



*Personal Computer  
Hardware Reference  
Library*

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# **IBM PC Compact Printer**

6361476

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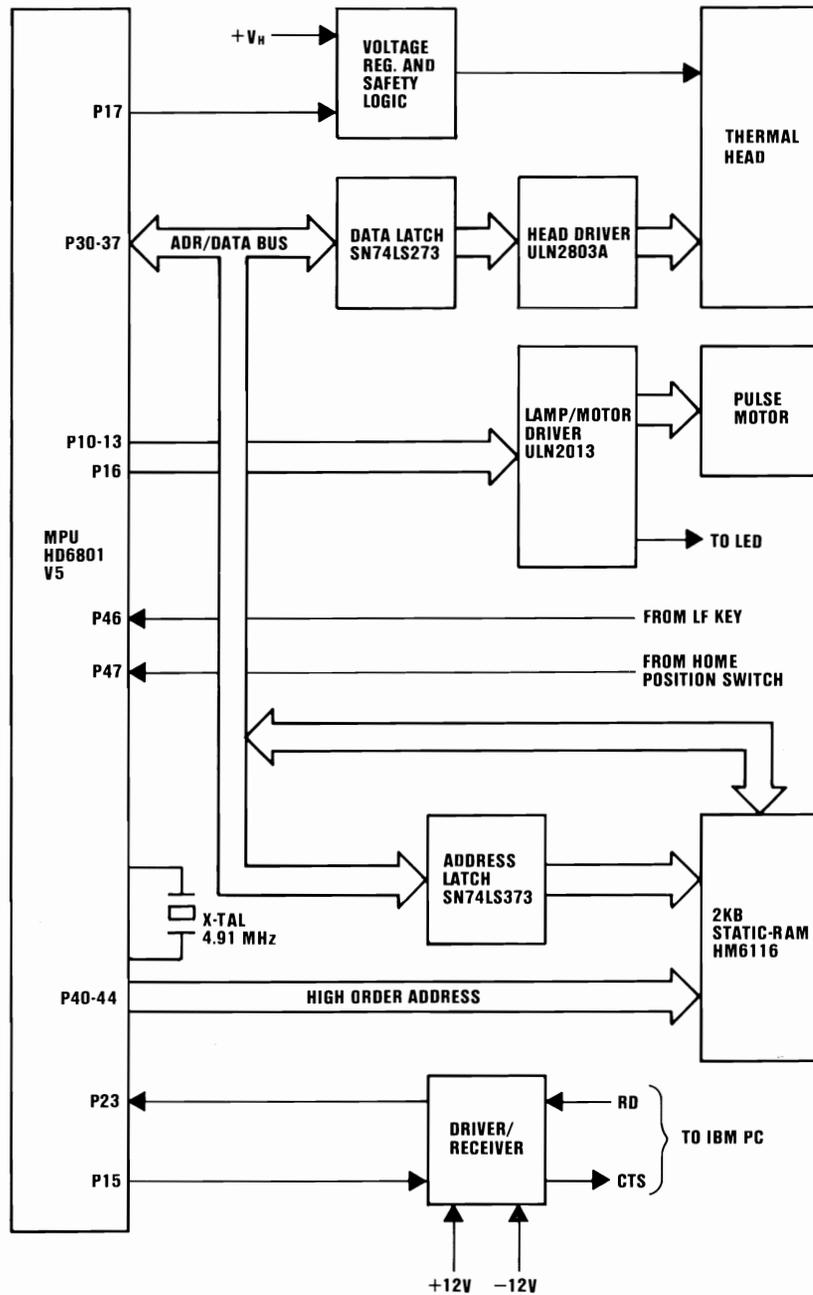
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## Description

The IBM PC Compact Printer is a stand-alone, tabletop unit that plugs into a standard, 120-Vac wall outlet. Using a print head with eight print elements and thermal-sensitive paper, the printer can print characters from the standard ASCII, 96-character, uppercase and lowercase character set, and prints the characters in a 5-by-8 dot matrix at 50 characters per second (cps). The printer prints in one direction (left-to-right) and has four print modes. In the standard mode, the printer prints 80 characters per line; in the compressed mode, 136 characters per line; in the double-width mode, 40 characters per line, and in the compressed double-width mode, 66 characters per line. The IBM PC Compact Printer can also underline characters, has an extended character set for international languages, and can accept special characters in all-points-addressable mode to do graphics or draw special characters under program control.

