COULTER LH 780 System

Special Procedures and Troubleshooting

CE

PN 773023AE (January 2013)

Beckman Coulter, Inc.
250 S. Kraemer Blvd.
Brea, CA 92821 U.S.A.

BECKMAN COULTER

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 when 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.

Issue A, 12/06
Software Version 1A. Converted from Help Version 1A.063001 (CE)

Issue AA, 08/09
Software Version 1B1. Converted from Help Version 1B1.091732.

Issue AB, 10/10
Software Version 1B.1.

Updates were made to the company corporate address.

Issue AC, 12/10
Software Version 1B.1.

Changes were made to:

- FLUSHING LOW VACUUM LINES
- FLUSHING THE BACKWASH TANK VACUUM SUPPLY LINE
- USING HANDHELD SCANNER

Issue AD, 12/11
Software Version 1B.1.

Changes were made to:

- Review Results on the Calibration Window
- BLEACHING APERTURES

Issue AE, 01/13
Software Version 1B3. Manual derived from Online Help version 1B3.

Changes were made to:

- A Prepare Instrument for Removal of BSV
- A Prepare Instrument for Needle Replacement
- F Return Needle to Its Original Location
- Added reference to the Hematology Tube List information

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released to the Beckman Coulter website. For labeling updates, go to www.beckmancoulter.com and download the most recent manual or system help for your instrument.

REVISION STATUS

CONTENTS

This introductory section contains the following topics:

- How to use your COULTER LH 780 System hard-copy manuals
- About this manual
- Online Help System
- Conventions.

HOW TO USE YOUR COULTER LH 780 SYSTEM HARD-COPY MANUALS

Use the Reference manual for in-depth information about what the instrument does, the methods it uses, its specifications, and information on installation, safety and software options. The Reference manual for the LH 780 System is included in the online Help system; it is available in hard copy by request.

Use the Special Procedures and Troubleshooting manual to run calibration; to clean, replace or adjust a component on the instrument; and for troubleshooting the instrument. This document is made up of procedures from the online Help system; it is available in hard copy by request.

Use the Operator's Guide for the day-to-day operation of your instrument. This document is made up of procedures from the online Help system; it includes Startup, running controls and samples, reviewing data, Shutdown, and the software on the Analyzer and the Workstation. This document is available in hard copy by request.

Use the SlideMaker Operator's Guide for in-depth information about what the SlideMaker does, the methods it uses, its specifications, and information on installation, safety and software, as well as day-to-day operating and troubleshooting your SlideMaker. This document is made up of procedures from the online Help system; it is available in hard copy by request.

Use the SlideStainer Operator's Guide for the day-to-day operating and troubleshooting of your SlideStainer. This document is made up of procedures from the online Help system; it includes in-depth information about what the SlideStainer does, the methods it uses, its specifications, and information on installation, safety and software. This document is available in hard copy by request.

Use the Host Transmission Specification to find the information needed to program the transmission interface between the LH 700 SERIES System and your laboratory's host computer. This document is available in hard copy by request.

See the Documentation page on the back cover of this manual for the contents of each manual. It can help you to determine quickly in which manual the information you need is located.

ABOUT THIS MANUAL

Your LH 780 Special Procedures and Troubleshooting Guide is a source of information for the day-to-day operation of your instrument. This information is organized as follows:

- Chapter 1, Calibration
  Provides procedures for reproducibility, carryover, calibration with S-CAL calibrator and calibration with whole blood.
- Chapter 2, Cleaning Procedures
  Provides procedures for cleaning parts of the system.
- Chapter 3, Replacement Procedures
  Provides procedures for replacing parts of the system.
- Chapter 4, Adjustment Procedures
  Provides procedures for adjusting parts of the system.
- Chapter 5, Troubleshooting
  Provides an overview of troubleshooting concepts, describes the Numeric keypad functions, lists the solenoids, describes how to reset the Analyzer and the Workstation, describes the Workstation logs, and lists the error messages.
- Chapter 6, Error Messages
  Provides a list of all the error messages that appear on the system.
- Index, hard copy only.

ONLINE HELP SYSTEM

The LH Workstation has a comprehensive Online Help System, which includes reference information, all operating, maintenance and troubleshooting procedures. On the LH Workstation, select  to access Help.

CONVENTIONS

This document uses the following conventions:

 indicates a key on the Numeric keypad.

 indicates a key on the LH Workstation keyboard.

 is the icon for Patient results on the LH Workstation.

 is the icon for the Printer on the LH Workstation.

1.1 OVERVIEW

Calibration fine-tunes the LH 700 Series System so it provides the most accurate results possible.

Your laboratory is responsible for the final calibration of the CBC parameters and for recording the calibration factors. Beckman Coulter recommends S-CAL calibrator, or an exact equivalent, as an acceptable alternative to whole-blood calibration.

In the normal process of tracking data for an extended period of time, your laboratory can make a specific decision to recalibrate a given parameter. Never adjust to a specific value for an individual sample.

For best performance, calibrate all the CBC parameters. The WBC differential and Retic parameters are calibrated at the factory; they do not require calibration in the laboratory.

When to Calibrate

You should calibrate your instrument:

- At installation
- After the replacement of any component that involves dilution characteristics (such as the BSV) or the primary measurements (such as the apertures)
- When advised to do so by your Beckman Coulter Representative.

You should verify the calibration of your instrument:

- As dictated by your laboratory procedures, local or national regulations
- When controls begin to show evidence of unusual trends
- When controls exceed the manufacturer's defined acceptable limits.
- If the average ambient room temperature changes more than 10°F from the calibrating temperature.

1.2 PERFORMING REPRODUCIBILITY CHECK

Sample Requirements

For reproducibility studies, ensure the patient for the sample:

- is receiving no medication
- has normal hematologic parameters, with a WBC count of 10,000 ±1,000.
- has normal erythrocyte, leukocyte and platelet morphology and, if you want to check the Diff parameters, with Diff values:

Neutrophils	40 to 72%
Lymphocytes	17 to 45%
Monocytes	4 to 12%
Eosinophils	0 to 10%
Basophils	0 to 1%

1. Ensure you have enough normal whole blood from a single donor for a minimum of 11 and a maximum of 31 cycles.
2. Ensure pneumatics are on.
3. Ensure the blood detector is enabled.
4. Ensure the number of aspirations per tube is set to 1.
5. Select the desired mode of operation.
6. Select **REPRODUCIBILITY** as the process type on the Command Center.
7. If necessary, select  on the Reproducibility window to clear out the values that appear on the results table.

   Note: If you want to view the reproducibility results as the Workstation receives them, you can access the Reproducibility window (step 14) before proceeding. The background of the Reproducibility window changes to the same background as the Command Center when you change the process type to **REPRODUCIBILITY**.
8. Allocate approximately 1 ml of the well mixed normal whole blood sample into one tube.
9. Cycle one sample of normal whole blood in Automatic aspiration mode.
10. Set the number of aspirations per tube to 5.

CAUTION Needle damage can occur if you pierce a specimen tube more than five times. Do not pierce a specimen tube more than five times.

11. Separate the well-mixed normal whole-blood sample into two tubes. (Additional tubes are necessary for reproducibility greater than n = 10.)
12. Place the tubes into consecutive positions in a cassette and place the cassette in the loading bay. The system automatically begins processing the cassette. It pierces, aspirates, and analyzes the samples.
13. Select on the Command Center to display the Quality Assurance application.
14. Select to display the Reproducibility window.
15. Review the results table and statistics table on the window. Use the scroll bars to review results that do not appear on the window.
16. Verify that the CV (Coefficient of Variation) does not exceed the established Reproducibility Limits. If limit is exceeded, repeat steps 10 through 12 under Performing Reproducibility Check, until at least 11 but not more than 31 whole blood samples have been analyzed. You may stop the analysis at any point between 11 and 31 runs if the reproducibility established limits have been met.
17. Upon completion of reproducibility, select **AUTO ANALYSIS** as the process type on the command center for continuing with sample analysis.

1.3 REVIEWING REPRODUCIBILITY RESULTS

Note: To perform this task, you must log on with a user name that was set up as an Advanced Operator or Lab Administrator. If you need to access this function, contact your laboratory administrator.

1. Select  on the Command Center to display the Quality Assurance application.
2. Select  to display the Reproducibility window.
3. Review the results table and statistics table on the window. Use the scroll bars to review results that do not appear on the window.
4. Verify that the CV (Coefficient of Variation) doe not exceed the established limits. If limit is exceeded, repeat steps 8 through 13 under Performing Reproducibility Check, until at least 11 but not more than 31 whole blood samples have been analyzed. You may stop the analysis at any point between 11 and 31 runs if the reproducibility established limits have been met.

Reproducibility Limits for CBC

Parameter	%CV
WBC	<= 1.7
RBC	<= 0.8
Hgb	<= 0.8
MCV	<= 0.8
Plt	<= 3.3
MPV	<= 2.2

1.4 PERFORMING CARRYOVER CHECK

1. Ensure pneumatics are on.
2. Ensure the blood detector is disabled.
3. Ensure the mode of operation is set to CBC. You can perform carryover check using other operating modes, however the procedure will take longer and use excess reagents.
4. Ensure the number of aspirations per tube is set to 1.
5. Select **CARRYOVER** as the process type on the Command Center.

   Note: If you want to view the carryover results as the Workstation receives them, you can access the Carryover window (step 13) before proceeding. The background of the Carryover window changes to the same background as the Command Center when you change the process type to **CARRYOVER**.

6. If necessary, select  on the Carryover window to clear out the values that appear on the results table.
7. Obtain a normal whole-blood specimen.
8. Separate the well-mixed normal whole-blood specimen into two 5 mL tubes.
9. Place the tubes into consecutive positions in a cassette.
10. Dispense 2 mL of diluent into three separate 5 mL tubes.
11. Place the three diluent tubes in the same cassette. Place the tubes after the whole-blood specimens.

12. Place the cassette in the loading bay. The instrument begins processing the cassette automatically.
13. Verify the carryover results.
14. Enable the blood detector.
15. On the Command Center, select **AUTO ANALYSIS** as the process type if you are not continuing to either Reproducibility or Calibration.

Carryover Formula

The LH 700 Series software calculates the percent carryover by using:

(1st diluent - 3rd diluent) / 2nd sample x 100 = % carryover

1.5 REVIEWING CARRYOVER RESULTS

Note: To perform this task, you must log on with a user name that was set up as an Advanced Operator or Lab Administrator. If you need to access this function, contact your laboratory administrator.

1. Select  on the Command Center to display the Quality Assurance application.
2. Select  to display the Carryover window.
3. Verify that the message *CARRYOVER ACCEPTABLE* appears on the Carryover window. If Carryover is unacceptable, the unacceptable values appear flagged. Review the results table and the limits table.

   Note: If negative carryover values persist, and the third diluent is higher than the first two, check background. If the problem persists, an instrument problem may exist, call your Beckman Coulter Representative.

4. Select  to print the carryover results for your logbook.

1.6 CALIBRATING CBC PARAMETERS WITH S-CAL CALIBRATOR

Summary

A. Ensure the apertures are clean.

B. Ensure the instrument is functioning properly.

C. Prepare the instrument for calibration.

D. Set up the CBC calibration information at the Workstation.

E. Run S-CAL calibrator.

F. Review results on the Calibration window.

G. Adjust parameters as needed.

H. On the Command Center, select **AUTO ANALYSIS** as the process type.

I. Verify calibration by cycling each level of 5C Cell control in Automatic aspiration mode.

Procedure

Ensure Apertures are Clean

If the instrument is shut down, and you routinely shut down the instrument for at least 30 minutes every 24 hours in LH Series Cleaner, cleaning is unnecessary.

If you routinely use LH Series Cleaner, but you are beginning calibration after processing patient samples, shut down the instrument in the cleaning agent for 30 minutes before proceeding.

CAUTION Possible flow cell damage could occur if you aspirate bleach. Do not aspirate bleach.

If you do not routinely use LH Series Cleaner, bleach the apertures before proceeding.

Ensure the Instrument is Functioning Properly

1. Check the reagent containers for:
   - Sufficient quantity
   - Not beyond expiration date
   - No precipitates, turbidity, particulate matter, or unusual color
   - Proper connections between the Diluter and the reagent containers.

WARNING Biohazardous materials might be contained in the waste container and could cause contamination unless handled with care. Avoid skin contact. Clean up spills immediately. Follow your laboratory's protocol for safety measures.

2. Check the waste container for:
   - Sufficient capacity
   - Proper connections.
3. Perform daily startup.
4. In addition to verifying daily startup results, verify acceptable control results.

Prepare the Instrument for Calibration

1. Ensure room temperature is stable and within the normal ambient temperature range. If the average ambient room temperature changes more than 10°F from the calibrating temperature, verify calibration and recalibrate (if necessary).
2. Ensure the blood detector is enabled.
3. Ensure the test mode is CBC.
4. Go to the Numeric Keypad.
5. Press 

if necessary to activate pneumatics.
6. Cycle a sample of normal whole blood in Automatic aspiration mode as a prime.

IMPORTANT Misleading results could occur if all calibration factors are 1.000. If all calibration factors are 1.000, specify the last valid set of calibration factors from your logbook at the Analyzer.

7. Set the number of aspirations per tube to 11.

Set Up the CBC Calibration Information at the Workstation

Note: To perform this task, you must log on with a user name that was set up as an Advanced Operator or Lab Administrator. If you need to access this function, contact your laboratory administrator.

1. On the Command Center, select **CALIBRATION** as the process type.
2. Select  to display the Quality Assurance application.
3. Select  to display the Calibration window.

   Note: The background of the Calibration window, for the selected instrument, changes to the same background as the Command Center when you change the process type to **CALIBRATION**.
4. If necessary, select  to record the old calibration information in its history log and delete the information from the database. The values on the window change to 0.00.
5. If you have already set up calibration information, check that the appropriate lot number for calibration is selected; otherwise, set up new calibration information.

   Note: Calibration runs will be rejected if the calibrator information has not been set up, or if the calibrator is expired. If expired, the Expiration field will be backlighted red, and a message 'Calibrator expired. No statistics will be calculated.' appears in the task bar.

Run S-CAL Calibrator

IMPORTANT Misleading results could occur if you fail to perform the calibration procedure within 1 hour of opening the S-CAL calibrator vials. Follow the instructions in the S-CAL calibrator package insert.

1. Prepare the S-CAL calibrator according to the instructions in the package insert.
2. Place the vial of S-CAL calibrator in position 1 of a cassette, and place the cassette in the loading bay. This automatically begins processing the cassette. The system pierces, aspirates and analyzes the S-CAL calibrator 11 times. The Workstation automatically deletes the results from the first sample because the results are used as a prime.

Review Results on the Calibration Window

Note: Prior to performing this procedure, you must perform steps 1 through 7 of the appropriate calibration procedure (whole blood or S-Cal Calibrator). After performing this procedure you must perform the remaining steps of the appropriate calibration procedure.

1. On the Calibration window, inspect the calibration results table for trending; the parameter results must not show a trend. If the results show trending, there could be an instrument problem; call your Beckman Coulter Representative. Do not continue. If the calibrator is expired, the expiration date is displayed in black text with a red background and the calibration run is discarded.
2. With the following in mind, use the calibration statistics to determine if you should transmit calibration factors to the Analyzer.

IMPORTANT Misleading results could occur if you transmit calibration factors that are outside the established limits. If results are outside the limits, call your Beckman Coulter Representative.

- The Workstation checks the results for precision (%CV within the established limits). The Workstation flags results outside the limits with a red background. If all calibration factors are within limits, and if the user tries to adjust the calibration by selecting the parameters checkbox and then selecting the Adjust Calibration Image button, then the following warning message displays: *Are you sure you want to store and/transmit new calibration factors for the checked parameters?* You must confirm that you want to transmit the calibration factors. Once the transmission is confirmed, the Workstation transmits the calibration factors and posts a message to the Calibration History Log.

IMPORTANT Misleading results could occur if you calibrate MCV if RBC FAC % Diff is out of range because MCV depends on RBC. Do not calibrate MCV if RBC FAC % Diff is out of range.

- The Workstation checks the results to ensure the FAC % Diff numbers are less than or equal to established limits. The Workstation flags results outside the limits with a red background. If all calibration factors are within limits, and if the user tries to adjust the calibration by selecting the parameters checkbox and then selecting the Adjust Calibration Image button, then the following warning message displays: *Are you sure you want to store and/transmit new calibration factors for the checked parameters?* You must confirm that you want to transmit the calibration factors. Once the transmission is confirmed, the Workstation transmits the calibration factors and posts a message to the Calibration History Log.
- The Workstation checks the FAC % Diff and DELTA Diff. The Workstation automatically selects (marks with ) the parameters that need adjustment and flags results that meet the calibration criteria with a yellow background. If you do not want to adjust a marked parameter, unmark it. If all parameters are within limits, a message appears. The message indicates that all calibration factors are set correctly.

3. Select  to print a copy of the calibration results for your logbook.
4. Ensure the calibration factors you want to transmit to the Analyzer are selected ().

Table 1.1 Calibration Criteria

Parameter	Precision (CV%)	Acceptable FAC % Diff	Calibrate if FAC % Diff is:	Calibrate if Delta Diff is:
WBC	CV <= 2.5%	<= 5.0%	>1.25% BUT <=5.0%	>0.1 BUT <= 0.4
RBC	CV <= 0.8%	<= 2.0%	>0.7% BUT <=2.0%	>0.03 BUT <= 0.09
Hgb	CV <= 0.8%	<= 3.0%	>0.78% BUT <=3.0%	>0.1 BUT <= 0.4
MCV	CV <= 0.8%	<= 2.5%	>1.18% BUT <=2.5%	>1.0 BUT <= 2.0
Plt	CV <= 3.2%	<= 9.0%	>2.70% BUT <=9.0%	>6.0 BUT <= 20.0
MPV	CV <= 5.0%	<= 20.0%	>5.0% BUT <=20.0%	>0.5 BUT <= 2.0

G Adjust Parameters As Needed

1. Ensure the Analyzer is ready to receive the new calibration factors.
2. On the Workstation Calibration window, select  to transmit the calibration factors, for the selected parameters, to the Analyzer.
3. Select  to print the new calibration factors for your logbook.

H On the Command Center, Select AUTO ANALYSIS as the Process Type

I Verify Calibration by Cycling Each Level of Coulter 5C Cell Control in Automatic Aspiration Mode

1.7 CALIBRATING CBC PARAMETERS WITH WHOLE BLOOD

Sample Requirements

For whole blood calibration, use a donor who:

- is not receiving medication
- has normal hematologic parameters
- has normal erythrocyte, leukocyte and platelet morphology.

You must draw into and store specimens in the proper amount of EDTA anticoagulant. If you use vacuum collection tubes, fill them to proper capacity.

1. Ensure the apertures are clean and the instrument is functioning properly.
2. Obtain 20 normal, fresh whole-blood specimens. You need enough of each to cycle three samples on the LH 700 Series System and three samples on a reference instrument.

3. Using the whole-blood specimens collected in step 2, obtain reference values from other instruments. The following methods are suggested:

WBC and RBC	A single-aperture impedance cell counter such as a COULTER Z Series cell counter and the manufacturer's recommended reagents. Macro dilutions are made using Class A glassware. Both WBC and RBC are corrected for coincidence.
Hgb	Hemoglobincyanide spectrophotometric procedure that follows NCCLS* Standard H15-A7. This method employs modified Drabkins (Ziljstra) Reagent and is referenced to NIST-certified filters and ICSH standards.
MCV	Packed cell volume measured by a hematocrit procedure that follows NCCLS* Standard H7-A8. The PCV is not corrected for trapped plasma. MCV is calculated: PCV/RBC x 10.
Plt	Phase-contrast microscopy.
MPV	Reference against latex particles.

4. Using these reference values, set up the CBC calibration information at the Workstation.
5. Run a prime sample. This sample will automatically be removed from statistics.
6. Cycle each of the 20 samples three consecutive times in CBC Automatic aspiration mode.
7. Review results on the Workstation Calibration window.
8. Adjust parameters as needed.
9. On the Command Center, select **AUTO ANALYSIS** as the process type.
10. Verify calibration by cycling each level of COULTER 5C Cell control in Automatic aspiration mode.

*National Committee for Clinical Laboratory Standards is now the Clinical and Laboratory Standards Institute (CLSI).

1.8 CHANGING CALIBRATION FACTORS FOR AUTOMATIC ASPIRATION MODE

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **CALIBRATION**.
5. Press **AUTOMATIC CALIBRATION FACTORS**. The existing calibration factors appear on the Analyzer screen.
6. Press the button corresponding to the parameter you want to change. Example: Press the button next to WBC.
7. Go to the Numeric Keypad.
8. Use the keypad to provide the desired calibration factor. Example: Press 

.

9. Press 

.
10. Repeat steps 6 through 10 for each value you want to change.
11. Press one of the following:

SYSTEM RUN	To cycle samples. The next sample you cycle automatically updates the calibration factors on the Workstation.
RETURN	To display the **CALIBRATION MENU** screen.

12. Set number of aspirations back to 01.

1.9 CHANGING CALIBRATION FACTORS FOR MANUAL ASPIRATION MODE

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **CALIBRATION**.
5. Press **MANUAL CALIBRATION FACTORS**. The existing calibration factors appear on the Analyzer screen.
6. Press the button corresponding to the parameter you want to change. Example: Press the button next to WBC.
7. Go to the Numeric Keypad.
8. Use the keypad to provide the desired calibration factor. Example: Press 

.
9. Press 

.
10. Repeat steps 6 through 9 for each value you want to change.
11. Press one of the following:

SYSTEM RUN	To cycle samples. The next sample you cycle automatically updates the calibration factors on the Workstation.
RETURN	To display the **CALIBRATION MENU** screen.

1.10 RECEIVING AVERAGE CALIBRATION FACTORS FROM WORKSTATION

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **CALIBRATION**.
5. Press **RECEIVE AVERAGE CALIBRATION FACTORS**. Status messages appear on the Analyzer while it receives the data.
6. Press one of the following:

MAIN MENU	To display the Analyzer **MAIN MENU** screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the **CALIBRATION MENU** screen.

1.11 SETTING UP NEW CALIBRATION INFORMATION

Note: Before performing this procedure, you must set up Workstation calibration information.

1. Select  to display the Instrument Calibration Setup window.
2. Determine if you want to set up calibration:

   Using Removable Media to load S-CAL Values:

   a. Select  to load the reference values, lot number and expiration date.
   b. Insert your removable media into the appropriate drive.
   c. Select  on the Load S-CAL CBC Calibration Reference Values window.

   Without using Removable Media to load S-CAL Values:

   a. Select  Manual Value Entry.
   b. Type the lot number for calibration (if appropriate).
   c. Type the expiration date for calibration (if appropriate).
   d. Type the reference values for calibration.
   e. Select  to save the values.
   f. Select  to save the calibration information in the database.

1.12 REVIEWING ANALYZER'S CURRENT CALIBRATION FACTORS FOR AUTOMATIC ASPIRATION MODE

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.

3. Press **ANALYZER FUNCTIONS**.
4. Press **CALIBRATION**.
5. Press **AUTOMATIC CALIBRATION FACTORS**. The existing calibration factors appear.
6. Press one of the following:

SYSTEM RUN	To cycle samples.
RETURN	To display the **CALIBRATION MENU** screen.

1.13 REVIEWING ANALYZER'S CURRENT CALIBRATION FACTORS FOR MANUAL ASPIRATION MODE

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **CALIBRATION**.
5. Press **MANUAL CALIBRATION FACTORS**. The existing calibration factors appear.
6. Press one of the following:

SYSTEM RUN	To cycle samples.
RETURN	To display the **CALIBRATION MEN**U screen.

2.1 OVERVIEW

Clean the apertures as needed. Use the following information to determine the best method for cleaning based on your system's status.

Zap and Bleach Apertures

- If you fail to recover control values.
- If you observe:
  - Decreased cell counts
  - Increased MCV values
  - Increased voteouts.

Systems using LH Series Cleaner for at least 30 minutes/day do not need to bleach the apertures routinely. Before bleaching, check that the apertures are not clogged. If you do not use LH Series Cleaner, bleach the apertures before calibration.

Unclog Apertures

- If you fail to recover control values.
- If you observe:
  - Frequent aperture errors
  - Decreased cell counts
  - Increased MCV values
  - Increased voteouts
  - Erratic MCV, RBC, WBC or Plt counts.

Bleach RBC Internal Electrodes

If you observe a red/brown buildup on the RBC internal electrodes.

Clean an Aperture Bath

If you observe:

- Salt deposits on or around an O-ring
- Bubbles in the sweep-flow lines above, but not below, the aperture blocks. First check that the bubbles are not caused by a loose fitting, which can be tightened.

When you clean aperture baths, replace the O-rings if you have spares available.

Clean the Waste Chamber or Vacuum Isolator Chamber

If you see protein buildup in a chamber, you should bleach it.

Drain the Overflow Chamber

If the overflow chamber has liquid in it because the baths overflowed.

Clean Air Filters

CAUTION Risk of damage to the Power Supply. A dirty air filter can cause the Power Supply to overheat. Check the filters and clean as needed.

Clean the air filters as needed. Initially, check air filters monthly.

Clean the BSV and the BSV Drip Plate

If you see blood or reagent buildup on the drip plate, clean the drip plate. Only remove and clean the BSV at the advice of a Beckman Coulter Representative.

Note: It is normal for crystallized reagent to be present on the external surfaces. The presence of crystallized reagent does not indicate the need for removal and cleaning of the BSV. The crystallized reagent can be removed by cleaning the outside sections of the BSV.

2.2 CLEANING AND REPLACING AIR FILTERS

Procedure

CAUTION Risk of damage. A dirty air filter can cause overheating. Check the filters and clean as needed.

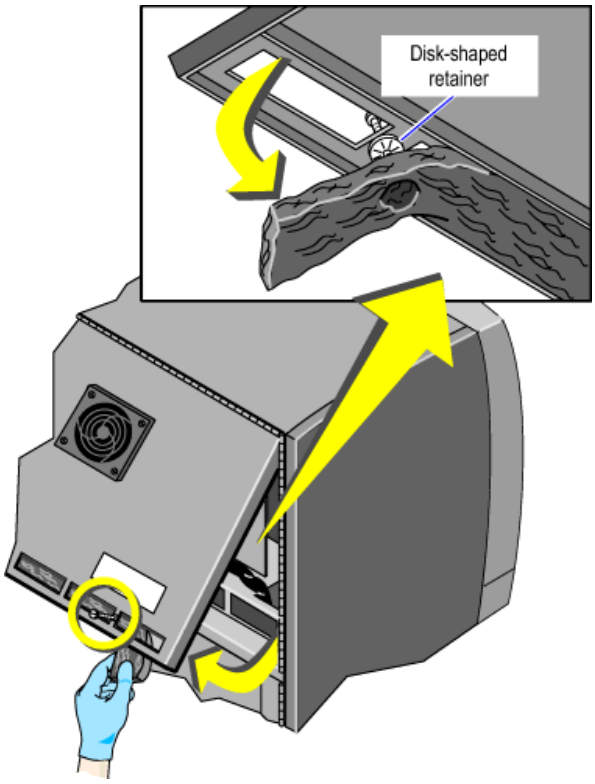
1. Go to the Numeric Keypad.
2. Press 

.
3. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

4. Disconnect the primary power cord at the source (not at the power supply).
5. Locate and remove the air filters.

For Analyzer



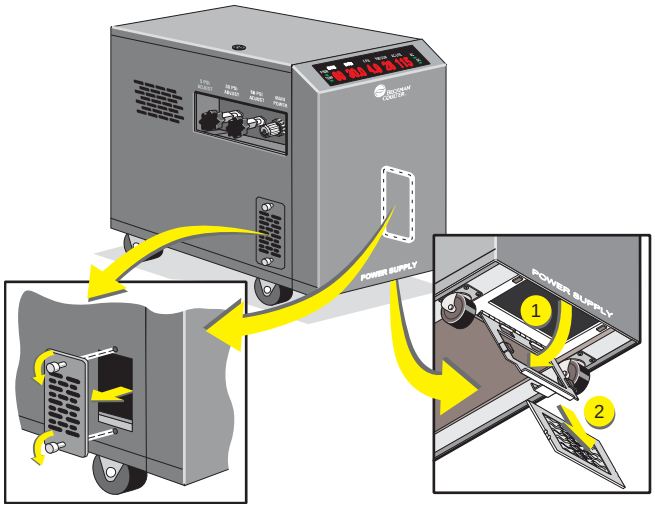
a. Loosen the screws on the back of the Analyzer.

b. Open the back of the Analyzer.

c. Pull the air filter down over the disk-shaped retainer on the screws to remove the air filter.

For Power Supply

Air Filters can be found on both sides and on the bottom of the power supply.



d. Bottom Filter. Pull downward on the handle of the filter cover and slide filter out.

e. Side Filter. Loosen thumbscrews and pull filter out.

6. Wash the filters in soap and water, rinse them and dry them completely. If you find a filter that is torn or shredded, discard it and replace it with a new one. Order replacement filters from your Beckman Coulter Representative.
7. Return the clean air filters to their original location.

8. Reconnect the primary power cord.
9. Turn on the Power Supply main breaker.
10. Go to the Numeric Keypad.
11. Press 

.

2.3 BLEACHING APERTURES

WARNING Risk of chemical injury from bleach. To avoid contact with the bleach, use barrier protection, including protective eyewear, gloves, and suitable laboratory attire. Refer to the Safety Data Sheet for details about chemical exposure before using the chemical.

CAUTION Risk of system damage. If you mix LH 700 series diluent with bleach, a precipitate forms that can clog the apertures. Do not mix diluent with bleach.

A. Prepare 40 mL of bleach solution in a wash bottle.

B. Put the bleach solution in the WBC bath.

C. Use F05 and activate solenoid 12 to bleach the Hgb cuvette.

D. Press 

. The numeric keypad displays READY.

E. Refill the WBC bath with bleach.

F. Put the bleach solution in the RBC bath.

G. Perform F11, Extended Prime. If necessary, add more bleach solution to the WBC bath to keep the liquid above the apertures.

H. Disconnect the wash bottle from WBC bath.

I. Leave the bleach solution in the baths 

.

J. Go to the Numeric Keypad.

K. Press 

.

L. Perform F12, Extended Clear.

M. Press 

.

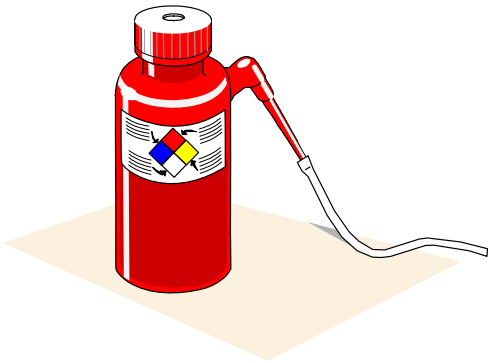
N. Fill the baths with cleaning agent and drain.

O. Press SHUT DOWN.

P. Press START UP.

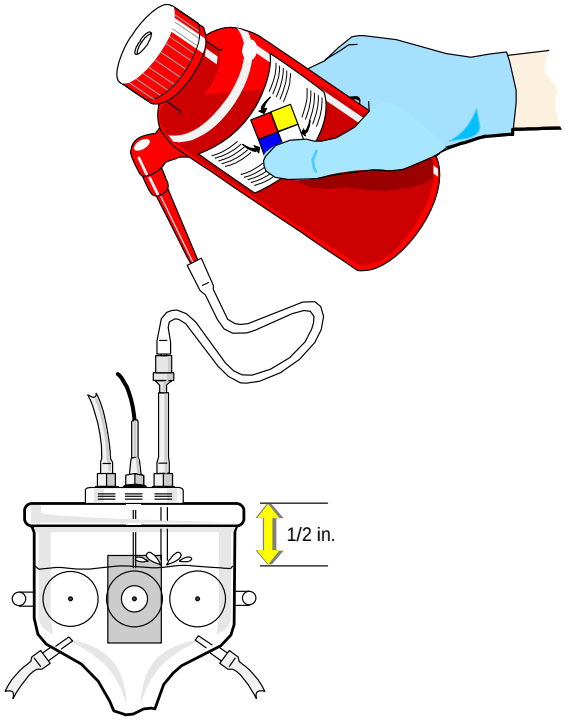
Q. Prime the system by cycling whole blood.

A Prepare Bleach Solution



1. Put one part bleach and one part distilled water into a wash bottle. Use a high-quality, fragrance-free bleach (5 to 6% sodium hypochlorite - available chlorine).
2. Mix the solution.
3. Connect a 20-cm (7-in.) piece of tubing to the spout of the wash bottle containing the bleach solution.

B Put Bleach Solution in WBC Bath



1. Open the Diluter door.
2. Ensure pneumatics are on.
3. Go to the Numeric Keypad.
4. Press DRAIN until the aperture baths drain completely into the waste chamber.
5. Find the bleach fitting check valve on the top right of the WBC bath.
6. Connect the loose end of the tubing on the wash bottle to the bleach check valve on the WBC bath.
7. Put bleach solution into WBC bath so solution is within 1/2 in. from the top of the bath.

C Use F05 and Activate Solenoid 12 to Bleach the Hgb Cuvette

1. Go to the Numeric Keypad

2. Press 

to manually activate a specific solenoid. The Numeric Keypad displays SOLENOID XXX.

