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Print Quality

Print Quality Troubleshooting Checklist

When faced with a Print Quality problem, use the following checklist as a guide in troubleshooting the problem:

- 1 Problem reproduction
 - Reproduce the problem that the customer is seeing using their original settings.
- 2 Printer configuration:
 - Print Mode: Set to "Max. Quality" (in the Printer and in the driver).
 - Dry time: Set to "Automatic".
 - Select the correct media setting when loading the media.
- 3 Hardware check list
 - Firmware Revision
 - Check if the latest version of the Firmware is installed. If not Install the latest Firmware revision ⇒ Page 9-12.
- 4 Printheads
 - Printhead Troubleshooting Process:
 - Check the Printhead status in the front-panel.
 - If (xxxx)REPLACE is displayed, the faulty Printhead must be replaced.
 - If the (xxxx)RECOVER is displayed recover the Printhead ⇒ Page 6-15.
 - If you don't have any samples yet, reproduce the original problem with the correct Printer settings.
 - Print the Diagnostic Print (See Page 6-5) using the exact settings and Media that the Customer used when faced with the Print Quality problem.
 - Printhead Alignment and Check:
 - Perform the "Printhead Alignment" from the Printer Setup menu / Utilities/Calibrations/Printhead Alignment, using the same media with which you were experiencing problems.
- 5 Media
 - Make sure that you use HP or HP-approved media.
 - Store media according to its Environmental Specifications.
 - Select the correct media type through the Front Panel when loading it.

6 Driver print quality configuration:

To clarify if the reason of the problem is related with the print mode defined with the Non-HP Driver try the following:

- Print the same sample using the Non-HP driver and their normal media.
- Print one of the internal demos or Diagnostic Print using HP Media and configuring the Printer as indicated previously.
- If the output obtained using the HP Solution is good and the one obtained through the 3rd party solution is bad, HP support organization should communicate to the customer that the problem is not in the Printer and that they should address it through the 3rd party vendor support structure.

7 Service Accuracy Calibration

- Perform the “Service Accuracy calibration” using HP High-Gloss Photo Paper ⇒ Page 5-14.

WARNING

Do NOT use any other type of media apart from HP High Gloss Photo Paper when performing the Service Accuracy Calibration.

Print Modes

The Printers have a large number of print modes. A print mode specifies how to interpret and put on media a set of bitmap planes, each of which consists of a sequence of rows. Each mode corresponds to a unique combination of the following parameters:

- Print resolution (300 dpi, 600 dpi, 1200 x 600 with Enhanced Resolution on Glossy Media).
- Number of passes per advance.
- Number of advances per swath.
- Print direction.
- Carriage speed.
- Print masks.
- Servicing states.

User input to print mode selection consists of the following:

- Choice of media type.
- Choice of print mode setting (Max. Speed, Productivity, Max. Quality).
- Enhanced resolution On or Off.
- The language in which the file is received.
- The model of Printer used.
- The type of driver (HP or Non-HP).

How to Use the Diagnostic Print

What is the Diagnostic Print?

The Printer contains an internal Diagnostic Print to help you diagnose the possible source of any print quality defects. The Diagnostic Print is divided into five numbered parts:

- 1 Primary colors specifically designed to diagnose banding problems.
- 2 Color to color alignment.
- 3 Bidirectional alignment to check alignment when printing bidirectionally.
- 4 Vertical line straightness.
- 5 Nozzle print test to check each Printhead nozzle in a Printhead.

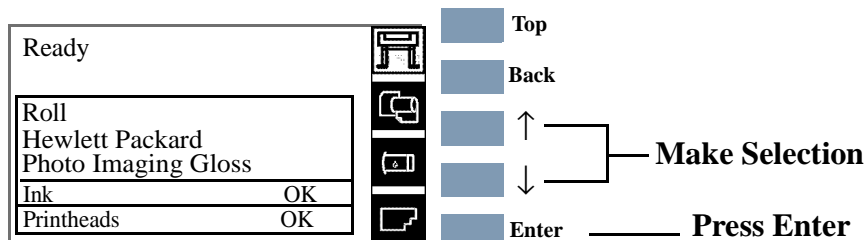
Considerations for Printing the Diagnostic Print.

