

## **IJ-3000 Ink-Jet Printer**

### **Specification**

Provides the electrical, mechanical, and interface specifications of the IJ-3000 Ink-Jet Printer.

Cover Models: IJ-3000

The Addmaster Model IJ-3000 is a quiet ink jet alphanumeric printer. This printer is intended for journal printing, receipt and listing generation in a banking or POS environment.

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Notices: Subject to change without notice.  
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## **1 Specification Overview**

This document provides the electrical, mechanical, and interface specifications of the J-3000 Ink-Jet Printer. For information concerning the operation of the printer from a user's standpoint, consult the following document:

*IJ-3000 Operations Guide*  
Revision 1, Dated January 19, 1995 (or later)

## 2 Equipment Specifications

<b>Item</b>	<b>Specification</b>
<i>Power Requirements</i>	12 V DC, @ 500 mA, Wall-Mount Addmaster P/N 95679 <i>Use only Addmaster supplied power supply</i>
<i>Power Consumption</i>	
<i>Operating</i>	6 to 9 Watts approximate
<i>Standby</i>	3 Watts approximate
<i>Operating Environment</i>	
<i>Temperature</i>	10 -> 40 C
<i>Humidity</i>	10 -> 90% RH (non-condensing)
<i>Printer Unit</i>	
<i>Type</i>	Ink Jet, 10x12 Dot-Matrix
<i>Capacity</i>	42 columns maximum, Standard Font
<i>Speed</i>	120 CPS 2.5 LPS average
<i>Ink Cartridge</i>	Black, Other colors available HP 51604A (plain paper) From Addmaster as P/N 95045
<i>Dimensions</i>	6.75" (W) by 3.5" (H) by 6.0"(D) (Excluding Journal Paper Roll)
<i>Weight</i>	3 lb. (5 lb. Shipping) (Includes wall-mount power supply)
<i>Noise Level</i>	49 db (2 feet)

### 3 Printer Specification

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**Printing: Ink, Characters, & Fonts**

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<i>Matrix Print Head</i>	10 by 12 matrix
<i>Ink Cartridge Life</i>	11 million dots. Approx. 550,000 characters
<i>Print Contrast Ratio</i>	Constant throughout life of cartridge.
<i>Character Height</i>	0.070 to 0.125 inch (depends on font)
<i>Character Set</i>	96 character ASCII set Optional: full code page 437 or 850
<i>Fonts</i>	4 Fonts Included (All May Be Expanded) Standard & Standard Bold Large & Large Bold

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**Printing: Capacities**

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<i>Print Speed</i>	2.5 lines/sec (140 CPS) (journal)
<i>Pitch</i>	5 to 18 CPI (depends on font) 15 to 54 chars/line (depends on font)
<i>Line Spacing</i>	5.5 lines per inch (default)
<i>Print Field</i>	
<i>Width</i>	2.75 inches
<i>Position</i>	0.125 inch from left margin
<i>Paper Roll</i>	
<i>Width</i>	3.00 inches (+0.00", -0.02")
<i>Diameter</i>	3.25 inches maximum

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## 4 Operator Controls & Available Options

### 4.1 OPERATOR CONTROLS

Item	Usage
Power on/off switch.	
Paper-Feed button.	
Power LED indicator light (green, rear-most).	
Error LED indicator light (green, front-most)	<i>FLASHING</i> - Print-head jam or other error.
Self-Test feature:	Test all features of the printer: (1) Prints out Firmware revision levels and installed options, (2) Prints a message on the journal roll.  To perform test, follow these steps: (1) Turn off power, (2) Hold down paper-feed button, (3) Turn on power, (4) release button after printing starts.

### 4.2 AVAILABLE OPTIONS

- 220/240 Volt, 50 Hz, Power Supply.
- Receive Buffer: 8K.
- International character sets: complete code pages 437 or 850
- Factory can reconfigure character set, firmware, or interface for special applications. Contact factory for information.
- Hardware Interface: (must be configured at factory)
- RS232C *standard model*
- PARALLEL *standard model*

## 5 Font Selections & Printing

Eight different type styles (fonts) are available. The following chart shows the approximate pitch measured in characters per inch and per line for each font.

### For Journal Printing:

#### *Characters Per Inch*

<b>Type Style</b>	<b>Single Wide</b>	<b>Double Wide</b>
Standard	15.2	7.6
Standard Bold	15.2	7.6
Large	11.6	5.8
Large Bold	11.6	5.8

#### *Characters Per Line*

<b>Type Style</b>	<b>Single Wide</b>	<b>Double Wide</b>
Standard	42	21
Standard Bold	42	21
Large	32	16
Large Bold	32	16

Character height is 0.094" (standard) and 0.125" (large).

Vertical spacing on the journal is 5.5 lines per inch. Line spacing can be set by the factory on a custom basis.