3. Press 12 to activate, then press 

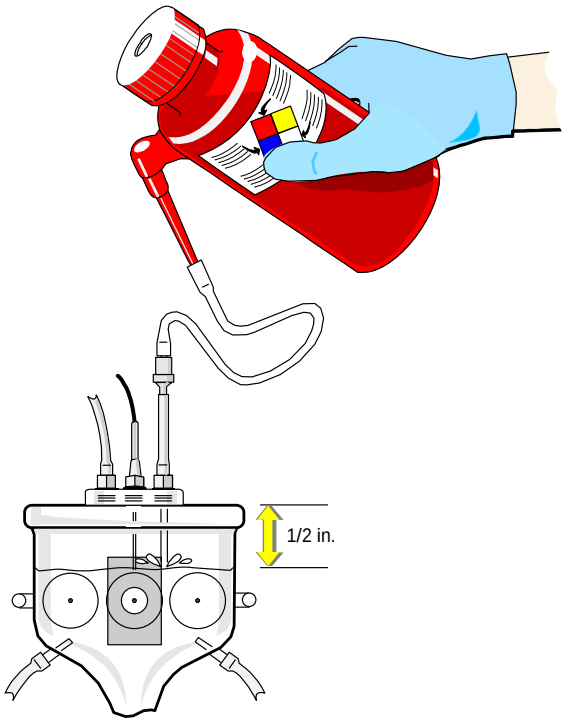
. The Numberic Keypad displays SOLENOID 12 while processing your request.

4. Press: 

2 times to return the solenoid to its original state if no other solenoid was selected. The Numeric Keypad displays FUNCTION =05.

D Refill the WBC Bath with Bleach

E Put Bleach Solution in RBC Bath



1. Disconnect the bleach tubing from the check valve on the top of WBC bath and connect it to the bleach check valve on the top right of the RBC bath.
2. Put bleach solution into the RBC bath so the solution is within 1/2 in. from the top of the bath.
3. Disconnect the bleach tubing from the RBC bath. Reconnect it to the WBC bath. You may need to refill the WBC bath. Monitor the bleach level in the bath to ensure the liquid level remains above the apertures.

F Perform F11, Extended Prime. If Necessary, Add More Bleach Solution to the WBC Bath to Keep the Liquid Above the Apertures

IMPORTANT Risk of misleading results. Make sure the baths are full before performing this procedure. If the baths are not full, you may need to prime again because bubbles could be in the line.

1. Go to the Numeric Keypad.
2. Press F 1 1 ENTER to pull fluid through the apertures to the vacuum isolator chamber for 60 seconds. The Numeric Keypad displays *EXTENDED PRIME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 11*. Monitor the liquid level to make sure it remains above the apertures.
3. Press ENTER to perform this function again.
4. Press STOP to exit this function. The Numeric Keypad displays *READY.*

G Disconnect the Wash Bottle from WBC Bath

H Leave the Bleach Solution in the Baths 

I Go to the Numeric Keypad

J Press 

K Perform F12, Extended Clear

1. Go to the Numeric Keypad.
2. Press 

to apply 5-psi pressure to the rear of the apertures for 60 seconds. The Numeric Keypad displays *EXTENDED CLEAR* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 12*.
3. Press 

to perform this function again.
4. Press 

to exit this function. The Numeric Keypad displays *READY.*

L Press 

M Fill the Baths with Cleaning Agent and Drain

1. Fill a wash bottle with cleaning agent.
2. Connect a 20-cm (7-in.) piece of tubing to the spout of wash bottle.
3. Fill each bath to the top with cleaning agent to remove residual bleach.
4. Go to the Numeric Keypad.
5. Press 

CAUTION Risk of system damage. Possible damage can occur to the instrument if the waste chamber overflows. Do not let the waste chamber get too full. Use F05 to activate solenoid 15 to drain the waste chamber as needed.

6. Refill the baths with cleaning agent.

7. Press DRAIN.
8. Disconnect the wash bottle.
9. Press RINSE.
10. Ensure the baths fill with diluent and the waste chamber empties.
11. Close the aperture compartment.

N. Press SHUT DOWN.

O. Press START UP.

P Prime the System by Cycling Whole Blood.

2.4 CLEANING AN APERTURE BATH

Summary

WARNING Possible biohazardous condition. The aperture bath and its associated tubing can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

A. Press DRAIN until the aperture baths drain completely into the waste chamber.

B. Press POWER OFF.

C. Unhook the bath springs and disconnect the bath

D. Use distilled water to clean bath and O-rings.

E. Moisten the O-rings and return the bath to its original location.

F. Check for leaks and bubbles.

G. Close the compartment door for the baths and aperture compartment.

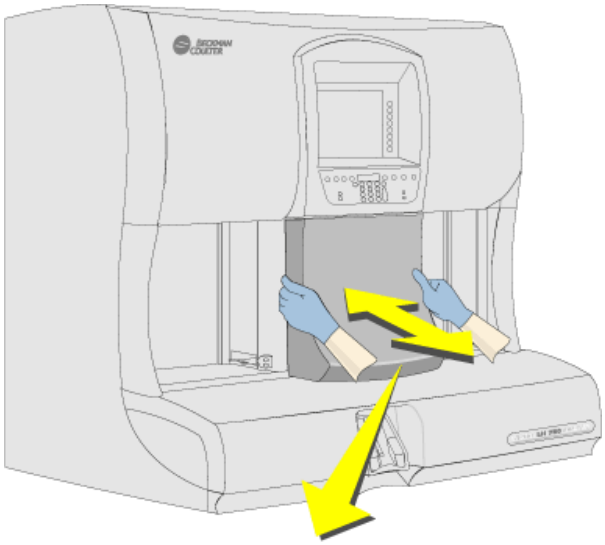
H. Prime the system by cycling whole blood.

Procedure

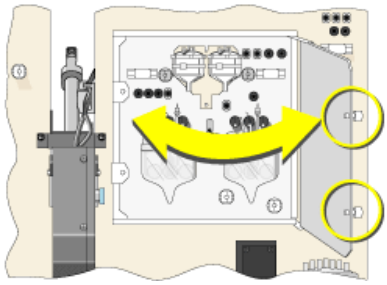
A Press DRAIN until the Aperture Baths Drain Completely into the Waste Chamber

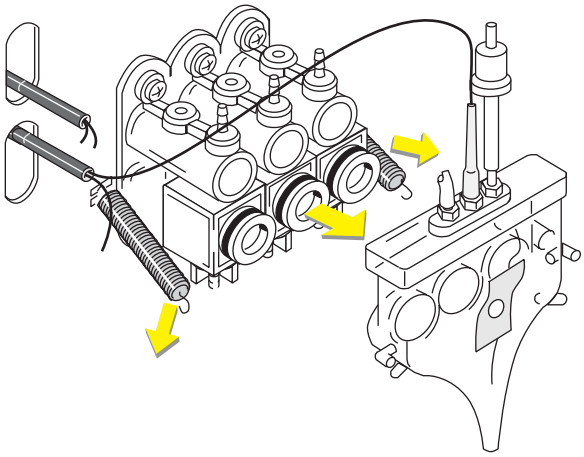
B Press POWER OFF

C Unhook Springs and Pull Out Bath



1. Open the Diluter.
2. Manually move the rocker bed to its backward position.



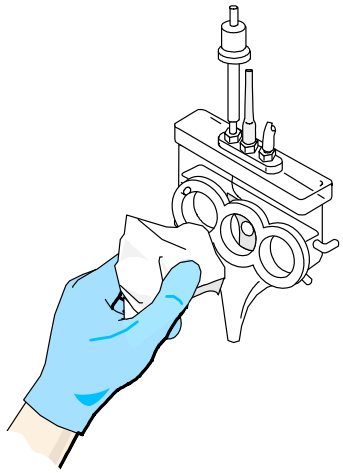


3. Use a hemostat to unhook the spring attached to each side of the bath.

IMPORTANT Risk of incorrect control results. If you move the external electrode attached to the bath you can create a carryover problem. Do not move the external electrode.

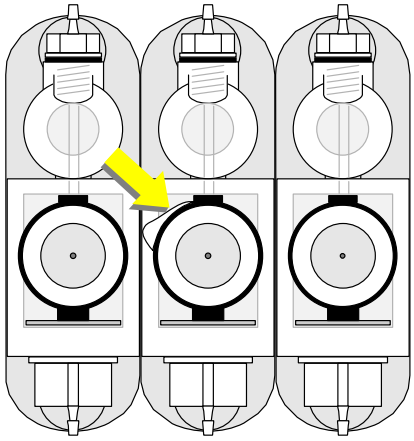
4. Using both hands, gently rock the bath off the large O-rings.

D Use Distilled Water to Clean the Bath



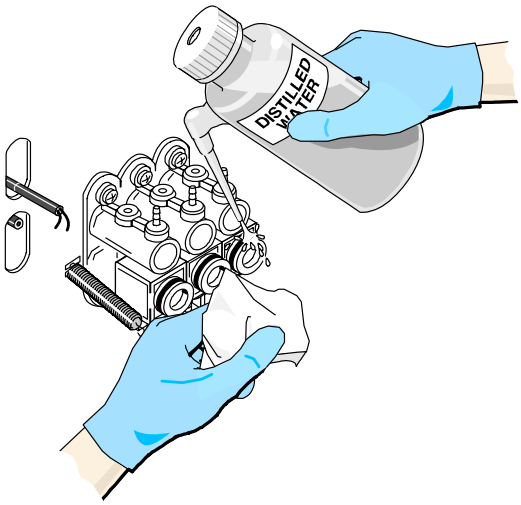
1. Moisten a lint-free tissue with distilled water.
2. Use the moist lint-free tissue to clean the openings in the bath so they are free of salt deposits.

IMPORTANT Risk of instrument damage. If you touch the center of the block you can damage the instrument. Do not touch the aperture in the center of the block.

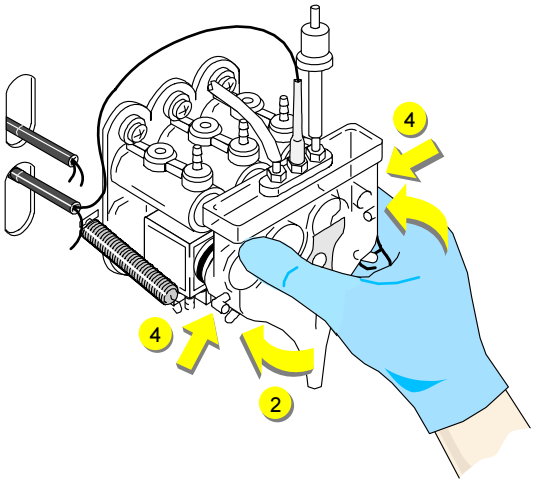


3. Look at each large O-ring to ensure it is free of salt deposits.
4. If necessary, use the moist lint-free tissue to clean the area on and around the three large O-rings.
5. Replace the O-rings if necessary.

E Moisten O-Rings and Return Bath



1. Moisten the three large O-rings with distilled water.



2. Gently rock the bath onto the large O-rings until it snaps back to its original position.
3. Ensure you properly aligned the bath with all three blocks to prevent leaking.
4. While holding the bath in place, use a hemostat to hook springs to each side of the bath.

F Check for Leaks and Bubbles

1. Go to the Numeric Keypad.
2. Press POWER ON.
3. Ensure the bath fills with diluent and the waste chamber empties.
4. Ensure the bath is not leaking.
5. Press DRAIN.
6. Ensure the bath drains.
7. Press RINSE.

8. Both solenoids will be active at the same time. Verify that all three lines from the bath to the vacuum isolator chamber pull a bubble-free stream. Repeat steps 5 through 7 as needed to ensure the bath is not leaking.
9. If acceptable, press 

three times. The Numeric keypad displays *READY.*

G Close the Compartment Door Beneath the Baths and Aperture Compartment

H Prime the System by Cycling Whole Blood.

2.5 CLEARING CLOGGED APERTURES

1. Go to the Numeric Keypad.
2. Press 

.
3. If the aperture remains clogged, clean the apertures using F01.
   a. Go to the Numeric Keypad.
   b. Press 

to apply current across the apertures. The current removes protein or debris from the apertures. The Numeric Keypad displays *CLEAN APERTURES* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 01*.

   Press 

to perform this function again.

   c. Press 

to exit this function. The Numeric Keypad displays *READY.*
4. If the aperture remains clogged, zap the apertures using F09.
   a. Go to the Numeric Keypad.
   b. Press 

to:
      - Apply pressure behind the baths.
      - Drain and rinse the baths four times with cleaning agent.
      - Draw cleaning agent behind the apertures.
      - Zap the apertures 10 times to remove protein or debris from the apertures.

The Numeric Keypad displays *ZAP APERTURES* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *PRESS 0 / 1 FOR RINSE/REPEAT ZAP.*

c. Press:

- 0 To rinse with cleaning agent. The Numeric Keypad displays *RINSE CLENZ*.
- 1 To repeat the zap aperture function. The Numeric Keypad displays *REPEAT ZAPPING*.

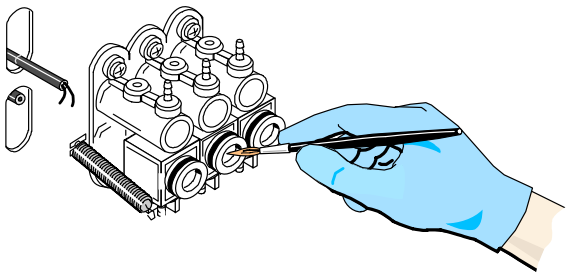
d. Press STOP to exit this function. The Numeric Keypad displays *READY.*

5. If the aperture remains clogged, bleach the apertures. While bleach is in the baths, use F01 up to five times. For additional information regarding bleaching the apertures, refer to Heading 2.3, Bleaching Apertures.
6. If the aperture remains clogged, clean the aperture with a camel-hair brush.

a. Press DRAIN until the aperture baths drain completely into the waste chamber.

b. Press POWER OFF.

c. Unhook the bath springs and gently pull the bath out of the instrument.



d. Using the tip of the camel-hair brush supplied with your instrument, gently brush the clogged aperture.

e. Moisten the O-rings with distilled water and return the bath to its original location.

f. Check for leaks and bubbles.

g. Close the aperture compartment.

h. Prime the system by cycling whole blood in the aspiration mode you plan to use.

7. If the aperture remains clogged, call your Beckman Coulter Representative.

2.6 ZAPPING APERTURES

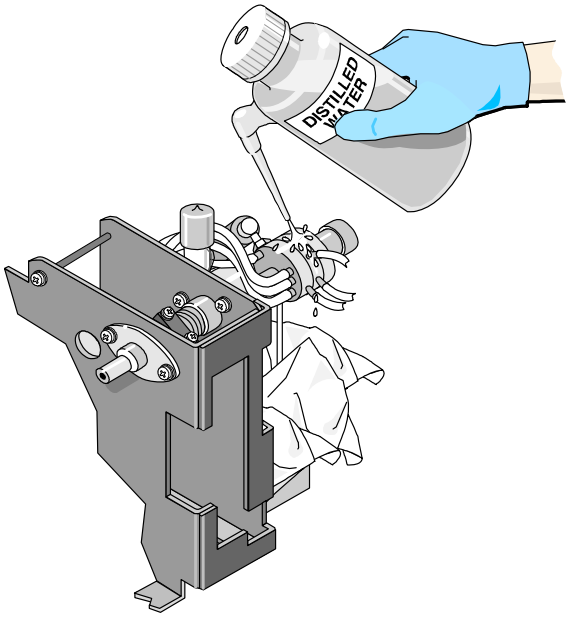
1. Ensure pneumatics are on.
2. Use F09. to zap the apertures.
3. Press START UP to purge the system of cleaning agent.

4. Prime the system by cycling whole blood in Automatic aspiration mode.
5. Run a control in CBC test mode.
6. Verify your control results are acceptable. If they are unacceptable, bleach the apertures.

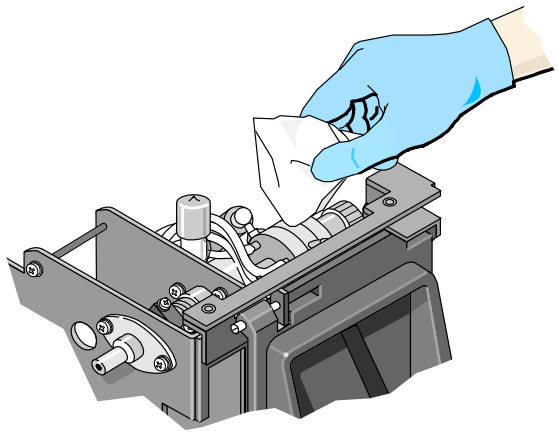
2.7 CLEANING BLOOD SAMPLING VALVE (OUTSIDE SECTIONS)

Procedure

WARNING Possible biohazardous condition. The BSV and its associated tubing can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.



1. Open the Diluter lower front door.
2. Open the black activator.
3. While holding the activator open, insert several lint-free tissues beneath and around the BSV to catch overflow.
4. Close the black activator.
5. Rinse the outside surfaces with distilled water.



6. Dry the outside surfaces with a lint-free tissue.
7. Open the black activator and remove the lint-free tissues.
8. Close the black activator.
9. Close the Diluter lower front door.
10. Resume normal operation.

2.8 CLEANING BLOOD SAMPLING VALVE (REMOVE AND CLEAN INSIDE)

Summary

CAUTION Risk of system damage. The BSV can be scratched or misaligned during this procedure. Be careful not to scratch or rub the BSV surfaces. This is not a routine procedure and should only be done if instructed to do so by your Beckman Coulter Representative.

WARNING Possible biohazardous condition. The BSV and its associated tubing can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

A. Prepare the instrument so you can remove the BSV.

B. Remove the BSV.

C. Clean the BSV.

D. Return the BSV to its original location.

E. Clean up the area around the BSV.

F. Verify that the BSV is functioning properly.

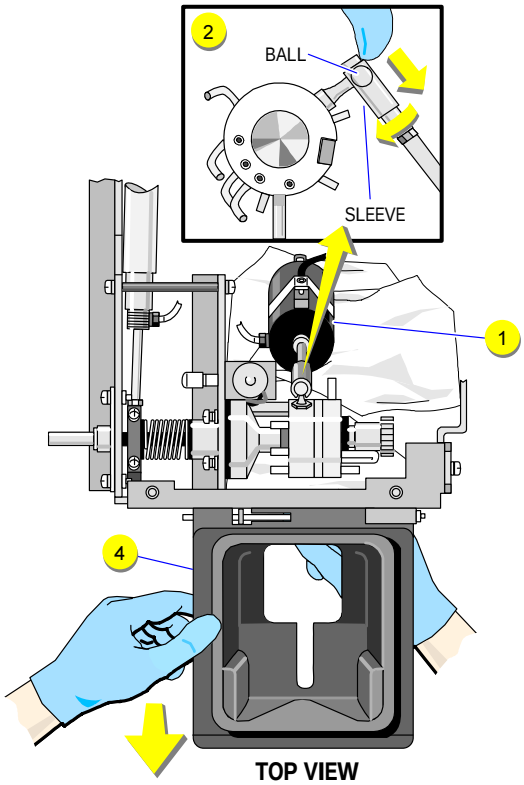
A Prepare Instrument for Removal of BSV

1. Ensure pneumatics are on.
2. Go to the Numeric Keypad.
3. Press 

.
4. Wait 

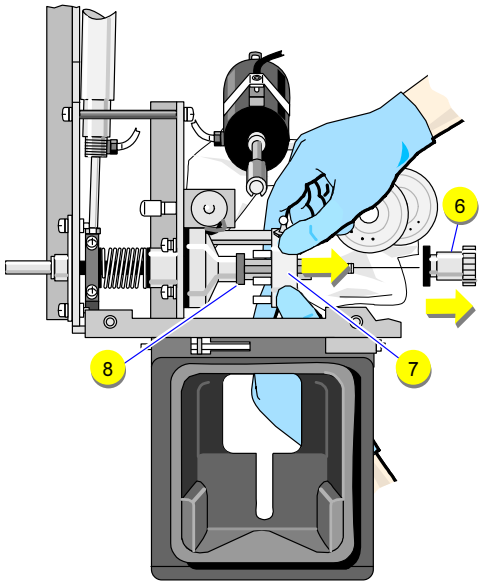
.
5. Use F06 to release BSV.
6. Open the Diluter lower front door.
7. If your instrument has an Advanced Bar-Code Reader, position the Advanced Bar-Code Reader in the up or service position.

B Remove BSV



1. Find the air cylinder.
2. Push back the sleeve on the air cylinder and rotate it so that it does not slide back over the ball joint. Lift it off the ball joint to disconnect the air cylinder from the inner section.
3. Manually move the air cylinder block as needed to position the BSV.
4. Open the activator.
5. While holding the activator open, cover the area below and around the BSV with several layers of lint-free tissue to catch overflow that occurs during the cleaning process.

CAUTION Risk of damage to fittings can occur if you try to remove the associated tubing from the BSV. Handle all sections carefully. Do not pull on the sample loop or any other metal fittings attached to the BSV.



TOP VIEW

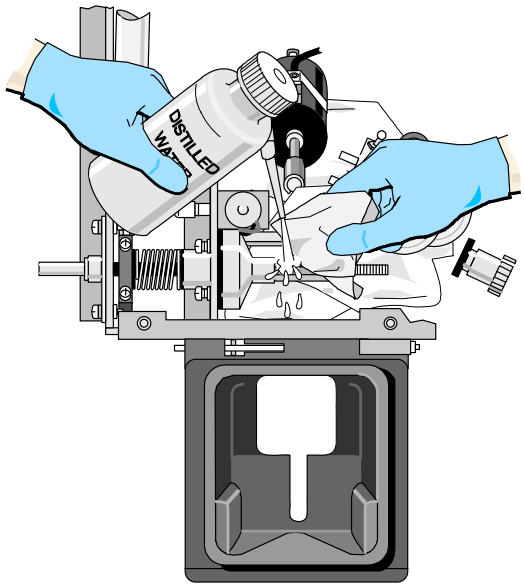
6. Unscrew and remove the knob that holds the BSV in place. Do not try to remove the BSV tubing, you may damage the fittings. Do not pull on the sample loop or any other metal fittings attached to the instrument.

CAUTION Risk of damage to ceramic sections can occur if they come in contact with the metal shaft. Handle all sections carefully. Do not touch the inside surfaces against the metal shaft.

7. Remove the three ceramic sections from the mounting post with a sliding, not a pulling motion.
8. Pull the plastic washer off the mounting post.

   Note: The plastic washer may be stuck to the ceramic section. If so, remove it from the ceramic section for cleaning.
9. Place the sections and the plastic washer on the lint-free tissues around the BSV assembly.
10. Close the activator.

C Clean BSV

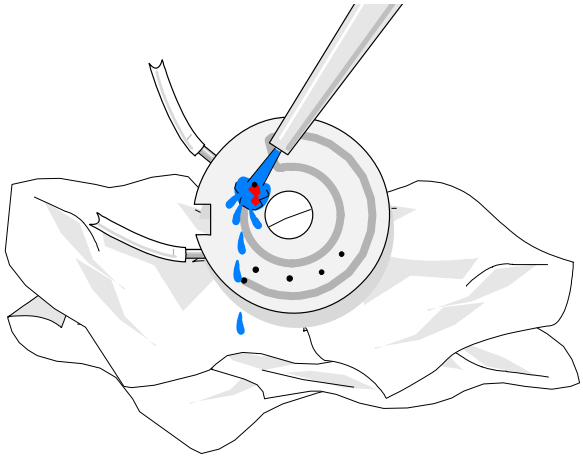


TOP VIEW

1. Clean the guide post and mounting post with distilled water and dry them with a lint-free tissue.

CAUTION Risk of damage to ceramic sections can occur if they come in contact with an abrasive material. Do not scratch or use abrasive materials on the inside surfaces. Never try to remove debris by inserting an object in the valve¢s passageways.

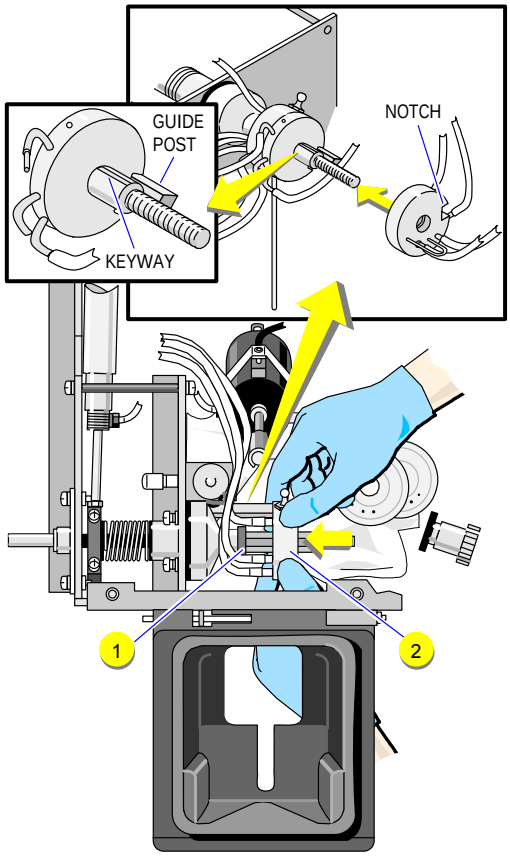
2. Hold a container or several lint-free tissues beneath the BSV mounting post to catch overflow.



3. Clean the passageways, inside surfaces, and center holes of the three sections with a stream of cleaning agent from a wash bottle.
4. Place the spout of the wash bottle over each opening. Force cleaning agent into each passageway to free and remove any debris or blood.
5. If a stubborn plug remains lodged in passageway, try a jet of filtered compressed air to dislodge it.
6. Use a lint-free tissue moistened with distilled water to remove any debris or dried blood that still remains on the surface or in center holes.
7. Rinse the passageways and inside surfaces thoroughly with distilled water.

D Return BSV to its Original Location

IMPORTANT Incorrect results can be reported if oil or powder gets on the BSV. Before returning each section to the mounting post, moisten the inside surfaces with distilled water. Never use your fingers to spread water over the surfaces because there could be oil or powder on your gloves.

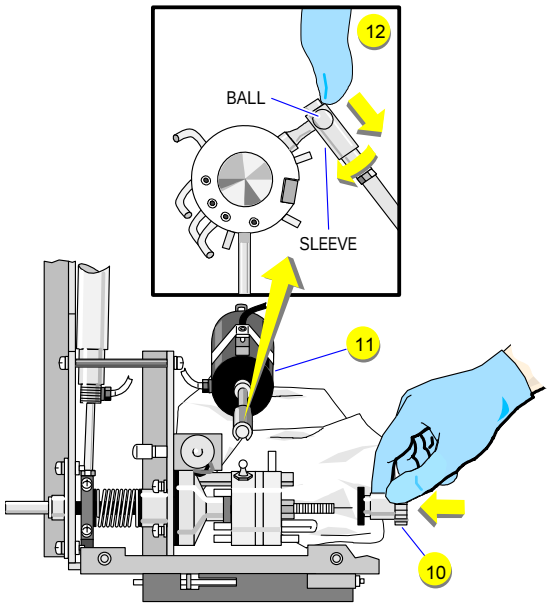


TOP VIEW

1. Replace the plastic washer on the mounting post.
2. Return the inner section to its original position; align the notch with the guide post and push the section into place.
3. Make sure to position all tubing attached to the inner section behind the probe.
4. Ensure the routing of tubing is smooth to prevent kinks.
5. Align the key of the center section with the keyway on the mounting post and push it into place.
6. Manually move the air cylinder block as needed to position the key and keyway.
7. Ensure the routing of tubing is smooth to prevent kinks.

CAUTION Risk of system damage. The tubing can be damaged if positioned in front of the aspirator tip. Before mounting the front section, make sure all tubing attached to the front section is positioned behind the aspirator tip.

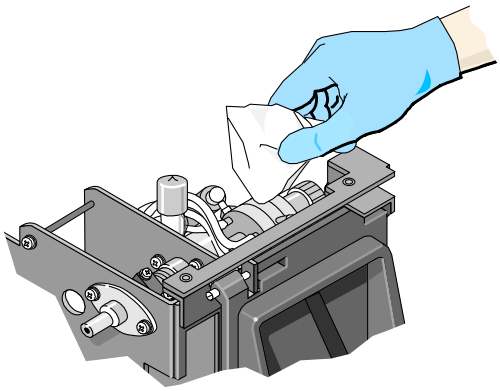
8. Align the notch in the front section with the guide post and push the section into place.
9. Ensure the routing of tubing is smooth to prevent kinks.



TOP VIEW

10. Screw the knob onto the mounting post until you see compression of the spring, then continue until finger tight.
11. Go to the air cylinder.
12. While holding the air cylinder shaft securely, push back the sleeve and reattach the shaft to the ball joint on the front section of the BSV, then turn the sleeve to secure the ball joint.

E Clean Up Area Around BSV



1. Dry the outside of the BSV with a lint-free tissue.
2. Open the black activator and remove the lint-free tissues.
3. Close the black activator.
4. If necessary, dry the area beneath and around the BSV assembly.

F Verify BSV Functions Properly

1. Go to the Numeric Keypad.
2. Press STOP twice to exit F06 function.
3. Press RINSE to refill the baths.
4. Ensure the BSV is not leaking and the baths fill with diluent.
5. Open the Diluter door.
6. Cycle a sample of diluent in Manual aspiration mode.

7. Verify that the BSV rotates and does not leak.
8. Close the Diluter door.
9. Disable the blood detector.
10. Cycle a sample of diluent in Automatic aspiration mode.
11. When the instrument completes its cycle, open the Diluter door and verify that the BSV is not leaking.
12. Enable blood detector.
13. Go to the Numeric Keypad.
14. Press 

.
15. Prime the system by cycling whole blood in Automatic aspiration mode.
16. Run a control.
17. Review the control results.

2.9 FLUSHING SYSTEM

1. Prepare 750 mL of bleach solution in a container.
2. Place the reagent line labeled CLEANER into the bleach container.
3. Go to the Numeric Keypad.
4. Press 

to decontaminate Diluter lines that are exposed to blood. The Numeric Keypad displays *SYSTEM FLUSH* while the instrument performs this function. This takes approximately 5 minutes. When the function completes processing, the Numeric Keypad displays *FUNCTION = 40*.

CAUTION System damage could occur if you leave the bleach solution for more than 

. Remove the bleach solution immediately after the system flush completes processing.

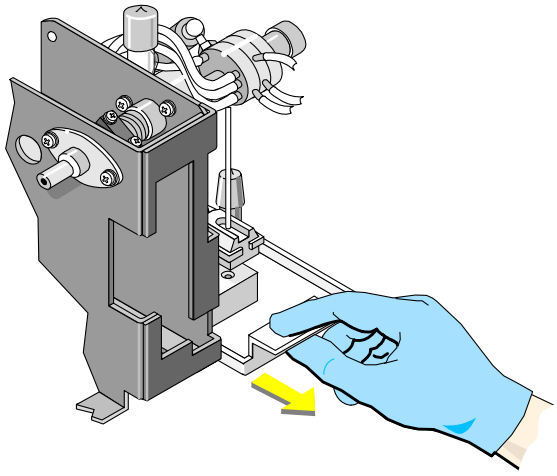
5. Remove the reagent line from the bleach container and place it in a 750 mL container of distilled water.
6. Press 

to remove the bleach solution. The Numeric Keypad displays *SYSTEM FLUSH* while the instrument performs this function. This takes approximately 5 minutes. When the function completes processing, the Numeric Keypad displays FUNCTION = 40.

7. Press STOP twice to exit this function. The Numeric Keypad displays *READY.*
8. Remove the reagent line from the distilled water container and place it in the CLEANER container.
9. Press SHUT DOWN.
10. Perform daily startup.

2.10 CLEANING BLOOD SAMPLING VALVE DRIP PLATE

WARNING Possible biohazardous condition. The drip plate can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

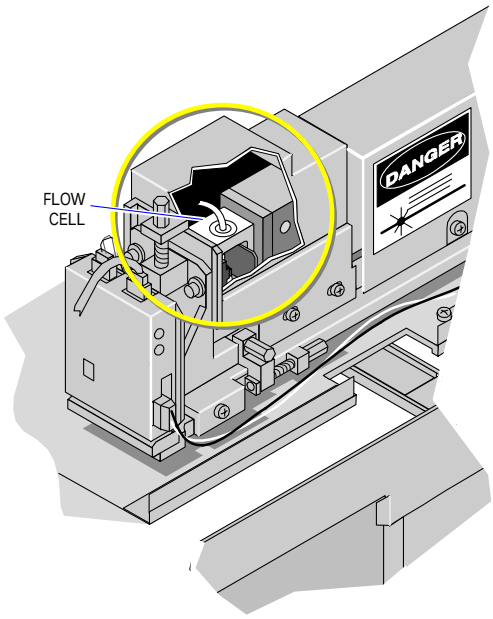


1. Prepare a bleach solution in a wash bottle.
2. Open the Diluter lower front door.
3. Slide the drip plate out.
4. Use the wash bottle to fill the drip plate with the bleach solution. Be careful not to overflow the drip plate.
5. Leave the bleach solution in the drip plate for 00:15:00 (HR MIN SEC).
6. Use gauze held with a hemostat to clean the entire surface.
7. Use clean, dry gauze to soak up any excess bleach solution.
8. Use a wash bottle with distilled water to rinse the drip plate.
9. Use clean, dry gauze to soak up any excess water.
10. Slide the drip plate back.
11. Close the Diluter lower front door.

2.11 CLEARING CLOGGED FLOW CELL

WARNING Risk of personal injury. If non-Beckman Coulter trained personnel attempts to remove the laser, injury could result. Do not try to remove the laser from the Diluter. All service and maintenance of the laser must be done by trained Beckman Coulter personnel.

For additional laser safety information, see the Hazards.



1. Use F44 to clear the flow cell.
2. If you see *FLOW CELL CLOGGED* on the Analyzer, use F44 again.
3. If you still see *FLOW CELL CLOGGED* on the Analyzer, use F45 up to three times to clear the flow cell.

