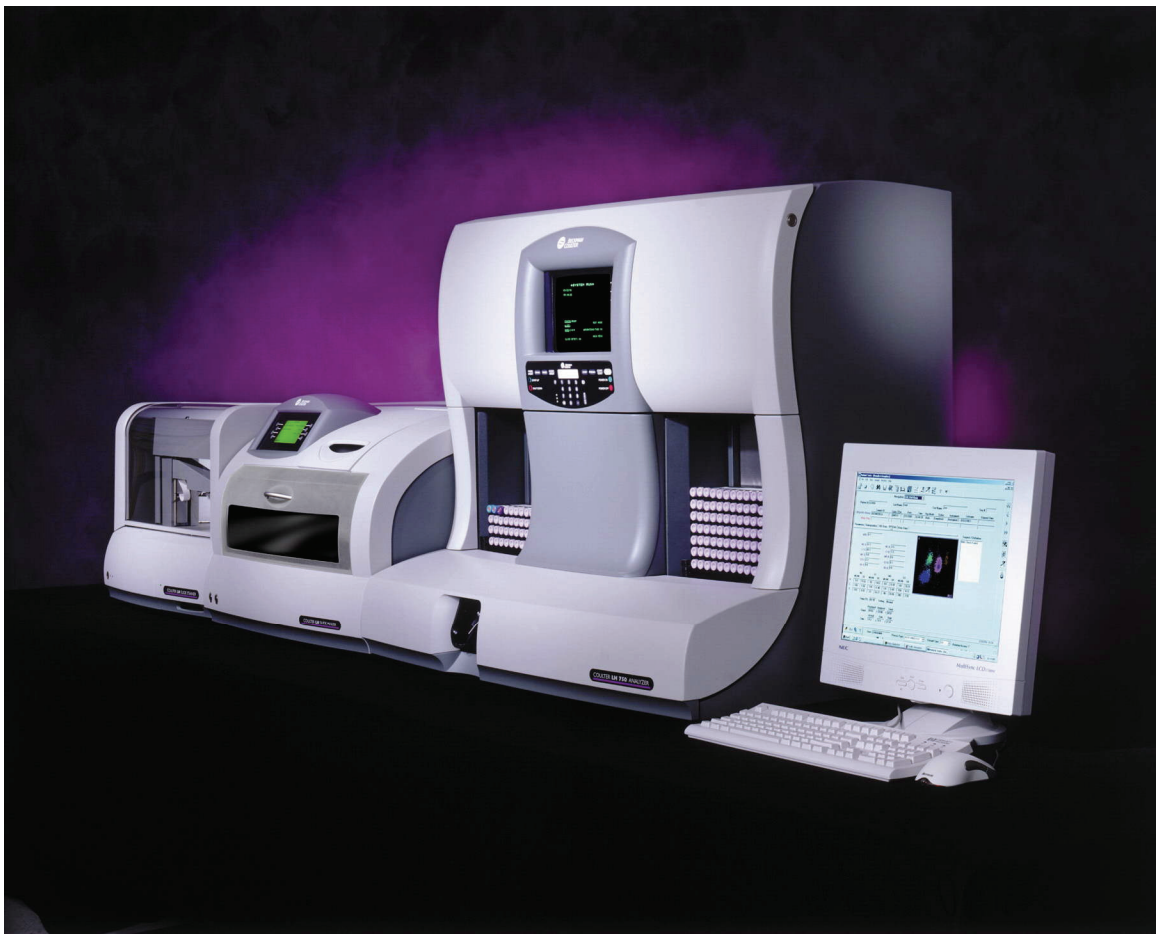
COULTER® LH SLIDEMAKER

COULTER® LH SLIDESTAINER



This document is not intended to replace the information in your instrument Instructions for Use manual (IFU). Information in the Instructions for Use manual supersedes information in any other manual.

WARNINGS AND PRECAUTIONS

READ ALL PRODUCT MANUALS AND CONSULT WITH BECKMAN COULTER-TRAINED PERSONNEL BEFORE ATTEMPTING TO OPERATE INSTRUMENT. DO NOT ATTEMPT TO PERFORM ANY PROCEDURE BEFORE CAREFULLY READING ALL INSTRUCTIONS. ALWAYS FOLLOW PRODUCT LABELING AND MANUFACTURER'S RECOMMENDATIONS. IF IN DOUBT AS TO HOW TO PROCEED IN ANY SITUATION, CONTACT YOUR BECKMAN COULTER REPRESENTATIVE.

HAZARDS AND OPERATIONAL PRECAUTIONS AND LIMITATIONS

WARNINGS, CAUTIONS and IMPORTANTS alert you as follows:

WARNING – Can cause injury.
CAUTION – Can cause damage to the instrument.
IMPORTANT Can cause misleading results.

BECKMAN COULTER, INC. URGES ITS CUSTOMERS TO COMPLY WITH ALL NATIONAL HEALTH AND SAFETY STANDARDS SUCH AS THE USE OF BARRIER PROTECTION. THIS MAY INCLUDE, BUT IT IS NOT LIMITED TO, PROTECTIVE EYEWEAR, GLOVES AND SUITABLE LABORATORY ATTIRE WHEN OPERATING OR MAINTAINING THIS OR ANY OTHER AUTOMATED LABORATORY ANALYZER.

WARNING

Risk of operator injury if:

- All doors, covers and panels are not closed and secured in place prior to and during instrument operation.
- The integrity of safety interlocks and sensors is compromised.
- Instrument alarms and error messages are not acknowledged and acted upon.
- You contact moving parts.
- You mishandle broken parts.
- Doors, covers and panels are not opened, closed, removed and/or replaced with care.
- Improper tools are used for troubleshooting.

To avoid injury:

- Keep doors, covers and panels closed and secured in place while the instrument is in use.
- Take full advantage of the safety features of the instrument. Do not defeat safety interlocks and sensors.
- Acknowledge and act upon instrument alarms and error messages.
- Keep away from moving parts.
- Report any broken parts to your Beckman Coulter Representative.
- Open/remove and close/replace doors, covers and panels with care.
- Use the proper tools for troubleshooting.

CAUTION

System integrity might be compromised and operational failures might occur if:

- This equipment is used in a manner other than specified. Operate the instrument as instructed in the Product Manuals.
- You introduce software that is not authorized by Beckman Coulter into your computer. Only operate your system's computer with software authorized by Beckman Coulter.
- You install software that is not an original copyrighted version. Only use software that is an original copyrighted version to prevent virus contamination.

IMPORTANT

If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, if it is not presently under a Beckman Coulter service maintenance agreement, Beckman Coulter cannot guarantee that the product is fitted with the most current mandatory engineering revisions or that you will receive the most current information bulletins concerning the product. If you purchased this product from a third party and would like further information concerning this topic, call your Beckman Coulter Representative.

TRADEMARKS

REVISION STATUS

The information contained in this manual has been reviewed and approved. The materials are linked to the following reference:

TRAINING MODULES

COULTER® LH 750 HEMATOLOGY ANALYZER

COULTER® LH 780 HEMATOLOGY ANALYZER

COULTER® LH SLIDEMAKER

COULTER® LH SLIDESTAINER

Revision AA	Initial Issue (November 2011) Software release 2D2/1B2 or higher

INFORMATION / PRACTICE SECTION

References in HELP

Step	Action
1	At a Workstation in ? (HELP) go to **Contents → LH SlideMaker → Operating.**
2	**Display and read:** *Loading Slides into a Cassette and Loading Slide Cassettes (into the Slidemaker).*
3	Close **HELP.**

Loading Slides into a Slide Cassette

Step	Action
1	Follow the Help procedure, if necessary, and practice inserting the slides.
Note	**Watch out for these relatively common errors!**

Don't	Do
Frosted bars on the ends of the slides are not facing down in the slide cassette.	Frosted bars should be facing down in the slide cassette.
Slides misaligned in the cassette.	Be sure slides are straight.
Cassette picked up by holding on sides.	Hold slide cassette on front and back.

Loading a Slide Cassette into the LH SlideMaker

Step	Action
1	Review *Loading Slide Cassettes* procedure in HELP, if necessary. Practice loading the Slide Cassette into the SlideMaker. Remove the practice cassette from the SlideMaker when finished..
Note	**Watch out for these relatively common errors!** **Don't** / **Do** Place cassette too far forward (toward the SlideMaker) in the input queue so that locking arms cannot lock cassette in place. / Instead place the cassette near the center of the input queue. Cassette arrow facing rear. / Be sure the slide cassette has the arrow facing you.

Cleaning the Dispense Probe and Rinse Cup

Using the Easy Reference Guide, find the parts diagram for the Dispense Probe Mechanism and Rinse Block. Locate this area on the right side of the LH SlideMaker.

The Dispense Probe and Rinse Cup must be visually inspected Daily and cleaned if any traces of blood appear. A good time to do this might be during Shutdown.

Step	Action
1	In HELP, go to **CONTENTS** **LH SlideMaker** **Operating** **Shutting Down the SlideMaker.**
2	Select the hypertext for "Cleaning the Dispense Probe and Rinse Cup".
3	Print the "Cleaning the Dispense Probe and Rinse Cup" procedure.
4	Close HELP.
5	Review the *Cleaning Dispense Probe and Rinse Cup* procedure.
Note	**Watch out for this relatively common error!** ▸ Dried blood remains on dispense probe and around rinse cup.
6	Perform this procedure now on the LH SlideMaker.

