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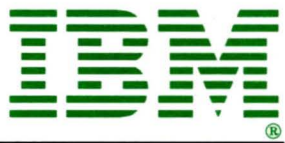

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Introduction and Welcome

These are the Proceedings of the IBM Personal Computer Seminar, designed for independent developers of products for IBM Personal Computers. The purpose of these Proceedings is to aid you in your development efforts by providing relevant information about new product announcements and enhancements to existing products.

This issue of the Proceedings is devoted to IBM PC Printers. These printers have common and unique functions and interfaces. Most of the technical differences among them can be obtained from the summarized information provided in this issue.

Purpose

What is our purpose in issuing a publication such as this? It is quite simple.

The IBM Personal Computer family is a resounding success. We've had a lot of help in achieving this success, and much of it came from the independent developers.

As you proceed with your development, do you at times wish for some bit of information or direction which would make the job easier? Information which IBM can provide? This is the type of information we want to make available to you.

Since we want to be assured of giving you the information you need, we ask you to complete the questionnaire which appears at the end of these Proceedings. Your response to this questionnaire will be taken into account in preparing the content of future issues, as well as the content of seminars we will present at microcomputer industry trade shows.

Topics

The following list gives a general indication of the topics we plan to cover in future seminars and include in the IBM Personal Computer Seminar Proceedings:

- Information exchange forum -- letters to the editor format
- Development tools -- languages, database offerings
- Compatibility issues
- New devices -- capacities and speeds
- System capacities -- disk and memory
- Enhancements in maintenance releases
- Tips and techniques
- New system software
- Hardware design parameters
- Tips on organizing and writing documents
- Changes to terms and conditions

IBM PC Printers

The information provided in this issue of the Proceedings is best described as a compendium. A compendium gathers together and presents in a concise form all the essential facts and details of a subject. The subject of this compendium is IBM PC Printers. These printers were designed for attachment to IBM Personal Computers. They provide a wide range of capabilities to meet many needs. This compendium on IBM PC Printers has been organized into seven sections.

The first section provides a general description for ten IBM PC printers. Each description focuses on a printer's salient characteristics, functions and interfaces. Uses or applications may also be highlighted.

The second section contains tables of characteristics for the ten printers. These tables can be used as an aid to distinguish the individual capabilities of each printer.

We then list the control codes and functions for the printers in the third section. There are many common functions among the printers but each printer has a unique set. Functional differences become important when "compatibility" is a consideration or requirement. This information can be used to help determine the control codes or functions a particular printer supports or vice versa or, given the same input, whether or not two different printers will produce equivalent output.

Note that the tables lack parametric and contextual information, and there may be other functional differences that cannot be obtained from the information supplied. Also, all the functional differences cannot be determined from the explanatory notes; they may also apply to other printers. Consequently, the references must be consulted to obtain more specific information. Programs should be thoroughly tested to insure that the expected output can be obtained.

The fourth section summarizes the primary interfaces of the printers. More detailed information, such as connector pin assignments and interface signal specifications, can be obtained from the references.

The fifth section is an appendix which contains certain specifications, for easy reference.

The next section lists certain acronyms and mnemonics.

The last section contains technical references.

General Descriptions

IBM Pageprinter 3812

The IBM Pageprinter 3812 is a tabletop, multifunction, nonimpact, all-points-addressable, electrophotographic page printer. Microcode, diagnostics and fonts are contained on a 1.2 MByte removable diskette. The 3812 prints letter-quality text at 12 pages per minute, maximum. Basic paper-handling functions include dual input cassettes for legal- and letter-size, cut sheet, xerographic paper and gummed labels.

The 3812 is equipped with an RS-232C interface and an RS-422A serial interface and is designed to be hardware compatible with the IBM Personal Computer (PC), PC XT™, Personal Computer AT®, 3270 PC, 3270 Personal Computer AT and Portable PC, as well as to compatible non-IBM personal computers.[1,2] "Hardware compatible" means that the host system's RS-232C interface is logically compatible with the 3812 interfaces, and the host system is capable of generating a data stream (control codes and character codes) which is properly interpreted by the IBM Pageprinter. The 3812 can be attached to a stand-alone IBM Personal Computer, up to eight IBM Personal Computers (excluding the 5271 and 5273) via an optional Sharing Card, or to multiple IBM Personal Computers via the IBM PC Network or the IBM Token-Ring Network. Modem attachment of the 3812 is not supported.

The control codes for the 3812 are consistent with those used on the IBM Graphics Printer 5152-002. This means that much of the software written for use with this printer will function properly with the 3812. "Function properly" means that the 3812, using its supported features, gives the type of output expected from the software; it does not imply that the software takes full advantage of all the features and capabilities of the 3812. For example, the 3812 supports an additional and unique set of control codes/functions called "PMP (Page Map Primitive) Commands". (The PMP Commands are not listed in this document.) Two functional differences between the Pageprinter and the Graphics Printer are:

- On the 3812, lines that exceed page width are truncated (i.e., no "line-wrap");
- Without the optional 3812 Pageprinter Driver, some PC applications may require the user to send a Form Feed control character to print the last page. (See Reference Section, Item 6.)

1. IBM PC XT is a trademark of IBM Corporation.
2. IBM Personal Computer AT is a registered trademark of IBM Corporation.

IBM Color Jetprinter 3852 Model 2

The IBM Color Jetprinter (3852 Model 2), a functionally enhanced version of the IBM Color Printer (3852 Model 1), prints color graphics and text on transparencies and paper. It is a small, convenient, quiet workstation printer for use in creating color graphics and text output from the supported Personal Computer products. The Jetprinter is a drop-on-demand color ink jet printer that provides all-points-addressable color graphics at 100 x 96 pels per inch and 100 x 72 pels per inch resolutions, and near-letter quality and draft text. It has pin feed and cut sheet paper capability, four printing pitches, superscript and subscript characters, and the ability to print up to 132 characters on an 8-inch line.

The Jetprinter provides simple controls for ease of use: Form Feed, Line Feed, and On-Line/Off-Line switches on the control panel and indicator lights (Ready, Check, and Power) to show the status of the printer. A switch to control print intensity ("normal" and "bold" modes) is located on the back panel of the printer.

The Jetprinter attaches to the IBM Personal Computer, PCjr, Personal Computer XT, Personal Computer AT, Portable Personal Computer, 3270 PC, 3270 PC/G and 3270 PC/GX, as well as to compatible non-IBM personal computers.

Certain key features are:

- Seven-color, all-points-addressable ink jet printing for graphics and text (black, cyan, magenta, yellow, green, red, and blue)
- Near-letter quality resolution
- Print pitches of 5, 8.4, 10, and 16.8 CPI supported
- Prints directly onto special Jetprinter transparencies, which are fed manually.

IBM Proprinter 4201

The IBM Proprinter 4201 is a serial dot matrix printer for attachment to IBM Personal Computers (Personal Computer, Personal Computer AT, Personal Computer XT, Personal Computer XT/370, Personal Computer AT/370, PCjr, Portable Personal Computer, 3270 PC, 3270 PC/G, 3270 PC/GX, Industrial Personal Computer) and IBM Series/1 System Unit 5170 Model 495 and compatible non-IBM personal computers. The IBM Proprinter 4201 adds high-speed, desktop, impact printing to the IBM Personal Computer family. Manual front sheet feed and continuous forms paper handling are integrated into the IBM Proprinter 4201, which is capable of handling "downloadable" print fonts.

The Proprinter 4201 attaches to the IBM PC via the standard IBM Personal Computer parallel interface. An optional asynchronous serial interface is also available, as is an optional 5K print buffer.

The IBM Proprinter 4201 provides new levels of printing flexibility for the IBM PC family and IBM 3270 PC family. Three speeds - 40 CPS, 100 CPS and 200 CPS - allow three levels of print quality in a small, convenient workstation printer. Additionally, the IBM Proprinter 4201 is designed to accommodate a variety of paper handling requirements, including envelopes and "tear and run" forms (document on demand).

Product highlights are:

- Nine-wire matrix impact printing
- One model with integrated front sheet or envelope feed and continuous forms feed
- Print speeds of 200, 100 and 40 CPS
- Graphics of 480, 960 or 1,920 dots per 8" line horizontally
- 8" maximum print line width
- Pitch: 5, 6, 8.55, 10, 12 or 17.1 CPI
- Line spacing: 1/6", 1/8", 7/72", N/72" or N/216"
- Easy forms handling, continuous and cut sheet forms up to 4 parts, tractor and friction feed.

IBM Proprinter XL 4202

The Proprinter XL 4202 is a wide carriage, high-speed, desktop, impact printer. Its features include: a user-friendly operator panel that lets the user choose many print modes without the need for programming skills; support for proportional spacing, software selectable margins and printing of double-high characters; power-assisted paper loading for continuous forms; 4K standard print buffer; and "quiet" mode, a user-controlled feature that mutes the sound level while printing.