CAUTION Risk of instrument damage. Performing the following step can damage the flow cell because it places greater stress on the flow cell than do the previous functions. Use the following step **only** if the other functions fail to remove the clog and **never** more than once, unless specifically instructed to do so by your Beckman Coulter Representative.

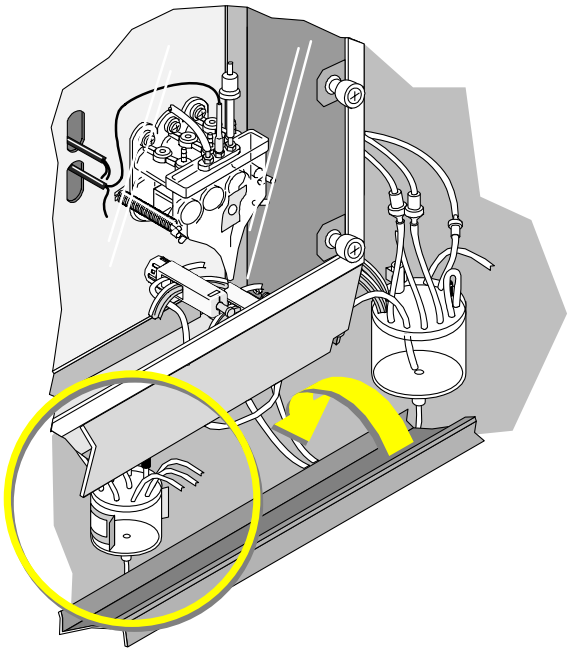
4. If you still see *FLOW CELL CLOGGED* on the Analyzer, use F46 to clear the flow cell.
5. Leave the instrument idle for 

.
6. Use F44 again before analyzing samples or running controls.
7. If you still see *FLOW CELL CLOGGED* on the Analyzer, call your Beckman Coulter Representative.

2.12 DRAINING OVERFLOW CHAMBER

WARNING Possible biohazardous condition. The overflow chamber can contain residual biological materials and must be handled with care. Follow your laboratories protocol for safety measures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

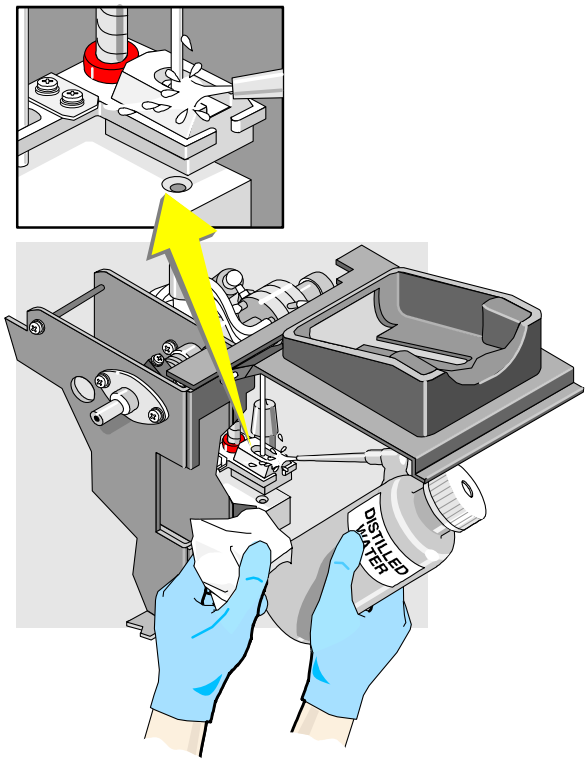
Drain the overflow chamber if it has liquid in it because the baths overflowed.



1. Ensure pneumatics are on.
2. Use F05 to activate solenoid 12 to drain the overflow chamber.

2.13 CLEANING MANUAL ASPIRATION PROBE WIPE

WARNING Possible biohazardous condition. The manual aspiration probe wipe can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.



1. Open the Diluter lower front door.
2. Open the black activator.
3. Use distilled water to rinse the probe wipe.
4. Use a lint-free tissue to remove any dried blood and dry the probe wipe.
5. Close the black activator.
6. Close the Diluter lower front door.

2.14 BLEACHING RBC INTERNAL ELECTRODES

Summary

CAUTION Risk of system damage. Do not mix diluent with bleach. A precipitate forms that can clog the apertures.

A. Prepare 50 mL of bleach solution in a wash bottle.

B. Put the bleach solution in the WBC bath.

C. Put the bleach solution in the RBC bath.

D. Perform Extended Prime.

E. Disconnect the sweep flow lines and attach tubing to draw up bleach.

CAUTION Risk of damage to the instrument. Possible damage can occur to the instrument if the waste chamber overflows. Use F05 to activate solenoid 15 to drain the waste chamber as needed. Do not let the waste chamber get too full.

F. Draw bleach into the RBC apertures and drain.

G Draw cleaning agent into the RBC aperture housing and drain.

H. Disconnect the tubing and reconnect the sweep-flow lines.

I. Perform Extended Clear.

J. Press SHUT DOWN.

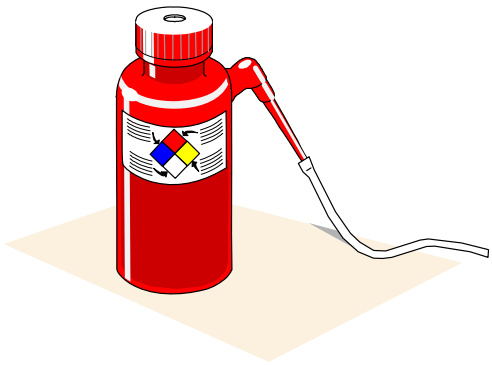
K. Press START UP.

L. Prime the system by cycling whole blood in the automatic mode.

Procedure

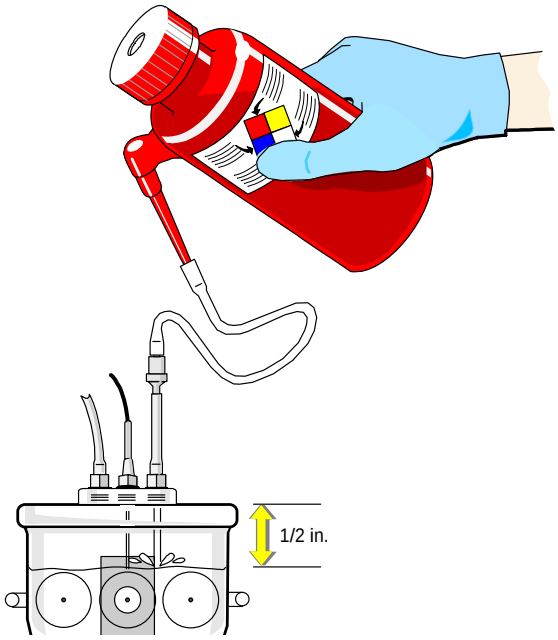
CAUTION Risk of system damage. Do not mix diluent with bleach. A precipitate forms that can clog the apertures.

A Prepare 50 mL of Bleach Solution in a Wash Bottle



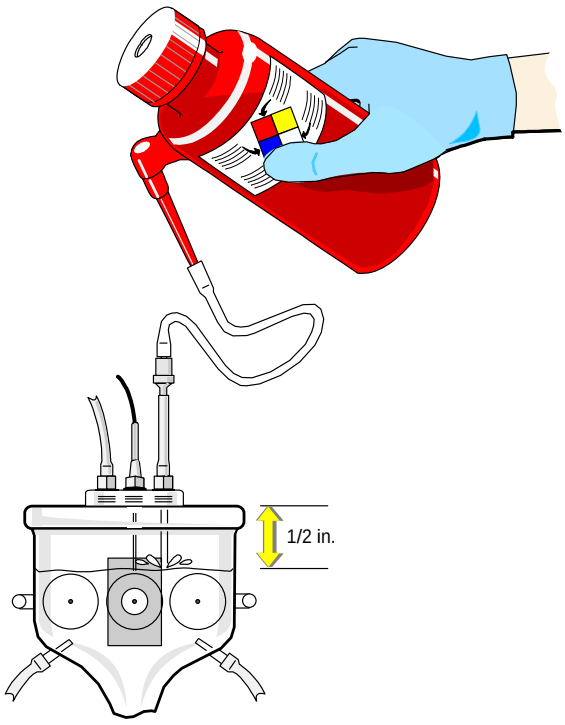
1. Put one part bleach and one part distilled water into a wash bottle. Use a high-quality, fragrance-free bleach (5 to 6% sodium hypochlorite - available chlorine).
2. Mix the solution.
3. Connect a 20-cm (7-in.) piece of tubing to the spout of the wash bottle containing the bleach solution.

B Put the Bleach Solution in the WBC Bath



1. Open the Diluter door.
2. Ensure pneumatics are on.
3. Go to the Numeric Keypad.
4. Press DRAIN until the aperture baths drain completely into the waste chamber.
5. Find the bleach fitting check valve on the top right of the WBC bath.
6. Connect the loose end of the tubing on the wash bottle to the bleach check valve on the WBC bath.
7. Put bleach solution into WBC bath so solution is within 1/2 in. from the top of the bath

C Put the Bleach Solution in the RBC Bath



1. Disconnect the bleach tubing from the check valve on the top of WBC bath and connect it to the bleach check valve on the top right of the RBC bath.
2. Put bleach solution into the RBC bath so the solution is within 1/2 in. from the top of the bath.
3. Disconnect the bleach tubing from the RBC bath and reconnect it to the WBC bath. You may need to refill the WBC bath. Monitor the bleach level in the bath to ensure the liquid level remains above the apertures.

D Perform Extended Prime

IMPORTANT Risk of misleading results. Make sure the baths are full before performing this procedure. If the baths are not full, you may need to prime again because bubbles could be in the line.

1. Go to the Numeric Keypad.
2. Press 

to pull fluid through the apertures to the vacuum isolator chamber for 60 seconds. The Numeric Keypad displays *EXTENDED PRIME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 11*. Monitor the liquid level to make sure it remains above the apertures.
3. Press 

to perform this function again.
4. Press 

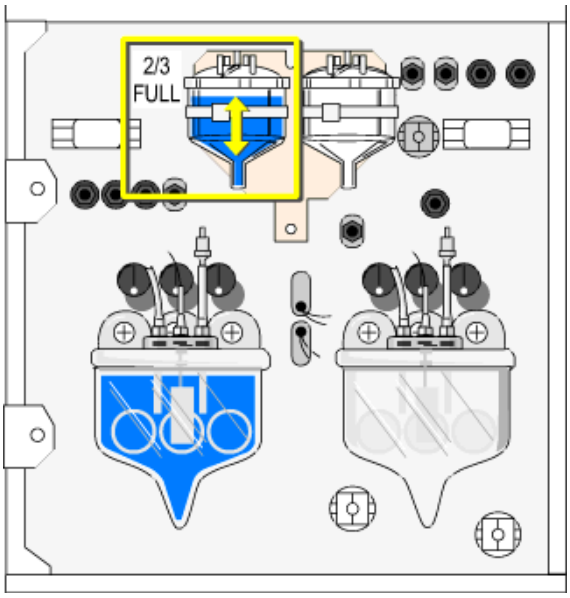
to exit this function. The Numeric Keypad displays *READY.*

E Disconnect Sweep-Flow Lines

1. Add at least 100 mL bleach solution to a beaker.
2. Disconnect the three sweep-flow lines at the bottom of the RBC bath. Do not remove the white fittings.
3. Attach a piece of tubing approximately 10 in. long to each fitting.
4. Place the ends of the tubing into a beaker of bleach solution.

F Draw Bleach into RBC Aperture and Drain

CAUTION Risk of damage to the instrument. Possible damage can occur to the instrument if the waste chamber overflows. Do not let the waste chamber get too full. Use F05 to activate solenoid 15 to drain the waste chamber as needed.



1. Use F05 to activate solenoid 11 for 

to draw bleach solution into RBC aperture housing.

   Note: The bleach is not blue, it is colored for illustration purposes.
2. Do not let the liquid level in the vacuum isolator rise above 2/3 full. Use F05 to activate solenoid 16 as needed to drain the vacuum isolator chamber.
3. Leave the bleach solution in bath and aperture housing for 

.
4. Go to the Numeric Keypad.
5. Press 

to drain and rinse baths.
6. Press 

.

G Draw Cleaning Agent into RBC Apertures and Drain

1. Transfer the ends of tubing connected to the fittings on the RBC bath from the beaker of bleach solution to the beaker containing cleaning agent.
2. Use F05 to activate solenoid 11 to draw cleaning agent into RBC aperture housing.
3. Do not let the liquid level in the vacuum isolator chamber rise above 2/3 full. Use F05 to activate solenoid 16 as needed to drain the vacuum isolator chamber.

CAUTION Risk of damage to the instrument. Possible damage can occur to the instrument if the waste chamber overflows. Do not let the waste chamber get too full. Use F05 to activate solenoid 15 to drain the waste chamber as needed.

4. Repeat steps 2 and 3 until the bleach is removed. The bleach is removed when you see cleaning agent (blue if LH Series Cleaner) in the vacuum isolator chamber.

H Disconnect Tubing and Reconnect Sweep-flow Lines

1. Disconnect the three lengths of tubing from the white fittings on the RBC bath.
2. Reconnect the sweep-flow lines.
3. Go to the Numeric Keypad.
4. Press 

.

I Perform Extended Clear

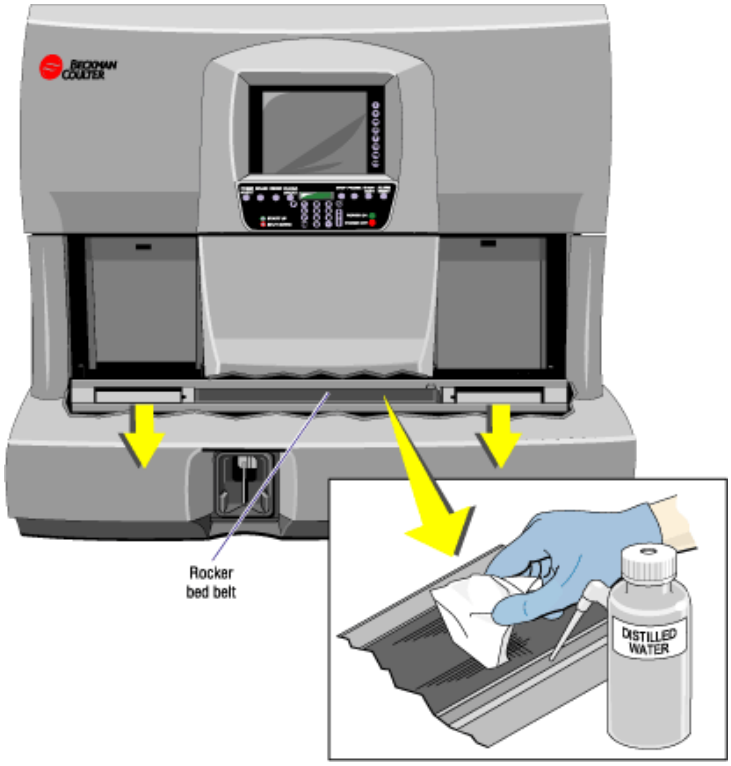
J Press 

K Press 

L Prime the System by Cycling Whole Blood in Automatic Mode.

2.15 CLEANING THE ROCKER BED BELT

The instrument rocks the samples prior to aspiration in Automatic aspiration mode. When the compressor is off, the rocker bed is unlocked. It can be tilted easily.



1. Wipe both sides of the conveyor belt with a cloth dampened with distilled water. Use only a damp cloth, not a wet one. Be careful not to get any components wet. Do not use anything but distilled water.
2. Wipe the surfaces dry; lift the belt and thoroughly dry the underside of the belt and the rocker bed.

2.16 USING HANDHELD SCANNER

IMPORTANT

1. Risk of sample misidentification. When using the handheld scanner, occasional misread errors can occur as the result of partial label scans and damaged or misapplied labels. Beckman Coulter recommends that you verify each bar-code reading to assure correct patient identification.
2. DO NOT use the following characters # @ [\ ] ` { | } ~ in Specimen or Patient identifiers. There is a potential for Specimen or Patient misidentification to occur. The system will substitute or omit these characters when the system is configured in a language other than English or Chinese.
3. DO NOT use leading or trailing spaces in the ID.

1. Ensure the cursor is in the field you want to fill with the scanned information.

WARNING Risk of personal injury. Some handheld scanners use a low-power, visible laser diode which could damage your eye. Avoid staring directly into the beam.

2. Aim the scanner at the bar-code and press the trigger. If necessary, adjust the scanner position so the red scan beam is centered on the bar-code and overlaps it on both sides.
3. When the scanner has read the symbol, you will hear a beep. If you do not hear a beep:
   - Ensure the scanner is properly connected to your Workstation.
   - Make sure the scanner is properly configured for your labels.
4. Press 

to accept the sample ID at the Workstation.

IMPORTANT Risk of missing identifier. If you fail to send the sample ID to the instrument within 60 seconds of data entry in the Bar-code ID field, the sample ID provided is cleared. This minimizes the risk of sample misidentification.

5. Press 

, then 

to send the bar-code ID to the Analyzer.

6. After the sample ID appears on the Analyzer. Press 

to accept the sample ID or 

to reject the sample ID.
7. Ensure the sample ID is correctly displayed at the Analyzer screen.

Cleaning the Scan Window (Welch Allyn IT 3800)

Note: The following information is reprinted from the Welch Allyn IT 3800/3900 Handheld Linear Imager User's Guide by permission of Welch Allyn, Inc.

CAUTION Risk of damage to the handheld scanner. Do not submerge the scanner in water. The scanner's housing is not water tight. Do not use abrasive wipers or tissues on the scan window: abrasive wipers may scratch the window. Never use solvents (alcohol or acetone) on the housing or window: solvents can damage the finish or the window.

Scanning performance can degrade if the scan window is not clean. If the scan window is visibly dirty, or if the scanner is not scanning well, clean the scan window with a soft cloth or tissue dampened with water (or a mild detergent-water solution). If a detergent solution is used, rinse with a clean tissue dampened with water only.

The scanner housing can also be cleaned the same way.

2.17 ADVANCED BAR-CODE READER

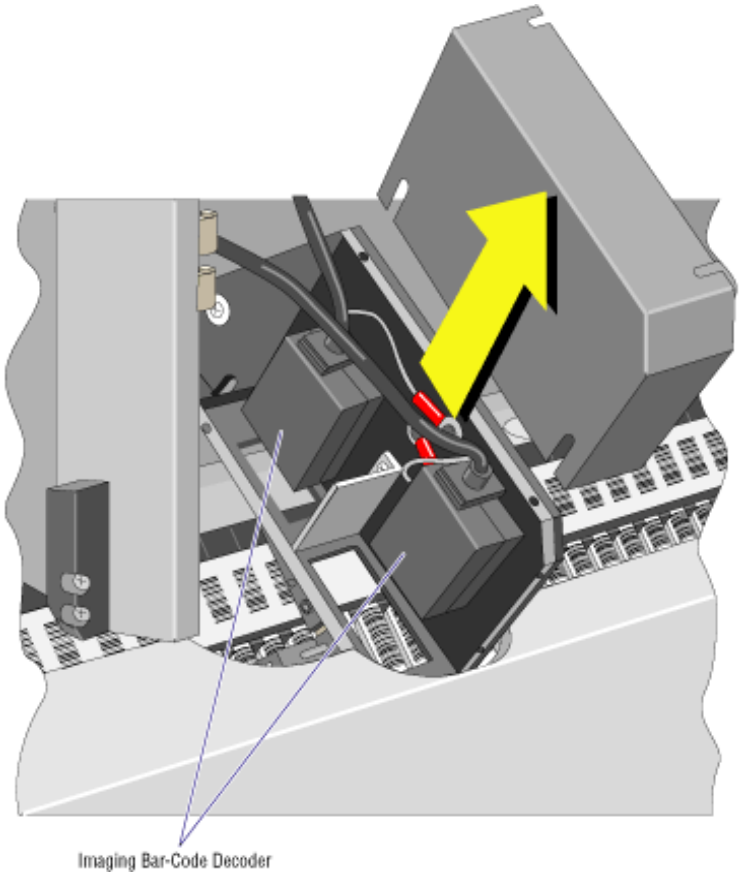
The Advanced Bar-Code Reader is a vision based bar-code reader that uses two Imaging Bar-Code Decoders. One decoder reads the cassette label, the other decoder reads the sample label.

The instrument activates the bar-code reader while piercing a sample tube in Automatic aspiration mode.

IMPORTANT Risk of misidentification. Use of poor quality, dirty, improperly placed or damaged bar-code labels could prevent the instrument from reading the bar-code labels. Ensure the bar-code labels are undamaged. Ensure the bar-code labels conform to the specifications provided in the online help.

The instrument reads both the tube and cassette labels. If the instrument cannot read the tube label, the instrument only reports the cassette label.

Using two decoders enables the bar-code reader to remain in a fixed position. Because the Advanced Bar-Code Reader does not have any moving part or assemblies, it does not require routine cleaning, adjustment or calibration.

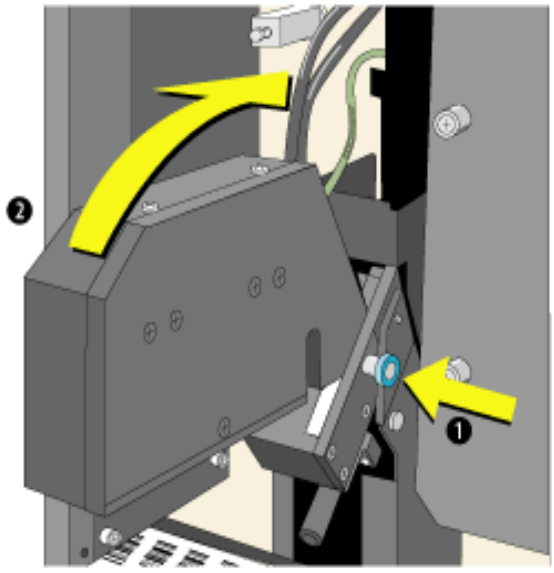


Positioning the Advanced Bar-Code Reader

The Advanced Bar-Code Reader has two positions:

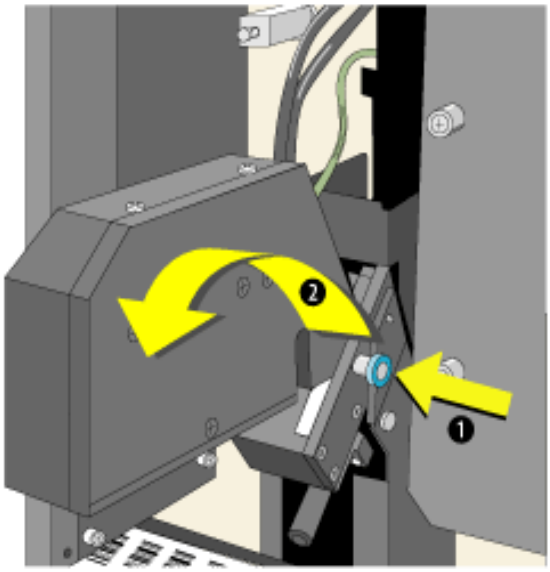
- Up - Service Position.
- Down – Read Position

Up - Service Position



1. Remove the Diluter center cover and pull out the Advanced Bar-Code Reader lock pin.
2. Lift the Advanced Bar-Code Reader until the lock pin slides into place. The Advanced Bar-Code Reader is now in the Service Position.

Down - Read Position



1. To place the Advanced Bar-Code Reader in the Down position, pull out the lock pin.
2. Lower the Advanced Bar-Code Reader until the lock pin slides into place. The Advanced Bar-Code Reader is now in the Read Position.
3. Replace the Diluter center cover.

2.18 CLEANING VACUUM ISOLATOR CHAMBER (VIC)

Summary

WARNING Possible biohazardous condition. The VIC can contain residual biological materials and must be handled with care. Follow your laboratories protocol for safety measures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

A. Prepare the VIC for cleaning.

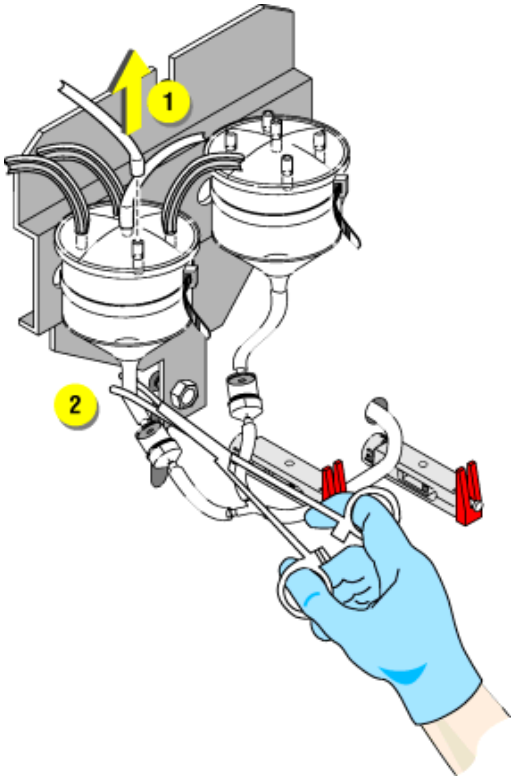
B. Bleach the VIC.

C. Return the VIC to working order.

D. Shut down your system.

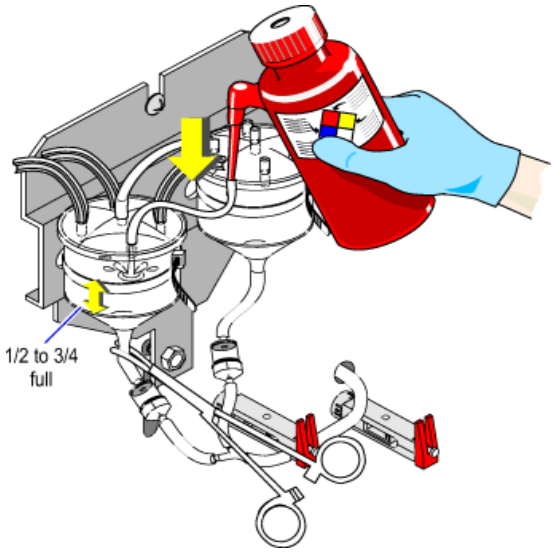
E. Start up your system.

A Prepare VIC for Cleaning



1. Ensure pneumatics are on.
2. Go to the Numeric Keypad.
3. Use F05 to activate solenoid 16 to drain the VIC and waste chamber.
4. Press POWER OFF.
5. Disconnect one end of the U-shaped tubing connection at the top of the VIC.
6. Use a hemostat to restrict the liquid flow by pinching the tubing at the bottom of the VIC.

B Bleach VIC



1. Prepare a bleach solution.
2. Connect the bleach bottle tubing to the VIC fitting where the U-shaped tubing was disconnected.

CAUTION Risk of system damage. Operating the instrument when VIC is filled with bleach can cause VIC to overflow. Do not operate instrument when the VIC is filled with bleach solution.

3. Fill the VIC 1/2 to 3/4 full with bleach solution.
4. Disconnect the bleach bottle.
5. Leave the bleach solution in the VIC for 

.

C Return VIC to Working Order

1. Reconnect the original U shaped tubing to the VIC.
2. Open the hemostat to unpinch the tubing at bottom of the VIC.
3. Go to the Numeric Keypad.
4. Press 

.
5. Use F05 to activate solenoid 16 to drain the VIC and waste chamber.

D Shut Down Your System

E Start Up Your System

2.19 CLEANING WASTE CHAMBER

Summary

WARNING Possible biohazardous condition. The waste chamber can contain residual biological materials and must be handled with care. Follow your laboratories protocol for safety measures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.

CAUTION Risk of system damage. Operating the instrument when the waste chamber is filled with bleach solution can damage the instrument. Do not operate the instrument when the waste chamber is filled with bleach solution.

A. Prepare the waste chamber for cleaning.

B. Bleach the waste chamber.

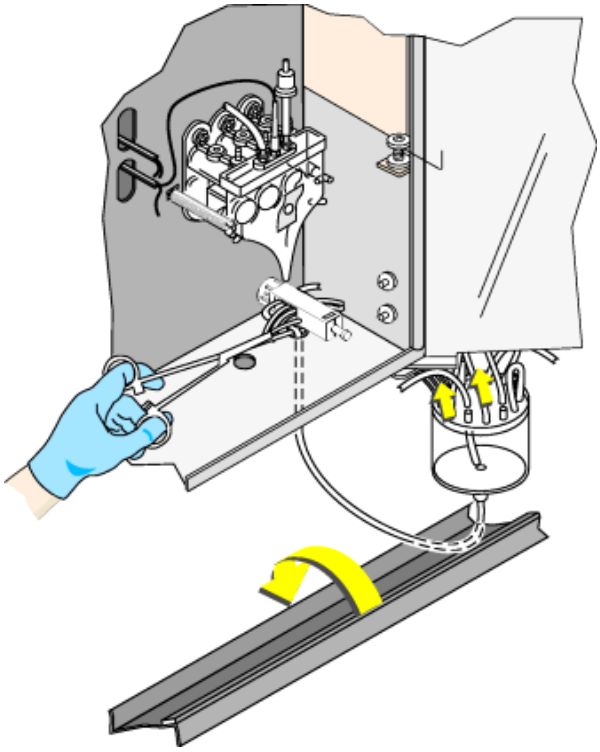
C. Return the waste chamber to working order.

A Prepare Waste Chamber

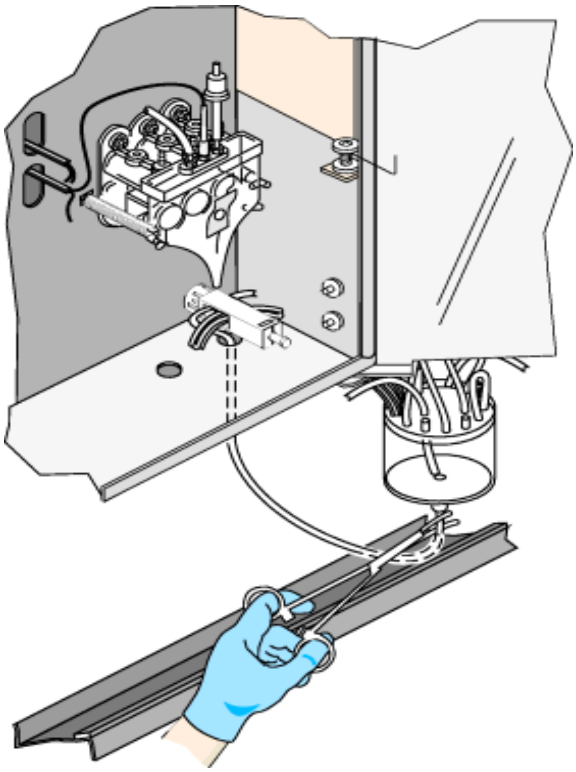
1. Ensure pneumatics are on.
2. Go to the Numeric Keypad.
3. Press 

.
4. Use F05 to activate solenoid 15 to drain the waste chamber.
5. Press 

.

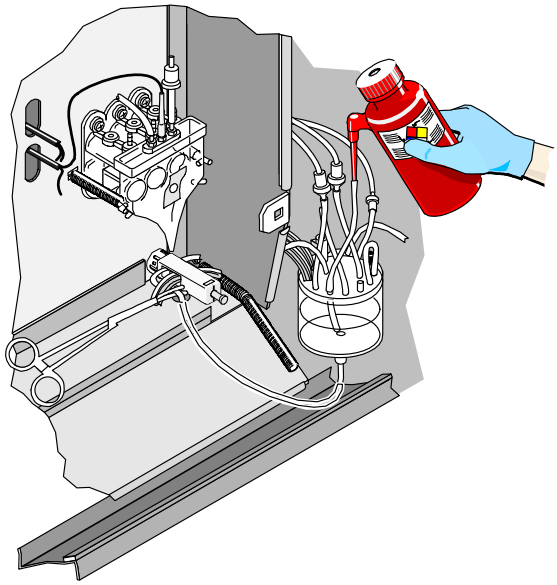


6. Tilt the rocker bed back to reach the waste chamber.
7. Find the fitting on top of the waste chamber with an extension inside and disconnect the tubing from this fitting.
8. Disconnect the tubing from a different fitting to vent the waste chamber.



9. Use a hemostat to restrict liquid flow by pinching the tubing at the pinch valve connected to the bottom of the waste chamber.

B Bleach Waste Chamber



1. Prepare a bleach solution.

CAUTION Risk of system damage. Possible damage can occur to the instrument if the waste chamber overflows. Do not let the waste chamber get too full. Use F05 to activate solenoid 15 to drain the waste chamber as needed.

2. Connect the bleach bottle tubing to the waste chamber fitting and fill the waste chamber to the top with bleach solution.
3. Disconnect the bleach bottle.
4. Leave the bleach solution in the waste chamber for 

.

C Return Waste Chamber to Working Order

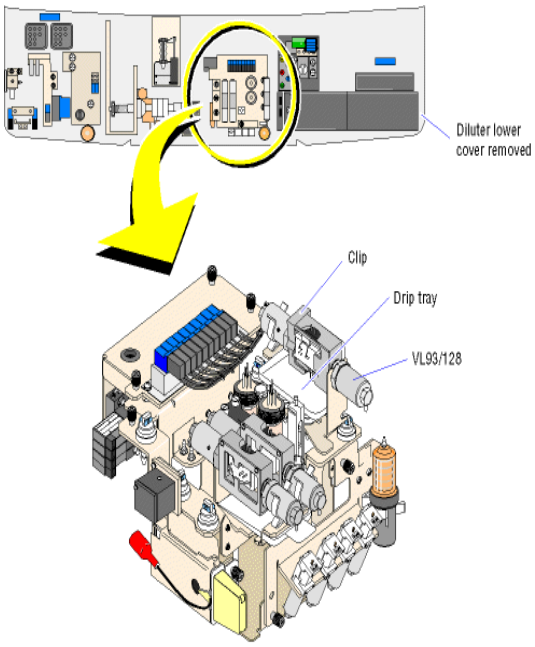
1. Release the hemostat to unpinch tubing connected to the bottom of the waste chamber.
2. Reconnect the tubing at the top of the waste chamber.
3. Go to the Numeric Keypad.
4. Press 

.
5. Use F05 to activate solenoid 15 to drain the waste chamber.
6. If protein deposits remain, repeat the entire procedure.

