

# Disco DAD 3220 Dicing Saw SOP

## Purpose and Scope

This document provides job breakdowns and references for the Disco DAD 3220 Dicing Saw operations.

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## Reference Documents

Reference Documents	Specification No.
NanoFab User Guide	<a href="https://www.nanofab.utah.edu/documents/2016/02/smbb-user-guide.pdf">HTTPS://WWW.NANOFAB.UTAH.EDU/DOCUMENTS/2016/02/SMBB-USER-GUIDE.PDF/</a>

## Acronyms, Abbreviations and Definitions

Term	Description
SOP	Standard Operating Procedure
JB	Job Breakdown
JR	Job Reference

## Equipment and Supplies

Description	
Dicing Blade	See User Notes

## Safety

### Safety alert symbol



The Safety Alert Symbol is used in conjunction with signal words to convey a personal injury hazard is present.

### Signal words

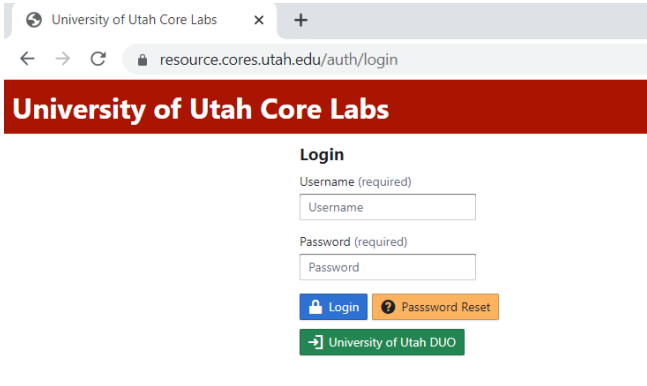
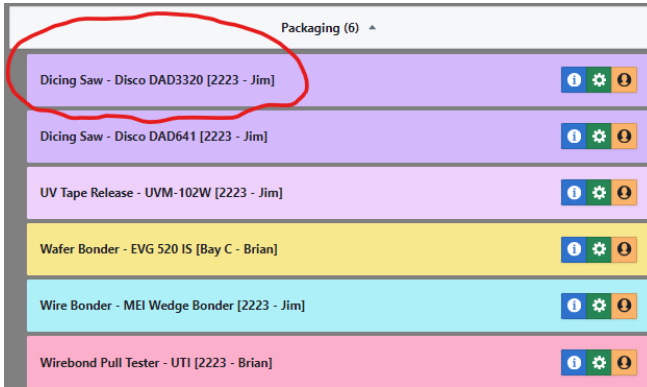
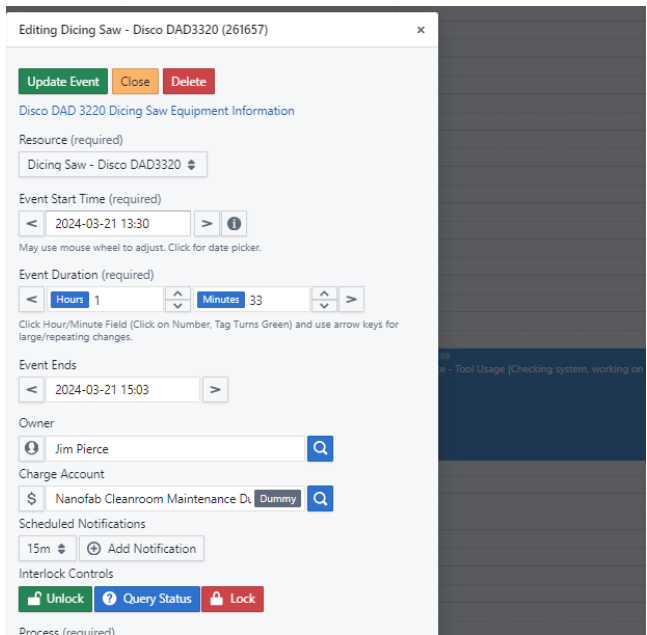
- DANGER** Indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. The Safety Alert Symbol should always be used.
- WARNING** Indicates a potentially hazardous situation, which if not avoided, may result in death or serious injury. If the safety alert symbol is NOT used in conjunction with this signal word, then the hazard conveyed is severe equipment or material damage.
- CAUTION** Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. If the safety alert symbol is NOT used in conjunction with this signal word, then the hazard conveyed is minor equipment or material damage.

