

Technical Bulletin

RJ-900 Print Head Alignment

OVERVIEW

As with all printers produced by Mutoh, the head alignment steps on the RJ-900 and RJ-901 are quite straightforward. These steps are common across the entire Mutoh product line although different names may be used for each function from time to time.

This bulletin includes the relevant pages from the Mutoh service manual, along with corrections for instructions that may be inaccurate or out of date.

MATERIALS NEEDED

- #2 Philips screwdriver - for removing cover screws
- 5x or greater power loupe
- Flashlight - a single LED unit such as a Mini Maglite is preferable due to its brightness. Also, a blue LED light may help illuminate the yellow alignment patterns, which can be very difficult to see under normal lighting conditions.
- At least 10 to 15 feet of available paper for printing the alignment patterns.

PROCEDURE

1. Start the printer in Self Diagnostic Mode by holding down the UP, DOWN, and RIGHT arrow keys during initialization. Release the keys when the printer displays Check: Test.
2. Press the RIGHT arrow key to display Check: Adjustment. Make sure that you have paper loaded and the lever is down before you press ENTER.
3. Using the menu tree shown on the following page as a guide, go through the steps in this order:
 - a) Nozzle check. This step is to ensure that the head is firing properly.
 - b) Slant check 1. In this step, you will compare the first (black) and last (yellow) channels to determine if the head is slanted. This can be adjusted through a lever on the side of the head carriage.
 - c) Slant check 2. This pattern determines whether there is a vertical adjustment (slant) to the print head. This step is generally not necessary unless the head carriage has been replaced or reinstalled.
 - d) Uni-directional alignment. This adjusts the electronic timing of each of the 8 channels on the print head to each print mode (the print mode is a combination of head height and carriage speed).
 - e) Bi-directional alignment. This is a single adjustment that compensates for the alternating directions of carriage travel when printing bi-directionally. One adjustment must be made for each print mode.














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5.5 Adjustment Menu

In this menu, the printing position can be aligned and media feed operation can be corrected.
The adjustment menu includes the following diagnosis menus.