The printer has a 1.89 meter (6-foot), 16-lead, printer cable. This cable connects to the 25-pin D-shell connector of an Asynchronous Communications Adapter (primary or alternate) through the use of the IBM PC Compact Printer Connector Adapter.

The following is a block diagram of the IBM PC Compact Printer.



Compact Printer Block Diagram

## Programming Considerations

### Printer Control Codes

The following pages list, in alphabetic order, the printer control codes with a description of each. Some knowledge of BASIC programming is necessary to insert printer control codes in your program. An example of each code in BASIC is given at the end of each description. The "Format" information is given where more information is needed for programming considerations.

Printer Code	Printer Function
<b>CAN</b>	<p><b>Cancel</b> Clears the printer memory of all data waiting to be printed following the last-received line-ending code. Resets the printer to the power-on defaults. Example: LPRINT CHR\$(24);</p>
<b>CR</b>	<p><b>Carriage Return</b> Causes the printer to print the data that follows CR beginning at the left margin. No line-feed operation takes place unless ESC 5;1 (Automatic Line-Feed) has been sent.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. IBM Personal Computer BASIC (and many other programs) automatically sends LF (line feed) with CR.</li> <li>2. If no data precedes the CR, or if all preceding data is spaces, the printer does not carriage return. If automatic line feed is On, the paper is advanced one line space.</li> </ol> <p>Example: LPRINT CHR\$(13);</p>
<b>DC2</b>	<p><b>Device Control 2 (Compressed Off)</b> Ends printing in the Compressed mode. Example: LPRINT CHR\$(18);</p>
<b>DC4</b>	<p><b>Device Control 4 (Double Width Off)</b> Ends printing in the Double Width mode. Example: LPRINT CHR\$(20);</p>
<b>ESC</b>	<p><b>Escape</b> Sets the printer to accept the next data sent as a printer command. (See the following list.) Example: LPRINT CHR\$(27);</p>

Printer Code	Printer Function
<b>ESC B</b>	<p><b>Escape B (Set Vertical Tabs)</b> Format: ESC B;n<sub>1</sub>;n<sub>2</sub>;...n<sub>64</sub>;NUL; Sets the vertical tab-stop positions. The power-on default is no vertical tab stops set. n<sub>1</sub> through n<sub>64</sub> represent tab-stop positions by line number. The topmost line of the page is line 0. Tab-stop positions must be received in ascending numeric order and cannot exceed the set page length. Up to 64 positions are recognized by the Compact Printer. The positions do not take effect until NUL is received. Once vertical tab stops are set, they remain in effect until new ones are specified or all tab stops are set to the power-on defaults by ESC R (Clear Tabs). (If the printer is reset or switched Off, set tab stops are cleared.) If no vertical tab stops are set, the Vertical Tab (VT) command behaves as a Line Feed (LF) command. ESC B followed only by NUL clears all vertical tab stops. The form length must be set by the ESC C command (Set Lines per Page) prior to setting vertical tab stops. Example: LPRINT CHR\$(27);CHR\$(66);CHR\$(n<sub>1</sub>); CHR\$(n<sub>2</sub>);...CHR\$(n<sub>64</sub>);CHR\$(0);</p>
<b>ESC C</b>	<p><b>Escape C (Set Lines per Page)</b> Format: ESC C;n; Sets the page length in number of lines (n). The 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 printer default is 66 lines per page when switched On or reset. Example: LPRINT CHR\$(27);CHR\$(67);CHR\$(n);</p>
<b>ESC D</b>	<p><b>Escape D (Set Horizontal Tab Stops)</b> Format: ESC D;n<sub>1</sub>;n<sub>2</sub>;...n<sub>28</sub>;NUL; Sets the horizontal tab-stop positions represented by n<sub>1</sub> through n<sub>28</sub>. The power-on default is a tab stop set at column 8 and every eighth column thereafter. The printer recognizes up to 28 horizontal tab stops. They must be in ascending numeric order and followed by NUL. Tab stops can be set between 1 and 80 in standard print mode; between 1 and 136 in compressed print mode. ESC D immediately followed by NUL will clear all horizontal tabs. ESC R (Clear Tabs) may be used to set horizontal tabs to the power-on default. Example: LPRINT CHR\$(27);CHR\$(68);CHR\$(n<sub>1</sub>); CHR\$(n<sub>2</sub>);...CHR\$(n<sub>28</sub>);CHR\$(0);</p>

