IJ-3080 Journal/Validation Printer

Specification

Provides the electrical, mechanical, and interface specifications of the IJ-3080 Journal/Validation Printer.

Cover Models: IJ-3080

The Addmaster Model IJ-3080 is a quiet ink jet alphanumeric printer. This printer is intended for receipt printing and forms validation 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 IJ-3080 Journal/Validation Printer. For information concerning the operation of the printer from a user's standpoint, consult the following document:

IJ-3160 Operations Guide
Revision 1 Dated December 6, 1994 (or later)

2　　Equipment Specifications

Item	Specification
Power Requirements	Uses Addmaster P/N 95679 Wall-Mount Supply 12 to 14 V DC, @ 500 mA
Power Consumption	
Operating	6 to 9 Watts *(approx., to be determined)*
Standby	3 Watts *(approx., to be determined)*
Operating Environment	
Temperature	10 -> 40 C
Humidity	10 -> 90% RH (non-condensing)
Printer Unit	
Type	Ink Jet, 10x12 Dot-Matrix
Capacity	42 columns max., std. pitch (validations) 42 columns max., std. pitch (journal)
Speed	140 CPS printing 2.5 LPS average
Ink Cartridge	Black, Other colors available HP 51604A (plain paper) From Addmaster as P/N 95045
Dimensions	6.75" (W) by 3.5" (H) by 6.0"(D) (Excluding Journal Paper Roll)
Weight	3 lb. (5 lb. Shipping) (Includes wall-mount power supply)
Noise Level	49 db (2 feet) *approx.*

3   Printer Specification

Printing: Ink, Characters, & Fonts

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

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Journal Only

Line Spacing	5.5 lines per inch (default)
Journal Print Field	
Width	2.75 inches
Position	0.125 inch from left margin
Journal Roll	
Width	3.00 inches (+0.00", -0.02")
Diameter	3.25 inches maximum
Document Detection	Waits for cut-form removal before printing.

Multi-Line Validation & Documents

Validation Print Field	
Width	3 inches
Position	Top Line: 1.4 inches maximum Bottom Line: 0.35 inches minimum (Both from form's bottom to line's bottom)
Maximum Lines	7 (standard line spacing 6.6 per inch) 8 (when in PAK mode)
Line Spacing	6.6 lines per inch (default)
Cut-Form Documents	
Thickness	0.0015 to 0.0180 inches
Width	4.75 inches minimum
Cut-Form Document Throat	Fully open through machine. (Left & Right) Normally open. Can insert form at any time.
Document Detection	Aborts printing if document removed.

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4   Operator Controls & Available Options

4.1   OPERATOR CONTROLS

Item	Usage
Power on/off switch.	Located at side of unit.
Paper feed button.	Located on top rear right of unit.
Validation LED indicator light (green):	*ON* This indicates a cut-form needs to be inserted for validation. Can also be turned on by host for other purposes.
	FLASHING Cut-form document needs removal. Cut-form must be manually removed before operation can continue.
	In absence of a cut-form, informs the operator that the print-head is jammed.
Self-Test feature:	Test all features of the printer: Prints out Firmware revision levels and installed options. Validates forms continuously until power is cycled.
	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

• Receive Buffer: 4K, or 8K characters.
• Parallel interface (PC standard type). RS-232C interface is standard.
• Factory can reconfigure character set, firmware, or interface for special applications. Contact factory for information.

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 type style.

Validation Printing:

Characters Per Inch

Type Style	Single Wide	Double Wide
Regular	15.2	7.6
Regular Bold	15.2	7.6
Large	11.6	5.8
Large Bold	11.6	5.8

Characters Per Line

Type Style	Single Wide	Double Wide
Regular	42	21
Regular Bold	42	21
Large	32	16
Large Bold	32	16

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

Vertical spacing on the cut-form (validations) is 6.6 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
Baud Rates:	Dip switch selectable: 1200, 9600.
Data Bits:	Dip switch selectable: 7 or 8, w/1 stop bit
Parity:	Dip switch selectable: even, none.
Interface Connector:	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)

Interface Connector: 25 pin, male, 'DB' type connector.
                                TTL interface levels.

Pin Configurations: Standard assignments. Identical to IBM PC compatible parallel
                                ports.

Parallel Interface Cables: *Available from Addmaster*

95529   Printer to PC compatible DB25 type parallel, 6 feet

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-3080, the Receive Buffer can store typically 1
                                character (often 2).

                                The *Receive Buffer Option*, increases the size to 4096, 8192, or
                                32256 characters (depending on the option.)

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-3080, 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-3080. The Switches are accessible through the rear cover.

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

"*" indicates factory defaults

6.6 INTERFACE CONTROL CODES

The following table lists the control codes sent to the printer to command various actions. Examples are also provided in a following section.