Table 5-4 Diagnosis Items in Adjustment Menu

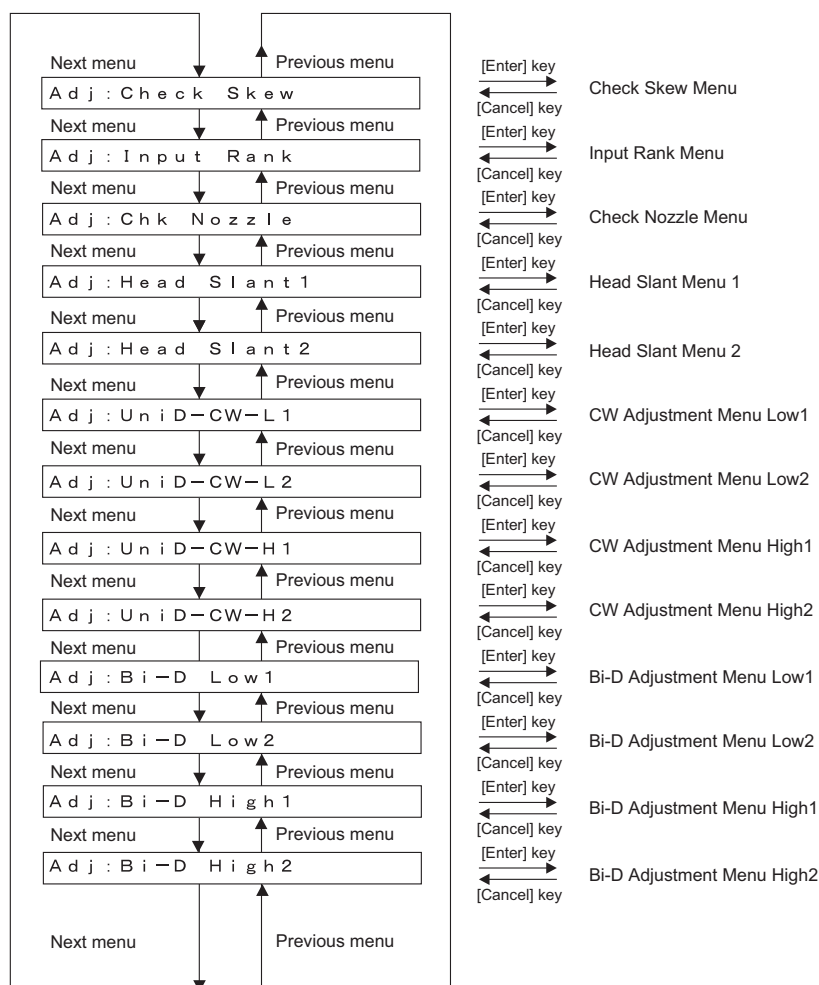
Diagnosis item	Contents	Reference
Skew check	Performs media feed and detects the degree of skew in media feed by the sensor.	 "5.5.1 Skew Check Menu" p.5-24
Head rank input	Enters the characteristic value of the print heads in use. After the entry, charge ink.	 "5.5.2 Head Rank Input Menu" p.5-25
Head nozzle check	Prints out a printing to check the ink discharge performance of the head nozzles.	 "5.5.3 Head Nozzle Check Menu" p.5-26
Head slant check 1	Prints out a printing to check for print head slant (horizontal direction). Mechanical adjustment must be performed as necessary.	 "5.5.4 Head Slant Check Menu 1" p.5-28
Head slant check 2	Prints out a printing to check for print head slant (vertical direction). Mechanical adjustment must be performed as necessary.	 "5.5.5 Head Slant Check Menu 2" p.5-29
CW adjustment	Prints out a printing to adjust uni-direction (CW direction) printing between nozzles. Low 1: PG Low 3-peak waveform Low 2: PG Low 6-peak waveform High 1: PG High 3-peak waveform High 2: PG High 6-peak waveform	 "5.5.6 CW Adjustment" p.5-31
Repeatability adjustment	Prints out a printing to align the positions of the repeated printings. Low 1: PG Low 3-peak waveform Low 2: PG Low 6-peak waveform High 1: PG High 3-peak waveform High 2: PG High 6-peak waveform	 "5.5.7 Repeatability Adjustment Menu" p.5-35
CCW adjustment	Prints out a printing to adjust uni-direction (CCW direction) printing between nozzles. Low 1: PG Low 3-peak waveform Low 2: PG Low 6-peak waveform High 1: PG High 3-peak waveform High 2: PG High 6-peak waveform	 "5.5.8 CCW Adjustment" p.5-38
Band feed correction	Prints out a printing to correct the media feed amount for each pass.	 "5.5.9 Band Feed Correction Menu" p.5-41
Top & bottom adjustment	Sets the top & bottom margins.	 "5.5.10 Top and Bottom Adjustment Menu" p.5-42
P_REAR sensor position adjustment	Adjusts the P_REAR sensor position using cut media.	 "5.5.11 P_REAR Sensor Position Adjustment Menu" p.5-43

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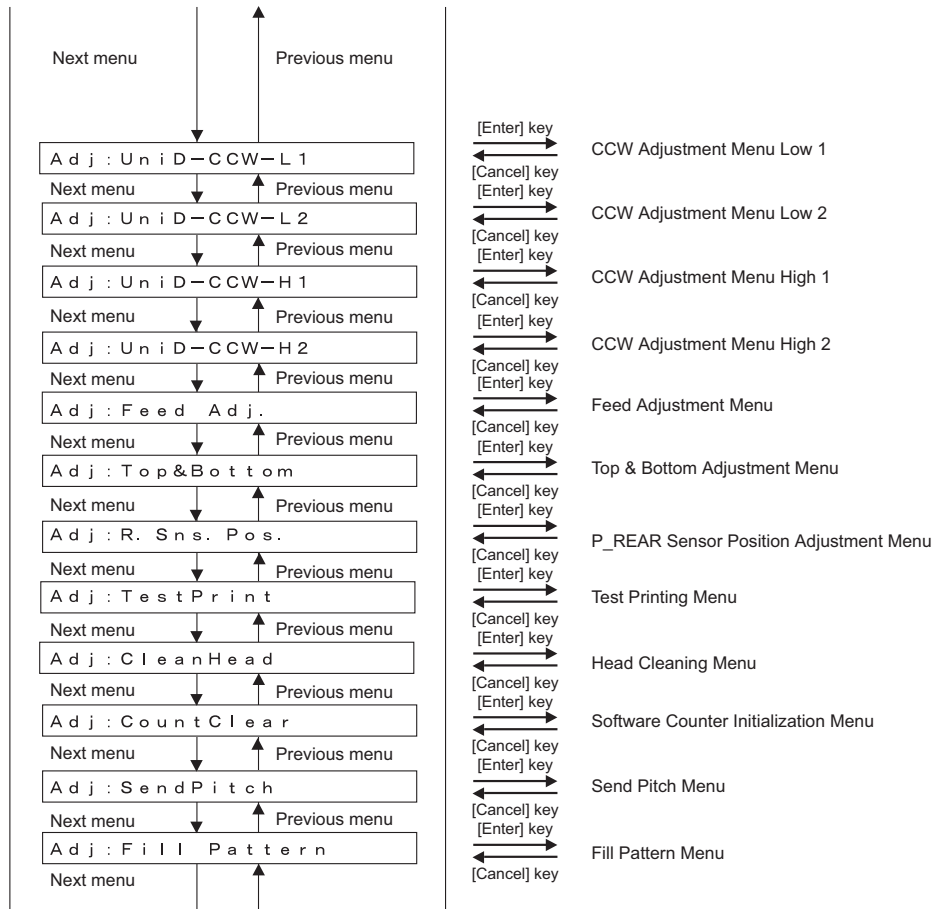
Table 5-4 Diagnosis Items in Adjustment Menu (Continued)

