Instructions for Use

UniCel DxH 900 Series with System Manager Software

Coulter Cellular Analysis System

Published Version:
DxH 900, DxH Slidemaker Stainer II, and DxH 690T

CE IVD

C06947AE
July 2024

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

BECKMAN COULTER

UniCel DxH 900 Series with System Manager Software
Coulter Cellular Analysis System
Instructions for Use
PN C06947AE (July 2024)

UniCel DxH 900 Series with System Manager Software Coulter Cellular Analysis System includes the following instruments as individual or workcell (connected) systems:

- UniCel DxH 900 Coulter Cellular Analysis System
- UniCel DxH Slidemaker Stainer II Coulter Cellular Analysis System

and the following instrument as an individual system:

- UniCel DxH 690T Coulter Cellular Analysis System

Find us on the World Wide Web at:
www.beckmancoulter.com

Symbols Glossary is available at **www.beckmancoulter.com/techdocs**. See Related Documents for the part number.

Summary of Safety and Performance is available from the EUDAMED database:
https://ec.europa.eu/tools/eudamed

Rx Only in the U.S.A.

EC REP

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Original Instructions

Revision History

Initial Issue AA, November 2017
DxH 900 Software Version 1.0.0

DxH SMS II Software Version 1.0.0

Issue AB, December 2017
DxH 900 Software Version 1.0.0

DxH SMS II Software Version 1.0.0

The following sections were modified:

- EC Rep address was added to the copyright page
- Space and Accessibility Requirements - DxH 900 in CHAPTER 1, System Overview

Issue AC, May 2019
DxH 900/DxH 690T Software Version 1.2.0

DxH SMS II Software Version 1.2.0

The following sections were modified:

- Added DxH 690T throughout this manual, as appropriate
- Changed VCSn to VCS 360 throughout this manual, as appropriate
- Copyright page
- Conventions in the Introduction
- Overview in CHAPTER 1, System Overview
- DxH 900 in CHAPTER 1, System Overview
- Added DxH 690T in CHAPTER 1, System Overview
- Added Stylus in CHAPTER 1, System Overview
- DxH Slidemaker Stainer II in CHAPTER 1, System Overview
- Specimen Transport Module (STM) in CHAPTER 1, System Overview
- Single-Tube Station in CHAPTER 1, System Overview
- Mix Station in CHAPTER 1, System Overview
- Sample Aspiration Module (SAM) in CHAPTER 1, System Overview
- VCSn Module in CHAPTER 1, System Overview
- Slide Printer in CHAPTER 1, System Overview
- DxH 900 Floor Stand in CHAPTER 1, System Overview
- "Sticky" Notes in CHAPTER 1, System Overview
- On-Screen Keyboard in CHAPTER 1, System Overview
- Added Guided Help Icons to CHAPTER 1, System Overview
- Displaying the IFU in CHAPTER 1, System Overview
- Removed step 5 from Using the Notepad in CHAPTER 1, System Overview
- Viewing Documents in the Reader in CHAPTER 1, System Overview
- Refresh in CHAPTER 1, System Overview

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- Added Privacy and Security to CHAPTER 1, System Overview
- Viewing System Status in CHAPTER 1, System Overview
- Reagents in CHAPTER 1, System Overview
- Physical Specifications in CHAPTER 1, System Overview
- Space and Accessibility Requirements - DxH 900 in CHAPTER 1, System Overview
- Space and Accessibility Requirements - DxH 690T in CHAPTER 1, System Overview
- Space and Accessibility Requirements - DxH Slidemaker Stainer II in CHAPTER 1, System Overview
- Laboratory Automation System (LAS) in CHAPTER 1, System Overview
- Aspiration in CHAPTER 1, System Overview
- Limitations in CHAPTER 1, System Overview
- Voting and Averaging in CHAPTER 2, Operation Principles
- Dataplot Development in CHAPTER 2, Operation Principles
- Parameter Measurement, Derivation, and Calculation in CHAPTER 2, Operation Principles
- Running Daily Checks on Individual Instruments in CHAPTER 3, Daily Checks
- Exporting Daily Checks in CHAPTER 3, Daily Checks
- Extended QC in CHAPTER 4, Quality Control
- Added Extended QC Troubleshooting in CHAPTER 4, Quality Control
- Added RBC Indices in XB in CHAPTER 4, Quality Control
- Added Enable XB in CHAPTER 4, Quality Control
- Added Out of Control Batches in CHAPTER 4, Quality Control
- Added Troubleshooting When a Batch is Out of Control in CHAPTER 4, Quality Control
- XM Analysis in CHAPTER 4, Quality Control
- Added Enable XM in CHAPTER 4, Quality Control
- Added Out of Control Batches in CHAPTER 4, Quality Control
- Added Troubleshooting When a Batch is Out of Control in CHAPTER 4, Quality Control
- Analyzing Commercial Controls in CHAPTER 4, Quality Control
- Using QC Auto Rerun in CHAPTER 4, Quality Control
- QC Only in CHAPTER 4, Quality Control
- Set Up QC Only Mode in CHAPTER 4, Quality Control
- When a Commercial Control is Outside Its Expected Range in CHAPTER 4, Quality Control
- Added Using Guided Help to Recover from a Maximum Control Run Capacity Event by Exporting, Transferring IQAP to BCI, and/or Printing, and Deleting Control Runs in CHAPTER 4, Quality Control
- Added Using Guided Help to Recover from a Maximum Control File Capacity Event by Exporting, Transferring IQAP to BCI, and/or Printing, and Deleting Control Files in CHAPTER 4, Quality Control
- Deleting Control Runs in CHAPTER 4, Quality Control
- Added Deleting Control Files in CHAPTER 4, Quality Control
- Advancing a Basket in CHAPTER 5, Sample Analysis

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- Rerun and Reflex in CHAPTER 6, Data Review
- Manually Order a Rerun in CHAPTER 6, Data Review
- Manually Order a Reflex in CHAPTER 6, Data Review
- Flags in CHAPTER 6, Data Review
- Codes in CHAPTER 6, Data Review
- Blasts in CHAPTER 6, Data Review
- Releasing Results in CHAPTER 6, Data Review
- Rejecting Results in CHAPTER 6, Data Review
- Viewing Rejected Results in CHAPTER 6, Data Review
- Daily Shutdown in CHAPTER 8, Shutdown
- Overview in CHAPTER 8, Shutdown
- Performing a Manual Shutdown in CHAPTER 8, Shutdown
- Container Configuration in CHAPTER 9, Setup
- Setting Up DxH 900 Supplies in CHAPTER 9, Setup
- Added Setting Up DxH 690T Supplies in CHAPTER 9, Setup
- Setting Up DxH Slidemaker Stainer II Reagents in CHAPTER 9, Setup
- Configuring Baths (Mapping) to the Bath Location in CHAPTER 9, Setup
- Setting Up Collation in CHAPTER 9, Setup
- Activating Rules in CHAPTER 9, Setup
- Adding/Editing a Rule in CHAPTER 9, Setup
- Add a Rule in CHAPTER 9, Setup
- Edit a Rule in CHAPTER 9, Setup
- IF Condition Menu Selections in CHAPTER 9, Setup
- Setting Up IQAP Export in CHAPTER 9, Setup
- EMC Information in CHAPTER 10, Troubleshooting
- RoHS Notice in CHAPTER 10, Troubleshooting
- Resolve a Plugged Aperture in CHAPTER 10, Troubleshooting
- When a WBC Aperture is Plugged in CHAPTER 10, Troubleshooting
- When an RBC Aperture is Plugged in CHAPTER 10, Troubleshooting
- Added Using Guided Help for RBC/WBC Maximum Consecutive Voteouts in CHAPTER 10, Troubleshooting
- Removed Clearing an RBC Aperture in CHAPTER 10, Troubleshooting
- Added Clean Apertures in CHAPTER 10, Troubleshooting
- Setting the Count Vacuum Regulator in CHAPTER 10, Troubleshooting
- California Proposition 65 was removed. See the Symbols Glossary (see Related Documents for the part number) for more information.
- Event Messages from the System Manager with Action Required in CHAPTER 10, Troubleshooting

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- Event Messages from the SPM in CHAPTER 10, Troubleshooting
- Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures
- Cleaning the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures
- Unpack the New PSM in CHAPTER 13, Replacement/Adjustment Procedures
- Remove and Replace the PSM in CHAPTER 13, Replacement/Adjustment Procedures
- Refill Supply and Deionized Water Containers in CHAPTER 13, Replacement/Adjustment Procedures
- Operator Access in APPENDIX B, Operator Access
- Event Logs in APPENDIX C, LogsFinding Events in the Log in APPENDIX C, Logs
- Displaying/Printing Log Details in APPENDIX C, Logs
- Filtering Event Log in APPENDIX C, Logs
- Deleting Events from the Event Log in APPENDIX C, Logs
- Exporting Events from the Event Log in APPENDIX C, Logs
- Reviewing Events in the General Event Log in APPENDIX C, Logs
- Maintenance Log in APPENDIX C, Logs
- Add a New Entry to the Maintenance Log in APPENDIX C, Logs
- Report Examples in APPENDIX D, Reports
- Add a New Entry to the Maintenance Log in APPENDIX C, Logs
- Added Peripheral Distribution Box - DxH 690T in APPENDIX F, System and Module Connections
- Total Voteout ----- (WBC, RBC, Plt)..... (Calculated Parameters) in APPENDIX G, Job Aids
- Added APPENDIX H, Adding, Copying, and Exporting Files
- Abbreviations and Acronyms
- Glossary
- Related Documents

Issue AD, April 2023
DxH 900/DxH 690T Software Version 1.2.0

DxH SMS II Software Version 1.2.0

The following sections were modified:

- Changed the EC REP address from Nyon, Switzerland to Co. Clare, Ireland in the Copyright page.

Issue AE, July 2024
DxH 900/DxH 690T Software Version 2.3.1

DxH SMS II Software Version 2.3.1

NOTE: Changes that are listed in this revision are indicated by a change bar in the left margin of the page.

The following sections were modified:

- Removed the software version in the Published Version on the IFU cover page
- Changed VCS 360 to VCSn throughout this manual, as appropriate

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- Added a reference to the Summary of Safety and Performance on the UniCel DxH 900 Series with System Manager Software Coulter Cellular Analysis System Instructions for Use Copyright page
- Added "This device is intended for indoor use only. Safety protection may be impaired if used in a manner not specified by the manufacturer." to the Safety Notice
- Added Notice to User in Safety Notice
- Added "The *VCSn* technology referenced in this manual may be referred to as *VCS 360* in promotional materials." to Conventions in the Introduction
- Updated "analyzer" to "Coulter Cellular Analysis System" in the instrument title in DxH 900 and DxH 690T in CHAPTER 1, System Overview
- Added "UniCel" and "Coulter Cellular Analysis System" to the instrument title in DxH Slidemaker Stainer II in CHAPTER 1, System Overview
- Added Intended User in CHAPTER 1, System Overview
- Changed "Microsoft® Windows® 7" to "Microsoft® Windows® 10" in DxH 900 in CHAPTER 1, System Overview
- Changed "Microsoft® Windows® 7" to "Microsoft® Windows® 10" in DxH 690T in CHAPTER 1, System Overview
- Changed "Microsoft® Windows® 7 operating system" to "Microsoft® Windows® 10 operating system" in DxH Slidemaker Stainer II in CHAPTER 1, System Overview
- Added "Autogain adjustment fine-tunes selected VCSn gain factors to keep the LATRON parameter recovery close to the assigned target values resulting in optimized VCSn performance." in VCSn Module in CHAPTER 1, System Overview
- Added information about the SPM restarting when Type C cassettes are in use in Cassettes in CHAPTER 1, System Overview
- Added the updated the Home screen and the descriptions to include the Windows and Print icons in Home Screen in CHAPTER 1, System Overview
- Added the updated on-screen keyboard and descriptions to On-Screen Keyboard in CHAPTER 1, System Overview
- Updated the System Status description in Application Icons and/or Buttons in CHAPTER 1, System Overview
- Removed "Fast User Switching" from Advanced in CHAPTER 1, System Overview
- Added "Select Instrument" icon and description to System Icons in CHAPTER 1, System Overview
- Added more information about the toolbar in step 3 in Displaying the IFU in CHAPTER 1, System Overview
- Changed "Save as" to "Save" in step 4 in Displaying the Canvas in CHAPTER 1, System Overview
- Changed "Save as" to "Save" in step 4 in Using the Notepad in CHAPTER 1, System Overview
- Removed Enabling Non-English Characters on the Virtual Keyboard from CHAPTER 1, System Overview
- Changed "IFU" to "PDF" in Viewing Documents in the Reader in CHAPTER 1, System Overview
- Added more icons and procedural information to the steps in Displaying the Toolbar and Bookmark for the IFU and Reader Tabs When Minimized in CHAPTER 1, System Overview

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- Changed "A display may not appear to be refreshed with new information in the Worklist, Daily Checks, or after a setup or configuration change. Exit and re-enter the screen to see the correct information on the screen." to "A display may not appear to be refreshed with new information (black boxes may appear around the fields) in the Worklist, Daily Checks, or after a setup or configuration change. Exit and re-enter the screen to see the correct information on the screen, or use the mouse instead of the touchscreen" in Refresh in CHAPTER 1, System Overview
- Added the statement "If a privacy or security incident related to the product has occurred, contact your Beckman Coulter Representative." in Privacy and Security in CHAPTER 1, System Overview
- Added Product Cybersecurity Information in CHAPTER 1, System Overview
- Added "In a connected system, all workstations (Review station and System Manager) indicate the errors for all instruments (SPM). Verify that the instrument displayed in the upper left-hand Status area is the instrument where the task, such as replenishing supplies, replacing reagent containers, running daily checks, or running diagnostics, needs to be performed." in Viewing System Status in CHAPTER 1, System Overview
- Added Restarting a Review Station in CHAPTER 1, System Overview
- Added statement about ordering consumables in Supplies in CHAPTER 1, System Overview
- Added additional bulleted information to COULTER DxH Retic Pack in CHAPTER 1, System Overview
- Added Peripheral Setup in CHAPTER 1, System Overview
- Updated the dimensions and weight in Space and Accessibility Requirements - DxH 900 in CHAPTER 1, System Overview
- Updated the dimensions and weight in Space and Accessibility Requirements - DxH 690T in CHAPTER 1, System Overview
- Added a NOTE in the Anticoagulant section under Performance in CHAPTER 1, System Overview
- Added the CLSI reference in Synovial Fluid subsection in Reference Range Studies in CHAPTER 1, System Overview
- Added the CLSI reference in Body Fluids subsection in Sample Stability and Storage in CHAPTER 1, System Overview
- Added "on the predicate DxH 800 instrument" to the first sentence in Venous and Capillary Sample Performance Characteristics in CHAPTER 1, System Overview
- Added "on the predicate DxH 800 instrument" to the first sentence in Closed and Open Vial Characteristics in CHAPTER 1, System Overview
- Added "on the predicate DxH 800 instrument" to the first sentence in Whole Blood and Predilute Performance Characteristics in CHAPTER 1, System Overview
- Added "Use of non-Beckman Coulter Stains and Buffers" information in Stains and Buffers in CHAPTER 1, System Overview