- 1 The Diagnostic Print requires A2 or C size media so you must have media loaded (roll or sheet) that is this size or larger.
- 2 Use the same type of media that the customer was using when they experienced the print quality problem.
- 3 Use the same print mode the customer was using when they experienced the print quality problem.
- 4 If the customer is using non-HP media and after the Diagnostic Print you still have the same print quality problems, change to genuine HP media and repeat the Diagnostic Print.
- 5 Study each of the test patterns in the order that they are shown i.e. 1 through 5.
- 6 If you do not see any problems with the Diagnostic Print, then the problem may not be with the Printer itself. The problem may be with the RIP or the driver for example.

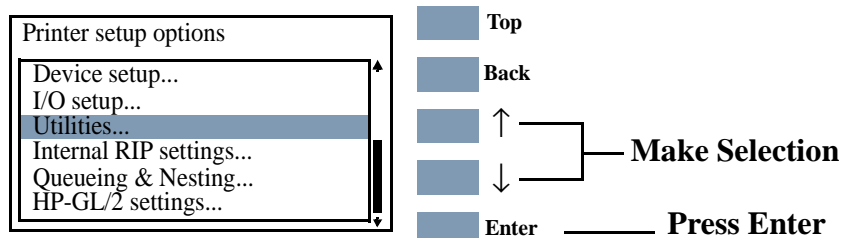
However if you do see problems with the Diagnostic Print then continue with the following procedures which will help you to diagnose the problem.

Printing the Diagnostic Print

- 1 Once the message “Ready” is displayed on the Front Panel, scroll to the “Printer Setup Options” icon and press the **Enter** key.

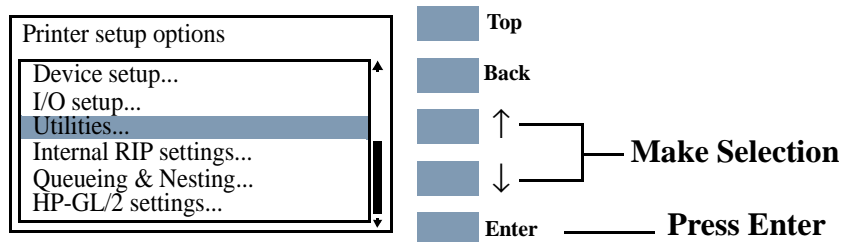


- 2 Once inside the “Printer Setup Options” menu, use the **Arrow** keys to scroll to the “Utilities” menu and press the **Enter** key.

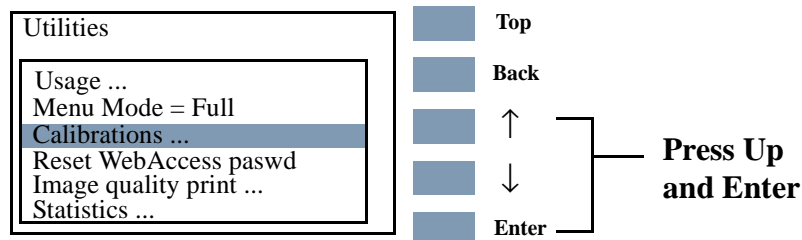


For On-Site Engineers accessing the complete list of Service Utilities

- a Once inside the “Printer Setup Options” menu, use the **Arrow** keys to scroll to the “Utilities” menu and press the **Enter** key.



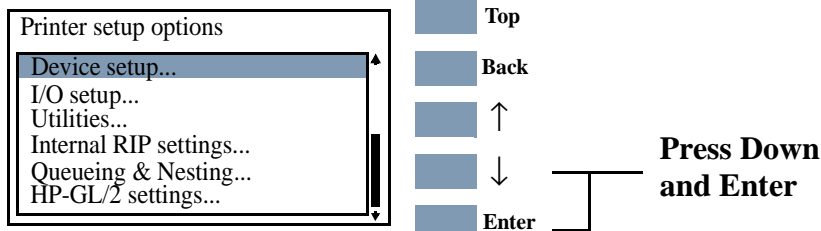
- b Once inside the “Utilities” Menu, press the following key combination to access the complete list of Service Utilities..