## Forms

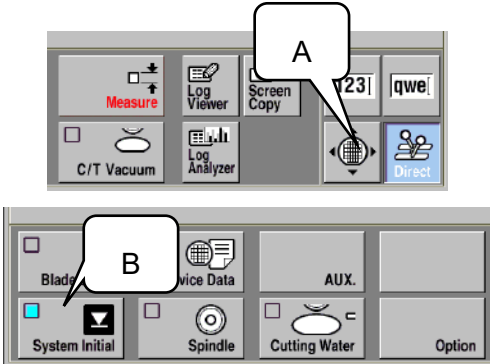
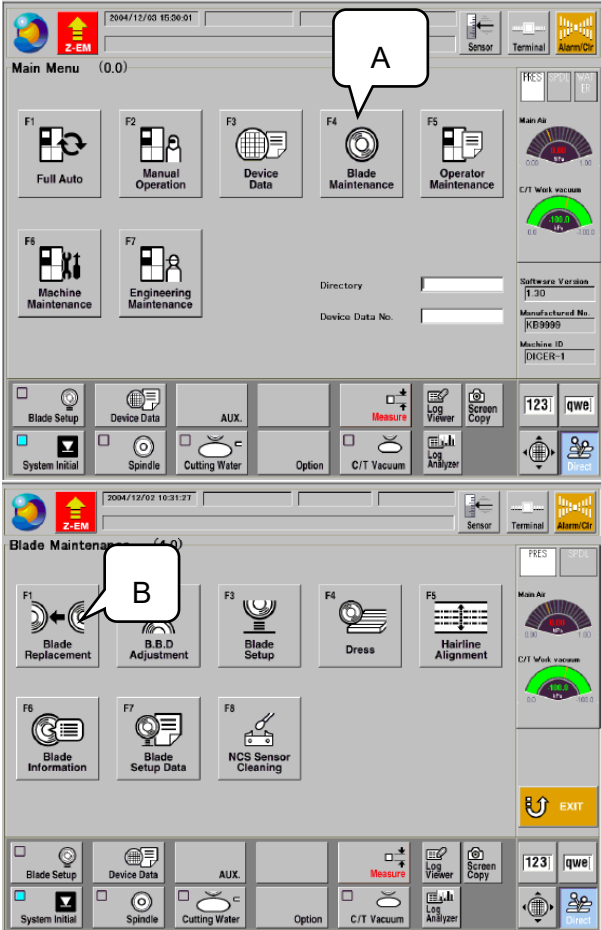
### Training Form

Trainee:									
Area:									
This person has been declared qualified to train others <input type="checkbox"/> (check if "Yes")									
Item #	Task	Date Training Completed	Trainer						
1									
2									
3									
4									
5									
6									
Training Notes (Optional)									
Run completion dates:	1)		2)		3)		4)		5)

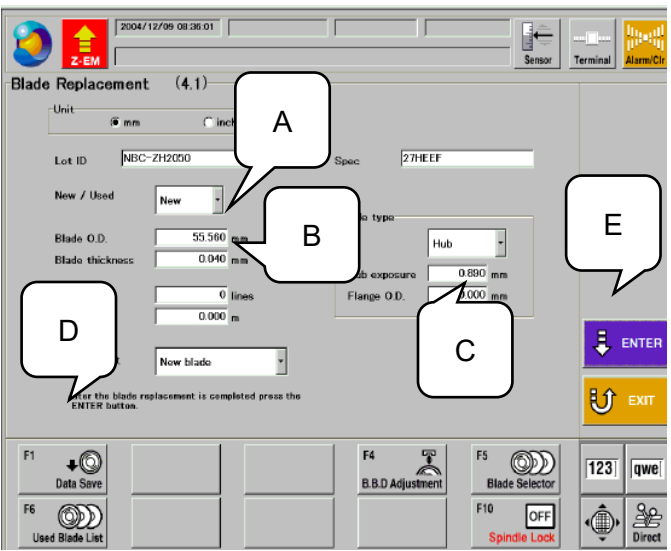
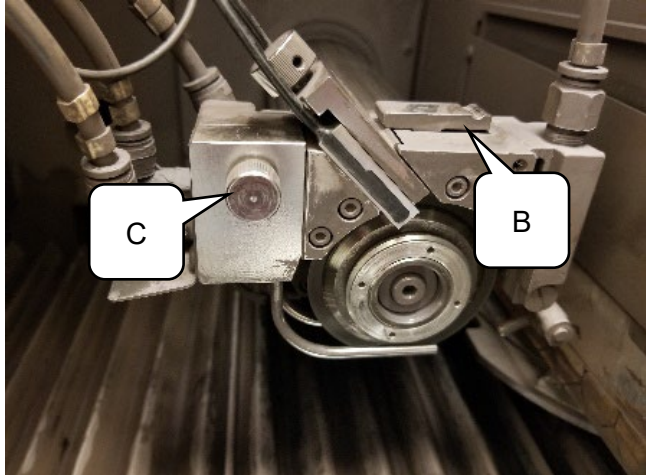
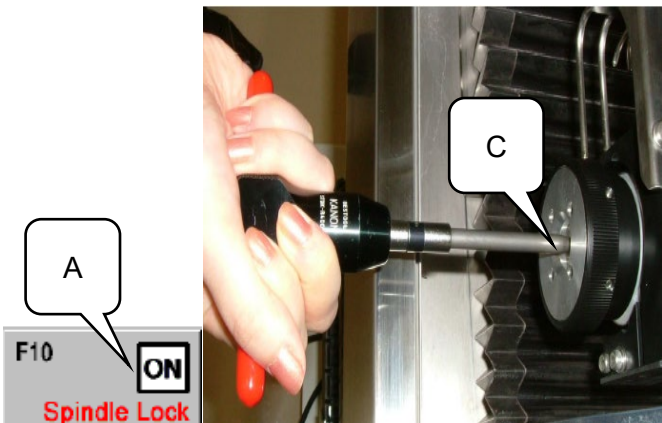
## JB1 – Enable/Disable the Disco Dicing Saw (1 of 1)

<p>1.</p>	<p>A. Log into HSC and navigate to the NanoFab packaging dropdown.</p>		<input type="checkbox"/>
<p>2.</p>	<p>A. Select the Disco DAD 3220 dicing saw. B. Select the desired block of time.</p>		<input type="checkbox"/>
<p>3.</p>	<p>A. Send "Unlock" to the tool for starting. B. Send "Lock" command for stopping.</p>		<input type="checkbox"/>

