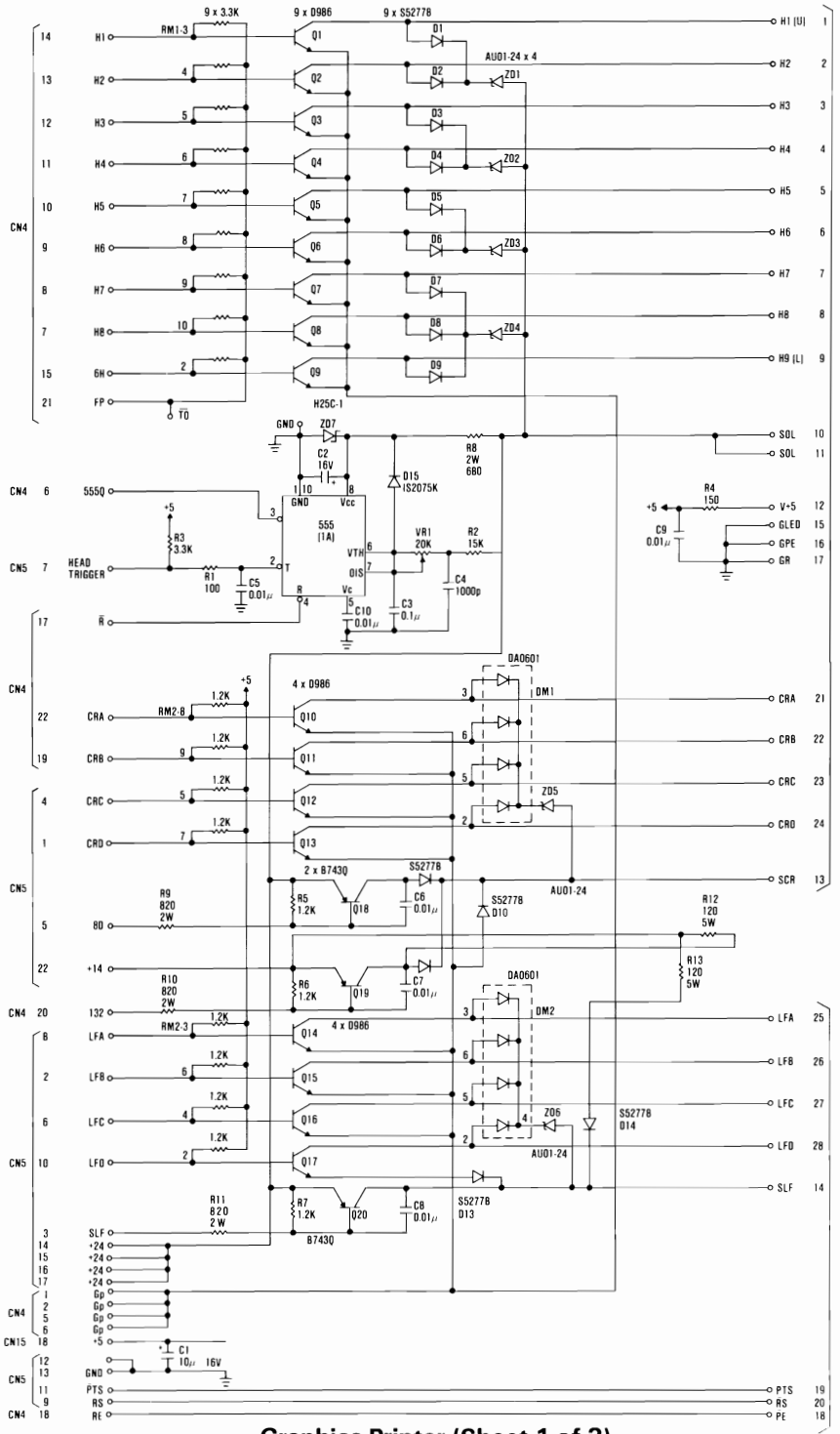
Signal Pin No.	Return Pin No.	Signal	Direction	Description
32		$\overline{\text{ERROR}}$	Out	The level of this signal becomes "low" when the printer is in "Paper End" state, "Offline" state and "Error" state.
