Functional Overview 10

Introduction

This Chapter contains a simplified description of the HP DesignJet 5000/5000PS Printer.

In total there are 4 Models with the following Part Numbers:

Model	HP DesignJet 5000		HP DesignJet 5000PS	
Size	42"	60"	42"	60"
Part No.	C6090A	C6095A	C6091A	C6096A

Electrical System

The electrical system of the Printer consists of six major blocks and their associated cabling:

- Power Supply Unit: Connected to the mains supply of whichever country this block provides 24V, 5V, 3.3V and -15V to the rest of the electrical system. It has a soft power switching feature allowing the firmware to control when power is removed from the system, and eliminates the need for high tension cables to the front panel.
- Main Electronics: This block contains the I/O, central processing units and controls most of the motors and sensors in the printer. The motors and sensors themselves are located throughout the printer and are connected to the main electronics via cables.
- Carriage: Connected to the Printheads, this block supplies power to them, as well as monitoring and protecting them from damage. It also has the ability to control warming and to perform continuity checking, as well as controlling the Line Sensor. The Carriage Encoder is also located in this block.
- Ink Supply Station: The Ink Supply Station is connected to the Ink Cartridge supplies, and controls air pressure (pump, sensor and valve), as well as monitoring ink levels and the supply latch sensor.
- Service Station: Contains the electronics needed to perform drop detection, a DC motor/encoder for capping, wiping and spitting and a stepper motor for priming.
- Front Panel: is the user interface. It consists of an LCD display, a key panel and four LEDs.

Front Panel

The Front Panel is used to display messages, configure the Printer and send commands to the Printer via the keys.

The display is a 128 x 64 pixel graphic LCD and can display both text and graphics at the same time. The display has an LED backlight to improve its viewing characteristics. The contrast of the LCD can also be adjusted.

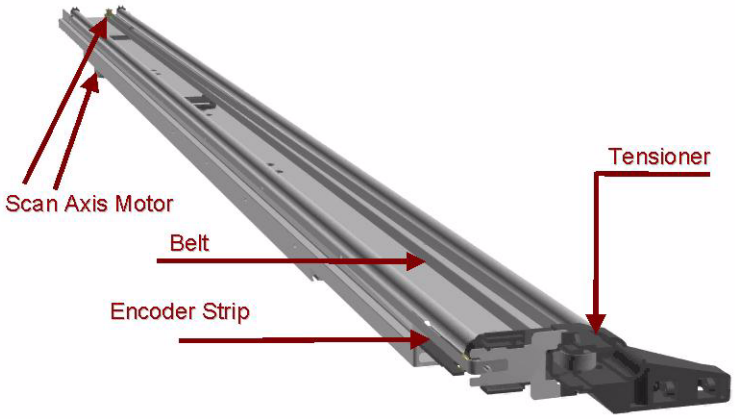
The navigation and command keys are distributed in three groups:

- 1 key at the bottom left corner is used to select the **Print Quality** (**Max. Quality**, **Productivity** or **Max. Speed**). The LEDs on top of the key show the selected option.
- 2 keys at the top left part are used to send commands directly to the printer: **Cancel** and **Load/Unload Media**.
- 5 keys to the right of the display are used to navigate through the menus: **Back**, **Enter**, **Up**, **Down** and **Menu**. (You can print a demo plot called Menu to get the complete menu tree).
- 1 key on the upper right corner is used to set the Printer to Standby mode.

Scan Axis

The Scan Axis determines the Carriage's motion and its position with respect to the media. Its main parts are:

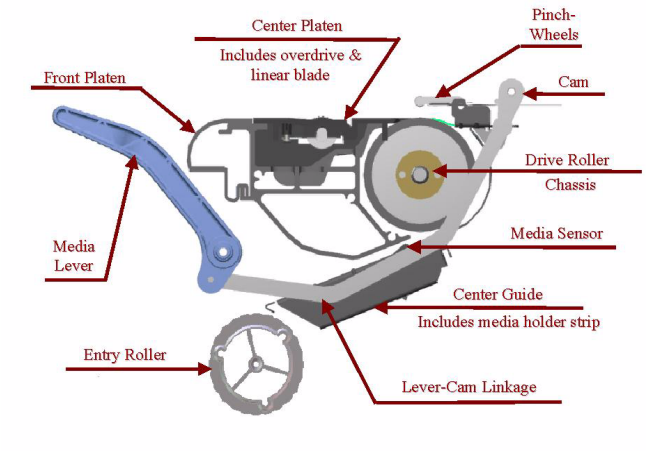
- Scan-Axis Motor - drives the Carriage using the Belt.
- Tensioner - maintains the tension of the Belt.
- Encoder Strip - determines the position of the Carriage using the LED Sensor on the Carriage PCA.



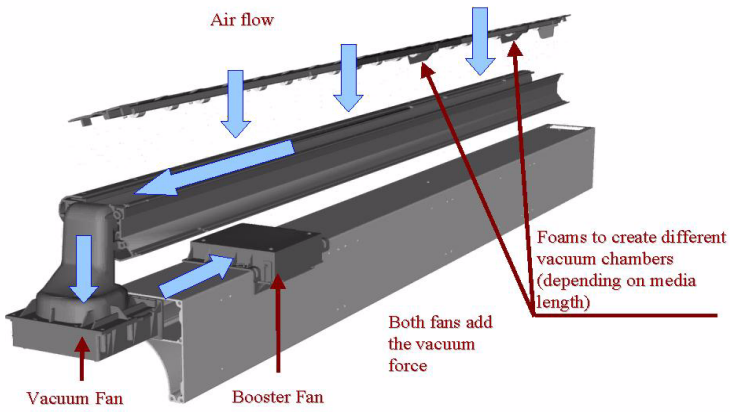
Paper Axis

The Paper Axis determines the motion of the media through the printer. Its main parts are:

- Paper-Axis Motor - provides traction to the Overdrive.
- Center Platen and Overdrive - controls the printing path and expansion of the media.
- Pinch-wheels and Lever - “captures” the media and provides added friction.
- Center Guide and Entry Roller - feeds media through the paper path.
- Vacuum Fans - provides the required vacuum to maintain the media flat over the Center Platen.



The diagram below illustrates the air flow created by the Vacuum Fans.



Ink Delivery System (IDS)

The Ink Delivery System (IDS) delivers ink under pressure from the large capacity off-axis Ink Cartridges via permanently connected tubes to the high throughput Printheads.

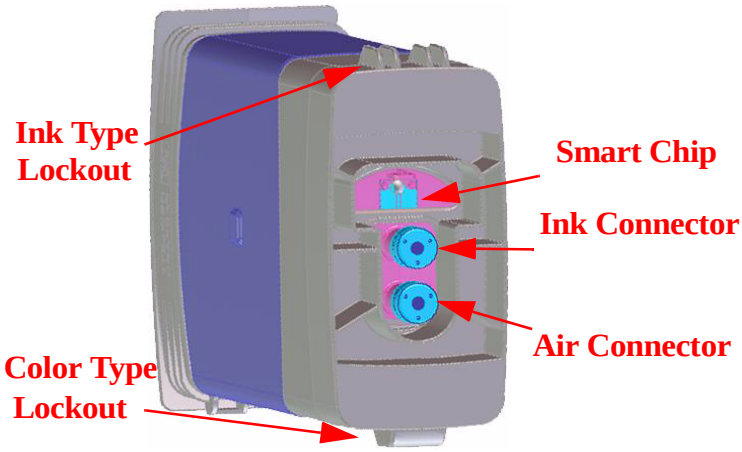
The IDS consists of six major subsystems:

- The Ink Cartridges.
- The Ink Supply Station (ISS).
- The Tubes System.
- The Printheads.
- The Air Pressurization System (APS).
- The Leak Detect System (LDS).