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- Updated first sentence to include “or a comparator hematology instrument” in the Accuracy section, Body Fluids in CHAPTER 1, System Overview
- Added “On a stand-alone DxH Slidemaker Stainer, you must wait until a slide is completed before adding a new slide request to an existing test order using the Patient Results screen.” in the Slidemaking and Staining section, Overview in CHAPTER 2, Operation Principles
- Changed “CDR” to “CBC/Diff/Retic” in Workcell Logic in CHAPTER 2, Operation Principles
- Added “Comments are not printed for the Daily Checks Data Summary log. To view comments, go to Event Logs, select Data Summary Logs from the Log Type drop-down menu and select the Daily Checks tab. Select the Comments button to view the comments.” in Printing Daily Checks in CHAPTER 3, Daily Checks
- Added Viewing Comments for the Daily Checks Data Summary Log in CHAPTER 3, Daily Checks
- Updated step 3 in Enabling Daily Checks Auto Report in CHAPTER 3, Daily Checks
- Changed “Batch Mean table” to “XB Batch Mean table” in Out of Control Batches in CHAPTER 4, Quality Control
- Added “Do not load two or more control vials with the same lot number in a cassette when the control is set up to run on more than one DxH 900 within a workcell configuration. After initial analysis of the control vials, the instrument will be stalled. To recover, power OFF and power ON the stalled DxH 900 instrument. When the cassette exits, remove any duplicate vials from the cassette and present the cassette again to process the applicable control. When an inactive control exists and the system auto-configures another control with the same ID as the inactive control, if you change the state from inactive to active, the system will detect a duplicate control ID and generate an error. Delete one of the active control files in order to be able to activate the inactive control and to reuse the ID. Run Body Fluid controls in single-tube presentation on only one SPM at a time in a workcell.” in Analyzing Commercial Controls in CHAPTER 4, Quality Control
- Added “IMPORTANT: Do not load patient samples and/or patient controls in the same cassette with COULTER Cell controls. Otherwise, the cassette will be skipped and the sample processing module will go offline.” and “Confirm that commercial controls are within limits before processing patient samples according to your laboratory procedures and/or local and state requirements.” in Using QC Auto Rerun in CHAPTER 4, Quality Control
- Added “If Extended QC is enabled and the values for Delta Diff and RMSE are printed as blank in the Extended QC Summary Report, this implies an internal formatting error. Run QC again to correct the error. If printing a blank Delta Diff and RMSE persists, call your Beckman Coulter Representative.” in Quality Control (Data View) Screen - Components in CHAPTER 4, Quality Control
- Added “The shift value in .csv and IQAP export files is always 0 (indicating all shifts). Print the QC Run Details report or view the QC Run Details screen to determine the shift for an individual run.” in Exporting Quality Control Data in CHAPTER 4, Quality Control
- Added “If the XB/XM icon turns red, the display does not automatically go to the test location screen where the error occurred. Navigate through the individual instrument’s XB/XM screens to determine the location of any error.” in Navigating to XB in CHAPTER 4, Quality Control
- Updated step 1 in Manually Print XB Batch Reports in CHAPTER 4, Quality Control

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- Added “If the XB/XM icon turns red, the display does not automatically go to the test location screen where the error occurred. Navigate through the individual instrument’s XB/XM screens to determine the location of any error.” in Navigating to XM in CHAPTER 4, Quality Control
- Added “The aspiration error *P* flag may be present when the diluent blank is run to verify background counts prior to body fluid analysis. The diluent blank result with a *P* flag can be accepted except when accompanied by other system event messages indicating a hardware parameter such as voltage, temperature, or pressure is out of limit. This includes System Event: RBC or TNC.” in Body Fluids in CHAPTER 5, Sample Analysis
- Added “NOTE: If a Secondary ID is entered for a manually entered test order and during Sample Analysis, the specimen was skipped with a Secondary ID Mismatch because the Secondary ID entered does not match the Tube Position in which the sample was placed, the sample must be run manually or the order deleted and resubmitted with the correct Secondary ID. Beckman Coulter recommends using only the Primary Identifier when manually entering test orders.” in Manually Entering a Test Order in CHAPTER 5, Sample Analysis
- Added “NOTE: When you use the LIS to add comments to test orders, do not manually add comments in the workstation to prevent the comments originating from the host to be edited. This occurs when comments are received from the LIS. If comments are added to a test order prior to making changes to the patient associated to the test order, the added comments for the order will be deleted. View the test order and re-enter the previously added comments.” in Adding Comments to a Test Order in CHAPTER 5, Sample Analysis
- Added “IMPORTANT: When there are three DxH 900 instruments in a workcell, ensure that the cassettes are all loaded for Sample Analysis in the input buffer of the rightmost instrument or are distributed among the input buffers for all three DxH 900 instruments to obtain the best possible workload distribution.” in Cassette Presentation in CHAPTER 5, Sample Analysis
- Added “Using short tubes below the minimum tube height of 55 mm in the left (lavender) position will result in an error message being displayed: *Tube not detected*. If *Unable to Switch Instrument State* is displayed, select **OK**, request single-tube presentation again, and remove the tube. Replace the tube with a tube that meets the minimum tube height requirement.” in Single-Tube Presentation in CHAPTER 5, Sample Analysis
- Added “The single-tube presentation is also used to analyze STAT samples.” in Single-Tube Presentation in CHAPTER 5, Sample Analysis
- Updated the information for “Locate” in the table in Not Processed Tab in CHAPTER 6, Data Review
- Added “Exporting large amounts of data to a USB drive can take a significant amount of time. Plan accordingly.” in Export Released Results in CHAPTER 6, Data Review
- Added “In a connected configuration, exporting CSV files (INF/DAT) for any QC files should be done from the System Manager. Exporting from the review station is not recommended because the files reside within the System Manager.” in Export Released Results in CHAPTER 6, Data Review
- Updated “Description” for “Flag & Position” for “R” in Table 6.1 in Flags in CHAPTER 6, Data Review

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- Updated “Description” for “HGB Blank Shift” and for “PLT Inter: Debris” in Table 6.4 in System Messages in CHAPTER 6, Data Review
- Updated “Description” for “Reticulocytosis #” in Table 6.5 in Definitive Messages in CHAPTER 6, Data Review
- Updated “Description” for “Default Test Order” and “No Match” in Table 6.8 in Exception Messages in CHAPTER 6, Data Review
- Created new section Log Off in CHAPTER 8, Shutdown
- Added “NOTE: After initiating Daily Checks or Shutdown, leaving the screen and returning disables **View Log**. Wait for Daily Checks or Shutdown to be completed before selecting **View Log**.” in Shut Down in CHAPTER 8, Shutdown
- Removed 3 steps and updated steps 1, 2, 3, 4, and 7 in Running Prolonged Shutdown (48 Hours to 7 Days) - DxH Slidemaker Stainer II in CHAPTER 8, Shutdown
- Updated steps 6 and 7 in Placing the DxH Slidemaker Stainer II in Operational Mode After Prolonged Shutdown in CHAPTER 8, Shutdown
- Added new section Power Down in CHAPTER 8, Shutdown
- Added new section Power Up in CHAPTER 8, Shutdown
- Updated the first bulleted section including the bulleted numbers in Power States in CHAPTER 8, Shutdown
- Added “When you configure Stainer supplies, ensure that the Shelf Life Exp entered is prior to January 19, 2038 (for software versions prior to v.2.0.0).” in step 4 in Setting Up DxH Slidemaker Stainer II Reagents in CHAPTER 9, Setup
- Added “IMPORTANT: The system does not accept a Shelf Life Exp beyond January 18, 2038.” in Set Up/Edit Other Reagents in CHAPTER 9, Setup
- Added “IMPORTANT: To prevent shutdown failures, after performing a database recovery, ensure that shutdowns are not performed during a database backup.” in Setting Up Backup and Recover in CHAPTER 9, Setup
- Added new password information in Operators and Roles in CHAPTER 9, Setup
- Added new section titled User Lockout Settings in CHAPTER 9, Setup
- Added new section titled Active Directory Setup in CHAPTER 9, Setup
- Added new section titled Searching/Adding a User in the Active Directory in CHAPTER 9, Setup
- Added new section titled Banner Setup in CHAPTER 9, Setup
- Added “IMPORTANT: To prevent database errors, ensure all instruments are offline when adding or editing Flagging Limits.” in Flagging Limits in CHAPTER 9, Setup
- Added “IMPORTANT: Do not delete decision rules if they have been triggered on patient specimens. If the rule is no longer valid, disable the rule by selecting **Menu > Setup > Flagging/Rules > Rules > Active Decision Rules** tab. Select the rule to be disabled and select **Disable Rule**.” in Activating Rules in CHAPTER 9, Setup
- Added “NOTE: Using extra digits of precision may impact the rounding of results. The system should not be configured to use extra digits of precision.” in Units Format in CHAPTER 9, Setup
- Added “NOTE: When a patient control file is in an inactive state and no other active or accumulating control file exists with the same control ID, then the specific ID is no longer treated as a reserved control identifier.”in New Patient Control in CHAPTER 9, Setup

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- Updated step 5 in Entering a Beckman Coulter Control Manually in CHAPTER 9, Setup
- Added "NOTE: When the Advanced Search on the Custom tab for the Worklist includes *Presentation = Single Tube*, the result of the search may be incomplete. Conduct a new search to obtain a complete list by entering **Tube Pos. ID Contains 99999**." in Custom Worklist Filter in CHAPTER 9, Setup
- Added "*Collection Date and Time* does not appear on printed patient reports. This information is available as *Draw Date and Time* on test order screens, result displays, and patient export files (.csv), and in specific fields in the host transmission." in Inserting a Draw Date/Time in CHAPTER 9, Setup
- Updated section title from "Radiation Statement" to Laser Radiation Statement in CHAPTER 10, Troubleshooting
- Added the statement "The DxH 900 and the DxH 690T are Class 1 Laser Products." in Laser Radiation Statement in CHAPTER 10, Troubleshooting
- Removed "U.S. Department of Health and Human Services" bullet point and added "IEC 60825-1 (Safety of Laser Products)" bullet point in Laser Radiation Statement in CHAPTER 10, Troubleshooting
- Rewrote Electromagnetic Compatibility (EMC) in CHAPTER 10, Troubleshooting
- Added a new statement to Disposal of Electrical Instrumentation in CHAPTER 10, Troubleshooting
- Added the order for removing and installing the front cover and transport shield in Covers and Shields in CHAPTER 10, Troubleshooting
- Updated Figure 10.9 in Monitor the System in CHAPTER 10, Troubleshooting
- Updated the names of the procedures for resolving a plugged aperture and added "NOTE: The Zap Apertures procedure is the simpler procedure and may be all that is needed to remove the blockage or buildup so always try the Zap Apertures procedure first." in Resolve a Plugged Aperture in CHAPTER 10, Troubleshooting
- Added Zapping Apertures in CHAPTER 10, Troubleshooting
- Removed When a WBC Aperture is Plugged in CHAPTER 10, Troubleshooting
- Removed When an RBC Aperture is Plugged in CHAPTER 10, Troubleshooting
- Added Clearing an RBC Aperture (Software v1.1.1 and Prior) in CHAPTER 10, Troubleshooting
- Updated step 5 and the graphic in Verifying the Aspiration Probe Alignment - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Added "NOTE: If the LIS Data Transport is Ethernet, there is no need to attach a loopback connector. Select **OK** when you are prompted to attach a loopback connector." in Performing a Loopback Check in CHAPTER 10, Troubleshooting
- Added "Agitation motor down position cannot be verified" event messagein Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Added the "Agitation motor position cannot be verified" event message in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Updated the "Action" for "Bath tray drawer is unexpectedly in down position" and "Bath tray drawer position cannot be verified" in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Updated all the "Action" steps for "Stainer bath tray is full. Operator must empty bath tray." in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting

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- Updated all the “Action” steps for “Stainer bath tray liquid level cannot be verified” in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Updated all the “Action” steps for “Stainer reagent over delivered” in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Added new event message “Incomplete Flush Stainer Module procedure” in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Added new event message “Out of flush reagent or hardware failure” in Table 10.2, Error Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Added the “Out of Reagent” event message in Table 10.3, Informational Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Updated the “Action” for “Bath level is low” by adding a new step 4, “Press (F10).” in Table 10.4, Warning Event Messages - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting
- Updated “Action” for “All diluent supplies are depleted” in Table 10.5 in Event Messages from the System Manager with Action Required in CHAPTER 10, Troubleshooting
- Updated “Action” for “Perform Weekly Stainer Maintenance” in Table 10.6 in Event Messages from the System Manager with Action Required in CHAPTER 10, Troubleshooting
- Added Additional Troubleshooting section to CHAPTER 10, Troubleshooting
- Added report printout information in Calibrating with COULTER S-CAL Calibrator in CHAPTER 11, Quality Assurance
- Updated Table 12.1 in When, Why, and How to Perform Each Procedure - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures
- Updated Table 12.2 in Why, When, and How to Perform Each Procedure - DxH Slidemaker Stainer II in CHAPTER 12, Cleaning Procedures
- Added Performing the Flush Stainer Module Procedure - DxH Slidemaker Stainer II - Automatic Procedure (Software v1.2.0 and Prior) in CHAPTER 12, Cleaning Procedures
- Added Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0) in CHAPTER 12, Cleaning Procedures
- Added Flush Stainer and Clean Stainer Baths and Tray (Software v2.0.0 if Drain All Baths and Flush Stainer is Enabled and the Proper Hardware is Installed) in CHAPTER 12, Cleaning Procedures
- Added Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED) in CHAPTER 12, Cleaning Procedures
- Added “Preparing to fill the stainer with fresh stain to allow for optimal performance.” and “CAUTION: Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)” and updated steps 1, 2, 4, 6, 11, 16, and 17 in Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes in CHAPTER 12, Cleaning Procedures