Clean the dispense probe and rinse cup immediately if you find traces of blood on either component.

Replacing the Label Roll

Step	Action
1	In HELP go to **Contents** **LH SlideMaker** **Replacement Procedures.**
2	Review *Replacing SlideMaker Label Rolls* video and procedure.
Note	There is an extra label tension bar located to the upper left of the label roll supply that is not shown on the video. Be sure to place the labels over this bar when you begin threading the pathway. Gently slide labels under metal tab. DO NOT lift metal tab. Its function is to keep tension on the labels.
3	**Be sure to Power Off the LH SlideMaker before beginning this procedure.**
Note	**Watch out for these relatively common errors!** ➢ **Labels not routed correctly following pathway in LH SlideMaker** ➢ **Label core not pushed all the way in on retainer spool**
4	Perform this procedure now on the LH SlideMaker. See a facilitator if you need assistance.

Replacing Printer Ribbon

Step	Action
1	Review *Replacing the SlideMaker Printer Ribbon* video and procedure in the on-line HELP.
Note	**Watch out for these relatively common errors!** ➢ **Printer ribbon not routed correctly following pathway in LH SlideMaker** ➢ **Printer ribbon core not pushed all the way in on retainer spool**
2	Perform this procedure now on the LH SlideMaker.

Verifying Procedure

Any time you replace the Label Roll or Printer Ribbon, generate a test "dummy" slide as follows:

Step	Action
1	Close all LH SlideMaker covers and Power On.
2	From the **Main Menu**.on the LH SlideMaker Keypad,
3	Select **Special Cycles**.
4	Select **Print Label**.

Examine the test slide for proper label placement and printing.

It is important to do this to verify there were no problems after replacing label or ribbon.

Workstation Set Up for LH SlideMaker

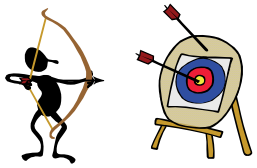
At the Workstation Command Center go to  (**System Set Up**), then 

If this screen is setup for your lab, print the screen and save the printout.

From the SlideMaker tab, setup the following:

Step	Heading	Action
1	**Smear Dispense Mode**	Choose Alternate Position (this means only six slides will fill a basket)
2	**Slide Label Definition**	Laboratory ID: Type the name of your lab
		Print Bar Code Tube ID: ☐ (leave check box blank)
3	**Print Layout**	Date & Time: line 1
	Include all of the following in a format of your choice **[Use Small Font for Patient Name and Date & Time]**	Lab ID: line 2
		Sample ID
		Patient Name
		Cassette / Position
4		Select  to save.
5		Print the screen.
		Refer to the first printout to return all selections to the ones that your lab uses.

SKILL CHECK



Load Slides into Slide Cassette

- ❑ Frosted bars on the ends of the slides are facing down in the cassette
- ❑ Slides are aligned evenly in the cassette
- ❑ You picked up cassette by holding it on the front and back

Load Slide Cassette into SlideMaker

- ❑ Cassette is placed in the center of the input queue
- ❑ The arrow on the cassette is pointing up and facing you

Locate the Dispense Probe

- ❑ With a facilitator present, open the cover on your LH SlideMaker and point to the Dispense Probe. Use a step stool, if necessary.

Cleaning Dispense Probe and Rinse Cup

- ❑ Performed at LH SlideMaker

Replacing Label Rolls

- ❑ Labels are threaded correctly, following diagram on the unit

Replacing Printer Ribbon

- ❑ Ribbon is threaded correctly, following diagram on the unit

Verifying Procedure (Print Label)

- ❑ Labels are positioned correctly on the slide
- ❑ Printing is centered and totally readable on label

Show your test slide to your facilitator for final sign off.

Workstation Set Up for LH SlideMaker

Show your printout of the SlideMaker Setup screen with your modifications to your facilitator.

❑ Facilitator sign off

_____

SET UP

- Be sure to wear **full-face protection** (either a full-face shield **OR** protective eyewear with a facemask) along with lab coat and gloves.

1. At the LH Command Center, select Default Type **C**.
2. At the LH Command Center, go to  System Configyration.
   - Set Automatic Output / Print to **DISABLED.**
   - **Enable** the LH SlideMaker.
   - **Disable** the LH SlideStainer.
   - From the **SlideMaker** tab**,** select to make slides on **All samples.**
3. On the Analyzer Control screen, verify the number of aspirations per tube is **1**.
4. At the Diluter, remove the center panel by pulling it toward you.
5. Remove the gray drop-down doors in front of the Diluter left and right panels by pulling toward you and then opening outward.
6. Open the LH SlideMaker cover.
   - For cycling the LH 700 Analyzer and LH SlideMaker, use the blood samples previously collected.
   - Ask facilitator to apply magnets to the Diluter and LH SlideMaker and give you a flashlight.

When operating the LH 700 Analyzer in your laboratory you must heed the warning shown below. For training purposes, your facilitator will place a magnet on your instrument to defeat the door interlock. You may then run the instrument with the front door open. You will need a flashlight so you can better see what is going on inside the Diluter!

WARNING

Keep the front door of the LH 700 Analyzer closed while you use the Automatic mode. The system will stop if you open the front door.

If the magnet is not used, when the door is opened, an alarm sounds, a *DOOR OPEN RUN STOPPED* message displays on the Control Center keypad and the Analyzer display. The instrument stops.

Press <ALARM RESET> to silence the alarm.

Close the Door.

Press <START CONT> to continue operation. DO NOT reset the Analyzer.

INFORMATION / PRACTICE SECTION

LH SLIDEMAKER SAMPLE FLOW

Summary

The LH SlideMaker sample acquisiton system:

1. First aspirates a portion of blood from the specimen tube for the Diluter side, then a second aspiration of blood occurs through the vent side of the needle for the SlideMaker.
2. Transfers the sample to one of two reservoirs.
3. Holds and mixes the sample.
4. Transfers the sample from the reservoir to the dispense probe, priming the dispense line with a portion of the sample.
5. Dispenses a measured drop of the blood sample onto a slide for processing.
6. Rinses and dries the aspiration and dispense lines between samples to limit dilution and carryover.

The three modules involved with these functions are the Sample Access and Reservoir module (located under the front cover of the diluter on the left) and the Dispense module (located in the LH SlideMaker on the front right). Refer to your Easy Reference Guide for labeled diagrams to use during this exercise.

Conditions When The LH SlideMaker Never Makes A Smear

1. SlideMaker is disabled in **Run Configuration.**
2. In *Retic only* mode of operation (slides are never made if Retic only is used).
3. Blood detectors are disabled.
4. Aspiration error conditions from Analyzer.
5. Any Process Type **except** Auto Analysis.
6. When running bar-coded COULTER® 5C® and Retic-C Controls.
7. Samples run in Manual mode.
8. When the SlideMaker is set to make slides based on Decision Rules Only and the samples run do not meet Decision Rule criteria (in other words, normal samples).

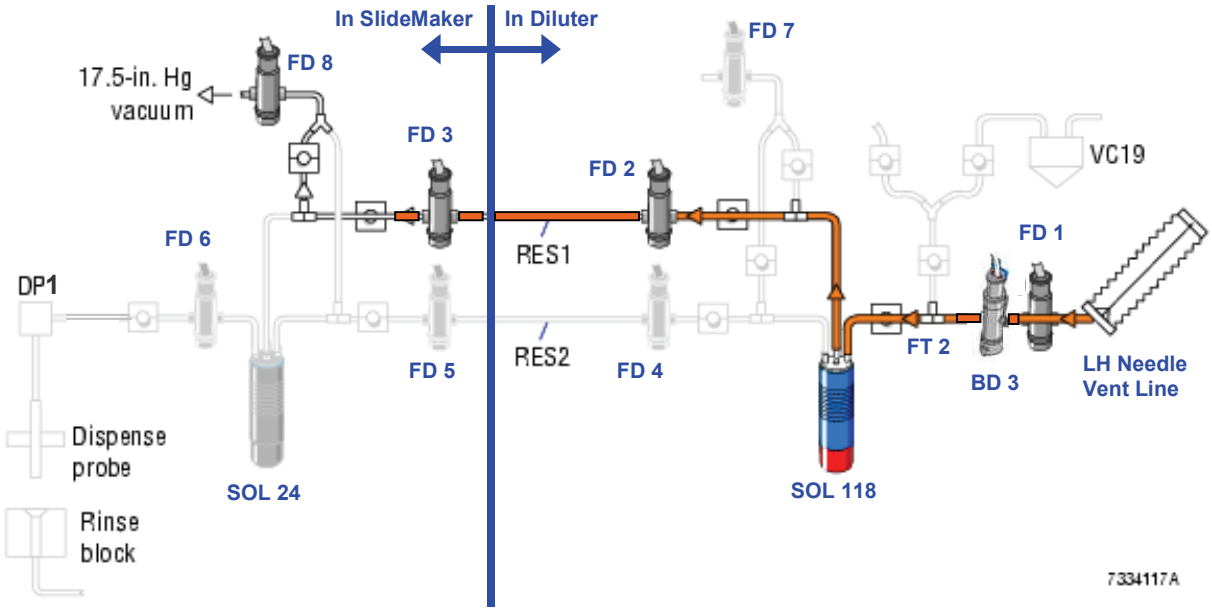
Conditions When The LH SlideMaker Always Makes a Smear