Ink Cartridge

The HP No.81 Ink Cartridges for the HP DesignJet 5000 Series deliver 680 cc of ink. Residual ink in the Ink Cartridge is required to avoid starvation in the Ink System, that could cause damage to components. Ink Cartridges are designed with:

- Smart chip storing Ink Cartridge information.
- Ink connector to deliver ink to the Ink Tubes.
- Air connector that forces ink out of the Ink Cartridge.
- Ink Type lockouts that avoid Ink Cartridges with the wrong type of ink being installed in the Ink Supply Station.
- Color lockouts allowing insertion of only one color in a given slot.



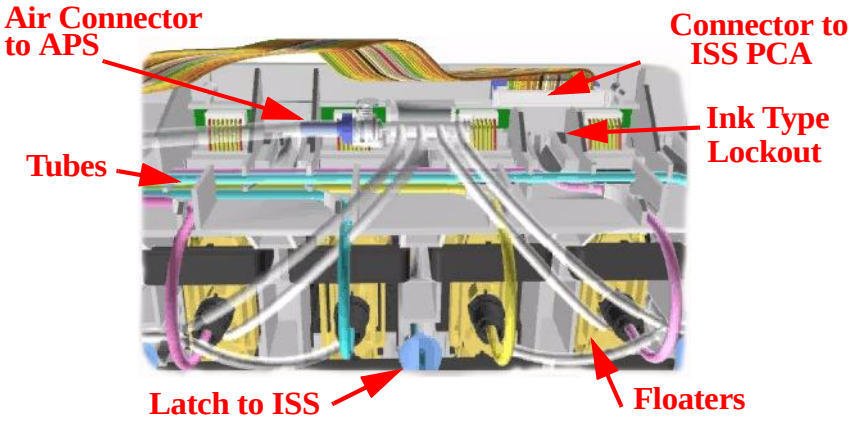
Ink Supply Station (ISS)

In the Printer, the Ink Cartridges reside inside the Ink Supply Station (ISS). This module is situated on the left side of the machine.

The ISS includes the plastic housing that surrounds the supplies, the latch mechanism, and the fluid and electrical connections to the Ink Cartridges. It also supports the Air Pressure System (APS) that forms a replaceable module clipped under the ISS.

These are the key functions of the ISS:

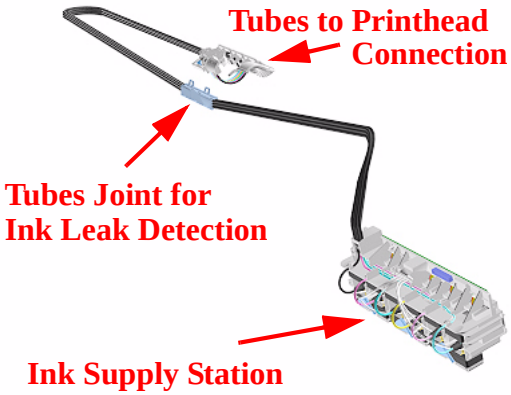
- Ink Cartridges support and location.
- Limit creep of cartridge side walls.
- Avoid incorrect insertion of colors and inks.
- Contain ink from leaks.
- Support the Air Pressurization System (APS).



Tubes System

The Tubes System is the assembly that performs these functions:

- Conduct the ink pumped from the Ink Cartridge to the Printhead.
- Conduct the air from the pump into the Ink Cartridge.
- Keep the ink in good condition until it is delivered to the Printhead.
- Avoid leaks and minimize ink on customer.



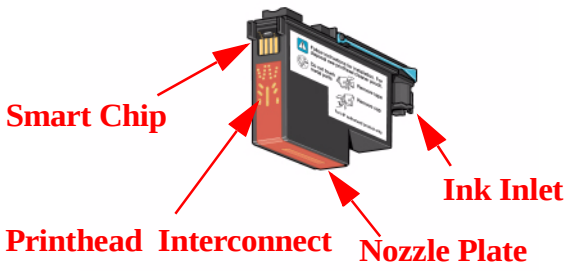
The Tubes move back and forth inside the volume defined by the Tube Guides. The Tube Guides are a pair of sheet metal parts with opposing U-shaped profiles.

The Tubes are threaded inside a protective extrusion called the Tube Carrier which consists of a base material that provides the structure of the part, and a resistant outer part protecting the structure.

