

Geometric Correction

72-3511B-A

Apr. 15, 2003

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Revision History

Revision	Date	Author	Comments
0.01	19-Jan-1998	Mike Bogelund	Initial Work
0.02	26-Feb-1998	Mike Bogelund	Document Instructions Clarified and Scaling Correction Added
0.03	26-Mar-1998	Mike Bogelund	Document corrected after testing.
1.0	27-Mar-1998	Steve Froese	Added support for all systems and plate sizes and general edit for release
2.0	19-Dec-00	Steve Froese	Added plot 114 to procedure and removed .ps files
3.0	07-Sept. 01	Steve Froese	Document updated
4.0	15-Apr-03	Steve Froese	Document revised to remove IP information

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1. INTRODUCTION

This document provides a procedure that can be used to align 2 or more Creo recorders in the field. This procedure has become necessary because machines have adjusted during the shipping process to a point where plates printing on multiple machines may not register when put on press.

2. BEFORE YOU START

Due to the addition of a new diagnostic plot used in this procedure, the correct firmware version is to be installed on the imaging devices before you begin.

- **Trendsetter 800 and 400/800 Quantum - version 2.40 or higher**
- **Trendsetter Quantum Autoloader - version 1.42 or higher**
- **VLF Trendsetter - version 1.50 or higher (thermal only)**
- **VLF Platesetter – version 2.40 or higher**
- **3244 Platesetter - version 2.28 or higher (thermal only)**

For each machine, make sure that there is a serial cable connecting the diagnostic port on the CTP machine to the COM3 port on the corresponding workstation or to a free COM port on a laptop.

Power up all the machines and workstations in the normal fashion.

Keep in mind that all measurements with the microscope should be in micro-meters (microns).

2.1. Checking Laser Operation

It is important to first verify the laser head is operating properly on all machines to be matched prior to starting the alignment procedure. Before proceeding, please ensure the laser head is installed and functioning properly. Refer to the thermal head troubleshooting guide for reference.

2.2. Setting Up

For each machine, open up a diagnostic session on the workstation or laptop.

In the terminal window type:

>>set gc

Record the first 5 values from this display. If the system is a 32xx MPE Trendsetter, also record the value for “sprot”. If the system is a VLF Trendsetter or MCE Trendsetter 400/800, also record the values for “sprot” and “vsprot”. Now type:

>>set hdp

and record the value shown for 'sssa' Recording these values will allow you to return the machine to it's original state if necessary. Repeat this for each workstation.

2.3. Description of Terminology

For the rest of this document, several terms will be used to describe orientation and locations on the plate. Figure 1 below shows a plate and points out the various edges that will be referenced.