1. If no response from workstation within about 20 seconds, then makes a slide with “Auto Slide” label.

Aspirating a Blood Sample

1. In order to generate a slide, the LH SlideMaker needs the following information from the Analytical Station:
   a. The decision to make a slide. **Note: With a SlideMaker, blood is aspirated to a reservoir on every sample whether a slide is made or not.**
   b. Verification of the patient or sample ID.
   c. Sample analysis (CBC) results for determining the proper smear acceleration, velocity and wicking time.
2. The LH SlideMaker uses two reservoirs (RES1 and RES2) alternately to draw, hold, and mix the samples. **(Locate the reservoirs.)**
3. Confirmation of aspiration from the specimen tube into the Diluter must be successful. No slides are made on a sample with an aspiration error.
4. The Analytical Station sends a command to the SlideMaker to aspirate a sample:
   a. High pressure (30 psi) routes through the reservoir and aspiration line to remove diluent and dry the line prior to aspiration of a new sample. The reservoir fluid detectors confirm the presence of air in the line.
   b. Approximately 250 µL of blood sample is aspirated through the vent side of the needle using low vacuum (6.5 in. Hg). This is confirmed by sensors FD1 and BD3 detecting the leading edge of blood. **(Locate FD1 and BD3 in the analyzer.)**
   c. Before transferring the blood sample to the reservoir, the SlideMaker introduces an air bubble (at FT2) into the middle of the blood sample (dividing it into two segments).
   d. The first segment will be used for priming the lines and the second segment for making the smear.
5. The sample then moves into and through the appropriate reservoir for mixing.

Sample Aspiration to Reservoir 1



Holding and Mixing the Blood Sample

1. The capacity of each reservoir is larger than the volume of blood drawn into it.
2. To mix the blood, the LH SlideMaker uses a combination of atmospheric pressure and low vacuum to move the blood back and forth in each reservoir.
3. Fluid detectors, one on each end of the reservoir, detect the leading and trailing edge of the blood to control sample position (FD2 and FD3 for RES 1. and FD4 and FD5 for RES 2). (**Locate these four fluid detectors.**)
4. The duration of the mixing cycle depends on the duration of the "count" cycle on the Analyzer, but usually will be between 2.2 seconds and 15.0 seconds.
   - If there is no response from the Workstation (e.g. Autoclearing) within about 20 seconds, then a slide is made with Default values and labeled "Auto Slide".
5. At the completion of the mixing cycle, the reservoir lines remain pinched to hold the blood sample in the reservoir while the other reservoir is rinsed and dried.

Activity

Be sure you are wearing PPE including full face protection.

- Run three-four samples and watch the aspiration pathway, through to the reservoirs.
- Notice how the reservoirs alternate and how the blood mixes.

Transferring the Blood Sample to the Dispense Probe and Priming the Dispense Line

1. Before transferring blood to the dispense probe, the LH SlideMaker ensures the dispense probe is down in the rinse block. It then uses 30 psi of pressure to dry the dispense line and probe.
2. Solenoid 42 opens the path for the correct reservoir and the valves at each reservoir end are opened. Low pressure (5 psi) pushes the segments from the reservoir, through the dispense line and then through the dispense probe until the leading edge, air bubble and front section of the trailing segment pass through the dispense probe and into the rinse cup.
3. Fluid detector 6 (FD6) detects the back section of the trailing segment, a "not blood condition" at the end of the blood sample. **(Locate FD6.)**
4. VL8 (located just past FD6) then closes to stop the flow of the sample. The dispense line is now fully primed with sample. **(Locate VL8.)**

Dispensing a Drop of Blood Sample onto the Slide

1. After priming, the dispense probe moves up and out of the rinse block
2. The LH SlideMaker then moves the shuttle with a labeled slide from the Label Printer module to the dispense position.
3. When the presence of the shuttle is detected, the dispense probe moves down until it is about 0.040 in. above the slide.
4. The dispense pump (DP1) then places a nominal 4.0 µL blood drop on the slide.
5. After the drop is dispensed, the probe moves back to its up position.
6. The shuttle moves the labeled slide with the blood drop to the smear position for making the blood film.

Rinsing and Drying the Aspiration and Dispense Lines

1. While the sample is in the reservoir, the sample aspiration lines are rinsed in preparation for aspirating the next sample.
2. Backwashing and drying of the aspiration lines consist of three processes:
   a. The LH SlideMaker and the Analyzer synchronize the rinsing of the LH SlideMaker's aspiration line to the needle vent chamber and the needle bellows.
   b. The LH SlideMaker uses pressurized air to dry its aspirate line
   c. The Analyzer uses vacuum to dry the needle vent line.
3. After the drop of blood is dispensed, the LH SlideMaker backwashes the reservoir and the dispense line.

4. Backwashing and drying the reservoir and dispense lines consist of the following processes:
   a. Diluent rinsing of the appropriate sample reservoir and dispense lines.
   b. 30 psi drying of the reservoir and dispense line through the dispense probe and rinse block to waste.
   c. Refilling the reagent tank.
   d. Draining all diluent rinse into the LH SlideMaker waste chamber and then to the Analyzer's waste chamber.

Activity

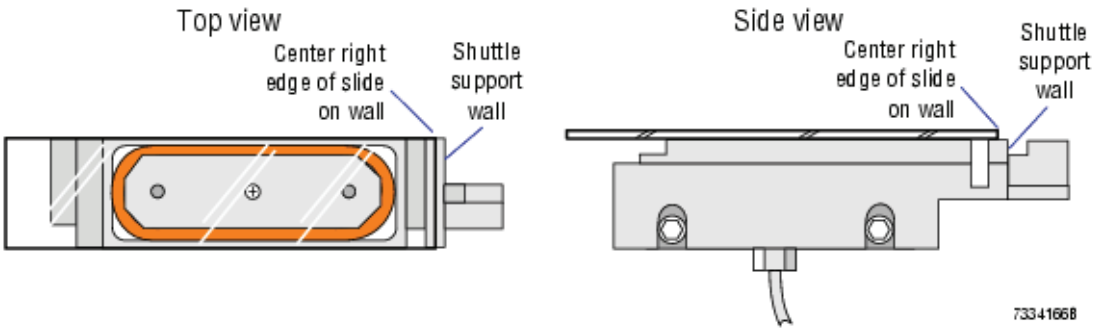
Be sure you are wearing your PPE including full face protection.

- Run three-four samples and watch the blood move from the reservoir, up through FD 6, then through the dispense probe to deposit a drop on the waiting slide. (you may need to use a step stool to see this)
- Notice the up and down movements of the dispense probe during priming and then dispensing.
- Notice how the backwash and drying of the lines from the dispenser back to the reservoir occurs.

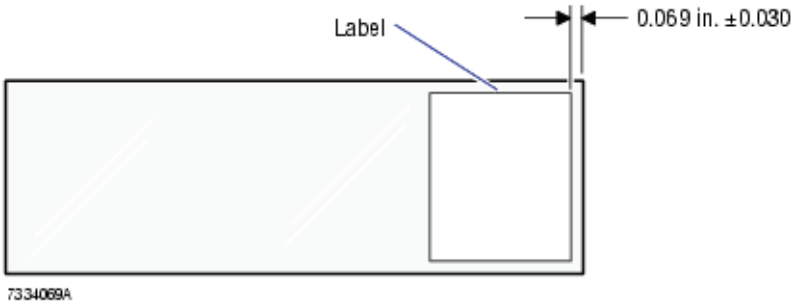
Slide Transport and Making the Smear

The Slide and Smear module transports and precisely positions the slide at the various locations in the LH SlideMaker for preparing the slide and making a wedge blood smear on the slide. The Slide and Smear module spans the area from the Label Printer module to the Dispense module.

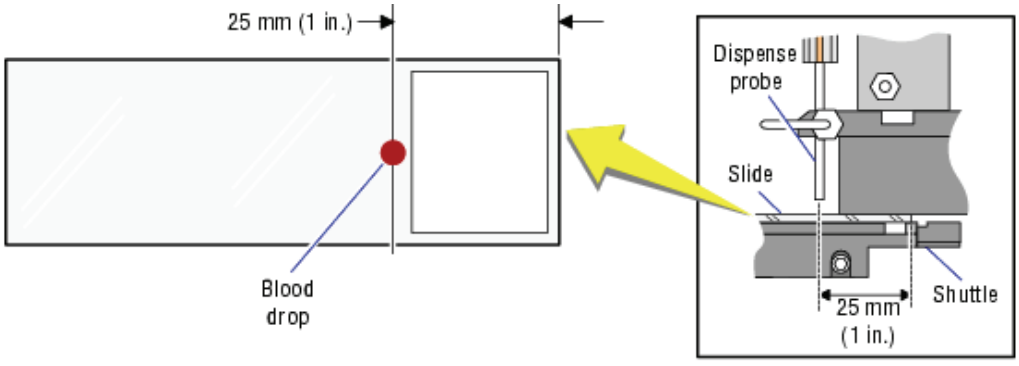
1. The Slide Transport module uses a moving platform, called a shuttle, to transport a slide between three positions: **(Locate the shuttle.)**
   a. The smear (home) position for access by the Smear module and the Dryer module.
   b. The print (labeling) position for access by the Label Printer module.
   c. The dispense position for access by the Dispense module.
2. The LH SlideMaker software controls and varies the speed of the shuttle as needed to perform the necessary functions.
3. At the beginning of the cycle, the shuttle is in the smear (home) position. Before moving the shuttle, the LH SlideMaker checks the shuttle for the presence of a slide. Normally the pusher slide used to make the previous smear is on the shuttle. If no slide is present, the smear truck in the Smear module moves to the Slide Ejector module, picks up a slide, and deposits the slide on the shuttle.