The 4202 is the low-to-medium use wide-carriage printer for the IBM PC family. In addition to the standard IBM 8-bit parallel interface, an optional asynchronous serial interface module and 8K print buffer are available. Both options can be installed by the user.

The Proprinter XL 4202 extends the versatility of the Proprinter 4201. It offers all 4201 features plus the following:

- Print line 354.4 mm (13.6")
- Continuous forms up to 381.0 mm (15") wide
- Cut forms up to 429.3 mm (16.5") wide
- Double-high printing
- Proportional spacing
- Additional operator panel controls
- Standard 4K buffer
- Optional 8K print buffer
- Increased character set size for "downloadable" fonts.

IBM Graphics Printer 5152-002

The IBM Graphics Printer 5152 (Model 2) has all of the capabilities of the first IBM PC printer, the IBM 5152 80 CPS Matrix Printer (Model 1), plus Graphics or APA (All Points Addressable) capabilities, as well as subscript/superscript and underline modes. It also supports the IBM PC Character Sets 1 and 2 (Figures 2 and 3). The printer is a self-powered, stand-alone tabletop unit. It attaches to the IBM PC System Unit via a parallel signal cable. The printer is a bidirectional wire matrix, impact printer. It has a 9-wire print head and can print 132 text characters per line in condensed mode and 80 text characters per line in the standard font.

Although this printer is no longer offered for sale by IBM, it is included in this compendium for the purpose of making compatibility analyses of application programs and printer drivers. Most of the code-controlled functions implemented on this printer are supported by the newer IBM PC printers to maintain functional compatibility.

IBM Color Printer 5182

The IBM Personal Computer Color Printer 5182 Model-1 is a versatile bidirectional, APA Graphics, dot-matrix printer that prints reports and displays graphics in any of three programmable states: all black, four-color (red, green, blue, black), and eight-color (yellow, magenta, cyan, black, orange, green, violet, brown) at speeds of 30 to 200 CPS, depending on the image quality desired. Three levels of printing are available: draft at 200 CPS, text or correspondence at 110 CPS and near-letter-quality at 30 CPS. The last is achieved by dense matrix imaging in a two-pass print cycle. Print-screen capability is supported in text mode, but is not supported in color graphics mode.

The IBM PC Color Printer attaches via the standard printer signal cable to the IBM Personal Computer and IBM Personal Computer XT. Attachment is made through either the IBM Monochrome Display and Printer Adapter or the IBM Printer Adapter.

In addition to its capabilities for printing in color, the IBM Color Printer 5182 has the following features:

- IBM Graphics Printer 5152-002 compatible
- Dual aspect ratios: 5:6, 1:1
- Three resident fonts
- Multipitch
- Fixed/proportional spacing
- Wide carriage
- Automatic, multiple line buffering of 6K bytes
- Print head: ballistic type using 9-wire (5 x 4 array) staggered design
- Character set: 96-character U/L case ASCII with lower case descenders plus special IBM PC characters -- i.e., PC Graphics Printer compatible; matches PC coded character sets.

Although this printer is no longer offered for sale by IBM, it is included in this compendium for the purpose of making compatibility analyses of application programs and printer drivers. Most of the code-controlled functions implemented on this printer are supported by the newer IBM PC printers to maintain functional compatibility.

IBM Quietwriter® Printer 5201-001[1]

IBM "Quietwriter" Printer 5201-001 is a very quiet, letter quality desktop printer for attachment to the IBM Personal Computer (5150), the IBM Personal Computer XT (5160), the IBM Personal Computer AT (5170), the IBM Portable Personal Computer (5155), the IBM 3270 Personal Computer (5271), the IBM 3270 PC/G and 3270 PC/GX (5371), and the IBM PCjr (4860), as well as non-IBM personal computers compatible with the IBM PC parallel interface. The 5201 has a burst print speed of 40 CPS. The 5201 features an optional modular single-drawer sheet feed and an optional modular pinwheel forms feed. It offers a variety of fonts that easily plug into the printer, with any two being available online at a given time. The IBM QUIET™ Electronic Font PC contains the full IBM PC Character Set, which incorporates a wide range of characters, symbols, dots and lines and provides the ability to print foreign languages, technical documents and PC-based graphic characters.[2]

Other features include:

- Letter quality nonimpact printing
- 252 characters per type font
- One or two type fonts online
- Four pitches (in addition to double-wide printing for each) and multiple type styles
- Optional paper handlers for cut sheet and continuous forms
- 13.2-inch writing line
- 8.5-inch wide paper can be fed automatically with the cut sheet feed
- 2.5-inch to 14.5-inch (pin to pin) paper can be fed with the continuous forms feed
- 3-inch to 15-inch paper (including envelopes) can be manually inserted
- Character spacing: 10, 12 and 15 characters per inch and PSM.

1. "Quietwriter" is a registered trademark of IBM Corporation.
2. The IBM QUIET Electronic Font PC is a trademark of IBM Corporation.

IBM "Quietwriter" Printer 5201-002

IBM "Quietwriter" Printer 5201-002 is a nonimpact, quiet, letter quality printer with high resolution all-points-addressable (APA) graphics capability. It attaches to the IBM Personal Computer (5150), the IBM Personal Computer XT (5160), the IBM Personal Computer AT (5170), the IBM Portable Personal Computer (5155), the IBM 3270 Personal Computer (5271), the IBM 3270 PC/G and 3270 PC/GX (5371) and the IBM PCjr (4860), as well as non-IBM personal computers compatible with the IBM PC parallel interface. The 5201-002 has a burst print speed of 40 CPS. It features an optional modular single-drawer sheet feed and an optional modular pinwheel forms feed. It offers a variety of fonts that easily plug into the printer, with any two being available online at a given time. The IBM QUIET Electronic Font PC contains the full IBM PC Character Set, which incorporates a wide range of characters, symbols, dots and lines and provides the ability to print foreign languages, technical documents and PC-based graphic characters.

The 5201-002 has all the features, functions and options of the 5201-001 plus:

- APA graphics support including graphing commands of the IBM Proprinter and new high resolution graphics up to 240 X 240 dots per inch
- Increased print buffer to 15.5 KBytes.

The 5201-001 can be upgraded to a 5201-002.

IBM Wheelprinter 5216

The IBM Wheelprinter is a letter-quality, printwheel (impact) printer designed for attachment to the IBM Personal Computer (5150), the IBM Personal Computer XT (5160), the IBM Portable Personal Computer (5155), the IBM PCjr (4860), the IBM Personal Computer AT (5170), the IBM 3270 PC (5271), the IBM 3270 PC/G and 3270 PC/GX (5371), and to non-IBM personal computers compatible with the IBM PC parallel or asynchronous serial interface. (An interface module must be attached to the printer.) Automatic cut sheet and continuous forms paper feeding are standard. The 5216 uses the IBM Cartridge Printwheel II.

Other highlights of the 5216 are:

- 25 CPS burst print speed
- Four pitches and multiple type styles including word processing and ASCII printwheels
- Drop-in film ribbon cartridge (single-strike or multi-strike)
- Integrated paper handlers for cut sheet and continuous forms
- Removable tray with up to 100-sheet capacity (weight and paper thickness determines exact count)
- 13.2-inch writing line
- Program selectable vertical spacing in 1/48 inches/line increments
- 8.5-inch wide paper can be fed automatically with the cut sheet feed
- 2.7-inch to 14.9-inch (pin-to-pin) paper can be fed with the continuous forms feed
- 3.2-inch to 15.4-inch paper (and envelopes) can be manually inserted
- User-selectable impression control.

IBM Wheelprinter 5223 E

The Wheelprinter 5223 E is a letter-quality, impact printer that attaches to IBM Personal Computers (4860, 5150, 5155, 5160, 5170, 5271, 5273, 5371, 5373) via their parallel interfaces, and to non-IBM personal computers with a compatible IBM Personal Computer parallel interface. It prints at a burst speed of 16 characters per second. A sheetfeed and pinwheel form feeder are optional features.

Other highlights of the 5223 are:

- Four pitches and multiple type styles
- 13.2-inch writing line
- Character Spacing: 10, 12 and 15 characters per inch and PSM
- Program selectable vertical spacing in 1/96 inch/line increments
- 8.5-inch wide paper can be fed automatically with the cut sheet feed
- 2.5-inch to 14.5-inch (pin-to-pin) paper can be fed with the continuous pinwheel form feed
- Removable tray with approximately 1/2" paper capacity (weight and paper thickness determines exact count).

Characteristics

Characteristics

Tables I through VI list the principal characteristics for ten IBM PC printers. Table entries at characteristic-printer (row-column) intersections are either:

- A "♦" symbol which indicates that the characteristic is supported by a particular printer or is applicable to it, or
- A number which not only indicates that the characteristic is supported by a particular printer or is applicable to it but also refers to a corresponding explanatory note at the bottom of the same page.