Diagnosis item	Contents	Reference
Test printing	Prints out a nozzle check pattern and adjustment variables.	"5.5.12 Test Printing Menu" p.5-44
Head cleaning	Cleans the tubes and heads using cleaning liquid.	"5.5.13 Head Cleaning Menu" p.5-45
Software counter initialization	Clears various software counters.	"5.5.14 Software Counter Initialization Menu" p.5-46
Feed amount check	Used to check the media feed amount per band.	"5.5.15 Feed Pitch Check Menu" p.5-46
Solid print check	Performs solid nozzle print check (color selection, nozzle selection and print direction selection are available).	"5.5.16 Solid Print Menu" p.5-48



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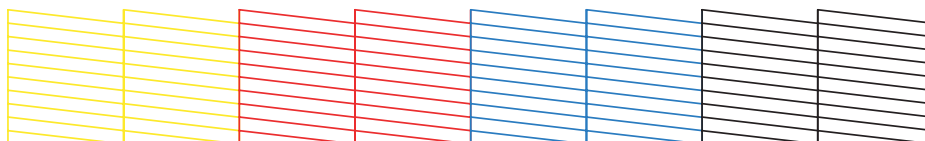
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5.5.3 Head Nozzle Check Menu

In this menu, the head nozzle printing to confirm ink is fired from nozzles correctly after the ink charge, are available. To check the head nozzle condition, follow the steps below. To check the head nozzle, follow the steps below.

1. Set media as necessary.
2. After media is set, the machine prints out head nozzle check patterns in the following modes.
 - 1 pass, unidirectional
 - PF: 360 dpi
 - CR: 360 dpi
3. Check the printed head nozzle check patterns for the following points.
 - Ink nozzle discharge amount (omission, discontinuity, meandering)
 - Satellite
 - T fence
 - Nozzle alignment in vertical direction
 - Nozzle alignment in horizontal direction

Nozzle check: Prints the patterns in the order of A to H.



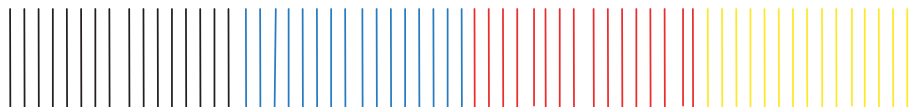
Vertical nozzle alignment check: Prints the patterns in the order of A to H.



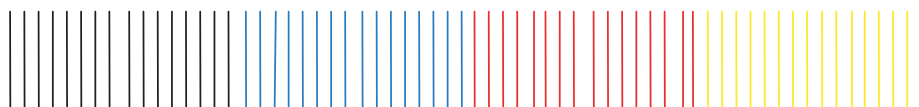
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Horizontal nozzle alignment check (CW direction): Prints the patterns in the order of A to H.



Horizontal nozzle alignment check (CCW direction): Prints the patterns in the order of A to H.