4. The shuttle moves the slide from the smear position to the print position at the Label Printer module. At the print position, the print position sensor senses the presence of the shuttle. Then the shuttle reverses direction and starts moving at the same speed as the label dispenser in the Label Printer module, which applies a label to the slide.



5. From the print position, the shuttle carries the slide to the dispense position. When the shuttle reaches the dispense position, the dispense position sensor senses the presence of the shuttle. The Dispense module places a 4 µL drop of blood onto the slide.



6. From the dispense position, the shuttle moves the slide back to the smear position for preparation of the smear by the Smear module. The smear position sensor senses the presence of the shuttle in the smear position.

7. The Smear module uses a precisely controlled slide carrier, called a smear truck, to make the wedge blood smear and to place the spreader slide on the shuttle in preparation for the next smear. **(Locate the smear truck.)**
8. The smear truck uses unregulated vacuum to pick up and securely hold the slides. The truck vacuum switch sensor monitors the smear truck vacuum.
9. When a slide with a drop of blood is in the smear position, the smear truck moves to the Slide Ejector module and picks up a slide. Holding the slide in position for making a wedge smear, the smear truck places the left edge of this spreader slide on the smear slide, moves the spreader slide through the drop of blood, and stops, allowing the blood to wick along the edge of the spreader slide.
10. Then the smear truck pushes the spreader slide across the long direction of the smear slide, producing a wedge blood smear. The LH SlideMaker software varies the wicking time and the acceleration and velocity of the spreader slide, depending on the viscosity of the specimen.
11. After making the smear, the Smear module transfers the labeled, wet slide to the Dryer module for drying. To move the slide from the shuttle to the Dryer module, the shuttle vacuum holding the slide on the shuttle de-energizes releasing the slide. The slide pusher bars then push the wet slide from the shuttle onto the conveyer belts of the Dryer module.
12. Then the smear truck deposits the spreader slide on the shuttle. This spreader slide becomes the smear slide for the next sample of blood.

Activity (Be sure you are wearing your PPE including full face protection.)

- Run three-four samples and watch the slide and shuttle positions.
- Notice how each spreader slide becomes the smear slide for the next sample.

Dryer

The Dryer module: Receives a labeled, wet, smear slide from the Slide and Smear module; Dries the smear; Moves the smear to the Slide Elevator module. **(Locate the Dryer module.)**

1. The conveyor belts, belt/pulley mechanisms move the slide through the upper chamber at a constant, slow speed while maintaining the correct orientation of the slide. The warm air (about 10ºC above ambient) from the lower chamber contacts the underside of the slide, drying the smear as the slide moves through the upper chamber.
2. As the dried slide nears the exit of the Dryer module, the Dryer Exit Sensor card senses the exiting slide. From this information, the LH SlideMaker calculates when the slide will drop onto the platen, determining when to close the gripper.
3. In addition, the LH SlideMaker counts the number of steps that the dryer stepper motor takes for each slide. If the motor takes too many steps before the LH SlideMaker senses an exiting slide, the LH SlideMaker considers the slide lost or fallen in the Dryer module and generates an error.

Slide Elevator

The Slide Elevator module: Receives dried smear slides from the Dryer module and inserts the slides into slide baskets in the Basket Queue module.

1. Force from the moving conveyer belts in the Dryer module and friction between the slide and the slide exit wheels move the slide from the belts onto the slide exit wheels which in turn drop the slide onto the platen of the Slide Elevator module. The platen is in the horizontal position with the gripper open, ready to receive a slide. **(Locate the Elevator and the platen.)**
2. When enough time has elapsed from a slide sensed exiting the Dryer module for the slide to be on the platen, the gripper assembly closes the gripper on the slide.
3. The gripper activates up to three times to grip a slide. **If after the third try the sensor is still blocked, indicating no slide is on the platen, an error message is generated.**
4. When a slide is on the platen, the platen elevator moves down to the slide releasing position. As the elevator moves, the platen rotates 90 degrees.
5. When the elevator reaches the down position, the gripper is released, and the slide falls into the basket slot.
6. After the slide is confirmed in the basket slot, the platen elevator returns to the up position and rotates the platen back to the horizontal position.

Basket Queue Module

The Basket Queue module: moves empty slide baskets to the Slide Elevator module to receive the dried slides (up to 12 per basket), moves the filled slide baskets (or in the case of a stat, the slide basket containing the stat slide) away from the Slide Elevator module. The Basket Queue module can hold up to 12 slide baskets at any one time or up to 6 slide baskets if connected to an LH SlideStainer.

1. The Basket Queue module uses two independent belt/pulley tracks to move the slide baskets. The rear (input) track, advances the slide baskets from left to right, one basket slot at a time. The front (output) track, from right to left, a complete basket at a time. If an LH SlideStainer is attached, the basket is moved all the way to the left for pickup by the stainer's gripper arm.
2. Cylinder operated crossover arms mounted on each end of the tracks transfer the slide baskets from one track to the other, so the baskets can continue to cycle within the module.
3. The rear track advances the slide baskets until the basket index sensor senses that an empty slot is positioned under the point where the platen of the slide elevator is vertical. The Slide Elevator module inserts the next slide into the empty slot.
4. After sensors confirm a slide is in the slot, the rear track advances the slide baskets until the next empty slot is in position for receiving a slide. During initialization, the rear track also advances the slide baskets until the basket index sensor finds the next empty slot.

5. The operator can insert or remove slide baskets from any position on the tracks except immediately under the Slide Elevator module.

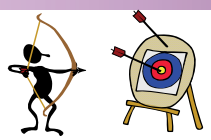
Review Entire Slide Making Process

Be sure you are wearing PPE including full face protection.

1. Set the number of aspirations/tube to 2.
2. Place 3 or 4 sample tubes into a cassette and place cassette into the right-hand loading bay.
3. Observe the following:
   a. Two part aspiration at the needle: first, to the front blood detector and BSV in the Diluter, then to the LH SlideMaker through the needle vent line.
   b. Passage of blood to the reservoirs.
   c. The reservoir mixing process.
   d. Dispenser prime.
   e. Preparation of the slide with the printed label.
   f. Transport of the slide to the dispense probe area.
   g. "Thready" appearance of the blood at FD6.
   h. Dispensing of blood onto the slide.
   i. Making the smear.
   j. Slide in dryer.
   k. Slide placed in basket.
   l. Baskets moving around track.

Be sure to return all settings to the originals--
the ones that your lab uses.

SKILL CHECK



LH SlideMaker Components

Place numbered Post-It® tabs on the correct components (numbered below) on the LH SlideMaker. You may use references as needed.

Have a facilitator check your work when you are finished.

LH SlideMaker Component Checklist

1. **FD1 and BD3**
2. **Blood Reservoirs 1 and 2**
3. **FD 3 and 5**
4. **FD 2 and 4**
5. **Dispense Probe**
6. **Shuttle**
7. **Truck**
8. **Dryer**
9. **Elevator**
10. **Platen**

Score:
_____ / 10

Continue>>>>

LH SlideMaker

1. Approximately _____µL of blood is aspirated for the SlideMaker through the _____ line of the needle.
2. The blood sample for the SlideMaker is mixed in a _____
3. The reservoirs mix by alternating low _____ and _____
4. Name the two fluid detectors on Reservoir 2 _____ and _____
5. Name the component that detects the trailing edge of blood before the drop of blood is dispensed onto the slide _____
6. Approximately _____ µL of blood is used for making the smear.
7. The gripper activates up to _____ to grip a slide.
8. When does the LH SlideMaker consider a slide lost or fallen into the Dryer module? _____

_____

❑ Facilitator sign off

_____

INFORMATION / PRACTICE SECTION

SYSTEM OVERVIEW / COMPONENT LOCATION

Step	Action
	You may print any topic from the HELP system.
1	From the Command Center, go to HELP, **Index** (tab).
2	Type the keyword **Use.**
3	Select the topic **Use and Function – SlideStainer.**
4	Select Display.
5	Print the topic if you wish.
6	In **Index,** type the keyword **Identifying.**
7	Select the topic **Identifying System Components – SlideStainer.**
8	Use the various hypertext links for close up views.
9	Study the different views of the SlideStainer to become familiar with components and their locations.
10	Close HELP.

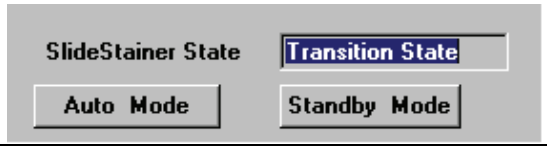
Practice

Practice locating and naming components. You may wish to work with a partner.