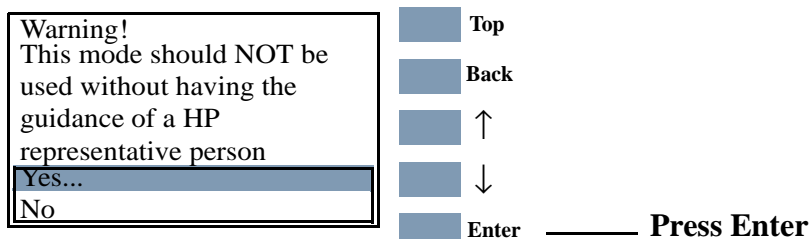
PHONE SUPPORT

For Call Agents requesting the User to print the Service Diagnostic print

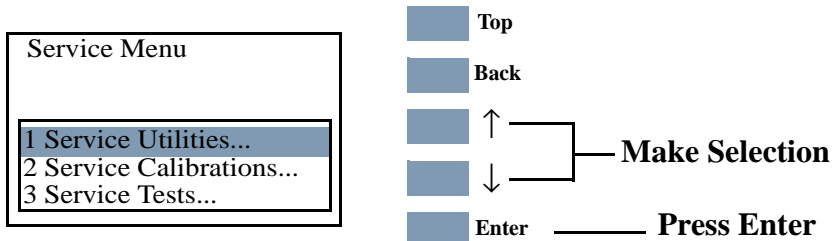
- a Once inside the “Printer Setup Options” menu and the “Device setup” menu is highlighted, press the following key combination.



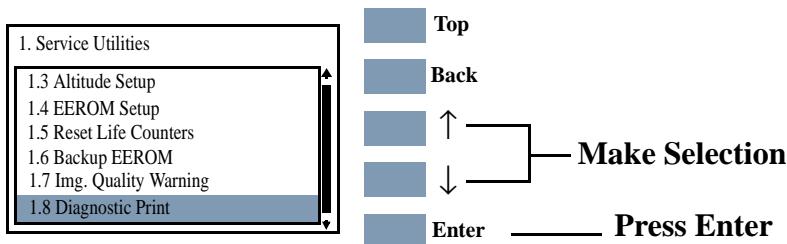
- 2 The message below is displayed. Select **Yes** to continue.



- 3 You are now in the **Service Menu**. Use the **Arrow** keys to scroll to the “Service Utilities” menu and press the **Enter** key.



- 4 Use the **Arrow** keys to select “1.8 Diagnostic Print” and press **Enter**.



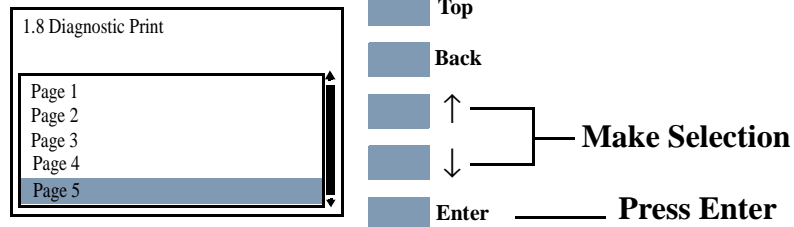
NOTE

For Firmware Versions earlier than A.02.xx, the Printer will start to print the Diagnostic Print immediately after selecting.

NOTE

For Firmware Version A.02.xx, the Printer DOES NOT print the complete Diagnostic Print. Instead you must select which part of the Diagnostic Print that you need.

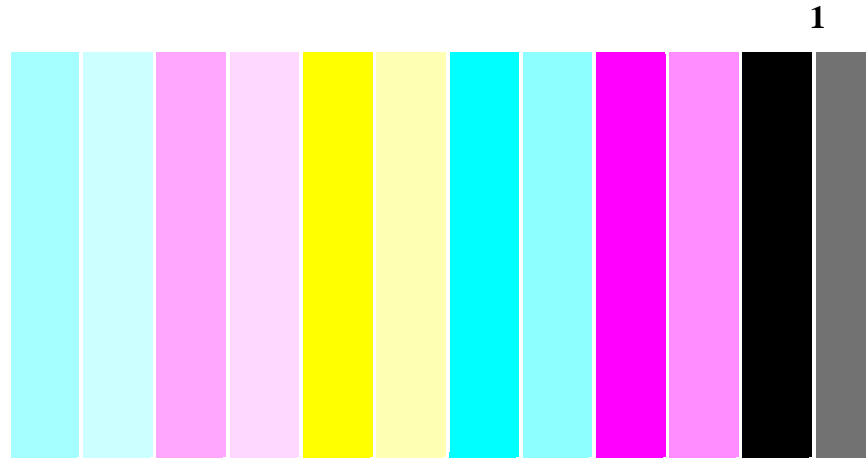
- 5** Use the **Arrow** keys to select the page that you need and press **Enter** to print it.