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- Added a graphic, "NOTE: This procedure does not apply to these new fill and drain probes," and "Follow this procedure to remove stain buildup and to unclog fill probes and drain probes." to Extensive Cleaning of Fill Probes and Drain Probes - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES in CHAPTER 12, Cleaning Procedures
- Updated Replacing a Bath - DxH Slidemaker Stainer II in Table 13.2, Matrix of Frequency for Replacement Procedures - DxH Slidemaker Stainer II in CHAPTER 13, Replacement/Adjustment Procedures
- Added step 2 in Replacing a Bath - DxH Slidemaker Stainer II in CHAPTER 13, Replacement/Adjustment Procedures
- Added "collar" and replaced "tube" with "probe" to the NOTE in step 9 in Remove the Aspiration Probe in CHAPTER 13, Replacement/Adjustment Procedures
- Added a graphic, "NOTE: This procedure does not apply to these new fill and drain probes," and "Follow this procedure when replacing or cleaning fill probes and drain probes." in Replacing Fill Probes and Drain Probes - DxH Slidemaker Stainer II - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES in CHAPTER 13, Replacement/Adjustment Procedures
- Added "NOTE: In order to minimize spillage, perform this procedure when the reagent supply has been depleted." in Replacing the Stainer Reagent Line Filters - DxH Slidemaker Stainer II in CHAPTER 13, Replacement/Adjustment Procedures
- Removed the word "Other" from step 8 in Replacing Reagent Containers - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures
- Added "NOTE: The Printer Ribbon contains Protected Health Information (PHI), dispose accordingly." under step 3 in Remove the Printer Cartridge in CHAPTER 13, Replacement/Adjustment Procedures
- Updated "Export and Reset Workload Data" and "Configure LIS Communications" in Table B.1, and added "** A Level III operator cannot perform Reset Workload. To reset workload data, call your Beckman Coulter Representative." in Table B.1, Operator Access Levels in APPENDIX B, Operator Access
- Updated the first paragraph to read "Select the icon displaying **!** or select **Menu > Logs** at the top of any screen to display the History Logs screen. The icon background may be either yellow or red for an unreviewed event, or neutral if all events have been reviewed." in History Logs in APPENDIX C, Logs
- Added "and are not associated with a calendar date" in Event Logs in APPENDIX C, Logs
- Added step 5 in Filtering Event Log in APPENDIX C, Logs
- Added "To see all of the events matching the **Filter** criteria selected, do not select **Unreviewed** or **Guided Help Available.** Ensure that they are not selected. If **Unreviewed** or **Guided Help Available** are selected, the **Filtered By** fields are updated to reflect the selections." in Reviewing Events in the General Event Log in APPENDIX C, Logs
- Added "No audit log entry occurs to indicate that a physician or location that already exists in the workstation is received from the LIS. Subsequent attempts to modify that physician or location via the workstation will be prevented since it is managed by the LIS." in step 2 in Audit Logs in APPENDIX C, Logs
- Added new section Audit Log Setup in APPENDIX C, Logs
- Added "NOTE: If the algorithm version is not printed on the Patient Lab report, select **Patient Results > Additional Information** and refer to the version number in *Algorithm Version*." in Report Examples in APPENDIX D, Reports

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- Replaced reports for D.13, D.14, D.15, D.16, D.17, and D.18 with updated reports in Report Examples in APPENDIX D, Reports
- Rewrote DxH Slidemaker Stainer - Flushing Reagent Lines with Methanol, Wright Giemsa Stain, or Wright Stain (Manual Procedure) in APPENDIX G, Job Aids
- Added UniCel DxH Series Cleaning Checklist in APPENDIX G, Job Aids
- Added UniCel DxH Slidemaker Stainer II Cleaning Checklist in APPENDIX G, Job Aids
- Rewrote step 1 in Export to IQAP in APPENDIX H, Adding, Copying, and Exporting Files
- Added new section Setting File Encryption for PHI Data in APPENDIX H, Adding, Copying, and Exporting Files
- Updated definition of term photometric measurement in Glossary
- Added a reference (# 55) to References
- Added a reference (#56) to References
- Added a reference (#57) to References
- Added the part number for the Hematology Tube List in Related Documents
- Added link to Summary of Safety and Performance in Related Documents
- Added the part number for the RoHS Table of Hazardous Substances in Related Documents

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Safety Notice

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.

This device is intended for indoor use only. Safety protection may be impaired if used in a manner not specified by the manufacturer.

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 is not limited to, protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this or any other automated laboratory analyzer.

Notice to User

For a patient/user/third party in the European Union and in countries with identical regulatory regime (Regulation 2017/746/EU on In Vitro Diagnostic Medical Devices); if, during the use of this device or as a result of its use, a serious incident has occurred, please report it to the manufacturer and/or its authorized representative and to your national authority.

Alerts for Warning and Caution

Throughout this manual, you will see the appearance of these alerts for Warning and Caution conditions:

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury. May be used to indicate the possibility of erroneous data that could result in an incorrect diagnosis.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. May be used to indicate the possibility of erroneous data that could result in an incorrect diagnosis.

Safety Precautions

⚠ 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.**
- **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 could be compromised and operational failures could 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.**

⚠ CAUTION

If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, 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.

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Tables

Introduction

Overview

This chapter contains the following topics:

- How to Use Your Manuals
- About This Manual
- System Help
- Conventions
- Graphics

How to Use Your Manuals

Use this Instructions for Use manual for the day-to-day operations of your DxH 900 workcell and stand-alone DxH 900, DxH 690T, and DxH Slidemaker Stainer II.

This manual contains:

- Safety information
- Specifications and characteristics
- Principles of operation
- Detailed information for daily operation
- Maintenance and troubleshooting information

Use the Host Transmission Manual to find the information needed to program the transmission interface between the DxH 900/DxH 690T and your laboratory's host computer.

To quickly determine which manual to read for the information you need, see Related Documents.

About This Manual

NOTE Screens and hardware depicted in this manual may differ slightly from the screens and hardware in your DxH 900/DxH 690T and DxH Slidemaker Stainer II System configuration.

The information in your Instructions for Use manual is organized as follows:

CHAPTER 1, System Overview
States the instrument's intended use, the controls and indicators to be used, information on performance, and information on using the system's software.

CHAPTER 2, Operation Principles
Contains a description of the Coulter Method, the normal sample flow, counting and sizing, VCSn technology, measurement of hemoglobin concentration, derivation of parameters, and descriptions of the various modules.

CHAPTER 3, Daily Checks
Provides information on how to perform and review Daily Checks.

CHAPTER 4, Quality Control
Provides information on how to run quality control material.

CHAPTER 5, Sample Analysis
Provides information on specimen collection, affixing a bar code label to a tube, loading cassettes, adding a test order, running samples, setting up your DxH Slidemaker Stainer II's auto settings, stain protocols, and supplies.

CHAPTER 6, Data Review
Provides information on reviewing and interpreting sample results, including flagged results.

CHAPTER 7, Workload
Provides information on Workload screens.

CHAPTER 8, Shutdown
Provides information on shutdown for one or more SPMs and the DxH Slidemaker Stainer II.

CHAPTER 9, Setup
Provides information on setting up your system including supplies, operators and roles, flagging and rules, reporting, patient demographics, quality control, DxH Slidemaker Stainer II settings, and stain protocols.

CHAPTER 10, Troubleshooting
Describes safety precautions, operational hazards, and troubleshooting guides.

CHAPTER 11, Quality Assurance
Provides an overview of calibration, instructions for precalibration checks, and procedures for repeatability, carryover, and calibration.

CHAPTER 12, Cleaning Procedures
Describes when, why, and how to perform cleaning procedures.

CHAPTER 13, Replacement/Adjustment Procedures
Describes when, why, and how to perform replacement procedures.

This manual also includes references, appendices, a list of abbreviations and acronyms, a glossary, and an index.

System Help

The DxH 900/DxH 690T Systems have comprehensive System Help, which includes reference information, and operating, maintenance, and troubleshooting procedures.

Select the **Help** icon at the top right of any screen on the System Manager to access System Help.

Help can also be accessed by selecting the **Troubleshoot** button displayed for an event log.

NOTE If the information displayed after selecting the **Help** or **Troubleshoot** button does not appear to be relevant to the subject, use the Search function to look for a topic.

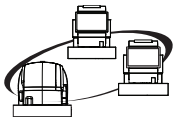
Conventions

This manual uses the following conventions:

- **Bold** font indicates buttons on the System Manager screens,
- *Italics* font indicates screen text displayed by the System Manager.
- The term *Select* is used to indicate either one or both of the following actions:
  - to tap or touch with your finger
  - to click with a mouse

IMPORTANT IMPORTANT is used for comments that add value to the step or procedure being performed. Following the advice in the IMPORTANT adds benefit to the performance of a piece of equipment or to a process.

NOTE NOTE is used to call attention to notable information that should be followed during use or maintenance of this equipment.

 indicates that the information following the graphic applies to DxH 900 workcells.

The instructions in this manual are presented at the Lab Administrator level. For levels of access for other types of operators, see APPENDIX B, Operator Access.

The *VCSn* technology referenced in this manual may be referred to as *VCS 360* in promotional materials.

Graphics

All graphics, including screens and printouts, are for illustration purposes only and must not be used for any other purpose.

CHAPTER 1

System Overview

Intended Use

DxH 900 and DxH 690T

The UniCel DxH 900/DxH 690T Coulter Cellular Analysis System is a quantitative, multi-parameter, automated hematology analyzer for in vitro diagnostic use in screening patient populations found in clinical laboratories.

The DxH 900/DxH 690T analyzer identifies and enumerates the parameters shown in Table 1.1, System Parameters.

DxH Slidemaker Stainer II

The UniCel DxH Slidemaker Stainer II Coulter Cellular Analysis System is a fully automated slide preparation and staining device that aspirates a whole-blood sample, smears a blood film on a clean microscope slide, and delivers a variety of fixatives, stains, buffers, and rinse solutions to that blood smear.

Intended User

This device is intended to be used by a laboratory professional.

System Parameters

Table 1.1 System Parameters

Parameter	Whole Blood (Venous or Capillary)	Prediluted Blood (Venous or Capillary)	Body Fluids (Cerebrospinal, Serous, or Synovial)
WBC	X	X	
RBC	X	X	X
HGB	X	X	
HCT	X	X	
MCV	X	X	
MCH	X	X	
MCHC	X	X	
RDW	X	X	

Table 1.1 System Parameters *(Continued)*

Parameter	Whole Blood (Venous or Capillary)	Prediluted Blood (Venous or Capillary)	Body Fluids (Cerebrospinal, Serous, or Synovial)
RDW-SD	X	X	
PLT	X	X	
MPV	X	X	
NE% and #	X		
LY% and #	X		
MO% and #	X		
EO% and #	X		
BA% and #	X		
NRBC% and #	X		
RET% and #	X		
MRV	X		
IRF	X		
TNC			X

Overview

The DxH 900 System may consist of a workcell (multiple connected DxH 900 instruments with or without a DxH Slidemaker Stainer II), a stand-alone DxH 900, or a stand-alone DxH Slidemaker Stainer II.

NOTE A UniCel DxH 800 and/or a UniCel DxH Slidemaker Stainer cannot be included in a DxH 900 workcell system. The DxH 900 workcell system will not allow them to be connected.

The DxH 690T System consists of a stand-alone DxH 690T instrument.

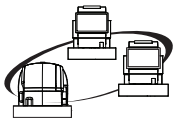
Table 1.2 DxH 900, DxH 690T, and DxH Slidemaker Stainer II Stand-alone Instruments, and DxH 900 and DxH Slidemaker Stainer II Workcell Configurations

Configuration	Topologies				System Manager	Review Stations
DxH 900	DxH 900				Standard Computer	N/A
DxH 690T	DxH 690T				Standard Computer	N/A
DxH Slidemaker Stainer II	DxH Slidemaker Stainer II				Standard Computer	N/A
DxH 900 S	DxH Slidemaker Stainer II	DxH 900			Standard Computer	Optional Stand-alone Review Station with Standard Computer
DxH 900-2	DxH 900	DxH 900			Power Computer	Power Computer

Table 1.2 DxH 900, DxH 690T, and DxH Slidemaker Stainer II Stand-alone Instruments, and DxH 900 and DxH Slidemaker Stainer II Workcell Configurations *(Continued)*

Configuration	Topologies				System Manager	Review Stations
DxH 900-2 S	DxH Slidemaker Stainer II	DxH 900	DxH 900		Power Computer	One Review Station required with a Power Computer. Optional Review Station with Standard Computer
DxH 900-3	DxH 900	DxH 900	DxH 900		Power Computer	Two Review Stations required, one with Power Computer and one with Standard Computer
DxH 900-3 S	DxH Slidemaker Stainer II	DxH 900	DxH 900	DxH 900	Power Computer	Two Review Stations required, one with Power Computer and one with Standard Computer. Optional Stand-alone Workstation with Standard Computer

DxH 900 Workcell



The available DxH 900 workcell systems are listed in Table 1.2, DxH 900, DxH 690T, and DxH Slidemaker Stainer II Stand-alone Instruments, and DxH 900 and DxH Slidemaker Stainer II Workcell Configurations.

Figure 1.1 Example of a DxH 900 Workcell

The various workcell configurations are described in Table 1.2, DxH 900, DxH 690T, and DxH Slidemaker Stainer II Stand-alone Instruments, and DxH 900 and DxH Slidemaker Stainer II Workcell Configurations. Depending on the configuration, your System Manager and/or Review Station may be a standard computer or a power computer.

DxH 900

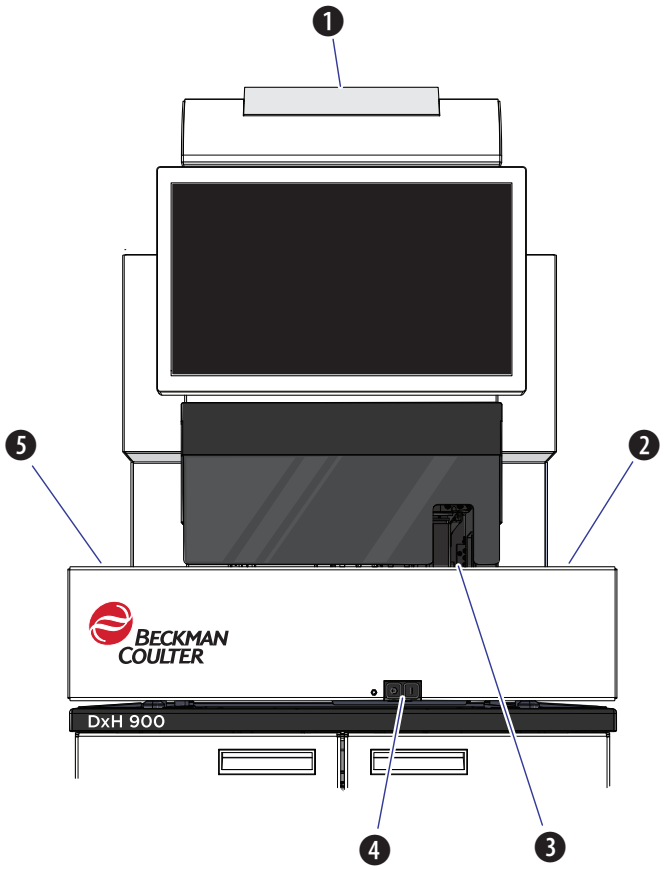
The DxH 900 is available as a stand-alone instrument or within a workcell.