Helpful Hints

• Open the Basket Tray drawer only when the **green light** on the front of the drawer is ON.
• To silence the SlideStainer alarm, acknowledge the error message on the Workstation,
• For information on changing reagents go to Help **Contents → LH SlideStainer → Operating Procedures → Operating –BASIC → *Daily Operation.***

LH SlideStainer State

Step	Action
1	On the Workstation, go to  then  .
2	Select  .
3	Look at the top left corner of the window. Depending on the "state' of the SlideStainer, the message you see may be different. 
4	Select the Help Mode  button from the bottom of this window.
5	Click once in the box to the right of SlideStainer State. A pop up window called "SlideStainer State" opens.
6	Print the pop up window by right clicking and selecting "print".
7	Using the HELP topic that you printed, become familiar with the SlideStainer States that may be displayed. Keep the topic handy for reference.

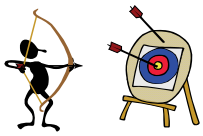
Fill and Drain Baths

Step	Action
1	In HELP  go to **Contents** **LH SlideStainer** **Operating Procedures** **Operating –BASIC.**
2	Select and print in turn: **Draining Baths** and **Filling Baths**
Note 1	You must be in Standby Mode to Fill or Drain baths.
Note 2	**Bath 3 contains Stain/Buffer. Get a small (50 mL) bottle of stain to add to Bath 3 as the baths are filling. Slowly pour the stain into Bath 3 after it is about half full.**

3	Follow the procedure for **Filling Baths** and fill *all* baths.
4	Confirm that all baths fill completely.
5	**At the end of the day or shift, drain all baths.**

NOTE: When you are running the LH 700 with LH SlideMaker and LH SlideStainer, the "empty" basket area contains baskets that the LH SlideStainer will automatically return to the LH SlideMaker. After removing slides from the baskets for manual Diffs, return the empty baskets to the LH SlideStainer in the "empty" basket area. Do Not return the baskets to the front track of the LH SlideMaker.

SKILL CHECK



Component Locations

Place numbered Post-It® tabs on the correct components (numbered below) on the LH SlideStainer. You may use references as needed.

Have a facilitator check your work when you are finished.

NOTE: Remove the Agitation Module cover

1. Basket tray door
2. STAT area
3. Gripper Arm
4. Parking Lot
5. Peristaltic Pumps
6. Bath Liquid Level Sensor
7. Dryer
8. Mandatory empty basket area
9. Waste Filter
10. Power on/off switch
11. Holding position tray
12. Output queue
13. Agitator

SCORE

_____

Fill and Drain Baths

- Describe to a facilitator how to drain and fill **bath 5.**

Continue>>>>

SlideStainer State

1. At the Workstation, demonstrate how to change SlideStainer State to
   - Auto Mode
   - Standby Mode
2. Describe when the following SlideStainer States are used or seen: Use the document you printed using the HELP Mode button to find these descriptions.
   - Filling _____
   - Auto Mode _____
   - Initializing _____
   - Standby Mode _____
   - Error Mode _____

❑ Facilitator sign off

_____

REPLACING COMPONENTS ON THE LH SLIDESTAINER

Practice

Step	Action
Note	Peristaltic pumps may need changing if the SlideStainer is getting "Unable to fill baths" error messages.
1	Select any **peristaltic pump** on your instrument's SlideStainer to be "faulty".
2	Select a new pump.
3	Using the "Replacing a Peristaltic Pump" procedure from HELP, remove the defective pump and replace with the new one.

Checklist for Practice

- ❑ The pump is oriented in its original direction and reconnected to the correct tubing.
- ❑ Both sides of the pump are snapped into place.
- ❑ No tubing is kinked or crimped.

Practice

Step	Action
Note	The waste filter may need changing if the SlideStainer is getting "Unable to drain bath" messages.
1	Locate the **waste filter** on your SlideStainer. Pretend that it is "clogged".
2	Select a new filter.
3	Using the "Replacing the Waste Filter" procedure from HELP, remove the defective filter and replace with the new one.

Checklist for Practice

- ❑ The filter is oriented in the clamp with its arrow pointed toward the back of the SlideStainer and reconnected to the waste line tubing.
- ❑ No tubing is kinked or crimped.

Practice

Step	Action
Note	Reagent line filters may need changing if the SlideStainer is getting "Unable to fill baths" messages.
1	Locate the reagent **line filter** on your SlideStainer. Pretend that it is "clogged".
2	Select a new filter.
3	Remove the defective filter and replace with the new one.

Checklist for Practice

- ❑ The filter is reconnected with its arrow pointed up toward the SlideStainer and the tubing pinches are completely open.

SKILL CHECK

Using a COULTER® LH 700 locate and perform the following replacement procedures:

LH SlideStainer:

- Replace a peristaltic pump
- Replace a waste filter
- Replace a reagent line filter

Inspection Checklists for SlideStainer

Checklist for Replacing a Peristaltic Pump

- ❑ The pump is oriented in its original direction and reconnected to the correct tubing.
- ❑ Both sides of the pump are snapped into place.
- ❑ No tubing is kinked or crimped.

Checklist for Replacing a Waste Filter

- ❑ The filter is oriented in the clamp with its arrow pointed toward the back of the SlideStainer and reconnected to the waste line tubing.
- ❑ No tubing is kinked or crimped.

Checklist for Replacing a Reagent Line Filter

- ❑ The filter is reconnected with its arrow pointed up toward the SlideStainer and the tubing pinches are completely open.

❑ Facilitator sign off

_____

INFORMATION / PRACTICE SECTION

Set Up

1. Be sure to wear **full face protection** (either a full-face shield OR protective eyewear and a face mask).
2. At the Analyzer, set the number of aspirations per tube to **1.**
3. At the Workstation, go to **Run Configuration**. Set Automatic Output / Print to **DISABLED.**

LH SLIDEMAKER TROUBLESHOOTING BASICS

VLS FUNCTION, CALIBRATION AND TROUBLESHOOTING

VLS Function

On an LH 700 with an LH SlideMaker, the needle-vent line for the Analytical Station is also the aspiration line for the LH SlideMaker. The vent-line sensing (VLS) function is used when the Analytical Station is operating in the Automatic mode to confirm the needle-vent/aspiration line is rinsed and dried correctly at the end of each cycle.

Note: The VLS function is used whether the LH SlideMaker is on or off. It is used for all Test modes (CBC/DIFF/RETIC, CBC/DIFF, CBC ONLY, CBC/RETIC, and RETIC ONLY), but only in the Automatic aspiration mode.

Blood detector BD3 is the detector used for the VLS function. BD3 is located on the interface bracket installed near the BSV module.

VLS Diluent Error

During the vent-line backwashing process (controlled by SL1 in the Analytical Station), BD3 is used to detect the presence of diluent. If diluent is not detected, a ***VLS Diluent*** error is generated, and the Automatic mode is disabled because insufficient rinsing of the vent line can lead to carryover issues.

A ***VLS Diluent*** error indicates an issue in the vent-line backwashing process that requires further troubleshooting.

VLS Air Error

During the vent-line drying process, BD3 is used to detect the presence of air. If air is not detected, a ***VLS Air*** error is generated, and the Automatic mode is disabled because inadequate drying of the vent line can lead to dilution of the specimen in the tube.

A ***VLS Air*** error indicates an issue in the vent-line vacuum drying process that requires further troubleshooting.

Calibration

BD3 is calibrated automatically whenever the LH 700 System is powered up or reset. You can also initiate a calibration of BD3 by using the F79 function on the Diluter numeric keypad. The software routine for the automatic calibration and for calibration using F79 is the same, so you can use F79 as a troubleshooting function in the event of a VLS failure.

- Diluent Prime and Calibration
  Diluent is dispensed from the backwash tank via SL1 to prime the needle vent-line for 3 seconds. At the completion of the priming process, BD3 is automatically calibrated on the diluent.
- Diluent and Air Checking
  After the calibration routine, the vent line is primed with diluent for an additional 2.5 seconds during which BD3 is checked for diluent. The check is considered successful if the diluent value is between 70% and 100% of the calibration value.

  Immediately after the diluent check, SL33 is energized to vacuum dry the vent line for 9.5 seconds during which BD3 is checked for air. The check is considered successful if the air value is between 30% and 50% of the calibration value.
- Calibration and Diluent and Air Checking Retry
  If the diluent or air checking routine fails, the System performs the calibration routine a second time. If the system fails to recover the correct diluent or air value a second time, a ***VLS Diluent*** **or** ***VLS Air*** **error** is generated and the Automatic mode for the System is disabled. Only the Manual aspiration mode is allowed.

Troubleshooting

ATTENTION: You must reset the LH 700 System to return it to the Automatic mode after a VLS error. However, F79 can be done continually.

Most VLS errors are usually caused by tubing kinks at the feed-thru or Y-fittings in the needle-vent/aspiration line. Under normal conditions, the diluent rinse flows very rapidly through the vent line, followed by a very rapid air dry.

If unable to find the cause and clear the VLS error, call your Beckman Coulter representative. In the interim, use the Manual aspiration mode.