- **Page 1** - Checks for banding in the Primary Colors.
- **Page 2** - Checks the Color to Color Alignment.
- **Page 3** - Check the Bidirectional Alignment.
- **Page 4** - Check for Vertical Line Straightness.
- **Page 5** - Performs the Nozzle Test.

Overall Print Quality Test

This test pattern checks for banding in the print mode and media that is being used.



What is Banding?

Banding is when you see repetitive horizontal bands within the printed image (these may appear as light or dark bands).

This array of colored stripes is designed to check for certain defects with the Printer. It should not be used to check for color consistency or accuracy. The test pattern is printed with the six Printhead colors; Light Cyan, Light Magenta, Yellow, Cyan, Magenta and Black. Each pair of colors is printed by only one Printhead; one is the full color and the other is a lighter shade to help you detect any banding.

Solving the Banding Problem

The main causes of banding are:

- Printhead problems.
- Use of Non-HP media.
- Incorrect media type selected in the front panel.
- Media advance problems.

Banding Caused by Printhead Problems

Banding caused by problems with the Printhead(s) will be highlighted in the Diagnostic Print because the banding is not in all of the colors, the colored strip that has banding was caused by the same colored Printhead.

In the following example, there is a problem in the Magenta Printhead. There will be clear repetitive bands (perhaps white) in the magenta column.

1



NOTE

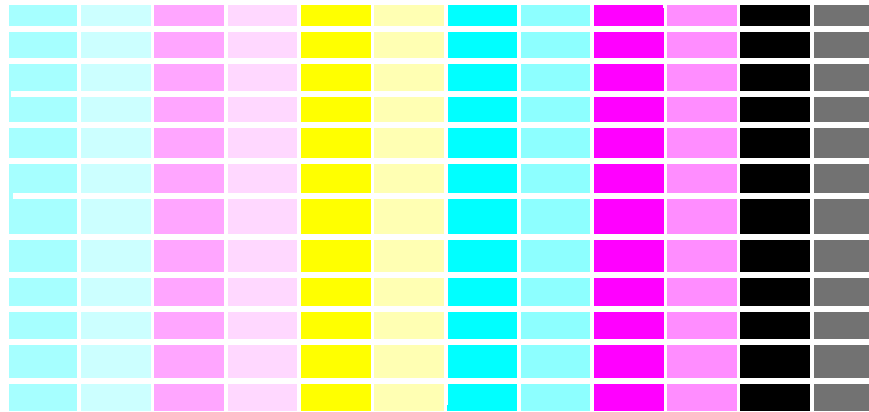
The Printer has automatic procedures to hide many Printhead defects. This type of problem affects print quality mostly in Productivity and Max. Speed modes. If you use Max. Quality print mode, banding caused by a malfunctioning Printhead may be “hidden” and image quality may not be affected.

- 1 Perform Printhead Recovery ⇒ Page 6-15.
- 2 If there is no improvement after Printhead Recovery, replace the failing Printhead.

Banding Caused by Media Advance Problems

Another type of banding is caused by an inaccurate media advance. In this case there will be banding (horizontal repetitive bands along the test pattern) in **all** the color columns.

The bands can appear as dark bands, due to a shorter advance of the roller which causes an overlap, or lighter bands due to a longer advance causing spaces.



Banding in all of the colors

NOTE

In high quality modes media advance problems may not appear as lines of banding, they may appear grainy instead. The banding or graininess will appear in all the colors.

- 1** If the image is grainy, this could also be a symptom of problems with the bidirectional alignment (See Solving Bidirectional Alignment Problems 6-12). If the Bidirectional Alignment pattern has no problems go to step two.
- 2** Make sure that the media selection made in the front panel is the same as the media that you have loaded.
- 3** It is possible that the banding was caused because the customer was using non-HP media. If the customer still wants to use non-HP media, recalibrate the paper accuracy by performing the User's Accuracy calibration and **NOT** the Service Accuracy Calibration (Refer to the User's Guide). Performing this will overwrite the default setting for **only** the paper that you have selected.
- 4** Perform the Printheads alignment procedure (Refer to the User's Guide).

Color Alignment Print Test

This part of the Diagnostic Print Test is designed to check the color alignment.

It produces five crosses: one for each color compared to magenta. All lines are printed in one direction. If there is misalignment between Magenta and another color, the lines in the cross will not be aligned.