33	—	GND	—	Same as with pin numbers 19 to 30.
34	—	NC	—	Not used.
35				Pulled up to + 5 Vdc through 4.7 k-ohms resistance.
36	—	$\overline{\text{SLCT IN}}$	In	Data entry to the printer is possible only when the level of this signal is "low." (Internal fixing can be carried out with DIP SW 1-8. The condition at the time of shipment is set "low" for this signal.)

Notes:
1. "Direction" refers to the direction of signal flow as viewed from the printer.
2. "Return" denoted "Twisted-Pair Return" and is to be connected at signal-ground level.
   When wiring the interface, be sure to use a twisted-pair cable for each signal and never fail to complete connection on the return side. To prevent noise effectively, these cables should be shielded and connected to the chassis of the system unit and printer, respectively.
3. All interface conditions are based on TTL level. Both the rise and fall times of each signal must be less than 0.2 µs.
4. Data transfer must not be carried out by ignoring the $\overline{\text{ACKNLG}}$ or BUSY signal. (Data transfer to this printer can be carried out only after confirming the $\overline{\text{ACKNLG}}$ signal or when the level of the BUSY signal is "low.")

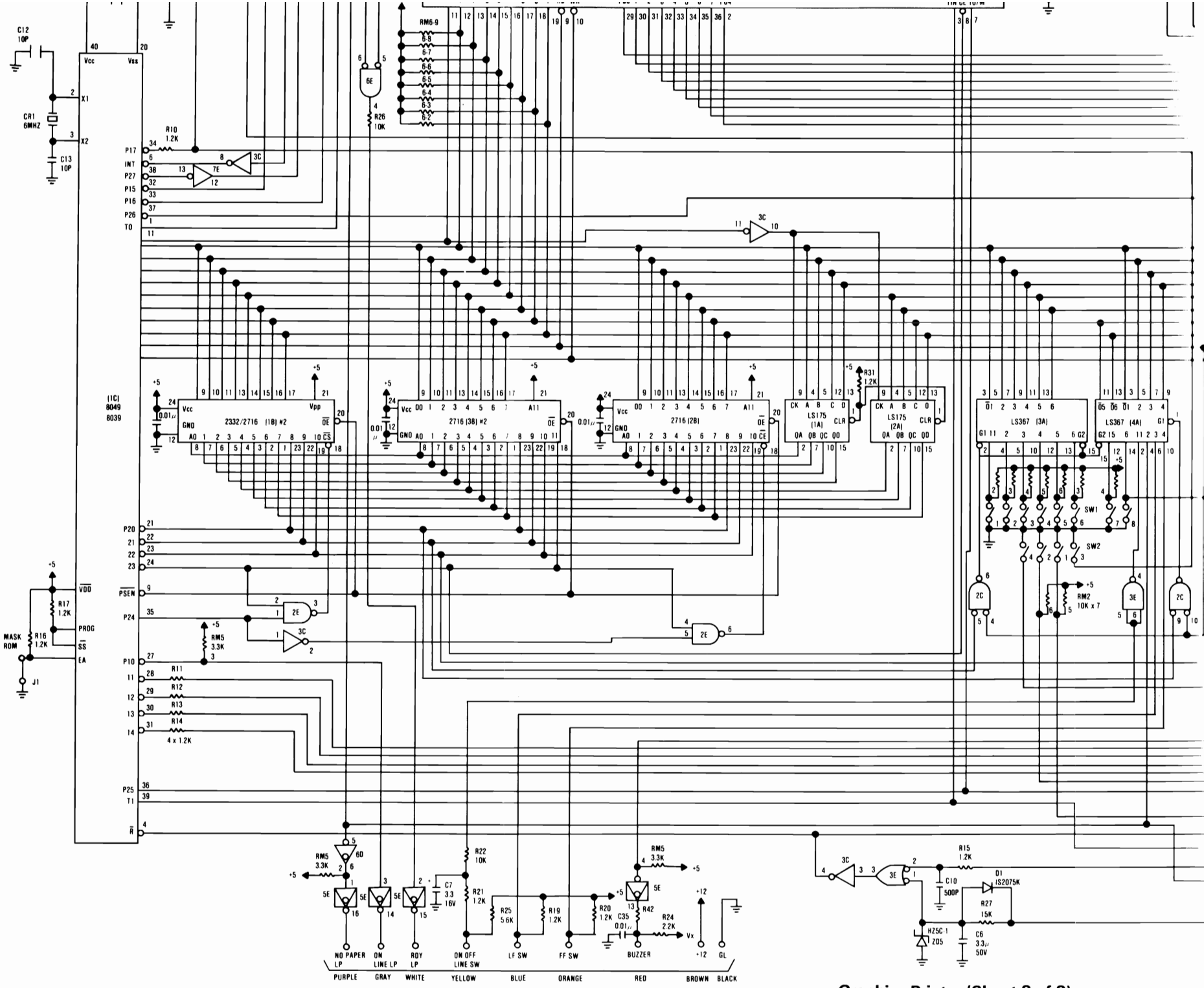
Connector Pin Assignment and Descriptions of Interface Signals (Part 3 of 3)

Logic Diagrams

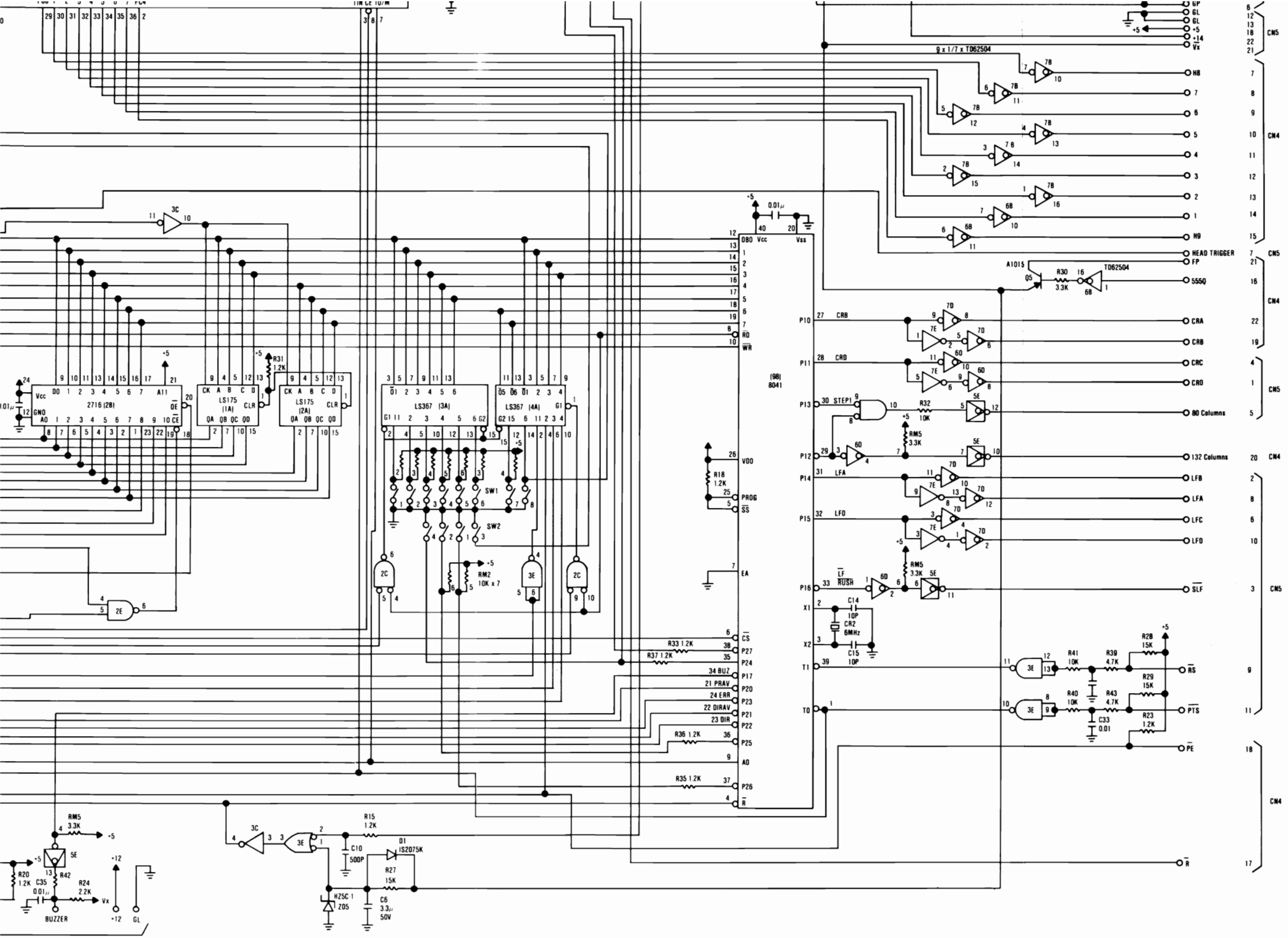
The following page and foldout contain the logic diagrams for the the IBM Graphics Printer.