The DxH 900 includes:

- A System Manager consisting of a standard computer with a CD/DVD RW drive running Microsoft® Windows® 10 operating system and the DxH Solutions software
- A LCD flat panel screen with touchscreen capability that includes an on-screen keyboard that is activated when you select an editable field

A wireless keyboard and optical mouse are included.

Figure 1.2 Front View of the Specimen Processing Module (SPM)



Number	Description
1	Beacon Alerts you to the state of the instrument and conditions requiring attention: • Amber - alert • Blue - system is offline; system is running studies, QC only, or diagnostics • Green - ready; online and without error • Red - system has stopped; action is needed
2	Input Buffer Area for placement of specimen cassettes
3	Single-Tube Station Station where you can process a single specimen
4	Power Button Lets you power the SPM ON and OFF
5	Output Buffer Area for removal of cassettes

DxH 690T

The DxH 690T is a table-top analyzer available only as a stand-alone instrument.

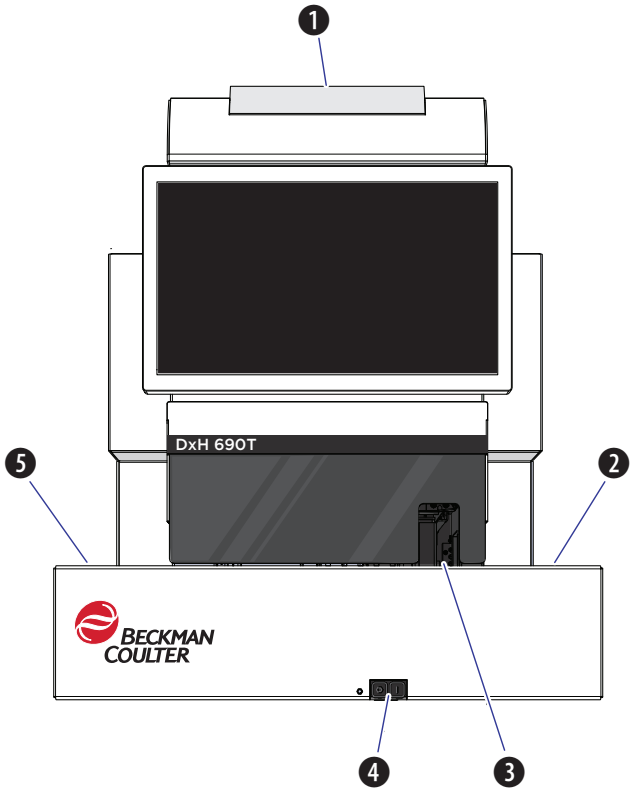
The DxH 690T includes:

- A System Manager consisting of a standard computer with a CD/DVD RW drive running Microsoft® Windows® 10 operating system and the DxH Solutions software
- A LCD flat panel screen with touchscreen capability that includes an on-screen keyboard that is activated when you select an editable field

A keyboard and mouse are available.

You can use a stylus on the touchscreen. See Stylus for more information.

Figure 1.3 Front View of the Specimen Processing Module (SPM)

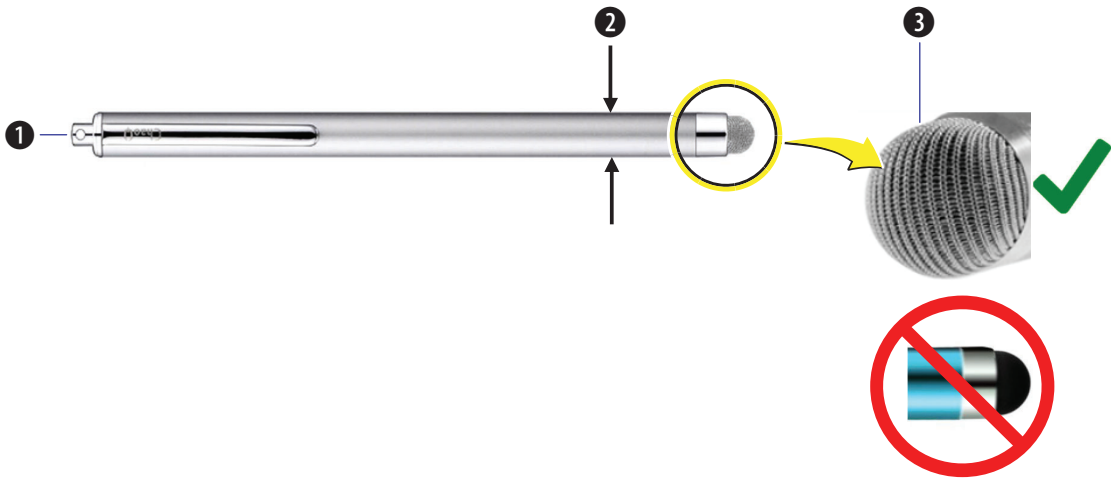


Number	Description
1	Beacon Alerts you to the state of the instrument and conditions requiring attention: • Amber - alert • Blue - system is offline; system is running studies, QC only, or diagnostics • Green - ready; online and without error • Red - system has stopped; action is needed
2	Input Buffer Area for placement of specimen cassettes
3	Single-Tube Station Station where you can process a single specimen
4	Power Button Lets you power the SPM ON and OFF
5	Output Buffer Area for removal of cassettes

Stylus

You can use a stylus on the touchscreen. The stylus should meet these specifications.

Figure 1.4 Stylus



Number	Description	Recommended Specification
1	Type	Capacitive Stylus
2	Stylus Diameter	0.88 cm (0.35 in.) to 0.99 cm (0.39 in.)
3	Stylus Pen Tip	Microfiber Tip (Beckman Coulter recommends a microfiber-tip stylus to avoid scratching the touchscreen. Do not use a rubber-tip stylus.)

DxH Slidemaker Stainer II

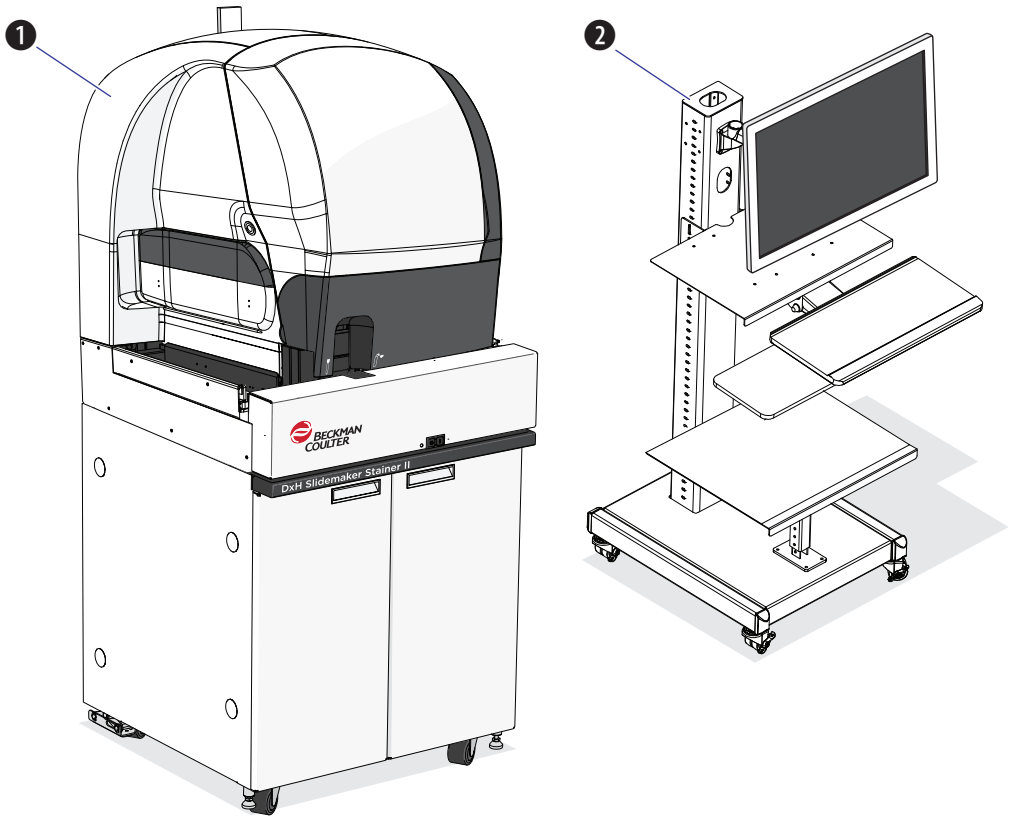
The DxH Slidemaker Stainer II (see Figure 1.5, DxH Slidemaker Stainer II) consists of a slidemaking module and a slidestaining module precisely integrated to provide process control, slidemaking and staining, and cassette or single-tube delivery of specimens.

The DxH Slidemaker Stainer II processes patient specimens and sends data to the System Manager.

The System Manager:

- Controls processes, such as making and staining blood smears, and diagnostic procedures.
- Manages data, such as test ordering, LIS interface, and logging.

Figure 1.5 DxH Slidemaker Stainer II

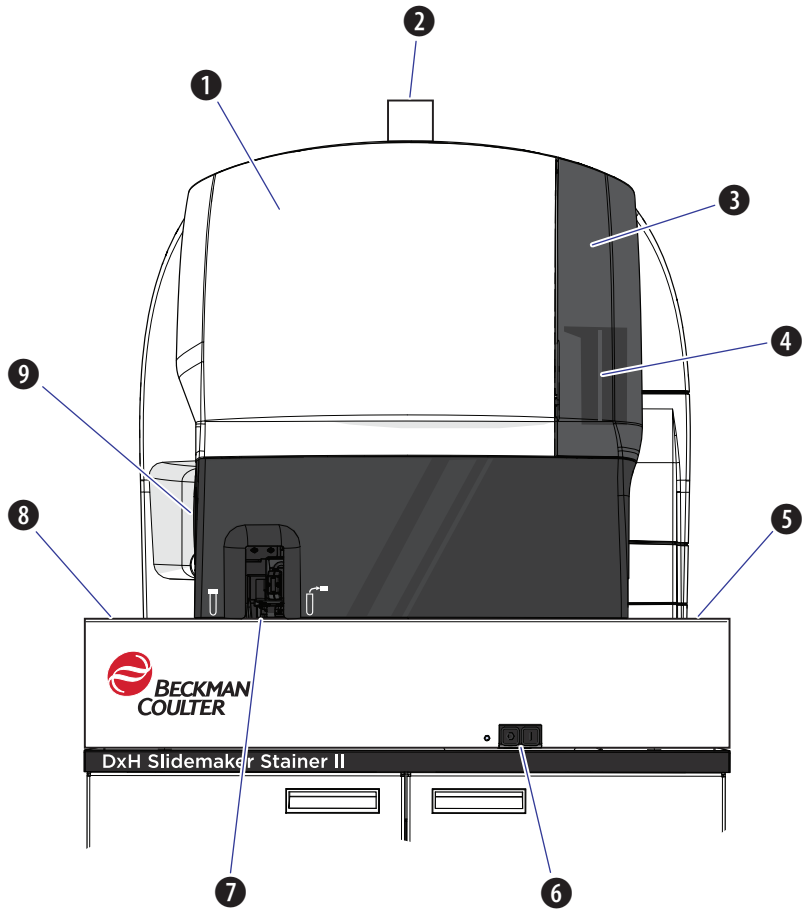


Number	Description
1	DxH Slidemaker Stainer II
2	System Manager Includes: • A LCD flat panel monitor with touchscreen capability that includes an on-screen keyboard that is activated when you select an editable field • A System Manager consisting of a standard computer with a CD/DVD RW drive running Microsoft® Windows® 10 operating system and the DxH Solutions software • A cart that holds the LCD flat panel monitor and the System Manager • A standard keyboard • An optical mouse

The DxH Slidemaker Stainer II consists of:

- Specimen Transport Module (STM)
- Sample Aspiration Module (SAM)
- Slidemaker Module
- Stainer Module and Basket Transport

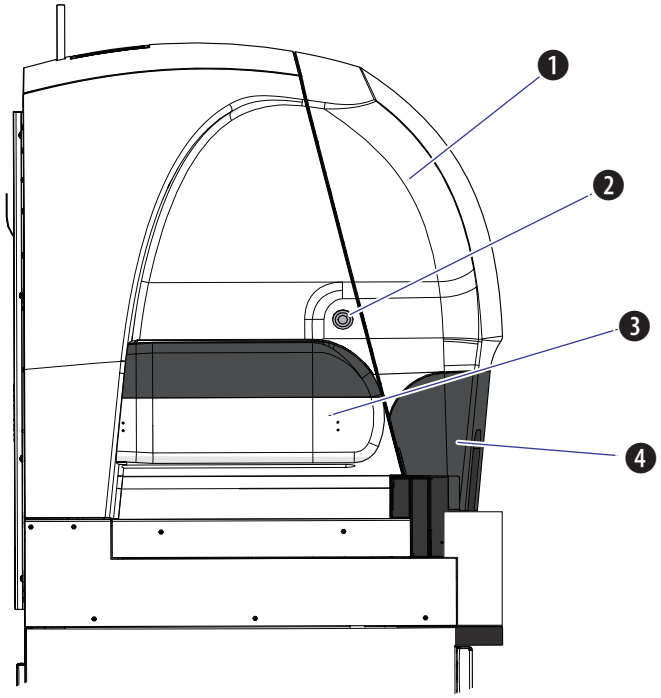
Figure 1.6 Front View of the DxH Slidemaker Stainer II



Number	Description	Number	Description
1	Front Cover	6	Power Switch
2	Beacon Alerts you to the state of the instrument and conditions requiring attention: • Amber - alert • Blue - not in patient processing state (offline) or may be in diagnostics; action is needed • Blue (blinking) - not in patient processing state (offline); slides have been processed and are ready to be removed from the I/O drawer • Green - ready • Green (blinking) - system is online; slides have been processed and are ready to be removed from the I/O drawer • Red - Slidemaker has an error and action is needed; Slidestainer can still work	7	Single-Tube Station
3	Ejector Door	8	Cassette Output Buffer