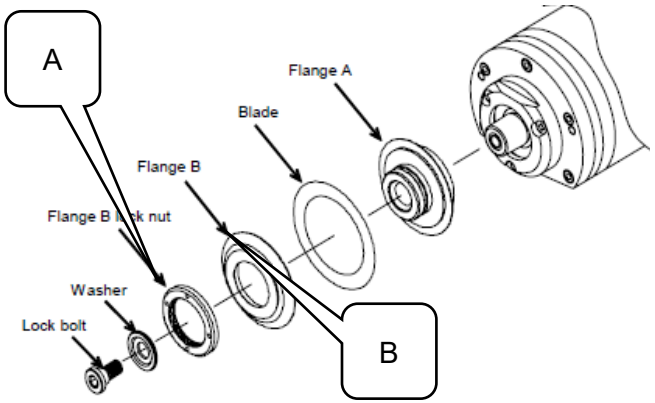
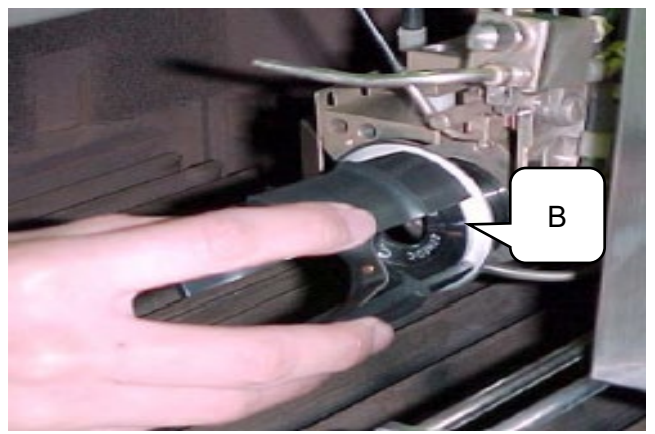
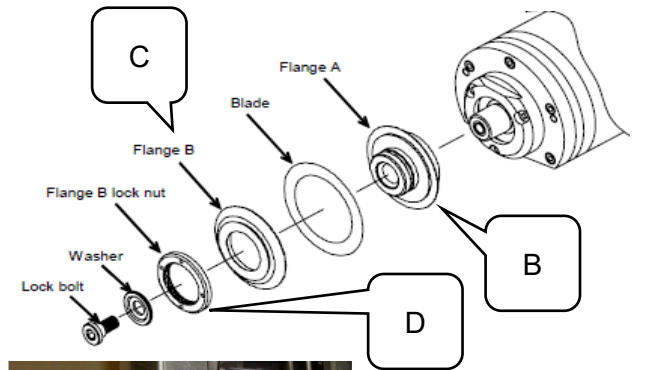
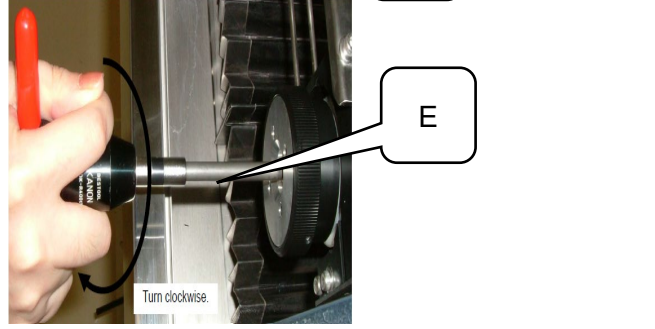
## JB2 – Initialization, Blade Exchange & Setup (1 of 6)

<p><b><u>Executing Initialization:</u></b></p> <p>A. From the main menu, select the “Direct” button.</p> <p>B. Select the “System Initial” button.</p> <p>C. Wait for the system to initialize.</p> <p>1. <i>Note: If alarm sounds press the “Alarm/Clr” button. Make sure both splash and microscope covers are closed. Press the “System Initial” button again.</i></p>		<input type="checkbox"/>
<p><b><u>Executing Blade Exchange &amp; Setup:</u></b></p> <p>A. From the main menu, press the F4 “Blade Maintenance” button.</p> <p>B. From the “Blade Maintenance” menu select the F1 “Blade Replacement” button.</p> <p>2.</p>		<input type="checkbox"/>