Printer Code	Printer Function																		
<b>ESC K</b>	<p><b>Escape K (560 Bit-Image Graphics Mode)</b>  Format: ESC K;n<sub>1</sub>;n<sub>2</sub>;v<sub>1</sub>;v<sub>2</sub>;...v<sub>560</sub>;  Changes the printer to the Bit-Image Graphics mode. Dot density is 70 by 70 dots per inch. If the graphics data exceeds the space remaining on the line, the printer ignores the excess data. 7 bytes of bit-image data equal 1 standard-width character.  n<sub>1</sub> and n<sub>2</sub> are binary numbers that specify the number of bit-image data bytes to be transferred. n<sub>1</sub> represents values from 0 to 255, and n<sub>2</sub> represents values from 0 to 2 times 256. The total number of bit-image data bytes is equal to n<sub>1</sub> + (n<sub>2</sub> x 256) and cannot exceed 560.  All eight of the print-head thermal dots are used to print bit-image graphics. v<sub>1</sub> through v<sub>560</sub> are bit-image data bytes, each of which represents a set of 8 printable dots in a vertical line. The horizontal position of these 8 dots is determined by the position of the bit-image data byte within the v<sub>1</sub> through v<sub>560</sub> series. v<sub>1</sub> is printed at the starting position followed in order from left to right by v<sub>2</sub> through v<sub>560</sub>.  Each bit of a bit-image data byte represents a vertical dot position at the horizontal position represented by that bit-image data byte. The lowest value, or least significant bit (bit 0), represents the bottom dot position, and the highest value, or most significant bit (bit 7), represents the top dot position.  In the following table the left-hand column of (•)'s represents dot positions within a vertical line. The right-hand column shows the corresponding bit number within a bit-image data byte. (The bits are numbered 7 through 0, from left to right.)</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Dot Position</th> <th>Bit Number</th> </tr> </thead> <tbody> <tr> <td>Top</td> <td>• - 7</td> </tr> <tr> <td></td> <td>• - 6</td> </tr> <tr> <td></td> <td>• - 5</td> </tr> <tr> <td></td> <td>• - 4</td> </tr> <tr> <td></td> <td>• - 3</td> </tr> <tr> <td></td> <td>• - 2</td> </tr> <tr> <td></td> <td>• - 1</td> </tr> <tr> <td>Bottom</td> <td>• - 0</td> </tr> </tbody> </table> <p>For example, if v<sub>1</sub> is binary 10000000 (decimal 128), only the top dot prints in that horizontal position; if v<sub>1</sub> is binary 00000001 (decimal 01), only the bottom dot prints; and if v<sub>1</sub> is binary 11111111 (decimal 255), all eight dots print.</p> <p>Example:  LPRINT CHR\$(27);CHR\$(75);CHR\$(n<sub>1</sub>);  CHR\$(n<sub>2</sub>);CHR\$(v<sub>1</sub>);CHR\$(v<sub>2</sub>); ... CHR\$(v<sub>560</sub>);</p>	Dot Position	Bit Number	Top	• - 7		• - 6		• - 5		• - 4		• - 3		• - 2		• - 1	Bottom	• - 0
Dot Position	Bit Number																		
Top	• - 7																		
	• - 6																		
	• - 5																		
	• - 4																		
	• - 3																		
	• - 2																		
	• - 1																		
Bottom	• - 0																		