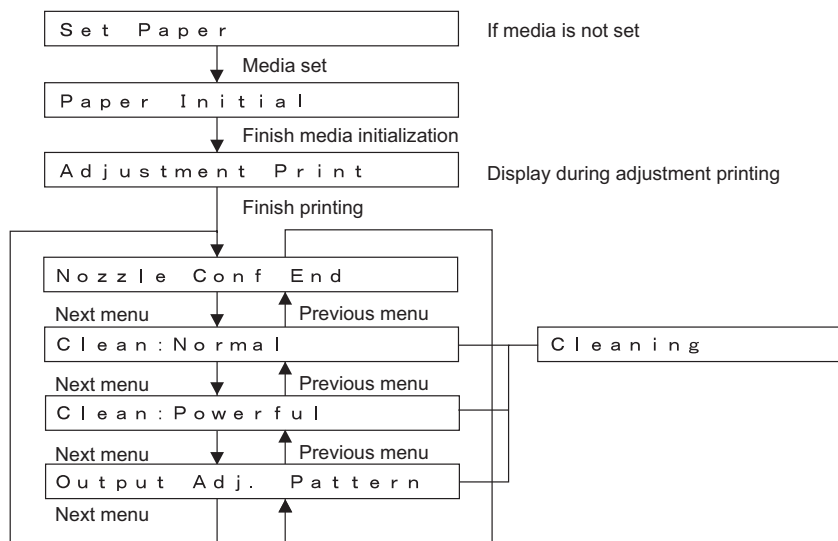


- If any abnormal conditions are found in the ink discharge status of the head nozzles, perform cleaning.

TIP

☞ "5.5.15 Feed Pitch Check Menu" p.5-46

- After cleaning, make the machine print out head nozzle check patterns again.



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7.7 Head Alignment Adjustment(Horizontal Height)

This section describes the procedure to adjust the head slant in horizontal direction.

When you have removed and installed the head assembly, such as for head assembly replacement, always adjust the head slant and depth following the steps below.

NOTE

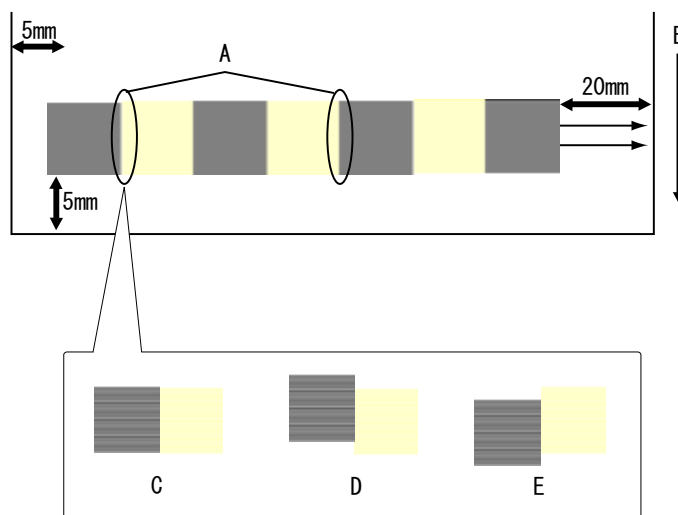
Before starting adjustment, remove the following parts.

- CR board cover: [☞ "4.6.1 Replacing Print Head" p.4-37](#)
- Cable cover R: [☞ "4.6.1 Replacing Print Head" p.4-37](#)

1. Start the system in self-diagnosis function mode and print the adjustment patterns in "Head Slant Check Menu 1".

[☞ "5.5.4 Head Slant Check Menu 1" p.5-28](#)

2. Make adjustment based on the printed adjustment patterns.



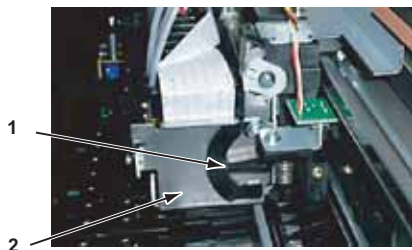
A: Check the slant at this point.

B: Media feed direction

C: OK

D: Move the head adjusting cam upward.

E: Move the head adjusting cam downward.



No.	Part name
1	Head adjusting cam
2	Head mounting plate

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7.8 Head Alignment Adjustment(Slant)

This section describes the procedure to adjust the head slant in vertical direction.

After operation such as head assembly replacement, adjust the head slant according to the steps below.