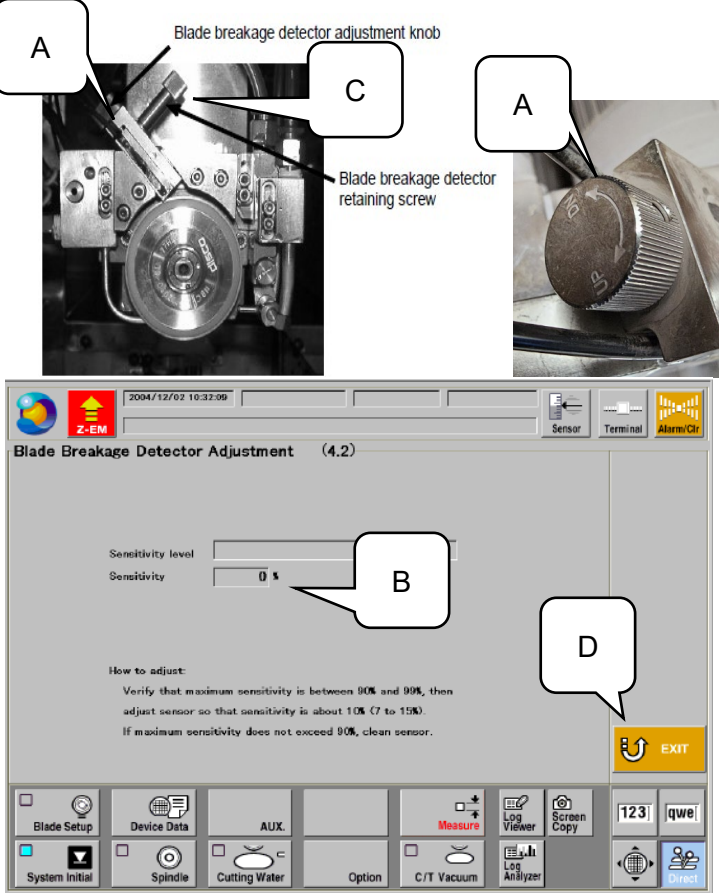
## JB2 – Initialization, Blade Exchange & Set-up Continued (2 of 6)

<p><b>Updating Blade Parameters</b></p> <p>Note: Blade OD and thickness can be found on the blade case. The Flange O.D. is not changed it should always be 49.4. Data must be saved to be updated.</p> <p>4. Select the following fields to update.</p> <ol style="list-style-type: none"> <li>Enter the Blade O.D. (Outside Diameter) of the blade.</li> <li>Enter the Blade thickness</li> <li>Ensure the Flange O.D. is 49.4</li> <li>Press “Data Save” button to save the new parameters.</li> <li>Press the “Enter” button.</li> </ol>	
<p><i>Note: The following items are removed to access the spindle parts to install or deinstall the blade.</i></p> <p>5.</p> <ol style="list-style-type: none"> <li>Open the splash cover to expose the spindle and blade.</li> <li>Remove the blade breakage detector by pressing down on the right side of the spring-loaded clamp. Gently lift the blade breakage detector from the housing and set it safely on top of the shelf above the housing.</li> <li>Loosen the thumbscrew to remove the blade nozzle, and gently set it on the shelf.</li> </ol>	
<p>6.</p> <ol style="list-style-type: none"> <li>From the Blade Replacement menu, ensure the “Spindle Lock” button is on.</li> <li>Carefully rotate the spindle until it locks into position.</li> <li>Align the T-handle and demounting jig to the spindle assembly. Carefully line up the pins to engage the “Flange B lock nut.”</li> </ol>	

## JB2 – Initialization, Blade Exchange & Set-up Continued (3 of 6)

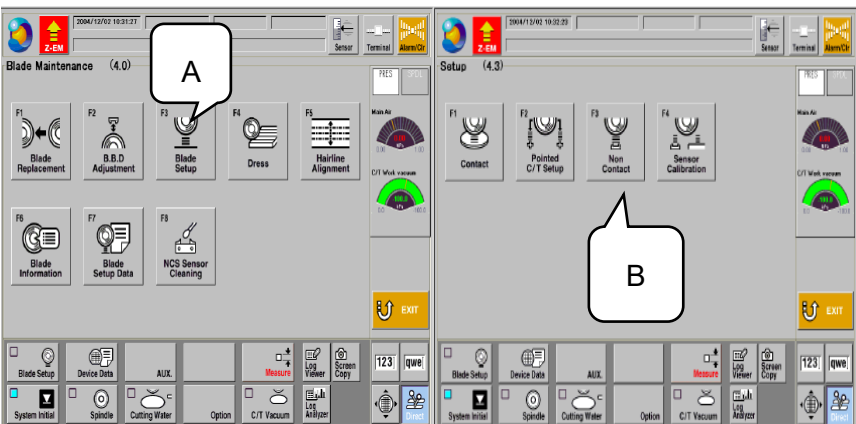
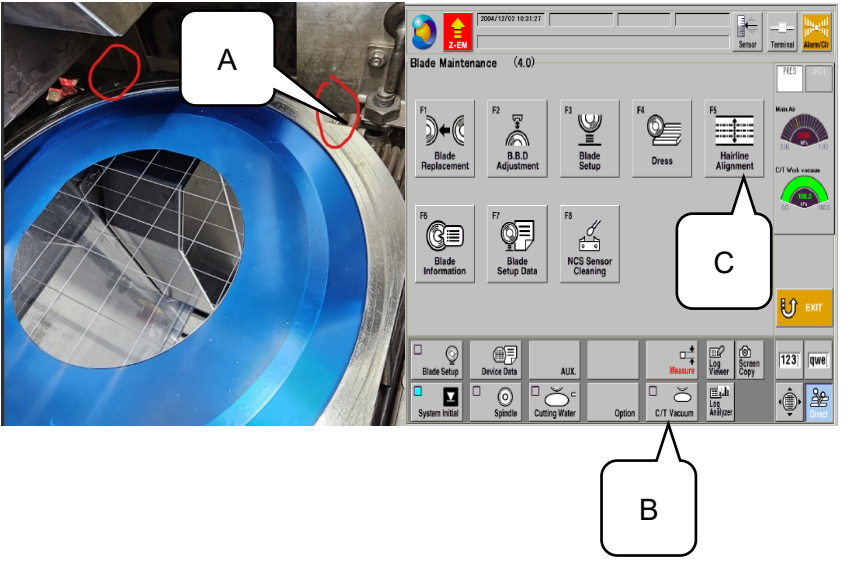
<p>7.</p> <p>A. Carefully loosen the “Flange B lock nut” from the spindle.</p> <p><i>Note: The spanner nut loosens by turning Counterclockwise (CCW) and tightens by turning Clockwise (CW). Set the lock nut in the tray on the front of the tool</i></p> <p>B. Carefully remove the “Flange B,” use the flange demounting tool if necessary, and set the flange on the tray in front of the tool.</p> <p><i>Note: Be careful not to drop this flange onto the floor or damage it in any way. A damaged flange can negatively impact the dicing. Notify Staff immediately if the flange is damaged.</i></p>	 	<input type="checkbox"/>
<p>8.</p> <p>A. Clean the blade spindle surfaces with clean wipes, DI water, and IPA to ensure there is no debris on the mounting surfaces.</p> <p>B. Carefully install the blade onto “Flange A.”</p> <p>C. Carefully replace the “Flange B” be careful not to break the blade.</p> <p>D. Carefully replace the “Flange B lock nut”</p> <p>E. Carefully rotate the torque wrench clockwise until it slips once proper torque is reached.</p> <p>F. Return the blade breakage detector. Refer to JB2-5.</p> <p>G. Return the blade nozzle. Refer to JB2-5.</p> <p>H. Close the splash cover.</p>	 	<input type="checkbox"/>