There are two types of misalignment:

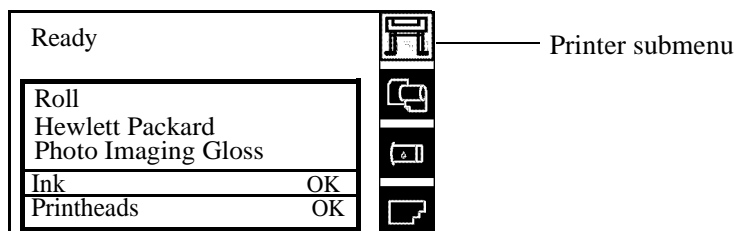
- Horizontal - when the misalignment is in the horizontal axis.
- Vertical - when the misalignment is in the vertical axis.

Below are shown an example of alignment and misalignment:



Solving the Color Alignment Problem

- 1 Make sure you have A1/D-size (24inches) media loaded (not clear film, vellum or tracing paper).
- 2 Go to the Printer submenu and press **Enter**.

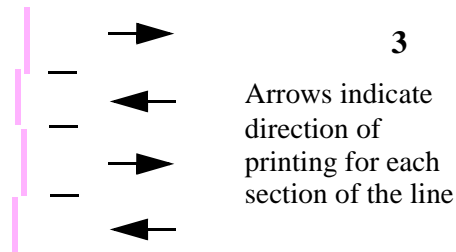


- 3 Go to Utilities/Calibrations/Printhead Alignment. Please wait as the process of aligning the Printheads takes a few minutes.
- 4 Reprint the image you were attempting to print before (in the same mode) to see if the problem still exists.

Bidirectional Alignment

If a Printer has Bidirectional alignment problems, lines are not straight. The pattern shown below is designed to highlight this kind of problem.

A pair of vertical lines is printed with each Printhead color except yellow. Each section of the vertical line is printed by a different group of Printhead nozzles (one quarter), in one pass. Check the lines on this test pattern, if they have any defects like the ones described above, perform the corrective action.



Solving Bidirectional Alignment Problems

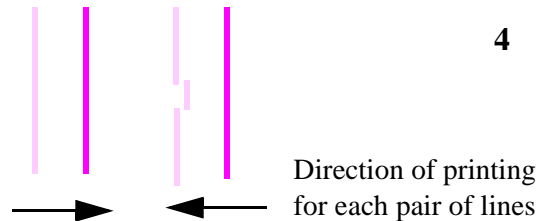
- 1 Using the same media with which you were experiencing problems, perform Printhead Alignment from the Printer Setup menu by selecting Utilities/Calibration/Printhead Alignment. Please wait as the process of aligning the Printheads takes a few minutes.

Vertical Line Straightness

If a Printer has Vertical Line Straightness problems, lines are not straight. The pattern seen below is designed to highlight this kind of problem.

A pair of vertical lines is printed in each direction, comparing line straightness for each Printhead color compared to Magenta.

Check the lines on this test pattern, if they have any defects like the ones described above perform the corrective action.



Solving Vertical Line Straightness

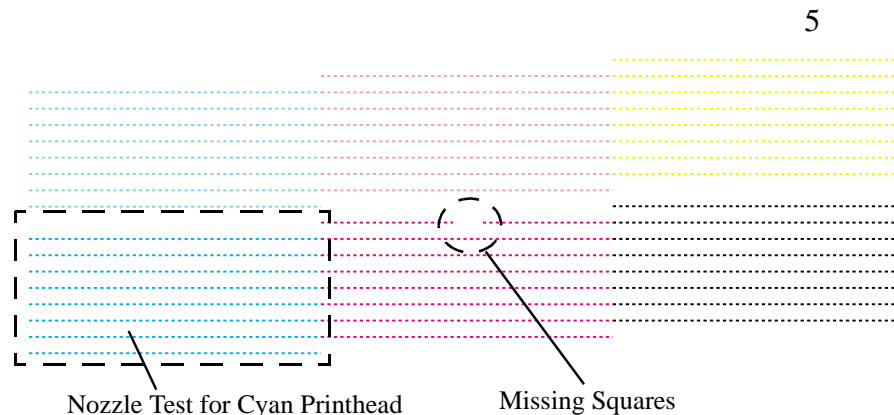
- 1 Using the same media with which you were experiencing problems, perform Printhead Alignment from the Printer Setup menu by selecting Utilities/Calibration/Printhead Alignment. Please wait as the process of aligning the Printheads takes a few minutes.