No entry at a characteristic-printer (row-column) intersection (i.e., a blank cell) indicates that the characteristic (row) for a printer (column) is not supported or it is not applicable; or, it is unspecified.

The abbreviations used in the table column headings for IBM PC Printers are in order of occurrence, from left to right, as follows:

- 3812 = IBM Pageprinter 3812;[5-8]
- 38522 = IBM Color Jetprinter 3852-2;[9,10]
- 4201 = IBM Proprinter 4201;[11,12]
- 4202 = IBM Proprinter XL 4202;[13,14]
- 51522 = IBM Graphics Printer 5152-002;[15,16]
- 5182 = IBM Color Printer 5182;[17-19]
- 52011 = IBM "Quietwriter" Printer 5201-001;[20-22]
- 52012 = IBM "Quietwriter" Printer 5201-002;[21,22]
- 5216 = IBM Wheelprinter 5216;[23,24]
- 5223 = IBM Wheelprinter E 5223.[25,26]

TABLE I

CHARACTERISTIC	3812	3852 2	4201	4202	5152 2	5182	5201 1	5201 2	5216	5223
SPECIAL PRINTING/FEATURES										
Alarm/Bell	♦		♦	♦	♦	♦	♦	♦	♦	♦
Bidirectional Printing with logic seeking		♦	♦	♦	♦	♦			♦	♦
Bold/Double Strike/NLQ	♦	♦	♦	♦	♦	♦				♦
Colors										
Black	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Blue		♦				♦				
Brown						♦				
Cyan		♦				♦				
Green		♦				♦				
Magenta		♦				♦				
Orange						♦				
Red		♦				♦				
Violet						♦				
Yellow		♦				♦				
Condensed	♦	♦	♦	♦	♦	♦	1	1	♦	♦
Compressed Data Stream (Font Download)	♦									
Double High				♦						
Double Wide	♦	♦	♦	♦	♦	♦	♦	♦		
Double Wide-Condensed	2	♦	♦	♦	♦	♦	♦	♦		
Double Wide-Double High				♦						
Emphasized	♦		♦	♦	♦	♦				♦
Font Download	♦		♦	♦					♦	
Graphics/APA	♦	♦	♦	♦	♦	♦		♦		
Hexadecimal Dump			♦	♦						♦
Multipart Forms			♦	♦	♦	♦			5	5
Overscore			♦	♦						
Printer Sharing (2 ≤ Number of PC's ≤ 8)	3									
Proportional Spacing	♦			♦		♦	1	1	♦	♦
Rotated Page (0°, 90°, 180° and 270°)	♦									
Self-Test	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Setup Mode				4			1	1		
Signature and Logo	♦									
Superscript/Subscript	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Transparencies										
Black-only							♦	♦		
Color		♦								
Underline	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Wide Carriage	♦			♦		♦	♦	♦	♦	♦

1. Various pitches (10, 12 or 15 CPI; or, proportional space) are supported by selection of a font cartridge with the desired pitch.
2. Unique functional implementation
3. Optional, operator installable
4. Type of print can be selected from the operator panel.
5. Multipart forms can not be used in the automatic sheet feed (only manual or carbon pack).

TABLE II

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
BURST/MAXIMUM PRINT SPEED										
CPS (Characters Per Second) @ 10 Pitch										
16										♦
25									♦	
30		♦								
40							♦	♦		
80					♦					
200			♦	♦		♦				
PPM (Pages Per Minute) - text only; 8½" X 11"										
12	♦									

TABLE II

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	52216	52223
HORIZONTAL MOTION										
Minimum Increment in inches										
1/336 (0.00298)						1				
1/240 (0.00417)	♦		1	1	1			♦		
1/120 (0.00833)							♦		♦	♦
1/100 (0.01)		♦								
Pitch (Characters Per Inch)										
5.0	♦	♦	♦	♦	♦	♦	♦	♦		
6.0			♦	♦			♦	♦		
7.5							♦	♦		
8.4		♦								
8.55	♦		♦	♦	♦					
10.0	♦	♦	♦	♦	♦	♦	2	2	♦	♦
12.0	♦		♦	♦			2	2	♦	♦
13.0	♦									
13.3						♦				
15.0	♦						2	2	♦	
16.8		♦								
17.1	♦		♦	♦	♦	♦				♦
20.0	♦									
27.0	♦									
Proportional Space	♦			♦		♦	2	2	♦	♦
Typographic	♦									
Tabs, maximum										
28	♦		♦	♦	♦	♦	♦	♦		♦
30									♦	
32		♦								

1. Can only print every second or third dot position. (See, e.g., Ref. 12, pp. 2-91 to 2-96.)
2. Various pitches (10, 12 or 15 CPI; or, proportional space) are supported by selection of a font cartridge with the desired pitch.

TABLE II

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
VERTICAL MOTION										
Minimum Increment in inches										
1/240 (0.00417)	♦									
1/216 (0.00463)					1					
1/144 (0.00694)			♦	♦						
1/96 (0.01042)		♦					♦	♦		♦
1/84 (0.0119)						♦				
1/48 (0.0208)									♦	
1/6 (0.1667)					2					
Inches Per Line										
n/240 (0.00417 min.)								♦		
n/216 (0.00463 min.)	3		4	4	♦			5		
n/144 (0.00694 min.)			♦	♦		♦		5		
n/96 (0.01042 min.)		♦					♦	♦		
n/72 (0.01389 min.)	3	♦	♦	♦	♦	♦	♦	♦		♦
n/48 (0.0208 min.)							♦	♦	♦	
6/72 (0.0833)						♦				
9/96 (0.0938)							♦	♦	♦	
7/72 (0.0972)	3		♦	♦	♦		♦	♦		♦
1/8 (0.1250)	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1/6 (0.1667)	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Typographic	♦									
Tabs, maximum										
16		♦								
64			♦	♦		♦	♦	♦		

1. Text only
2. Block Graphics
3. Distance moved is to the nearest 1/240th of an inch.
4. Emulated
5. Unique functional implementation

TABLE III

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
PRINTING TECHNOLOGY										
Color Ribbon						♦				
Drop-On-Demand Color Ink Jet		♦								
Electrophotographic	♦									
Impact			♦	♦	♦				♦	♦
Matrix	♦	♦	♦	♦	♦	♦	♦	♦		
Printwheel									♦	♦
Resistive Ribbon							♦	♦		
PAPER/FORM HANDLING										
Auto Cut Sheet	♦					1	1	1	♦	1
Manual Cut Sheet (Friction Feed)		♦	♦	♦		♦	♦	♦	♦	♦
Pin Feed/Pinwheel/Tractor Feed		♦	♦	♦	♦	♦	1	1	♦	1
PAPER/FORM TYPES										
Cut/Single Sheet	♦	♦	♦	♦		♦	♦	♦	♦	♦
Continuous Forms			♦	♦	♦	♦	♦	♦	♦	♦
Envelopes		♦	♦	♦			♦	♦	♦	♦
Labels	♦	♦	♦	♦	♦		♦	♦	♦	♦
Multipart Forms			♦	♦	♦	♦			♦	♦
Multipart Continuous Forms										
One original plus two carbon copies					♦					
One original plus three carbon copies			♦	♦		♦			♦	♦
Roll (Microperforated)		♦								
Transparencies										
Black only							♦	♦		
Color		♦								
PRINT HEAD ELEMENTS										
Dot-Producing[2]										
4		♦								
9			♦	♦	♦	♦				
40							♦	♦		
2048	♦									
Engraved (fully-formed) Characters									♦	♦

1. Optional, operator installable
2. LED's, nozzles, wires, or electrodes.

TABLE IV

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	52116	52223
WIRE/DOT SIZE: Diameter										
in millimeters / in inches										
0.065 / 0.00256		♦								
≈0.1058 / ≈0.00417	♦						♦	♦		
0.29 / 0.011			♦	♦	♦					
0.356 / 0.014						♦				
DOTS PER INCH (Horizontal X Vertical)										
60 X 60								♦		
60 X 72			♦	♦	♦			♦		
70 X 84						♦				
84 X 84						♦				
100 X 72		♦								
100 X 96		♦								
120 X 72			♦	♦	♦			♦		
120 X 120								♦		
140 X 84						♦				
168 X 84						♦				
240 X 72			♦	♦	♦			♦		
240 X 240	♦							♦		
280 X 84						♦				
336 X 84						♦				
CHARACTER DOT MATRIX (Horizontal X Vertical)										
8 X 9						♦				
9 X 8		♦								
9 X 9			♦	♦	♦					
9 X 11		♦								
9 X 12			♦	♦						
12 X 12			♦	♦						
24 X 9						♦				
24 X 14						♦				
36 X 18						♦				
36 X 40 - 10 pitch & 6 LPI							♦	♦		
40 X 24 - typical 10 pitch	♦									
PRINT LINE WIDTH, Maximum										
in millimeters / in inches										
203.2 / 8.0		♦	♦		♦					
335.2 / 13.2						♦	♦	♦	♦	♦
345.4 / 13.6				♦						
353.0 / 13.9	♦									