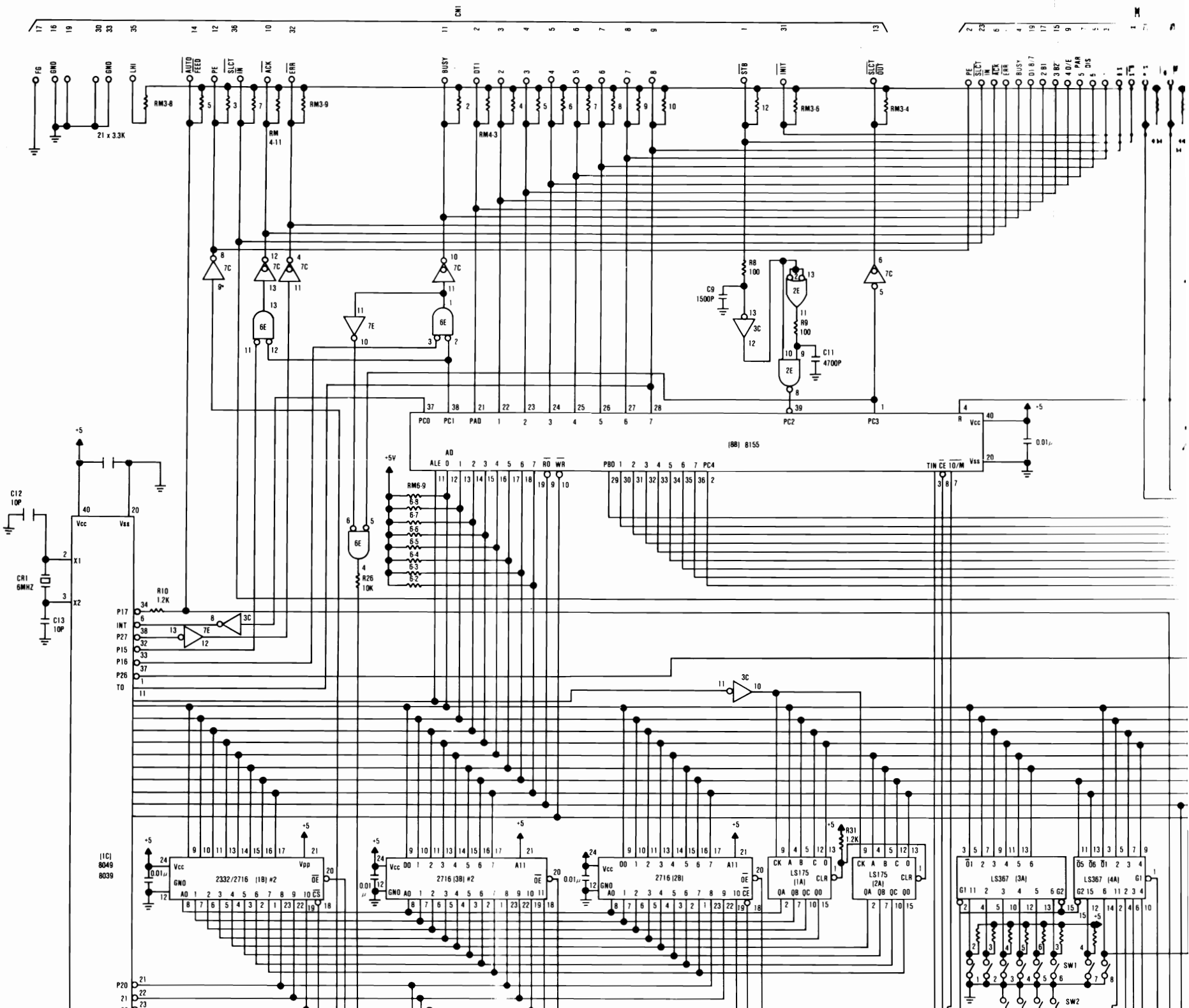
Graphics Printer (Sheet 1 of 2)

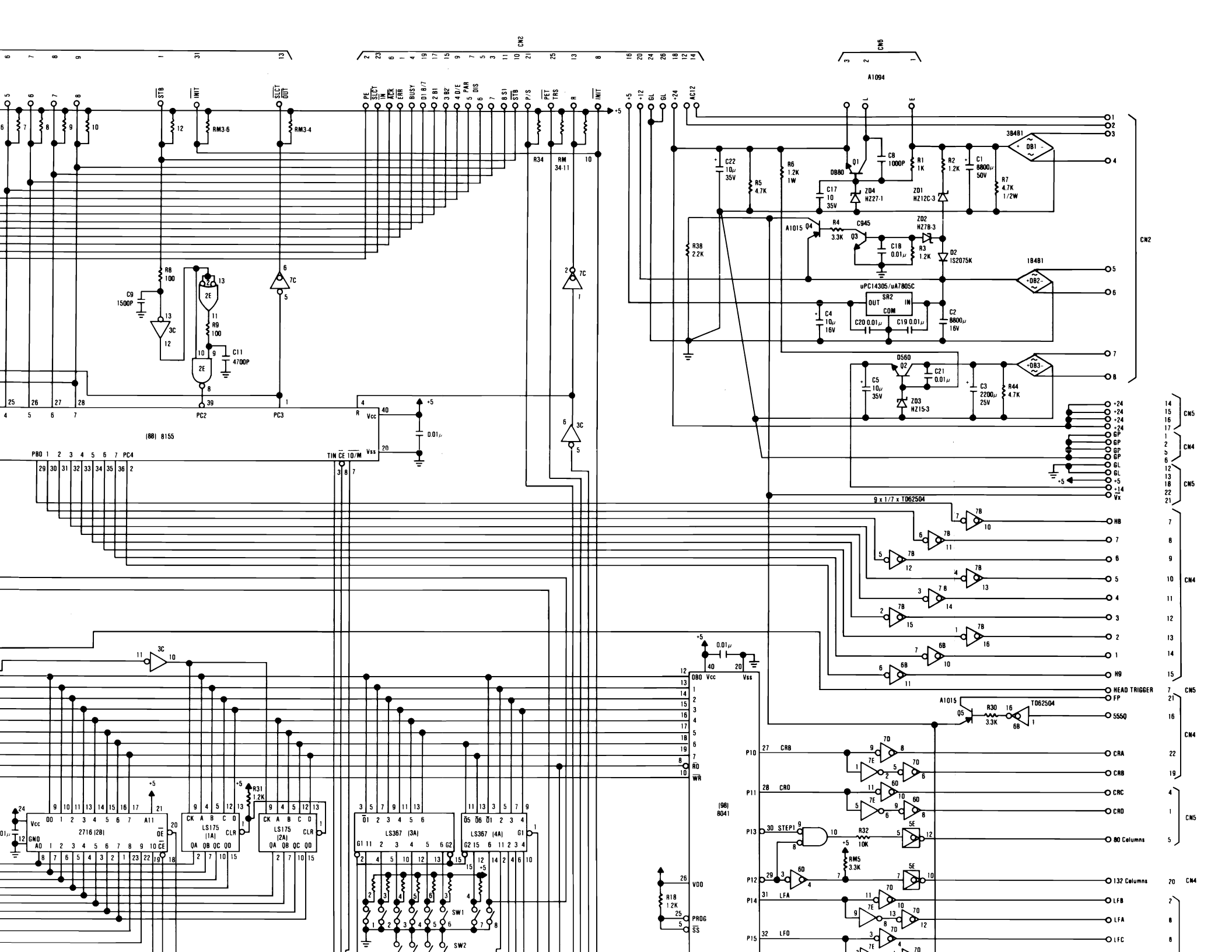


Graphics Printer (Sheet 2 of 2)



Graphics Printer (Sheet 2 of 2)


CN1
FG
GND
GND
21 x 3.3K
LNI
RM3-8
AUTO FEED
PE
SLCT IN
ACK
ERR
RM 4-11
RM3-9
BUSY
DT1
RM4-3
STB
INIT
RM3-6
SLCT OUT
RM3-4
PE
SLCT IN
ACK
ERR
BUSY
PAR DIS
7C
6E
7E
2E
3C
R8 100
C9 1500P
R9 100
C11 4700P
PC0
PC1
PA0
PC2
PC3
(88) 8155
AD
ALE
RD
WR
PB0
PC4
TIN
CE
IO/M
Vcc
Vss
+5
0.01μ
RM6-9
6.8
6-7
6-6
6-5
6-4
6-3
6-2
R26 10K
C12 10P
C13 10P
CR1 6MHZ
X1
X2