## JB2 – Initialization, Blade Exchange & Set-up Continued (4 of 6)

<p>9.</p>	<p><b>Blade Breakage Detector Setup:</b></p> <p>A. From the Blade Maintenance Menu, select the F2 “BBD (Blade Breakage Detector) Adjustment” button.</p>		<p style="text-align: right;">□</p>
<p>10</p>	<p>A. Locate the BBD adjustment knob.</p> <p>B. Using the BBD Adjustment screen, carefully adjust the BBD knob until the screen shows 10%.</p> <p>C. Tighten the BBD retaining screw once 10% is achieved.</p> <p><i>Note: Apply some pressure to the top of the knob when tightening the set screw.</i></p> <p>D. Press Exit on the screen.</p> <p><i>Note: If the BBD knob doesn't register on the screen after adjusting full range, the BBD detector may need to be cleaned or repositioned. Contact Staff for help with either condition.</i></p>		<p style="text-align: right;">□</p>



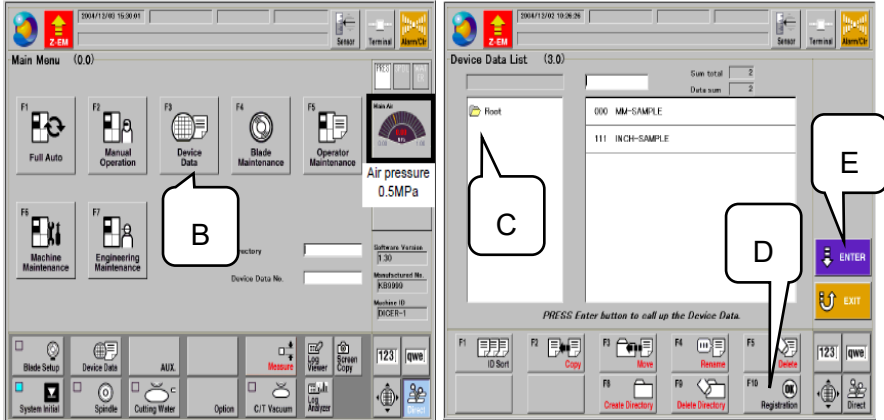
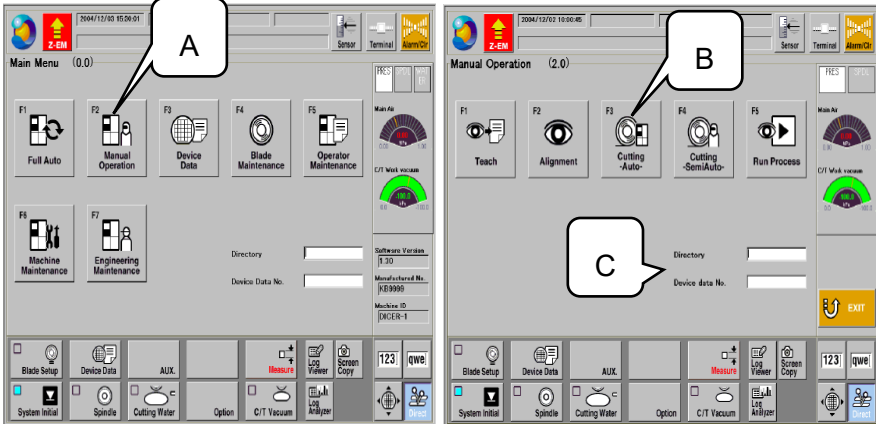
## JB2 – Initialization, Blade Exchange & Set-up Continued (5 of 6)