TABLE V

CHARACTERISTIC	3812	3852-2	4201	4202	5152-2	5182	5201-1	5201-2	5216	5223
CHARACTERS PER LINE, Maximum										
132					♦					
134		♦								
137			♦							
198							♦	♦	♦	
225										♦
233				♦						
378	♦									
CHARACTERS PER 8" LINE, Maximum										
120							♦	♦	♦	
132		♦			♦					
136										♦
137			♦	♦						
216	♦									
225						♦				
CHARACTER SETS	1									
3270 Display Character Set 1		♦								
IBM PC Character Set 1 (See Figure 2.)	♦		♦	♦	♦	♦	♦	♦	2	2
IBM PC Character Set 2 (See Figure 3.)	♦	♦	♦	♦	♦	♦	♦	♦	2	2
IBM PC Multilingual	♦									
IBM PC APL	♦									
IBM PC Hebrew	♦									
IBM PC Katakana	♦									
IBM PC Symbol (Codepage 259)	♦									
IBM PC OCR-A	♦									
CHARACTER SET SIZE										
96									3	3
227	♦	♦			♦	♦				
230			♦							
256				♦			♦	♦		

1. Not all 3812 fonts are available in all 3812 character sets.
2. Subset of character set
3. 97-110 characters, by overstrike, to meet the special needs of users in other countries.

TABLE VI

CHARACTERISTIC	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
FONTS	1									
Cartridge							2	2		
Cartridge Printwheel II									3	3
Down Loadable									4	
IBM-designed	♦									
User-designed	♦		♦	♦						
Resident	♦	♦	♦	♦	♦	♦				
Typographic	♦									
Typefaces/Type Styles										
APL (10)	♦									
APL (20)	♦									
Artisan 10									♦	♦
Barak (proportional space)	♦									
Barak PS/Boldface (proportional space)							♦	♦		
Boldface (proportional space)	♦						♦	♦	♦	♦
Boldface (proportional space) Italic	♦									
Courier 5	♦									
Courier 5 Bold	♦									
Courier 10	♦						♦	♦	♦	♦
Courier 10 Bold	♦									
Courier 12	♦						♦	♦	♦	♦
Courier 15							♦	♦	♦	♦
Courier 17	♦									
Courier 17 Bold	♦									
Courier 17 SS	♦									
Document (proportional space)	♦									
Essay (proportional space)	♦								♦	♦
Essay (proportional space) Bold	♦									
Essay (proportional space) Italic	♦									
Essay (proportional space) Light	♦									
Gothic Text 10	♦									
Gothic Text 10 Bold	♦									
Gothic Text 12	♦									
Gothic Text 12 Bold	♦									
Gothic Text 12 Italic	♦									
Gothic Text 13	♦									

1. Not all 3812 fonts are available in all 3812 character sets.
2. Additional font cartridges are available, not shown below, which are supported for the "Quietwriter" 7 and 8 typewriters, that are usable by the printer although special characters are limited. See "Supplies Reference Guide for Information Processing Equipment, 1985-86," IBM Form No. G570-2098-02.
3. Additional printwheels are available, not shown below, which are supported for the Wheelwriter™ 3, 5 and 6 typewriters, that are usable by the printer although special characters are limited.
4. Unique functional implementation

TABLE VI

CHARACTERISTIC	3812	3852	4201	4202	5152	5182	5201	5202	5216	5223
Typefaces/Type Styles (Continued)										
Gothic (Text) 15	♦								♦	♦
Gothic Text 20	♦									
Gothic Text 27	♦									
Kanji	♦									
Katakana Gothic 10	♦									
Letter Gothic (12)	♦						♦	♦	♦	♦
Letter Gothic (12) Bold	♦									
Math-Symbol 10	♦									
Math-Symbol 12	♦									
OCR-A[1] (10)	♦									
OCR-B[1] (10)	♦									
Orator (10)	♦									
Orator (10) Bold	♦									
Prestige 15							♦	♦		
Prestige Elite (12)	♦						♦	♦	♦	♦
Prestige Elite (12) Bold	♦									
Prestige Elite (12) Italic	♦									
Prestige Pica (10)	♦						♦	♦		
Roman Text 10	♦									
Serif Text 10	♦									
Serif Text 10 Italic	♦									
Serif Text 12	♦									
Serif Text 12 Bold	♦									
Serif Text 12 Italic	♦									
Serif Text 15	♦									
Shalom 10	♦									
Shalom 12	♦									
Shalom 15	♦									
Sonoran Serif[2] 8 point	♦									
Sonoran Serif 10 point	♦									
Sonoran Serif 12 point	♦									
Sonoran Serif 16 point	♦									
Sonoran Serif 18 point	♦									
Sonoran Serif 24 point	♦									
Title (proportional space)							♦	♦		
Yasmin Boldface (proportional space)							♦	♦		

1. The 3812 prints the OCR-A and OCR-B fonts with the same high quality as other type styles. IBM does not warrant, and has not tested that these characters are readable by all OCR reading devices. Users of these fonts should test read-write compatibility before implementing the 3812 for OCR applications.
2. The Sonoran Serif program contains data derived under license from Monotype® Corporation PLC.

Control Functions

Control Functions

Each control function for an IBM PC printer has a specific meaning to which a specific control code or code sequence has been assigned. These codes or code sequences are based upon "ASCII," which is an acronym for the American National Standard Code for Information Interchange as defined by "ANSI" (which is another acronym for the American National Standards Institute). As specified by ANSI[1] and shown in Figure 1, ASCII is a coded character set consisting of 128, 7-bit characters which have been assigned specific graphic and control meanings. There are 32 Control Characters (hexadecimal values '00-1F' or X'00-1F'), 94 Graphic Characters (X'21-7E'), the Space Character (X'20') and the Delete Character (X'7F').

DECIMAL col		0	16	32	48	64	80	96	112
+ row	HEX c/r	0	1	2	3	4	5	6	7
0	0	NUL	DLE	SP	0	@	P	`	p
1	1	SOH	DC1	!	1	A	Q	a	q
2	2	STX	DC2	"	2	B	R	b	r
3	3	ETX	DC3	#	3	C	S	c	s
4	4	EOT	DC4	$	4	D	T	d	t
5	5	ENQ	NAK	%	5	E	U	e	u
6	6	ACK	SYN	&	6	F	V	f	v
7	7	BEL	ETB	'	7	G	W	g	w
8	8	BS	CAN	(	8	H	X	h	x
9	9	HT	EM	)	9	I	Y	i	y
10	A	LF	SUB	*	:	J	Z	j	z
11	B	VT	ESC	+	;	K	[	k	{
12	C	FF	FS	,	<	L	\	l	¦
13	D	CR	GS	-	=	M	]	m	}
14	E	SO	RS	.	>	N	^	n	~
15	F	SI	US	/	?	O	_	o	DEL

Figure 1. ASCII (1967)

IBM PC printers have been designed for attachment to IBM Personal Computers and use 8-bit (1-byte) coded character sets. Most of the IBM PC printers support PC Character Set 1 (Figure 2) and PC Character Set 2 (Figure 3).

A printer control function is a specific action or operation which, when executed, causes the printer to change from one state or condition to another. Execution of proper sequences of control codes will cause specific functions to be invoked for the purpose of producing hard copy output (i.e., a "printout"). Control codes or sequences may be sent to a printer from a PC (via an operator, printer driver or application program), set by a printer operator or initiated by the printer itself (e.g., initialization to switch-controlled default conditions when power is turned on). A given printer control function may be specified

DECIMAL		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
col + row	HEX c/r	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	NUL		á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q		DC1	í	▒	┴	╤	β	±
2	2		DC2	"	2	B	R	b	r		DC2	ó	▒	┬	╥	Γ	≥
3	3		DC3	#	3	C	S	c	s		DC3	ú	▒	├	╙	π	≤
4	4		DC4	$	4	D	T	d	t		DC4	ñ	▒	─	╘	Σ	⌠
5	5			%	5	E	U	e	u			Ñ	▒	┼	╒	σ	⌡
6	6			&	6	F	V	f	v			ª	▒	╞	╓	μ	÷
7	7	BEL		'	7	G	W	g	w	BEL		º	▒	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	▒	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	HT		⌐	▒	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	LF		¬	▒	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	▒	╦	▓	δ	√
12	C	FF		,	<	L	\	l	¦	FF		¼	▒	╠	■	∞	n
13	D	CR		-	=	M	]	m	}	CR		¡	▒	═	▌	φ	²
14	E	SO		.	>	N	^	n	~	SO		«	▒	╬	▐	ε	■
15	F	SI		/	?	O	_	o		SI		»	▒	╧	■	∩	SP

Figure 2. PC Character Set 1

or implemented differently for different printers.

