

PW2400 print adjustment guide

This is a guide for adjusting the PW2400 to achieve best possible printing quality. The adjustment is done both mechanically to ensure that the head is at a correct angles and height and by software to setup the printer.

In general before making any testprints start with executing a clean from the user panel and test that all nozzles are present.

The mechanical adjustment comprises three settings:

1. The head height (Epson service manual term: Platen Gap)
This is the distance between the head nozzle plate and the printing surface.
2. The head slant (Epson service manual term: head slant PF)
Head slant refers to the angle or tilt of the head relative to the printing plane.
The adjustment is done to make the head as close to parallel to the printing plate as possible.
3. The head bias (Epson service manual term: head slant CR)
Head bias refers to the angle of the head relative to the scan direction of the head.

The software setup adjusts the settings in the printer relating to the bi-directional printing. A small utility PWAdjUtil is used for this.

Steps needed for adjustment:

- Determining setup parameters
- Remove ink drier
- Initial head height and slant setting
- Head bias adjustment
- Head slant adjustment
- Head height adjustment
- Verify bias adjustment and head slant adjustments
- Bidirectional adjustment
- Refit inkdrier

PW2400 print adjustment guide

Determining setup parameters

Some of the parameters needed for adjustment are dependent upon which combinations of plategauges will be used for actual printing.

All possible combinations of plategauges are listed in the table along with the recommended parameters.

It is only needed to select one scenario for which the printer will be used.

E.g. if plate gauges 0.15 and 0.20 will be printed then use the settings in scenario 1 or 2 depending upon for which plate gauge you want to optimize the quality slightly.

If e.g. all three plategauges will be printed, then use the setting of scenario 1, 2 or 3.

Look in the column “Plate gauge used for adjustments” to find the number of plate gauges needed for the actual adjustment. E.g. for scenario 1 two plate gauges are needed to make the adjustment. The other information from the table will be needed during the adjustment procedures.

Scenarios			Settings used for adjustments					Settings used for normal printing	
Scenario	Plate gauges	Optimized for	Plate gauges needed for adjustment	Head height position	Head slant adjustment	Bidirectional	Head height (mm)	Head height position	Media thickness
1	0.15	0.15	0.15	Narrow	2 lower on front edge	Narrow	0.30	Narrow	0.20
	0.20		0.20	Std.		Std.		Std.	0.20
	0.30							Std.	0.30
2	0.15							Narrow	0.10
	0.20	0.20	0.20	Narrow	0	Narrow	0.30	Narrow	0.20
	0.30							Narrow	0.30
3	0.15							Narrow	0.10
	0.20							Narrow	0.20
	0.30	0.30	0.30	Narrow	2 higher on front edge	Narrow	0.30	Narrow	0.20
4	0.15	0.15	0.15	Narrow	2 lower on front edge	Narrow	0.30	Narrow	0.20
	0.30		0.30	Std.		Std		Std.	0.30
5	0.15	0.15	0.15	Narrow	0	Narrow	0.30	Narrow	0.20
6	0.20	0.20	0.20	Narrow	0	Narrow	0.30	Narrow	0.20
7	0.30	0.30	0.30	Narrow	0	Narrow	0.30	Narrow	0.20

Note:

For 0.15 and 0.20 use scenario 1 or 2.

For 0.20 and 0.30 use scenario 2 or 3.

For 0.15 and 0.30, optimized for 0.30 use scenario 3.

PW2400 print adjustment guide

Remove the ink drier

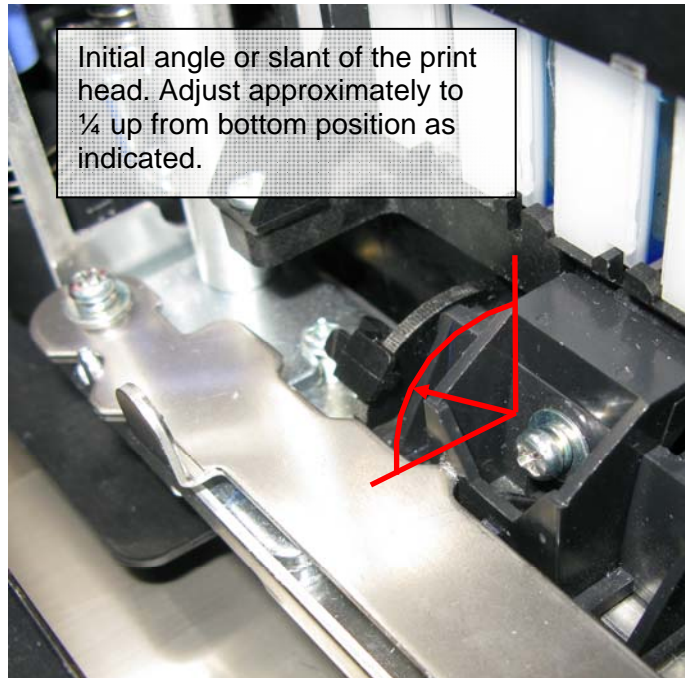
Remove the complete inkdrier unit by unscrewing the 2 finger screws in each side. This will allow easy access to the head carriage unit for adjustment.

Initial head height and slant setting

A first time or basic adjustment has to be made if the printer has not previously been adjusted according to this guide. You may skip this part if the printer has previously been adjusted according to this guide and only need fine tuning.

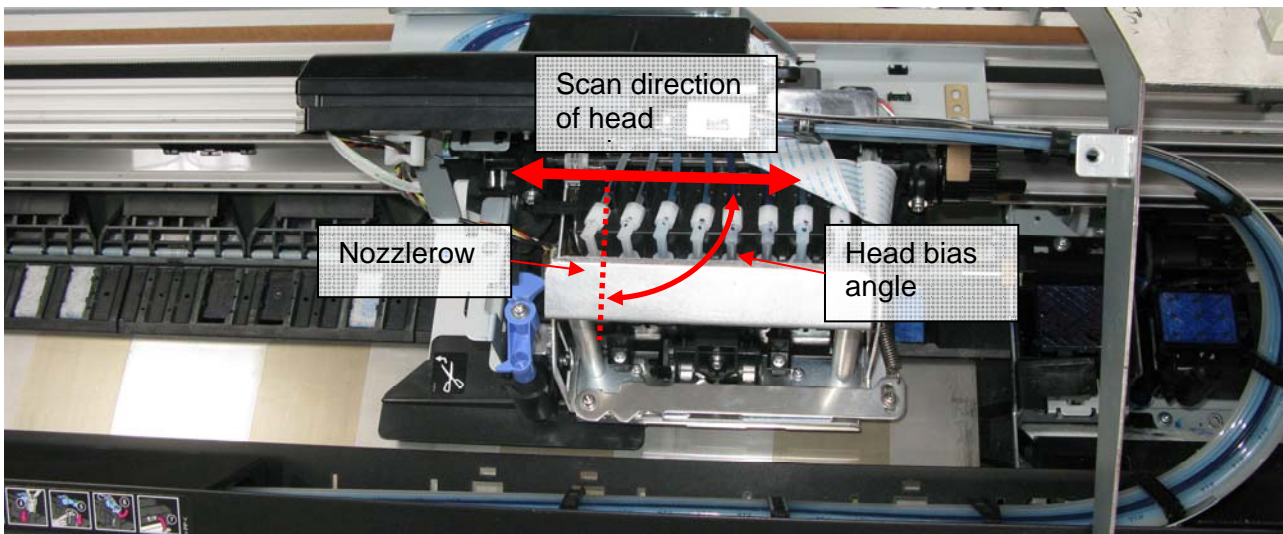
Set the head slant lever approximately as shown on the image. Refer to the section describing head slant adjustment on how to do this.