NOTE

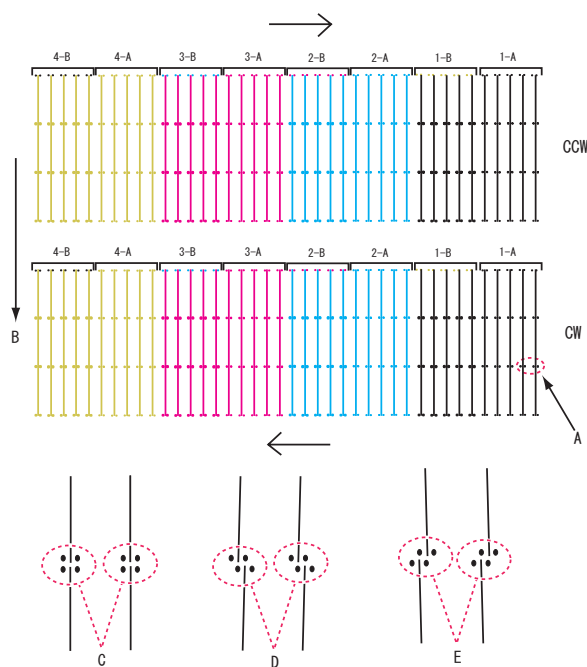
Before starting adjustment, remove the following parts.

- CR board cover:  "4.6.1 Replacing Print Head" p.4-37
- Cable cover R:  "4.6.1 Replacing Print Head" p.4-37

1. Start the system in self-diagnosis function mode and print the adjustment patterns in "Head Slant Check Menu 2".

 "5.5.5 Head Slant Check Menu 2" p.5-29

2. Make adjustment based on the printed adjustment patterns.



A: Check the point to check the vertical slant angle.

B: Media feed direction

C: OK

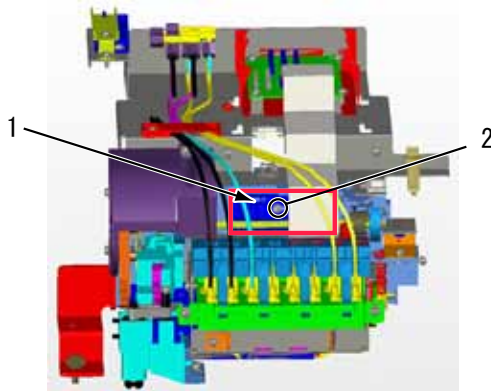
D: Move the vertical-slant adjusting tab to the right.

E: Move the vertical-slant adjusting tab to the left.

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3. Loosen the vertical-slant adjusting tab screw and move the tab left and right to adjust the head vertical angle.



No.	Part name
1	Vertical-slant adjusting tab
2	Vertical-slant adjusting tab screw

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5.5.6 CW Adjustment

This menu is used to adjust the gap of the print positions caused by CR passes.

To adjust the gap of it, at first print out Uni-D printing and confirm the differences of print position. Then, enter the difference for the relevant parameters.

Adjustment items are shown in the tables below.

Table 5-6 Uni-D Menu Items

Item	Contents
CW adjustment Low 1	CW adjustment for low head height, PG 1 value, using 3-peak waveform
CW adjustment Low 2	CW adjustment for low head height, PG 1 value, using 6-peak waveform
CW adjustment High 1	CW adjustment for high head height, PG 2 value, using 3-peak waveform
CW adjustment High 2	CW adjustment for high head height, PG 2 value, using 6-peak waveform

Table 5-7 Uni-D Adjustment Items

Item	Contents
Gap1A-1B	Uni-D (CW) adjustment of nozzle row B to nozzle row A
Gap1A-2A	Uni-D (CW) adjustment of nozzle row C to nozzle row A
Gap1A-2B	Uni-D (CW) adjustment of nozzle row D to nozzle row A
Gap1A-3A	Uni-D (CW) adjustment of nozzle row E to nozzle row A
Gap1A-3B	Uni-D (CW) adjustment of nozzle row F to nozzle row A
Gap1A-4A	Uni-D (CW) adjustment of nozzle row G to nozzle row A
Gap1A-4B	Uni-D (CW) adjustment of nozzle row H to nozzle row A