<p><b>11. Executing Non-Contact Setup:</b></p> <p>A. From the Blade Maintenance Menu, select the “Blade Setup” button.</p> <p>B. From the Setup Menu, press the F3 “Non-Contact” button.</p> <p>C. Press the “Start” button and allow the blade setup to complete before moving to the next step.</p> <p>D. Press the “Exit” button once completed.</p> <p>E. Note: Contact Staff if there is an error during setup.</p>		
<p><b>12. Executing Hairline Adjustment:</b></p> <p>Note: The hairline alignment operation is carried out when the cut line (kerf) and the hairline on the screen do not coincide.</p> <p>A. Set a dummy workpiece and carefully align the pins to the frame.</p> <p>B. Press the “C/T Vacuum” button.</p> <p>C. From the Blade Maintenance Menu, select F5 “Hairline Alignment”.</p>		

## JB2 – Initialization, Blade Exchange & Set-up Continued (6 of 6)

<p>13. A. Adjust the position of the workpiece by using the arrow keys and find the desired alignment mark on the right side of the wafer.</p> <p>B. Adjust the F7 “Light” and/or the F8 “Focus” buttons as necessary to view the wafer streets or alignment marks. Refer to Job references 2 and 3 for light and focus instructions.</p> <p>C. Press the F5 “Align <math>\theta</math>” key. The chuck table automatically moves from the right to the left.</p> <p>D. Adjust the left side of the wafer to the desired alignment mark.</p> <p>E. Press the F5 “Align <math>\theta</math>” key again. This should align the right and left sides of the wafer so that the cut can be made along the desired streets.</p> <p><i>Note: The goal is to align the hairline to the alignment target so that there is no change when moving left and right. The F5 key changes theta automatically based on your target positions. If alignment isn't satisfied, repeat steps JB28 A-D.</i></p>	
<p>14. A. Once alignment is satisfied, using the arrow keys, navigate to a desired region on the wafer to make a fresh cut and press the “Enter” button.</p> <p>B. Press the “Start” button to cut. Once cutting is complete, the chuck will return to the beginning of the cut for a hairline-to-cut adjustment.</p> <p>C. Use the arrow keys to adjust the hairline to the cut that was just made.</p> <p>D. Use the appropriate keys F4 “Narrow Hair” and/or F9 “Widen Hair” to adjust the hairline to the cut.</p> <p>F. Press the “Enter” button once adjustments are satisfied.</p>	<p>• End alignment by pressing the  button.</p> <p>Alignment</p> <p>Use the  and  buttons to adjust the center of the hairlines to the center of the street.</p> <p>• End adjustment by pressing the  button.</p>

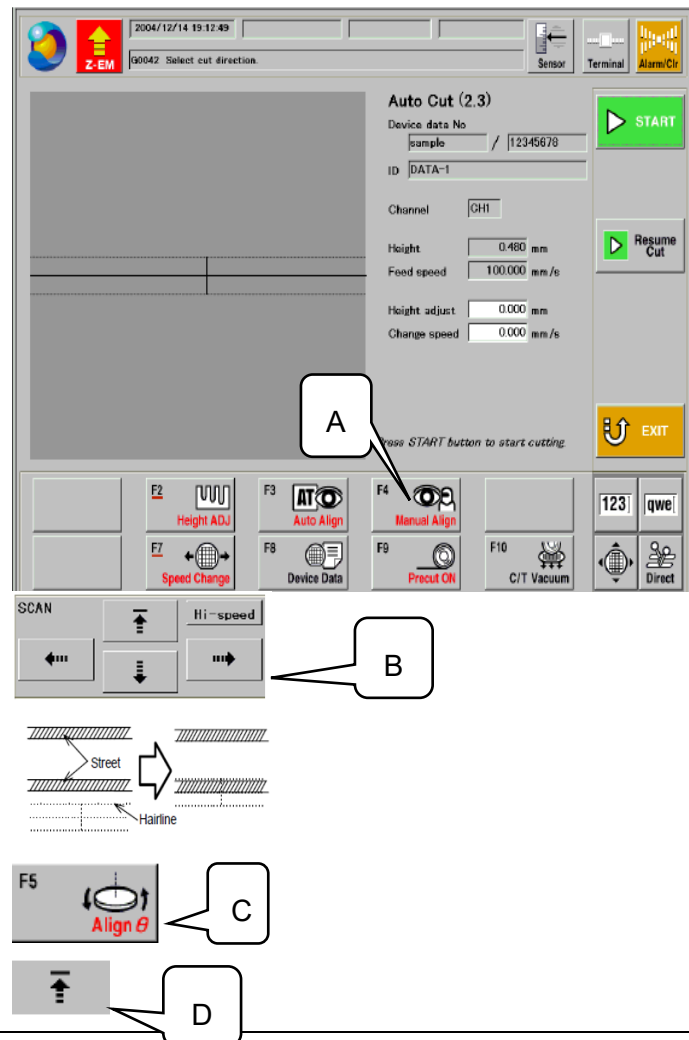
## JB3 – Manual Operation (1 of 2)

<p><b>Selecting the device data:</b></p> <ol style="list-style-type: none"> <li>A. Load your taped sample to be diced. Refer to JB2-12 and/or JB4 to load or tape your sample.</li> <li>B. From the Main Menu select the F3 “Device Data” button.</li> <li>C. From the Device Data List, specify the target directory and recipe.</li> <li>D. Select the “Registration OK” button.</li> <li>E. Press the “Enter” button.</li> </ol> <p><i>Note: The dicing recipes contain the parameters for dicing. Editing recipes is an advanced feature that will require independent training.</i></p>		<input type="checkbox"/>
<p><b>Executing Manual Operation:</b></p> <ol style="list-style-type: none"> <li>A. From the Main Menu select the F2 “Manual Operation” button.</li> <li>B. From the Manual Operation Menu, select the F3 “Cutting Auto” button.</li> <li>C. Make sure the desired directory and device date number are displayed in the lower right of the screen.</li> </ol>		<input type="checkbox"/>