Printer Code	Printer Function
<b>ESC N</b>	<p><b>Escape N (Set Skip Perforation)</b>  Format: ESC N;n;  Specifies the number of lines to be skipped at the end of each page. This causes the printer to automatically skip over the perforation between pages of continuous forms. The number of lines n, is converted to inches using the line-spacing in effect. The value of n must be between 1 and 127. ESC N must be reset anytime the page length (ESC C) is changed. The default for skip perforation is 25.4 mm (1 in.).  Example:  LPRINT CHR\$(27);CHR\$(78);CHR\$(n);</p>
<b>ESC O</b>	<p><b>Escape O (Cancel Skip Perforation)</b>  Cancels the Skip Perforation function.  Example:  LPRINT CHR\$(27);CHR\$(79);</p>
<b>ESC R</b>	<p><b>Escape R (Clear Tabs)</b>  Resets all tab stops, both horizontal and vertical, to the power-on defaults.  Example:  LPRINT CHR\$(27);CHR\$(82);</p>
<b>ESC W</b>	<p><b>Escape W (Continuous Double-Width Print)</b>  Format: ESC W;n;  Changes the printer to double-width printing when ESC W is followed by 1. This mode is not canceled by a line feed or DC4. It is canceled when ESC W is followed by 0 (zero).  Example:  LPRINT CHR\$(27);CHR\$(87);CHR\$(n);</p>
<b>ESC 0</b>	<p><b>Escape Zero (1/9-Inch Line Feed)</b>  Changes the line feed to 2.82 mm (1/9 in.). This produces 9 lines per inch.  Example:  LPRINT CHR\$(27);CHR\$(48);</p>
<b>ESC 1</b>	<p><b>Escape One (1/9-Inch Line Feed)</b>  Changes the line feed to 2.82 mm (1/9 in.). This produces 9 lines per inch. ESC 1 functions the same as ESC 0.  Example:  LPRINT CHR\$(27);CHR\$(49);</p>
<b>ESC 2</b>	<p><b>Escape Two (1/6-Inch Line Feed)</b>  Resets line spacing to 4.23 mm (1/6 in.). This produces 6 lines per inch and is the power-on default for vertical line spacing.  Example:  LPRINT CHR\$(27);CHR\$(50);</p>

Printer Code	Printer Function
<b>ESC 5</b>	<p><b>Automatic Line Feed</b>  Format: ESC 5;n;  When n is 1, automatic line feeding starts; the printer will line-feed each time a code that indicates the end of a line, such as CR, is received. When n is 0, automatic line feeding stops.  Example:  LPRINT CHR\$(27);CHR\$(53);</p>
<b>ESC -</b>	<p><b>Escape Minus (Underline)</b>  Format: ESC -;n;  ESC - followed by 1, causes all of the following data to be printed with an underline. ESC - followed by 0 (zero), cancels the underlining.  Example:  LPRINT CHR\$(27);CHR(45);CHR\$(n);</p>
<b>ESC &lt;</b>	<p><b>Escape Less Than (Home Head)</b>  Returns the print head to the left margin to print the line following ESC &lt;. This occurs for one line only.  Example:  LPRINT CHR\$(27);CHR\$(60);</p>
<b>FF</b>	<p><b>Form Feed</b>  Advances the paper to the top of the next page. The location of the paper, when the printer Power switch is set to On, is the top-of-page position. The next top-of-page is determined by the form length as defined by the power-on default, 279 mm (11 in.), or as set by ESC C. Always separate multiple Form Feed commands with spaces.  Example:  LPRINT CHR\$(12);</p>
<b>HT</b>	<p><b>Horizontal Tab</b>  Causes the carriage to move to the next horizontal tab stop. Tab stops are set with ESC D. A horizontal tab stop every 8 columns is the power-on default.  Example:  LPRINT CHR\$(9);</p>
<b>LF</b>	<p><b>Line Feed</b>  Advances the paper one line space. Line spacing is 4.23 mm (1/6 in.) unless reset by ESC 0, ESC 1, or ESC 2.  Example:  LPRINT CHR\$(10);</p>
<b>NUL</b>	<p><b>Null</b>  Used with control commands as a command list terminator. NUL is also used with some printer control codes to select options.  Example:  LPRINT CHR\$(0);</p>