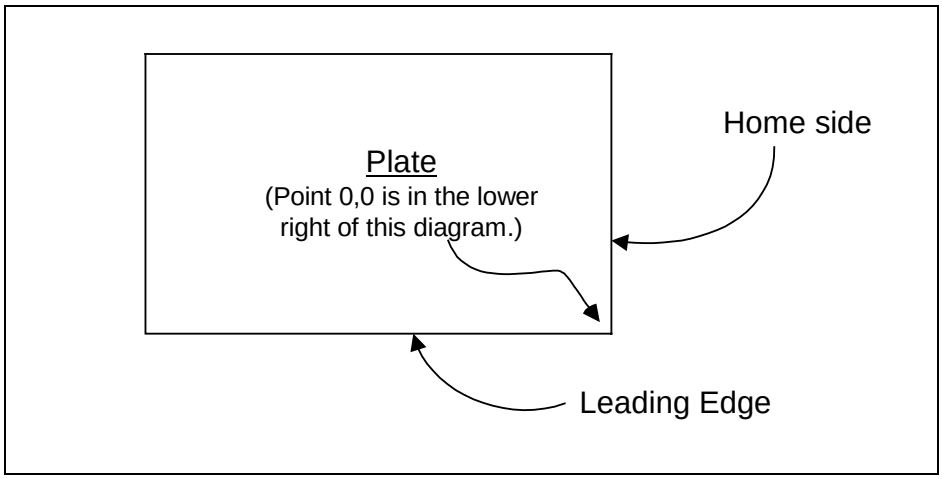


Figure 1: Definition of Plate Locations and Reference Points

3. ALIGNING THE MACHINES

1. Pick a recorder to be the reference machine. This recorder will be the baseline for the other machines to match.
2. This procedure will utilize two diagnostic plots. Plot 100 has solid cross-hairs, and plot 114 is identical to plot 100 except it utilizes dashed cross-hairs.
3. You can use any plate size, but ensure that the same plate is used on all machines to be matched. If you are matching trendsetters, please be sure to load them as specified in the operator's manual. Since these machines have multiple registration pins, it is imperative that the plate is centred on the 2 pins in use. The table below will specify which gc parameters are to be adjusted for different size plates.
4. Image a plate using "plot 100" on the reference machine, but don't process the plate yet.
5. Double expose the plate by imaging it on the next machine, this time using "plot 114".
6. Now, process the plate if required.
7. Using a 100x microscope, determine the rotation difference between the two images. You will be able to differentiate between the two images because the

reference machine has a solid screen and the machine to be adjusted has a dashed one. The variation must be measured at the registration pin locations. Use the table below to determine the registration pin locations as measured out from the centre of the plate. At each location, use the microscope to measure the error between the centres of the crosses that are 1" up from the plate edge.

Table 1 – pin positions as measured from centre of plate

Platesetter

	3244	dist. between pins (x) [microns]
Pin position	257mm	514000µ
gc parameter	prot	

Trendsetter

Plate size (width)	32xx pin position	(x) [µ]	gc parameter	VLF pin position	(x) [µ]	gc parameter
< 22" [<559mm]	140mm	280000	sprot	140mm	280000	vsprot
≥22" [≥559mm]	257mm	514000	prot	252mm	504000	sprot
>30" [>762mm][1]	NA	NA	NA	348mm	696000	prot

Make sure to note whether the solid cross is above or below the dashed cross, assigning a minus sign to values where the solid cross is below the dashed cross (ie. closer to the leading edge). Remember that the units must be microns.

[1] VLF size only

Figure 2 provides a graphical example of this measurement.

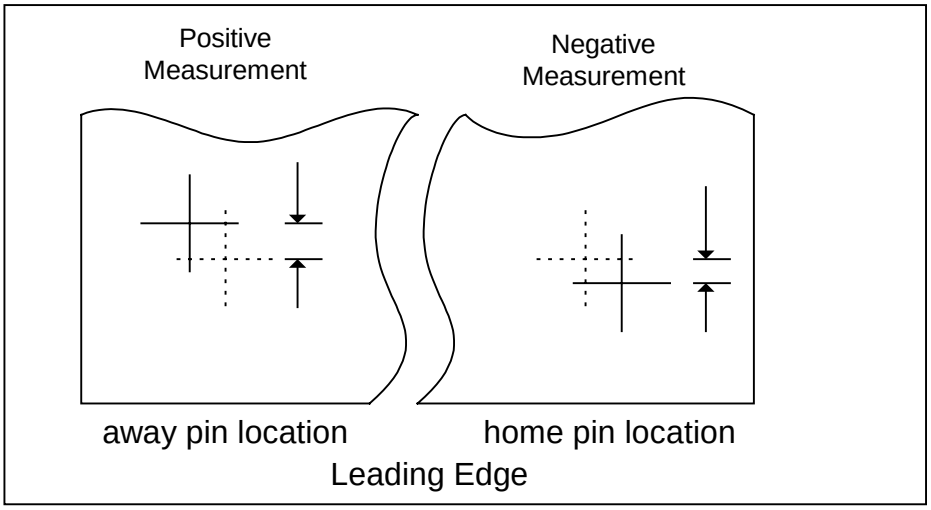


Figure 2: Measuring to find the rotational error.

8. Calculate the difference in the errors to get the change in Y. Make sure to subtract the measurement at the home side pin position from the one at the away side, as this will ensure proper orientation. Use this value and the distance between the pins (x) and calculate a rotation angle with the following formula:

$$m = \tan^{-1}\left(\frac{ChangeinY(microns)}{x(microns)}\right)$$

Note: Make sure to use a calculator in radian mode or else remember to convert the result to radians.