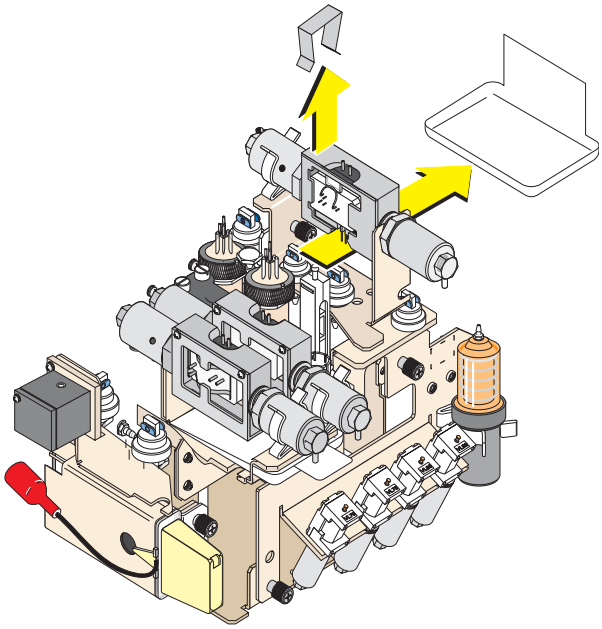
2.20 CLEANING THE SHEAR VALVE

CAUTION This is **not** a routine procedure and should only be done if instructed to do so by your Beckman Coulter Representative.

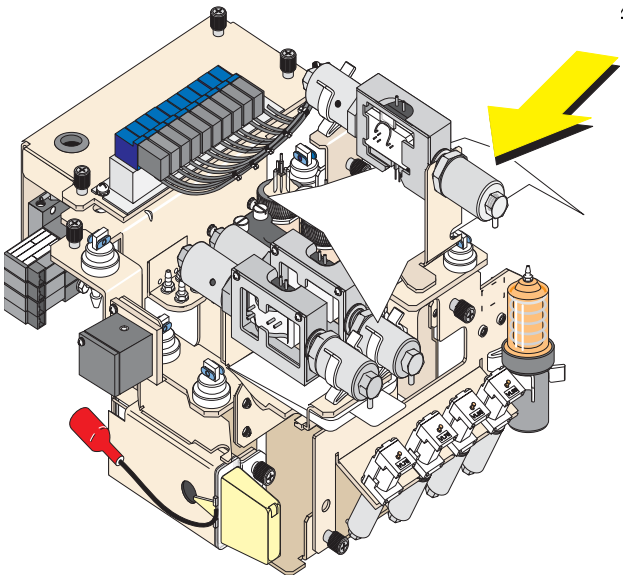
CAUTION Possible biohazardous condition. The Shear Valves and associated tubing can contain residual biological materials and must be handled with care. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures. This may include, but is not limited to, wearing protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this analyzer.



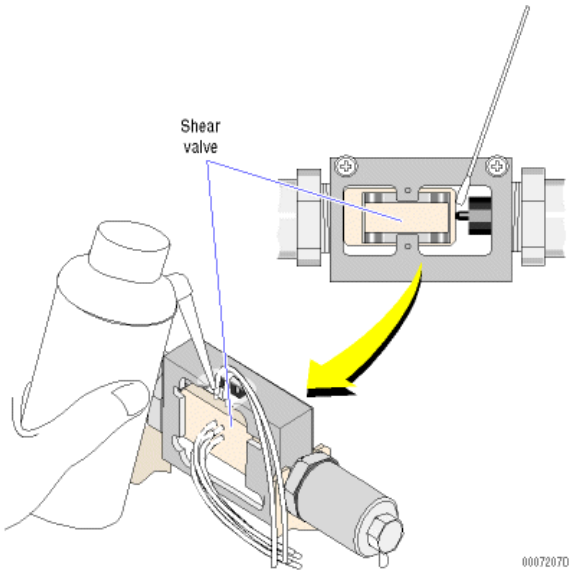
1. Open the Diluter lower front door.
2. Locate the Shear Valve labeled VL93 / 128.



3. Remove the clip and drip tray.

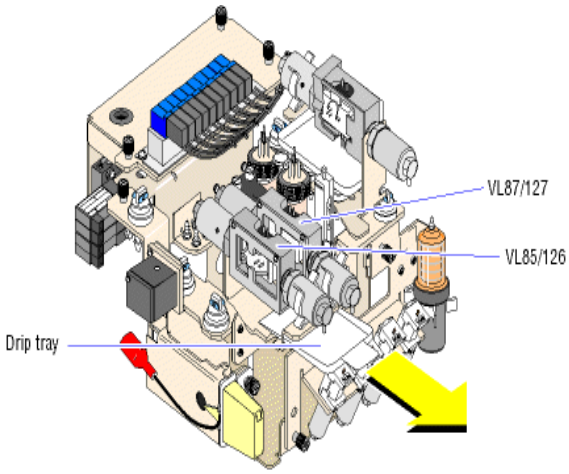


4. Place lint free tissue around the outside and underneath of the Shear Valve.



5. Rinse the outside surfaces of the Shear Valve with warm tap water. Use a cotton tip applicator to clean around the middle of the valve on both sides.

6. Ensure the pneumatic pressures and vacuum are at a satisfactory level.
7. From the Diluter Keypad, press F 9 3 ENTER to move the valve. While the valve is moving, re-wet the surfaces again with distilled water.
8. Clean any excess moisture with lint free tissue.
9. Reinstall the clip and drip tray.
10. Repeat steps 4 through 8 of this procedure for the cleaning of Shear Valves VL85 / 126 and VL87 / 127.

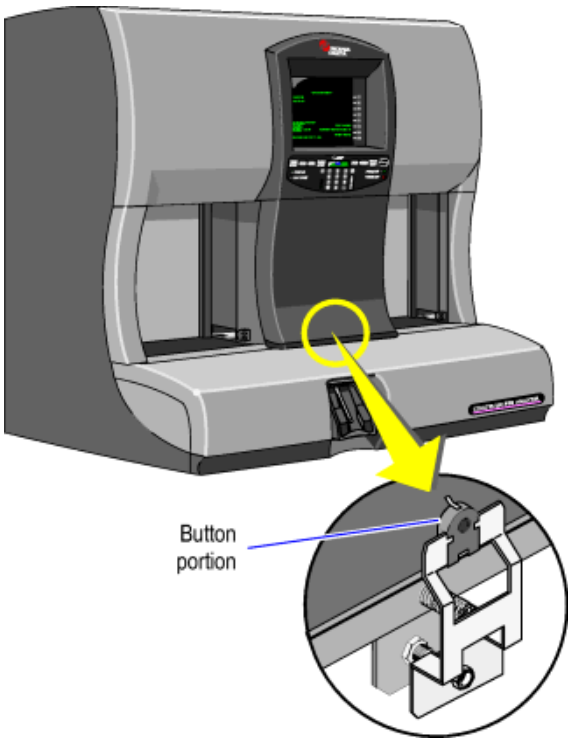


Note: When performing Step 7 for Shear Valve VL85 / 126, use F 8 5 ENTER and for Shear Valve VL87 /127, use F 8 7 ENTER.

2.21 CLEANING THE STRIPPER PLATE

The universal stripper plate accommodates various sizes and styels of tube caps.

WARNING Biohazardous materials might be contained on the stripper plate. Take appropriate precautions when cleaning. Follow your laboratory's protocol for safety measures.



1. Go to the Numeric Keypad.
2. Press POWER OFF.
3. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing this procedure.

4. Disconnect the primary power cord at the source (not at the power supply).
5. Use cleaning agent on a gauze pad to wipe the plate; use a cotton swab around the opening.

3.1 REPLACING AIR FILTERS

Procedure

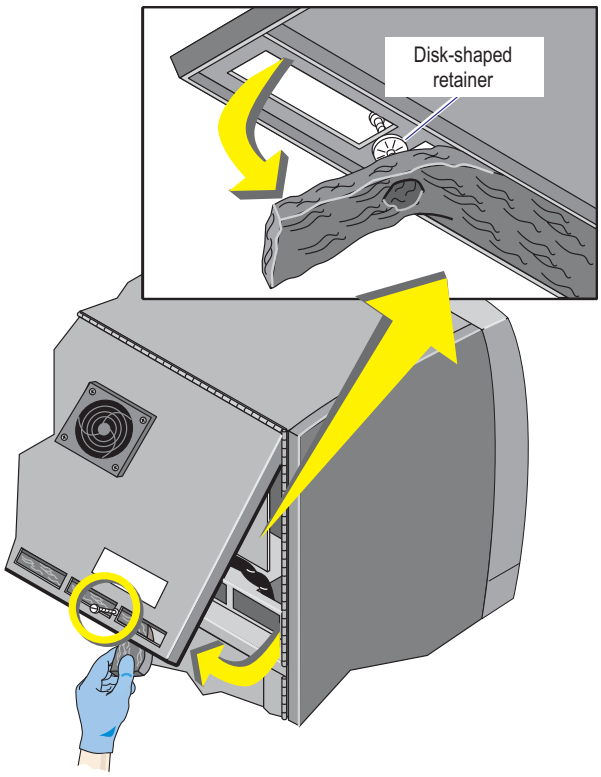
CAUTION Risk of damage. A dirty air filter can cause overheating. Check the filters and clean as needed.

1. Go to the Numeric Keypad.
2. Press POWER OFF.
3. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

4. Disconnect the primary power cord at the source (not at the power supply).
5. Locate and remove the air filters.

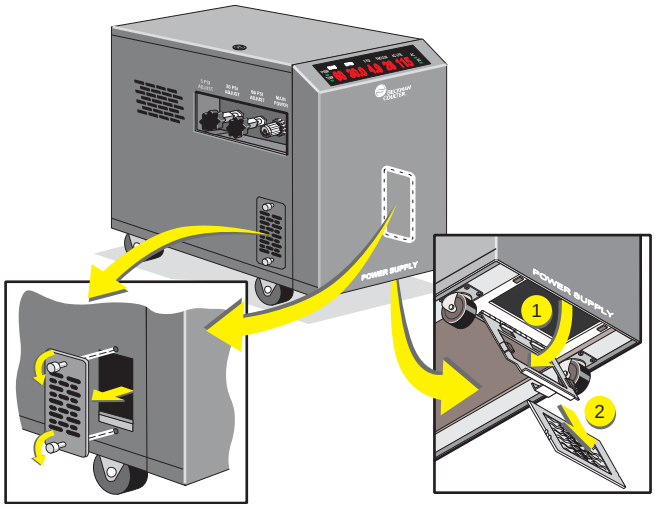
For Analyzer



a. Loosen the screws on the back of the Analyzer.
b. Open the back of the Analyzer.
c. Pull the air filter down over the disk-shaped retainer on the screws to remove the air filter.

For Power Supply

Air Filters can be found on both sides and on the bottom of the power supply.



d. Bottom Filter. Pull downward on the handle of the filter cover and slide filter out.

e. Side Filter. Loosen thumbscrews and pull filter out.

6. Wash the filters in soap and water, rinse them and dry them completely. If you find a filter that is torn or shredded, discard it and replace it with a new one. Order replacement filters from your Beckman Coulter Representative.
7. Return the clean air filters to their original location.
8. Reconnect the primary power cord.
9. Turn on the Power Supply main breaker.
10. Go to the Numeric Keypad.
11. Press POWER ON.

3.2 REPLACING AN APERTURE BATH

Summary

A. Press DRAIN until the aperture baths drain completely into the waste chamber.

B. Press POWER OFF.

C. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

D. Disconnect the primary power cord.

E. Unhook the springs and pull out bath for replacement.

F. Label and disconnect the tubing attached to left side of the aperture bath. You must disconnect all four pieces of attached tubing.

G. Replace the O-rings on the aperture block if you have spare O-rings available.

H. Replace the aperture bath and reconnect it.

I. Reconnect the primary power cord.

J. Turn on the main breaker on the Power Supply.

K. Check for leaks and air bubbles.

L. Close the bath compartment.

M. Press 

.

N. Run a control in CBC test mode.

Procedure

A Press 

Until the Aperture Baths Drain Completely into the Waste Chamber

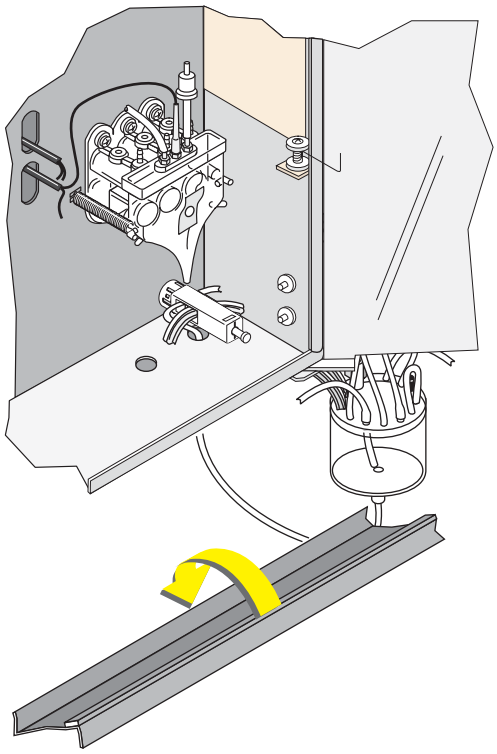
B Press 

C Turn Off the Main Breaker on the Power Supply

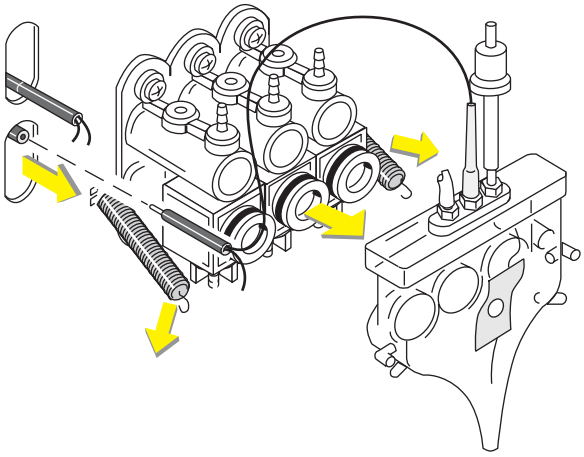
WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

D Disconnect the Primary Power Cord

E Unhook the Bath Springs and Gently Pull the Bath Out of the Instrument



1. Open the bath compartment.
2. Manually move the rocker bed to its backward position



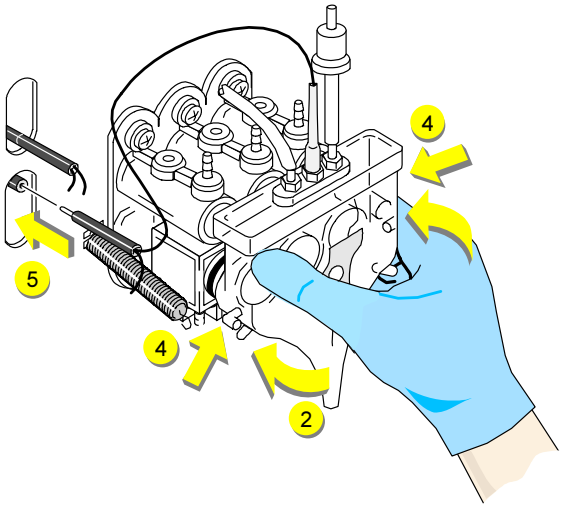
3. Unhook the spring attached to each side of the bath.
4. Disconnect the electrode cable where it attaches to the Diluter panel.
5. Using both hands, gently rock the bath off the large O-rings.

F Label and Disconnect the Tubing Attached to Left Side of the Aperture Bath

G Replace the O-Rings on the Aperture Block if You Have Spare O-rings Available

See Heading 3.9, Replacing Aperture O-Ring for this procedure.

H Replace the Aperture Bath and Reconnect it



1. Moisten the three large O-rings with distilled water.
2. Using both hands, gently rock the bath onto the large O-rings until it snaps back to its original position.
3. Ensure you properly aligned the bath with all three blocks to prevent leaking.
4. While holding the bath in place, use a hemostat to hook the springs to each side of the bath.
5. Connect the electrode cable to the center front panel.
6. Connect the labeled tubing to the new bath.

I Reconnect the Primary Power Cord

J Turn on the Main Breaker on the Power Supply

K Check for Leaks and Air Bubbles

1. Go to the Numeric Keypad.
2. Press POWER ON.
3. Ensure the bath fills with diluent and the waste chamber empties.
4. Ensure the bath is not leaking.
5. Press DRAIN.
6. Ensure the bath drains.
7. Press RINSE.
8. Both solenoids will be active at the same time. Verify that all three lines from the bath to the vacuum isolator chamber pull a bubble-free stream. Repeat steps 5 through 7 as needed to ensure the bath is not leaking.
9. If acceptable, press STOP three times. The Numeric keypad displays ready

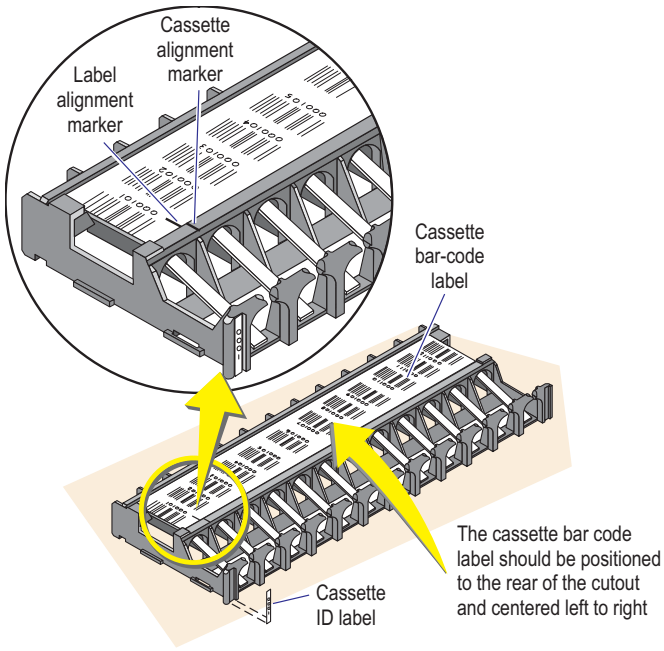
L Close the Bath Compartment

M Press START UP

N Run a Control in CBC Test Mode

3.3 REPLACING CASSETTE LABELS

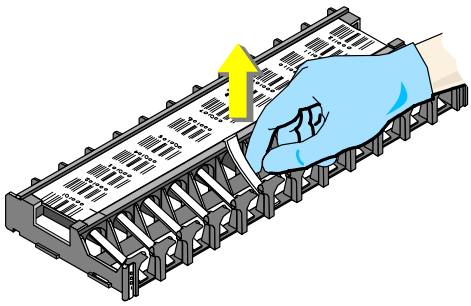
Replace worn or damaged cassette labels as needed.



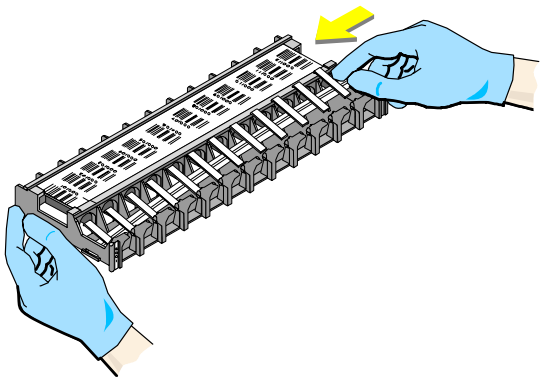
1. Remove the old label completely.
2. Use the label alignment marker only to orient the new label in the label cutout on the cassette.Place the label in the label cutout area, positioned to the bottom of the cassette and centered left to right in the cutout.
3. Ensure that the bar-codes on the label are centered on the sample tube positions.
4. Ensure you match the cassette number on the bar-code label with the cassette ID label on the cassette.

3.4 REPLACING CASSETTE SPRING CLIP

Replace the spring clip if the fingers of the spring clip become flat and the tubes are not held securely in the cassette.



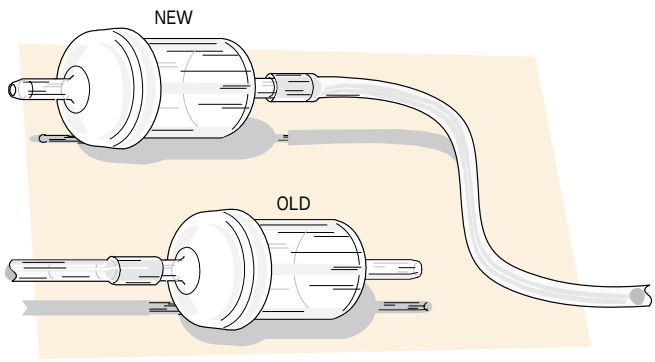
1. Grasp the spring clip in the middle of the cassette and pull it out.



2. Insert the tabs of the new spring clip into the slots in the ends of the cassette.
3. Insert a tube in each position to verify that all positions are secure.

3.5 REPLACING CHECK VALVES

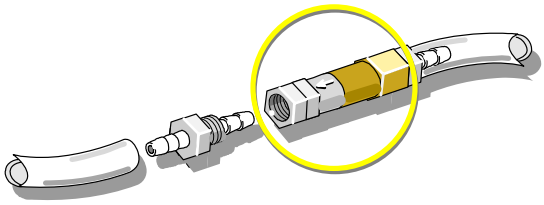
CAUTION Risk of system damage. Possible system damage can occur if you replace a check valve in a mixing bubble line to either aperture valve. Drain the baths before replacing these check valves.



1. Record the direction in which the old check valve is pointing.
2. Ensure you have the same size and type of check valve as the one you want to replace.
3. One at a time, remove the tubing connected to the old check valve and transfer it to the new check valve, to ensure the direction of the flow is correct.

3.6 REPLACING CHOKES

WARNING Possible biohazardous condition. Chokes can include residual biological material and must be handled with care. Check the tubing connection periodically. Avoid skin contact and clean up spills immediately. Dispose of the old chokes in accordance with your local regulations and acceptable laboratory procedures.



1. Ensure you use the same size (color) choke. Chokes are color-coded by size.
2. Ensure you install choke in same direction. Arrow on choke indicates direction of pressure flow.
3. Check choke fittings. If choke is wet or plugged, it may be necessary to replace fittings.

You receive a supply of chokes with your LH 700 Series system. Order additional chokes and fittings by calling your Beckman Coulter Representative.

3.7 REPLACING FUSES

1. Go to the Numeric Keypad.
2. Press POWER OFF.
3. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

4. Disconnect the primary power cord.
5. Locate the fuses you want to replace.
6. Push in and turn the cap 1/4-turn  . The cap will pop out of its holder when released.
7. Remove the open fuse and replace it with a fuse of the same type and rating. The amperage and voltage rating is written on the fuse. You can insert the fuse in either direction.
8. Return the fuse and its cap by inserting the fuse and turning the cap 1/4 turn  while pushing in.

CAUTION Risk of system damage if you attempt to use the power supply when a fuse continually fails. If a fuse fails shortly after replacement, power off and call your Beckman Coulter Representative.

9. Reconnect the primary power cord.
10. Turn on the Power Supply main breaker.
11. Go to the Numeric Keypad.
12. Press POWER ON.

3.8 REPLACING NEEDLE

Summary

WARNING Possible biohazardous condition. Cotton swabs and components used in this area must be handled with care. Avoid skin contact. Dispose of components in accordance with your local regulations and acceptable laboratory procedures. Take additional care if the needle is visible, or the bellows are torn or leaking.

A. Prepare the instrument so you can replace the needle.

B. Attach the safety clip and remove the needle cartridge.

C. Clean the needle assembly area.

D. Remove the tubing.

E. Attach the tubing to the new needle.

F. Return the needle to its original location.

G. Verify calibration and control recovery.

Procedure

A Prepare Instrument for Needle Replacement

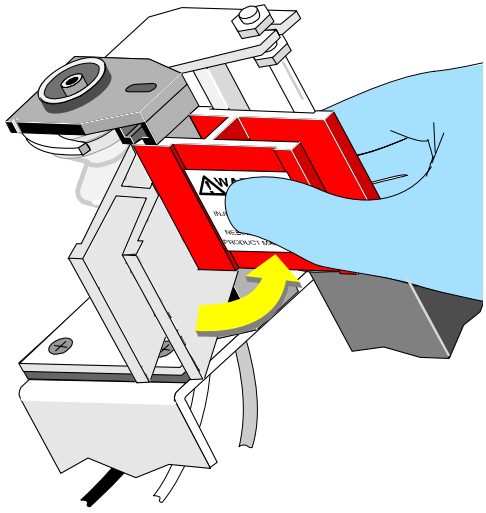
1. Go to the Numeric Keypad.
2. Press POWER OFF.
3. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

4. Disconnect the primary power cord.
5. Open the Diluter lower front door.
6. If your instrument has an Advanced Bar-Code Reader, position the Advanced Bar-Code Reader in the up or service position.

B Attach Safety Clip and Remove Needle Cartridge

WARNING Skin puncture from the needle, which might contain biohazardous material, can occur. Handle the needle cartridge with extreme care. Always use the safety clip to remove and install the needle cartridge. This protects you from possible needle puncture

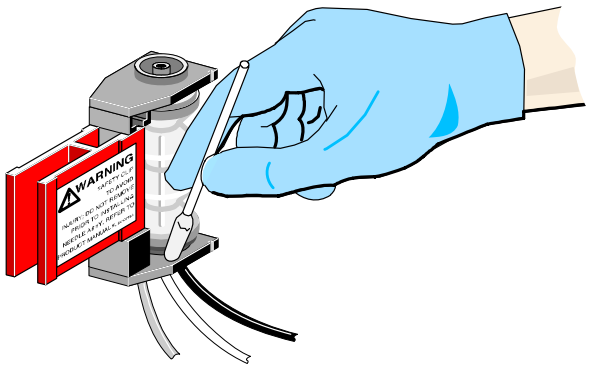


1. Without squeezing the safety clip, fit the right edge of the safety clip into the groove on the right side of the front support of the needle cartridge.
2. Slide the safety clip to the left until its left edge enters the groove on the left side of the front support of the needle cartridge. You should hear a click.

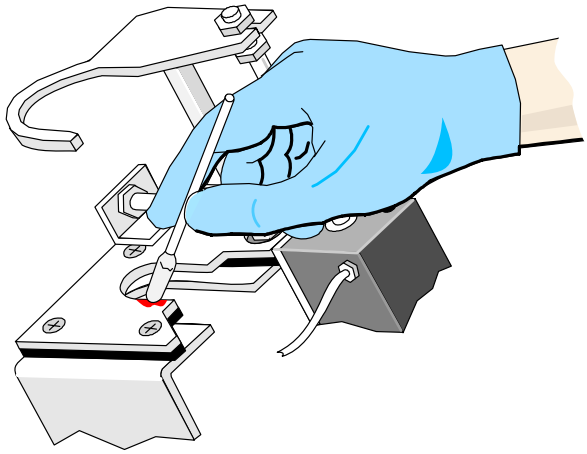
CAUTION Risk of system damage. Pulling the needle cartridge out too far can tear the tubing. Pull the cartridge out slowly.

3. Pull out the needle cartridge.

C Clean Needle Assembly Area

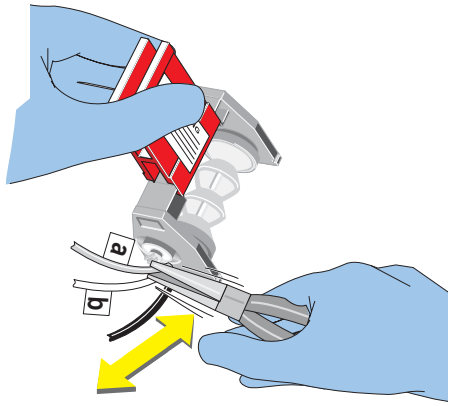


1. If there is blood on the cover:
   a. Clean the cover with a cotton swab moistened with a 50:50 solution of bleach and distilled water.
   b. Rinse another cotton swab in distilled water and wipe the same area.



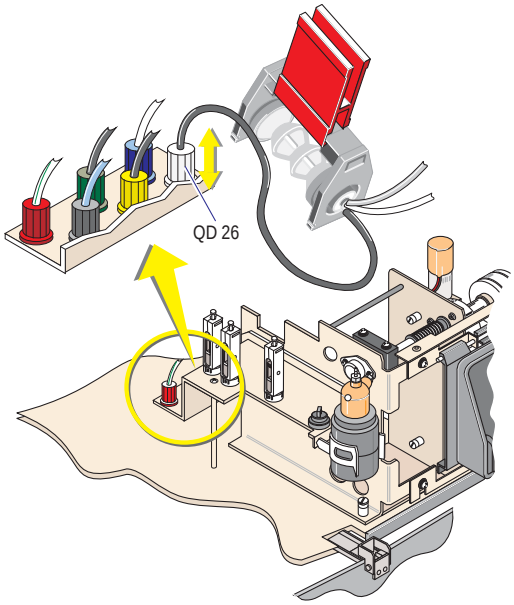
2. Dip a cotton swab into a 50:50 solution of bleach and distilled water to clean upper and lower grooves where the needle assembly fits.
3. Rinse another cotton swab in distilled water and wipe the same area.

D Remove Needle Tubing

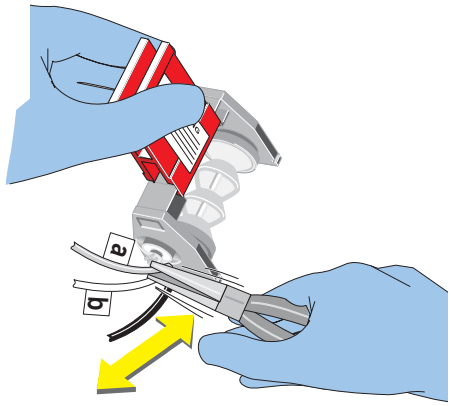


1. If necessary, label the tubing before removing it.

WARNING Possible biohazardous condition. Pulling or cutting the tubing can damage the tubing causing it to leak. Do not pull or cut the tubing.

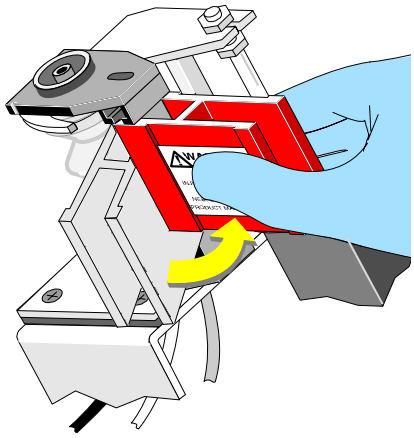


2. Detach the black tubing from the Instrument.
   a. Trace the black tubing on the bottom of the needle cartridge back to the white connector on QD 26.
   b. Unscrew the white connector and pull the black tubing free.

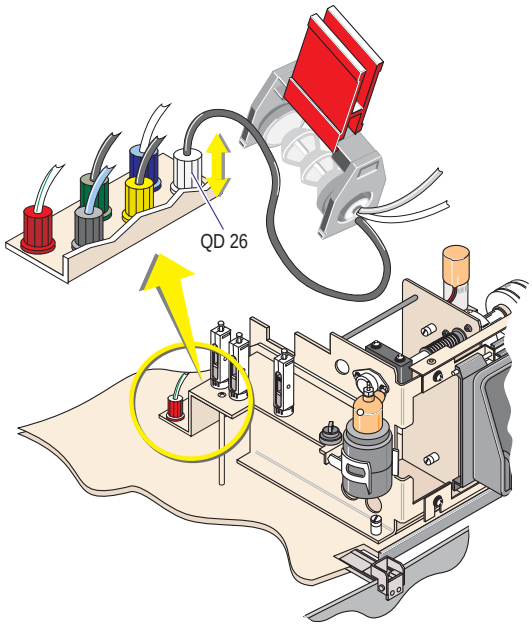


3. Remove the remaining tubing from the needle cartridge by sliding them off the connection with needlenose pliers:
   a. Opaque silicone tubing (Slide back the protective sheath tubing to reach the silicone tubing.)
   b. Small clear tubing
4. Discard the old needle cartridge with the black tubing still attached.