Printer Code	Printer Function
<b>SI</b>	<p><b>Shift In (Compressed On)</b>  Causes the printer to begin compressed printing. This command is canceled by DC2 (Compressed Off).  Example:  LPRINT CHR\$(15);</p>
<b>SO</b>	<p><b>Shift Out (Double Width)</b>  Causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. A Carriage Return, Line Feed or DC4 (Double Width Off) cancels the SO command.  Example:  LPRINT CHR\$(14);</p>
<b>VT</b>	<p><b>Vertical Tab</b>  Advances the paper to the next vertical tab-stop position. If no vertical tab stops are set, the VT command is treated as a line-feed (LF) command. Vertical tab stops are set with ESC B.  Example:  LPRINT CHR\$(11);</p>

## Printer Control Code Quick Reference

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

Description	Code	ASCII Value
Cancel	DC2	24
Carriage return	CR	13
Compressed character off	DC2	18
Double width off	DC4	20
Escape	ESC	27
Vertical tab set	ESC B	66
Lines per page set	ESC C	67
Horizontal tab stops set	ESC D	68
Graphics mode (bit-image)	ESC K	75
Skip perforation	ESC N	78
Cancel skip perforation	ESC O	79
Tabs clear	ESC R	82
Double width (multiple lines)	ESC W	87
Line feed (2.82 mm (1/9 in.))	ESC 0	48
Line feed (2.82 mm (1/9 in.))	ESC 1	49
Line feed (4.23 mm (1/6 in.))	ESC 2	50
Line feed (automatic)	ESC 5	53
Underline	ESC -	45
Home head	ESC <	60
Form feed	FF	12
Tab (horizontal)	HT	9
Line feed	LF	10
Null	NUL	0
Compressed character	SI	15
Double width	SO	14
Tab (vertical)	VT	11

## Print Mode Combinations

The following figure shows the print-mode combinations possible with the IBM PC Compact Printer. Modes shown with XXX in the same column can be combined.

A print mode can be changed at any time within a line; however, the double-width mode affects the entire line.

Allowable Mode Combinations					
Standard	XXX				
Compressed		XXX		XXX	XXX
Double-Width			XXX	XXX	XXX
Underline	XXX	XXX	XXX		XXX

### Allowable Mode Combinations

# Compact Printer Character Set

0	1	2	3	4	5	6	7	8	9
NUL			♥	♦	♣	♠	●	●	HT
10	11	12	13	14	15	16	17	18	19
LF	VT	FF	CR	SO	SI	▶	◀	DC2	!!
20	21	22	23	24	25	26	27	28	29
DC4	⋈	■	↕	CAN	↓	→	ESC	L	↔
30	31	32	33	34	35	36	37	38	39
◀	▶	SP	!	''	#	\$	%	&	'
40	41	42	43	44	45	46	47	48	49
(	)	*	+	,	-	.	/	0	1
50	51	52	53	54	55	56	57	58	59
2	3	4	5	6	7	8	9	:	;
60	61	62	63	64	65	66	67	68	69
<	=	>	?	@	A	B	C	D	E
70	71	72	73	74	75	76	77	78	79
F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89
P	Q	R	S	T	U	V	W	X	Y
90	91	92	93	94	95	96	97	98	99
Z	[	\	]	^	_	`	a	b	c
100	101	102	103	104	105	106	107	108	109
d	e	f	g	h	i	j	k	l	m
110	111	112	113	114	115	116	117	118	119
n	o	p	q	r	s	t	u	v	w
120	121	122	123	124	125	126	127	128	129
x	y	z	{		}	~	DEL	Ç	ü