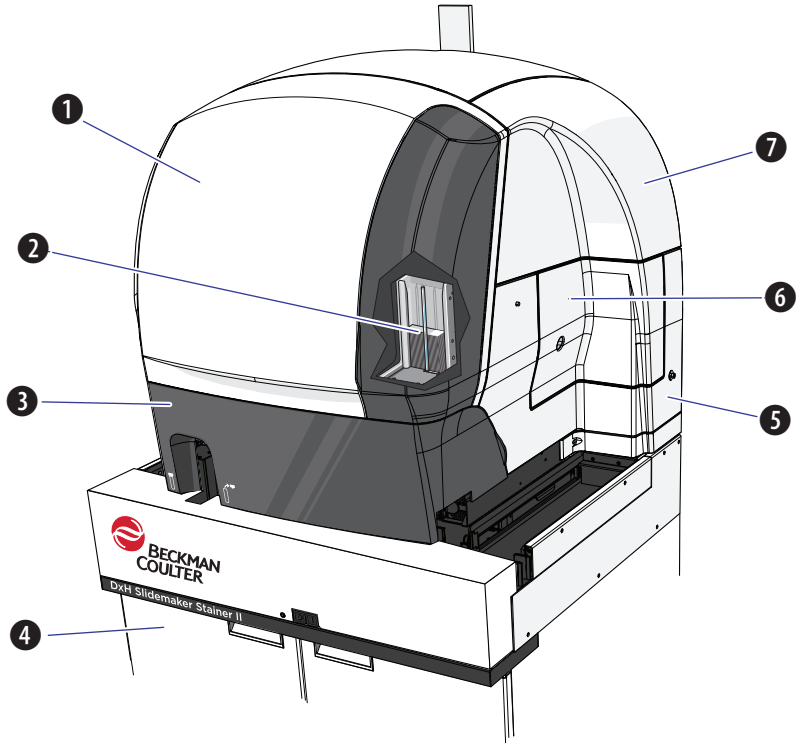
Number	Description	Number	Description
4	Slide Chute	9	Input/Output (I/O) Drawer
5	Cassette Input Buffer		

Figure 1.7 Left-Side View of the DxH Slidemaker Stainer II



Number	Description	Number	Description
1	Front Cover	3	I/O Drawer
2	Input/Output (I/O) Drawer Open/Close Button	4	Transport Shield

Figure 1.8 Right-Side View of the DxH Slidemaker Stainer II



Number	Description	Number	Description
1	Front Cover	5	Slide Printer Cover
2	Slide Chute	6	Cartridge Cover
3	Transport Shield	7	Upper Right-Side Cover
4	Floor Stand		

Hardware

The DxH 900/DxH 690T and the DxH Slidemaker Stainer II share many common components. However, each has individual components unique to their systems. These components are briefly described in this section.

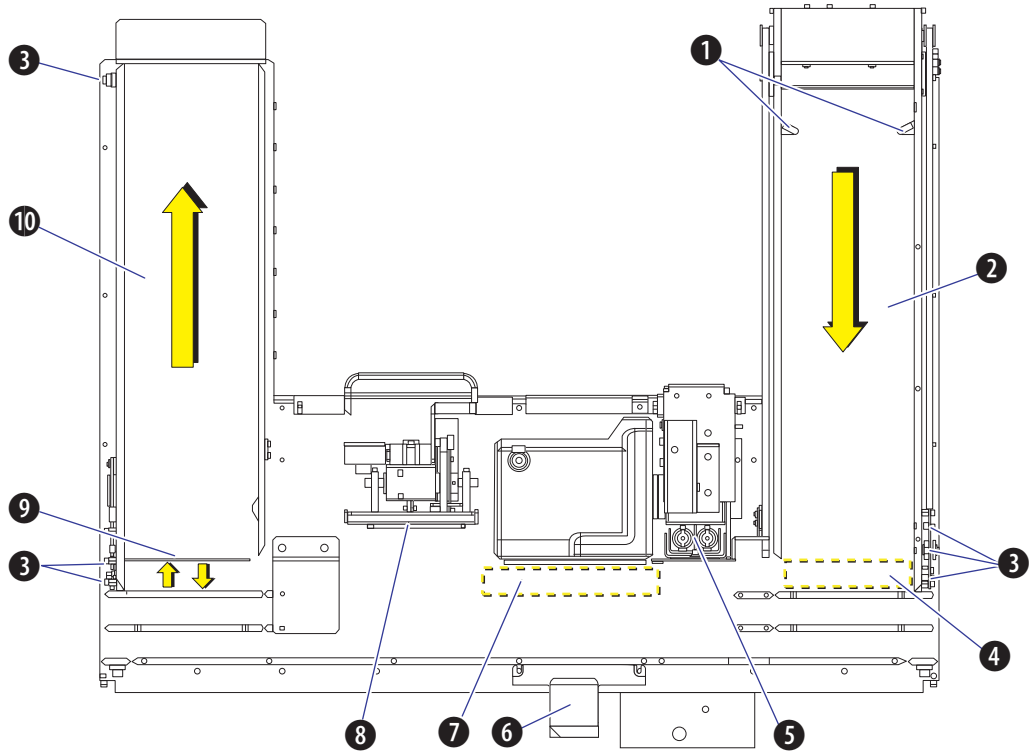
The flow of samples through the systems is described in CHAPTER 2, Operation Principles.

Inter-unit connections for power and signal cable, and consumable to module are described in APPENDIX F, System and Module Connections.

Specimen Transport Module (STM) - DxH 900/DxH 690T

The specimen transport module (STM) for the DxH 900/DxH 690T is shown in the following figure.

Figure 1.9 Specimen Transport Module (STM) - DxH 900/DxH 690T - Top-Level View



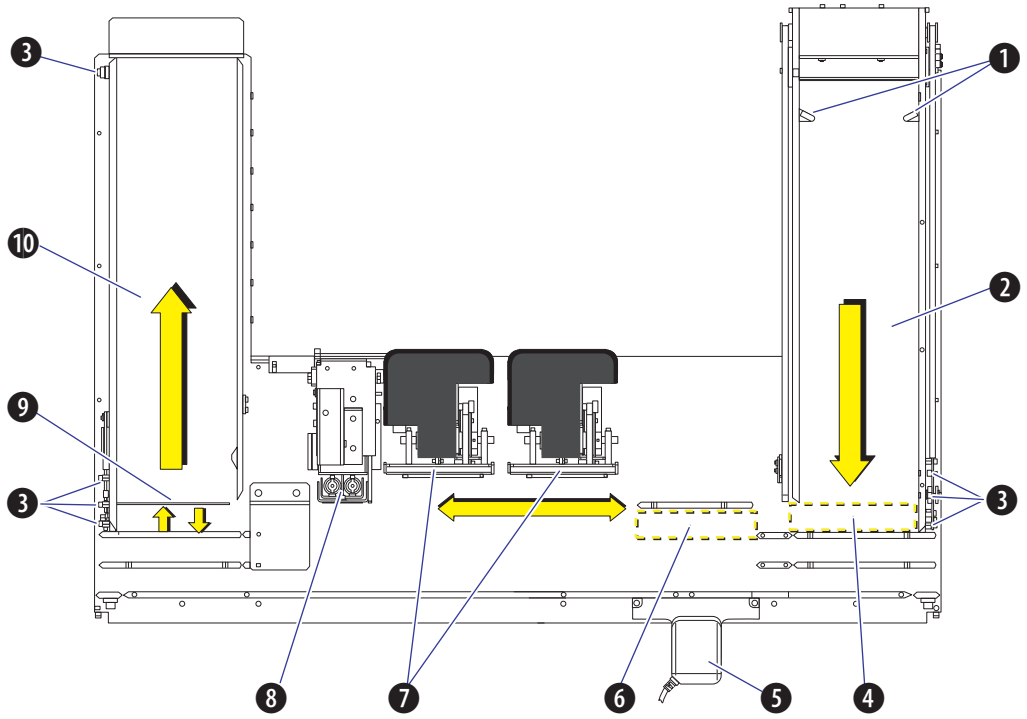
Number	Description	Number	Description
1	Input Buffer Pushers	6	Primary Bar Code Reader
2	Input Buffer	7	Primary Bar Code Reading Station
3	Cassette Detection Sensors	8	Mix Station
4	STAT Cassette Position	9	Output Buffer Pusher
5	Single-Tube Station	10	Output Buffer

Specimen Transport Module (STM)

The Specimen Transport Module (STM) uses magnets to transport cassettes containing closed-vial specimens. The STM supports specimen:

- Loading and unloading
- Transport and queuing
- Mixing and presentation

Figure 1.10 Specimen Transport Module (STM) - DxH Slidemaker Stainer II - Top-Level View



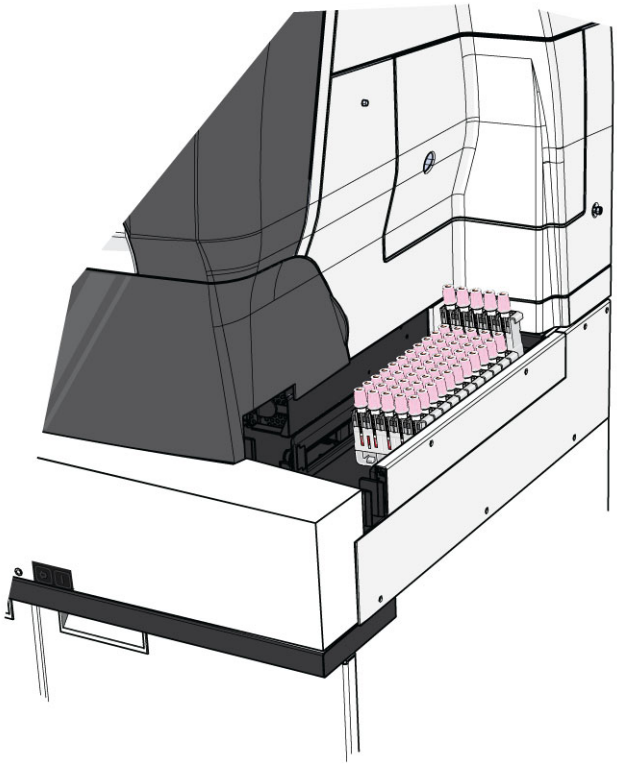
Number	Description	Number	Description
1	Input Buffer Pushers	6	Primary Bar Code Reading Station
2	Input Buffer	7	Mix Stations
3	Cassette Detection Sensors	8	Single-Tube Station
4	STAT Cassette Position	9	Output Buffer Pusher
5	Primary Bar Code Reader	10	Output Buffer

See DxH 900 Sample Flow in CHAPTER 2, Operation Principles for more information about the STM in connected systems.

Input Buffer

The input buffer is where you place specimen cassettes. The capacity is 20 cassettes. The STM uses magnets to sweep the cassettes forward for transport to the mixing station.

Figure 1.11 Input Buffer



Single-Tube Station

⚠ WARNING

Risk of contamination. When loading a tube, push the tube all the way down into the station.

⚠ CAUTION

Risk of erroneous results. Do not place a closed tube or a 16 mm diameter tube in the right position of the Single-Tube Station. Doing so could result in an incomplete aspiration and an erroneous result.

The Single-Tube Station accepts different sized tubes. A fixed bar code reader reads labels at or near the depression on the cover. Each side of the cradle has a mechanical switch for tube recognition.

The right (green) position indicated in Figure 1.12, Single-Tube Station - DxH 900, Figure 1.13, Single-Tube Station - DxH 690T, and Figure 1.14, Single-Tube Station - DxH Slidemaker Stainer II is designed for open vial aspiration from 7 to 13 mm diameter tubes. The open vial position uses a spring-drive adjustment to allow aspiration from tubes with minimal dead volume. The minimum tube height is 30 mm. The maximum tube height is 80 mm.

The left (lavender) position indicated in Figure 1.12, Single-Tube Station - DxH 900, Figure 1.13, Single-Tube Station - DxH 690T, and Figure 1.14, Single-Tube Station - DxH Slidemaker Stainer II adapts to both open and closed vial tubes from 10.5 to 13 mm in diameter. The minimum tube height is 55 mm (measured from under the cap). The maximum tube height is 107 mm (with cap, if present).

Figure 1.12 Single-Tube Station - DxH 900

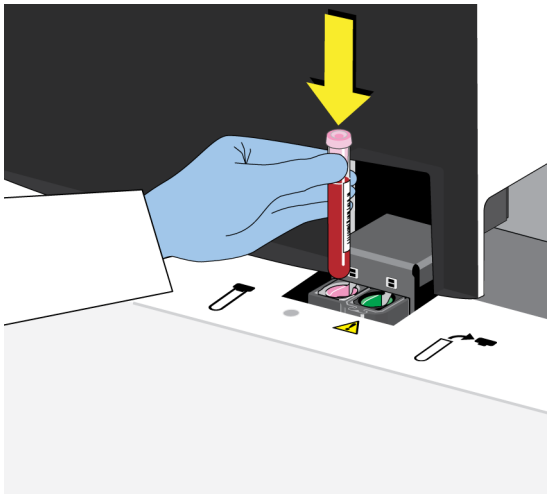


Figure 1.13 Single-Tube Station - DxH 690T

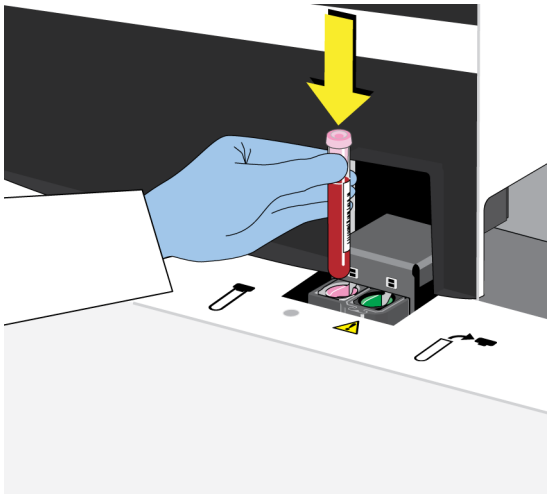
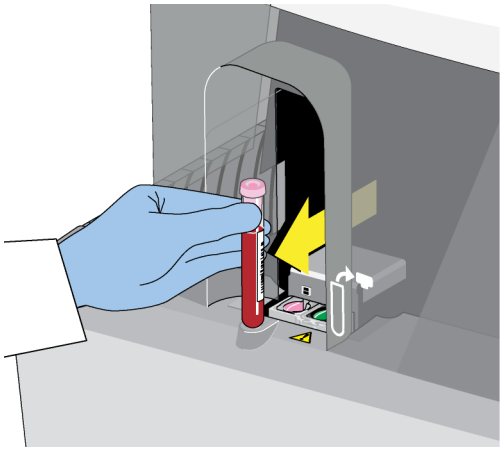


Figure 1.14 Single-Tube Station - DxH Slidemaker Stainer II



Bar Code Readers

The 2D compatible digital bar code reader is a camera that:

- Provides positive identification for all specimen tube IDs.
- Reads the cassette and specimen IDs prior to aspiration.
- Reads bar codes of 5 mil and larger.
- Reads a maximum number of 22 characters plus checksum.
- Supports Code 128, Codabar, NW7, Code 39, and Interleaved 2-of-5 symbologies.