R10 1.2K
P17
INT
P27
P15
P16
P26
T0
P20
(1C) 8049 8039
2332/2716 (1B) #2
2716 (3B) #2
2716 (2B)
Vpp
OE
CS
CE
A11
LS175 (1A)
LS175 (2A)
CLR
R31 1.2K
LS367 (3A)
LS367 (4A)
SW1
SW2



CN2
CN6
A1094
STB
INIT
SLCT
OUT
PE
SLCT
IN
ACK
ERR
BUSY
D1 B/7
2 B1
3 B2
4 D/E
PAR
DIS
8 S1
STB
P/S
PET
TRS
R
INIT
+5
+12
GL
GL
+24
AC12
RM3-6
RM3-4
R34
RM 34-11
R8 100
C9 1500P
R9 100
C11 4700P
PC2
PC3
(88) 8155
PB0
PC4
TIN
CE
IO/M
Vcc
Vss
0.01μ
C22 10μ 35V
R5 4.7K
R6 1.2K 1W
C8 1000P
Q1
DB80
R1 1K
R2 1.2K
C1 8800μ 50V
R7 4.7K 1/2W
3B4B1
DB1
C17 10 35V
ZD4 HZ27-1
ZD1 HZ12C-3
A1015
Q4
R4 3.3K
C945
Q3
ZD2 HZ7B-3
C18 0.01μ
R3 1.2K
D2 1S2075K
R38 2.2K
1B4B1
DB2
uPC14305/uA7805C
SR2
OUT
IN
COM
C4 10μ 16V
C20 0.01μ
C19 0.01μ
C2 8800μ 16V
D560
Q2
C21 0.01μ
C5 10μ 35V
ZD3 HZ15-3
C3 2200μ 25V
R44 4.7K
DB3
CN5
CN4
GP
GL
+14
Vx
9 x 1/7 x TD62504
HB
H9
HEAD TRIGGER
FP
555Q
CRA
CRB
CRC
CRD
80 Columns
132 Columns
LFB
LFA
LFC
A1015
Q5
R30 3.3K
TD62504
DB0
RD
WR
(98) 8041
P10
P11
P13
P12
P14
P15
CRB
CRD
STEP1
R32 10K
RM5 3.3K
LFA
LFD
VDD
PROG
SS
R18 1.2K
2716 (2B)
LS175 (1A)
LS175 (2A)
LS367 (3A)
LS367 (4A)
R31 1.2K
SW1
SW2