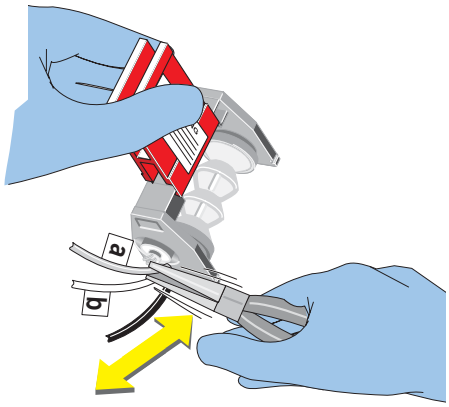
E Attach Tubing to New Needle



1. A safety clip comes attached to the new needle cartridge. If safety clip is missing, attach one before proceeding.

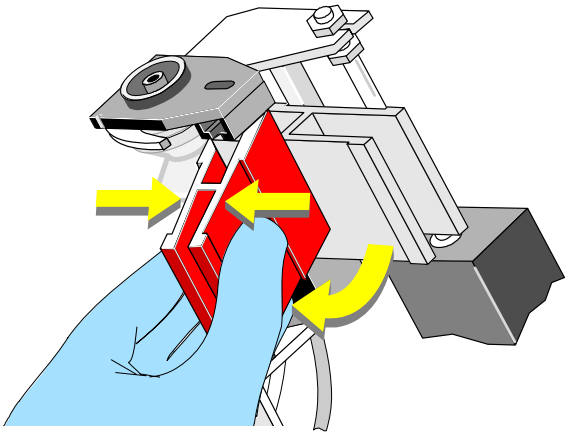


2. Attach the black tubing's white connector to the white fitting on QD 26.



3. Attach the tubing to the new needle cartridge:
   a. Opaque silicone tubing to the port (be sure to slide protective tubing back over the fitting).
   b. Small clear tubing to the center port.

F Return Needle to Its Original Location



1. Slide in the needle cartridge until it clicks into place.
2. Slightly squeeze the safety clip and move it a little to the right to separate the right side of the clip from the needle assembly.
3. Continue to move the clip to the left to free it from the needle assembly.
4. Save the safety clip for future use.
5. If your instrument has an Advanced Bar-Code Reader, position the Advanced-Bar Code Reader in the down or read position.

G Verify Control Recovery

WARNING Risk of skin puncture. The needle can go into the pierce position after power up. Keep hands away from the needle cartridge area when you power up the instrument.

1. Close the Diluter lower front door.
2. Reconnect the primary power cord.
3. Turn on the main breaker on the Power Supply.
4. Go to the Numeric Keypad.
5. Press POWER ON.
6. Run controls in CBC test mode.
7. Check that your control results are acceptable. If they are unacceptable, ensure you:
   - Connected the tubes to the proper fittings
   - Positioned the needle cartridge properly.

3.9 REPLACING APERTURE O-RINGS

Summary

A. Press DRAIN until the aperture baths drain completely into the waste chamber.

B. Press POWER OFF.

C. Unhook the springs and pull out the bath.

CAUTION Risk of instrument damage. If you touch the center of the block you can damage the instrument. Do not touch the aperture in the center of the block.

D. If replacing the O-rings on the RBC bath, disconnect the sweep-flow tubing.

E. Unscrew the white fitting beneath the housing.

IMPORTANT Incorrect results can occur if aperture blocks are mismatched. Remove only one aperture block at a time to avoid mismatching the apertures.

F. Pull the block out.

G. Replace the O-rings.

H. Return the aperture block to its original location.

I. Repeat steps E through H for the remaining aperture blocks.

J. Replace the bath and reconnect it.

K. Check for leaks and air bubbles.

L. Close the bath compartment.

M. Run a control.

N. Review the control results.

O. Press POWER ON.

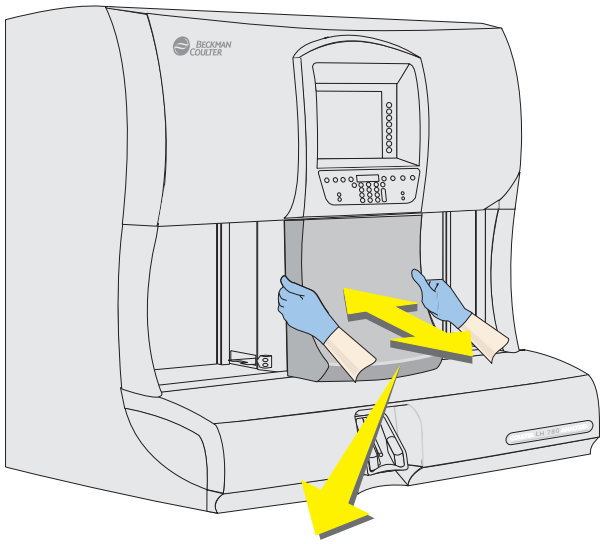
Procedure

A Press DRAIN Until the Aperture Baths Drain Completely into the Waste Chamber

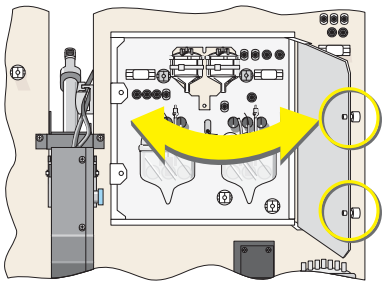
B Press POWER OFF

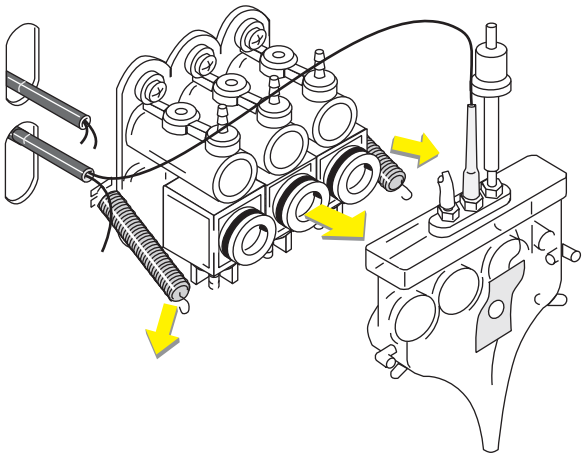
C Unhook the Bath Springs and Gently Pull the Bath Out of the Instrument

CAUTION Risk of instrument damage. If you touch the center of the block you can damage the instrument. Do not touch the aperture in the center of the block.



1. Open the Diluter.
2. Manually move the rocker bed to its backward position.



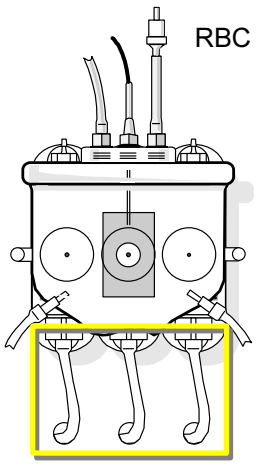


3. Use a hemostat to unhook the spring attached to each side of the bath.

IMPORTANT Risk of incorrect control results. If you move the external electrode attached to the bath you can create a carryover problem. Do not move the external electrode.

4. Using both hands, gently rock the bath off the large O-rings.

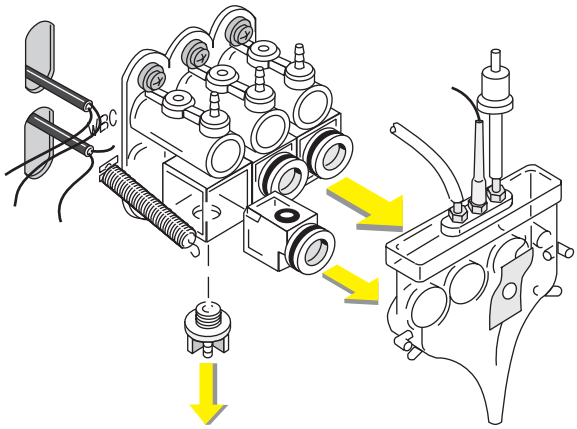
D If Replacing the O-Rings on the RBC Bath, Disconnect the Sweep-flow Tubing



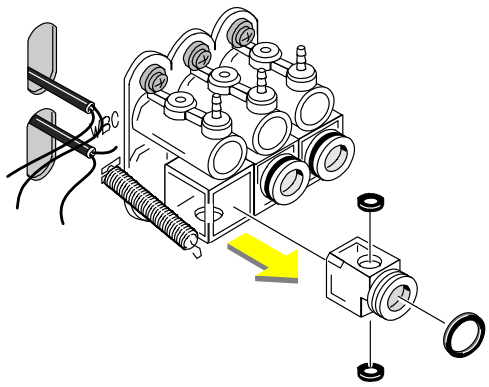
E Unscrew the White Fitting Beneath the Housing

IMPORTANT Incorrect results can occur if aperture blocks are mismatched. Remove only one aperture block at a time to avoid mismatching the apertures.

F Pull the Block Out

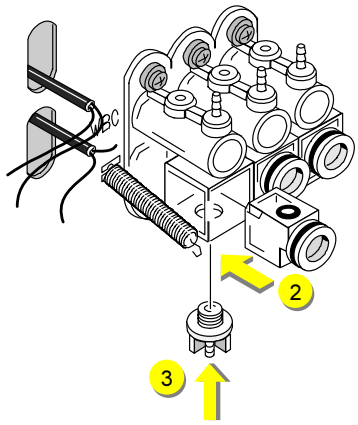


G Replace Defective O-Rings



1. Remove and discard the defective O-rings.
2. Fit the new O-rings onto the block.

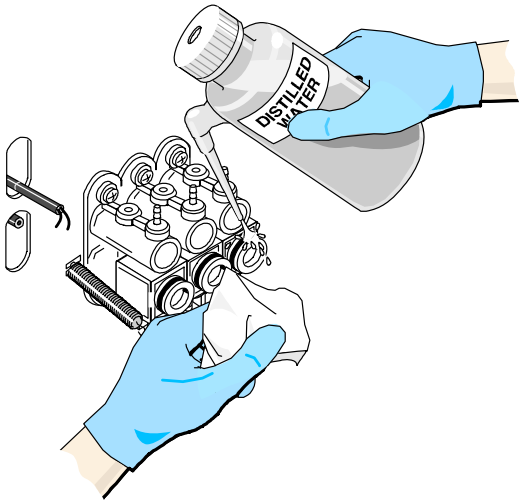
H Return Aperture Block to Its Original Location



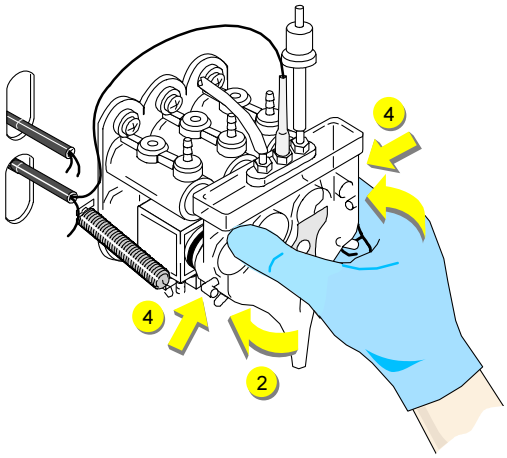
1. Rinse the rim of the aperture block with distilled water and dry it.
2. Align the aperture block so the beveled edge is at the top left corner, and put it back into its housing.
3. Tighten the white fitting with fingers only.
4. If replacing the O-rings on the RBC bath, reconnect the sweep-flow tubing.

I Repeat Steps D through H for the Remaining Aperture Blocks

J Return the Bath and Reconnect It



1. Moisten the three large O-rings with distilled water.



2. Gently rock the bath onto the large O-rings until it snaps back to its original position.
3. Ensure you properly aligned the bath with all three blocks to prevent leaking.
4. While holding the bath in place, use a hemostat to hook springs to each side of the bath.

K Check for Leaks and Air Bubbles

1. Go to the Numeric Keypad.
2. Press POWER ON.
3. Ensure the bath fills with diluent and the waste chamber empties.
4. Ensure the bath is not leaking.
5. Press DRAIN.
6. Ensure the bath drains.
7. Press RINSE.

8. Both solenoids will be active at the same time. Verify that all three lines from the bath to the vacuum isolator chamber pull a bubble-free stream. Repeat steps 5 through 7 as needed to ensure the bath is not leaking.

9. If acceptable, press STOP three times. The Numeric keypad displays ready

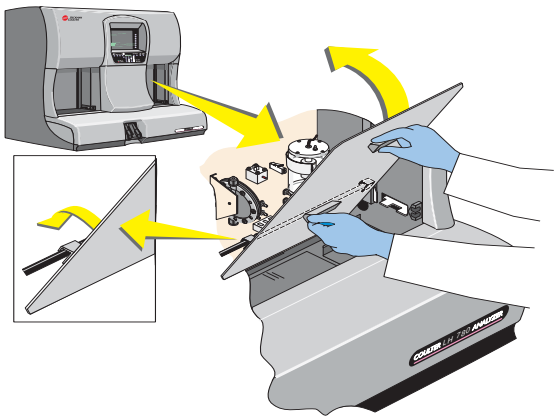
L Close the Bath Compartment

Reverse steps C1 and C2 above to close the aperture bath compartment.

M Run a Control

N Review the Control Results

Removing Panel Covers



To remove right or left panel covers:

Grab top and bottom handles of cover and pull out and up to unhook the curved hinge from bar.

Replacing Pickup Tube Assembly

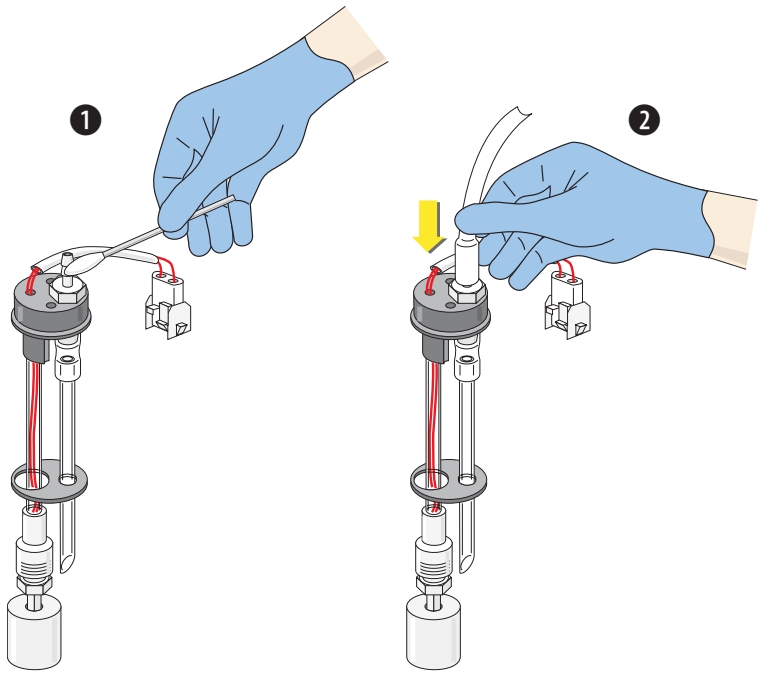
WARNING Some replaceable items can come in contact with residual biological material. Skin contact with these materials can be harmful to your health. Dispose of these items in accordance with your laboratory procedures.

Reagent Pickup Tube Replacement

1. Press POWER OFF
2. Cut tubing above pickup tube to be discarded with tubing cutters. There may be a small splash of reagent when the tubing is cut.

CAUTION Do not use regular scissors as the tubing will not be cut properly. Use tubing cutters to ensure a straight and more even cut.

3. Discard old pickup tube.
4. Moisten top of new pickup tube using reagent on a cotton swab before inserting tubing.



Waste Pickup Tube Replacement:

1. Press POWER OFF.
2. Cut tubing above pickup tube to be discarded with tubing cutters. There may be a small splash of bleach solution when the tubing is cut.
3. Disinfect pickup tube by placing in a container with 10% bleach dilution for 15 minutes.

CAUTION Do not use regular scissors as the tubing will not be cut properly. Use tubing cutters to ensure a straight and more even cut.

4. Discard old pickup tube.
5. Moisten top of new pickup tube using bleach on a cotton swab before inserting tubing.
6. Ensure tubing is pushed fully onto the fitting.

3.10 REPLACING PINCH VALVES

Summary

A. Go to the Numeric Keypad.

B. Ensure the tubing you want to replace does not contain reagent prior to replacing it.

C. Ensure you have the same size and type of pinch valve as the one you want to replace.

D. For reference, make a drawing of the path the tubing takes through the non-functioning valve.

E. Remove the pinch valve tubing and pinch valve.

F. Install the tubing and new pinch valve.

G. Check the drawing you made in step D. Make sure the tubing is properly routed.

H. Press START UP.

I. If necessary, prime the reagent associated with the tubing.

J. Run a sample. Make sure that the new valve is correctly connected and there are no leaks.

Procedure

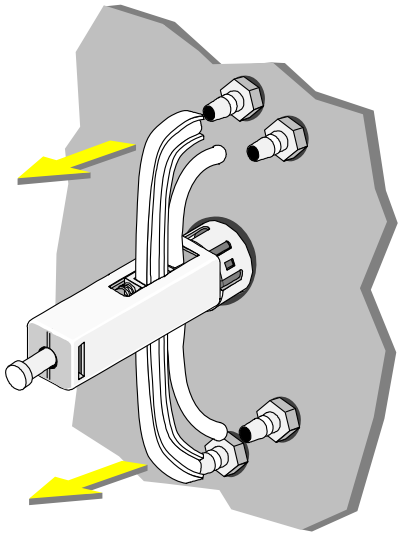
A Go to the Numeric Keypad.

B Ensure the tubing you want to replace does not contain reagent prior to replacing It.

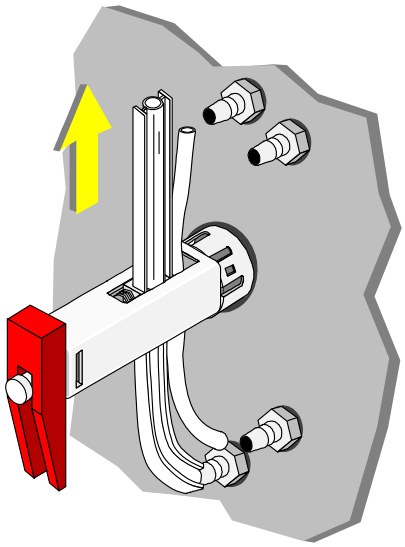
C Ensure you have the same size and type of pinch valve as the one you want to replace.

D For reference, make a drawing of the path the tubing takes through the nonfunctioning valve.

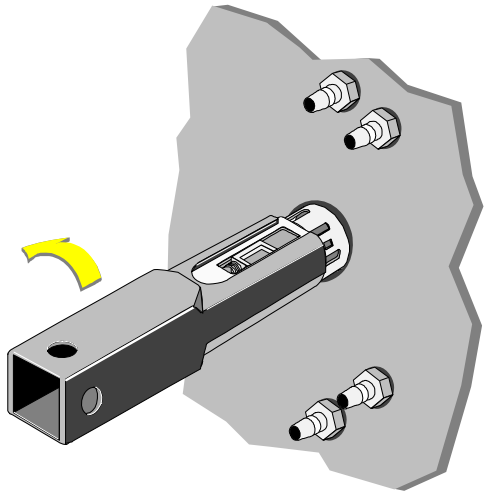
E Remove the Pinch Valve Tubing and Pinch Valve



1. Disconnect the tubing that goes through the pinch valve at the fitting closest to the pinch valve.

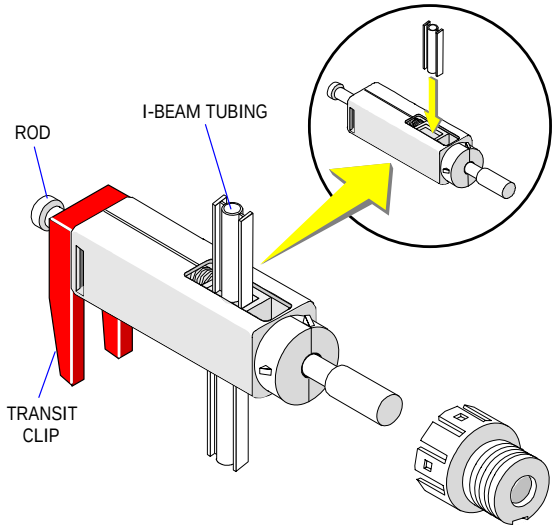


2. Attach a red shipping clip to hold open the valve.
3. Pull the tubing through the pinch valve.
4. Remove the red shipping clip.

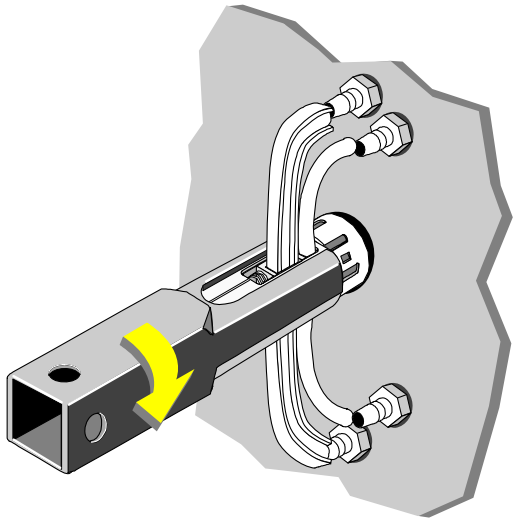


5. Using the pinch valve wrench, turn the pinch valve about 1/4-turn until it snaps out.

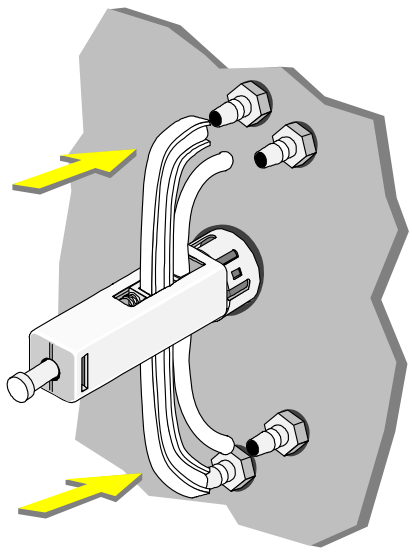
F Install the Tubing and New Pinch Valve



1. Use a red shipping clip to hold open the valve.
2. Thread the I-beam tubing through the valve.
3. Remove the red shipping clip.



4. Line up the valve to start the 1/4-turn twist based on where you want the valve to end.
5. Using the pinch valve wrench, push in and turn the valve until it seats.



6. Attach the tubing to the fittings.

G Check the drawing you made in step 3. Make sure the tubing is properly routed.

H Press START UP

I If necessary, prime the reagent associated with the tubing.

J Run a sample. Make sure that the new valve is correctly connected and there are no leaks.

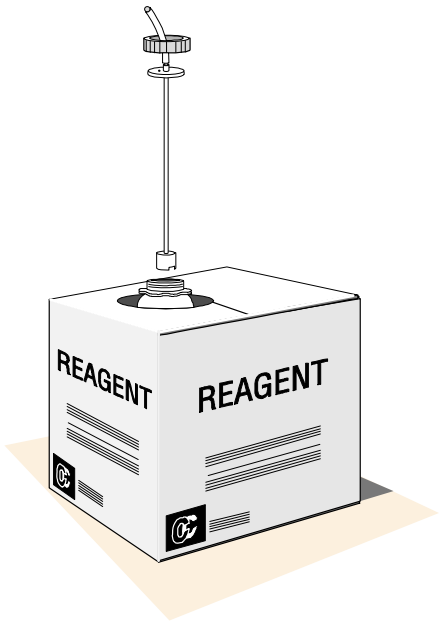
3.11 REPLACING REAGENT CONTAINERS

WARNING Misleading results can occur if a diluent is used with the incorrect diff lytic reagent. Use only LH Series Diluent with LYSE S III diff lytic reagent. Use only Isoton 4 Diluent with LYSE S 4 diff lytic reagent.

WARNING Some replaceable items can come in contact with residual biological material. Skin contact with these materials can be harmful to your health. Dispose of these items in accordance with your laboratory procedures.

Note: If you have Dual Diluent Pick-up Tubes installed, Beckman Coulter, Inc. (BCI) recommends that you use diluent containers with the same lot number.

1. Remove any cardboard cutouts.
2. Remove the cap and seal from the new reagent container. Be sure to completely remove the foil seal.



3. Remove the plastic collar that secures the pickup tube assembly.
4. Unscrew the pickup tube assembly from the old container.
5. Lift the assembly straight up and out.

IMPORTANT Incorrect results can occur if the tubes become contaminated. Do not touch the tubes or let them touch any laboratory surfaces. If the tubes touch anything, rinse them with distilled water and then wipe them with a lint-free tissue.

6. Inspect the pickup tube for damage, and replace it if necessary.
7. Carefully insert the pickup tube assembly straight into the new container.
8. Tighten the cap.
9. Insert the plastic collar that secures the pickup tubes.
10. Record the new container¢s information in Quality Assurance Set Up.
11. Ensure the pneumatics are on.

12. Press 

from the Numeric Keypad to continue cycling samples.

Recording Information in Your Logbook

Record the new reagent information in your laboratory's by:

- Selecting  after providing the information in Quality Assurance Set Up, and then including the printout in your logbook
- Writing the information directly in your logbook.

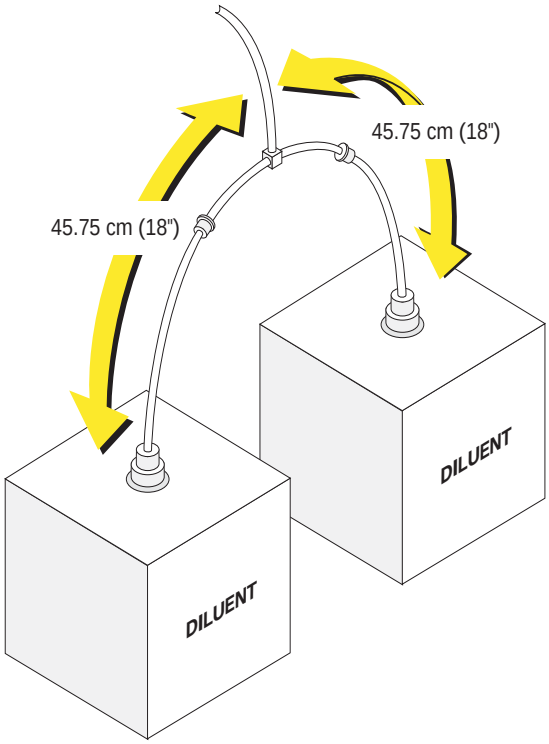
3.12 REPLACING DILUENT WHEN USING DUAL PICK-UP TUBES

WARNING Misleading results can occur if a diluent is used with the incorrect diff lytic reagent. Use only LH Series Diluent with LYSE S III diff lytic reagent. Use only Isoton 4 Diluent with LYSE S 4 diff lytic reagent.

WARNING Some replaceable items can come in contact with residual biological material. Skin contact with these materials can be harmful to your health. Dispose of these items in accordance with your laboratory procedures.

Note: If you have Dual Diluent Pick-up Tubes installed, Beckman Coulter, Inc. (BCI) recommends that you use diluent containers with the same lot number.

1. Remove any cardboard cutouts.
2. Remove the cap and seal from the new reagent container. Be sure to completely remove the foil seal.



3. Remove the plastic collar that secures the pickup tube assembly.
4. Unscrew the pickup tube assembly from the old container.
5. Lift the assembly straight up and out.

IMPORTANT Incorrect results can occur if the tubes become contaminated. Do not touch the tubes or let them touch any laboratory surfaces. If the tubes touch anything, rinse them with distilled water and then wipe them with a lint-free tissue.

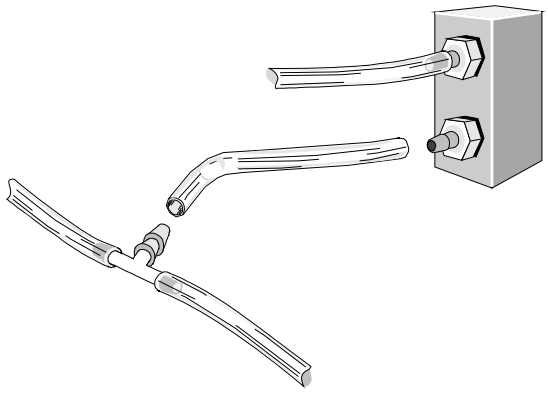
6. Inspect the pickup tubes for damage, and replace them if necessary.
7. Carefully insert each end of the pickup tube assembly straight into the new containers.
8. Tighten the caps.
9. Insert the plastic collars that secure the pickup tubes.
10. Record the new containers' information in Quality Assurance Set Up, in your laboratory logbook and on the reagent package.
11. Ensure the pneumatics are on.
12. Press START CONT from the Numeric Keypad to continue cycling samples.

3.13 REPLACING TUBING

WARNING Possible biohazardous condition. Tubing can come in contact with biohazard materials. Skin contact with these materials can be harmful to your health. Handle and dispose of tubing in accordance with your laboratory's procedures.

CAUTION Risk of damage to tubing. Using alcohol or any liquid to lubricate the tubing when you replace it can damage the tubing. Do not lubricate the tubing when you replace it.

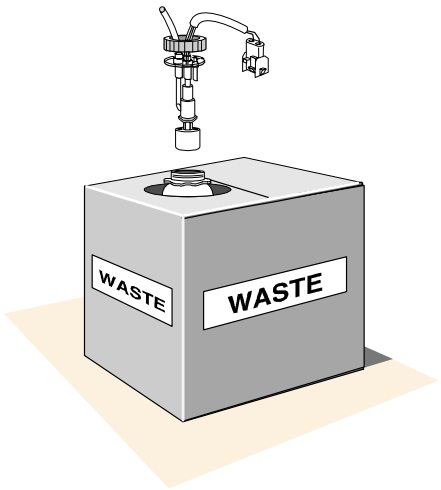
IMPORTANT Incorrect results can occur if you change the length of tubing. If tubing tears or becomes damaged, replace it with a new piece of tubing of the same type and length. If you need tubing, call your Beckman Coulter Representative.



1. Carefully push the tubing straight onto the fitting.
2. Ensure it is securely in place.

3.14 REPLACING WASTE CONTAINER

WARNING Possible biohazardous condition. The contents of the old waste container and its associated tubing can include residual biological material and must be handled with care. Check the tubing connection and container location periodically. Avoid skin contact and clean up spills immediately. Dispose of the contents of the waste container in accordance with your local regulations and acceptable laboratory procedures.



Unscrew the pickup tube assembly from the old container.

Lift the pickup tube assembly straight out of the old container.

Place the pickup tube assembly straight into the new container and screw it into position.

Label the new waste container and verify that the old container is clearly labeled, then discard old container according to your laboratories standards for biohazardous material.

4.1 CHANGING TEST MODE

1. Go to the Command Center.
2. Use CR to select the default test type for sample processing.

CDR	Run samples for CBC, Diff and Retic.
CD	Run samples for CBC and Diff.
C	Run samples for CBC only.
CR	Run samples for CBC and Retic.
R	Run samples for Retic only.

The *CURRENT MODE* message displays the test mode you select.

Note: If Random Access is enabled, review the Random Access Overview help topic.

4.2 CHANGING ANALYZER ALARM SETTINGS

1. Go to the Analyzer screen.
2. Select **MAIN MENU**.
3. Select **SYSTEM CONFIGURATION**.
4. Select **ALARM SET UP**.

CAUTION System damage could occur if an alarm is ignored. If you disable the alarm, audible alarms will no longer be available. Ensure you check the Analyzer alert line and the Numeric Keypad for alarms.

5. Specify whether you want each alarm enabled or disabled:

DILUTER SWITCH PANEL ALARM	Sounds whenever you press a key on the Numeric Keypad.
LONG ALARM	Sounds whenever you press an illegal key on the Numeric Keypad.
CONTINUOUS ALARM	Sounds whenever the instrument identifies an alert condition.

6. Press one of the following:

MAIN MENU	To display the Analyzer MAIN MENU screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the SYSTEM CONFIGURATION screen.

4.3 TURN PNEUMATICS OFF

1. Go to the Analyzer screen.
2. Select **MAIN MENU**.
3. Select **TURN PNEUMATICS OFF**. The compressor turns off, the Numeric Keypad displays *NOT READY* and the Analyzer screen turns off. Wait at least 30 seconds before you turn pneumatics back on.

Note: The LH compressor should not be manually turned off until all slide processing has been completed at the SlideMaker.

4.4 ADJUSTING HGB LAMP VOLTAGE

1. Verify that the baths contain diluent, not cleaning agent.
2. Go to the Analyzer screen.
3. Press **MAIN MENU**.
4. Press **ANALYZER FUNCTIONS**.
5. Press **HGB LAMP ADJUST**. The message *Performing HGB Lamp Adjust* appears on the Analyzer. The message *Adjusting HGB* appears on the Keypad display. (If the voltage appears out of range, call your Beckman Coulter Representative.
6. Press **SYSTEM RUN**.
7. Cycle three (3) samples of diluent in CBC Manual aspiration mode. Ignore all results, including Hgb "....." incomplete computation.

4.5 SETTING UP BAR-CODE CONFIGURATION

Note: Use this procedure to indicate the number of digits only when you use Interleaved 2-of-5 bar-code labels for sample tubes.

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **SYSTEM CONFIGURATION**.
4. Press **NUMBER OF BAR-CODE DIGITS (2 OF 5) XX**, where **XX** represents the current number of bar-code digits.
5. Go to the Numeric Keypad. It displays *VALUE? XXXX*
6. Use the Keypad to specify the number of digits (from 03 through 11).
7. Press 

after specifying the number of digits.
8. Go to the Analyzer screen.
9. Confirm the number you specified appears on the Analyzer screen.
10. Press one of the following:

SYSTEM RUN	To cycle samples.
RETURN	To display the Analyzer MAIN MENU screen.

Saving/Restoring Configuration Information

Saving Configuration Information

1. Select  on the Command Center to display the System Setup window.
2. Select  to save system setup configuration information.
3. Ensure Save is selected, and then select Next >.
4. Select either or both of the following operations and then select Next >:

Select This	To Do This
Save Registry	Save your system registry, which contains information about how your computer runs.
Save Database Component(s)	Save database information, which appears in tables.

5. Select Browse, insert a 3.5 inch diskette in drive a:, type a file name and then select Next >. You will do this twice if both options are selected.
6. If you specified **Save Database Component(s)**, specify the tables you want to save, and then select Finish.
7. Remove diskette. Label diskette and store in a safe place.