## JB3 – Manual Operation Continued (2 of 2)

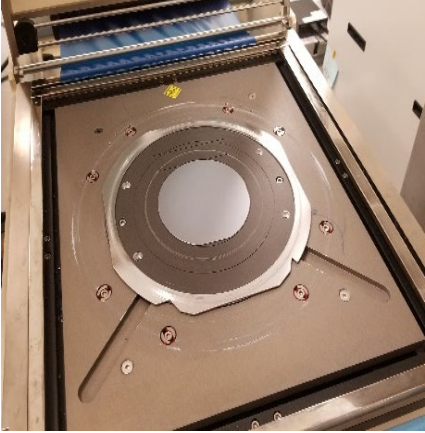
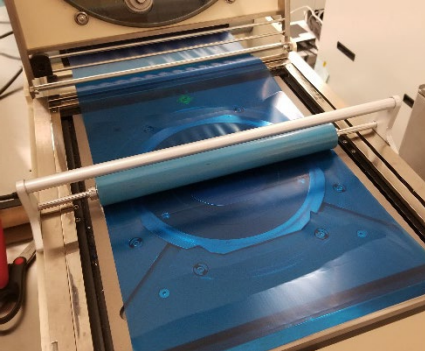
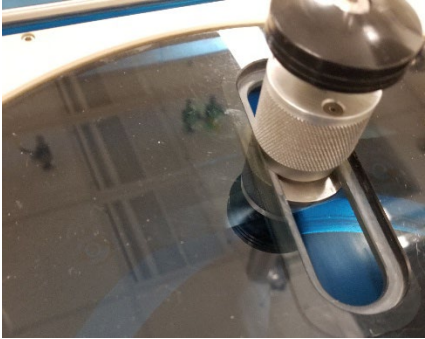
### Manual Alignment:

- A. From the Auto Cut Menu, select the F4 “Manual Align” button.
- B. Using the arrow keys, align the hairline to the street or alignment mark for CH1.
- C. Press the F5 “Align” key. The stage will move to the opposite side of the feature. Repeat steps B and C until the line is perfectly aligned.
- D. Make sure the last move is with this key, otherwise an error will occur.
- E. Press the “Enter” button.
- F. The chuck should rotate to the CH2 position. Perform steps JB3B-E until all channels have been set up.
- G. Press the “Exit” button.
- D. *Note: In most cases, only channels 1 and 2 are used and channel 2 is rotated 90 degrees from channel 1. This creates a square or rectangular dicing shape. More complex shapes can be made, however, the channel alignment becomes more user-specific and must be trained on a user-specific level.*

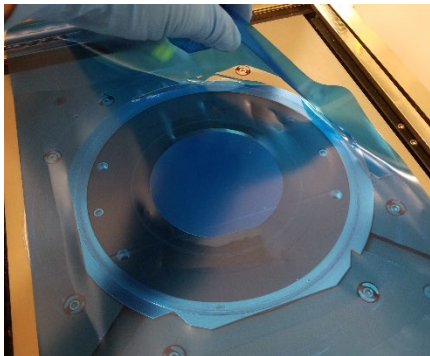
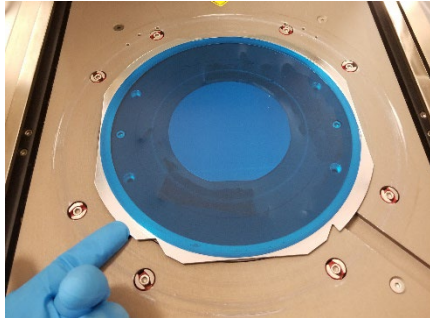


## Job Breakdown 4 – Film Framing Substrate (1 of 2)

Follow this section to Film Frame a substrate.

<p>1.</p>	<p>A. Place substrate face down in the tape applicator, aligning the substrate flat with the flat edge of the tape applicator. Use the scribed rings in the applicator as guides.</p> <p><i>Note: The side that is face down will be the side that is facing up on the dicing saw. If your substrate doesn't have a flat, disregard any flat orientation in this document.</i></p> <p>B. Center a <b>small tape frame</b> around the substrate. Equally align the sides of the tape frame using the magnets to secure in place. Align the flat of the small tape frame to be parallel to the applicator edge and the flat of the substrate if applicable.</p>		<input type="checkbox"/>
<p>2.</p>	<p>A. Pull tape over the substrate and frame without touching them and affix the tape to the front and rear edges of the tape applicator.</p> <p><i>NOTE: Make sure tape is not too wavy and it covers the film frame equally on both sides.</i></p> <p>B. Lift up roller assembly pushing the roller slowly over the substrate and film frame.</p> <p>C. Return roller assembly into the lowered position and close hinged top.</p>		<input type="checkbox"/>
<p>3.</p>	<p>A. Verify that the small film frame is under the Circle Cutter by sighting the blade position above the centered Film Frame.</p> <p>Note: The cutter can be re-positioned by loosening its knurled knob on the handle.</p> <p>B. Push down lightly on knob and make just over one full turn going clockwise. Repeat the cutting a second time going in the counterclockwise direction.</p> <p>C. Use the push button cutter at the back of the cutter to cut the tape from the roll.</p>		<input type="checkbox"/>

## Job Breakdown 4 – Film Framing Substrate Continued (2 of 2)

<p>4.</p>	<p>A. Open hinged top carefully.          B. Lift up tape trimmings pulling radially outwards to prevent lifting up tape from Film Frame, in case there are spots where it hasn't been cut through.</p> <p>Note: It's best to start peeling from the back of the applicator and pull toward the front.</p>		<input type="checkbox"/>
<p>5.</p>	<p>A. Slowly lift out the using the finger recesses.          B. Lift at an angle to release the tape adhesive from the tape chuck without too much force to peel it from the small tape frame.</p>		<input type="checkbox"/>

## JR1 – User Notes (1 of 1)

Dicing blades can be purchased from Staff Members.

