- - Preliminary - -

IJ101

Ink-Jet Controller PCA

Specification

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Revisions:

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1 Overview and General Description

This document provides the electrical, mechanical, and interface specifications for the model IJ101 Print-head controller.

1.1 General Description

The IJ101 Ink-jet Print-head controller is a circuit board which implements hardware and algorithms used for the simple validation printing using the HP 51604A print-head. The unit is composed of the following items:

- IJ101 Print-head controller PCA

This is the controller that is used in the Addmaster IJ-1000 Ink-jet Validation Printer. Consult the IJ-1000 Specification for additional details of operation.

The Controller includes these features:

- Microprocessor controlled operation
- Optosensor interface to paper sensors
- Asynchronous serial interface
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The Controller requires the following items, which are not included, to be fully functional:

- Power supply
- Interface and control

The IJ101 can be identified as follows:

- Part Number appears as 71342-1.
- Firmware version and revision are noted by a label affixed to the bottom side of the board.

2 Features and Specifications

2.1 Printing Specifications

See IJ-1000 Specification.

2.2 Mechanical Specifications

Item	Specification
Dimensions	
Width	8.75 inches
Depth	1 inch approximately. Not specified.
Height	1.625 inches
Operating Environment	
Temperature	10 -> 40 C
Humidity	10 -> 90% RH (non-condensing)

2.3 Power Requirements

Item	Specification
Power Supply	
Voltage #1	+12.00 Volts DC
Regulation	+/- 4.0V
Current	60 mA maximum
Voltage #2	+30.00 Volts DC
Regulation	+/- 4.0V
Current	100 mA maximum

The Controller board can also be powered by a transformer coupled AC power supply. This method requires a center-tapped transformer. Consult the circuit schematic for proper usuage.

2.4 Controller PCA Wiring Connections

2.4.1 Required Connections:

The following connections must be made to the Controller Board.

Reference	*Use*
J1	Serial data link to Host
J2	Connects Ink-jet Print-head
J3	Power connection
J4	*Paper Inserted* sensor connection
J6	*Paper at Print-Head* sensor connection
J7	LED indicator (optional connection)

2.4.2 Interface Connector -- Print-Head:

Name	Print-Head Connector
Usage	Connects Ink-jet Print-head
Type	13-Pin
Location	J2
Mates to:	Addmaster cable to Ink-jet Print-head holder

2.4.3 Interface Connector -- Host Interface:

Name	Host Interface Connector
Usage	Implement Serial Host Interface
Type	RJ-45
Location	J1
Mates to:	Addmaster Cable 95078 (cable to DB9 style PC compatible serial port).

2.4.4 Interface Connector -- Power:

Name	Power Connector
Usage	Connects controller to power supply. May either connect to AC or DC supply.
Type	3-Pin
Location	J3
Mates to:	Molex. Style: T.B.D.

For DC Supply Connections:

Pin	*Name*	*Usage*
1	GND	Power and Logic Ground
2	VPWR1	+12VDC Power Source
3	VPWR2	+30VDC Power Source

For AC Supply (Transformer) Connections:

Pin	*Name*	*Usage*
1	V+	24V rms with respect to V-
2	V0	Center Tap
3	V-	

AC supply connections require center-tapped transformer.

2.4.5 Interface Connector -- Sensors:

Name	Paper Sensor Connectors
Usage	Connects controller to optical paper sensors
Type	4-Pin
Location	J4 and J6
Mates to:	Molex. Style: T.B.D.
Usage:	J6 = *Paper Inserted* Sensor J4 = *Paper at Print-head* Sensor

Pin	*Name*	*Usage*
1	VLED	+12V Power Source, through 750 Ohm resistor
2	GND	Power Ground
3	GND	Logic Ground
4	VSENSE	Active low logic. Logic Low = Paper *sensed* Logic High = Paper *not sensed*

Signals	Specification
Logic	Standard HCMOS Levels
V (in) Max.	5.0 V
V (in) Min.	0.0 V
Input Buffer	80C51 Port Pin 80C51 has a complicated pull-up structure. Consult manual for exact specification. Approximate as a 10K Ohm pull-up resistor across full voltage swing.

These connectors are designed to drive typical opto-sensors with approximately 20mA of current. Recommended series of opto-sensors is Optek OPB-708 line.

2.4.6 Operator Indicators:

A single LED is included to give an indication of the present state of the machine. This LED is driven on J7 with approximately 20mA of current.

State	*Meaning*
ON	Controller has data. Awaiting Form.
FLASH	Fault condition
OFF	Controller is idle.

2.5 Serial Interface and Control Signals

2.5.1 Serial Communications:

Communications are bi-directional using asynchronous serial protocol with the following parameters as default.

Item	*Setting*
Data Rate	1200 baud
Data Bits	8
Stop Bits	1
Parity	None
Handshaking	None
Voltage Levels	RS-232C levels -5-10V = low, 5-10V = high

2.5.2 DIP Switches and Configuration:

DIP Sw. 2	*DIP Sw. 1*	*Baud Rate Setting*	
OFF	OFF	9600	
OFF	ON	4800	
ON	OFF	2400	
ON	ON	1200	Default

DIP Switch	*Setting*	*Usage*	
3	ON	8 Data Bits, No Parity	Default
	OFF	7 Data Bits, 1 Parity Bit	
4	ON	Odd Parity (if used)	
	OFF	Even Parity (if used)	Default

Important Notes:

- Do not use DIP Switches 5 through 8. These are for factory use only.
- Do not use Jumper JP1. It is for factory use only.