Host to Printer	
NUL	*Null.* Ignored.
CAN	*Hard Reset.* Clears the entire Receive Buffer and resets the printer.
STX	*Clear Print-Line Buffer.*
ESC @ *Clear All.*	Clear print buffer, resets all fonts and modes to default, ejects cut-form if present, returns the unit to journal mode.
ENQ	*Request Printer Status.* See notes.
ESC ACK	*Send ACK* after sequence is processed. See notes.
SYN	*Turn on Cut-Form LED. STX* will turn off LED if it was turned on by *SYN*. Note: *ETB* will also turn on LED.
ETB	*Set Multi-Line Validation Mode.* Must precede all print lines intended for multi-line validation.
FF	*Exit Multi-Line Validation Mode.* Ejects cut-form if present.
ETX	Same operation as *FF*.
CR	*Print Line.* If Auto-Linefeed mode is enabled, then the paper is fed 1 line. If DIP4=OFF, then an *ACK* is sent to the host.
LF	*Print & Feed Line.* Prints data and feeds paper 1 line.
VT	(Feed Journal.) Feeds journal roll past tear-bar.
SO	Selects Single-Wide pitch (cancels Double-Wide).
SI	Selects Double-Wide pitch.
GS	Selects Large Font.
FS	Selects Large Bold Font.
RS	Selects Standard Font.
US	Selects Standard Bold Font. *Obsolete: Do not use.*
DC3	Set "Packed Print Mode." See notes before using.
DC4	Reset "Packed Print Mode." See notes before using.
SUB	Set "Upside-Down Mode" printing.
EM	Reset "Upside-Down Mode" printing.
ESC T	Sets "Turbo" operating mode. Contact factory before using.
ESC R	Clears "Turbo" operating mode.
ESC n	All other escape sequences are ignored.

INTERFACE CONTROL CODES (continued)

Printer to Host	
ACK	*Acknowledge.* Sent in two cases:
	Sent after *CR* is processed. DIP4 must be OFF to enable this feature. If the Receive Buffer Option is present, this feature is disabled.
	Sent in response to the *ESC ACK* command. The *ACK* will be sent after the escape sequence is processed.
NAK	*Transmission error.* Host should send *CAN* and resend message. Not sent if unit has Receive Buffer Option.
inquiry responses	See table in next section.

Important Notes:

This set is preliminary only and not final.

6.7   ASCII Control Code Table

Refer to the following table for a listing of the ASCII control codes previously noted.

Code Symbol	Ctrl Char	Decimal Value	Hex Value	Code Symbol	Ctrl Char	Decimal Value	Hex Value
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:

Reset and Clear Commands

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 milli-seconds. 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 pre-set modes with the following exception: if Multi-Line validation mode is active, it remains active. These actions occur when *STX* is processed from the Receive Buffer, if present.

The *ESC @* clears the Print-Line Buffer, any selected fonts, any selected mode, ejects any cut-form if present, and returns the printer to journal mode. These actions occur when *ESC @* is processed from the Receive Buffer, if present.

Information Request Commands

The *ENQ* control code is sent as a single character. The IJ-3080'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 *ETB ESC ACK* is sent, the printer enters Multi-Line Validation mode, and will sent an *ACK* after a cut-form is inserted. This sequence has no use unless the Receive Buffer Option is included.

Validation Selection Commands

Before any printing can occur, the printer must first be put into the Multi-Line Validation Mode by sending the *ETB* command. If Multi-Line Validation Mode is not in effect, then the print line will be ignored.

Multi-Line Validation Mode is only exited when *FF* received. However, only the first 7 or 8 lines of text can be printed, and all remaining lines are ignored. Refer to a following section for important additional information.

Font and Pitch Selection Commands

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 mode.*

Operating Mode Commands

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 preferred on units without the Receive Buffer Option. This allows the printer to determine before the interface is turned off the line feeding requirements. Disable Auto-LineFeed mode if you need to overprint lines.

8 Host Status Request

Host may request status at any time by sending the single ASCII character *ENQ* (05h). The IJ-3080 will respond immediately with a single ASCII character specifying its status. This character carries "bit-specific" information. Consult the table below for each bit's meaning.

IJ-3080 Status Response

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

	Bit		Meaning
MSB	8	0	
	7	(BEMP)	*Receive Buffer Empty*
	6	1	*reserved*
	5	0	*reserved*
	4	0	*reserved*
	3	(VMP)	*Valid Operation Pending*
	2	(PRDY)	*Printer Ready*
LSB	1	(FORM)	*Form Inserted*

(BEMP)	*Buffer_Empty*	*=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.
(FORM)	*Form_Inserted*	*=1* If (A) the right or the left form sensors detect form, or (B) the printer has previously clamped the form and the left (top) sensor detects a form. *PRDY* contains additional information on form insertion., *=0* otherwise.
(PRDY)	*Printer_Ready*	*=1* if printer is ready and no error conditions are sensed, *=0* if an error condition: Jam, PowerLow, Improper cut-form insertion, others. If a cut-form is inserted, but covers only 1 of the 2 form sensors, *PRDY* is cleared. If cut-form validation is completed and cut-form needs to be removed, *PRDY* is cleared.
(VMP)	*Valid_Message_Pending*	*=1* if a valid message has been received and machine is performing an action or awaiting a form for printing. *=0* otherwise.