Fonts may be mixed within a print line. If so, then the available number of characters per line will depend upon the mixture of fonts.

If the print line is longer than the available media width, the print line will be truncated either at the beginning or ending of the print line depending upon the print head direction.

Inter-character spacing is two (2) dots. This can be reduced by the factory on a custom basis. If so, then the characters per inch or per line will increase somewhat.

## 6 Interface Specification

### 6.1 SERIAL RS232 INTERFACE

Item	Specification
<i>Baud Rates:</i>	Dip switch selectable: 1200, 2400, 4800, 9600.
<i>Data Bits:</i>	Dip switch selectable: 7 or 8, w/1 stop bit
<i>Parity:</i>	Dip switch selectable: even, odd, none.
<i>Interface Connector:</i>	RJ-45, 8 pin phone jack type connector. RS232C interface levels.

*Pin Configurations: at RJ-45 connector*

Pin	Signal	Direction
Pin 1	Signal Ground	--
Pin 2	Recv. Data	Input to printer
Pin 3	Tran. Data	Output from printer
Pin 4	CTS	Input to printer
Pin 5	RTS	Output from printer
Pin 6	DTR (High)	Output from printer
Pins 7,8	Frame Ground	--

*Serial Interface Cables: Available from Addmaster*

95078 Printer to PC compatible DB9 type serial port

95079 Printer to PC compatible DB25 type serial port

Handshaking: Printer toggles RTS, which is connected by standard cables to IBM PC's CTS signal.

## 6.2 PARALLEL INTERFACE (standard 'PC' type)

<i>Interface Connector:</i>	25 pin, male, 'DB' type connector. TTL interface levels.
<i>Pin Configurations:</i>	Standard assignments. Identical to IBM PC compatible parallel ports.
<i>Parallel Interface Cables:</i>	Available from Addmaster
95529	Printer to PC compatible DB25 type parallel port

## 6.3 PRINTER BUFFERS: Receive and Print-Line

The printer has two type of buffers to which it receives incoming characters:

*Receive Buffer* Stores incoming characters. The printer removes characters from the Receive Buffer when needed.

The characters are then "processed."

In the standard IJ-3000, the Receive Buffer can store typically 1 character (often 2).

The *Receive Buffer Option*, increases the size to 8192 characters.

*Print-Line Buffer* Stores characters (typically text characters) after processing, but before actual printing.

This buffer is used to build up the complete "Print-Line" that will then be printed or validated.

In the standard IJ-3000, the Print-Line Buffer is approximately 75 characters. Therefore, you can not print a line with more than 75 characters (including any formatting commands).



## 6.4 HARDWARE HANDSHAKING

When the Receive Buffer is full or is otherwise unavailable, then the printer is unable to receive any characters. If any are sent, then they will be lost. This "un-availability" is signaled to the computer by "handshaking" lines on the interface.

*For the Serial Interface:*

The printer toggles its RTS line which is connect through the standard cables to the computer's line called "CTS". If the computer tests CTS high, then data can be sent, and if tested low, then do not send data. This testing is usually accomplished automatically via the computer's BIOS routines.

For DOS based computers, set the "mode" command as follows:

```
C> mode com1:9600,n,8,1,p
```

The "p" parameter sets the appropriate retry on the CTS line when used with printers in general.

For units with Receive Buffers, CTS goes low (or BUSY goes high on Parallel units) when the Receive Buffer reaches 256 characters from full.

*For the Parallel Interface:*

The printer signals that it is busy by holding the line called "BUSY" high. No characters may be sent when BUSY is high.

## 6.5 DIP SWITCH SETTINGS

DIP Switches set functional features of the IJ-3000. The Switches are accessible from the bottom of the unit.

Position	Setting
1 *	Off = 9600 Baud On = 1200 Baud
2 *	Off = 8 data bits, no parity On = 7 data bits, even parity
3 *	Off = No auto-linefeed on CR On = Auto-linefeed on CR
4 *	Off = Send ACK on processed CR On = Don't send ACK on processed CR

*Notes:* • Defaults marked with an asterisk "\*"

• For Parallel Units, DIP Switches 1 and 2 are not used.