Printheads

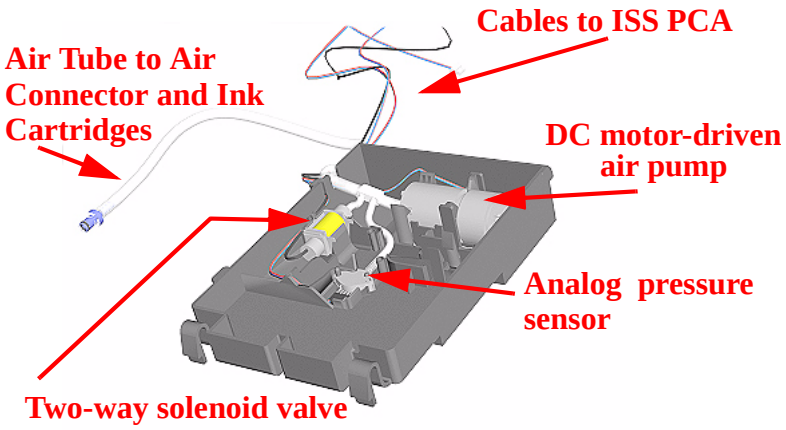
The Printheads are high precision devices that place the ink on the media. The Printheads are designed with:

- Smart chip storing Printhead information.
- Ink inlet to receive ink from the Tubes.
- Nozzle plate with 512 Nozzles to deliver ink on to the media.
- Ink Type lockouts that avoid Printheads of the wrong type (Setup Printheads or Ink type) being installed in the Carriage.
- Color lockouts that will allow only one color to be inserted into a given slot.



Air Pressurization System (APS)

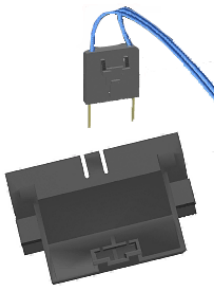
The APS is the system that provides and controls the pressurization of the ink in the Ink Cartridges and is located under the ISS. The key purpose of this system is to ensure the minimum required ink pressure at the inlet to each Printhead respectively at the required print rates. The APS is also used to provide pressure for tube purge and as part of the blow prime system operation.



The APS pressurizes the ink in the Ink Cartridge bags by pressurizing the air around them. The Printer controls the air pressure using the pump with feedback from the sensor; when required the valve is opened to depressurize the air circuit. This allows control of the ink pressure at the inlet to the Printheads.

Leak Detect System (LDS)

The purpose of the Leak Detect System (LDS) is to detect the breakage of any of the Tubes that deliver ink from the Ink Cartridges to the Printheads.



If a Tube breaks, as the system is pressurized, the ink flows through the breakage and gets between the Tube and the Tube Carrier, and is forced to go to the Ink Leak Detector where the leaking ink is collected. There will be a potential short circuit between the two metallic pins, and the ink leak will be detected.

Service Station

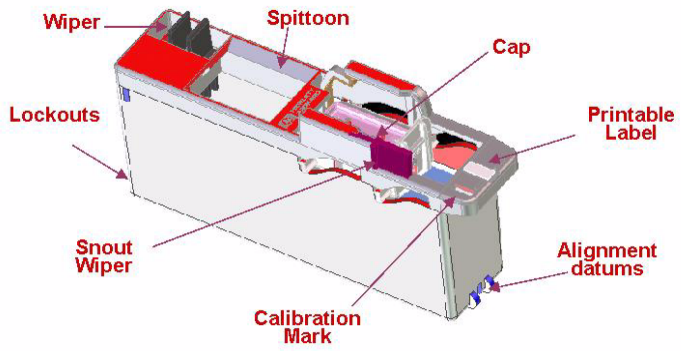
The Service Station consists of a linear motion mechanism with a chassis containing one PrintHead Cleaner (PHC) for each printhead. Attached to the Service Station chassis, one optical drop detector provides nozzle check functionality.