Adjust the headheight to approximately 0.6 mm at the frontedge. Refer to the section describing head height adjustment on how to do this. The headheight will need to be readjusted more accurately at a later point.



Head bias adjustment

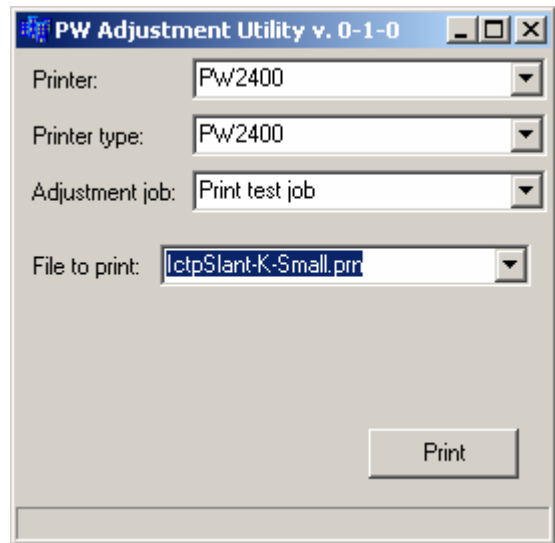
Epson uses the term “head slant CR” in the service manual. It is called head bias in this guide as it can be difficult to remember the difference between the two head slant terms. Head bias refers to the angle of the head nozzle rows relative to the scan direction of the head. The nozzle rows must be perpendicular to the head scan direction.



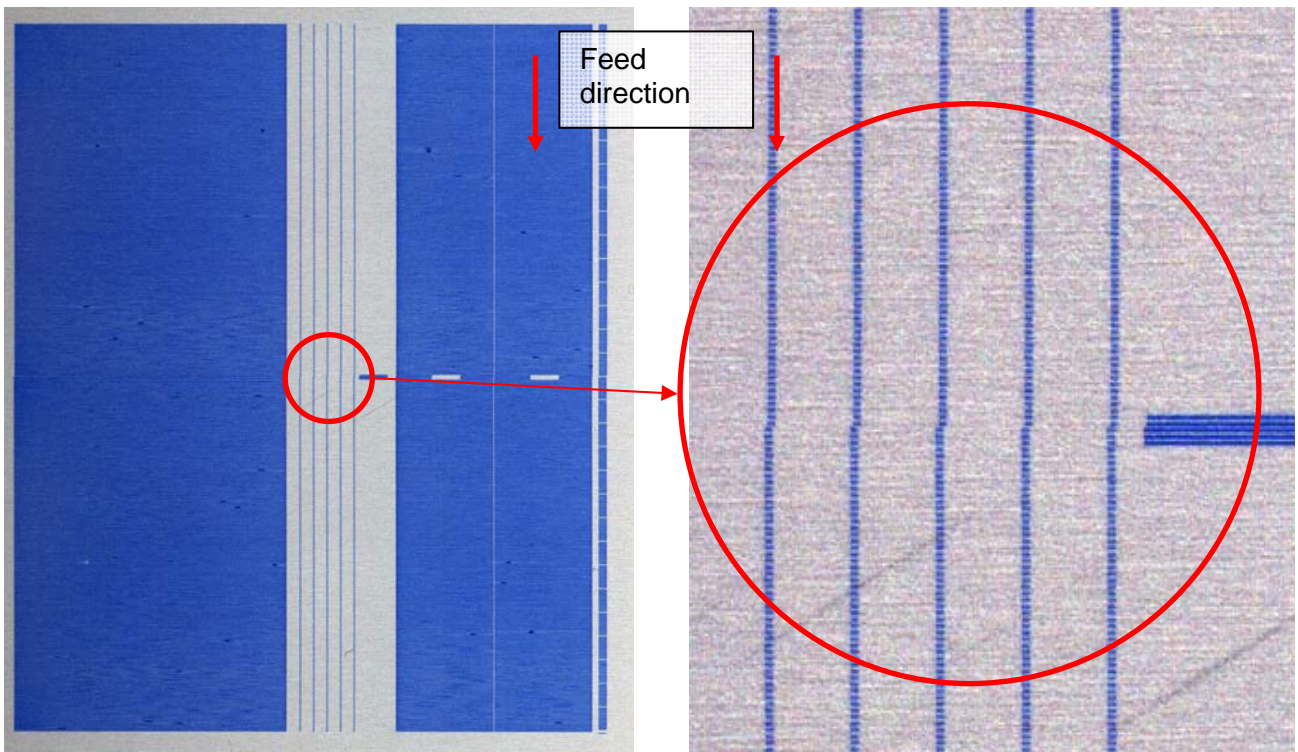
PW2400 print adjustment guide

The head bias adjustment job

The head bias adjustment job is printed using the PWAdjUtil. Select "Print test job" in "Adjustment job" and select lctpSlant-K-Small.prn as test job. If this job is not present then select lctpSlant-K.prn instead. This job is wider than the first but works identically. The examples shown are for lctpSlant-K-Small.prn.



The testjob prints a complete nozzlerow of dots, then moves the plate the length of one nozzlerow and prints a second complete nozzlerow of dots. The two lines will line up if the bias is adjusted correctly. The actual printjob repeats this with a total of 5 linepairs.