Tables VII, VIII and IX are tables of the "code-controlled" functions for ten IBM PC printers. The tables show some, but certainly not all, of the functional differences. Parametric differences cannot be obtained from the tables since they exclude count and parameter fields. All of the functional differences can be derived by comparing the specifications of the control functions for the printers of interest[5-26] and, given the same input, comparing the actual operation of the printers.

Neglecting parameters and count fields, if any, a printer control function is specified by a code -- either, a one-byte control character; or, the Escape ("ESC") control character (X'1B' or, if in PC Character Set 1, X'9B') followed by one or two other characters. A two-byte control function is called an "Escape

DECIMAL col + row	HEX c/r	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3	3	♥	DC3	#	3	C	S	c	s	â	ô	ú	▒	├	╙	π	≤
4	4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	▒	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	▒	┼	╒	σ	⌡
6	6	♠		&	6	F	V	f	v	å	û	ª	▒	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	▒	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	▒	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┘	Θ	·
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	▒	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	▒	╦	▒	δ	√
12	C	FF		,	<	L	\	l	¦	î	£	¼	▒	╠	▒	∞	n
13	D	CR		-	=	M	]	m	}	ì	¥	¡	▒	═	▒	φ	²
14	E	SO		.	>	N	^	n	~	Ä	₧	«	▒	╬	▒	ε	■
15	F	SI		/	?	O	_	o		Å	ƒ	»	▒	╧	▒	∩	SP

Figure 3. PC Character Set 2

Sequence". A three-byte control function is called a "Control Sequence Function".

The control codes/functions are ordered, hexadecimally, in the tables. The control codes exclude count fields and parameters, if any. Table entries at code/function-printer (row-column) intersections are either:

- A "♦" symbol which indicates that the code/function is supported, or
- A number which not only indicates that the code/function is supported but also refers to a corresponding explanatory note at the bottom of the same page.

No entry (a blank cell) indicates that the control function (row) for a printer (column) is not supported.

The abbreviations used in the table column headings are the same ones previously used for the "Characteristics".

Table X lists the "switch-controlled" functions for the same printers. The switches are located "under-the-covers".

TABLE VII

CODE without parameters or counts, if any.		FUNCTION	3812	3852	4201	4202	5152	5182	5201	5201	5216	5223
Hex	Mnemonic			22			22		11	12		
00 (80)	NUL	Null	♦ ♦	♦	♦ ♦	♦ 1	♦ ♦	♦ ♦	♦ 1	♦ 1	♦ 1	♦ 1
07 (87)	BEL	Bell	♦ ♦		♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦
08 (88)	BS	Backspace		♦	♦ ♦	♦ ♦		♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦
09 (89)	HT	Horizontal Tabulation	♦ ♦	♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦
0A (8A)	LF	Line Feed	♦ ♦	♦	2 2	2 2	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦
0B (8B)	VT	Vertical Tabulation	♦ ♦	♦	2 2	2 2	3 3	♦ ♦	♦ ♦	♦ ♦	3 3	3 3
0C (8C)	FF	Form Feed	♦ ♦	♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦
0D (8D)	CR	Carriage Return[4]	♦ ♦	♦	5 5	5 5	5 ♦	5 ♦	5 ♦	5 ♦	5 ♦	5 ♦
0E (8E)	SO	Shift Out - Double Wide Print Line Mode	♦ ♦	♦	6 6	6 6	♦ ♦	♦ ♦	♦ ♦	♦ ♦		

1. Not recognized as a terminator (for tab set parameter strings).
2. Print with CR if switch-controlled function is set ON. Print without CR if switch-controlled function is set OFF (Factory Setting).
3. Treated as a Line Feed.
4. IBM PC BASIC adds a Line Feed unless X'80' is added (i.e., X'8D').
5. X'0D' is with LF if (1) switch-controlled function is set ON; (2) an ESC 5 with n=1 was previously sent to the printer; or, (3) sent to the printer under BASIC, except when the PRINT # Statement is used. X'8D' is without a LF.
6. A CR, LF, CAN, FF, VT, ESC W or DC4 cancels Double Wide print mode; but, an automatic "line wrap" does <u>not</u> cancel it.

TABLE VII

CODE without parameters or counts, if any.		FUNCTION	3812	38522	4201	4202	51522	5182	52011	52012	5216	52223
Hex	Mnemonic											
0F (8F)	SI	Shift In - Change Line Length to 13.2 inches							11	11		
		Shift In - Condensed Print Select 15.0 CPI									♦ ♦	
		Shift In - Condensed Print Select 16.8 CPI		♦								
		Shift In - Condensed Print Select 17.1 CPI	♦ ♦		♦ ♦	♦ ♦	♦ ♦	♦ ♦				♦ ♦
11 (91)	DC1	Device Control 1 - Select		♦	♦ ♦	♦ ♦		♦ ♦	♦ ♦	♦ ♦	♦ ♦	
12 (92)	DC2	Device Control 2 - Set 10 CPI	♦ ♦	♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦			♦ ♦	♦ ♦
		Device Control 2 - Change Line Length to 8.0 inches							22	22		
13 (93)	DC3	Device Control 3 - Deselect		♦	33	33		♦ ♦			♦ ♦	
14 (94)	DC4	Device Control 4 - Cancel Double Wide Print Line Mode	♦ ♦	♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦		
18 (98)	CAN	Cancel		♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦			44	
1B (9B)	ESC	Escape	♦ ♦	♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦	♦ ♦

1. The printer does not print the characters in a condensed type face. Various pitches (10, 12 or 15 CPI; or, proportional space) are supported by selection of a font cartridge with the desired pitch.
2. Various pitches (10, 12 or 15 CPI; or, proportional space) are supported by selection of a font cartridge with the desired pitch.
3. For parallel interface, ignored (same as a NUL). For serial interface, XOFF.
4. Current print position is reset to the left margin.

TABLE VII

CODE without parameters or counts, if any.		FUNCTION	3812	3852 2	4201	4202	5152 2	5182	5201 1	5201 2	5216	5223
Hex	Mnemonic											
7F	DEL	Delete/NOP = NUL, but a printable Graphic	♦		1	♦		♦			2	1
		Delete/NOP = NUL, but not a printable Graphic		♦					♦	♦		

1. Produces a "space" (vs. a NUL) under X'1B5C' (ESC \) or X'1B5E' (ESC ^).
2. Produces a "dash" (X'2D' vs. the graphic "house" character) under X'1B5C' (ESC \) or X'1B5E' (ESC ^).

TABLE VIII

CODE without parameters or counts, if any.		FUNCTION	3812	38522	4201	4202	51522	5182	52011	52012	5216	52223
Hex	Mnemonic											
1B0E	ESC SO	Shift Out - Double Wide Print Line Mode			1	1	♦	1	1	1		
1B0F	ESC SI	Shift In - Change Line Length to 13.2 inches							1	1		
		Shift In - Condensed Print Select 15.0 CPI									1	
		Shift In - Condensed Print Select 17.1 CPI			1	1	♦	1				1
1B2D	ESC -	Auto Underscore	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B30	ESC 0	Set 1/8 Inch Line Spacing	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B31	ESC 1	Set 6/72" Vertical Spacing						♦				
		Set 9/96" Vertical Spacing							♦	♦	♦	
		Set 23/240" Vertical Spacing	♦									
		Set 7/72" Vertical Spacing			♦	♦	♦					
1B32	ESC 2	Invoke Text Line Spacing	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B33	ESC 3	Set Graphics Line Spacing n/216-inch	♦		♦	♦	♦			2		
		Set Graphics Line Spacing n/144-inch						♦				
1B34	ESC 4	Set Top of Form			♦	♦		♦	♦	♦	♦	♦
1B35	ESC 5	Set Auto Line Feed Mode		♦	♦	♦		♦	♦	♦	♦	♦
1B36	ESC 6	Select PC Character Set 2	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦

1. Support provided to maintain compatibility with previously announced printers. Further use of this control is discouraged, as it may not be supported in future IBM PC printers.
2. A unique functional implementation.

TABLE VIII

CODE without parameters or counts, if any.		FUNCTION	3812	3852 2	4201	4202	5152 2	5182	5201 1	5201 2	5216	5223
Hex	Mnemonic											
1B37	ESC 7	Select PC Character Set 1	♦	1	♦	♦	♦	♦	♦	♦	♦	♦
1B38	ESC 8	Ignore End of Form					♦		2	2		2
1B39	ESC 9	Honor End of Form					♦		♦	♦		♦
1B3A	ESC :	Set 12 CPI			♦	♦		♦	3	3	♦	♦
1B3C	ESC <	Move Head to Left Margin					♦	♦				
1B3D	ESC =	Character Font Image Download			♦	♦		♦			♦	
1B3E	ESC >	Set Horizontal Motion Index									♦	♦
1B3F	ESC ?	Enable Initial Signal						♦				
1B40	ESC @	Set Parameter Attribute Mode						♦				
1B41	ESC A	Set Text Line Spacing n/72"	♦		♦	♦	♦	♦	♦	♦		♦
		Set Text Line Spacing n/48"									♦	
1B42	ESC B	Set Vertical Tabs		♦	♦	♦		♦	♦	♦		
1B43	ESC C	Set Page Length (Inches Or Lines)	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B44	ESC D	Set Horizontal Tab Stops	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B45	ESC E	Begin Emphasized Print	♦		♦	♦	♦	♦				♦
1B46	ESC F	End Emphasized Print	♦		♦	♦	♦	♦				♦
1B47	ESC G	Begin Double Strike Print	♦	♦	♦	♦	♦	♦				♦
1B48	ESC H	End Double Strike Print	♦	♦	♦	♦	♦	♦				♦

1. Character Set 1 is a unique character set and only X'00-1F' controls are supported.
2. EOF is ignored in manual or pin wheel tractor feed modes; but, "Out of Paper" is indicated when cut sheet feeder is used.
3. Various pitches (10, 12 or 15 CPI; or, proportional space) are supported by selection of a font cartridge with the desired pitch.