Restoring Configuration Information

1. Select  on the Command Center to display the System Setup window.
2. Select  to restore system setup configuration information.
3. Ensure Restore is selected, and then select Next >.
4. Select either or both of the following operations and then select Next >:

Select This	To Do This
Restore Registry	Restore your system registry, which contains information about how your computer runs.
Restore Database Component(s)	Restore database information, which appears in tables.

5. Select Browse, insert your restore diskette in drive a:, select the RGS file, select Open and then select Next >.
6. Select Browse, select the .DBS file, select Open and then select Next >.
7. If you specified **Restore Database Component(s)**, specify the tables you want to restore, and then select Finish.

8. A window appears with the message, "the system will be restarted to reinitialize with the new settings".
9. Select OK. The system shuts down windows. Another window appears with the message, " It is now safe to turn off your computer."
10. Press the Power Off button on the computer tower.
11. Remove disk. Wait one minute and then Power On.
12. Log onto your system.

Archive Complete Database

1. Format a CD for direct archiving.
2. Select  on the Command Center to display the System Setup window.
3. Select  to archive the database.
4. Ensure Archive Complete Database is selected, and then select  .
5. Specify the location where you want to archive the database, and then select  .

4.6 ENABLING/DISABLING BLOOD DETECTOR

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **SYSTEM CONFIGURATION**.
4. Press **BLOOD DETECTOR** until the appropriate setting appears.

   Note: The system flags all parameters with a P (partial aspiration) when samples are analyzed with blood detectors disabled. P flagged control run results are automatically removed from statistical calculations, and there is no way to reintroduce the flagged runs into the calculations.
5. Press one of the following:

SYSTEM RUN	To cycle samples.
RETURN	To display the Analyzer MAIN MENU screen.

4.7 SETTING UP ANALYZER DATE FORMAT

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **DATE AND TIME**.
5. Press **FORMAT** until the date format you want to use appears:
   - MM/DD/YY
   - DD/MM/YY
   - YY/MM/DD

   where MM = Month, DD= Day, and YY= last two digits of the Year

6. Press one of the following:

MAIN MENU	To display the Analyzer MAIN MENU screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the ANALYZER FUNCTIONS screen.

4.8 SETTING UP ANALYZER DATE AND TIME

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **DATE AND TIME**.
5. Press **SET DATE & TIME**.
6. Press the button for the setting you want to set up. Example: Press MONTH.
7. Go to the Numeric Keypad.
8. Press the value associated with the setting you want to specify. Each setting must be entered as a two-digit number. Example: Press 

and then press 

.
9. Repeat steps 6 through 8 for each setting you want to specify.
10. Press one of the following:

SYSTEM RUN	To cycle samples.
RETURN	To display the DATE & TIME screen.

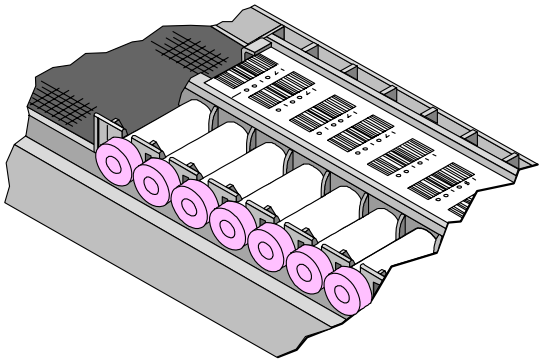
4.9 SETTING UP FLOW CELL AUTOSTOP

1. Go to the Analyzer screen.
2. Select **MAIN MENU**.
3. Select **SYSTEM CONFIGURATION.**
4. Select **FLOW CELL ERRORS AUTO STOP ON** or **OFF.**
5. Press one of the following:

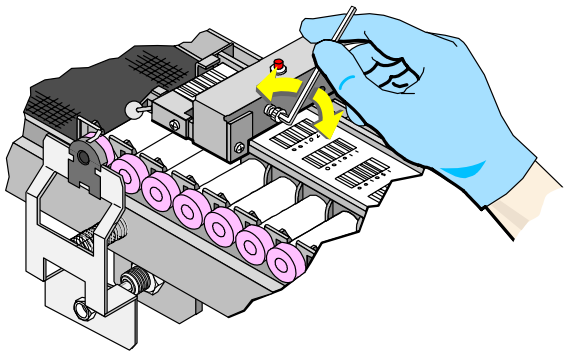
SYSTEM RUN	To cycle samples.
RETURN	To display the MAIN MENU screen.

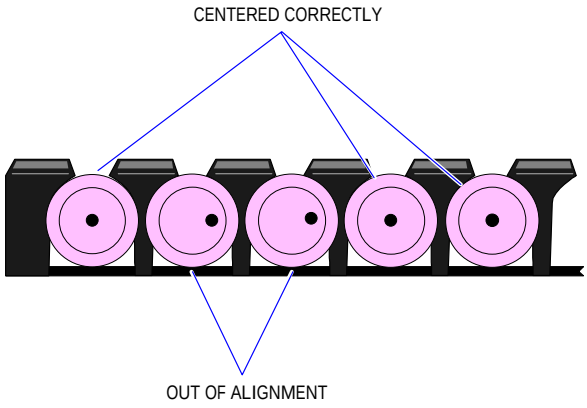
4.10 ADJUSTING TUBE DETECTOR

If your system produces multiple aspiration alarms when using Automatic aspiration mode, you may need to adjust the tube detector.



1. Place a cassette of empty, stoppered tubes on the rocker bed.
2. Ensure the pneumatics are on.
3. Use F96 to advance the cassette position.
   a. Place a cassette containing tubes in each cassette position on the rocker bed to the right of the tube detector.
   b. Go to the Numeric Keypad.
   c. Press F 9 6 ENTER to move the cassette through the piercing station one tube position at a time. The Numeric Keypad displays *TUBE ADVANCE* while the instrument performs this function.
   d. Press STOP to stop the tube advance. The Numeric Keypad displays *FUNCTION = 96*. To perform this function again, place the cassette on the rocker bed to the right of the tube detector and press ENTER.
   e. Press STOP to exit this function. The Numeric Keypad displays *READY.*
   f. Remove the cassette from the rocker bed.





4. Use an Allen wrench in the recessed socket of the adjustable screw to move the spacer as needed.

   - Clockwise  moves the sensor to the right.
   - Counterclockwise  moves the sensor to the left.

5. Verify that the needle centers directly on the tube stoppers. If the detector fails to hold the adjustment, call your Beckman Coulter Representative.

4.11 CONFIGURING HANDHELD SCANNER

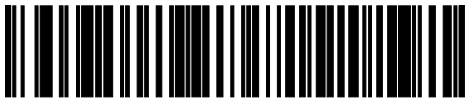
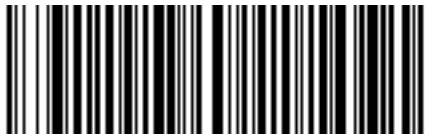
Configuring the Handheld Scanner

By default, your handheld scanner contains the following configuration:

Option	Default
Language Code Settings	English
Automatic tab to next field	Enabled
Code 39	Enabled Check Character: Enabled; Do not transmit Minimum character length: 03 Maximum character length: 16 Start/Stop character: Do not transmit
Code I-2 of 5 (AIM)	Enabled Check Character: Enabled; Do not transmit Minimum character length: 03 Maximum character length: 15
Codabar	Enabled Check Character: AIM Checksum Algorithm Enabled; Do not transmit Minimum character length: 03 Maximum character length: 16 Start/Stop character: Do not transmit
Code 128	Enabled Check Character: Enabled; Do not transmit Minimum character length: 03 Maximum character length: 16

View below and print the bar-codes used to configure additional options such as Keyboard Language Code Settings, Reset to Beckman Coulter, Inc. Defaults, Code 39, Interleaved 2-of-5, Codabar, and reagent container labels. When you hear two beeps, the scanner has accepted the configuration information.

Keyboard Language Code Settings

Scan This Bar-code	For This Result
	Configure scanner to English keyboard characters (default)
	Configure scanner to French keyboard characters
	Configure scanner to German keyboard characters
	Configure scanner to Italian keyboard characters
	Configure scanner to Spanish keyboard characters
	Configure scanner to Japanese keyboard characters
	Configure scanner to read reagent container labels.

Reset to Coulter Corporation Defaults

Scan This Bar-code	For This Result
	Reset to Coulter Corporation defaults.

Code 39

Scan This Bar-code	For This Result
	Disable Code 39 checksum

Interleaved 2-of-5

Scan This Bar-code	For This Result
	Enable (AIM) Interleaved 2-of-5 checksum.
	Disable (AIM) Interleaved 2-of-5 checksum.
	Enable (AIM) Interleaved 2-of-5 checksum and transmit.
	Enable Coulter Corporation Interleaved 2-of-5 checksum.

Codabar

Scan This Bar-code	For This Result
	Disable Codabar checksum (disable all Codabar checksum techniques).
	Enable Mod 10 Codabar checksum.
	Enable Mod 10 Codabar checksum and transmit.
	Enable Mod 16 Codabar checksum.
	Enable Mod 16 Codabar checksum and transmit.
	Enable Coulter Corporation Codabar checksum.
	Enable Coulter Corporation Codabar checksum and transmit
	Enable NW-7 Japan Red Cross Codabar as follows: Check Character: Japan Red Cross Algorithm Enabled; Do not transmit Required data digits: 09 Start/Stop character: Do not transmit.
	Enable NW-7 Japan Red Cross Codabar and transmit.

5.1 OVERVIEW

Data Review

A review of instrument data, such as background, control and blood sample results, is helpful in detecting problems. Sometimes a questionable blood sample result is the only symptom of subtle reagent or pneumatic problems. In that case, you can use the questionable parameter result as a clue to the location of the malfunction.

Specimen-Related Problems

An instrument problem is differentiated from a specimen-related problem by running a control. If the control results are acceptable, the problem is probably specimen-related.

Instrument Problems

If the control results show similar problems, it indicates an instrument problem. The next step is to determine the subsystem (electronic, pneumatic/hydraulic, or reagent) causing the problem. Because it is easiest to detect a problem in the electronic subsystem and hardest to detect a problem in the reagent subsystem, the subsystems are usually checked in the following order: electronic, pneumatic/hydraulic, reagent.

Workstation Troubleshooting

If the Workstation encounters a problem, it tries to display a message. The message describes the problem and provides information about how to avoid or fix the problem. For best results, follow the instructions with the messages.

Some messages appear from the Windows 2000 operating system and other software packages that are included on your Workstation. Because these messages may not be logged by the Workstation and may not have online help available for them, it is important that you write these down and call your Beckman Coulter Representative.

If your Workstation is connected to a network, some messages may be caused by your network configuration. If you have a local network administrator or a Windows 2000 Administrator, contact your administrator prior to calling your Beckman Coulter Representative. Your administrator may be able to resolve the problem.

Note: During the course of testing the Workstation, specific intermittent problems have been reported and corrective actions have been determined. You may want to review the Problem List periodically to help avoid these problems.

Electronic Troubleshooting

Detecting a problem in the electronic subsystem--or eliminating the electronic subsystem as the source of the problem--is simplified by indicators and electronic tests.

Indicators

An indicator may inform you that a problem exists; it may also pinpoint the source of a problem. For example, the pneumatic light on the power supply appears red when a problem exists.

Electronic Tests

The ramp pulse, and precision pulse tests are electronic subsystem checks that the system performs without using the pneumatic/hydraulic and reagent subsystems. Therefore, when these test results are out of tolerance, the problem is in the electronic subsystem.

Correcting Electronic Problems

Although you may be able to correct minor problems, such as loose cables, most electronic problems require the assistance of your Beckman Coulter Representative.

Pneumatic/Hydraulic Troubleshooting

Most pneumatic/hydraulic problems are detected by observing the Diluter section in operation. When you identify a symptom of a malfunction, try to isolate the malfunction to the specific part of the cycle, for example, during preparation, counting, or cleanup. Then, try to isolate the malfunction to the specific components and tubing. Next, look for one of four possible problems--pinched tubing, plugs, leaks, or defective components.

Pinched Tubing

When tubing is pinched, flow is either restricted or stopped. Tubing most often pinches where it passes through, between, or around something, or where it attaches to a fitting. Examples: tubing passing through a pinch valve, around a panel, or between two hard objects.

Plug

A plug, like a pinch, restricts or stops a flow. A plug can be composed of liquid, salt, or debris. This type of problem may be hard to find because it often occurs inside other components. A plug can occur in tubing, in a fitting, at an aperture, or in a choke.

Plugs are most common in vacuum lines and waste paths that involve the use of fluids and air.

Leak

A leak allows fluid to escape before reaching its destination. If there is a leak in a pneumatic line, the pneumatic signal may fail to operate a component, such as a pinch valve, pump, or diluent dispenser. A leak generally occurs where one component attaches to another, such as where tubing attaches to a fitting, a housing, a pilot actuator, a pump, or the Blood Sampling Valve. Leaks can also be the result of cracks in components, such as pumps or glassware.

Defective Components

The interrelationship of components performing a pneumatic/hydraulic process can make it difficult to determine which component, if any, is defective. For example, if a pinch valve does not open, it is possible the pinch valve is defective. But it is also possible that the solenoid responsible for activating the pinch valve is defective.

Correcting Pneumatic/Hydraulic Problems

You can correct most pneumatic/hydraulic problems, including defective components.

Reagent Troubleshooting

A reagent problem can be as obvious as precipitate in the reagent tubing. In the less obvious cases, the most effective way of detecting a problem is by keeping a log of the lot numbers with the opening and expiration dates of the reagents in use, and knowing how each reagent affects the data. Refer to the labeling information with your reagents for details.

Correcting Reagent Problems

You can correct most reagent problems by changing the container of reagent and priming the instrument with the new reagent.

5.2 DILUTER FUNCTIONS

Use the following Diluter functions for troubleshooting purposes or at the advice of your Beckman Coulter Representative.

Alphabetically by Function

Activate and Restore Solenoid	F05
Activate and Keep Solenoid Active	F90
Backwash Tank Check	F30
Clean Apertures	F01
Dispensing CBC Lytic Reagent	F27
Dispensing Diff Lytic Reagent High Volume	F24
Dispensing Diff Lytic Reagent Low Volume	F23
Dispensing Diff Preservative High Volume	F22
Dispensing Diff Preservative Low Volume	F21
Diluent Dispense	F04
Diluent Dispense into RBC Bath	F32
Diluent Dispense into WBC Bath	F33
Extended Prime	F11
Extended Clear	F12
Flow Cell Unclog 1	F44
Flow Cell Unclog 2	F45
Flow Cell Unclog 3	F46
Keypad Key Test	F98
LATEX Control--DIFF	F55
LATEX Control--DIFF and Retic	F57
LATEX Control--Retic	F56
Monitoring Low Vacuum	F92
Priming (Initial)	F67
Priming CBC Lytic Reagent	F02
Priming Cleaning Agent	F17
Priming DIFF Lytic Reagent	F14
Priming DIFF Preservative	F15
Priming Diluent	F16

Priming Retic Clearing Solution	F19
Priming Retic Staining Solution	F18
Priming Sweep Flow	F08
Probe Wipe Test	F28
Purge Mode	F13
RBC and WBC Mix	F03
Release BSV	F06
Reservoir Refill	F31
Retic Stain	F25
Retic Clear	F26
Sheath Tank Diagnostic	F20
Solenoids Free	F95
System Flush	F40
Tube Advance	F96
Wait Enable/Disable	F99
Zap Apertures	F09

Drain the Overflow Chamber

1. Go to the Numeric Keypad.
2. Press 

to manually activate a specific solenoid.
The Numeric Keypad displays *SOLENOID XXX*.
3. Press12 to activate, then press 

. The Numeric Keypad displays *SOLENOID 12*, while processing your request.
4. Press: 

2 times to return the solenoid to its original state if no other solenoid was selected. The Numeric Keypad displays READY.

Drain the Vacuum Isolator Chamber

1. Go to the Numeric Keypad.
2. Press 

to manually activate a specific solenoid.
The Numeric Keypad displays *SOLENOID XXX*.

3. Press16 to activate, then press 

. The Numeric Keypad displays *SOLENOID 16*, while processing your request.

4. Press: 

2 times to return the solenoid to its original state if no other solenoid was selected. The Numeric Keypad displays READY.

Drain the Waste Chamber

1. Go to the Numeric Keypad.
2. Press 

to manually activate a specific solenoid.
The Numeric Keypad displays *SOLENOID XXX*.
3. Press15 to activate, then press 

. The Numeric Keypad displays *SOLENOID 15*, while processing your request.
4. Press: 

2 times to return the solenoid to its original state if no other solenoid was selected. The Numeric Keypad displays READY.

Activating and Keeping Solenoid Active

1. Go to the Numeric Keypad.
2. Press 

to manually activate a specific solenoid. The Numeric Keypad displays *SOLENOID XXX*.
3. Press the buttons corresponding to the solenoid you want to activate and press 

. The Numeric Keypad displays *SOLENOID NNN*, where *NNN* is the solenoid you specified, while processing your request. After processing your request, the solenoid

maintains its current state and the Numeric Keypad displays *SOLENOID XXX*. Specify another solenoid number and press 

to perform this function on another solenoid.

4. Press 

to exit this function. The Numeric Keypad displays *READY.*

Draining The Vacuum Overflow Tank

1. Press the Analyzer Reset Button.
2. Verify the baths and the vacuum overflow tank, VC22, drain completely.
3. If the baths and the vacuum overflow tank drain completely, Press 

to resume normal operation.
4. If the baths and the vacuum overflow tank do not drain completely, or if the problem recurs, call your Beckman Coulter Representative.

Verifying Backwash Tank Operation

1. Go to the Numeric Keypad.
2. Press 

to automatically:
   - Drain the backwash tank
   - Fill the backwash tank
   - Check the backwash tank level.
3. The Numeric Keypad displays *BACKWASH TANK CHECK* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 30*.
4. Press 

to perform this function again.
5. Press 

to exit this function. The Numeric Keypad displays *READY.*

F27 - Dispensing CBC Lytic Reagent

1. Go to the Numeric Keypad.
2. Press F 2 7 ENTER to dispense 1.04 mL CBC lytic reagent into the WBC bath.

   Note: This function is intended for troubleshooting, not for priming CBC lytic reagent.

   The Numeric Keypad displays *CBC LYSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 27*. Press ENTER to perform this function again.
3. Press STOP to exit this function. The RBC and WBC baths drain. The Numeric Keypad displays *READY.*

Cleaning Apertures

1. Go to the Numeric Keypad.
2. Press F 0 1 ENTER to apply current across the apertures. The current removes protein or debris from the apertures. The Numeric Keypad displays *CLEAN APERTURES* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 01*. Press ENTER to perform this function again.
3. Press STOP to exit this function. The Numeric Keypad displays *READY.*

Running Latex Control—Diff and Retic

1. Perform instrument startup.
2. Check that the instrument process type on the Command Center is set to **AUTO ANALYSIS**.
3. Ensure the latex primer and control are within the correct temperature range. For COULTER LATRON primer and control the correct temperature range is 18-30°C/64-86°F.

4. Verify the lot number of the primer and control. If you must use a new lot number, ensure that it has been set up properly.

CAUTION Possible system damage could occur if you aspirate anything except latex control or latex primer using this function. Do not aspirate any other materials with this function.

5. Go to the Numeric Keypad.
6. Press 

to aspirate LATEX primer and LATEX control for combined Diff and Retic test modes. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.
7. Press 

. The Numeric Keypad displays *PRESS MANUAL OR PRESENT SAMPLE*.
8. Remove the cap of the latex primer vial.
9. Immerse the aspirator tip in the latex primer vial. The instrument automatically aspirates the RETIC+DIFF primer. The Numeric Keypad displays *RETIC+DIFF PRIMER* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 57*.
10. Remove the vial from the aspirator tip when you hear a beep and the Analyzer Status line displays *PREPARING SAMPLE*. The aspirator tip automatically retracts and the probe wipe cleans it.
11. At the Workstation, check the results from the primer.
12. If the results in the **PRIMER** column are less than or equal to 500, proceed to step 12. Otherwise, if the results in the **PRIMER** column are greater than 500:
    a. At the Numeric Keypad, press 

to reactivate the function for the control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.
    b. Perform steps 6 through 9 up to three more times.
    c. If you do not get a result below 500, cycle a new vial of primer.
    d. If you still do not get a result below 500, call your Beckman Coulter Representative.
13. At the Numeric Keypad, press 

to reactivate the function for the latex control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.

IMPORTANT Erroneous results could occur if you press **CLEAR APERTURE** before aspirating latex control. **CLEAR APERTURE** is only used before aspirating latex primer in this procedure.

14. Gently mix the latex control according to the directions in the package insert.
15. Immerse the aspirator tip in the latex control vial. The instrument automatically aspirates the control. The Numeric Keypad displays *RETIC+DIFF--LATEX* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 57*.
16. At the Workstation, verify the results from the control.
17. At the Numeric Keypad, press 

to exit this function. The Numeric Keypad displays *READY*.

Running Latex Control—Diff

1. Perform instrument startup.
2. Check that the instrument process type on the Command Center is set to **AUTO ANALYSIS**.
3. Ensure the latex primer and control are within the correct temperature range. For COULTER LATRON primer and control the correct temperature range is 18-30°C/64-86°F.
4. Verify the lot number of the primer and control. If you must use a new lot number, ensure that it has been set up properly.

CAUTION Possible system damage could occur if you aspirate anything except latex control or latex primer using this function. Do not aspirate any other materials with this function.

5. Go to the Numeric Keypad.
6. Press 

to aspirate latex for the Diff test mode. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.
7. Press 

. The Numeric Keypad displays *PRESS MANUAL OR PRESENT SAMPLE*.
8. Remove the cap of the latex primer vial.
9. Immerse the aspirator tip in the latex primer vial. The instrument automatically aspirates the primer. The Numeric Keypad displays *DIFF PRIMER* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 55*.
10. Remove the vial from the aspirator tip when you hear a beep and the Analyzer Status line displays *PREPARING SAMPLE*. The aspirator tip automatically retracts and the probe wipe cleans it.
11. At the Workstation, check the results from the primer.
12. If the results in the **PRIMER** column are less than or equal to 500, proceed to step 12. Otherwise, if the results in the **PRIMER** column are greater than 500:

a. At the Numeric Keypad, press 

to reactivate the function for the control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.

b. Perform steps 6 through 9 up to three more times.

c. If you do not get a result below 500, cycle a new vial of primer.

d. If you still do not get a result below 500, call your Beckman Coulter Representative.

13. At the Numeric Keypad, press to reactivate the function for the latex control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.

IMPORTANT Erroneous results could occur if you press **CLEAR APERTURE** before aspirating latex control. **CLEAR APERTURE** is only used before aspirating latex primer in this procedure.

14. Gently mix the latex control according to the directions in the package insert.
15. Immerse the aspirator tip in the latex control vial. The instrument automatically aspirates the control. The Numeric Keypad displays *LATEX—DIFF* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 55*.
16. At the Workstation, verify the results from the control.
17. At the Numeric Keypad, press 

to exit this function. The Numeric Keypad displays *READY*.

Running Latex Control—Retic

1. Perform instrument startup.
2. Check that the instrument process type on the Command Center is set to **AUTO ANALYSIS**.
3. Ensure the latex primer and control are within the correct temperature range. For COULTER LATRON primer and control the correct temperature range is 18-30°C/64-86°F.
4. Verify the lot number of the primer and control. If you must use a new lot number, ensure that it has been set up properly.

CAUTION Possible system damage could occur if you aspirate anything except latex control or latex primer using this function. Do not aspirate any other materials with this function.

5. Go to the Numeric Keypad.
6. Press 

to aspirate latex for Retic test mode. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.

7. Press CLEAR APERT. The Numeric Keypad displays *PRESS MANUAL OR PRESENT SAMPLE*.
8. Remove the cap of the latex primer vial.
9. Immerse the aspirator tip in the latex primer vial. The instrument automatically aspirates the primer. The Numeric Keypad displays *RETIC PRIMER* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 56.*
10. Remove the vial from the aspirator tip when you hear a beep and the Analyzer Status line displays *PREPARING SAMPLE*. The aspirator tip automatically retracts and the probe wipe cleans it.
11. At the Workstation, check the results from the primer.
12. If the results in the **PRIMER** column are less than or equal to 500, proceed to step 12. Otherwise, if the results in the **PRIMER** column are greater than 500:
    a. At the Numeric Keypad, press ENTER to reactivate the function for the control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.
    b. Perform steps 6 through 9 up to three more times.
    c. If you do not get a result below 500, cycle a new vial of primer.
    d. If you still do not get a result below 500, call your Beckman Coulter Representative.
13. At the Numeric Keypad, press ENTER to reactivate the function for the latex control. The Numeric Keypad displays *PRESS MANUAL OR CLEAR APERTURE*.

IMPORTANT Erroneous results could occur if you press **CLEAR APERTURE** before aspirating latex control. **CLEAR APERTURE** is only used before aspirating latex primer in this procedure.

14. Gently mix the latex control according to the directions in the package insert.
15. Immerse the aspirator tip in the latex control vial. The instrument automatically aspirates the control. The Numeric Keypad displays *RETIC--LATEX* while the instrument performs this function. When this function completes processing, the Numeric Keypad displays *FUNCTION = 56.*
16. At the Workstation, verify the results from the control.
17. At the Numeric Keypad, press STOP to exit this function. The Numeric Keypad displays *READY.*

F23 - Dispensing Diff Lytic Reagent Low Volume

1. Go to the Numeric Keypad.
2. Press 

to dispense Diff lytic reagent into the mixing chamber. The Numeric Keypad displays *DIFF PAK LYSE LOW VOLUME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 23*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

F24 - Dispensing Diff Lytic Reagent High Volume

1. Go to the Numeric Keypad.
2. Press 

to dispense Diff lytic reagent into the mixing chamber. The Numeric Keypad displays *DIFF PAK LYSE HIGH VOLUME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 24*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

F21 - Dispensing Diff Preservative Low Volume

1. Go to the Numeric Keypad.
2. Press 

to dispense Diff preservative into the mixing chamber. The Numeric Keypad displays *DIFF PAK PRESERVE LV DISPENSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad

displays *FUNCTION = 21*. Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*

F22 - Dispensing Diff Preservative High Volume

1. Go to the Numeric Keypad.
2. Press 

to dispense Diff preservative into the mixing chamber. The Numeric Keypad displays *DIFF PRESERVE PAK HV DISPENSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 22*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Dispensing Diluent

1. Place a empty vial below the aspirator tip to collect the diluent you want to dispense.
2. Go to the Numeric Keypad.
3. Press 

to dispense diluent through the Manual aspiration mode aspirator tip. The Numeric Keypad displays *DILUENT DISPENSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 04*. Press 

to perform this function again.
4. Press 

to exit this function. The Numeric Keypad displays *READY.*

Dispensing Diluent into RBC Bath

1. Go to the Numeric Keypad.
2. Ensure the pneumatics are on and press 

. The Numeric Keypad displays *DRAIN* during this processing. *READY* appears upon completion.
3. Press 

to activate the RBC dispenser to deliver diluent into the RBC bath. The Numeric Keypad displays *RBC PUMP DISPENSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 32*. Press 

to perform this function again.
4. Press 

to exit this function. The RBC and WBC baths drain. The Numeric Keypad displays *READY.*

Dispensing Diluent into WBC Bath

1. Go to the Numeric Keypad.
2. Ensure the pneumatics are on and press 

. The Numeric Keypad displays *DRAIN* during this processing. *READY* appears upon completion.
3. Press 

to activate the WBC dispenser to deliver diluent into the WBC bath. The Numeric Keypad displays *WBC PUMP DISPENSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 33*. Press 

to perform this function again.
4. Press 

to exit this function. The RBC and WBC baths drain. The Numeric Keypad displays *READY.*

Performing Extended Prime

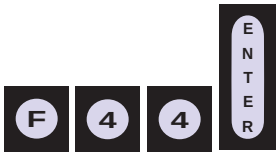
IMPORTANT Risk of misleading results. Make sure the baths are full before performing this procedure. If the baths are not full, you may need to prime again because bubbles could be in the line.

1. Go to the Numeric Keypad.
2. Press F 1 1 ENTER to automatically pull fluid through the apertures to the vacuum isolator chamber for 60 seconds. The Numeric Keypad displays *EXTENDED PRIME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 11*. Monitor the liquid level to make sure it remains above the apertures.
3. Press ENTER to perform this function again.
4. Press STOP to exit this function. The Numeric Keypad displays *READY.*

Performing Extended Clear

1. Go to the Numeric Keypad.
2. Press F 1 2 ENTER to automatically apply 5-psi pressure to the rear of the apertures for 60 seconds. The Numeric Keypad displays *EXTENDED CLEAR* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 12*.
3. Press ENTER to perform this function again.
4. Press STOP to exit this function. The Numeric Keypad displays *READY.*

Clearing Flow Cell (Level 1)

1. Go to the Numeric Keypad.
2. Press 

to
   - Purge the flow cell with cleaning agent.
   - Turn on the flow cell aperture current.
   - Apply low pressure to the flow cell.
   - Alternately apply vacuum.
   - Check the flow cell for a clog.

   The Numeric Keypad displays *FLOWCELL UNCLOG 1* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 44*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Clearing Flow Cell (Level 2)

CAUTION Risk of system damage. This function places stress on the flow cell. Excessive use of this function can damage your instrument. Use this procedure **only** if other functions fail to remove the clog and never more than specifically instructed to do so by your Beckman Coulter product information or Beckman Coulter Representative.

1. Go to the Numeric Keypad.
2. Press 

to
   - Purge the flow cell with cleaning agent.
   - Turn on the flow cell aperture current.
   - Apply 30 psi to top of the flow cell.
   - Alternately apply vacuum.
   - Check the flow cell for a clog.

The Numeric Keypad displays *FLOWCELL UNCLOG 2* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 45*. Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Clearing Flow Cell (Level 3)

CAUTION Risk of system damage. This function places greater stress on the flow cell than do other functions, and it may damage your instrument. Use this procedure **only** if the other functions fail to remove the clog and never more than once unless specifically instructed to do so by your Beckman Coulter Representative.

1. Go to the Numeric Keypad.
2. Press 

to
   - Purge the flow cell with cleaning agent.
   - Turn on the flow cell aperture current.
   - Apply 30 psi to top of the flow cell.
   - Alternately apply vacuum.
   - Leave cleaning agent in the flow cell.

   The Numeric Keypad displays *FLOWCELL UNCLOG 3* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 46*. Press 

to perform this function again, only on the advice of your Beckman Coulter Representative.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*
4. Use F44 before analyzing samples to clear any remaining cleaning agent from the flow cell.

Performing Keypad Key Test

1. Go to the Numeric Keypad.

2. Press 

to test whether each key on the keypad is operating properly. The Numeric Keypad displays *KEYBOARD TEST*.
3. Press any key on the Numeric Keypad. The Numeric Keypad displays the name of the key pressed. If the key fails to appear on the keypad, contact your Beckman Coulter Representative.
4. Press 

twice to stop the keypad test. The Numeric Keypad displays *FUNCTION = 98*.

   Press 

to perform this function again.
5. Press 

to exit this function. The Numeric Keypad displays *READY*.

Priming CBC Lytic Reagent

1. Go to the Numeric Keypad.
2. Press 

to prime CBC lytic reagent lines. The following sequence occurs twice:
   - Drains both baths.
   - Dispenses CBC lytic reagent into the WBC bath five times.
   - Drains WBC bath and the cycle repeats.
   - Fills both baths with diluent.
   - Primes apertures.

   The Numeric Keypad displays *PRIME CBC LYSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 02*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY*.

Priming Cleaning Agent

1. Go to the Numeric Keypad.

2. Press 

to prime cleaning agent lines. The Numeric Keypad displays *PRIME CLEANER* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 17*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Priming Diff Lytic Reagent

1. Go to the Numeric Keypad.
2. Press 

to prime the Diff lytic reagent lines. The instrument:
   - Dispenses Diff lytic reagent into the mixing chamber.
   - Drains the mixing chamber.

   The Numeric Keypad displays *PRIME DIFF LYSE* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 14*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Priming Diff Preservative

1. Go to the Numeric Keypad.
2. Press 

to prime the Diff lytic reagent lines. The instrument:
   - Dispenses Diff preservative reagent into the mixing chamber.
   - Drains the mixing chamber.

   The Numeric Keypad displays *PRIME DIFF PRESERVE* while the instrument performs this function.

Note: This function takes approximately 2 minutes.

When the function completes processing, the Numeric Keypad displays *FUNCTION = 15*.

Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY*.

Priming Diluent

1. Go to the Numeric Keypad.
2. Press 

to prime the diluent lines. The Numeric Keypad displays *PRIME DILUENT* while the instrument performs this function.

   Note: This function takes approximately 2 minutes.

   When the function completes processing, the Numeric Keypad displays *FUNCTION = 16*.

   Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY*.

Priming Retic Clearing Solution

1. Go to the Numeric Keypad.
2. Press 

to prime Retic clearing solution reagent lines. The instrument:
   - Dispenses Retic clearing solution to the Retic chamber
   - Drains the Retic chamber to the waste chamber.

   The Numeric Keypad displays *PRIME RETIC CLEAR* while the instrument performs this function.

   Note: This function takes approximately 1 minute.

When the function completes processing, the Numeric Keypad displays *FUNCTION = 19*.

Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Priming Retic Stain Solution

1. Go to the Numeric Keypad.
2. Press 

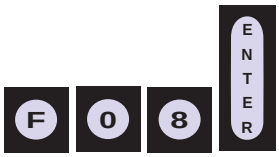
to prime the Retic stain lines. The instrument:
   - Dispenses Retic stain to the Retic chamber
   - Drains the Retic chamber into the waste chamber.