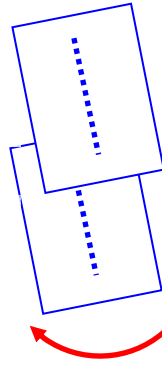
PW2400 print adjustment guide

Head bias adjustment procedure

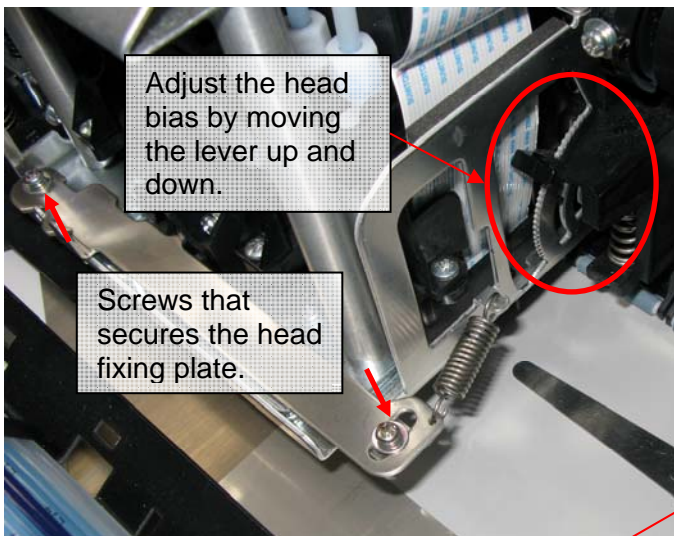
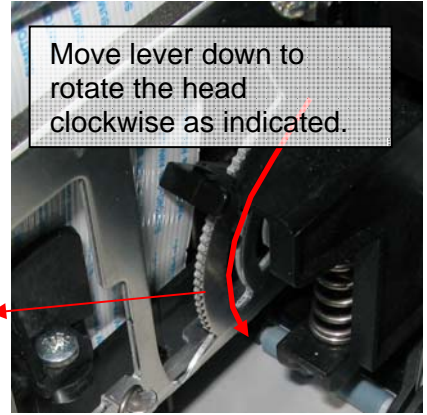
Power on or off?

1. Loosen the two screws securing the head fixing plate.
2. Release the head fixing plate from the head by inserting a suitable screwdriver between the plate and the carriage and twisting. Make sure that there is space between the head fixing plate and the head. The space has to be maintained as long as the lever is moved.
3. Move the bias adjustment lever up or down to adjust the bias. The head is rotated clockwise when the lever is moved downwards.
4. Slowly release the head fixing plate by removing the screwdriver.
5. Print a new head bias testjob. If the bias is not OK then repeat steps 2 – 5 until bias is correctly adjusted.
6. If you are continuing with the adjustment procedure "Head slant adjustment" it is not necessary to tighten the two screws securing the head fixing plate. Otherwise then tighten the two screws.

1. pass of printhead
2. pass of printhead

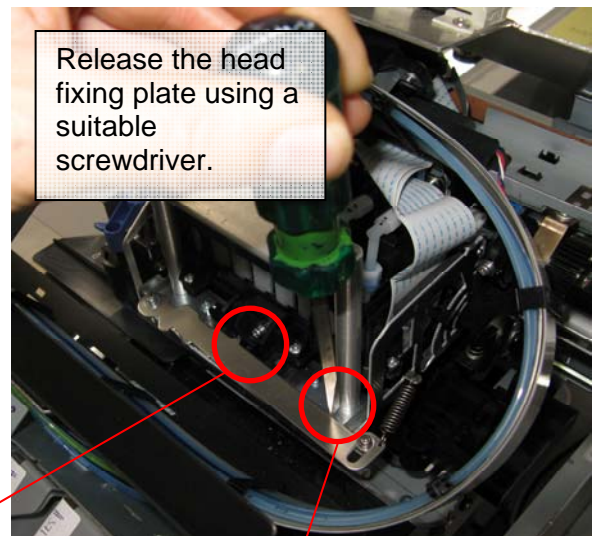


Move lever down to rotate the head clockwise as indicated.

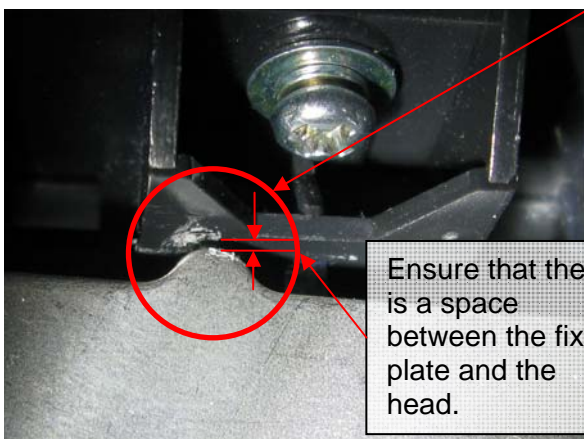


Adjust the head bias by moving the lever up and down.

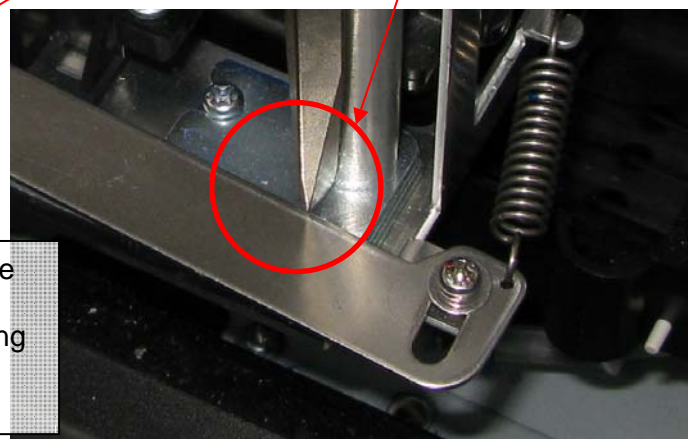
Screws that secures the head fixing plate.



Release the head fixing plate using a suitable screwdriver.



Ensure that there is a space between the fixing plate and the head.