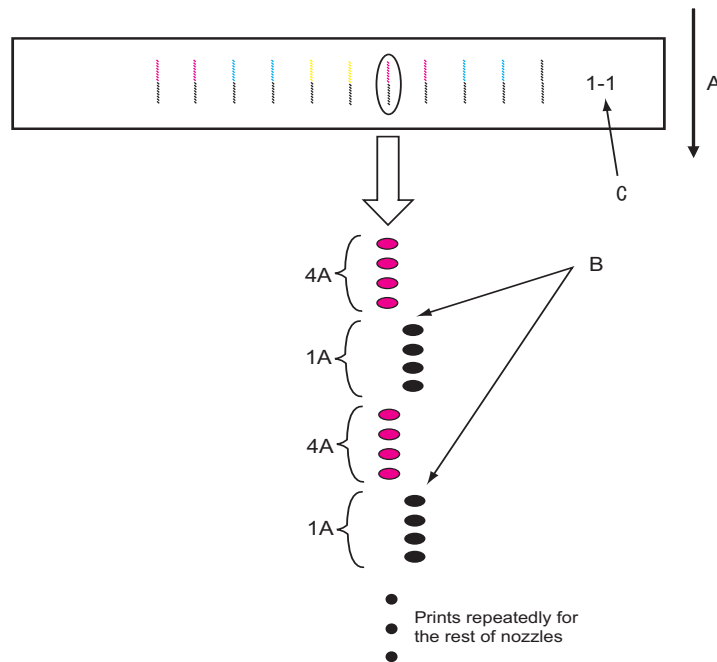
The actual procedure is as follows.

1. Set media as necessary.
2. After media is set, the machine prints out CW adjustment check patterns.

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- Check the printed CW adjustment check patterns for the following points.
(The following shows a case for CW adjustment Low 1)
Print the patterns in the order of A&B / A&C / A&D / A&E / A&F / A&G / A&H.



A: Media feed direction

B: Adjust the setting value so that the printed dots are aligned at this connecting point.

C: The number shows the performed adjustment items.

1-1: CW adjustment Low 1

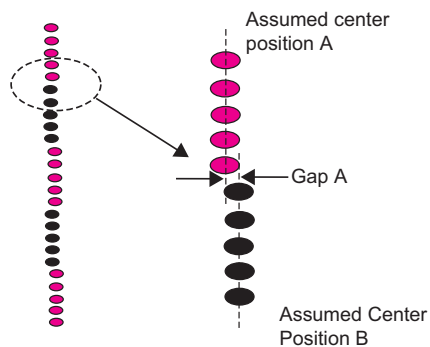
1-2: CW adjustment Low 2

2-1: CW adjustment High 1

2-2: CW adjustment High 2

* For CW adjustment Low 2, High 1 and High 2, perform adjustment using the same procedure.

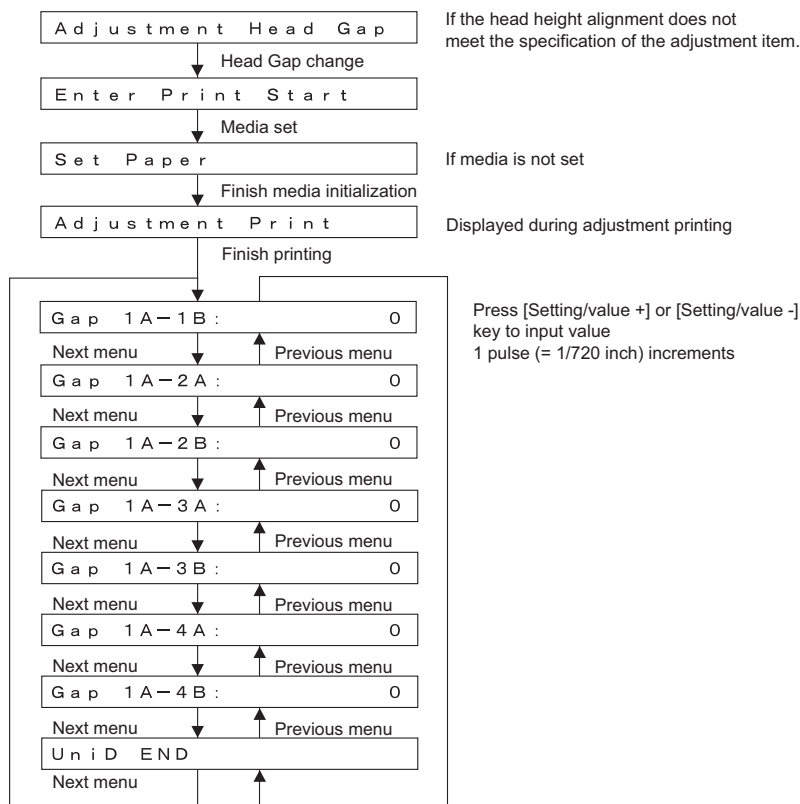
** Detail on B is as follows. Make an adjustment so that the size of the gap A below is smaller than the half size of the dot.