# Compact Printer Character Set (continued)

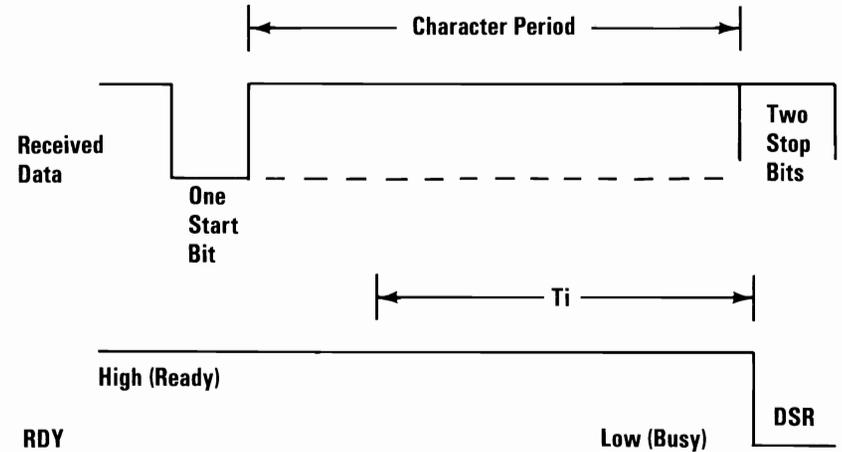
130	131	132	133	134	135	136	137	138	139	
é	â	ä	à	å	ç	ê	ë	è	ï	
140	141	142	143	144	145	146	147	148	149	
î	ì	Ä	Å	É	æ	Æ	ô	ö	ò	
150	151	152	153	154	155	156	157	158	159	
û	ù	ÿ	ö	ü	ç	£	¥	₤	₯	
160	161	162	163	164	165	166	167	168	169	
á	í	ó	ú	ñ	Ñ	à	ó	¿	┘	
170	171	172	173	174	175	176	177	178	179	
┘	½	¼	¡	<<	>>					
180	181	182	183	184	185	186	187	188	189	
190	191	192	193	194	195	196	197	198	199	
200	201	202	203	204	205	206	207	208	209	
210	211	212	213	214	215	216	217	218	219	
220	221	222	223	224	225	226	227	228	229	
					α	β	Γ	Π	Σ	σ
230	231	232	233	234	235	236	237	237	239	
μ	τ	ϕ	θ	Ω	δ	∞	∅	€	∩	
240	241	242	243	244	245	246	247	248	249	
≡	±	≥	≤	∫	J	÷	≈	°	■	
250	251	252	253	254	255					
-	√	ⁿ	²	■	SP					

# Interface

Specifications:

- Data transfer rate: 1200 bps (maximum)
- Synchronization: Internal clocking
- Handshaking: CTS (Clear to Send) Pacing
- Logic level: Input data and all interface control signals are EIA levels

## Serial Interface Timing Diagram



Compact Printer Serial Interface Timing Diagram

# Specifications

<b>Size</b>	
Height	88.9 mm (3.5 in)
Width	312.4 mm (12.3 in)
Depth	221 mm (8.7 in)
<b>Weight</b>	
	3.0 kg (6.6 lb)
<b>Power Cable</b>	
Length	1.98 m (6.5 ft)
Size	28 AWG
<b>Signal Cable</b>	
Length	1.89 m (6 ft)
Size	3 by 18 AWG