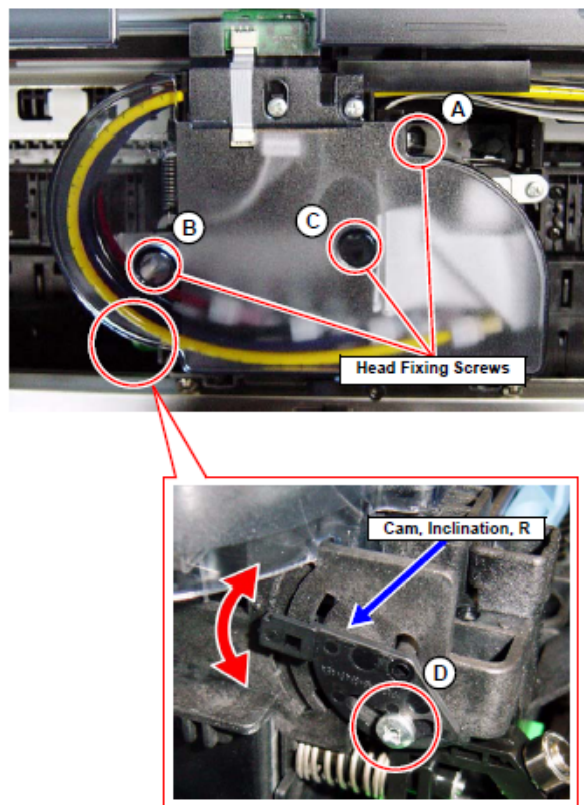
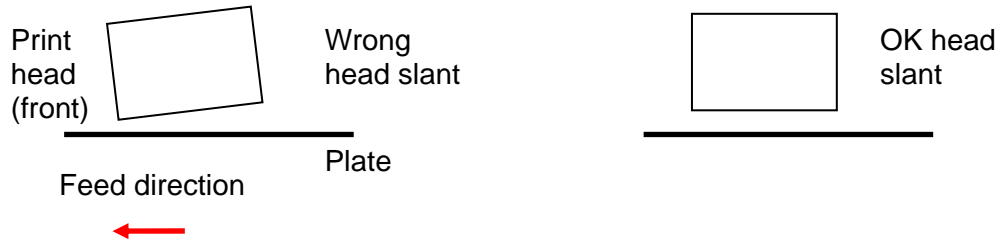


Figure 5-34. Head Fixing Screws and the Cam, Inclination, R.3

PW2400 print adjustment guide

Head slant adjustment

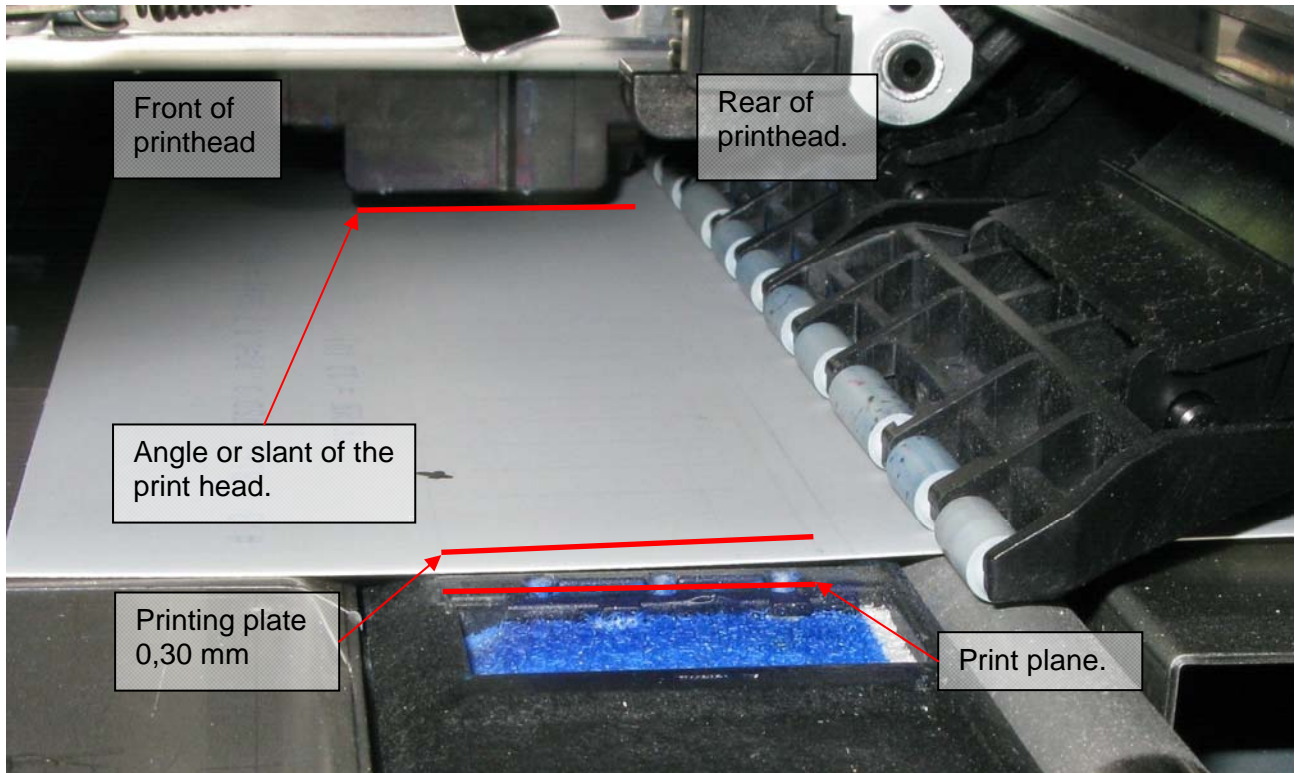
Epson uses the term “head slant PF” in the service manual. In this guide it is just called head slant. Head slant refers to the angle or tilt of the head relative to the printing plane.



The adjustment is done to make the head as close to parallel to the printing plate as possible.

Plate angle

The actual angle of the plate as it extends from the feed roller is slightly lifted at the rearend of the head. This is because the feedroller is higher than the printing plane.