**Best blade for glass** = 58 X 0.250 X 40 or 57 X 0.250 X 40

**Best blade for silicon** = 52 X 0.90 X 40

Use black arrow key to stop dimming of screen.







Blue Tape thickness = 130 um

UV Tape thickness = 160 um

Always leave 100 um gap above table.

## JR2 – Light Adjustments (1 of 2)


Use the following Job Reference to adjust the light on the Disco DAD 3220.

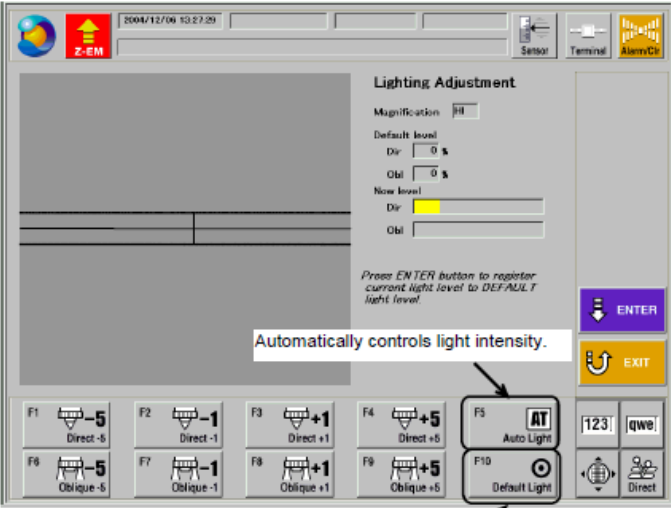
Adjustment Method	Screen to use	Button to use
Adjust Manually	HAIRLINE ALIGNMENT screen [4.5]	
Automatically adjust direct light	HAIRLINE ALIGNMENT screen [4.5]	Press the  button for one second or longer.
Automatically adjust the oblique light.	HAIRLINE ALIGNMENT screen [4.5]	Press the  button for one second or longer and then press it once more.
Automatically adjust the direct and oblique light.	HAIRLINE ALIGNMENT screen [4.5]	Press the  button for one second or longer and then press it twice more.
	LIGHTING ADJUSTMENT screen	
Put the light intensity to default.	LIGHTING ADJUSTMENT screen	



## JR2 – Light Adjustments Continued (2 of 2)

When you adjust the light intensity by using the LIGHT ADJUSTMENT screen:

Press the  button on the HAIRLINE ALIGNMENT screen [4.5] to call up the LIGHT ADJUSTMENT screen.



Automatically controls light intensity.

Gets back the light intensity to default.

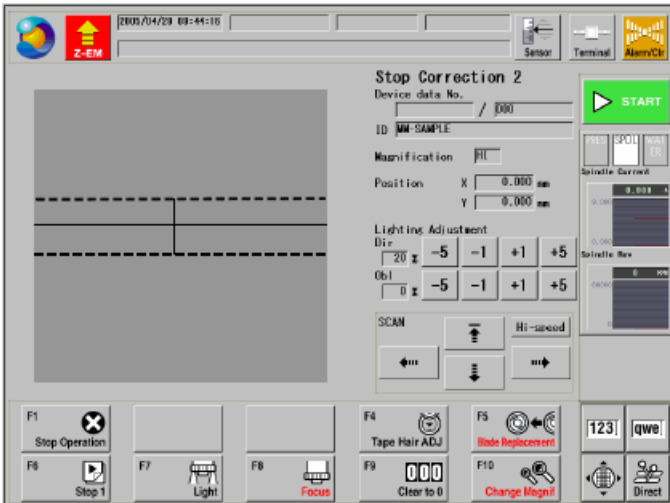


Press the “Exit” button once complete with light adjustments.

## JR3 – Focus Adjustments (1 of 1)

Use the following Job Reference to adjust the focus on the Disco DAD 3220.








Press F8 “Focus” button to enter the focusing parameters.



Press the F8 “Auto Focus” button for automatically focusing. It’s best to focus on the edge of a feature with some contrast to get the best results. The F2 “Up” and F7 “Down” buttons can be used for manually focusing.



Adjust the microscope focus. Use the following buttons to carry out focusing.

Microscope goes up	F2  Up	Microscope goes down	F7  Down
Auto Focus by Data	F3  AF by Data	Auto Focus	F8  Auto Focus
Large Stroke	F4  Large Stroke	Small Stroke	F9  Small Stroke
Auto Focus After 0 (Origin)	F5  AF After 0		

Press the “Exit” button once completed with focus adjustments.

## Revision History

Rev	Author	Date	Description of Change
A	Jim Pierce	03 Mar 2024	Initial