   The Numeric Keypad displays *PRIME RETIC STAIN* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 18*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Priming Sweep Flow

1. Go to the Numeric Keypad.
2. Press 

to prime the sweep-flow lines with diluent. The Numeric Keypad displays *PRIME SWEEP FLOW* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 08*.
3. Watch for three steady streams of droplets from the RBC bath to the vacuum isolator chamber. If the droplets fail to appear, press 

to perform this function again.

4. Press 

to exit this function. The Numeric Keypad displays *READY.*

Performing Probe Wipe Test

1. Go to the Numeric Keypad.
2. Press 

and observe that the truck moves up the full length of the probe, then down to the rest position, then moves halfway up, and finally returns to rest.
3. During the test the Numeric Keypad displays *CHECKING PROBE WIPE*, and displays *FUNCTION = 28*, when completed.
4. Press 

to repeat this function.
5. Press 

to exit this function. The Numeric Keypad displays *READY.*

   Note: You may occasionally observe error messages during Step 2 that do not indicate a fatal error condition and can be reset. The following may occur:

   - The Numeric Keypad Displays PROBE OBSTRUCTED.
   - The Analyzer display PROBE WIPE TRUCK NOT HOME.
   - The workstation displays the red traffic light and warning box.

   To proceed:

   - At the Numeric Keypad, press Alarm reset. The Keypad will display FUNCTION = 28. Press STOP to exit the function.
   - At the workstation, clear the warning box.
   - The instrument will be in a ready state.

   Note: If you observe no movement or erratic movement, or the probe appears physically obstructed, contact your service provider.

Performing Flow Cell Purge

1. Go to the Numeric Keypad.
2. Press 

to clear air bubbles or debris from the flow cell. The Numeric Keypad displays *PURGE MODE* while the instrument performs this function.

When the function completes processing, the Numeric Keypad displays *FUNCTION = 13*.

Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*
4.

Forcing Mixing Bubbles into Baths

1. Go to the Numeric Keypad.
2. Press 

to force mixing bubbles into the RBC and WBC baths. The Numeric Keypad displays *RBC & WBC MIX* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 03*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Releasing Blood Sampling Valve (BSV)

1. Go to the Numeric Keypad.
2. Press 

. This function will:
   - Release pressure from the BSV
   - Drain the baths
   - Rotate the BSV back and forth five times
   - Bleed off pressure.

   The Numeric Keypad displays *RELEASE B.S.V.* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 06.*

3. Press 

to perform this function again.

4. Press 

twice to exit this function. The Numeric Keypad displays *READY.*

Refilling the Reagent Reservoirs

1. Go to the Numeric Keypad.

2. Press 

to prime the reagent reservoirs. The Numeric Keypad displays REFILLING ... (whatever reagent is low) while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 31*. Press 

to perform this function again.

   Note: If the reservoirs are already primed, *RESERVOIRS FULL PRESS ALARM RESET* appears on the Numeric Keypad. Press 

and *FUNCTION = 31* displays on the Numeric Keypad.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Dispensing Retic Stain

1. Go to the Numeric Keypad.

2. Press 

to dispense Retic stain into the mixing chamber. The Numeric Keypad displays *RETIC STAIN* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 25*. Press 

to perform this function again.

3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Dispensing Retic Clearing Solution

1. Go to the Numeric Keypad.
2. Press 

to dispense Retic clearing solution into the mixing chamber. The Numeric Keypad displays *RETIC CLEAR* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 26*. Press 

to perform this function again.
3. Press 

to exit this function. The Numeric Keypad displays *READY.*

Performing Sheath Tank Check

1. Go to the Numeric Keypad.
2. Press 

to:
   - Drain sheath tank
   - Fill sheath tank
   - Check sheath tank level
3. The Numeric Keypad displays *SHEATH TANK CHECK* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 20*. Press 

to perform this function again.
4. Press 

to exit this function. The Numeric Keypad displays *READY.*

Freeing Solenoids

1. Go to the Numeric Keypad.
2. Press 

to release pressure on all the solenoids. The Numeric Keypad displays *SOLENOIDS FREE* while the instrument performs this function. When

the function completes processing, the Numeric Keypad displays *FUNCTION = 95*. Press ENTER to perform this function again.

3. Press STOP to exit this function. The Numeric Keypad displays *READY.*

Enabling/Disabling Access to Cycle Control

1. Go to the Numeric Keypad.
2. Press F 9 9 ENTER to enable or disable access to cycle control. The Numeric Keypad displays *WAIT ENABLE*D or *WAIT DISABLED*. Press STOP and the Numeric Keypad displays *FUNCTION = 99*. Press ENTER to perform this function again.
3. Press STOP twice to exit this function. The Numeric Keypad displays *READY.*

Perform an Initial Prime of Diluter

1. Go to the Numeric Keypad.
2. Press F 6 7 ENTER to perform an initial prime of the Diluter. The Numeric Keypad displays *DILUTER PRIME* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *FUNCTION = 67*. Press ENTER to perform this function again.
3. Press STOP to exit this function. The Numeric Keypad displays *READY.*

Monitoring Low Vacuum

1. Go to the Numeric Keypad.
2. Press 

to monitor low vacuum. The Numeric Keypad displays *X.XXXX*, where *X.XXXX* is the current vacuum level. The vacuum level may appear to change slightly while you view it on the Numeric Keypad. This is normal.
3. Use the vacuum regulator to adjust the level to 6 ±0.01 (5.99 to 6.01) inches Hg. Left increases. Right decreases.
4. Press 

twice to exit this function. The Numeric Keypad displays *READY.*

Advancing the Tube

1. Place a cassette containing tubes in each cassette position on the rocker bed to the right of the tube detector.
2. Go to the Numeric Keypad.
3. Press 

to move the cassette through the piercing station one tube position at a time. The Numeric Keypad displays *TUBE ADVANCE* while the instrument performs this function.
4. Press 

to stop the tube advance. The Numeric Keypad displays *FUNCTION = 96*. To perform this function again, place the cassette on the rocker bed to the right of the tube detector and press 

.
5. Press 

to exit this function. The Numeric Keypad displays *READY.*
6. Remove the cassette from the rocker bed.

Zap Apertures Function

1. Go to the Numeric Keypad.
2. Press 

to:

- Apply pressure behind the baths.
- Drain and rinse the baths four times with cleaning agent.
- Draw cleaning agent behind the apertures.
- Zap the apertures 10 times to remove protein or debris from the apertures.

The Numeric Keypad displays *ZAP APERTURES* while the instrument performs this function. When the function completes processing, the Numeric Keypad displays *PRESS 0 / 1 FOR RINSE/REPEAT ZAP.*

3. Press:
   - 

To rinse with cleaning agent. The Numeric Keypad displays *RINSE CLENZ.*
   - 

To repeat the zap aperture function. The Numeric Keypad displays *REPEAT ZAPPING.*
4. Press 

to exit this function. The Numeric Keypad displays *READY.*

5.3 SOLENOID FUNCTIONS

Table 5.1 Solenoid Functions

Solenoid	Function	Components Activated
1	Rinse Needle	Lee Valve
2	Backwash Probe	Lee Valve
3	CBC Lyse Pump	PM7, VL3
4	Hgb Drain Valve	VL4A, VL4B, VL4C
5	Backwash Pressure	Backwash Tank (VC23)
6	Hgb and Waste Drain	VL6
7	WBC Dispense	PM3, VL7
8	RBC Dispense	PM2, VL8
9	Whole Blood Aspirate	PM9, VL9A, VL9B
10	WBC Count	VL10
11	RBC Count	VL11A, VL11B
12	Baths Drain	VL12A, VL12B, VL12C, VL12D, VL12E, VLF
13	Probe/Needle drain	VL13
14	Cleaning Agent	VL14A, VL14B, VL14C
15	Sample Valve Return	VC14, CL2
16	Vac Isolator Drain	VL16A, VL16B
17	Segment Sample	VL17, CL2
18	Hgb Blank Dispense	South Bend, 2-way
19	WBC Sample Mix	WBC Bath (VC3)
20	RBC Sample Mix	RBC Bath (VC2)
21*	Right Lift	CL5
22*	Left Lift	CL4
23	Needle Interlock	L3
24	Manual Probe In	PM9, CL1
25	Tube Ram/Needle Bellow Down	CL6, CL3, VL25A
27	Backward Bed Rock	CL8
28	Bed Lock	L1, L2
29	Stripper Plate	CL10
30	Forward Bed Rock	CL8
31	Flipper Retract	L41, L42
32	Reservoir Refill Request	Logic Signal To Trigger Reservoir Refill
33	Needle Vent Vacuum	VL33
34	Manual Probe Out (N.O.)	CL1
35	Not used	

Table 5.1 Solenoid Functions *(Continued)*

36	Belt Advance	CL9
37	Needle Bellow Up	CL3
38	Not used	
39	Vacuum Overflow Dump	VL39, VC22
40	Stop Vacuum	VL40
41	Reverse Flush	VL41
42	Rinse - Diff	Lee Valve
43	Diff Lyse (PAK Lyse)	PM4, CVL43
44	Sample Disable - Retics	VL44
45	Diff Preserve (PAK Preserve)	PM1, VL45
46	Flush	VL46A, VL46B
47	Cleaning Agent Pump	VL47A, VL47B, PM10
48	5 Diff Mixing Chamber Drain	VL48B
49	Exit - Flow Cell	VL49
50	Vacuum to Diff Chamber	VL50A, VL50B
51	Sample Pressure/Vent - Diff	VL51
52	Sample Disable - Diff	VL52
53	Drain Diff/Retics Waste	VL53A, VL53B, VL53C, VL53D, VC13, VC26
54	Sheath Flow	VL54
55	Forward Flush	VL55
56	Vacuum to Retic Chamber	VL56
57	Probe/Needle Drain Vacuum	VL57A
58	Latex Sample Enable - Diff	VL58
59	Backwash Disable	VL59
60	Diff Preserve (PAK Preserve) Dispense/Refill Enable	South Bend, 3-way
61	Backwash Tank/Sweep Flow Reservoir Purge	VL61
62	Back Aspiration Enable	VL62
63	Diff Lyse (Pak Lyse) Dispense/Refill Enable	South Bend, 3-way
64	Front Aspiration Enable (N.O.)	VL64
65	Diff Lyse (Pak Lyse) to Diff Chamber Disable	VL65
66	Mixer - Retics	Logic Signal to Trigger Retic Mixing Motor
67	Vent Chamber Drain	VL67
68	Backwash Needle/Segments	Lee Valve
69	Backwash Flow Cell	Lee Valve
70	Sheath Tank Refill Request	Logic Signal to Trigger Sheath Tank Refill
71	Clog Detector On	Logic Signal to Trigger Clog Detector On

Table 5.1 Solenoid Functions *(Continued)*

72	RF On	Logic Signal to Trigger RF On
73	Mixer - Diff	Logic Signal to Trigger Diff Mixing Motor
74	Count - Diff/Retics	Logic Signal to Trigger Diff/Retics Count
75	Rinse Retic Chamber	Lee Valve
76	Sample Pressure - Retics	VL76
77	Diluent Sense	Logic Signal to Trigger Diluent Sense
78	Blood Flow	Logic Signal to Trigger Blood Flow Monitoring
79	Blood Sense	Logic Signal to Trigger Blood Sense
80	Retic Chamber Drain	VL80B
82	Pak Volume - Low	PM4, PM1
83	Probe Wipe Error Reset	Logic Signal to Trigger Probe Wipe Error Reset
84	Probe Wipe Enable	Logic Signal to Trigger Probe Wipe Enable
85	Diff Sample Segment Valve Return	CVL85/126
86	Sweep Flow Reservoir Refill	VL86
87	Retic Sample Segment Valve Return	CVL87/127
88	Latex Sample Enable - Retics (N.O.)	VL88
89	Blood/Stain to Stain Chamber	VL89
90	Tip Wipe Enable	Logic Signal to Trigger Tip Wipe Enable
91	Backwash Tank Refill Request	Logic Signal to Trigger Backwash Tank Refill
92	Blood/Stain Aspiration Pump	PM11
93	Segment 2µL Blood/Stain	CVL93/128
94	Enable 2µL Blood/Stain Aspiration	VL94A, VL94B, CVL93
95	Ghost Pump	PM6, VL95
96	Rinse Stain Chamber	Lee Valve
97	Drain Stain Chamber	VL97B
98	Segment Valves Self-Cleaning	VL98
99	Stain Pump	PM5, VL99
100	Diluent Level Refill	VL100 (not in use)
101	Cleaning Agent Level Refill	VL101
102	Pak Lyse Level Refill	VL102
103	Pak Preserve Level Refill	VL103
104	Stain Level Refill	VL104
105	Ghost Level Refill	VL105
106	CBC Lyse Reagent Refill	VL106
107	Backwash Tank Refill	VL107A, VL107B
108	Sheath Tank Refill	VL108
110	Probe Wipe Rinse	Lee Valve

Table 5.1 Solenoid Functions *(Continued)*

111	Probe Wipe Vacuum	VL111
112	Not used	
113	Not used	
114	Needle Vent Side Isolator (SlideMaker Option)	VL114
115	VC19 Isolator 1 (SlideMaker Option)	VL115
116	VC19 Isolator 2	VL116
117	SlideMaker Aspiration Line Isolator (SM)	VL117
118	Reservoir SW1 (SM) (N.O. RES1)	VL118
119	Not used	
120	Duplicate SlideMaker Aspiration Line Isolator (SM) (Duplicate of SL117)	VL120
121	VLS Check	Logic Signal to Trigger VLS Check
122	Sweep Flow Reservoir Refill	Logic Signal to Trigger Sweep Flow Reservoir Refill
123	Probe Wipe Block Up	Logic Signal to Trigger Probe Wipe Block Up
124	Probe Wipe Block Reset	Logic Signal to Trigger Probe Wipe Block Reset
125	Probe Wipe Rinse Cup	CL11
126	Segment Diff Blood Sample	CVL85/126 (Future component/function)
127	Segment Retic Blood Sample	CVL87/127 (Future component/function)
128	Blood/Stain Sample Segment Valve Return	CVL93/128 (Future component/function)
129	Ghost Line Protection (inverted signal)	VL129
131	5 PSI, WBC Bath	VL131864

5.4 RUNNING BACKGROUND TEST

The Background test includes Hgb voltage check, Diff test, and Retic test.

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **START UP TESTS**.
5. Press **BACKGROUND TEST**. The Analyzer screen displays a **SYSTEM RUN** screen that shows pulses. After showing the pulses, the Analyzer displays the **START UP TESTS** screen and transmits the test results to the Workstation. The Analyzer screen then returns to the **SYSTEM RUN** screen.
6. Review the results at the Workstation. If results are unacceptable, rerun the background test. If the results are unacceptable on the second try, call your Beckman Coulter Representative.
7. If background test results are acceptable, begin running controls or press **MAIN MENU** to display the Analyzer **MAIN MENU** screen.

5.5 RUNNING PRECISION TEST

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **START UP TESTS**
5. Press **PRECISION TEST**. The Analyzer screen displays a **SYSTEM RUN** screen that shows pulses. After showing the pulses, the Analyzer displays the **START UP TESTS** screen and transmits the test results to the Workstation.
6. Review the results at the Workstation. If results are unacceptable, rerun the precision test. If the results are unacceptable on the second try, call your Beckman Coulter Representative.
7. If precision test results are acceptable, press one of the following:

MAIN MENU	To display the Analyzer MAIN MENU screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the ANALYZER FUNCTIONS screen.

5.6 RUNNING RAMP TEST

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **START UP TESTS**.
5. Press **RAMP TEST**. The Analyzer screen displays a **SYSTEM RUN** screen that shows pulses. After showing the pulses, the Analyzer displays the **START UP TESTS** screen and transmits the test results to the Workstation.
6. Review the results at the Workstation. If results are unacceptable, rerun the ramp test. If the results are unacceptable on the second try, call your Beckman Coulter Representative.
7. If ramp test results are acceptable, press one of the following:

MAIN MENU	To display the Analyzer MAIN MENU screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the ANALYZER FUNCTIONS screen.

5.7 READING HGB VOLTAGE FOR LAST CYCLE

1. Go to the Analyzer screen.
2. Press **MAIN MENU**.
3. Press **ANALYZER FUNCTIONS**.
4. Press **HGB READINGS**.

   The **HGB READINGS** screen appears with the Hgb-blank voltage and the Hgb-sample voltage for the last completed cycle.

5. Press one of the following:

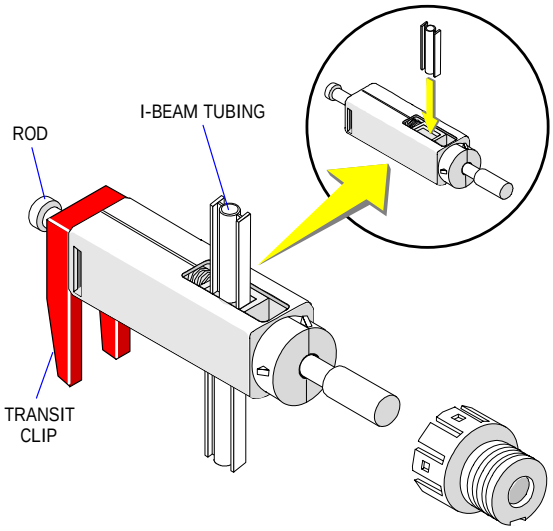
MAIN MENU	To display the Analyzer **MAIN MENU** screen.
SYSTEM RUN	To cycle samples.
RETURN	To display the **ANALYZER FUNCTIONS** screen.

5.8 CHECKING THE NEEDLE

1. Cycle two samples:
   - One in Automatic aspiration mode (to check the sample flow to the BSV). While cycling the sample, blood passes through the BSV. Verify the presence of blood sample in the WBC bath.
   - One in Manual aspiration mode (to check the sample flow from the BSV).
2. If blood does not appear in the WBC bath, open the Diluter lower cover.
3. If necessary, uncrimp or replace tubing.
4. Visually check the needle.
5. If the needle appears bent, replace the needle.

5.9 CHECKING PINCH VALVES

You can activate solenoids to check pinch valve functions.



1. Use a dental mirror to check tubing alignment.
2. If the tubing is crimped, use a red transit clip to hold the pinch valve open.

IMPORTANT Incorrect results can occur if you pull tubing too far through the pinch valve and cause it to restrict flow from its attached fitting. Do not pull the tubing too far through the pinch valve, and make sure to check the attached fittings to ensure flow is not restricted.
Incorrect results can also occur if you fail to thread the tubing properly. Make sure to properly thread the I-Beam tubing in the front and rear of the pinch valve.

3. Pull the tubing a short distance through the pinch valve and squeeze it until the pinched area releases.
4. Remove the red transit clip.

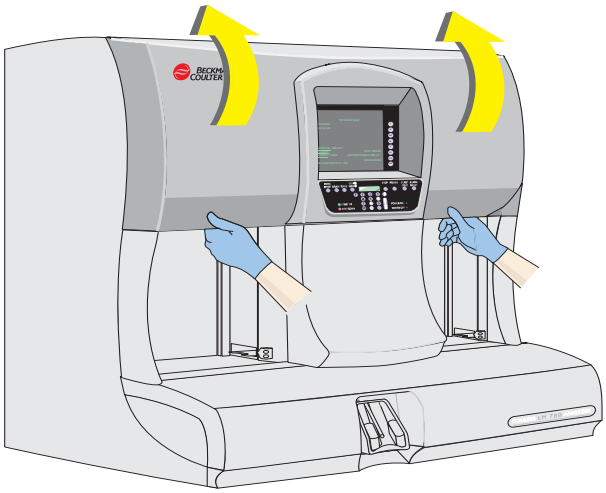
Note: No red transit clips should be present on an operational system.

5.10 RESEATING AN ANALYZER CARD

1. Press POWER OFF.
2. Turn off the main breaker on the Power Supply.

WARNING Risk of personal injury. A shock hazard exists if the power cord is connected. Unplug the primary power cord before performing these procedures.

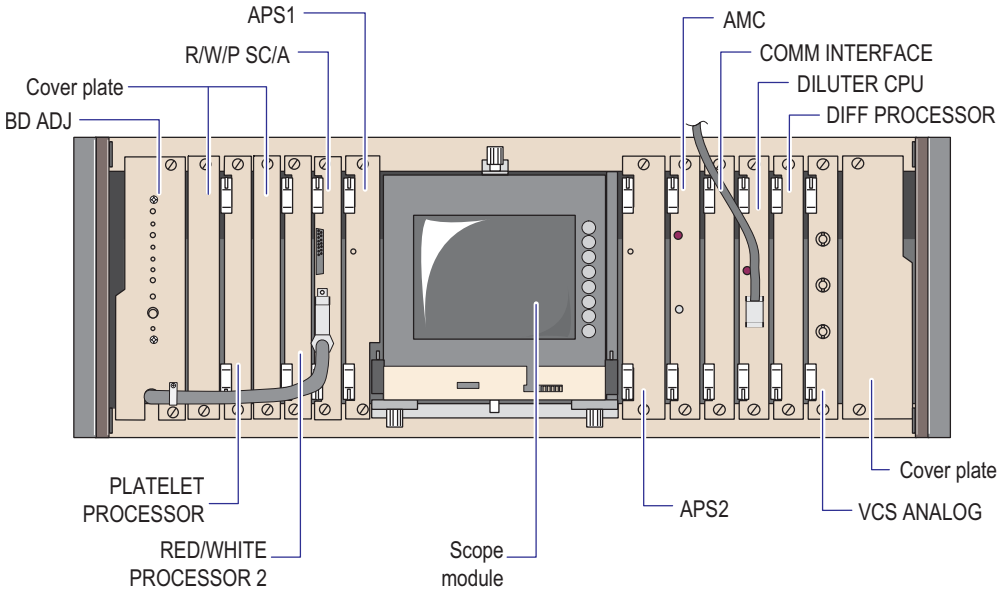
3. Disconnect the primary power cord.
4. Open the Analyzer cover.



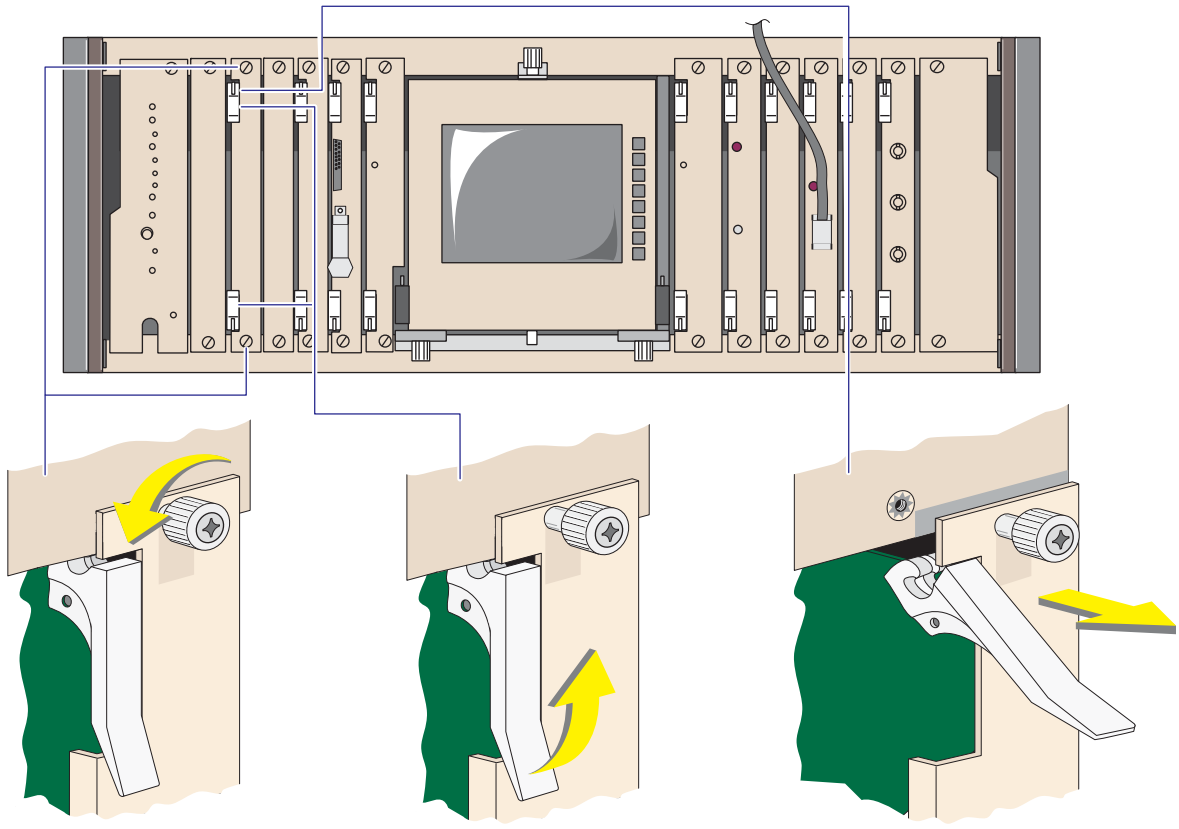
a. Lift the top cover forward and then upward until the side latch holds the cover open.

b. Several circuit cards appear behind the Analyzer cover. You should only open the Analyzer cover at the instruction of your Beckman Beckman Coulter Representative.

5. Locate the circuit card you want to reseat.



6. Loosen the thumbscrews on the upper and lower front edge of the circuit card.



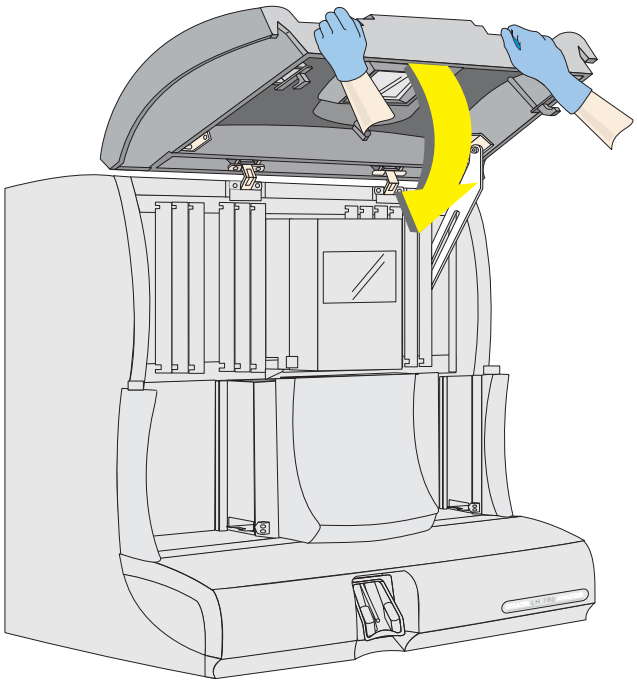
A. Unfasten thumbscrews B. Extend tabs C. Remove card

7. Extend the white tabs to push the card out of the connector.
8. Pull the card out.
9. Extend the white tabs to reseat the card.

CAUTION Installing the card into the wrong slot or misaligning the card with the connectors can damage the card or the instrument. Ensure the card is installed in the correct slot and is aligned with the connectors.

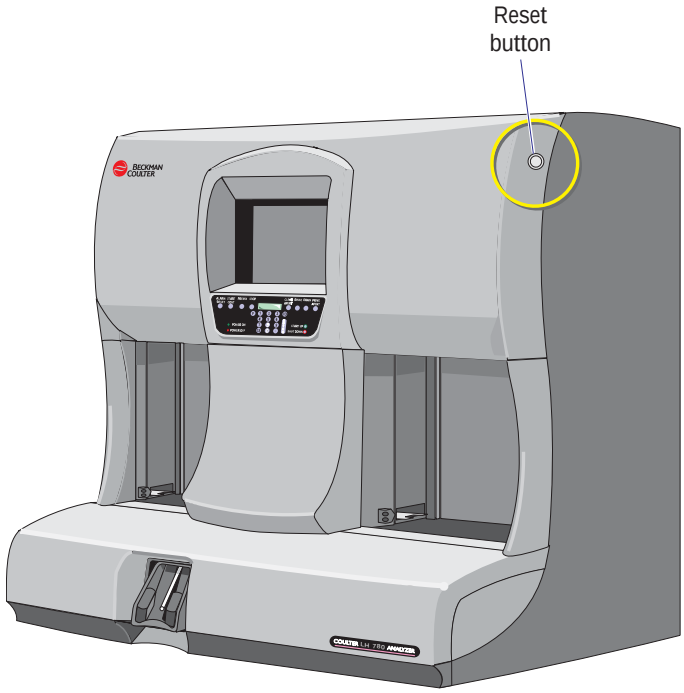
10. Align the card edges with the tracks for that card and push the card into the Analyzer.
11. Press the white tabs down to fully seat the card in the connector.
12. Tighten the thumbscrews.

13. Close the Analyzer cover.



14. Reconnect the primary power cord.
15. Turn on the main breaker on the Power Supply.
16. Press POWER ON.

5.11 ANALYZER RESET BUTTON



Press this button to reset the Analyzer. Resetting the Analyzer:

- Resets the electronic and pneumatic subsystems.
- Causes the baths to drain and rinse and a backwash to occur.
- Performs a memory test and senses the reagent and waste levels.

If used when the unit is not cycling, data from the last sample in the Analyzer memory is erased.

If used when the unit is cycling, any data in the Analyzer buffer that has not been transmitted to the Workstation is erased. The instrument also performs a cleanup cycle before returning to a *READY* state.

IMPORTANT An Analyzer Reset will cause an immediate full reset on the SlideMaker. If the SlideMaker is processing samples during an Analyzer Reset, all samples in process will be lost.

5.12 WORKING WITH ELECTRONIC HISTORY LOGBOOKS

Select  on the Command Center to access the History Log Viewer application.

The tabs on this window present an organized view of the logbook information stored in the database. The Workstation logs messages automatically whenever you perform startup or shutdown. It logs messages when you process key events, such as changing reagent information or calibrating. If the Workstation encounters a problem, it also logs the problem.

Each time maintenance or corrective actions are performed on an instrument, the Service Representative performing the actions can update the Maintenance log with text describing the maintenance or corrective action performed.

Each log presents identification information, such as the date and time a message was logged, and system messages.

You can access detailed descriptions and corrective actions for system messages by selecting  and then selecting an entry in the log.

The most current message appears at the top of the window. Select  to delete some or all of the messages. Periodic printout or archiving of the History Logs is suggested.

You can add comments to a logbook to help describe a problem or a corrective action you have taken. The Workstation saves the comments in the database along with the specific message.

Adding Comments to an Electronic Logbook

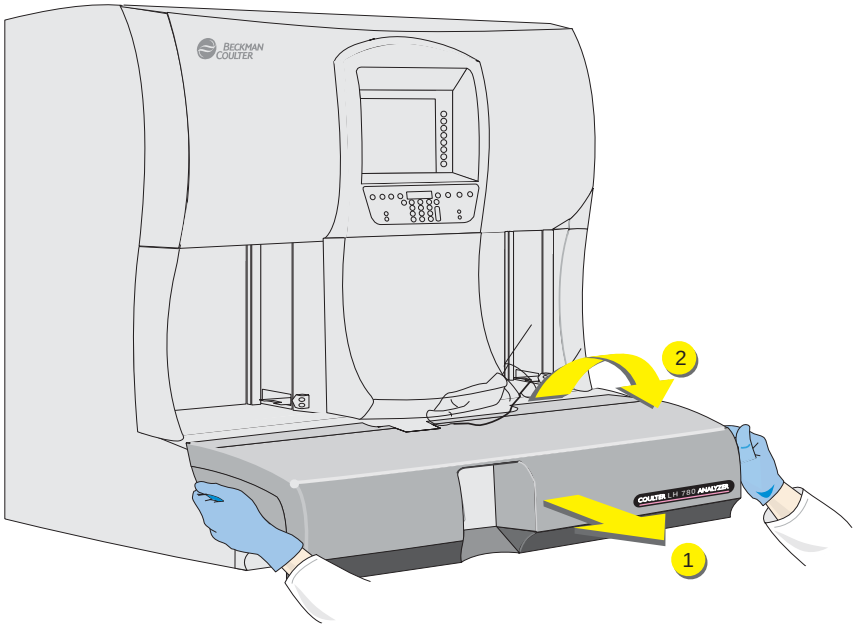
1. Select  on the Command Center to access the History Log Viewer application.
2. Select the tab for the logbook you want.
3. Select the message for which you want to provide a comment by clicking on the date of the message.
4. Select  to add a comment.
5. Type the comment you want to add.
6. Select  . The Workstation stores the comment in the database and displays it in the logbook. The software enters the Comment Date, Comment Time and Comment Author in their columns in the event list. The Comment Author is the Windows 2000 username logged on at the time the comment was entered.

Adding Your Laboratory Procedures

Select the NotePad button to use Microsoft Windows 2000 Notepad to add your laboratory-specific procedures online. You can save your laboratory procedures on a diskette. For details about using the Notepad application, use the Help available with the Notepad application.