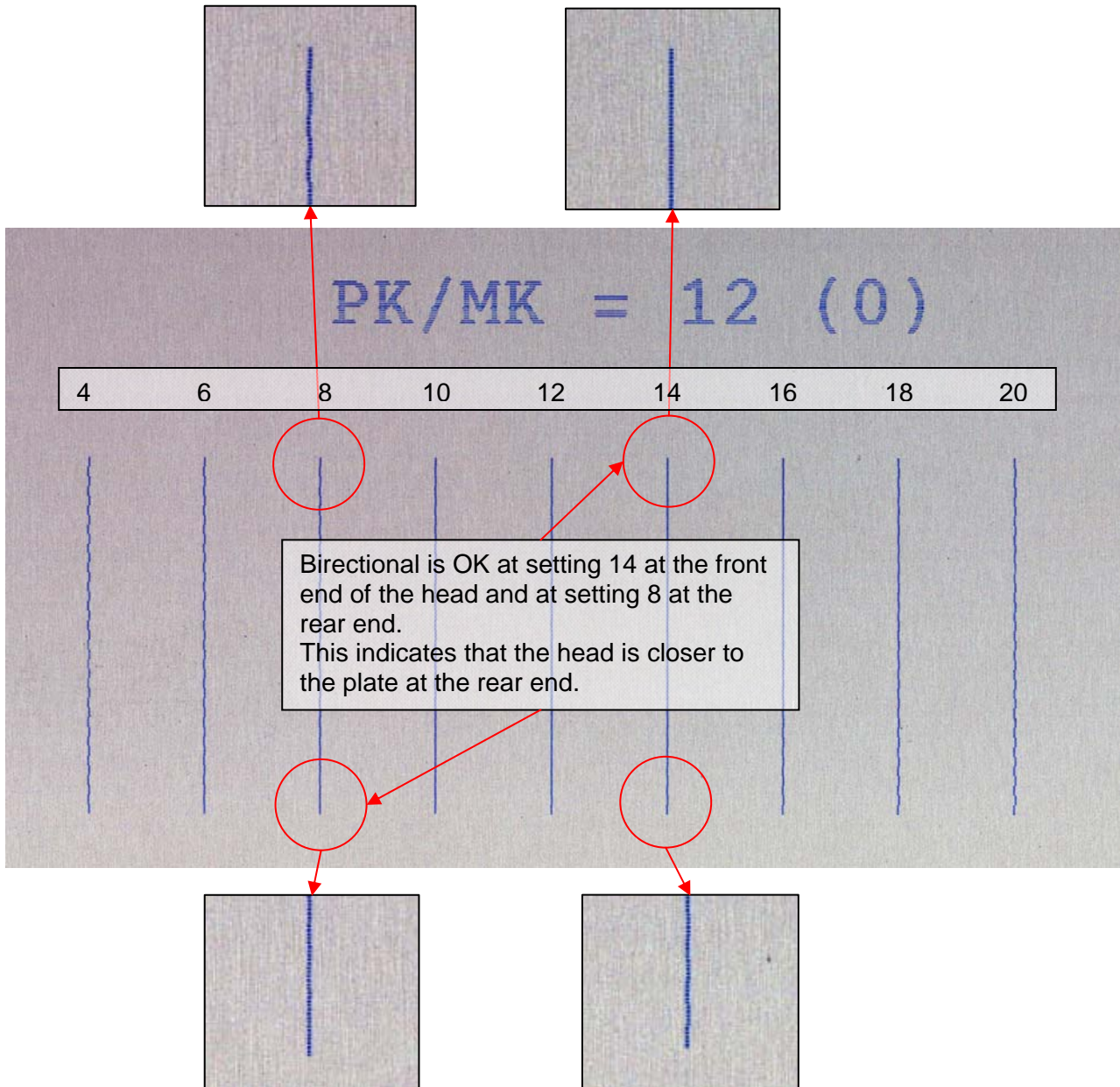
The angle of 0.15 mm and 0.30 mm plates are slightly different. The 0.30 mm plate is stiffer than the 0.15mm plate. If both plate gauges has to be printed then the head slant need to be adjusted as the average between the two.

Head slant testjob

The head slant can be determined by examining the bidirectional testjob. The bidirectional adjustment is sensitive to the headheight and thus it will reveal whenever the headheight is different at the front end than at the rear end of the head.

PW2400 print adjustment guide

Each of the 9 vertical lines in the testjob corresponds to one specific bidirectional setting. The line is jagged if the bidirectional setting is not correct and straight in the setting is OK. If the slant is not parallel to the plate then the correct bidirectional setting will be different from the front end of the head compared to the rear end.



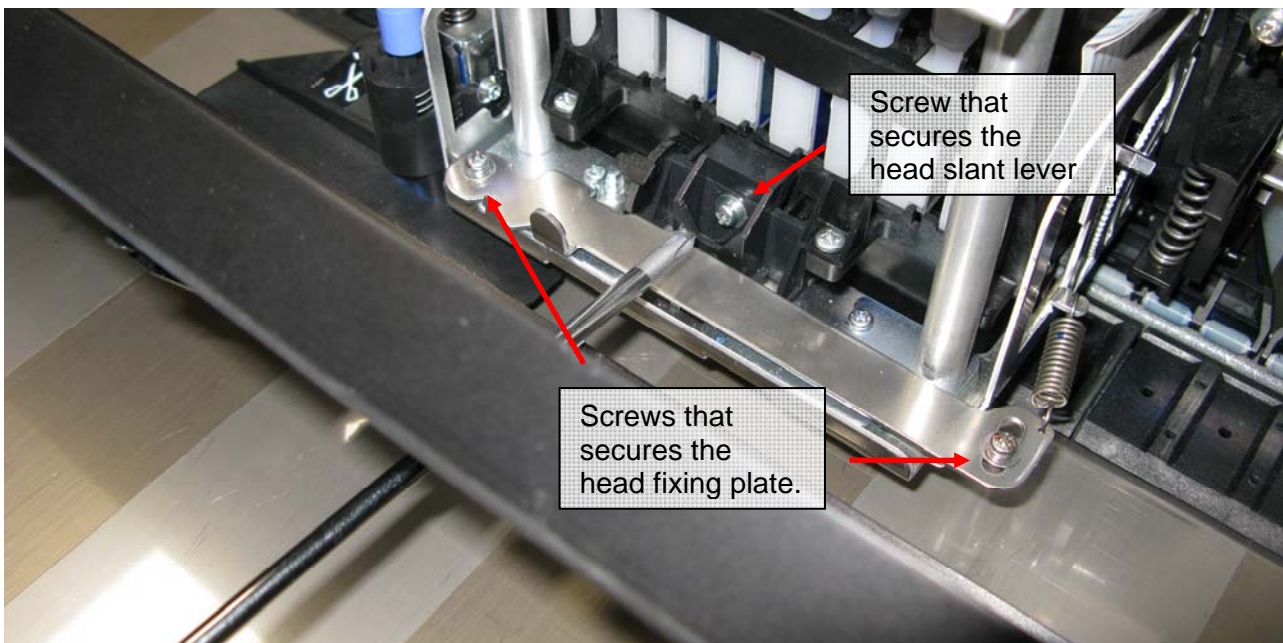
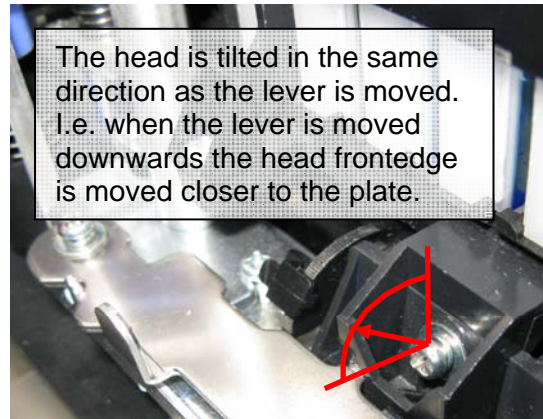
The head slant is not correct in this example. If the headslant is adjusted for one plate gauge only then the bidirectional test lines should be straight. This indicates that the head is parallel to the plate. If more than one plate gauge is used then refer to the table in "Determining setup parameters" for the correct head slant.