NOTE The DxH 900/DxH 690T System does not support Codabar with AIM-16 checksum technology with leading or trailing characters other than A.

NOTE Interleaved 2-of-5 is a high-density, continuous numeric symbology. It is self-checking. Every character in the symbology encodes two digits, one in the bars and one in the spaces.

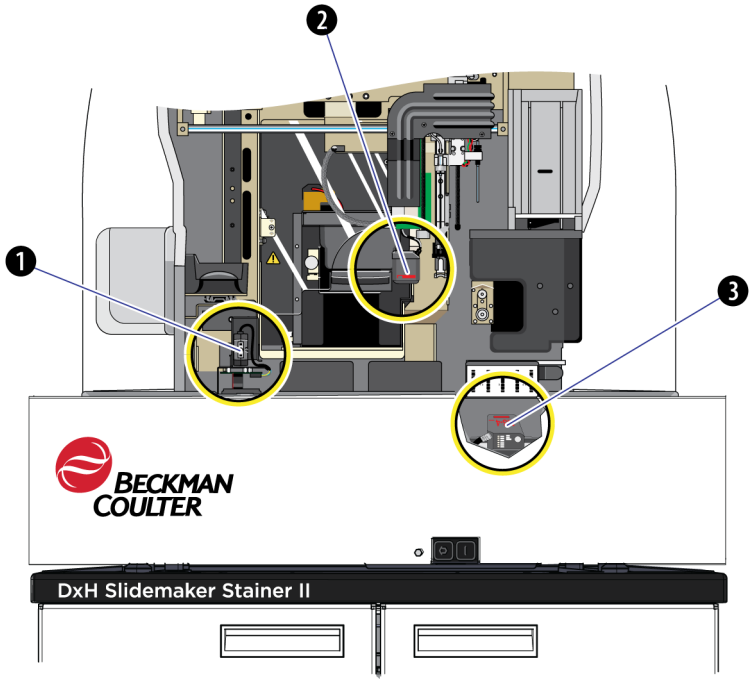
Interleaved 2-of-5 is susceptible to an incorrect read due to a partial scan that does not include both leading and trailing quiet zones. The most common incorrect read is a shorter, but valid decoding of information. The presence of a checksum does not eliminate this risk. It is recommended that any Interleaved 2-of-5 label contain bearer bars or be used with a fixed length only (with scanning devices set to recognize labels of specific length, such as 12 digits).

The primary bar code reading station for reading cassette and tube labels is located on the STM.

The single-tube bar code reader is located in the single-tube station.

The bar code reading station is a temporary holding place for a single cassette while it is in transit. A cassette in the bar code reading station blocks the path of a cassette from the input buffer to the mixer wall. Thus, a cassette in the bar code reading station has higher priority than cassettes in the input buffer and must be cleared out before the next cassette can exit the input buffer.

Figure 1.15 Bar Code Readers - DxH Slidemaker Stainer II



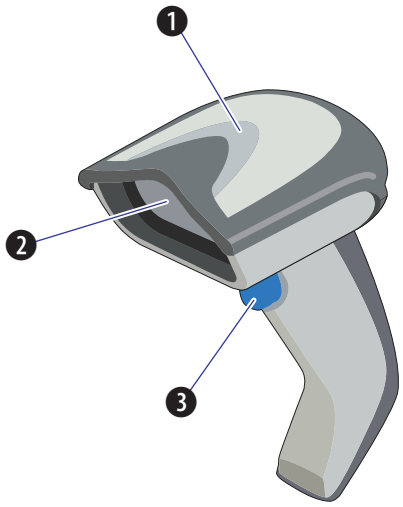
Number	Description
1	Single-Tube Station
2	SAM
3	STM

Handheld Bar Code Scanner

The USB-compatible handheld bar code scanner lets you enter:

- Reagent lot numbers and expiration dates
- Control and calibrator lot numbers, expiration dates, and assigned values and limits
- Specimen IDs

Figure 1.16 Handheld Bar Code Scanner



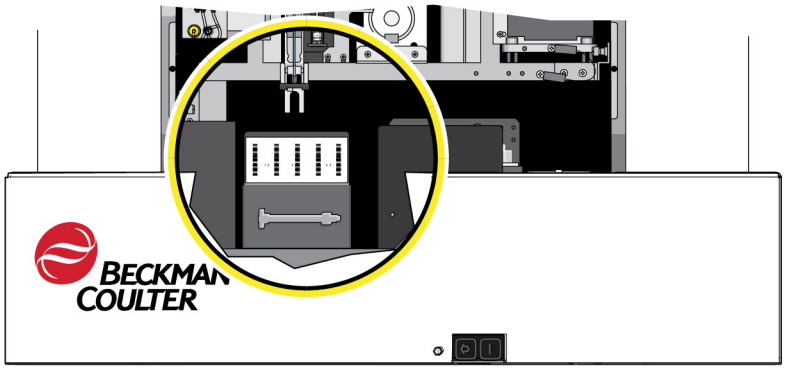
Number	Description
1	LED
2	Scan Window
3	Trigger

See Bar Code Label Specifications in APPENDIX A, Special Equipment for more information.

Mix Station

The Mix Station is the area where the specimen is mixed by rocking 11 times, and where the sample is aspirated by the aspiration probe. The specimens are mixed four times between aspirations. The DxH Slidemaker Stainer II has two mix stations.

Figure 1.17 Mix Station - DxH 900/DxH 690T

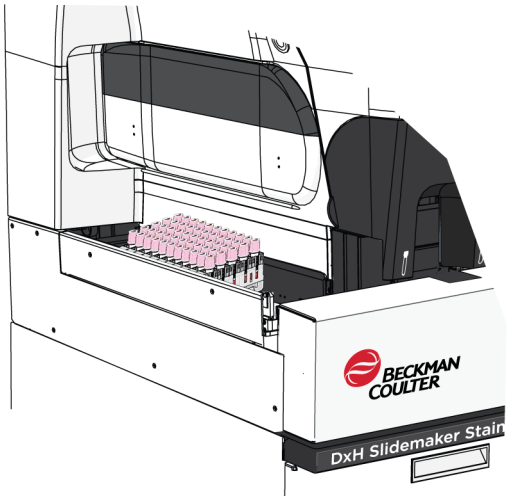


Output Buffer

After analysis, a cassette is transported to the output buffer to await removal. The output buffer is capable of holding up to 19 cassettes on the DxH 900/DxH 690T, and 19 cassettes on the DxH Slidemaker Stainer II (to accommodate the I/O drawer).

NOTE Keep the output buffer clear to optimize workflow.

Figure 1.18 Output Buffer - DxH Slidemaker Stainer II



Sample Aspiration Module (SAM)

The SAM contains the aspiration probe. The aspiration probe samples from specimens as described in the following table.

Sample	Cassette Presentation	Single-Tube Presentation
Whole Blood	Closed Vial	Closed Vial and Open Vial
Body Fluid	Not Available	Closed Vial and Open Vial
PREDix5	Not Available	Open Vial

The aspiration probe moves depending on the tube presentation position. The SPM shares a single aspiration path for both the cassette and the single-tube presentation of specimens. This simplifies calibration and quality control processes while eliminating mode-to-mode procedures.

After aspiration, the SAM design provides sample segmentation and dispensing. The aspiration syringe is driven by a precise stepper motor, and controls the volume and rate of sample aspiration.

Once a sample has been aspirated, the aspiration probe is cleaned. On the DxH Slidemaker Stainer II, the sample is transferred through the hemasphere to the dispense probe.

Hemasphere and Blood Detector - DxH Slidemaker Stainer II

The hemasphere is a patented device with an LED light source. It examines the blood left behind in the tubing to determine characteristics of speed and acceleration for the smearing process.

The blood detector monitors the passage of the sample through the aspiration process and can differentiate between blood, air, and diluent. On the DxH Slidemaker Stainer II, the blood detector is located behind the hemasphere.

Figure 1.19 Hemasphere - DxH Slidemaker Stainer II

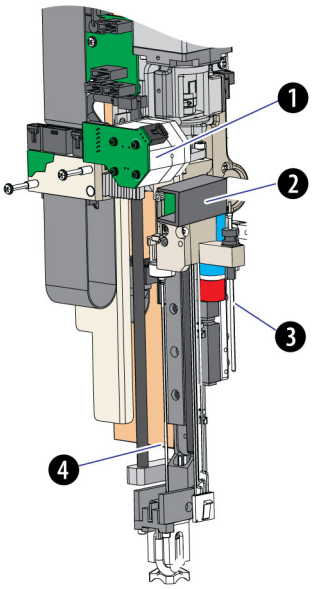


Table 1.3 Hemasphere - DxH Slidemaker Stainer II Components

Number	Description	Number	Description
1	Hemasphere	3	Dispense Probe
2	Blood Detector	4	Aspiration Probe

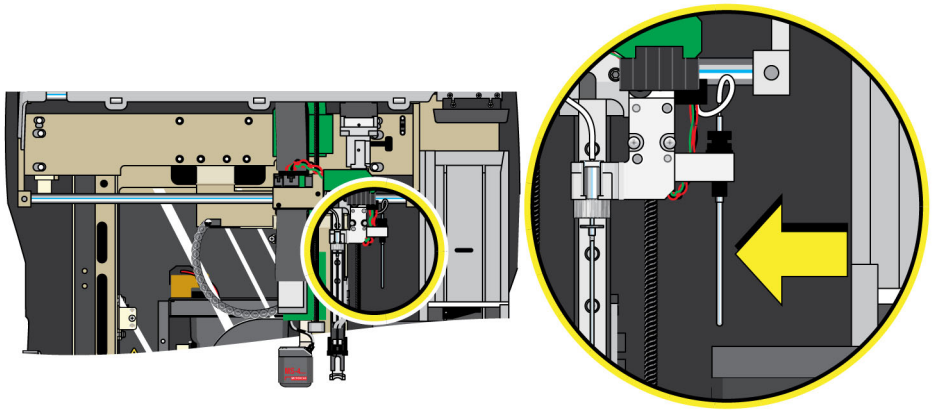
Dispense Probe - DxH Slidemaker Stainer II

The dispense probe as shown in Figure 1.20, Dispense Probe - DxH Slidemaker Stainer II has two functions:

1. **Predispense** - 25 µL of blood is discarded in the predispense wash cup. Diluent is brought into the wash cup to wash the probe and prepare it for the second function.
2. **Dispense** - a drop of blood is placed onto a clean slide for smearing.

When the two functions are completed, the dispense probe is rinsed and ready for the next sample.

Figure 1.20 Dispense Probe - DxH Slidemaker Stainer II



Blood Sampling Valve (BSV) - DxH 900/DxH 690T

The Blood Sampling Valve (BSV) segments a portion of the sample for CBC analysis.

VCSn Module

The VCSn Module (see CHAPTER 2, Operation Principles) supports the Differential, NRBC, and Retic sample preparation and subsequent measurement. The VCSn Module includes the Distribution Valve (DV), Air Mix Temperature Control (AMTC) module, Multi-transducer Module (MTM) and their associated electronic and fluidic components. Samples prepared at the AMTC are delivered to the MTM where the sample detection occurs.

Autogain adjustment fine-tunes selected VCSn gain factors to keep the LATRON parameter recovery close to the assigned target values resulting in optimized VCSn performance. Autogain adjustment is enabled by default to occur automatically during shutdown after five successful LATRON CP-X runs. Confirm that all QC results are within limits before processing patient samples.

NOTE This feature can only be disabled by a Beckman Coulter Service Representative.

CBC Module

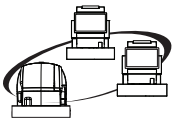
The CBC Module (see CHAPTER 2, Operation Principles) provides the physical processing elements necessary for CBC sample conditioning (combining of reagents and the sample segment, mixing and incubation) and measurement via the aperture bath assemblies, the HGB assembly and the electrical signal conditioning circuits.

Common Services

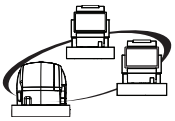
Common Services consist of the Electronic Supply Module, Pneumatic Services, and Reagent Services (supply and distribution). Common Services provides and monitors electronic power and supplies and monitors the reagents and waste levels, as well as the pressure and vacuum.

Pneumatic Supply Module (PSM)

The Pneumatic Supply Module (PSM) is the source of vacuum and pressure to Common Services.

Left and Right Transfer Stations 

Instruments are connected together by a bidirectional two-lane highway. On this highway, the Front Lane (closest to the operator) flows right to left, and the Middle Lane flows left to right.

Swap Station 

This area is used for temporary cassette parking. The swap station temporarily holds a single cassette waiting for rerun or reflex testing if specimen exit delay is enabled. A cassette in the swap station has higher priority than a cassette in the Input Buffer. The Swap Station must be cleared before a new cassette can exit the Input Buffer.

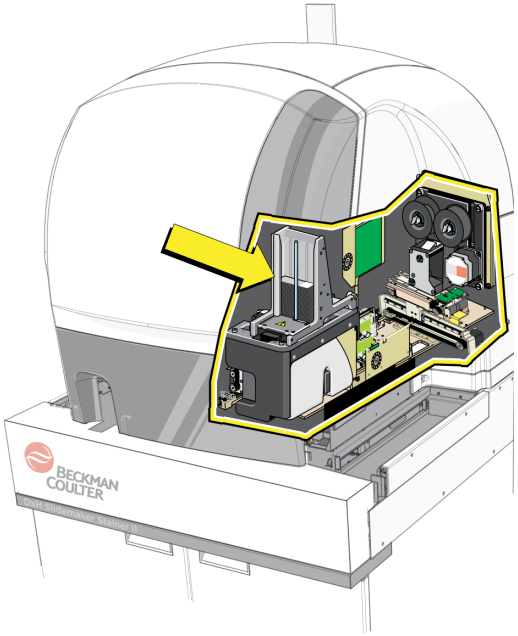
Mixer Process Lane

Samples travel from right to left between the Input Buffer, through the Primary BCR Station, and on to the Mixer Process Lane for analysis within a module.