Nozzle Print Test

NOTE

If your Printer has nozzle defects, it does not mean that you will not get perfect print quality results. The Printer has automatic procedures to hide many nozzle defects. This type of problem affects print quality mostly in Productivity and Max. Speed modes.

The nozzle print test is number 5 in the Diagnostic Print. In this test the 512 nozzles that each Printhead uses to print with are tested.



Each nozzle on each Printhead prints a series of very close lines that can be seen as small squares in the Diagnostic Print. You can see whether a nozzle is not working if squares are missing or if a nozzle is malfunctioning, the color fill is less dense.

If you have more than 30 defective nozzles, the Printer will automatically request you to recover the Printhead(s) **((XX20)RECOVER)**, or to replace the Printhead(s) **((XX21)REPLACE)** if the defect cannot be recovered.

This test also allows you to check the condition of the Printhead if your Printer displays a **(XXXX)REPLACE** or **(XXXX)RECOVER** message for a Printhead that has recently been changed or recovered successfully. If there are not a large number of squares missing, and so the nozzles are firing correctly, you may have a drop detector problem.

How to fix the Nozzle Defects

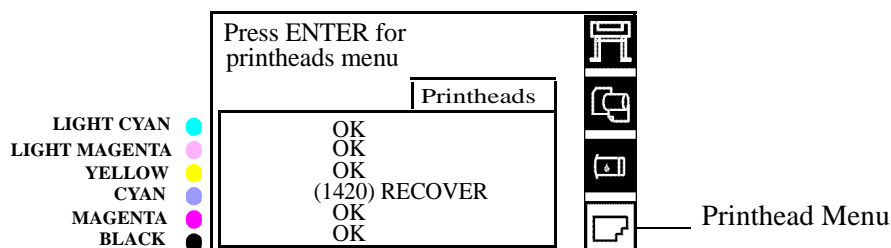
NOTE

The Printer will automatically request you to recover Printheads with a number of defective nozzles that may affect print quality, or replace them if the Printhead defect cannot be recovered.

NOTE

If your Printer has nozzle defects, it does not mean that you will not get perfect print quality results.

- 1 Go to the Printheads submenu and press **Enter**.



- 2 Go to Recover Printheads.
- 3 Select the Printhead color that is responsible for the problem. The Printer will try to 'Recover' the defective Printhead. Please wait as the process of recovery takes a few minutes.
- 4 Reprint the Diagnostic Print to check that the defective nozzles have been corrected.

If the error is still present, replace the worst Printheads.

If your Printer displays a **(XXXX)REPLACE** or **(XXXX)RECOVER** message for a Printhead that has recently been changed or recovered successfully:

- 1 Perform Service Station Calibration to verify the correct functioning of the Drop Detector ⇒ Page 5-11.

No Printing Defects Found in the Diagnostic Print

If all the test patterns from the Diagnostic Print are correct and you still experience print quality problems, here are some of the more likely causes to check:

- The print mode used in the Printer is not right for the image that is being printed (this is defined by the Printer's Front Panel menu selections).
- Non-HP driver.
- The RIP.
- The software applications you are using.

Use the following table to configure your system correctly.

What to Configure	Configuration Setting	Optimal Setting
Printer Front-Panel Menu	Media	Set to match the media type loaded in the Printer
	Dry time	Set to Automatic.
HP driver (Windows, AutoCAD or Mac)	Print mode setting	Set to Max. Quality
Non-HP drivers (Software RIPs)	<p>The settings available depend on the driver. The most typical settings are:</p> <ul style="list-style-type: none"> ■ Print Quality Settings ■ Half Tone ■ Media selection <p>See the user's guide for your application for more information about its print quality settings.</p>	<p>In the software application:</p> <ul style="list-style-type: none"> ■ Set Print Quality to Max. Quality. ■ Use no Half Tone (or Printer default). ■ Make sure that the media setting matches the media loaded in the Printer.

Print Quality Problems

For Color Accuracy and Consistency problems do the following:

- Set the Color Calibration in Printer Setup/Internal RIP Settings/ Color Calibration to ON or turn it ON.
- Perform a color calibration and print the plot again (any plots that have already been processed by the Printer will not benefit from the Calibration unless they are sent to the Printer again).
- If the problem persists check the lens and if it is dirty replace the Lens Cover Assembly (See ⇒ Page 9-5) and repeat the calibrations.