Fluid Detectors

The fluid detectors for the LH SlideMaker are located in the Sample Access and Reservoir module and the Dispense module.

The LH SlideMaker uses information from the fluid detectors, in conjunction with regulated vacuum or pressure, to determine the volume and positioning of the blood sample. The LH SlideMaker also uses fluid detectors to detect and confirm rinsing and drying of the blood sample lines.

The fluid detectors are designed to detect three distinct fluids: diluent, air and blood. The fluid detectors are calibrated with diluent. To confirm the presence of a particular fluid, blood, air or diluent, several readings are taken at defined intervals.

Fluid Detector Function Summary

FD	Functions	Module
FD1	• Identifies blood in the aspiration line during aspiration to ensure the minimum volume is acquired. • Identifies diluent and air in the aspiration line during rinsing and drying of the aspiration lines.	Sample Access and Reservoir (outside module, near needle)
FD2	• Identifies the leading edge of the aspirated sample for RES1, determining when to stop aspiration. • Detects the presence of blood during mixing in RES1, determining when to stop the left-to-right movement. • Confirms the presence of diluent and air during the rinsing and drying of RES1 and the aspiration lines.	Sample Access and Reservoir
FD3	• Controls the positioning of blood in RES1. • Detects the presence of blood during mixing in RES1, determining when to stop the right-to-left movement. • Confirms the presence of diluent and air during the rinsing and drying of RES1 and the aspiration lines.	Dispense
FD4	• Identifies the leading edge of the aspirated sample for RES2, determining when to stop aspiration. • Detects the presence of blood during mixing in RES2, determining when to stop the left-to-right movement. • Confirms the presence of diluent and air during the rinsing and drying of RES2 and the aspiration lines.	Sample Access and Reservoir
FD5	• Controls the positioning of blood in RES2. • Detects the presence of blood during mixing in RES2, determining when to stop the right-to-left movement. • Confirms the presence of diluent and air during the rinsing and drying of RES2 and the aspiration lines.	Dispense
FD6	• Detects the trailing edge of the blood during the dispensing of the prime sample, determining when to stop dispensing sample. • Confirms the presence of diluent and air during the rinsing and drying of the dispense line.	Dispense
FD7	• Detects diluent and air during the backwashing and drying of the aspiration lines.	Sample Access and Reservoir
FD8	• Detects diluent and air during the rinsing and drying of the reservoirs and the dispense line. • Confirms the presence of air during the drying of the aspiration lines.	Dispense

BD3	• Identifies diluent and air in the aspiration line during the rinsing and drying of the aspiration lines. • Note: While FD1 only checks the aspiration line for diluent and air if the LH SlideMaker is on, BD3 checks this line whether the LH SlideMaker is on or off. • Since the aspiration line for the LH SlideMaker is also the needle-vent line for the Analytical Station, it is important to verify that this line is cleaned and dried during LH 700 System operation.	Sample Access and Reservoir (outside module, near needle)

FD/BD3 Error Conditions

If fluid detectors FD1 through FD6 sense an issue while aspirating or dispensing the blood sample, the LH SlideMaker discards the sample and warns the operator. If the same issue occurs three times in a row, the LH SlideMaker generates an error message and stops.

If fluid detectors FD1 through FD8 sense an issue while rinsing or drying the lines, the LH SlideMaker generates an error message and stops.

If blood detector BD3 senses an issue while rinsing or drying the needle-vent line, the LH 700 generates a VLS error and disables the Automatic mode.

If an error message occurs for any of the fluid detectors, FD1 through FD8, refer to the table above.

Error Recovery

1. At the Workstation, go to HELP ?
   Contents → LH SlideMaker → Messages → SlideMaker Message List
2. To add this topic to your **Favorites,** select the Favorites tab and select **Add.**
3. Next select **Contents → LH SlideMaker → Troubleshooting → Overview** and **Add** this topic to your **Favorites**.
4. The LH SlideMaker messages are listed in alphabetical order. Use the letters at the top of the page to access your particular message. Both the **SlideMaker Message List** and the **Troubleshooting Overview** contain hypertext links that take you to Help topics that have troubleshooting tips related to the error condition as well as steps to take to resolve the issue. There are many videos included to show the area and what to do.

Use this now by selecting any of the hypertext links and viewing the associated help suggestions for the topic you selected.

LH SlideMaker Messages and Error Recovery

The following are some of the most common errors encountered on the LH SlideMaker. When the Workstation receives an error message for the LH SlideMaker, do not acknowledge (i.e., click the green checkmark) until you finish all troubleshooting. Acknowledging the error prior to troubleshooting causes the SlideMaker to automatically reset and the same error may happen again.

Message	Why This Message Occurs	What To Do
Basket (Did Not Transfer Between Belts)	a) A jam prevented completion of the slide basket transfer. b) When you turned the SM (SlideMaker) on, a basket was in a corner, but not at a belt position sensor. c) One of the sensors failed (extension or retraction).	Press any key on SM screen to silence the alarm, wait until dryer belt stops moving. Remove any jammed baskets or any other visible obstruction, such as slides. Acknowledge error at the Workstation to reset the SM. If the issue continues, turn SM power off. Open cover and remove slides from dryer, pusher bars and platen area and place them in a slide basket for staining. Call your Beckman Coulter Representative.
Basket (Move Position)	a) Jam prevented movement. b) Profile sensor failure.	Press any key on SM screen to silence alarm. Remove jammed slide basket. Acknowledge error screen at Workstation to reset the SM. If message persists turn SM power off. Close cover; call your Beckman Coulter Representative.

Message	Why This Message Occurs	What To Do
Truck (Vacuum, Sensor 3)	a) Truck lift sensor failure. b) Slides may be problematic	Press any key on SM screen to silence alarm. Wait until last slide in dryer is deposited in a basket. Acknowledge error at Workstation to reset SM. If you suspect a vacuum issue, debris may exist on the truck or on the slide. Use a lint-free tissue moistened with distilled water to wipe the truck and and its o-ring to remove any debris. Change/replace slides.
Dispense (Probe Not Down, Sen 12)	a) Dispense probe is stuck. b) Mechanism that pushes dispense probe down is not receiving sufficient pressure. c) SEN12 failed. d) Dispense probe or rinse block is dirty.	Press any key on the SM screen to silence the alarm. Wait until the last slide in the dryer has been deposited in a slide basket. Open the cover, if a slide is on the shuttle or has fallen, remove it. Inspect the area below the smear truck for fallen slides and retrieve the slides if possible. Clean dispense probe and/or rinse block. Close cover and acknowledge error on Workstation to reset the SM. If the issue continues, call your Beckman Coulter Representative.

Message	Why This Message Occurs	What To Do
Shuttle (Vacuum, Sensor 4)	a) Failure to detect vacuum when passing a slide from smear truck to shuttle indicating an improperly placed slide or debris on shuttle prevents the necessary seal. b) Shuttle vacuum sensor is defective. c) Shuttle vacuum supply solenoid defective.	Stop alarm, wait for last slide to be deposited. Open cover, if a slide is on the shuttle, remove it (if labeled, save for staining). Carefully wipe shuttle (area with orange oval o-ring) with lint-free tissue moistened with distilled water to remove any debris. Remove any fallen slides. Close cover and acknowledge error on Workstation.
Communication (PC Timeout) – SlideMaker to Workstation Timeout **Communication (Analyzer CRC) – SlideMaker to Analytical Station** **Communication Lost (CRC Check Failed)**	a) The Workstation is not responding. Handshake signals are absent when information is required. b) Three consecutive messages between the SlideMaker and the Analytical Station were not acknowledged. c) SlideMaker is disabled. d) SlideMaker is powered off and/or disconnected from power source.	Ensure the Workstation is working properly. If it is, check if the dryer module belt is moving by placing a finger on the plastic conveyer belt of the dryer module in the SlideMaker. If the belt is moving, at the Workstation Command Center in Process Type, change from AUTO ANALYSIS to any of the other choices and then back to AUTO ANALYSIS. Ensure the Analytical Station is working properly (at READY). Only if necessary, reset the Analyzer. Ensure SlideMaker is enabled in Run Configuration. Ensure SlideMaker is connected to power source and powered on. Reseat the cable at the port labeled HOST INTFC on the back panel below the power cord. Ensure the SM is powered off when reseating any cable.

Message	Why This Message Occurs	What To Do
Printer (Failure)	a) Label printer detected a failure. b) Loose labels are trapped within the label/ribbon pathway.	Stop alarm and wait for last slide to be deposited into a basket.
		Check for proper seating of label roll and ribbon roll and ensure rolls are seated properly on the printer spools.
		To confirm proper routing and seating of the labels and ribbon, print a dummy label. From the SlideMaker main menu choose Special Cycles and then Print Label.
		Remove any stuck labels and clean the area with an alcohol prep.
Cassette (No Cassette)	a) No slide cassette is available at input queue. b) Sensor failure indicates no slide cassettes with slides when one is present.	Press any key on the SlideMaker to reset the alarm.
		If the cassette input queue is empty, place a full slide cassette in the cassette input queue module and acknowledge error at Workstation.
		If a full slide cassette is in the cassette input queue wait until the last slide is deposited in the basket and unlock the cassette. At the Main Menu, select Routine Functions→Unlock Cassette to unlock the cassette
		Remove and reinstall the slide cassette that is in the slide ejector station.
		Acknowledge the error at the Workstation to reset the SlideMaker.