Slidemaker Module

The Slidemaker Module is illustrated in Figure 1.21, Slidemaker Module.

Figure 1.21 Slidemaker Module



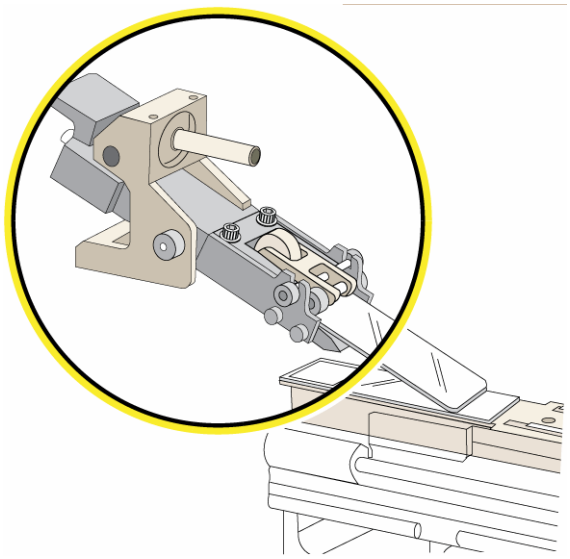
Ejector with Slide Chute

The slide chute (indicated by the arrow in Figure 1.21, Slidemaker Module above) holds the supply of slides. The ejector dispenses the slides.

Smear Truck

The smear truck places a slide on the smear shuttle, and uses a second slide to spread the blood drop on the slide.

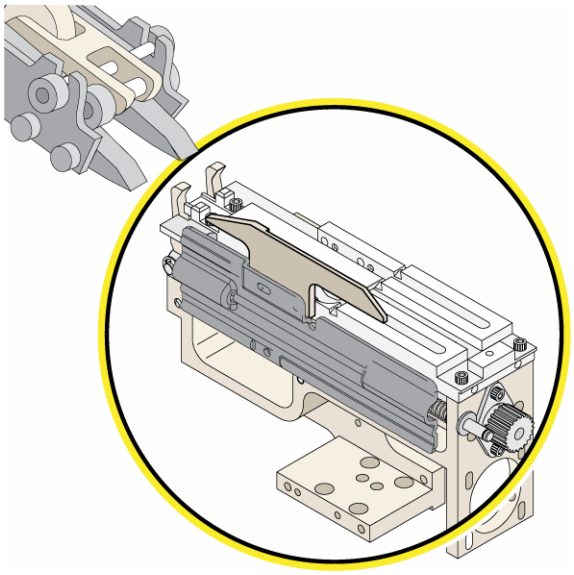
Figure 1.22 Smear Truck



Smear Shuttle

Once the smearing is completed at the smear truck, the prepared slide is transferred to the print shuttle.

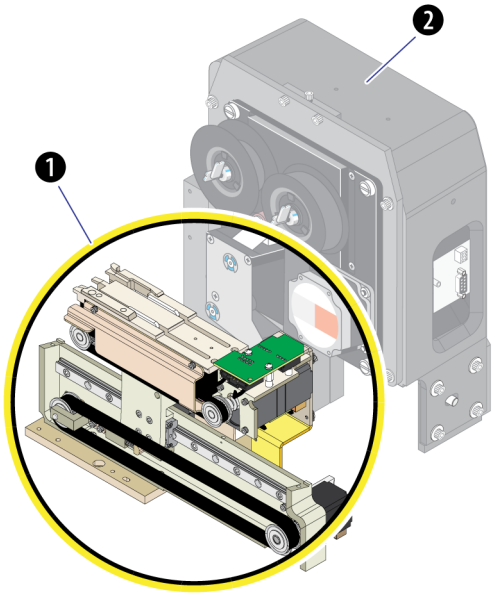
Figure 1.23 Smear Shuttle



Print Shuttle

The print shuttle (**1**) receives the slide from the smear shuttle and takes the slide to the slide printer (**2**).

Figure 1.24 Print Shuttle

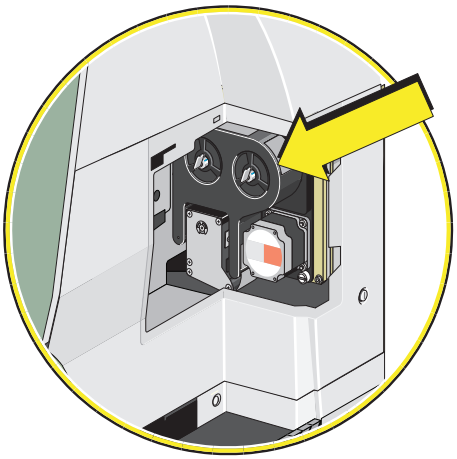


Slide Printer

The slide printer prints the specimen ID, date, time, and an optional bar code on the long painted area at the end of the slide.

The slide printer thermally prints the sample information you have selected. The slide is transferred to the basket elevator for pre-stain drying. The slide printer contains a printer cartridge.

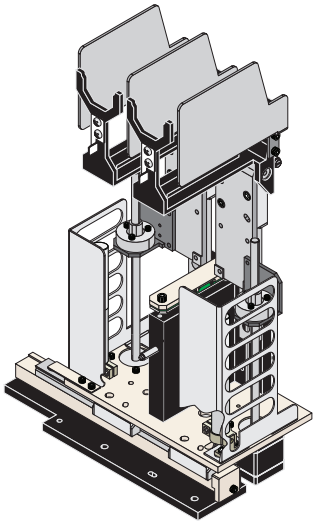
Figure 1.25 Slide Printer



Basket Elevators

There are two basket elevators: a front and a rear. Each elevator holds a basket to receive slides transferred from the print shuttle.

Figure 1.26 Basket Elevators



Pre-Stain Dryer

⚠ WARNING

Risk of injury. Hot surfaces in this area. To prevent injury, avoid contact with any surface in this area until you are sure that it has cooled down first.

The pre-stain dryer contains:

- Two heaters (cylinder rods), one for each basket elevator.
- A fan located in the bottom right rear behind the basket elevators. The fan pulls air out from the pre-stain drying station.

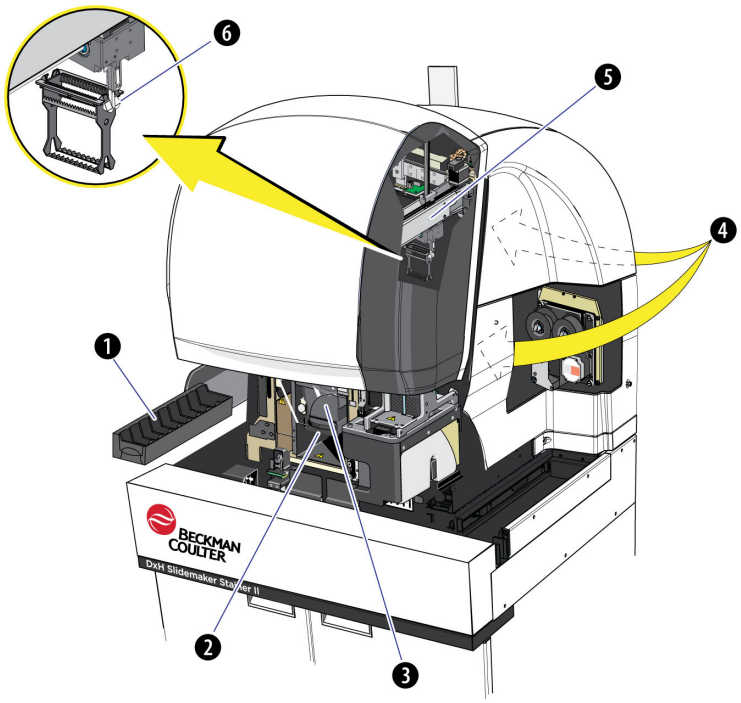
Stainer Module and Basket Transport

The Stainer module (see Figure 1.27, Stainer Module and Basket Transport) consists of a stain drawer that houses a bath tray with five baths. Each bath has a level sensor, and fill and drain probes.

The stainer drying station is located behind Bath 5. The right side of the stainer dryer contains absorbent material to blot excess liquid from the baskets coming out of the baths. The left side of the stainer dryer uses a heater. The stainer dryer is continuously fanned to aid in the drying at the conclusion of each stain cycle.

The basket transport module includes the Robot and the Input/Output Drawer.

Figure 1.27 Stainer Module and Basket Transport



Number	Description	Number	Description
1	Input/Output (I/O) Drawer	4	Drying Stations
2	Stain Drawer	5	Robot
3	Baths (within Stain Drawer)	6	Robot Hook

Robot

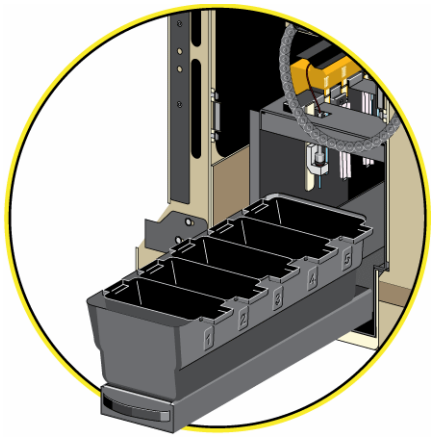
The robot moves baskets to and from basket elevators, through the stainer Baths 1 to 5, to the stainer dryer, and to and from the I/O drawer.

Stainer Module

Stain Drawer

The stainer drawer holds a bath tray with five baths. Each bath has a level sensor and fill and drain probes.

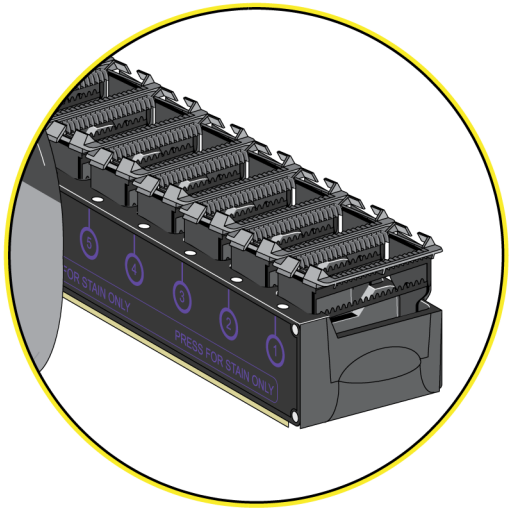
Figure 1.28 Stain Drawer



Input/Output Drawer

The I/O drawer (see Figure 1.29, Input/Output Drawer) holds the empty baskets and baskets with processed slides.

Figure 1.29 Input/Output Drawer



DxH 900 Floor Stand

NOTE The DxH 690T does not include a floor stand.

The DxH 900 floor stand provides self-contained support for the SPM as well as easy access storage for reagents or waste containers. Additionally, the floor stand houses the Pneumatic Supply on an integrated pull-out shelf in the left lower section of the cabinet. It also houses the power or standard computer.

Reagents are placed on slide-out drawers. The upper and lower right drawers each hold two 10L diluent containers for a quad diluent configuration (default). Dual diluent and onboard waste

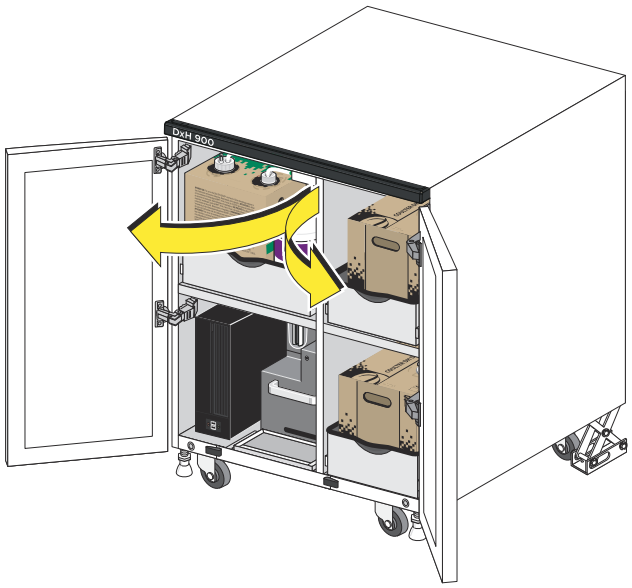
containers are available as options. Non-diluent reagents and cleaner are placed in the left upper drawer.

See Access Items Contained in the DxH 900 Floor Stand for more information.

Access Items Contained in the DxH 900 Floor Stand

1 Open the floor stand doors.

NOTE Only one drawer can be pulled forward at a time.

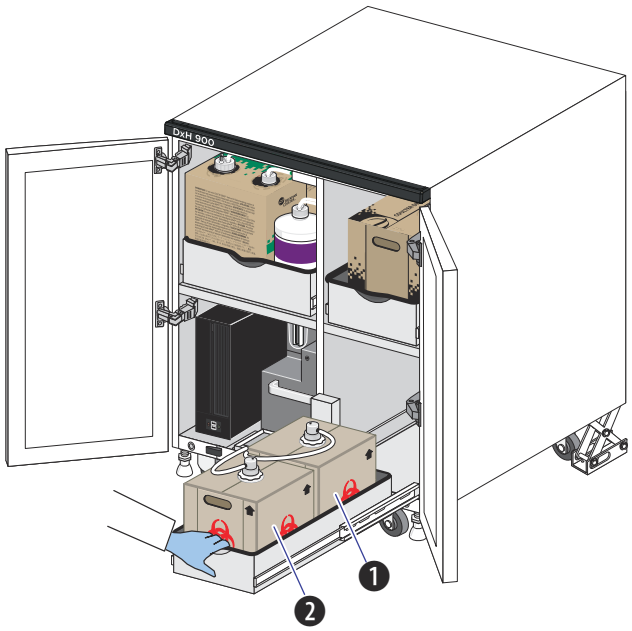


2 Pull out the top left drawer to access DxH Cell Lyse, Diff Pack, Retic Pack, and Cleaner.

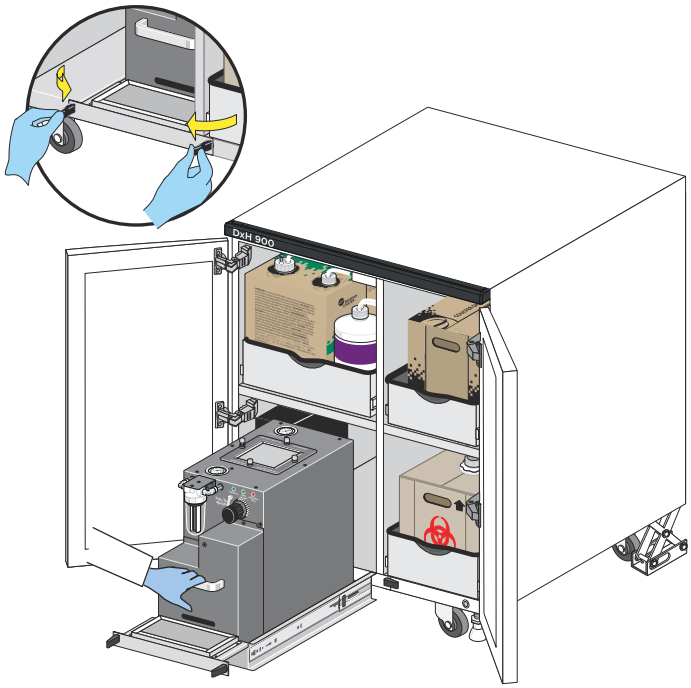
Two 10 L Diluent 1 containers are located in the right top drawer.