Print Head Cleaner (PHC)

The PHC case is the main structural part of the replacement module. It is the part that the customer handles and contains the other sub-components:

- Wiper to remove ink residue and external debris from the Printhead.
- Spittoon to receive ink from the firing Printheads when the nozzles are cleared of viscous plugs and any loose debris.
- Cap to prevent the Printhead nozzles from drying out while the Printer is idle.
- Handle and Printable Label to remove and install the PHC. Also, the printer uses the handle top surface to recognize if the PHC is present or not.

In addition, there is a built-in mark on the handle (a vertical hole) to calibrate the Service Station (Scan-axis) if there is a problem and the EEROM is erased.



Printer Specifications

Functional Specifications				
HP No.81 Supplies	Six colors: cyan, light cyan, magenta, light magenta yellow and black.			
	Printheads: 15.0 kHz	Cyan, light cyan, magenta, light magenta, yellow and black.		
	Printhead Cleaners:	Cyan, light cyan, magenta, light magenta, yellow and black.		
	Ink Cartridges:	Cyan, light cyan, magenta, light magenta, yellow and black each delivering 680cc of ink		
Media sizes	Width (carriage axis)		Length (paper axis)	
	Minimum	Maximum	Minimum	Maximum
Roll	610mm	60 inch/1.52m 42 inch 1.07m	N/A	300ft with light coated media
Sheet	210 mm	E/A0	594mm/22in	1.6m
HP Supported Medias				
For the supported medias for HP DesignJets 5000 and 5000PS, refer to Media Types, page 7-53. From time to time, new paper types may become available. For up-to-date information, please contact our web site www.designjet.hp.com				
	Print Mode	Default	Enhanced Resolution	
Print resolution	Max. Speed Productivity Max. Quality	300 x 300dpi. 600 x 600 dpi. 600 x 600 dpi	600 x 600 600 x 600 1200 x 600 dpi (Glossy media)	
	Roll (normal)	Sheet (normal)	Roll (Extended)	Sheet (Extended)
Margins (with continuous runs, you can reduce the 35mm margins)	Side Margins 7mm Leading edge Margin 35mm Trailing Edge Margin 7mm	Side Margins 7mm Leading edge Margin 35mm Trailing Edge Margin 17mm	Side Margins 15mm Leading edge Margin 15mm Trailing Edge Margin 35mm	Side Margins 15mm Leading edge Margin 35mm Trailing Edge Margin 17mm
Programming languages supported	HP-GL/2 (with kanji level 1 and 2 character sets HP-RTL PJL, PML Adobe PostScript 3 (supports Asian fonts) - Only available on the DesignJet 5000PS			
Accuracy	0.2% of the specified vector length in Max. Quality or Productivity with HP Glossy Media.			

Physical Specifications (with Ink installed or Media loaded)				
Type	Weight	Length	Depth	Height
RTL 42inch /1.07m size printer	100kg	1975mm	675mm	1280mm
60 inch/1.52m size printer	120kg	2433mm	675mm	1280mm

Memory Specifications			
Model	5000	5000PS	
42 inch	128 Mbyte	128 Mbyte	5 Gb Hard Disk
60 inch	128 Mbyte	192 Mbyte	20 Gb Hard Disk

Printer Power Specifications	
Source	100-240 V ac ±10% autoranging
Frequency	50-60 Hz
Current	3 amp maximum.
Consumption	350 watts maximum.

Ecological Specifications	
Energy efficiency	Compliant with Energy Star Program EPA (US).
Manufacturing process	Free of ozone-depleting chemicals (Montreal Protocol).
Plastics	Free of brominated flame retardants (PBB and PBDE). All housing parts made of the same material: ABS. Parts marked according to ISO 11469 standard.
Metals	Enclosures made of electro-galvanized steel sheet.
Packaging	Cardboard (non-chlorine-bleached) and foam are 100% recyclable. Inks used for printing do not contain heavy metals.
Batteries	Not used.
Recyclability	Modular construction screws easy to find and disassembly done using universal tools.