2.6 Data Stream & Command Set

An overview of the supported interface commands is given below. Commands are issued from Host to Decoder. The Controller only responds to commands and does not initiate any communications.

Type	*Sequence*	*Function*
RESETS		
	CAN	Reset. Hard power-on reset, at receive level.
PRINTING		
	CR	Carriage Return. Print and no-feed.
PRINT MEDIA SELECTION		
	DC1	Validate two forms. (Obsolete).
FONTS & PITCH		
	SO	Selects Single-Wide pitch (cancels Double-Wide).
	SI	Selects Double-Wide pitch.
	GS	Selects Large Font.
	FS	Selects Large Bold Font.
STATUS INDICATIONS		
	ENQ	Send printer status, immediate.

Detail on each of the supported commands follows in this section. The commands are grouped according to function. A table listing the Hex and Decimal values of each of the codes is provided.

CAN	Reset. Hard reset, at receive level.

This command will clear out the Receive Buffer, reset any modes, fonts, and other settings to the default values, and re-initialize the interface.

This command basically emulates a Power-On Reset. It is acted upon as soon as it is received, even if the Receive Buffer contains unprocessed data. Use this command only when needed -- at Host driver power on, error condition clearing, etc.

This command also resets the Printer Initialized bit (PINIT).

See also the *ESC* @ command.

Syntax: 17H

CR	Carriage Return. Print and no line feed.

Any data previously received is printed. The paper is not fed in typical usage. If Auto-LF on *CR* mode is set by DIP switch, then the paper is fed 1 line.

Syntax: 0DH

DC1	Double Validation Mode. (Obsolete)

Printer will validate the data on two different forms. Both forms should be inserted at the same time. Two Form LED's will be illuminated and printer halts awaiting the Forms to be inserted before proceeding. This command requires a double validation mechanism which is now obsolete.

Syntax: 11H

GS	Selects Large Font.
FS	Selects Large Bold Font.

Syntax: 1DH (GS), 1CH (FS),

SO	Selects Single Wide pitch
SI	Selects Double Wide pitch.

Selects or De-selection double-wide printing. Double-wide printing will resets to single-side at the end of each line.

Syntax: 0EH (SO) 0FH (SI)

a-z	Character Set

The following table lists potential control codes and their Hex values.

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
20	sp	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•

Character Set Notes:

- 64 character ASCII supported.
- Lower case characters ‘a’ through ‘z’ will print as ‘A’ through ‘Z’.
- Host controller can send both upper and lower case characters.

ENQ	Send Printer Status, immediate.

The printer will respond to this command immediately after receiving it. Command is operational only for units with the serial interface.

Syntax: 05H

Response Format Bit-map:

Bit	*Name*		*Usage & Meaning*
7	*Reserved*	0	Always 0
6	*Reserved*	1	Always 1
5	*Reserved*	1	Always 1
4	*LMPS*		Last Message Printed Status
		=1	• Last printing occurred without error.
		=0	• Last printing encountered an error.
3	*LMP*		Last Message Printed
		=1	• Last message sent to printer was printed.
		=0	• Last message sent to printer was canceled or overwritten.
2	*VMP*		Used to determine if machine is process of performing a mechanical task that may take an indeterminate amount of time
		=1	• if a valid message has been received and machine is performing an action or printing a line.
		=0	• otherwise.
1	*PRDY*		Used to determine if printer can print
		=1	• if printer is ready and no error conditions are sensed,
		=0	• if printer not ready because: (1) Form improperly inserted, (2) Paper-Out, (3) printhead in loading zone, (4) printhead jam.
0	*FORM*		Used to determine if Form is inserted into Validation Mechanism
		=1	• FORM is detected
		=0	• no FORM detected

2.7 Printing & Control Procedures

2.7.1 Printing Procedure:

The Host follows this procedure to cause the controller to print 1 line.

1. Host sends print-line, terminated with a *CR*.
2. Host mechanism moves document into position. The ***Paper Inserted*** sensor reads document inserted. Host may assert this line in any appropriate manner.
3. Mechanism begins moving document at scan rate.
4. When document is under print-head at scan rate the ***Paper At Print-head*** sensor signal line is asserted, either by an opto-sensor or logic interface.
5. Controller begins printing approximately 50ms after ***Paper At Print-head*** is asserted.
6. When document has left the print-head, sensors or host de-asserts the both signals.
7. Controller immediately stops printing, if it has not already done so.

2.7.2 Printing Timing Requirements:

Printing begins after the assertion of the ***Paper at Print-head*** sensor input. Printing begins approximately 50ms after this assertion. Dot columns are fire at a frequency of 1200 Hz. The horizontal spacing between dots is dependent upon the scan rate of the head, which is user dependent.

Print Capabilities and Capacities	
Printer Speed	
Dot Column Firing Rate	1200 Hz
Print Throughput	100 (char/sec) = 1200 (Hz) / 12 (dots / char)
Printer Resolutions	
Resolution (vertical)	96 dpi
Resolution (horizontal)	Determined by application. Dependent on scan rate.
Character Matrix	10 dots horizontal by 12 dots vertical
Inter-character Spacing	2 dots

3 Required Auxiliary Components

3.1 Ink-Jet Print-Head

This item is not supplied with the controller board.

Manufacturer: Hewlett-Packard
Part Number: 51604A

3.2 Print-Head Holder Assembly

This item is not supplied with the Controller board. The Holder assembly secures the print-head and provides the electrical connectors to the controller.

Manufacturer: Addmaster Corporation
Part Number: 95677-1

4 Document Revision Information

Revision	*Date*	*Changes*
1.0	01-15-01	Initial release.