Message	Why This Message Occurs	What To Do
Ejector (Slide Not Ejected)	a) The slide pusher is jammed. b) Slides within the cassette may be stuck together due to humidity c) A broken slide may prevent a slide from being dispensed. d) The slide pusher extended sensor, SEN24, is blocked or failed.	Press any key on the SlideMaker to reset the alarm. Wait until the last slide in the Dryer module is deposited in a slide basket. At the Main Menu, select Routine Functions→Unlock Cassette to unlock the cassette. Remove the slide cassette that is in the slide ejector station and ensure no slides in the cassette are sticking together. Open the cover. Manually remove any slide from the slide ejector mechanism and close cover. Reinstall the slide cassette in the Cassette Input Queue module. Acknowledge the error at the Workstation to reset the SlideMaker. If the issue continues, call your Beckman Coulter Representative.
Ejector (Slide not X registered)	a) The X-register is jammed. b) The slide is broken and is too short to push the flag into the slide register sensor, SEN25. c) The slide register sensor, SEN25, failed.	Press any key on the SlideMaker to reset the alarm. Wait until the last slide in the Dryer module is deposited in a slide basket. At the Main Menu, select Routine Functions→Unlock Cassette to unlock the cassette. Remove the slide cassette that is in the slide ejector station. Open the cover. Manually remove any slide from the slide ejector mechanism and close cover. Reinstall the slide cassette in the Cassette Input Queue module. Acknowledge the error at the Workstation to reset the SlideMaker.

Message	Why This Message Occurs	What To Do
Fluidics (Detector 6)	a) Either fluid detector FD6 is defective or there is a fluidics problem.	Press any key on the SlideMaker to reset the alarm. Acknowledge the error at the Workstation to reset the SlideMaker. Ensure the tubing to the fitting at FD6 is not kinked. You may need to remove the splashguard to get a good view of FD6. If the message persists, clean the dispense probe and replace the red-striped I-beam dispense line tubing at VL8. If the issue continues, call your Beckman Coulter Representative.

Workflow Scenarios for SlideMaker

1. **You observe that no slides are being made on your LH SlideMaker. You have not received any errors on the Workstation.**
A. What are the first things you would check?
Verify that the SlideMaker is powered on.
Verify that the SlideMaker is enabled in Run Configuration (Enable System Function checkbox).
Verify correct checkbox selected in Run Configuration SlideMaker tab.
Verify SlideMaker keypad screen displays “Ready”.
B. What would you do to verify that the problem has been resolved?
Run blood samples. Observe operation to confirm that the SlideMaker is now making smears.
2. **You observe that the labels on your slides are hanging off the edge of the slide and are not centered.**
A. What would you do to try to resolve the problem?
Verify that the labels and ribbon are installed correctly. Check that the “cores” of the rolls are pushed all the way in on the spools.
B. What would you check?
Check to ensure that no labels have gotten stuck within the pathway.
C. What test would you perform to ensure that the placement of the labels on your slides is correct?
Print a test label by accessing Special Cycles→Print Label from the SlideMaker Main Menu.
3. **You observe that your LH SlideMaker appears to be making slides, however, upon further investigation, you discover you are not getting a drop of blood on your slide to make the smear.**
A. What would cause this situation?
Incomplete aspiration of sample to the SlideMaker due to a possible blood clog in the pathway from the vent line to the dispense probe.
B. Where would you look?
Check the tubing through the fluid detectors for holes or kinks.
Check the dispense probe.
C. What could you do to resolve the issue?
Perform F-79 to calibrate the vent line. Observe the line through BD3 and FD1. Watch for the presence of liquid, then a change to air.
Remove kinks in any tubing that may be preventing proper sample flow.
Replace any tubing that is visibly leaking.
Clean dispense probe.

TIP:

If the compressor has timed out and you place a sample cassette in the loading bay, the LH SlideMaker will not automatically start.

- Before placing a cassette in the loading bay, press <PRIME APERT> to place the system in a READY state.
- Once READY appears on the Analyzer Control Keypad display, place the cassette in the loading bay and process normally.

If you have the LH SlideStainer, please continue.

LH SLIDESTAINER TROUBLESHOOTING

Monitor Sensor Status

Step	Action
1	In HELP, go to **Contents** **LH SlideStainer** **Operating Procedures** **Operating –BASIC.**
2	Select and read the procedure **Monitor Sensor Status.** Close HELP.
3	Open the **Monitor Sensor Status**  screen.
4	At the SlideStainer, place a basket in each of the following positions and observe changes on the **Monitor Sensor Status** window: ▸ Output queue ▸ STAT IN position ▸ Parking lot
5	Remove the baskets from the SlideStainer.

Input Queue Configuration

Step	Action
1	In HELP, go to **Search.**
2	Type: **Input Queue.**
3	Click on List Topics.
4	On the list displayed, select **Input Queue Configuration.**
5	Select  .
6	Print the topic. Close HELP.
7	Select the SlideStainer Input Queue Status button from the SlideStainer setup screen and follow the printed procedure to reconfigure the Input Queue.
Note	To change the configutration, select the button with text (Parking or Empty). Do not deselect any input/output queue positions. Doing so disables that specific slide basket position.
8	Configure the **empty basket area to seven spaces** and the **parking lot to five spaces**.
9	Manually move the plastic divider to indicate the visual dividing line between parking and empty baskets to reflect the change made in step 7.
10	Now change the configuration so that both **parking lot** and **empty basket** areas have **six** spaces. Move the plastic divider as well.
11	Select  to save.

Reinitialize Arm

Step	Action
1	In HELP, go to **Contents** **LH SlideStainer** **Operating Procedures** **Operating – BASIC.**
2	Select topic: **Reinitialize Arm** and print the procedure.
3	Close HELP.
4	If the arm is not in the "home" position at the rear of the LH SlideStainer, perform the procedure.
5	From the **SlideStainer Status dialog box,** practice opening and closing the gripper.

LH SLIDESTAINER TROUBLESHOOTING TIPS

1. At the Workstation, go to HELP ?

   Contents → LH SlideStainer → Messages List→ ST Message List

2. To add this topic to your **Favorites,** select the Favorites tab and select **Add.**
3. The SlideStainer messages are listed in alphabetical order. Use the letters at the top of the page to access your particular message. The **SlideStainer Message List** contains hypertext links that will take you to Help topics that have troubleshooting tips related to the error condition as well as steps to take to resolve the problem. There are many videos included to show the area and what to do.

Use this now by selecting any of the hypertext jumps and viewing the associated help suggestions for the topic you selected.

LH SlideStainer Messages and Error Recovery

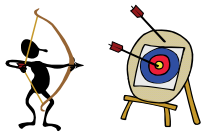
Message	Why This Message Occurs	What To Do
Unable to Drain Bath 1 (also applies to baths 2-5)	a) The waste filter is clogged. b) Metal drain tube in bath is clogged. c) Tubing leak or tubing not in pinch valve. d) Drain pump 6 is defective. e) A pinch valve is defective.	Clear error. Try to drain bath 1 again. Try to drain another bath. If neither bath drains, change the waste filter. If the second bath drains, the problem is not the waste filter, but could be b) Metal drain tube in bath is clogged or c) Tubing leak or tubing not in pinch valve. If b), clean the metal drain tube with a syringe or a pipe cleaner. If c), change tubing or place tubing back into pinch valve. If d) Drain pump 6 is defective or e) A pinch valve is defective, call your Beckman Coulter representative.
Unable to Fill Bath 1 (also applies to baths 2- 4)	a) The reagent supply is empty. b) The peristaltic pump is problematic. c) The reagent filter is clogged. d) The reagent pickup line is clogged.	Check the reagent supply and replace if necessary. Clear error. If issue persists, change the peristaltic pump. If issue persists, change the reagent filter. If issue persists, perform the ***Flushing Stain Baths and Tubing*** procedure from HELP. If unsuccessful, replace the line. If the issue persists, call your Beckman Coulter Representative.

Message	Why This Message Occurs	What To Do
Unable to Fill Bath 5	a) The reagent grade water supply is empty. b) Bath 5 reagent filter is clogged. c) The membrane pump is problematic.	Check the reagent grade water supply and replace/refill if necessary.
Arm Mechanism Jam (X-Axis, Y-Axis, Z-Axis)	a) A jam. b) A hardware issue.	If possible, assess cause of jam and remove obstacle. Clear error. If slide baskets are in the baths or dryer, you can abort the run or continue processing the baskets. • If you choose to abort the run, the SlideStainer goes to Standby, and **YOU MUST REMOVE ALL SLIDE BASKETS IN THE BATHS, THE DRYER AND BOTH POSITIONS OF THE TEMPORARY HOLD.** • If you choose to continue to process, the SlideStainer tries to recover automatically and continue. If the SlideStainer fails to recover, turn the SlideStainer off and then on. If the message persists, call your Beckman Coulter Representative.