Environmental Specifications		
Printer Operating Ranges	Printing:	15°C to 35°C (59° F to 95° F) RH 20% to 80%.
Media Operating Ranges	Optimal print quality with HP Glossy Media	15°C to 30°C (59° F to 86° F) RH 20% to 70%.
	Optimal print quality for other HP Media	15°C to 30°C (59° F to 86° F) RH 20% to 80%.
Non Operating Ranges	-20°C to 55°C (-4° F to 131° F)	

NOTE **If the printer temperature falls below its minimum operating temperature it may stop to protect its ink systems.**

NOTE **At 3000m altitude the printer may have operational problems.**

Acoustic Specifications	
Operating sound pressure	55 dB (A) (From a one-meter bystander position)
Idle sound pressure	<35dB (A) (From a one-meter bystander position)
Operating sound power	70 dB(A)
Idle sound power	<48dB (A)

EMC (ElectroMagnetic Compatibility) Specifications	
Canada	Canadian Department of Communications, Radio Interference Regulations Class B[1] compliant.
European Union	89/336/EEC EMC Directive compliant. Meets EN 55022 Class B[1] emission limits, prEN 55024-2 ESD, prEN55024-3 Radiated Immunity, prEN 55024-4 Fast Transients.
Japan	Registered VCCI Class B[1].
Korea	RRL certified.
South Africa	SABS licensed.
USA	Federal Communications Commission Rules. Class B[1] computing device. CFR 47 Part 15
Australia **New Zealand**	Meets AS/NZS 3548
Taiwan	BCIQ certified

[1] Product exhibits Class A operation when connected to LAN cables using Print Server accessories

Printer Safety Specifications	
Information Technology Equipment (ITE), Movable, Class I, Plugable Type A, Installation Category II, Pollution Degree 2, For indoor controlled office environments use.	
Canada & USA	Canadian Standards Association “Certified” for USA & Canada
European Union	Low Voltage Directive compliant.
Mexico	NOM-1-NYCE
Argentina	IRAM
China	CCIB and CCEE certified
Singapore	PSB, SS337 certified.
Poland	PCBC certified.
Russia	GOST certified.

Printable Area

Printable area=media size minus normal margins		Printing Area (Width x Height) by Orientation of Image			
Media Size		**landscape (inches)**	**portrait (inches)**	**landscape (mm)**	**portrait (mm)**
ANSI media	**C** **D** **E**	**21.46 x 15.36** **33.46 x 20.36** **43.46 x 32.36**	**16.46 x 20.36** **21.46 x 32.36** **33.46 x 42.36**	**545 x 390** **845 x 517** **1100 x 821**	**241 x 517** **545 x 821** **850 x 517**
ISO media	**A2** **A1** **A0**	**22.86 x 14.86** **32.56 x 21.76** **46.26 x 31.46**	**15.96 x 21.76** **22.86 x 31.46** **32.56 x 45.16**	**580 x 377** **827 x 552** **1175 x 799**	**405 x 553** **580 x 799** **827 x 1147**

Interface Specifications

For specifications of the HP JetDirect Print Server (Network Interface), see the JetDirect Print Server documentation supplied with the Print Server Interface or consult your dealer.

NOTE **Printing using the Parallel Cable is not recommended.**

Parallel (IEEE-1284 compatible/Centronics) Interface			
The connector on the printer is 36-pin female. **Most existing parallel cables support IEEE-1284 compatible communication, but for use with this printer, the cable must meet the specification in this table.**	**Pin**	**Wire/Signal Name**	**Source**
	1	**Strobe**	**computer**
	2 … 9	**D0 … D7 (data lines)**	**both**
	10	**Ack**	**printer**
	11	**Busy**	**printer**
	12	**PError**	**printer**
	13	**Select (SelectOut)**	**printer**
	14	**AutoFd**	**computer**
	16	**GND**	
	19 … 30	**GND**	
	31	**Init**	**computer**
	32	**Fault**	**printer**
	36	**SelectIn**	**computer**

The following cable is recommended for optimum performance and electromagnetic compatibility:

Recommended Cable for PCs and Unix Systems			
Interface type (Computer)	**HP part number**	**Cable length**	**Connector type at computer end of cable**
IEEE compatible/Centronics Interface (All)	C2951A	3.0 m	25-pin male