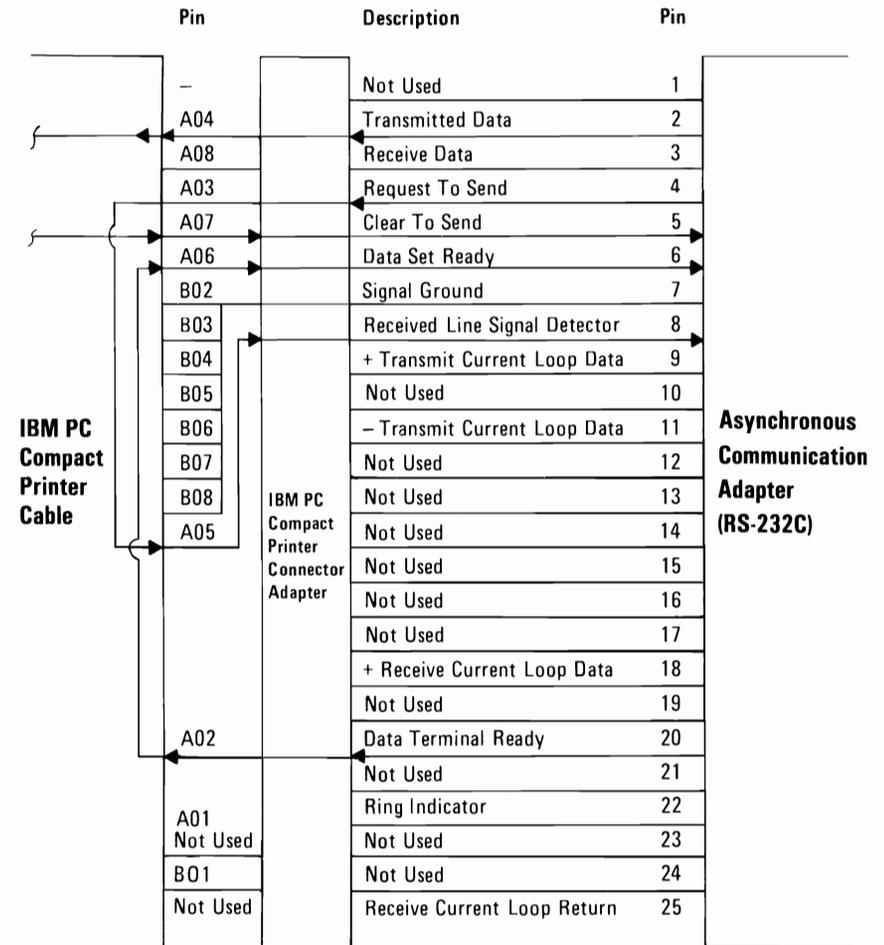
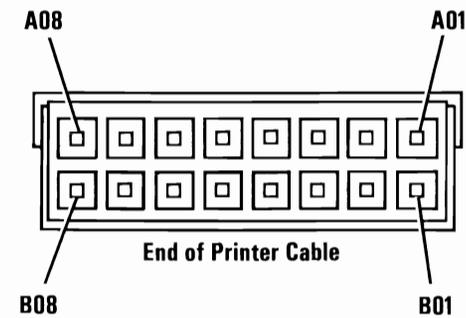
## Physical Specifications

Voltage (Vac)			Frequency (Hz)	Current (Amps)	Power (Watts)
Nominal	Minimum	Maximum	± 3 Hz	Maximum	Maximum
120	108	132	60	0.25	36