TABLE VIII

CODE without parameters or counts, if any.		FUNCTION	3812	3852 2	4201	4202	5152 2	5182	5201 1	5201 2	5216	5223
Hex	Mnemonic											
1B49	ESC I	Change Font			♦	♦		♦	♦	♦		1
		Select Font Quality		♦	♦	♦						
1B4A	ESC J	Relative Move Base Line Force n/144th LF and Print with CR						♦				
		Relative Move Base Line Force n/216th LF and Print with CR	♦		2	2	♦					
		Relative Move Base Line Force n/216th LF and Print without CR			2	2						
1B4B	ESC K	Normal Density Bit Image Graphics (Normal Speed)	♦	♦	♦	♦	♦	♦		♦		
1B4C	ESC L	Dual Density Bit Image Graphics (Half Speed)	♦		♦	♦	♦	♦		♦		
1B4D	ESC M	Auto Justify						♦				
1B4E	ESC N	Set Skip Perforation in Lines	♦	♦	♦	♦	♦	♦	♦	♦		♦
1B4F	ESC O	Reset Skip Perforation	♦	♦	♦	♦	♦	♦	♦	♦		♦
1B50	ESC P	Proportional Space Mode				3		♦			♦	♦
1B51	ESC Q	Deselect on Positive Query Reply		♦	4	4		♦	♦	♦	♦	
1B52	ESC R	Set Default Tab Rack (Vertical or Horizontal)			♦	♦		♦	♦	♦	♦	♦

1. Stop printer for for print wheel change.
2. Print with CR if switch-controlled function is set ON; without CR if set OFF (Factory Setting).
3. Proportional character widths are given in Appendix D of SC31-2587-01, a updated version of Reference 12 (see Reference Section, Item 12).
4. No echo of device code for serial attachment.

TABLE VIII

CODE without parameters or counts, if any.		FUNCTION	3812	3852 22	4201	4202	5152 22	5182	52011 1	52012	52116	52223
Hex	Mnemonic											
1B53	ESC S	Begin Subscript/Superscript Mode	♦	♦	♦	♦	♦	♦	1	1	2	1
1B54	ESC T	End Subscript/Superscript Mode	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
1B55	ESC U	Set Print Direction			3	3	3	3			4	3
1B57	ESC W	Double Wide Continuous Mode	♦	♦	♦	♦	♦	♦	♦	♦		
1B58	ESC X	Set Horizontal Margins				♦		♦	♦	♦	♦	♦
1B59	ESC Y	Dual Density Bit Image Graphics (Normal Speed)	♦		♦	♦	♦	♦		♦		
1B5A	ESC Z	High Density Bit Image Graphics (Half Speed)	♦		♦	♦	♦	♦		♦		
1B5C	ESC \	Print All Characters (Including < X'20')			♦	♦		♦	♦	♦	♦	♦
1B5D	ESC]	Reverse Line Feed						♦	5	5	6	7
1B5E	ESC ^	Print Single Character			♦	♦		♦	♦	♦	♦	♦
1B5F	ESC _	Continuous Overscore Mode			♦	♦						
1B61	ESC a	Select Auto Shift						♦				
1B62	ESC b	Select Black						♦				

1. Will print full size characters 5/96" below/above the current line (8/96" is a half line space) independent of line space setting.
2. Will print full size characters ½ the character height below/above the current line, thereby possibly exceeding the ½ character height distance.
3. Right-to-left (only) printing is <u>not</u> supported.
4. Right-to-left (only) printing is terminated by CR.
5. Using RLF with continuous forms tractor feed is <u>not</u> recommended. Printer will reverse through top margin in manual feed and print on platen. It will also RLF up to 3 lines or to the top of the form with cut sheet feeder attached and ignore additional RLF's.
6. Using RLF with continuous forms tractor feed is <u>not</u> recommended.
7. Using RLF with continuous forms tractor feed is <u>not</u> recommended. Printer will reverse through top margin in manual feed and print on platen. It will also RLF up to 3 lines or to the top of the form with cut sheet feeder attached and beep once with each ignored RLF.

TABLE VIII

CODE without parameters or counts, if any.		FUNCTION	3812	3852	4201	4202	5152	5182	52011	52012	5216	5223
Hex	Mnemonic											
1B63	ESC c	Select Cyan						♦				
1B64	ESC d	Relative Move Inline Forward						♦	1	1		
1B65	ESC e	Relative Move Inline Backwards						♦	♦	♦		
1B68	ESC h	Partial Index Down (PID)									♦	
1B69	ESC i	Partial Index Up (PIU)									♦	
1B6A	ESC j	Stop (STP)							♦	♦		♦
1B6D	ESC m	Select Magenta						♦				
1B6E	ESC n	Set Aspect Ratio						♦		♦		
1B79	ESC y	Select Yellow						♦				

1. Will not underscore tabs but will underscore moves inline forward.

TABLE IX

CODE without parameters or counts, if any.		FUNCTION	3812	3852	4201	4202	5152	5182	5201	5201	5216	5223
Hex	Mnemonic			2			2		1	2		
1B5B30	ESC [0	Set Print Resolution (SPR)		♦								
1B5B40	ESC [@	Set Presentation Highlights				♦						
1B5B42	ESC [B	Begin Underscore (BUS)		♦								
1B5B43	ESC [C	Page Map Primitives Escape (PMPE)	♦									
1B5B45	ESC [E	End Underscore (EUS)		♦								
1B5B48	ESC [H	Set Exception Action (SEA)									♦	
1B5B4B	ESC [K	Set Initial Conditions (SIC)		♦							♦	
1B5B4C	ESC [L	Set Presentation Surface Color (SPS)		♦								
1B5B4D	ESC [M	Set Foreground Color (SFC)		♦								
1B5B4E	ESC [N	Set Background Color (SBC)		♦								
1B5B4F	ESC [O	Color Raster Image (CRI)		♦								
1B5B54	ESC [T	Set Character Set Global (SCG)									♦	
1B5B55	ESC [U	Graphic Dot Line Skip Vertical (DSV)		♦								
1B5B56	ESC [V	Set Execution Mode (SEXEC)									♦	
1B5B57	ESC [W	Set Impression Level (SIL)										1
1B5B5C	ESC [\	Set Vertical Units (SUNIT)							♦	♦		♦
1B5B5D	ESC [ ]	Swap Fore/Back Color (SFBC)		♦								
1B5B73	ESC [s	Report Printer Status									2	

1. X'01' for default, normal; X'02' for heavy; all other values print like X'01'.
2. Serial interface only.

TABLE X

FUNCTION	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
SWITCH-CONTROLLED FUNCTIONS (Under-the-Covers)										
Audible Alarm (Active*/Not Active)			♦	1	♦	♦			♦	♦
Auto CR on LF/No Auto CR on LF*			♦	♦						
Auto Feed XT Signal (Fixed/Not Fixed*)					♦					
Auto LF after CR/No Auto LF after CR*			♦	♦	♦	♦	♦	♦	♦	♦
Auto Ribbon-Band Shift, On=Black/Off=Color*						♦				
Bits Per Second (various, incl. 9.6Kbps*)	♦		2	2					2	
Buffer Full (Print Only/Print and LF*)					♦					
Cancel Code (Invalid/Valid*)					♦					
Character Set/Printer Table (1* or 2)			3	3	♦	♦	♦	♦		
Contrast Control							♦	♦		
Country Character Support:										
France									♦	♦
Germany									♦	♦
Italy									♦	♦
Spain									♦	♦
United Kingdom									♦	♦
United States*									♦	♦
Cut Sheet Length (11* or 11.69 inches)									2	
Diagnostic Wrap Test (On=No Test*/Off=Test)									♦	
DTR Pacing (Dropped*/Asserted)	♦									
Form Length (11* or 12 inches)			3	3	♦	♦	♦	♦		♦
Hex Dump (Active/Not Active*)			4	4						♦
Line Length (8* or 13.2 inches)						♦	♦	♦		♦
Line Length (8* or 13.6 inches)				♦						
Line Spacing (6* or 8 LPI)					♦	♦				♦
Normal Zeros*/Slashed Zeros			♦	♦						
Number of Data Bits Per Frame (7 or 8*)			2	2					2	
Parity (None*/Even)	♦									
Parity (None, Ignored, Odd or Even*)			2	2					2	
Photoconductor-Unit Counter Reset	♦									
Pitch (Proportional Space, 10*, 12 or 15)									♦	
Print Quality/Pitch:										
DP-12, DP-10*, Text/10 or NLQ/10						♦				
Protocol:										
Simple Host or Asynch.*/Asynch.-only	♦									
XON/XOFF or DTR*			2	2					2	
Ribbon Saver*/Increase Throughput								♦		
RS-232C*/RS-422A	♦									
Skipover Perforation/No Skipover*					♦	♦	♦	♦		♦
SLCT IN Signal (Fixed*/Not Fixed)					♦				5	
Test (On=No Test*/Off=Test)									♦	

* = Off/Default/Factory Set position.