Solving Color Accuracy problems

These are two areas you should review when troubleshooting a color accuracy problem:

Configuration (PostScript option only)

Check that you are using the correct driver setting for the software. Check which ink emulation mode has been selected in the front panel.

Media

Make sure that the media loaded is genuine HP media and that the correct media type has been selected on the front panel.

Solving Color Consistency problems

- If color consistency is important for the customer, it is recommended that they do not use HP-GL/2 to print with.
- Some media may discolor or change with age. Check that the media is fresh and has been stored correctly.
- If the environmental conditions that the customer is printing in change rapidly, you may see changes in the color consistency. By reducing the time the print stays in extreme environmental conditions after being printed (especially very high humidity) you can reduce the color consistency problems.
- There will be color differences between HP DesignJet Printers because the other Printers use a different type of ink.

Color Accuracy Configuration

The configurations of the Printer, the driver, and the software RIPs define how ink is applied to each type of media. Use the information in the following table to configure the Printer and software for best color accuracy.

Location of Setting	Setting Description	Selection
Printer Front-Panel Menu	Media	Set to match the media type loaded in the Printer.
Internal RIP settings	Ink Emulation RGB CMYK (PS 5000PS only)	Set the type of inks that your software generates.
	Color Calibration (PS only)	Set to ON.
Non-HP drivers (Software RIPS)	Media or equivalent setting	Set to match the media type loaded in the Printer. See the documentation that came with your software for information.
	Color correction option or equivalent	Do the color correction calibration if one is available.

Blurred Lines (Ink “Bleeds” from Lines)

Perhaps you have adjusted the drying time in the Front Panel menu to speed up the Printer output.

- 1 Set “Drying time” to “Automatic”.
 - For details of drying time adjustments, see the User’s Reference Guide.

The Prints are Too Short

There are several situations where the print length can be too short:

- Prints with completely white bands.
- Improper use of crop marks.
- Use of Coated Media when trying to get precise output.

However, in the last case, the length difference is a maximum of 4 to 6mm per meter, whereas the first two cases can affect the print length by several centimeters. Depending on the type of problem, the troubleshooting sequence is different.

- 1 Prints with completely white bands.
 - Check to see if the prints that the customer is trying to produce contain completely white bands. If this is the case, upgrade the Printer to the UV Firmware Release (A.02.XX).
 - As an alternative solution, advise the customer to put a line or border around the print.

NOTE

This problem is solved in any A.02.xx firmware release.

- 2 Improper use of crop marks.

If the customer is using crop marks, this can be the cause of the length difference because the way the margins and the crop marks are implemented in the DJ5000 is very different from the way it is done in other Designjet products, e.g. DJ2000, 2500, 3000 & 3500.

- 3 Use of Coated Media when trying to get precise output.

If the customer is using any type of Coated Media, Bond, etc. advise them to use glossy or polyester based films when the print accuracy is important.

Colors are not as Expected

If the Application or Driver settings are not correct, this could result in colors which are different than the one that were expected.

- To have full control of the colors that are printed, use the CMYK option and no emulation (in Driver). Sending a file in RGB even with no color emulation could end up in undesirable results. If a Postscript file is not sent from a DesignJet 5000 PS driver, make sure you have the following settings in the Front Panel: Printer Setup Menu > Internal RIP settings > Ink Emulation > CMYK= Native.
- As a special case, Adobe PhotoShop sends Pantone Colors as CMYK (no Pantone name). Therefore, Pantone Calibration does not make any difference. The file should be created as CMYK to prevent unexpected color changes.

Bad Color to Color Alignment in the Media-Axis

During Printhead Alignment, all the colors are scanned with both the Green and Blue LED's. However, some colors are seen mainly with one LED whereas some other colors are seen with the other (e.g. Cyan is seen with the Green LED and Yellow is seen with the Blue LED). If there is any misalignment between these two LED's, it will directly translate into the misalignment of the colors. The worst alignment errors are normally between Light Cyan and

Yellow or between Cyan and Yellow. This problem is Printer related, so one of the Printers can print without misalignment and the other Printers will have this misalignment problem.