9. The resulting value should be added to the current prot/sprot/vsprot value in the machine being aligned (ie. Not the reference machine). To change the value in the nvs setup, type:

   >>set gc prot *n*

   or

   >>set gc sprot *n*

   or

   >>set gc vsprot *n*

   Where "*n*" is the "*m*" value calculated above added onto the original prot/sprot/vsprot value (*n = m + original value*).

10. Now save the changes to the nvs value(s) by typing:

    >>nvs save gc

11. Print another double exposed plate as above. Once again, use the microscope to check the errors at the crosses at the appropriate points along the leading edge. Make sure the error between the two points is within 10 micron of each other

[~0.5 mil]. If not, repeat from step 7. Figure 3 shows where the measurements should be taken this time. Once the error is close, these values will be used in step 11 to calculate the main scan shift offset.

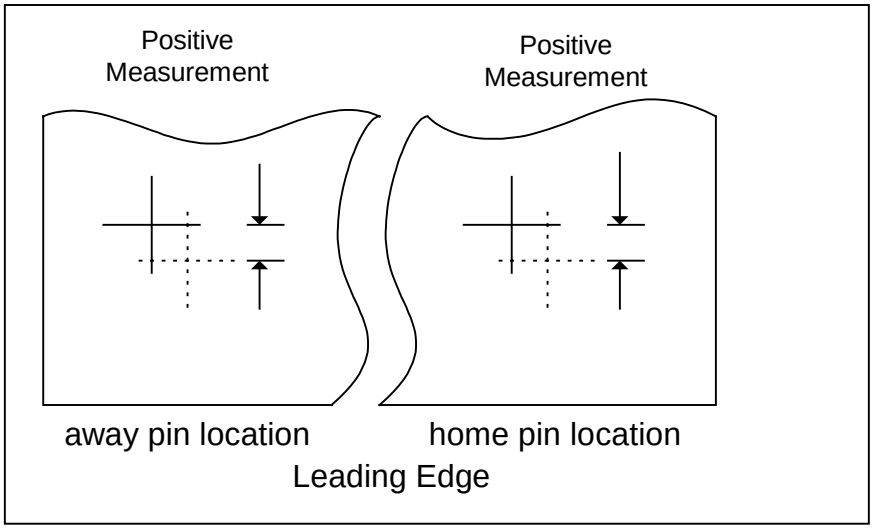


Figure 3: Measuring to Correct Main Scan Shift

12. If the errors are close, average the two values to obtain the "main scan shift" error. If the solid crosses are closer to the leading edge of the plate than the dashed ones, then this error should be a negative value, if the solids are farther away then it should be a positive value. Use the following commands to edit the gc parameter, where "value" is the averaged error in mils added onto the original value in nvs.

Note: You will have to convert the error value that is in microns to mils, to do this simply divide by 25.4.

>>set gc mssa *value*

13. Now save this change again using the following command:

>>nvs save gc

14. Now, still with the same plate, make two more measurements. This time measure along the home side to positions at 2 and 12 inches. At each point, measure the error between the cross positions and note which cross is closer to the home side. If the solid cross is closer to the edge then the measurement should be given a minus sign. If the solid cross is farther from the edge than the dashed one then leave it as a positive value. Figure 4 illustrates this measurement for clarity.