## 6.6 INTERFACE CONTROL CODES

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### Host to Printer

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<i>NUL</i>	<i>Null.</i> Ignored.
<i>CAN</i>	<i>Hard Reset.</i> Clears the entire Receive Buffer and resets the printer.
<i>STX</i>	<i>Clear Print-Line Buffer.</i>
<i>ENQ</i>	<i>Request Printer Status.</i> See notes.
<i>SYN</i>	<i>Turn on Error LED.</i> <i>STX</i> will turn off LED if it was turned on by <i>SYN</i> .
<i>CR</i>	<i>Print Line.</i> If Auto-LineFeed mode is enabled, then the paper is also advanced 1 line.
<i>LF</i>	Usage depends on Auto-LineFeed mode.  If Auto-LineFeed mode is disabled: <i>LF</i> causes the paper to be advanced 1 line. If any data was previously received, it will first be printed.  If Auto-LineFeed mode is enabled: <i>LF</i> causes 1 additional line feed after the current line is printed.  Multiple <i>LF</i> s may be sent. <i>LF</i> does not initiate the printing. <i>CR</i> is used to initiate printing.
<i>BS</i>	<i>Back-Space.</i> Move the buffer pointer back one character, if possible.
<i>SO</i>	Selects Single-Wide pitch (cancels Double-Wide).
<i>SI</i>	Selects Double-Wide pitch.
<i>GS</i>	Selects Large Font.
<i>FS</i>	Selects Large Bold Font.
<i>RS</i>	Selects Standard Font.
<i>US</i>	Selects Standard Bold Font. <i>Obsolete: Do not use.</i>
<i>DC3</i>	Set "Packed Print Mode." See notes before using.
<i>DC4</i>	Reset "Packed Print Mode." See notes before using.
<i>SUB</i>	Set "Upside-Down Mode" printing.
<i>EM</i>	Reset "Upside-Down Mode" printing.

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**INTERFACE CONTROL CODES (continued)**

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**Host to Printer: New "Level 2" Commands**

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<i>VT</i>	<i>Feed Journal</i> roll past tear-bar. Any data in line-buffer is printed first.
<i>ESC @</i>	<i>Clear All.</i> Clear print buffer, resets all fonts and modes to default.
<i>ESC ACK</i>	<i>Send ACK</i> after sequence is processed. See notes.
<i>ESC T</i>	Sets "Turbo" operating mode. See notes before using.
<i>ESC R</i>	Clears "Turbo" operating mode.
<i>ESC n</i>	All other escape sequences are ignored.
<i>others</i>	Others to be added for additional fonts and pitches.

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**Printer to Host**

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<i>ACK</i>	<i>Acknowledge.</i> Sent in two cases: Sent after <i>CR</i> is processed. Can be disabled by DIP Switch 4. Sent in response to the <i>ESC ACK</i> command. The <i>ACK</i> will be sent after the escape sequence is processed.
<i>NAK</i>	<i>Transmission error.</i> Host should send <i>CAN</i> or <i>STX</i> and resend message. Not sent if unit has Receive Buffer Option.
<i>inquiry responses</i>	See table in next section.

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## 6.7 ASCII Control Code Table

The following table of control codes lists only those used in the IJ-3000 printer interface specification.

<b>Code Symbol</b>	<b>Ctrl Char</b>	<b>Decimal Value</b>	<b>Hex Value</b>	<b>Code Symbol</b>	<b>Ctrl Char</b>	<b>Decimal Value</b>	<b>Hex Value</b>
NUL	^@	0	00	DLE	^P	16	10
SOH	^A	1	01	DC1	^Q	17	11
STX	^B	2	02	DC2	^R	18	12
ETX	^C	3	03	DC3	^S	19	13
EOT	^D	4	04	DC4	^T	20	14
ENQ	^E	5	05	NAK	^U	21	15
ACK	^F	6	06	SYN	^V	22	16
BEL	^G	7	07	ETB	^W	23	17
BS	^H	8	08	CAN	^X	24	18
HT	^I	9	09	EM	^Y	25	19
LF	^J	10	0A	SUB	^Z	26	1A
VT	^K	11	0B	ESC	^[	27	1B
FF	^L	12	0C	FS	^\	28	1C
CR	^M	13	0D	GS	^]	29	1D
SO	^N	14	0E	RS	^^	30	1E
SI	^O	15	0F	US	^_	31	1F

## 7 Interface Software Notes:

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### Reset and Clear Commands

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The *CAN* control code clears the entire Receive Buffer and resets the printer. These actions occur immediately after receiving the command. This is a "hard" reset and emulates all the actions taken when the printer is powered on.

These actions include mechanical movements which can take perhaps 250 milliseconds. The printer lowers the handshaking line to indicate that it is unavailable to receive data during this reset. If the computer sends data contrary to this signal during this time, that data will be lost. If your software or hardware cannot stop on character in response to hardware handshaking lines, then appends NULLs (0x00) after the *CAN* command.

The *STX* control code clears the current Print-Line Buffer and any current fonts, and turns off the Error LED. Pre-selected modes (Pack, Upside-Down) are not reset. These actions occur when *STX* is processed from the Receive Buffer, if present.

The *ESC @* clears the Print-Line Buffer, any selected fonts, and any selected modes. These actions occur when *ESC @* is processed from the Receive Buffer, if present.