## Electrical Specifications

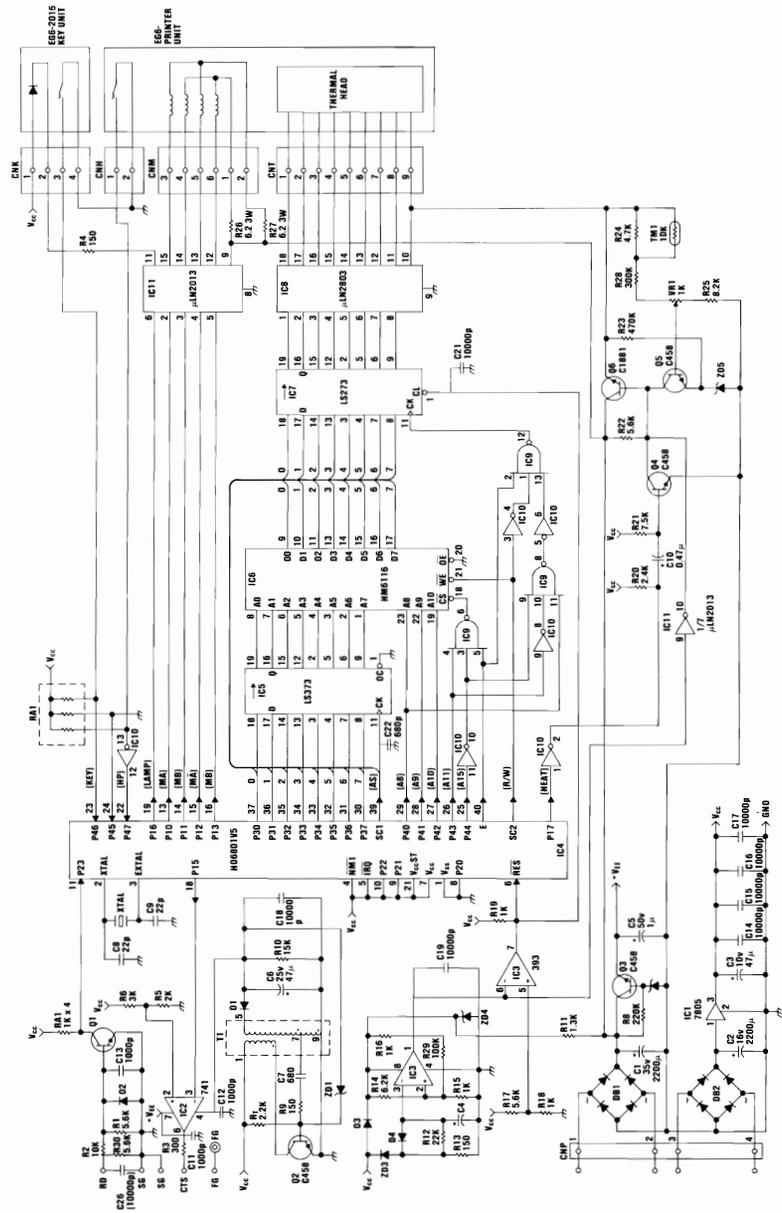
<b>Print Method</b>	Thermal, non-impact, dot-matrix	
<b>Print Speed</b>	50 cps	
<b>Print Direction</b>	Left to right only	
<b>Print Elements in Head</b>	8	
<b>Line Spacing</b>	4.23 mm (1/6 in.) or 2.82 mm (1/9 in.)	
<b>Printing Characteristics</b>		
Matrix	5 x 8	
Character Set	See "Compact Printer Character Set" tables.	
Graphics	APA (All Points Addressable)	
<b>Printing Sizes</b>		
	Characters per inch	Maximum characters per line
Normal	10	80
Double Width	5	40
Compressed	17.5	136
Double Width-Compressed	8.75	66
<b>Media Handling</b>		
Paper Feed	Friction feed	
Paper Width	216 mm (8-1/2 in.)	
Copies	Single sheet only	
Paper Path	Top	
<b>Interface</b>	Serial data and control lines	
<b>Print Color</b>	Black	
<b>Environmental Conditions</b>		
Operating Temperature	5 to 40°C (41 to 104°F)	
Operating Humidity	10 to 80% non-condensing	
<b>Heat Output</b>	54.6 BTU/hr (maximum)	

## Printer Specifications



**Note:** An IBM PC Compact Printer Connector (as shown in the diagram above) is required to connect the Compact Printer to an IBM Asynchronous Communications Adapter (primary or alternate).

# Logic Diagram



**Notes:**