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- If any abnormal conditions are found, identify the gap of the print positions and enter it as the CW adjustment parameter.
After entering the parameter, make the machine print out the check patterns again as necessary.
(The following shows a case for CW adjustment Low 1)



Ideal



No
Correction
Necessary

In Spec



Within 1/2 dot
tolerance, slight
adjustment toward
ideal will improve
image quality.

In Spec



Within 1/2 dot
tolerance, slight
adjustment toward
ideal will improve
image quality.

Out of Spec



Align this condition
by changing the
number on the LCD
to a larger (less
negative) number.

Out of Spec



Align this condition
by changing the
number on the LCD
to a smaller (more
negative) number.

Alignment note: 1 dot equals 9 increments on the display. Test one color and reprint pattern first.

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5.5.7 Repeatability Adjustment Menu

This menu is used to align the head positions for repeatability printing.

To align the head position for repeatability printing, at first print out a Bi-D printing and identify the difference between the CW printing position and the CCW printing position. Then, enter the difference between the relevant parameters.

Due to head characteristics, only one adjustment value is used for all nozzle rows. Therefore, adjust the setting value so that performance of each row becomes average.

Adjustment items are shown in the tables below.

Table 5-8 Bi-D Items

Adjustment Item	Contents
Repeatability adjustment Low 1	Bi-D adjustment for low head height, PG 1 value, using 3-peak waveform
Repeatability adjustment Low 2	Bi-D adjustment for low head height, PG 1 value, using 6-peak waveform
Repeatability adjustment High 1	Bi-D adjustment for high head height, PG 2 value, using 3-peak waveform
Repeatability adjustment High 2	Bi-D adjustment for high head height, PG 2 value, using 6-peak waveform

The actual procedure is as follows.

1. Set media as necessary.
2. After media is set, the machine prints out repeatability adjustment patterns.

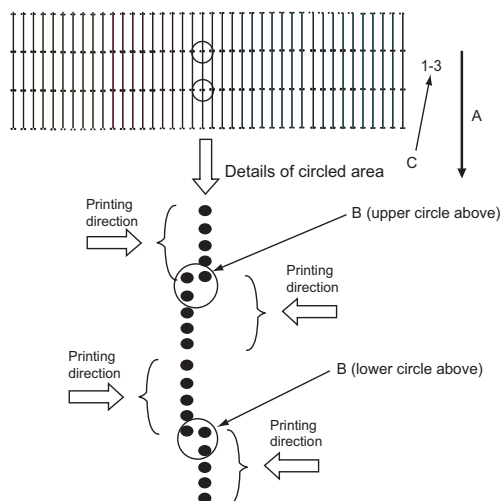
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3. Check the printed repeatability adjustment patterns for the following points.

* The pattern is printed with Bk row only.

(The following shows a case for repeatability adjustment Low 1)

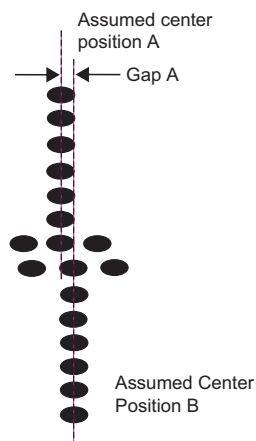


A. Media feed direction

B. Adjust the setting value so that the printed dots are aligned at this connecting point.

* Also for repeatability adjustment Low 2, High 1 and High 2, perform adjustment using the same procedure.

* Detail on B is as follows. Make an adjustment so that the size of the gap A below is smaller than the half size of the dot.