1. Deactivated by externally accessible switches (press/hold On Line key and turn Power Switch on).
2. Serial attachment/interface only.
3. Off/Default/Factory Set position for U.S. and Canada; on for all others.
4. Activated by externally accessible switches (press/hold Form Feed key and turn Power Switch on).
5. Parallel attachment/interface only.

Interfaces

Interfaces

An interface is a shared boundary. It might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs. It is an interconnection, interaction or communication between two equipments or parts of a system which usually have different functions.

Three sets of interfaces are listed in Tables XI and XII. Just as there are common and unique printer control functions, there are common and unique interfaces. Differences can be obtained from the tables.

The interfaces are ordered alphabetically/numerically in the tables. Table entries at the interface-printer (row-column) intersections are either:

- A "♦" symbol which indicates that the interface is supported, or
- A number which not only indicates that the interface is supported but also refers to a corresponding explanatory note at the bottom of the same page.

No entry (a blank cell) indicates that the interface (row) for a printer (column) is not supported.

The abbreviations used in the table column headings are the same ones previously used for the "Characteristics" and "Control Functions".

TABLE XI

INTERFACE	3812	38522	4201	4202	51522	5182	52011	52012	52116	52223
OPERATOR INTERFACES										
Audible Alarm	♦		♦	♦	♦	♦	♦	♦	♦	♦
Display	♦									
Indicators/Lights										
Add Toner	♦									
Check		♦								
Cl(ea)r Paper Jam	♦									
Close Cover	♦									
Fault						♦				
Font							♦	♦		
Forms Mode						♦				
Job in Process	♦									
Machine Check	♦									
NLQ/Paper Out				♦						
(No) Paper (Out)/Add Paper	♦		♦		♦		♦	♦		♦
On Line	♦				♦		♦	♦		♦
Power (On)		♦	♦	♦	♦	♦			♦	
Ready	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Remove Prints	♦									
Ribbon							♦	♦	♦	♦
Stand By	♦									
Test Mode						♦				
Wheel										♦
Switches/Control Keys										
Auto Stop (manual feed)							1	1		1
Bold		♦								
Cancel	♦									
Form Feed or Form Feed-Set		♦	♦		♦	♦	♦	♦	♦	♦
Form Feed/Load/NLQ				♦						
Forms Mode						♦				
Initialize						♦				
Impression									♦	
Line Feed or (Paper) "Up" Increment		♦	♦		♦	♦	♦	♦	♦	♦
Line Feed/Quiet Mode				♦						
Load									♦	
On Line/Off Line		♦	♦	♦	♦					
Paper Bail Loading (manual feed)							♦	♦		♦
Paper Feed (type) Toggle									♦	
Power (AC)	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Ready						♦				
Reverse Line Feed or "Down" Increment							♦	♦	♦	♦
Ribbon Feed (Rate)									♦	
Start	♦						♦	♦	♦	
Start-Reset										♦
Stop	♦								♦	
Stop-Code							♦	♦		♦
Test (Mode)	♦					♦				

1. With coded paper bail

TABLE XII

INTERFACE	3812	38522	4201	4202	51522	5182	52011	52012	52116	52223
COMMUNICATIONS/PC (Host) INTERFACES										
Parallel Interface ("Centronics-type")		♦	♦	♦	♦	♦	♦	♦	♦	♦
Data Transfer Rate: ≤1.0 KBytes/Sec.		♦	♦	♦	♦	♦	♦	♦	♦	♦
Synchronization: -STROBE		♦	♦	♦	♦	♦	♦	♦	♦	♦
Handshaking: -ACKNLG/+BUSY		♦	♦	♦	♦	♦	♦	♦	♦	♦
Paper End: +PE		♦	♦	♦	♦	♦	♦	♦	♦	♦
Select: +SLCT		♦	♦	♦	♦	♦	♦	♦	♦	♦
Automatic LF after CR: -AUTO FEED XT					♦	♦	♦	♦	♦	♦
Initialize, immediately: -INIT		♦			♦	♦				
Initialize after printing buffer: -INIT			♦	♦			♦	♦	♦	♦
Error: -ERROR		♦	♦	♦	♦	♦	♦	♦	♦	♦
Select In: -SLCT IN					♦				♦	
Serial Interface	♦		1	1					1	
RS-232C	♦									
Data Transfer Rate (Kbps)										
0.15			♦	♦						
0.3			♦	♦					♦	
0.6			♦	♦					♦	
1.2	♦		♦	♦					♦	
2.4	♦		♦	♦					♦	
4.8	♦		♦	♦					♦	
9.6	♦		♦	♦					♦	
19.2	♦		♦	♦						
Handshaking										
XON/XOFF	♦		♦	♦					♦	
DTR	♦		♦	♦					♦	
RS-422A	♦									
Data Transfer Rate (Kbps)										
1.2	♦									
2.4	♦									
4.8	♦									
9.6	♦									
19.2	♦									
Handshaking										
XON/XOFF-only	♦									

1. Optional, operator installable

TABLE XII

INTERFACE	3812	38522	4201	4202	51522	5182	52011	52012	5216	5223
INPUT BUFFER SIZE in KBytes										
0.255									♦	
0.38			♦							
0.04-0.132		♦			♦					
0.8		1								
≈1.75							♦			♦
≤4.0				♦						
≈5.0			2							
6.0						♦				
8.0				2						
15.5								♦		
856.8	♦									

1. Image, dual color
2. Optional, operator installable

Appendix

TABLE XIII

APPENDIX	3812	3852 2	4201	4202	5152 2	5182	5201 1	5201 2	5216	5223
PAPER/FORM SIZE										
Cut/Single Sheet: Width X Length										
in millimeters / in inches										
76-420 X 76 min. / 3-16.5 X 3.0 min.				♦			♦	♦		♦
76.2-254 X 76.2 min. / 3-11 X 3 min.			♦							
81-391 X 94 min. / 3.2-15.4 X 3.7 min.									♦	
177.8-304.8 X 216-432 / 7-12 X 8.5-17						♦				
178 X 267 / 7.00 X 10.50	♦									
182 X 257 / 7.20 X 10.10	♦									
184 X 267 / 7.25 X 10.50	♦									
191 X 267 / 7.50 X 10.50	♦									
210 X 297 / 8.30 X 11.70	♦									
216 X 279 / 8.50 X 11.00	♦	♦								
216 X 356 / 8.50 X 14.00	♦									
Continuous Forms: Width X Length										
in millimeters / in inches										
241 X 279 / 9.5 X 11.0		♦								
Continuous Forms: Edge-to-edge Width										
in millimeters / in inches										
76.2-254 / 3-10			♦							
76.2-381 / 3-15				♦			♦	♦		♦
76.2-406.4 / 3-16						♦				
81-391 / 3.2-15.4									♦	
101.6-254 / 4-10					♦					
Roll Paper: Width X Diameter										
in millimeters / in inches										
216 X 70 / 8.50 X 2.75		♦								

TABLE XIII

APPENDIX	3812	38522	4201	4202	51522	51822	52011	52012	52216	52223
PAPER THICKNESS										
Cut/Single Sheet	1									
in millimeters / in inches										
0.08-0.36 / 0.003-0.014			♦	♦						
0.093 ±0.005 / 0.004 ±0.0002		♦								
0.635 max. / 0.025 max.									♦	
Continuous Forms										
in millimeters / in inches										
0.064-0.3 / 0.0025-0.012					♦					
0.08-0.36 / 0.003-0.014			♦	♦						
0.093 ±0.005 / 0.004 ±0.0002		♦								
0.460 max. / 0.018 max.									♦	
Roll Paper										
in millimeters / in inches										
0.093 ±0.005 / 0.004 ±0.0002		♦								