Example: Scenario 1 is selected. According to the table plate gauge 0.15 mm is used for adjusting the head slant. Again according to the table the head slant should be 2 lower on the front edge of the head. This means that the lines in the test job should be straight at e.g. 10 for the front end of the head and 12 for the rear end of the head. Note that 10 or 12 in this example do not need to be at the centre position. This will be taken care of later in the bidirectional adjustment.

PW2400 print adjustment guide

Head slant adjustment procedure

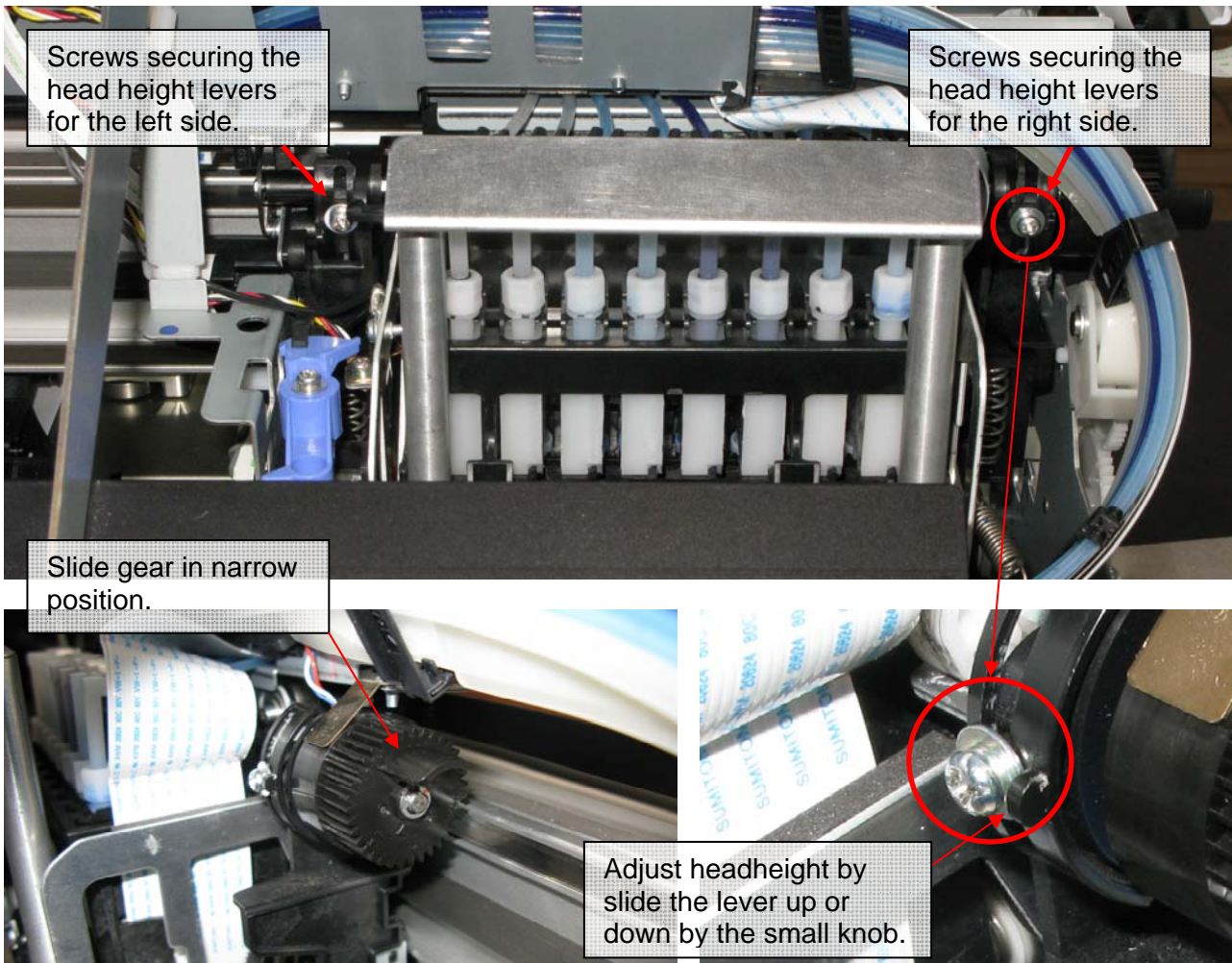
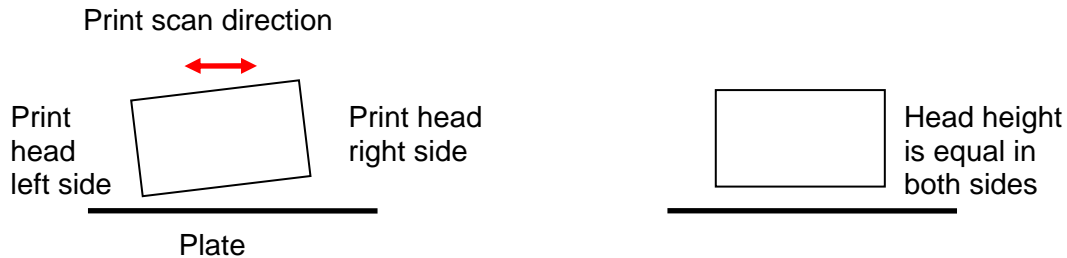
1. Find the correct plate gauge for the adjustment. The slant is always adjusted using the thinnest plate for which the printer will be used.
2. Start the PWAdjUtil, select the printer and printertype and select bidirectional as the Adjustment job. Set the headheight to "Narrow" in the PWAdjUtil. (The slant is always adjusted with the head at the narrow headheight.)
3. Load the plate and wait for the printer to become ready.
4. Click the print button.
5. Carefully inspect the pattern with a magnifier. Find the point at which the lines are most straight at the frontedge and at the rearedge. This may be e.g. 14 at the frontend and 8 at the rearend. Refer to table "Determining setup parameters" for the correct head slant.
6. If the head slant is correct skip to **step 14.**
7. Release the head carriage and move it to the center of the printer.
8. Loosen the screw securing the head slant adjustment lever. A long screwdriver can be used through a slot in the printer front.
9. Loosen the two screws that secure the head fixing plate.
10. Release the head fixing plate from the head by inserting a suitable screwdriver between the plate and the carriage and twisting. Make sure that there is space between the head fixing plate and the head. The space has to be maintained as long as the lever is moved. Refer to Head bias adjustment for further explanation on how to do this.
11. Adjust the head slant by moving the head slant adjustment lever up or down.
12. Slowly release the head fixing plate by removing the screwdriver.
13. Repeat steps 3-12 until the headslant is correct.
14. Tighten the screw securing the head slant lever.
15. Tighten the two screws securing the head fixing plate.