9   Validation of Forms

For the Model IJ-3080, there is only one method for validation:

Multi-Line Validation   The IJ-3080 prints by clamping the cut-form, moving the print-head horizontally during printing, and feeding the cut-form vertically to ready it for the next line of print.

Capacity: 7 Lines (8 if in PACK mode) of at most 42 characters per line.

Mode entered by control code *ETB*. Mode only exits by reception of control code *FF* or *ETX*.

For *Multi-Line Validations:*

If the capacity is exceeded (more than 8 lines sent), then any excess (the 9th line onwards) is ignored until the Multi-Line Validation Mode is quit via the *FF* command.

If the cut-form is removed during Multi-Line Validation, the printing mechanism will stop and abort the printing. It does this to prevent ink from being ejected into the printer.

After Multi-Line Validation is completed, the cut-form is returned to its original position and the clamp is opened to allow for removal of the cut-form. Operation can not continue until the cut-form is completely removed from the printer.

After 8 lines of Multi-Line Validation, the IJ-3080 will automatically return the cut-form to its original position and open the clamp so that the cut-form can be easily removed. However, the Multi-Line Validation Mode is not quit until the *FF* command is received.

The paper-feed button is operational during Multi-Line Validation.

10   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

Example #1: Multi-Line validation

Presuming Auto-Feed on CR Mode is On:

(ETB)

`This will be the 1st line of validation` *(CR)*

`This will be the 2nd line of validation` *(CR)*

`This will be the 3rd line of validation` *(CR)*

`This will be the 4th line of validation` *(CR)*

`This will be the 5th line of validation` *(CR)*

`This will be the 6th line of validation` *(CR)*

`This will be the 7th line of validation` *(CR)*

`This 8th line may or may not print` *(CR)*

`This 9th line will be ignored` *(CR)*

(FF)

and

(ETB)

`This will be the 1st of 2 validation lines` *(CR)*

`This will be the 2nd of 2 validation lines` *(CR)*

(FF)

Examples #3: 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) (PREFERRED)

`This will be the 1st line` *(CR)*

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

Examples #4: Inquiries

Host	Printer	Meaning
ENQ		
	62H	`Printer Ready, No Form, Not awaiting Form`

ENQ		
	63H	`Printer Ready, Form Inserted, Not awaiting Form`

ENQ		
	61H	`Printer Not Ready, Form Inserted, Form needs removal or adjustment`

Printer responses are bit specific, refer to previous section.

Examples #5: Monitoring Cut-Form Validation

Host	Printer	Notes
ETB		`Prompt Operator to insert cut-form`
Turns off interface (computer's CTS)		
		`Operator inserts cut-form`
Turns on interface after clamping cut-form		
Send print data		
FF		`Eject Form`

Host	Printer	Notes
SYN		`Prompt Operator to insert cut-form`
ENQ		`Query printer until form inserted`
	62H	`Printer Ready, No Form`

ENQ		
	63H	`Printer Ready, Form Inserted`

ETB		`Enter validation mode`
Send print data		
FF		`Eject Form`

Examples #6: Monitoring Cut-Form Validation with Receive Buffer Option

These steps are optional and only purposeful if the Receive Buffer Option is included.

Host	Printer	Notes
ETB		`Prompt Operator to insert cut-form`
		`Wait for cut-form insertion`
ENQ		
	62H	`Printer Ready, No Form`

ENQ		
	61H	`Printer Ready, Form Inserted`
Send print data		
FF		`Eject Form`

Host	Printer	Notes
ETB ESC ACK		Prompt Operator to insert cut-form
	ACK	ACK response after form inserted
Send print data		
FF		Eject Form

Host	Printer	Notes
ETB		Prompt Operator to insert cut-form
Send print data		
FF		Eject Form
ENQ		
	23H	Buffer not empty, printing in progress...

ENQ		
	62H	Buffer empty, printing complete...

Host	Printer	Notes
ENQ		
	23H	Buffer not empty, printing in progress...

ENQ		
	62H	Buffer empty, printing complete...
ETB		Prompt Operator to insert cut-form)
Send print data		
FF		Eject Form

11 Revision Information

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

- 86475-2 Rev 2 and above
- 86475-4 Rev 2 and above
- 86475-12 Rev 2 and above

Specification 5 changes concern:

- Model number changed.

Specification 4 changes concern:

- Auto-LineFeed on *CR* mode made DIP Switch Selectable. (Was always enabled).
- *CR* and *LF* changed with Auto-LineFeed mode.
- *VT* command added. Feeds past tear-bar.
- *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.)

Specification 3 changes concern:

- Mechanical Specifications and capacities.