1. See Reference Section, Item 8.

TABLE XIII

APPENDIX	3812	38522	4201	4202	51522	5182	52011	52012	52116	52223
PAPER WEIGHT										
Continuous Forms: Single Part										
in gm/m² / in pound bond										
45-90 / 12-24			♦	♦						
56-75 / 15-20						♦				
60-90 / 16-24	♦						♦	♦		
75-90 / 20-24		♦							♦	
90-150 / 24-40						♦				
Continuous Forms: Multipart										
in gm/m² / in pound bond										
23-30 carbon / 6-8 carbon						♦				
37.5-45 4 parts / 10-12 4 parts			♦	♦						
37.5-56 1-3 parts / 10-15 1-3 parts			♦	♦						
45-56 / 12-15						♦				
56-75 1-3 parts / 15-20 1-3 parts										♦
Single Sheet										
in gm/m² / in pound bond										
34-68 / 9-18						♦			1	
56-75 / 15-20						♦				
75-90 / 20-24		♦					♦	♦	♦	
90-150 / 24-40						♦			1	

1. Manual feed only

TABLE XIV

APPENDIX	3812	3852 2	4201	4202	5152 2	5182	52011	52012	5216	5223
ACOUSTICAL SPECIFICATIONS: noise level in dBA										
50		♦					♦	♦		
<56	♦									
59									♦	
60				♦						
61										♦
63			♦							
ELECTRICAL SPECIFICATIONS										
Voltage (VAC) Nominal / Min. / Max. / Frequency (Hz) / Current (Amps) Max. / Power (Watts) Max./Ave.										
100 / - / - / 50/60 / - / 120/80			♦							
100 / 90 / 110 / 50/60 / - / 25/-		♦								
100 / 90 / 110 / 50/60 / 12.0 / -/500	♦									
100 / 90 / 118 / - / - / -/-					♦					
100 / 90 / 118 / 50±3/60±3 / 1.5 / 135/-						♦				
115 / - / - / 60 / 1.1 / 90/50										♦
115 / - / - / 50/60 / 1.8 / 220/50							♦	♦		
120 / - / - / - / - / -/75									♦	
120 / - / - / 60 / - / -/-				♦						
120 / - / - / 60 / 1.0 / 100/-					♦					
120 / - / - / 60 / - / 120/80			♦							
120 / 102 / 139 / 60±3 / 1.5 / 135/-						♦				
120 / 108 / 132 / 60 / 0.3 / -/-		♦								
120 / 108 / 132 / 50/60 / - / -/500	♦									
200 / - / - / 50/60 / - / 120/80			♦							
200 / 180 / 236 / 50±3/60±3 / 1.0 / 135/-						♦				
220 / - / - / 50/60 / - / 120/80			♦							
220 / 190 / 264 / 50±3/60±3 / 1.0 / 135/-						♦				
220 / 198 / 242 / 50 / - / 25/-		♦								
220 / 198 / 242 / 50/60 / - / -/500	♦									
230 / - / - / 50/60 / - / 120/80			♦							
230 / 207 / 253 / 50 / - / 25/-		♦								
240 / - / - / 50/60 / - / 120/80			♦							
240 / 216 / 264 / 50 / - / 25/-		♦								
240 / 216 / 264 / 50/60 / - / -/500	♦									

TABLE XIV

APPENDIX	3812	38522	4201	4202	51522	5182	52011	52012	52116	52223
PHYSICAL SPECIFICATIONS:										
Size										
Height										
cm										
10.7					♦					
11.4		♦								
12.2				♦						
13.3			♦							
16.4							♦	♦		♦
22.4									♦	
24.4						♦				
26.6							1	1		1
35.1									2	
38.0	♦									
38.0	2									
49.3							2	2		2
inches										
4.2					♦					
4.5		♦								
4.80				♦						
5.25			♦							
6.5							♦	♦		♦
8.8									♦	
10.0						♦				
10.5							1	1		1
13.8									2	
15.0	♦									
15.0	2									
19.4							2	2		2
Width										
cm										
37.4					♦					
40.0		♦								
55.9				♦						
42.1			♦							
54.1							♦	♦		♦
58.1									♦	
57.8						♦				
54.1							1	1		1
58.1									2	
68.0	♦									
122.0	2									
54.1							2	2		2
inches										
14.7					♦					
15.75		♦								
22.0				♦						
16.6			♦							
21.3							♦	♦		♦
22.9									♦	
22.75						♦				
21.3							1	1		1
22.9									2	
26.8	♦									
48.0	2									
21.3							2	2		2
Depth										
cm										
30.5					♦					
29.5		♦								
34.3				♦						
34.3			♦							
36.7							♦	♦		♦
40.9									♦	
35.43						♦				
41.1							1	1		1
56.3									2	
48.0	♦									
48.0	2									
50.4							2	2		2
inches										
12.0					♦					
11.6		♦								
13.5				♦						
13.5			♦							
14.4							♦	♦		♦
16.1									♦	
14.0						♦				
16.2							1	1		1
22.2									2	
18.9	♦									
18.9	2									
19.8							2	2		2
Weight										
kilograms										
5.5					♦					
5.6		♦								
7.86-8.86			3							
10.0							♦	♦		
10.62				♦						
13.1										♦
15.7									♦	
18.4						♦				
66.0	♦									
145.2										
pounds										
12.0					♦					
12.3		♦								
17.3-19.5			3							
22.0							♦	♦		
23.6				♦						
29.0										♦
34.5									♦	
40.0						♦				
145.2	♦									
Signal Cable										
Interface										
Length										
in meters										
Parallel										
1.83						♦				
-		♦	♦	♦	♦		♦	♦	♦	♦
-									4	
Serial										
1.83	♦									
7.32	♦									
-			♦	♦					♦	
in feet										
Parallel										
6.0						♦				
-		♦	♦	♦	♦		♦	♦	♦	♦
-									4	
Serial										
6.0	♦									
24.0	♦									
-			♦	♦					♦	
Size (AWG) [IBM P/N]										
Parallel										
3 (18)						♦				
[1525612]		♦	♦	♦	♦		♦	♦	♦	♦
[8509390]									4	
Serial										
[1348421]	♦									
[1348423]	♦									
[8509386]			♦	♦					♦	

1. With continuous forms feed
2. With automatic sheet feed
3. Depending on weight of (input) power supply.
4. Right angle connector

TABLE XV

APPENDIX	3812	3822	4201	4202	5152	5182	5201	5212	5216	5223
ENVIRONMENTAL OPERATING CONDITIONS										
Temperature										
°C / °F										
5-35 / 41-95			♦	♦	♦	♦				
10-40.6 / 50-105										
15.6-32.2 / 60-90	♦	♦					♦	♦	♦	♦
Humidity in % non-condensing (relative)										
8-80	♦	♦	♦	♦			♦	♦	♦	♦
10-80					♦	♦				
SHIPPING/STORAGE TEMPERATURE										
°C / °F										
-40 to +60/0.6 to +60 / -40 to 140/33.1 to 140	1 ♦	♦	♦	♦	♦	♦	♦	♦	♦	♦

1. Does not apply to toner.

Acronyms and Mnemonics

Acronyms and Mnemonics

3812: IBM Pageprinter 3812

38522: IBM Color Jetprinter 3852-2

4201: IBM Proprinter 4201

4202: IBM Proprinter XL 4202

51522: IBM Graphics Printer 5152-002

5182: IBM Color Printer 5182

52011: IBM "Quietwriter" Printer 5201-001

52012: IBM "Quietwriter" Printer 5201-002

5216: IBM Wheelprinter 5216

5223: IBM Wheelprinter E 5223

ANSI: American National Standards Institute

APA: All Points Addressable

APL: A Programming Language

ASCII: American National Standard Code For Information Interchange

BASIC: Beginners All-purpose Symbolic Instruction Code

BEL: Bell

BS: Backspace

CAN: Cancel

CPI: Characters Per Inch

CPL: Characters Per Line

CPS: Characters Per Second

CR: Carriage Return

dBA: decibel A (weighting)

DC1: Device Control 1

DC2: Device Control 2

DC3: Device Control 3

DC4: Device Control 4

DEL: Delete character

DOS: Disk Operating System

DP: Data Processing

DPI: Dots Per Inch

DTR: Data Terminal Ready

ESC: Escape

FF: Form Feed

Hex: Hexadecimal

HT: Horizontal Tab
Kbps: Kilo (one thousand) bits per second
KBytes: Kilo (one thousand) Bytes
LED: Light Emitting Diode
LF: Line Feed
LPI: Lines Per Inch
MBytes: Mega (one million) Bytes
NLQ: Near Letter Quality
NUL: Null
OCR: Optical Character Recognition
P/N: Part Number
PC: Personal Computer
pels: picture elements (or, dots)
PN: Same as P/N
PPM: Pages Per Minute
PS: Proportional Space
PSM: Proportional Space Mode
RLF: Reverse Line Feed
SI: Shift In
SO: Shift Out
SP: Space
SS: Superscript/Subscript
VAC: Volts Alternating Current
VT: Vertical Tab
XOFF: Transmission OFF
XON: Transmission ON

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