PW2400 print adjustment guide

Head height adjustment

The head height adjustment adjusts the distance between the head and the printing plate. This adjustment is done individually in both sides of the head, thus the angle of the head is influence too.

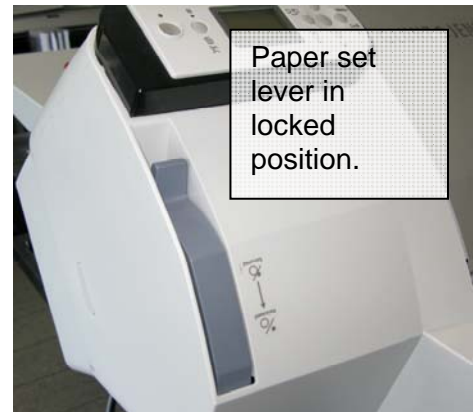


Feeler gauges are needed to adjust the headheight. The gauge is used in both sides to adjust the headheight. Be careful not to move the head across on top of the gauge to avoid scratching the head face plate. The head height and angle is correct when the feeler gauge just touched when the edge of the head is moved above it. The head height is only measured at the front edge of the head.

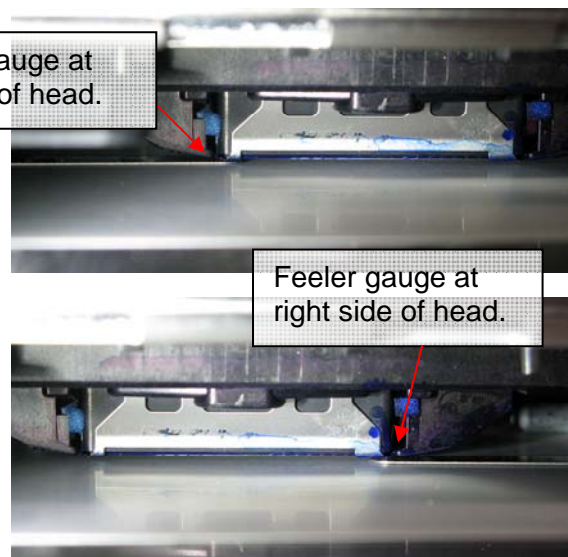
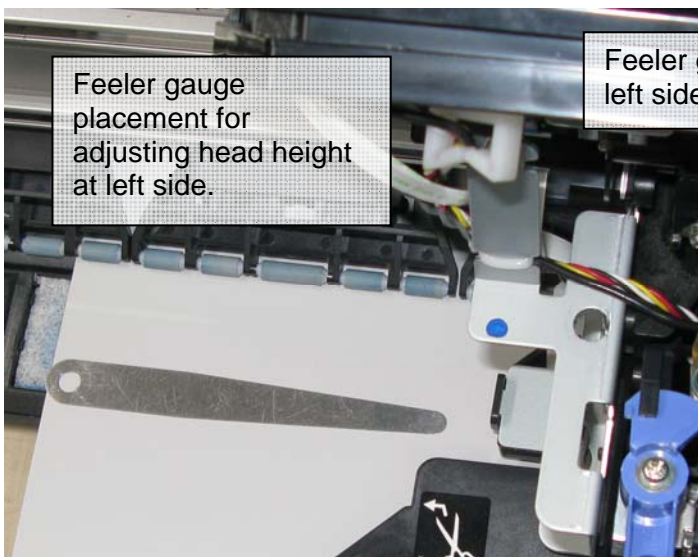
PW2400 print adjustment guide

Head height adjustment procedure.

1. Find the correct plate gauge for the adjustment. The head height is always adjusted using the plate gauge for which the print quality will be optimized. For e.g. scenario 1 use plate gauge 0.15mm.
2. Power the printer off.
3. Manually load a plate so that it is placed approximately as showed in the image. Lock the paper set lever.



4. Release the head carriage and move the head so that it is placed above the plate.
5. Rotate the slide gear on the right side of the head carriage, with the tab pointing upwards, to set the head height position to narrow.
6. Loosen the two screws securing the head height adjustment levers in both sides of the head.
7. Place a feeler gauge at the left side of the head and adjust the left side of the head by moving the head height adjustment lever up or down.
8. Repeat for right side.
9. Tighten the two screws securing the head height adjustment levers.



PW2400 print adjustment guide

Verify bias adjustment and head slant adjustments

1. Print the head bias adjustment job and verify that the bias has not moved.
2. Print the bidirectional test pattern to verify that the head slant is still correct.

Because the head is physically moved when adjusting the headheight it can happen that the adjustment of the head bias and head slant changes.

Bidirectional adjustment

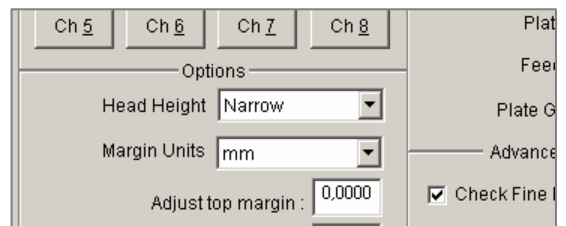
The bidirectional setting adjusts the printer timing so that droplets ejected when the printhead scans from left to right prints relative on the same spots as when the printhead is scanning back. This timing is largely dependent upon the head distance to the media surface.

Because of this the bidirectional setting should always be adjusted if the headheight has been adjusted.

The printer will remember a specific setting for each physical headheight that is used. The bidirectional adjustment therefore has to been made for each headheight that is used for printing.

Head height

The PlateWriter gives the possibility to use two different headheights called "Narrow" and "Normal" in the device setup in the RIP. The headheight is the physical distance between the head and the media. The head is actually moved up and down according to this setting.