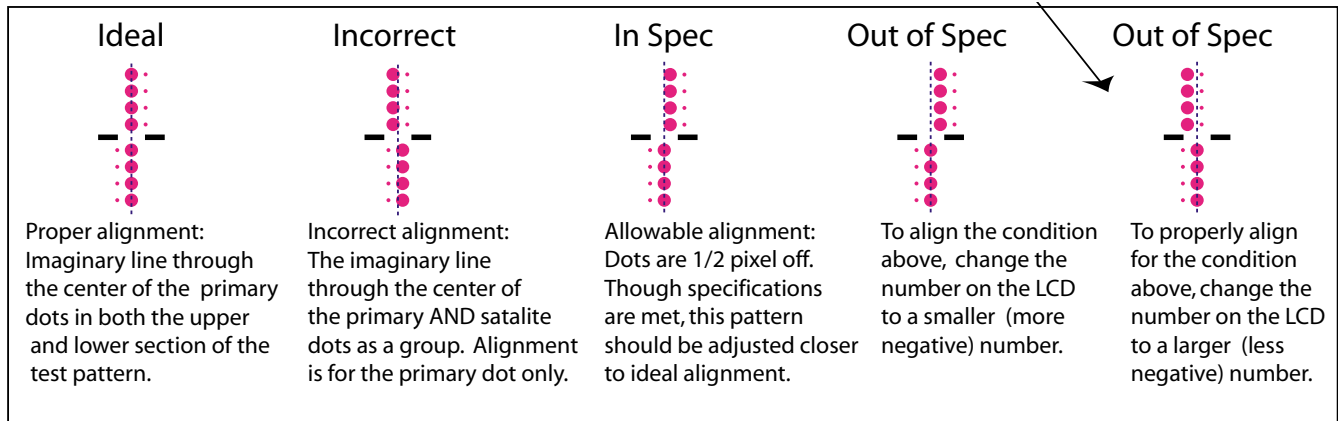


4. If any abnormal conditions are found, identify the difference between the CW printing position and the CCW printing position and enter the difference as the repeatability adjustment parameter.

In this case, note that while the alignment pattern shown to the left is theoretically correct, the actual pattern printed by the unit has an error in it. Note how the top and bottom passes of the pattern at left are perfectly aligned? On the RJ-900's alignment pattern, the top and bottom passes will not align. This is because, for some reason, the first CW pass of any print is always offset compared to all subsequent CW passes. For this reason, always perform your Bi-D alignments by comparing the second (CCW) pass to the third (CW) pass. In the image at left, these are shown as the upper two passes.

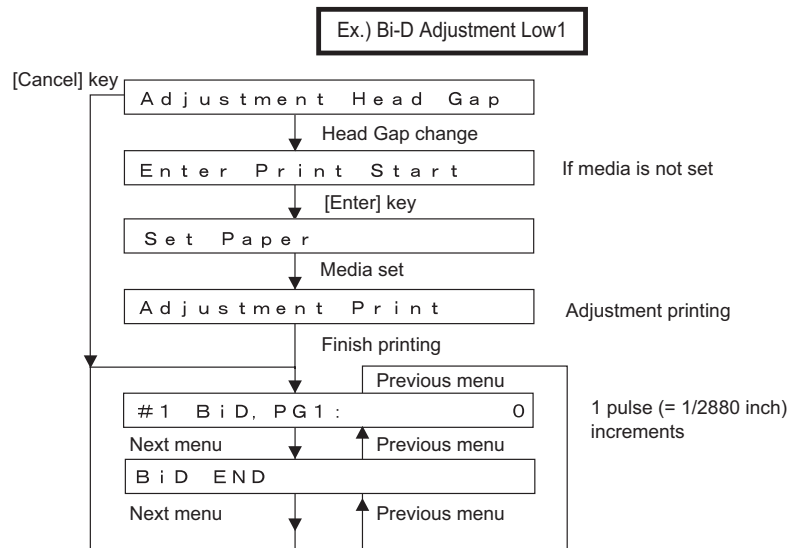
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As with the Uni-D (CW) alignments, 1 dot of movement equals 9 increments on the display.

- If any parameters are changed, make sure to update the parameters.



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4. Once you have completed all of the preceding alignments, print a confirmation.

a) From the Adjustment menu, press Cancel to return to Check: Adjustment.

b) Press the RIGHT arrow key until you see Check: Print. Press ENTER.

c) Press the RIGHT arrow key until you see Print: Adj. Variable. Press ENTER to print.

Write the date on the resulting print, roll it up, and store it inside the left hand cover of the printer.

You may also use the Mutoh Maintenance Engineer Assistant program to take a backup of the machine's memory. See GOTEK TIB 1006-002 for directions on using that program.

5. Power off and restart the printer normally. It should now be aligned and ready to use.