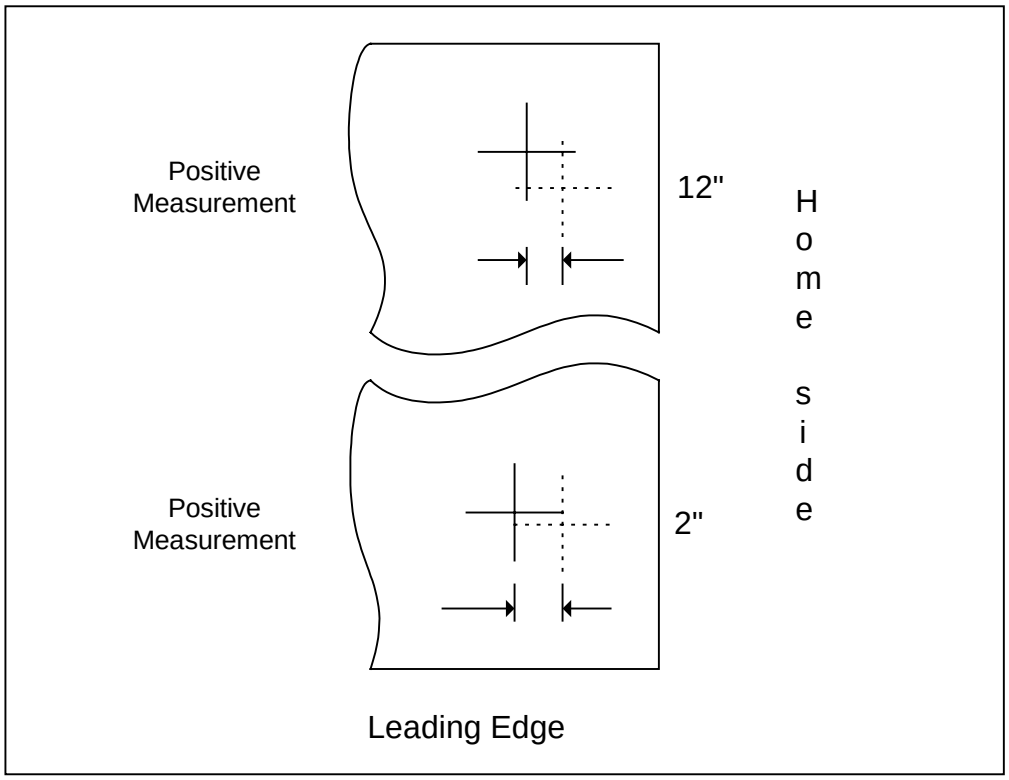


Figure 4: Measurements to Correct Sub Scan Shift

15. Average the two errors obtained in step 13 to get the required "sub scan shift" adjustment. Again, if the solid crosses are farther away from the edge than the dashed crosses this number should be negative. Use the following two commands to change and save the shift parameter. "*n*" represents the calculated value added onto the original value; make sure you convert your measurements to mils before adding onto the original value. (The sssa value is special hence the use of hdp instead of gc in the command.)

    >>set hdp sssa *n*

    >>nvs save hdp

16. Still on the home side, and still at 2 and 12 inches along that edge, take two more measurements. At each cross, measure the vertical error between the solid and dashed lines along the home side. If the solid cross is farther from the leading edge than the dashed cross then simply record the error. But if the dashed cross is the one farther from the leading edge, add a minus sign to the measurement. Figure 5 provides a visual representation of this step.