- This issue will be resolved in the UV Firmware Release (A.02.XX). For the time being there is nothing that can be done. The customer should be advised that this problem will be solved in the future and that it **should not** affect the Image Quality of the prints. Be aware that in line drawings there could be problems.
- If the customer is not prepared to wait for the new Firmware Release, replace the Line Sensor. There is a small probability that the new Line Sensor will be better. (Note: The Line Sensor should only be replaced if the customer insists).

NOTE

This problem is solved in any A.02.xx firmware release.

Banding at the Top of the Page

Some prints may have banding in the first 2-3 centimeters or swaths. This kind of problem normally happens at the top of the page (the rest of the print is not affected), because the error-hiding algorithm cannot be applied at the beginning of the print in certain circumstances. This depends on the Take-Up Reel installation settings, the media used and the plot margins selected.

To prevent banding at the top of the page, the Printer should be configured as follows:

- 1 Take-Up reel installed and loaded (only for customers that have a Take-Up Reel, if not got to the following step).
- 2 Select the paper margins as normal (only for customers which use the extended margin PPD in the driver, if not go to the following step).
- 3 If Heavy Coated media is being used, use the Front Panel to select Heavy Coated Economy with Normal paper margins. Other alternatives are either to add a 2.5 cm margin at the beginning of the print or switch to any other type of media.

Vertical Banding

Some prints with uniform area fills (ink density between 30 and 70%) show vertical banding when printed on High-Gloss Photo Paper.

- The problem can be minimized by printing with Composite Black when the problem appears in Black areas or by printing in RGB mode instead of CMYK when the effect appears in Color area fills.

Media

Always make sure that the customer is using the appropriate media for the required image and that it is consistent with the software application being used. To ensure color accuracy and print-quality performance of the Printer, only media types that have been certified for the Printer should be used. Use of non-HP media or HP media not certified for the Printer may significantly reduce the color and print quality of the required images. For details of HP media, refer to the **User's Guide** or the **Media Guide for the HP Designjet Printers**.

NOTE

To have accurate colors, the media settings must match the type of media loaded in the Printer.

If the customer is using non-HP media with HP drivers, the colors in the required print may not be accurate. Advise the customer to use HP media to improve the accuracy of the colors.

Printed surface smearing roll

As the media is printed and the image is coming out from the Printer, the natural curl of the media causes it to rub against the roll of media installed in the Printer. This causes image smearing. In addition to this, if the exiting media sticks against the roll, because the ink is not dry or because of static (some Polyester films get electrostatically charged) it could cause the media to reenter into the Printer.

- 1 Make sure that the media deflectors are installed onto the Printer. The increased distance between the roll and the exiting media reduces the probability of having both surfaces being attracted (and smears).

Warped Lines on Media

The media itself may be warped. This can happen if it has been used or stored in an extreme environment.

- 1 Make sure the Environmental Conditions your Printer is operating in are within specifications (See ⇒ Page 10-11).
- 2 Store all Media according to Environmental Specifications (See ⇒ Page 10-11).

Marks and/or scratches on double-sided media

If you are using double-sided media and there are marks and scratches evident on the media, the platen may need cleaning ((See ⇒ Page 9-9).

There are Smears or Scratching on the Printed Media

This problem can appear on paper-based coated media if a lot of ink printed quickly. The media cannot absorb the ink quickly enough and becomes distorted. As the Printheads move over the media, the Printheads and the media come into contact with each other and the printed image is smeared.

- 1 Press the **Cancel** key on the front panel; if you continue to print, the paper may damage the Printheads.
- 2 Cancel the print job from your computer application.

In order to obtain better results perform the following:

- Use HP recommended media. If the image you are printing has intense color, use HP Heavy Weight Coated (Economy) Paper.
- Use extended margins, or try to increase the print margins by relocating the image on the page from the software application.
- Ensure the Deflectors are installed on your Printer.
- If the customer is using 'Media Saving Options' from the advanced section of the HP- GL/2 Driver, try disabling one or both of the options 'auto rotate' and 'inked area'.
- Use the Take Up Reel if you have one installed.

If the above fails to solve the problem of smears and scratching, change the media that the customer is using to a non-paper based media such as HP High Gloss Photo Paper.

Long Term Color Bleeding (Glossy Papers)

If you see the colors are bleeding into the paper i.e. the color is soaking into the paper making the lines fuzzy and bleary. This will be because of the humidity conditions that the Printer is working under:

- Ask the customer to change the paper that they are printing with or
- Remove the Printer from the high humidity conditions.