Message	Why This Message Occurs	What To Do
Arm Initialization Error (X-Axis, Y-Axis, Z-Axis)	a) The axis home or initialization position sensor is defective. b) The axis arm mechanism is jammed.	If possible, assess cause of jam and remove obstacle. Clear error. If slide baskets are in the baths or dryer, you can abort the run or continue processing the baskets. • If you choose to abort the run, the SlideStainer goes to Standby, and you must remove any slide baskets in the baths and the dryer. • If you choose to continue process, the SlideStainer tries to recover automatically and continue. If the SlideStainer fails to recover, turn the SlideStainer off and then on. If the message persists, call your Beckman Coulter Representative.

SKILL CHECK

LH SlideMaker Error Recovery



1. An FD 8 error could mean that rinsing is not taking place.

   True False

2. If a VLS error occurs, what is the most common cause?

   _____

3. What function can be used to verify VLS calibration?

   _____

4. How is the shuttle cleaned to prevent Shuttle (Vacuum, Sensor 4) errors?

   _____

   _____

5. What is the first thing to check if receiving Communication (PC Timeout)-SlideMaker to Workstation errors?

   _____

   _____

6. What are four causes of the Ejector (Slide not X registered) errors?

   _____

   _____

   _____

   _____

7. What is the first thing to check if receiving Fluid Detector 6 errors?

   _____

8. If the LH 700 compressor has timed out, what should be done before placing a cassette of patient samples on the loading bay?

   _____

Continue >>>>

9. If no slides are being made on your LH SlideMaker and no errors have been received on the Workstation, what are the first things to check?

_____
_____
_____

10. What are 4 resolutions to the issue of not getting a drop of blood on your slide to make the smear.

_____
_____
_____
_____
_____
_____
_____
_____

LH SlideStainer Error Recovery

Monitor Sensor Status

1. At the Workstation, show a facilitator that you can access the **Monitor Sensor Status** window in System Set Up.
2. Using a slide basket, place it in each of the following positions on the SlideStainer. Explain the changes on the **Monitor Sensor Status** window.
   - STAT out position
   - Empty basket area
   - Parking lot

Input Queue Configuration

1. At the Workstation, show a facilitator that you can access the **Input Queue Configuration** window in System Set Up.
2. Demonstrate how to configure the **Parking Lot** and **Empty Basket Area** as follows:
   - Parking Lot: **seven** spaces and Empty Basket Area, **five** spaces.

Continue >>>>

Reinitialize Arm

- Perform the following procedures for a facilitator
  - Reinitialize arm
  - Open and close grippers

❑ Facilitator sign off

_____

LH SlideStainer Error Recovery

1. What is the most likely cause of Unable to Drain Bath error message?

   _____

2. If the reagent supply is adequate, what are other possile causes for Unable to Fill Bath error message?

   _____

3. If Arm Initialization Error (X-Axis, Y-Axis, Z-Axis) or Arm Mechanism Jam (X-Axis, Y-Axis, Z-Axis) occurs, what is the first thing that should be done?

   _____

❑ Facilitator sign off

_____

LH SERIES SLIDEMAKER/SLIDESTAINER FACILITATOR ANSWER KEY for SKILL CHECKS

SPLR SLIDES, PROBE, LABELS/RIBBON

Verify the practice loading of slides into a cassette, Frosted bars down, slides aligned evenly, pick up cassette by holding firmly front and back.

Cassette placed in center of input queue, arrow pointing up and facing you.

Have customer open the cover on the SlideMaker and point to the Dispense Probe.

Verify dispense probe and rinse cup are clean.

Labels and ribbon are threaded correctly, following diagram on unit.

Check test slide label for proper positioning on the slide and for printing to be properly positioned on the label.

SMSF SAMPLE FLOW – LH SLIDEMAKER

Using Component Check List from Skill Check, peel off Post-it tabs and keep track of score. Note score on Skill Check sheet.

1. 250 µL, vent
2. Reservoir
3. Low Vacuum and atmospheric pressure
4. FD 4 and FD 5
5. FD 6
6. 4 µL
7. 3
8. If the stepper motor takes too many steps before the LH SlideMaker senses an exiting slide.

Input Queue Configuration

1. Observe student access the Input Queue Configuration window.
2. Observe student configure Parking Lot with 7 spaces and the Empty Basket Area with 5 spaces. Ensure the configuration is returned to 6 Parking Lot and 6 Empty.

Reinitialize Arm

1. Observe student access the SlideStainer Dialog tab.
2. Observe student reinitialize arm and open & close grippers.

SS LH SLIDESTAINER SET UP

Review Component Checklist and tabs and record score.

Fill and Drain Baths

- Observe student drain and fill Bath 5.

SlideStainer State

1. Observe student change SlideStainer State to Auto Mode and to Standby Mode
2. Filling: when a bath is filling

   Auto Mode: when the stainer is in normal operation

   Initializing: when you request the arm to return to the home position

   Standby Mode: when doing maintenance cleaning or troubleshooting

RC REPLACING COMPONENTS

Use the checklist provided in the exercise to inspect the completed work presented to you. If anything is missing or incorrect, discuss the correction and have the student repeat that particular part of the exercise.

TB TROUBLESHOOTING BASICS

LH SlideMaker Error Recovery

1. True
2. Vent Line from needle pinched or torn.
3. F79
4. Carefully wipe shuttle (area with orange oval) with lint-free tissue moistened with distilled water to remove any debris.
5. Ensure the Workstation is working properly. If it is, place a finger on the plastic conveyer belt of the dryer module in the SlideMaker to check if the belt is moving. If the belt is moving, at the Workstation Command Center in Process Type, change from AUTO ANALYSIS to any of the other choices and then back to AUTO ANALYSIS.
6. The X-register is jammed.

   The slide is broken and is too short to push the flag into the slide registered sensor, SEN25.

   The Z-register arm is not forceful enough to prevent the X-register arm from pushing the slide past the sensor flag spring for SEN25.

   The slide registered sensor, SEN25, failed.
7. Ensure the tubing to the fitting at FD6 is not kinked. You may need to remove the splashguard to get a good view of FD6.
8. Before placing a cassette in the loading bay, press Prime Aperture to place the system in a READY state. Once READY appears on the Numeric Keypad, the cassette can be placed in the loading bay and processed as normal.
9. Verify that the SlideMaker is powered on.

   Verify that the SlideMaker is enabled in Run Configuration (Enable System Function checkbox).

   Verify correct checkbox selected in Run Configuration SlideMaker tab.
10. Perform F-79 to calibrate the vent line.

    Remove kinks in any tubing that may be preventing proper sample flow.

    Replace any tubing that is visibly leaking.

    Clean dispense probe.

LH SlideStainer

Monitor Sensor Status

1. Observe student access the Monitor Sensor Status window.
2. Observe student place basket in the STAT out position, the empty basket area, and the parking lot and explain the changes on the Monitor Sensor Status window.

Input Queue Configuration

3. Observe student access the Input Queue Configuration window.
4. Observe student configure Parking Lot with 7 spaces and the Empty Basket Area with 5 spaces. Ensure the configuration is returned to 6 Parking Lot and 6 Empty.

Reinitialize Arm

3. Observe student access the SlideStainer Dialog tab.
4. Observe student reinitialize arm and open & close grippers.

1. The waste filter is clogged.
2. The peristaltic pump is problematic.
3. Assess cause of jam and remove obstacle.

SLIDEMAKER / SLIDESTAINER TRAINING CHECKLIST

Given an operating COULTER® LH SlideMaker, access to HELP ? , and required supplies, able to perform the following:

- Load glass slides into a slide cassette
- Load slide cassettes into the LH SlideMaker
- Locate dispense probe to inspect for cleaning
- Clean Dispense Probe and Rinse Cup
- Replace label roll
- Replace printer ribbon
- Verify label and ribbon replacement
- Set up Workstation for SlideMaker

Given an operating COULTER® 700 with LH SlideMaker, Easy Reference diagrams, blood sample, and access to HELP ? able to perform the following:

- Trace sample flow through the LH SlideMaker and identify LH SlideMaker components
- Locate and name major LH SlideMaker components

Given an operating COULTER® LH 700 Analyzer with LH SlideMaker and LH SlideStainer, bloods collected in EDTA, bar code labels, slides, slide cassettes, and access to HELP ? able to perform the following:

- Locate and name key components on the LH SlideStainer so that you can identify the SlideStainer components
- Describe the various SlideStainer states
- Demonstrate how to automatically drain and fill baths

Given a COULTER® LH 700 SlideStainer requiring a component replacement, locate the procedure using HELP. Know how to perform the procedure following all safety precautions.

LH SlideStainer:

- Replace a waste filter
- Replace a reagent line filter
- Replace a peristaltic pump

Given an operating LH 700 Analyzer, access to HELP:

LH SlideMaker:

- Know the causes for the more common SlideMaker error messages and how to recover from the errors

LH SlideStainer:

- Know the causes for Unable to Drain Bath and Unable to Fill Bath error messages and how to recover from the errors
- Know the causes for Arm Mechanism Jam (X-Axis, Y-Axis, Z-Axis) or Arm Initialization Error (X-Axis, Y-Axis, Z-Axis) error messages and how to recover from the errors
- Show how to monitor sensor status at the Workstation
- Demonstrate how to reconfigure the input queue and empty basket area
- Demonstrate how to reinitialize the arm, and open and close the gripper