5.13 OPENING THE DILUTER LOWER COVER

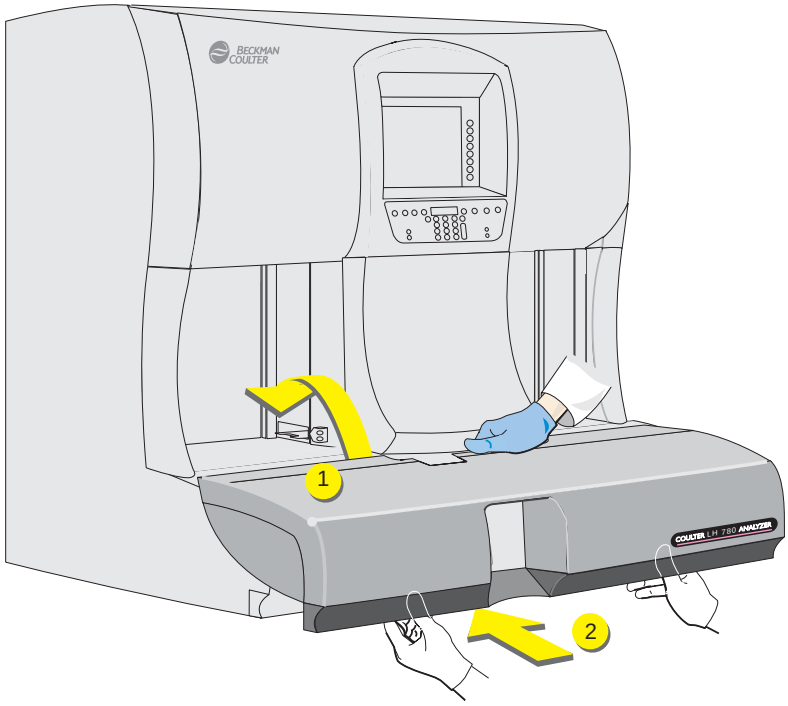
1. Place your hands on each side of the lower cover and pull it toward you.
2. Place your hand on top of the lower cover and pull it toward you, lowering it to a resting position.



If you open the lower cover during Automatic aspiration mode, the instrument stops processing samples and displays *DOOR OPEN* on the Numeric Keypad.

5.14 CLOSING THE DILUTER LOWER COVER

1. Lift the cover upward.
2. Push the cover back toward the instrument.



5.15 AUTOSTOP

The LH Workstation software allows you to configure the system to automatically halt under various conditions. By configuring the system to halt, it avoids analyzing samples during a fault condition that could affect parameter results or slide preparation. This minimizes the necessity to re-analyze those samples after the fault condition is resolved.

The number of runs (batches) configured for AutoStop needs to take into consideration that the next sample has already been aspirated before data from the preceding sample has been received at the Workstation. For example, AutoStop is configured to five and five consecutive Partial Aspirations occur. The last six samples are potentially affected.

The LH 700 Series AutoStop is enabled within System Setup-[Quality Assurance], Control Setup, for individual control lots. For controls, AutoStop must be enabled for the lot within Control Setup and in Run Configuration, for control errors to trigger an AutoStop.

AutoStop Options

Category	Definition	Configuration Options
Control	A control failure has occurred. Detail is provided in Control AutoStop On. Applies to both traditional Controls and Extended QC.	Disabled or Enabled for all.
NO MATCH	The Workstation can not find a match of the positive sample identifier to the preassigned ID in the To Do list.	Disabled or Enabled: 1 – 10. When consecutive runs meet the configured threshold, the system will halt.
NO READ	The Analytical Station cannot read a bar-code label and sample ID is used as a positive ID.	Disabled or Enabled: 1 – 10. When consecutive runs meet the configured threshold, the system will halt.
Partial Aspiration	The Analytical Station encountered, partial aspiration error disabled blood detectors blocked tubing or needle, or insufficient sample volume.	Disabled or Enabled: 1 – 10. When consecutive runs meet the configured threshold, the system will halt.
SlideMaker	A SlideMaker failure has occurred.	Disabled or Enabled for all.
Voteout	Sample results contain a parameter with a Voteout.	Disabled or Enabled: 1 – 10. When consecutive runs meet the configured threshold, the system will halt.
XB	Batch values exceed the defined percent differences from XB Target values.	Disabled or Enabled: 1 or 2. When consecutive batches meet the configured threshold, the system will halt.
XM	Batch values exceed the defined percent differences from XM Limits.	Disabled or Enabled: 1 or 2. When consecutive batches meet the configured threshold, the system will halt.

5.16 COMMUNICATION HAS BEEN LOST BETWEEN THE ANALYTICAL STATION AND WORKSTATION

There are situations when the Analytical Station and the Workstation will stop communicating with one another. The most effective way to restore communication is to Shutdown and restart the Workstation. If this is not successful to restore communication, you may be required to shutdown the Workstation, reset the Analytical Workstation, restart and then log on to the Workstation. It is not imperative to log on the Workstation but it must be restarted prior to the completion of the Analytical Station reset in order to avoid another message.

Note: Periodic optimization procedures will help the function of the Workstation. By shutting down the Workstation daily while performing the Analytical Station Shutdown, you can

optimize the processing speed of the system. At a minimum, the Workstation should be shutdown weekly.

When the Shutdown Computer dialog box displays “It is now safe to restart your computer”, turn off the computer. Allow it to remain off for a minute and then turn it back on. Depending on how much optimization needs to occur and how long it has been since the system was last shutdown, it may take as much as 60 minutes or as little as five.

One factor in the system configuration that can affect communication and overall operation of the Workstation is the amount of data that is being stored within the system. The amount and type of sample results that are stored in the Workstation is defined in System Setup-[Database Preferences].

The three types of data and the size for these choices are:

- Sample Numeric Data: All patient demographics and numeric parameter results
  - Range: 1000 to 20,000
- Graphics: WBC, RBC and PLT histograms
  - Range: 500 to 5000
- Listmode Data: Raw VCS data used in the development of histograms and VCS dataplots
  - Range: 50 to 500

The number of records in the database affects how long operations that search within the database will take. The number of sample records, therefore, impacts how long certain functions take to be performed. Examples of these functions are,

- searching for collation matches,
- looking for previous samples for Delta Check rules

It is the number of records, not the space they take up, that affects how long it takes to perform these functions.

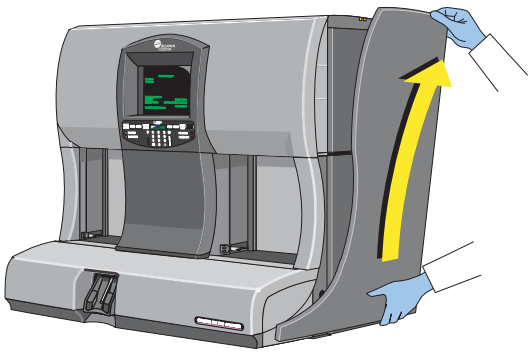
When setting these preferences, consider why your laboratory will go back to review the stored information and how many samples are typically run during a 24 hour period. Questions for you to consider:

- Does the laboratory use Delta checks? If so, what is the time frame for check?
- Does the laboratory use the Histogram for parameter review?
- Does the laboratory print abnormals or is the Workstation utilized for the review?
- Does the laboratory lock patient results and store them in the database?

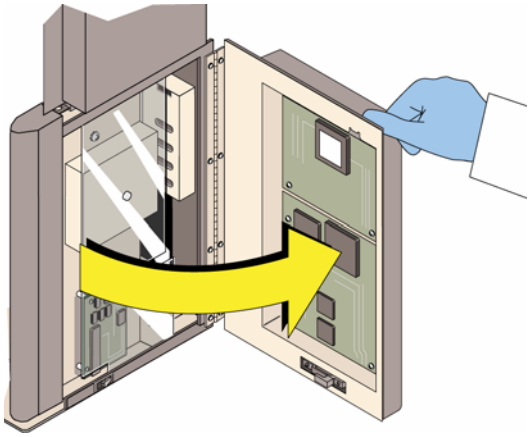
If you do not have a Laboratory Information System to store data, you may want to consider archiving data to disk rather than long term storage in the Workstation.

5.17 FLUSHING LOW VACUUM LINES

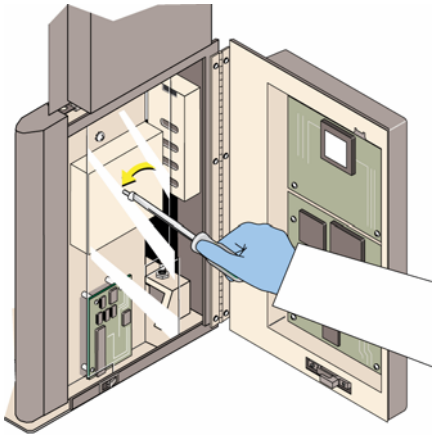
1. Ensure all required tools/ materials are available, including:
   - a flat blade screwdriver
   - a small container
   - distilled water



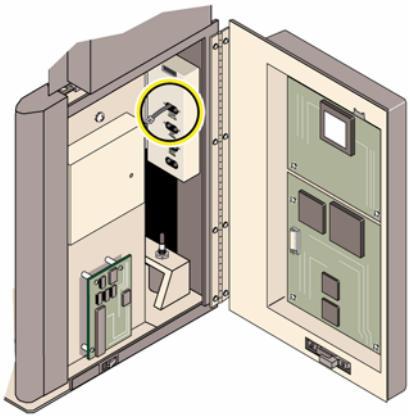
2. Remove the Diluter right-side panel by lifting up and out on the panel.



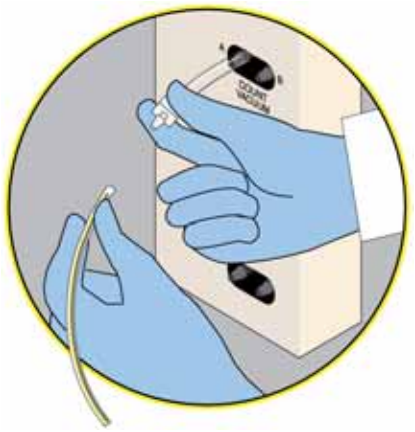
3. Open the lower right side door as shown.



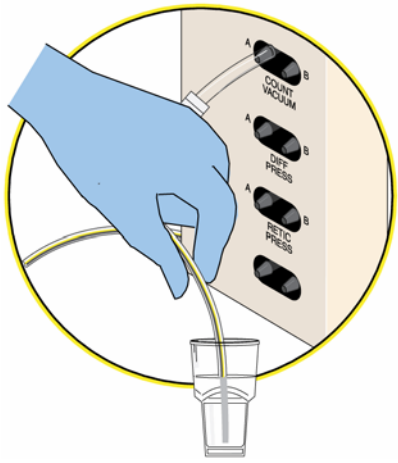
4. Remove the clear plastic protective covering by unscrewing the white plastic screw.



5. Locate the tubing connected to the Count Vacuum.

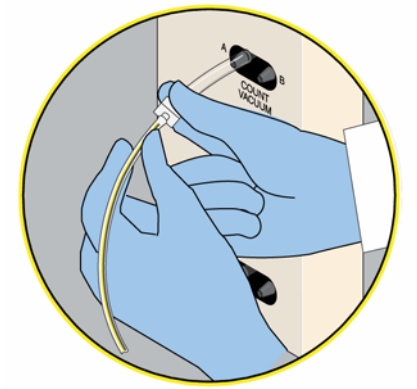


6. Remove the yellow and black-striped tubing from the reducer fitting.

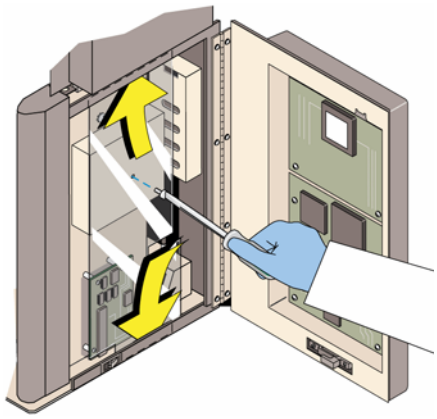


7. Fill the container with no more than 22 cc of distilled water and place the tubing into the container.

   NOTE: The vacuum will draw the water out of the container.

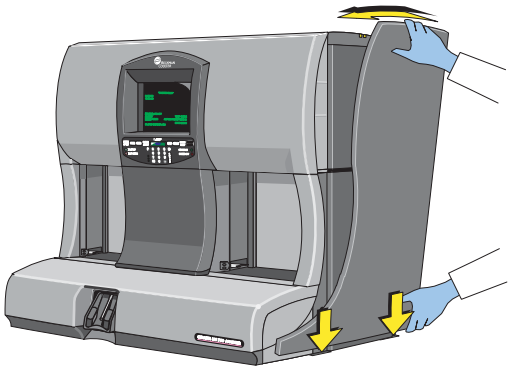


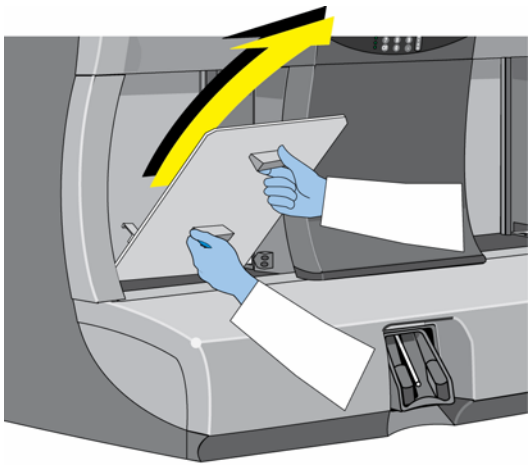
8. Let the instrument set idle for a minimum of 10 minutes to allow the tubing to dry, and then reconnect the tubing back into the fitting.



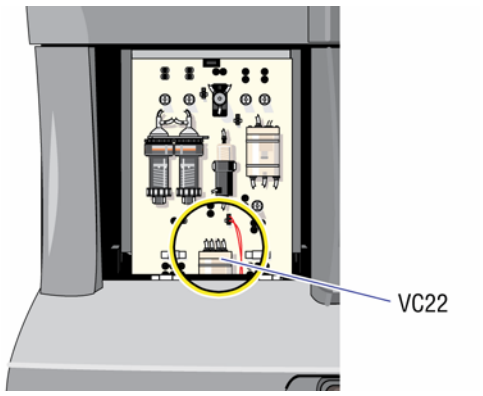
9. Replace the plastic protective covering and secure it with the white plastic screw.

10. Close the door.
11. Replace the Diluter right-side panel.

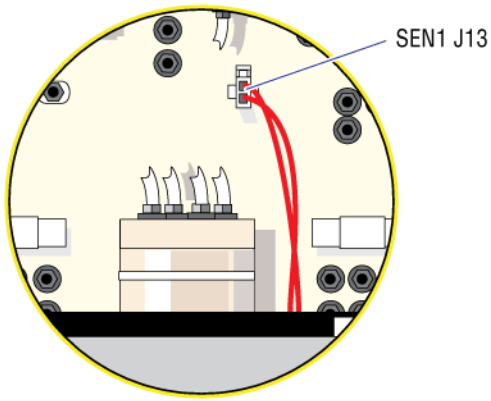




12. Open the left-side Diluter cover by lifting up and out on the cover.



13. Locate VC22, the Vacuum Overflow Tank, in the bottom section of this area.

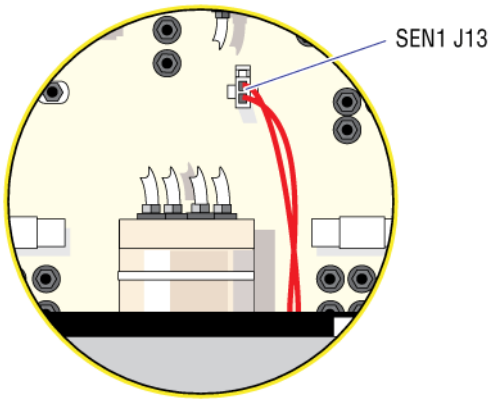


14. Disconnect the float sensor connector labeled SEN1 J13, located above the tank.

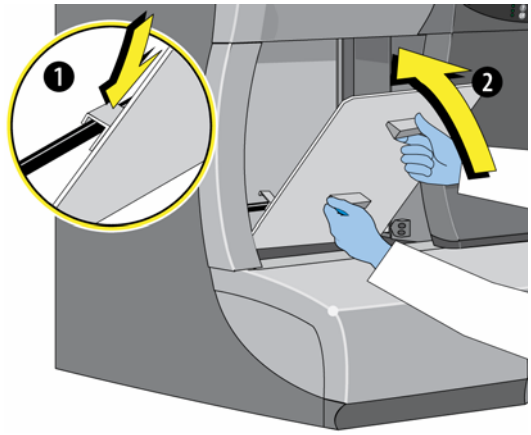
15. Press the STOP button on the Analyzer keypad. This will drain the VC22.

    An alarm will be triggered. Level V will be displayed in the Alert field on the Analyzer display. The *Vacuum Overflow Tank Full* message will also be displayed in the Instrument tab of the History Log, on the Workstation.

16. Press Alarm Reset on the Analyzer keypad. The keypad display will change to a Ready status.

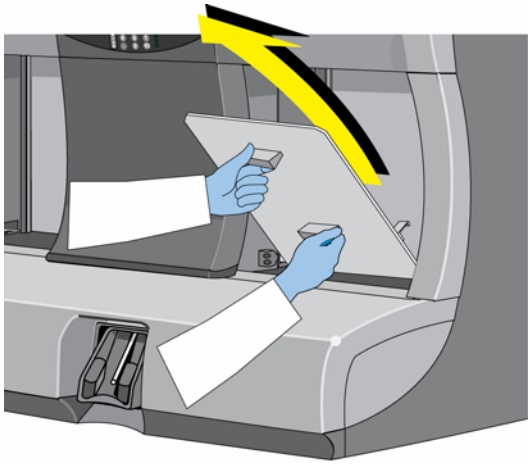


17. Reconnect SEN1 J13.

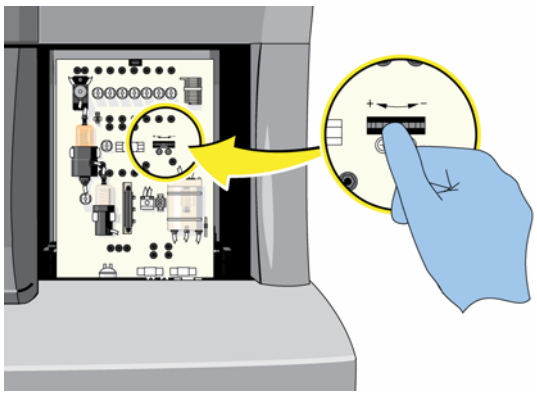


18. Replace the left-side Diluter cover.

19. Perform Diluter Function F92, and adjust the low vacuum level, if needed. The reading should be 6.000 ±0.010.



20. Remove the right-side Diluter cover to access the Low Vacuum Regulator.

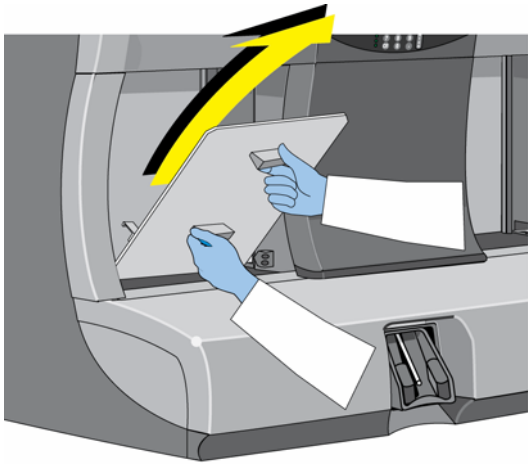


21. Use the adjustment wheel on the upper right-side corner to make the respective adjustments. The +/- sign is above the wheel.

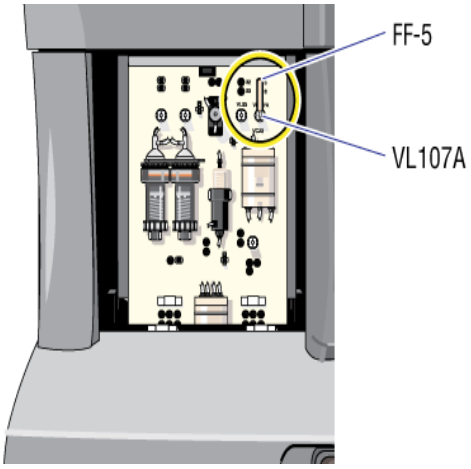
22. Replace the right-side Diluter cover when satisfied with the vacuum setting.

5.18 FLUSHING THE BACKWASH TANK VACUUM SUPPLY LINE

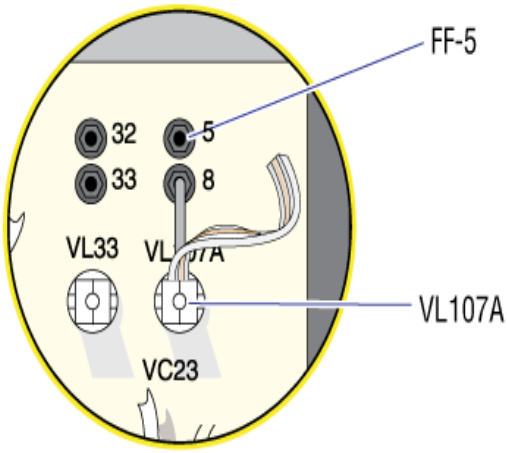
1. Ensure all required tools/ materials are available, including:
   - a 20 cc syringe with a piece of yellow-striped 5” tubing attached to the tip
   - distilled water



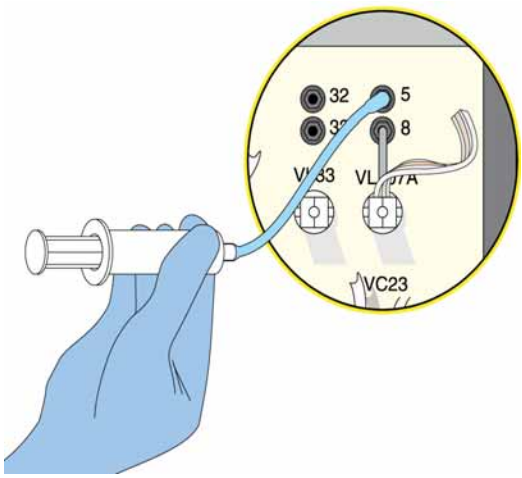
2. Remove the left-side Diluter cover by lifting up and out on the panel.



3. Locate the VL107A, the white pinch valve located above the Backwash Tank. The top-fitting above VL107A is a feed-through fitting marked FF-5.

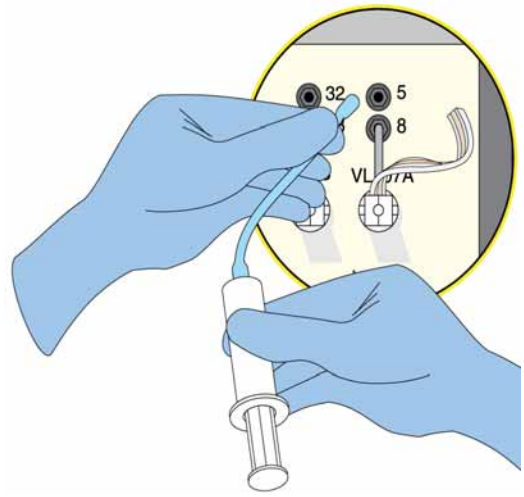


4. Disconnect the I-beam from the FF-5.

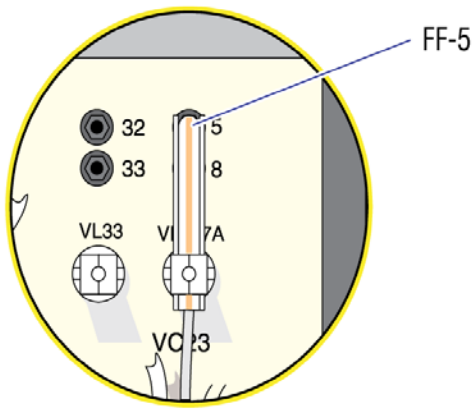


5. Fill the syringe with distilled water and attach the syringe tubing to FF-5. The water will fill the Vacuum Overflow Tank (VC22). (The VC22 is located towards the bottom of the left panel, behind the rocker bed.) Use enough water so that VC22 is half-full.

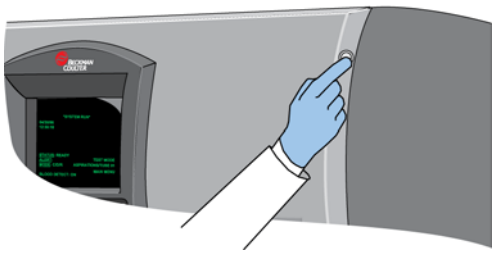
   NOTE: The vacuum will draw the water out of the syringe. If the water does not move, you may need to push on the plunger.



6. Disconnect the syringe tubing.



7. Reconnect the I-beam tubing to FF-5.



8. Press the Reset button on the Analyzer. This will drain the Vacuum Overflow Tank (VC22).

9. To confirm that the vacuum supply line is open, perform Diluter Function F30 to activate the Backwash Tank Check and verify that no error messages are generated.

6.1 SYSTEM AND WORKSTATION MESSAGES

The LH 700 SERIES System automatically monitors many of its activities and conditions and generates messages to alert the operator when the system does not respond as expected. All the messages are referenced in the index. Any messages that are logged at the Workstation appear in the following format: date, time, instrument name, operator name, message.

When an event causes the system to stop processing samples, double-click on  to display the Status dialog box. Place the cursor over an entry in the Status box to display additional information. Double-click on an entry in the Status box if you want to display the error message help topic for that event. Select  to acknowledge the event and continue processing.

Note: Not all system events require corrective action. Error message help topics are displayed only for the system events that have corrective actions that you can perform.

System Alarms

- Many of the System error messages are accompanied by an alarm. If the alarm is a Diluter-generated alarm, press **ALARM RESET**.
- If the alarm is generated in the SlideMaker, press any key on the SlideMaker screen.

About Table 6.2, System messages

The System messages, with their probable causes and corrective actions, are arranged alphabetically by Analyzer message.

Several System messages are listed with an “and” condition. For those messages:

- If the error occurs while the instrument is idle or ready to pierce, the Analyzer only displays the first message.
- If the error occurs while the instrument is running, the Analyzer displays the first message and then replaces it with the second message. The second message is always *Diluter Error* or *Non-Diluter Error.*

  To locate the appropriate corrective actions in the System Message tables for *Diluter Error* and *Non-Diluter Error* messages, use the message on the Diluter screen; it usually mirrors the original Analyzer message.

When a message column lists “current status” instead of a specific message, one of the following Analyzer status messages is displayed:

ACTIVE	*LH 700 SERIES INITIALIZING/RAW*	*READ HGB*
ANALYZE	*INTRO SAMPLE*	*READY*
ASPIRATE SAMPLE	*MANUAL MODE*	*RETICS BACKWASH*
AUTOCLEARING	*NOT READY*	*RETICS COUNT*
BACKWASH	*PERFORMING CLEANUP*	*RETICS PRIME*

CBC/DIFF PRIME	*PERFORMING RECOUNT*	*RINSE*
CHECKING PRESSURES	*PREPARING SAMPLE*	*SYSTEM FAULT*
COUNT	*PRIME*	*VERSION 1E/LH 700 SERIES*
COUNT COMPLETED	*RAW DATA DUMP*	*XMIT IN PROGRESS*
DATA ACCEPT		

Icons and Traffic Lights Displayed on the Workstation with System Messages

The Instrument icon is displayed on the Command Center when the LH 700 SERIES Instrument is halted.

A red traffic light is displayed on the Command Center when immediate action is required.

Double-clicking on the red traffic light displays the error message and a button for clearing the error. Double-clicking on the error message displays the Online Help System topic for that message.

A yellow traffic light is displayed on the Command Center when caution is required. However, a red light supersedes a yellow light. (For example, if another condition occurs that triggers a red light, the red light is displayed until that condition is resolved, then the yellow light appears.

Double-clicking on the yellow traffic light displays the warning message. Double-clicking on the warning message displays the Online Help System topic for that message.

About, Workstation Messages

The Workstation messages, with their probable causes and corrective actions, are arranged alphabetically.

Not all Workstation messages are described in Some messages appear from the Windows NT™ operating system and other software packages that are included on the Workstation. Because these messages may not be logged or have online help for them, you should write them in your laboratory notebook. If the Workstation is connected to a network, some messages may be caused by the network configuration. If a local network administrator or Windows NT administrator is available, contact the administrator for help resolving the problem prior to calling your Beckman Coulter Representative.

Icons and Traffic Lights Displayed on the Workstation with Workstation Only Messages

The Patient icon is displayed on the Command Center when patient sample results are pending to be reviewed for validation in the review folder.

The Host Communication icon is displayed on the Command Center when sample transmissions are pending to be transmitted and the LIS/HIS is not responding.

The XB icon is displayed on the Command Center when the last XB batch is outside limits.

The QC icon is displayed on the Command Center when the last control run is outside limits.

The Printer icon is displayed on the Command Center when sample reports are pending to be printed and the Printer is not ready.

The Instrument icon is displayed on the Command Center when the instrument is halted.

The Database icon is displayed on the Command Center when database storage is not functional.

A red traffic light is displayed on the Command Center when immediate action is required.

Double-clicking on the red traffic light displays the error message and a button for clearing the error. Double-clicking on the error message displays the Online Help System topic for that message.

A yellow traffic light is displayed on the Command Center when caution is required. However, a red light supersedes a yellow light. (For example, if another condition occurs that triggers a red light, the red light is displayed until that condition is resolved, then the yellow light appears).

Double-clicking on the yellow traffic light displays the warning message. Double-clicking on the warning message displays the Online Help System topic for that message.

6.2 DILUTER ERRORS

Any of the following messages may precede a DILUTER ERROR message.

ASPIRATION N---
ASPIRATION -P--
ASPIRATION --B-
ASPIRATION ---C
BED NOT ADVANCED
BED NOT BACKWARD
BED NOT FORWARD
BED NOT LEVEL
BELLOWS NOT DOWN
Bellows Not Down
BELLOWS NOT UP
Bellows Not Up
Blood Front And Rear Sensors Detected Partial Aspiration
Did Not Detect Rocker Bed Backward Position
Did Not Detect Rocker Bed Forward Position
Did Not Detect Rocker Bed Horizontal Position
Diluent Front And Rear Sensors Detected Carryover
Diluter Failure
Front Sensor Detected Air Bubbles
LEFT LIFT NOT UP
LEFT LOAD FAIL
Rocker Bed Did Not Advance
Rocker Bed Obstructed (Left Lift Not Down) Or Faulty Sensor
Rocker Bed Obstructed (Left Lift Not Up) Or Faulty Sensor
Rocker Bed Obstructed (Right Lift Not Down) Or Fault Sensor
Rocker Bed Obstructed (Right Lift Not Up) Or Faulty Sensor
RIGHT LIFT NOT DOWN
RIGHT LIFT NOT UP
SCANNING FAULT
Scanner Obstructed
Sensor Detected Diluted Blood Or Non-Blood Sample
Stripper Plate Obstructed (Not In) Or Faulty Sensor
Stripper Plate Obstructed (Not Out) Or Faulty Sensor
STRIPPER PLATE NOT OUT
STRIPPER PLATE NOT IN

6.3 NON-DILUTER ERRORS

Any of the following messages may precede a NON-DILUTER ERROR message.

AMC, Diluter, Or DIFF Processor Hardware Malfunction

ANALYZER ERROR

BACKWASH TANK NOT FULL

BACKWASH TANK STILL FULL

Diluent Level Low Or Faulty Backwash Tank Float Sensor

Diluent Level Low Or Faulty Sheath Tank Float Sensor

Numeric Keypad Failure

DPR DILUTER PACKET ERROR

FATAL DPR ERROR

Faulty Backwash Tank Float Sensor

Faulty Sheath Tank Float Sensor

FLOW CELL CLOG

ILLEGAL INTERRUPT

Instrument Detected Clog In Flow Cell And Attempted Three Times To Clear Clog Without Success

Instrument Dual Port RAM Memory Test Failed

Invalid Dual Port RAM Packet

KEYBOARD INTERRUPT ERROR

Manual Sampling Probe Wipe Obstructed (Not Down)

Manual Sampling Probe Wipe Obstructed (Not Home)

Manual Sampling Probe Wipe Obstructed (Not Up)

PROBE WIPE DOWN FAILED

PROBE WIPE TRUCK NOT HOME

PROBE WIPE UP FAILED

RF Voltage Reading Below Limit

RF VOLTAGE LOW

SHEATH TANK NOT FULL

SHEATH TANK STILL FULL

INDEX

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T

U

V

W

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Documentation

Your LH 780 documentation can be found on our website at www.beckmancoulter.com

▪ Host Transmission PN 4277303	Specifications for transmitting to a host computer. Available in hard copy by request.
▪ Reference PN 773021	Use and Function • Installation • Operation Principles • Specifications/Characteristics • Precautions/Hazards • References • Glossary • Index Available in hard copy by request.
▪ Operator's Guide PN 773022	Controls and Indicators • Startup • QC • Sample Analysis • Data Analysis • Shutdown • Analyzer CRT Functions • Workstation • Run Samples Display • To Do List • Database • Controls • Setup • Appendices Available in hard copy by request.
▪ Special Procedures and Troubleshooting PN 773023	Calibration • Cleaning Procedures • Replace/Adjust Procedures • Troubleshooting • Error Messages Available in hard copy by request.
▪ SlideMaker Operator's Guide PN 4277299	Use And Function • Installation • Operation Principles • Specifications/characteristics • Operating Procedures • Cleaning/Replacement Procedures • References Available in hard copy by request.
▪ SlideStainer Operator's Guide PN 4277300	Use And Function • Installation • Operation Principles • Specifications/characteristics • Operating Procedures • Cleaning/Replacement Procedures • References Available in hard copy by request.
▪ Body Fluids Instructions for Use PN 731113	Operating instructions regarding the use of the body fluids application.
▪ Hematology Tube Listing PN A70017	Tube List information

The information in the Reference manual, Operator's Guide, Special Procedures and Troubleshooting manual, SlideMaker Operator's Guide, SlideStainer Operator's Guide and Body Fluids Instructions for Use comes from the Online Help System.

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