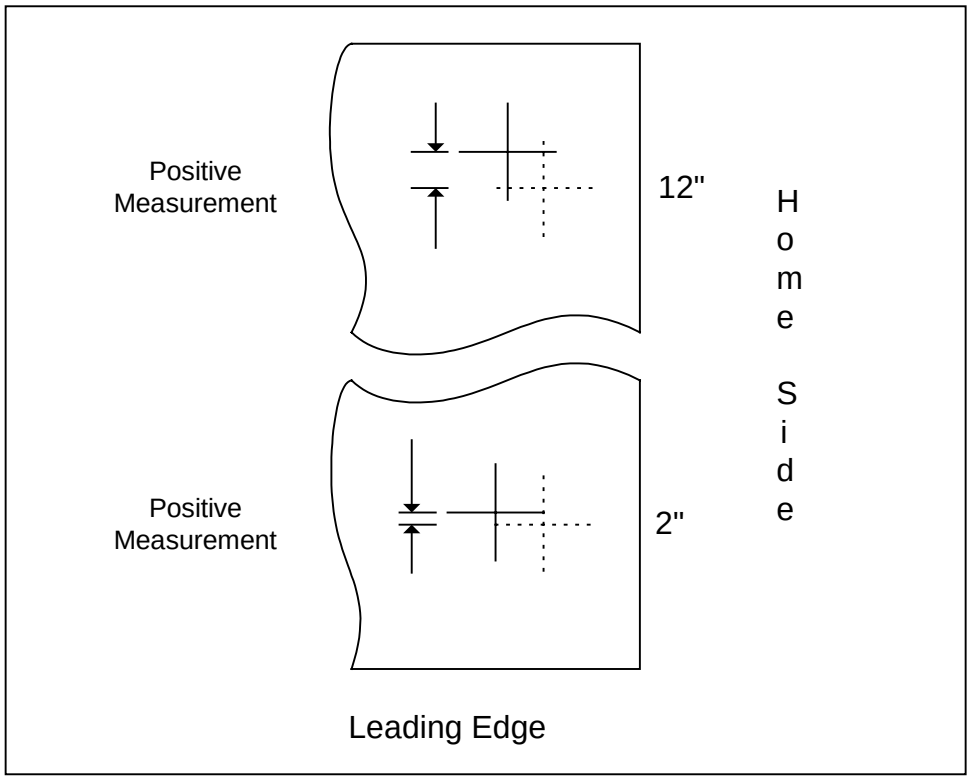


Figure 5: Measurements to Correct for Main Scan Scale

17. Subtract the error from the cross at 2 inches from the error at the 12 inch cross. Use the following equation to calculate the "main scan scale" adjustment which is required. error in the equation is the result of the subtraction done at the beginning of this step. Retain whatever sign is associated with the number.

$$scale(ppm) = \frac{error(microns)}{0.254}$$

Enter this value into the nvs parameters using the following commands:

>>set gc msca *n*

where "*n*" is the scale value from above added onto the old mssca value which you recorded before starting the alignment procedure.

18. Now switch back over to the leading edge. At 2 and 12 inches measure the horizontal error between the solid and dashed crosses along the leading edge. If the solid cross is farther from the home side than the dashed cross then simply record the error. But if the dashed cross is the one farther from the home side, add a minus sign to the measurement. Figure 6 provides a visual representation of this step.

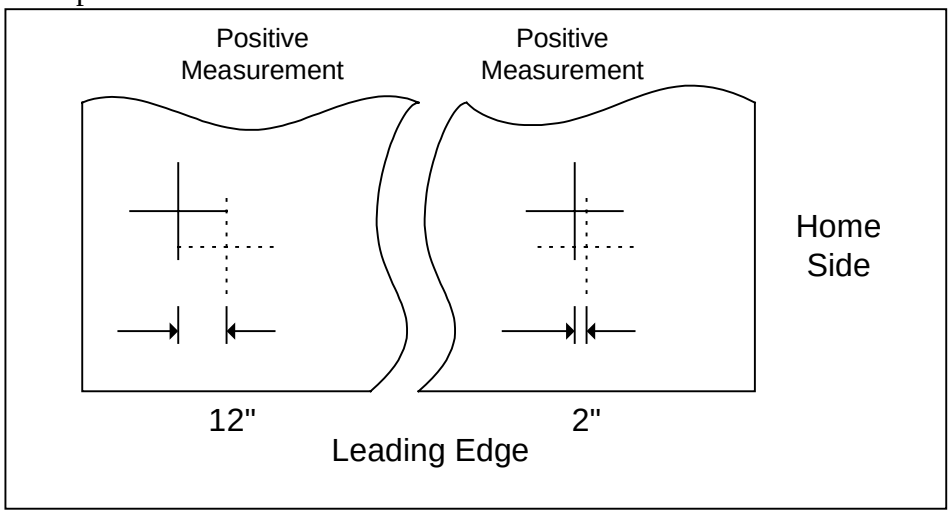


Figure 6: Measurements to Correct for Sub Scan Scale

19. Subtract the error measured at 2" from the error measured at 12" and use the equation given in step 17 to calculate the required adjustment to sub scan scale.

20. Enter this value into the nvs parameters using the following command:

    >>set gc ssca *n*

    once again, "*n*" is the calculated scale added onto the old value.

21. Save these new changes in nvs using the save command.

    >>nvs save gc

This recorder should now be aligned to register with the reference recorder. If there are more recorders you would like aligned then repeat the process for each one remembering to keep the same reference machine all the way through.