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### Information Request Commands

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The *ENQ* control code is sent as a single character. The IJ-3000's responses are given in the table provided on the next page. The response is sent immediately after receiving the *ENQ*.

When *ESC ACK* is processed, an *ACK* is sent to the host. This can be used by the host to monitor the printer. For example, if *ESC ACK* is sent at the end of a long print job, the printer will send an *ACK*, when printing is completed. This sequence has no use unless the Receive Buffer Option is included.

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### Font and Pitch Selection Commands

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Print pitches, bold print and print destination commands may be selected from the interface at any time, even in the middle of a line.

At the end of every printed line the font and pitch selects are reset to *Standard Font* and *Single-Wide* pitch.

The total number of characters and formatting commands can not exceed 75 characters per Print-Line.

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### **Operating Mode Commands**

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The operating modes affect the entire Print-Line. These modes remain in effect until changed by a software command, that is, they are never automatically reset. These operating modes include: (A) Auto-LineFeed mode, (B) Pack mode, (C) Upside-Down mode, and (D) Turbo mode.

Auto-LineFeed mode is selected by DIP Switch #3. If ON, the mode is enabled, meaning that a *CR* also performs a line-feed. In addition, *LF* is used in a delayed sense and is executed AFTER the next *CR* is received.

If Auto-LineFeed mode is disabled (DIP Switch #3 = OFF), then *CR* will print 1 line, but will not feed the paper. *LF* will feed the paper 1 line. *LF* is not delayed, but acted upon immediately. If any data is pending in the line-buffer when @i(LF) is received, it will be printed before the paper is advanced.

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## 8 Host Status Request

Host may request status at any time by sending the single ASCII character *ENQ* (05h). The IJ-3000 will respond immediately with a single ASCII character specifying its status.

### IJ-3000 Status Response

The single character response shall consist of 8 bits as follows:

MSB	8	0	
	7	(BEMP)	<i>Receive Buffer Empty</i>
	6	1	<i>reserved</i>
	5	0	<i>reserved</i>
	4	0	<i>reserved</i>
	3	0	<i>reserved</i>
	2	(PRDY)	<i>Printer Ready</i>
LSB	1	0	<i>reserved</i>

(BEMP)	<i>Buffer_Empty</i>	=1 if the Receive Buffer is empty and has processed all received data (processed data may not yet have been printed), =0 if Receive Buffer has any unprocessed data.
(PRDY)	<i>Printer_Ready</i>	=1 if printer is ready and no error conditions are sensed, =0 if an error condition: Jam, PowerLow, Paper Problems, other errors.

## 9 Interfacing Examples

To illustrate the various modes, this section presents examples. The following type-styles are used:

- print text      -the text to be printed
- (CC)            -control characters

### Examples #1: Auto-LineFeed on CR

*If Auto-LineFeed on CR mode is Off: (DIP3=OFF)*

This will be the 1st line (CR)

This 2nd line will overprint the 1st (CR) (LF)

This will be the 3rd line, (No overprint) (CR) (LF)

*If Auto-LineFeed on CR mode is On: (DIP3=ON)*

This will be the 1st line (CR)

This will be the 2nd line, (No overprint) (CR)

### Examples #2: Inquiries

Host	Printer	Meaning
ENQ	62H	Printer Ready, Buffer Empty
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ENQ	61H	Printer Not Ready, Buffer Empty
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ENQ	22H	Printer Ready, Buffer Contains Data

*Printer responses are bit specific, refer to previous section.*



## 10 Revision Information

The data-stream specified exists in units with EPROM's levels:

- 86475-1 Rev 2 (and above) or equivalents if you have any installed options

Specification Rev. 4 changes concern:

- Document reformatted. Several sections were reworded.

Specification Rev. 3 changes concern:

- *SYN* command erroneously omitted from documentation.
- Auto-LineFeed on *CR* mode made DIP Switch Selectable. (Was always enabled).
- *CR* and *LF* changed with Auto-LineFeed mode.
- *ESC ACK* command added. Returns *ACK*.
- *ESC @* command added.
- DIP Switch Settings changed. Options for 2400, 4800, & odd parity removed.
- Blank Line Detection added to Look-Ahead logic with Receive Buffer Option.
- *ACK* response to *CR* made DIP Switch selectable. (Was always enabled.)

Old settings shown below.

Old Dip Switch Settings:   - *No longer valid.*  
                                   - *Included for reference only.*

<b>Position</b>	<b>Setting</b>
4	<i>On</i> = odd parity <i>Off</i> = even parity
3	<i>On</i> = 8 data bits, no parity <i>Off</i> = 7 data bits, with parity
2,1	<i>Off, Off</i> = 9600 Baud <i>Off, On</i> = 4800 Baud <i>On, Off</i> = 2400 Baud <i>On, On</i> = 1200 Baud