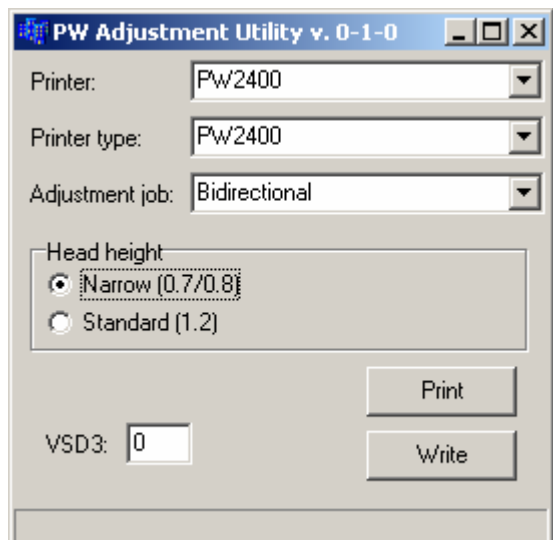


Biidirectional testjob

The printer has a built in printjob for determining the correct value at a given headheight. This printjob can be activated from the small utility called PWAdjUtil which is installed on the PlateWriter PC.

The print job can be printed for each of the two actual head heights (Called "Narrow" and "Standard" in the utility. "Standard" in the utility and "Normal" in the RIP device setup are the same).

When the correct setting for a specific headheight has been determined then this value should be entered in the VSD3 box. The value is sent to the printer when the Write button is clicked. Note that this value is stored in the printer for the specific headheight position that is selected.

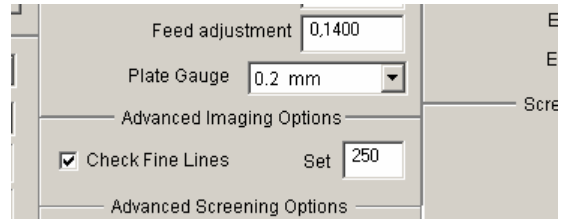


PW2400 print adjustment guide

Plate gauge

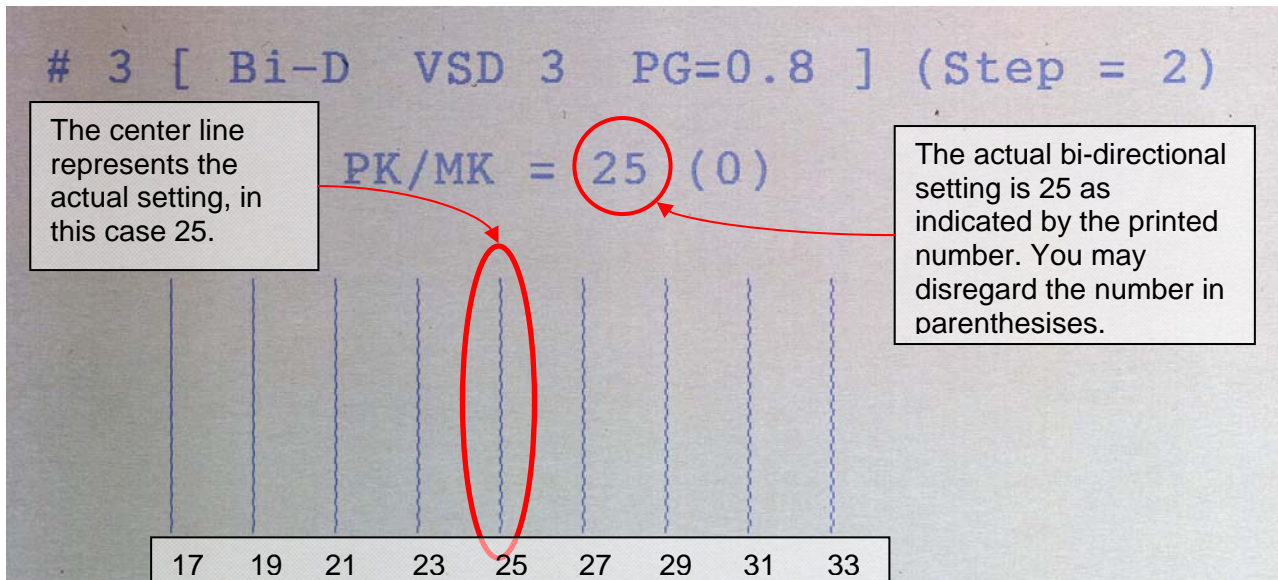
The printer always assumes that the bidirectional testjob is printed on a media which is 0.20 mm thick. The printer assumes this for all headheight positions. The printer thus needs to be aware of the used media thickness when a real printjob is printed. The printer will adjust the bidirectional timing to accommodate the difference in media thickness, from what was used at setup, to what is used when printing. This is set as plategauge in the device setup in the RIP.

It is important to understand that the plate gauge setting does not alter the headheight physically, but merely changes the timing in the printer.



The printjob

The bidirectional printjob consists of 9 vertical lines, each representing a bidirectional setting. The job is printed at the chosen headheight, in this case at Narrow. This is indicated in the printout as "PG=0.8". VSD3 refers to the smallest droplet set which can be used. This is the only droplet set used by the PlateWriter.



Lines to the left of the center line represents a relative decrease in setting of - (minus) 2. Lines to the right of the center represents a relative increase in setting of + 2.

Settings in between the printed ones can be selected. If e.g. 21 and 23 looks equal best then 22 can be used as a new setting.

PW2400 print adjustment guide

Bidirectional adjustment procedure

1. Start the PWAdjUtil, select the printer and printertype and select bidirectional as the Adjustment job.
2. Determine for which headheight the adjustment is to be made and set the "Head height" setting in the PWAdjUtil accordingly.
3. Load a plate and wait until the printer becomes ready.
4. Click the print button.
5. Carefully inspect the pattern with a magnifier. Find the straightest line of the 9 lines. With reference to the figure above count the setting of this line starting from the center one. In the example shown the leftmost line is the straightest, but however not being perfect. In this case you can select a value which is out of the printed range e.g. 15.
6. Load a new plate and wait for the printer to become ready.
7. Key in the selected value in the "VSD3" box in the PWAdjUtil and click "Print"
8. Repeat step 3 – 7 until an almost perfect straight line is printed at the center position. See example below with the setting of 12.

Important: If the lines are straight in one end and not in the other, then the slant of the head might need to be adjusted. Please refer to the head slant adjustment.

If the head slant is intentionally set to a small slant then select the line that looks best on an average in the middle of the line.

Note: The PlateWriter can print with two channels. The PWAdjUtil will adjust all channels to the same value when "Write" is clicked. The actual bidirectional testjob is printed using channel 5 (Black) only.