NOTE The quad Diluent configuration is the default.

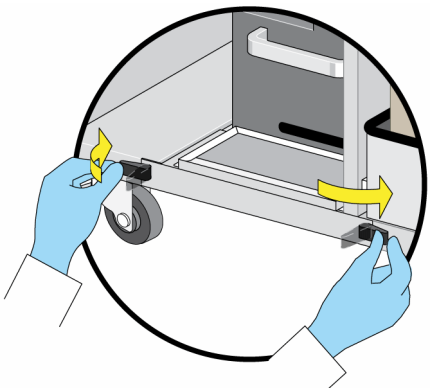
3 Pull out the bottom right drawer to access the second set of 10 L diluent containers (default) or waste containers (optional). Waste 1 is located in the back and Waste 2 is at the front of the drawer.



4 Unlock the latches on the bottom left drawer to pull out the pneumatics drawer and access the Pneumatic Supply Module (PSM).



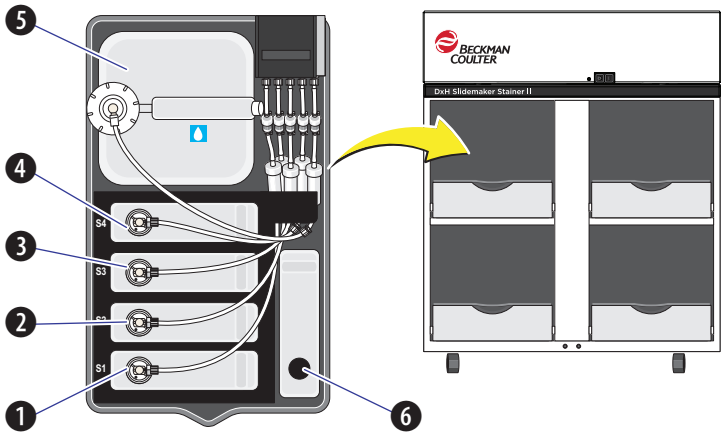
5 Flip the latches outward to lock the latches at the bottom of the left drawer when the drawer is closed.



DxH Slidemaker Stainer II Floor Stand

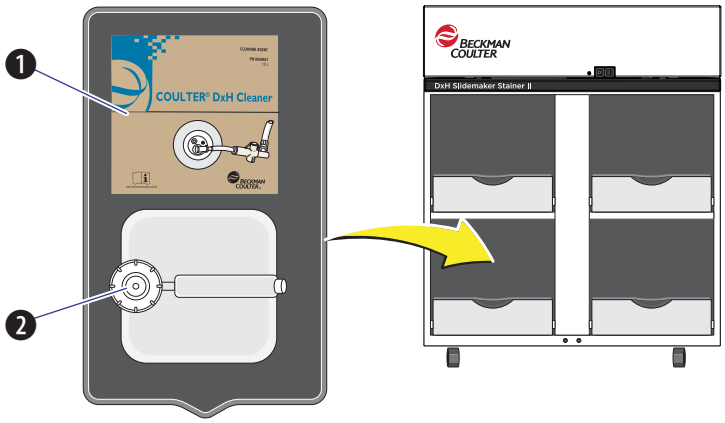
The floor stand has four drawers for storing the reagent and waste containers currently in use on the DxH Slidemaker Stainer II as indicated in the following figures.

Figure 1.30 Stain Reagent Locations in Top Left Drawer of Floor Stand



Number	Description	Number	Description
1	Supply 1 (S1)	4	Supply 4 (S4)
2	Supply 2 (S2)	5	Deionized Water
3	Supply 3 (S3)	6	Cleaning Bottle

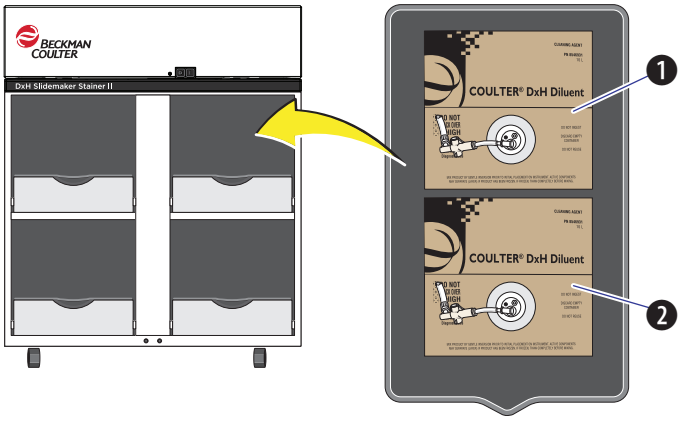
Figure 1.31 Cleaner Reagent and Stain Waste Locations in Bottom Left Drawer of Floor Stand



Number	Description
1	DxH Cleaner
2	Stain Waste

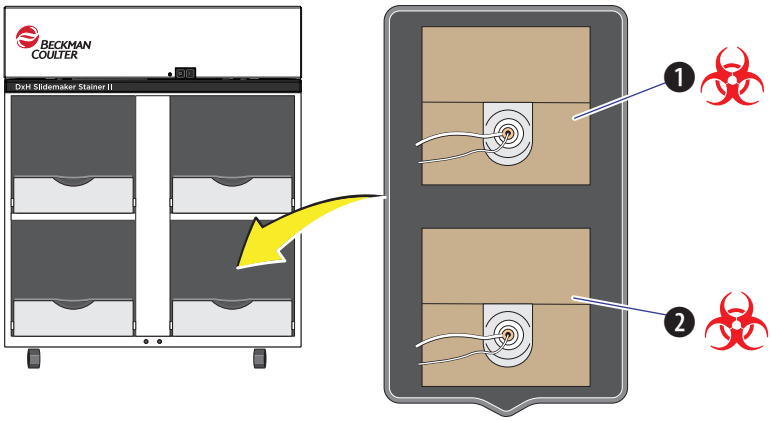
Figure 1.32, Diluent Container Locations in Top Right Drawer of Floor Stand (Default) shows the default configuration. One Diluent is an optional configuration. Changing the configuration requires the support of a Beckman Coulter Representative.

Figure 1.32 Diluent Container Locations in Top Right Drawer of Floor Stand (Default)



Number	Description
1	Diluent 1 Container
2	Diluent 2 Container

Figure 1.33 Biohazardous Waste Container Locations in Bottom Right Drawer of Floor Stand



Number	Description
1	Biohazard Waste 1 Container
2	Biohazard Waste 2 Container

Cassettes

The DxH 900/DxH 690T System uses a five-position cassette. The bottom of each cassette contains metal inserts for use with the Specimen Transport Module (STM) system. The cassette also includes grooves that interlock with mix station hardware to secure the cassette to the mix station.

NOTE Collection tubes listed for the comparator DxH Slidemaker Stainer are fit for use with the DxH Slidemaker Stainer II. See the tube list at www.beckmancoulter.com.

Each cassette identifies five contiguous tube sites using a 2D bar code label and human-readable text. Each cassette also has a cassette ID label on the cassette wing.

Table 1.4 Cassette Types and Tubes

Cassette Type	Block	Clip	Tube Size Diameter	Aspiration Depth	Tube Height (Min - Max *)	Additional Information
A	Grey	Lavender	11 - 13 mm	Full pierce	55 - 107 mm	Standard mixing
B	Black	Lavender	11 - 13 mm	Short pierce; false bottom	55 - 107 mm	Standard mixing
C	Grey	Green	8 - 13 mm	Full pierce	55 - 107 mm	Extended mixing
D	Black	Green	8 - 13 mm	Short pierce	28 - 80 mm	Standard mixing; contains green riser block for shorter tubes
A+	Grey	Black	13 - 16 mm	Full pierce	55 - 107 mm	Standard mixing; use with Laboratory Automation Systems (LAS)

* Tube height minimum is measured from the bottom of the tube to under the cap; the maximum is measured including the cap.

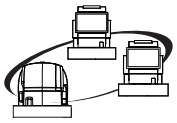
Short pierce depth tubes include:

- Long false bottom tubes which fit into the Type B cassette
- Smaller length tubes such as 2 and 3 mL pediatric sizes, or tubes shorter than a Beckman Coulter control product tube, which fit into the Type D cassette

⚠ CAUTION

Risk of specimen leakage or clogging. Possible specimen leakage or clogging of the system can occur. Excessive piercing of sample tubes may cause coring of the stopper. The number of pierces without problems can vary among sample tube types and manufacturers. Do not pierce a blood collection tube more than five times.

Verify the instructions for use from the tube manufacturer. Some tube types have more restrictive instructions for use and limitations on the number of pierces.



An SPM may restart when Type C cassettes are in use. The restart may occur when a Type C cassette needs to be routed to another SPM at the same time that a new Type C cassette begins mixing. The SPM will restart, but the System Manager will show the SPM offline and disconnected. Place the DxH 900 SPM online.

Samples in Type B and D cassettes used on a workcell will not act on decision rules, including making a slide. You must retrieve the cassettes from the output buffer and place them on the DxH Slidemaker Stainer II input buffer. This action has been taken to ensure that sufficient sample volume remains for testing. If desired, your laboratory can avoid retrieving cassettes and can force

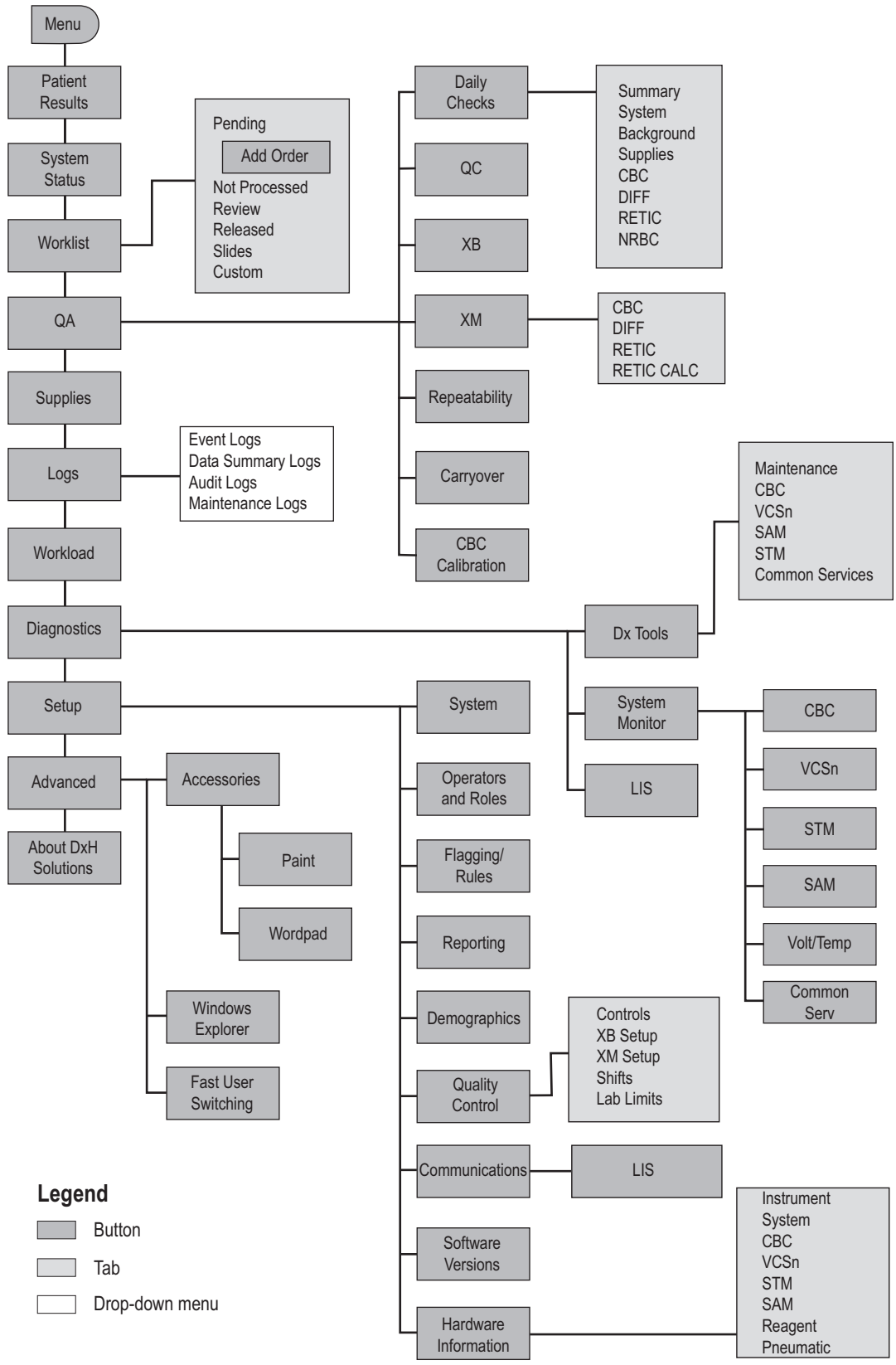
an automatic rerun/reflex by enabling Short Tube Rerun with the understanding that there may be insufficient blood remaining in the collection tube for analysis.

System Manager

The touchscreen is configured to each analyzer. The System Manager features touchscreen capability. See Figure 1.34, System Manager Menu Tree.

The Home screen is the default startup screen for the System Manager. See Figure 1.35, Home Screen.

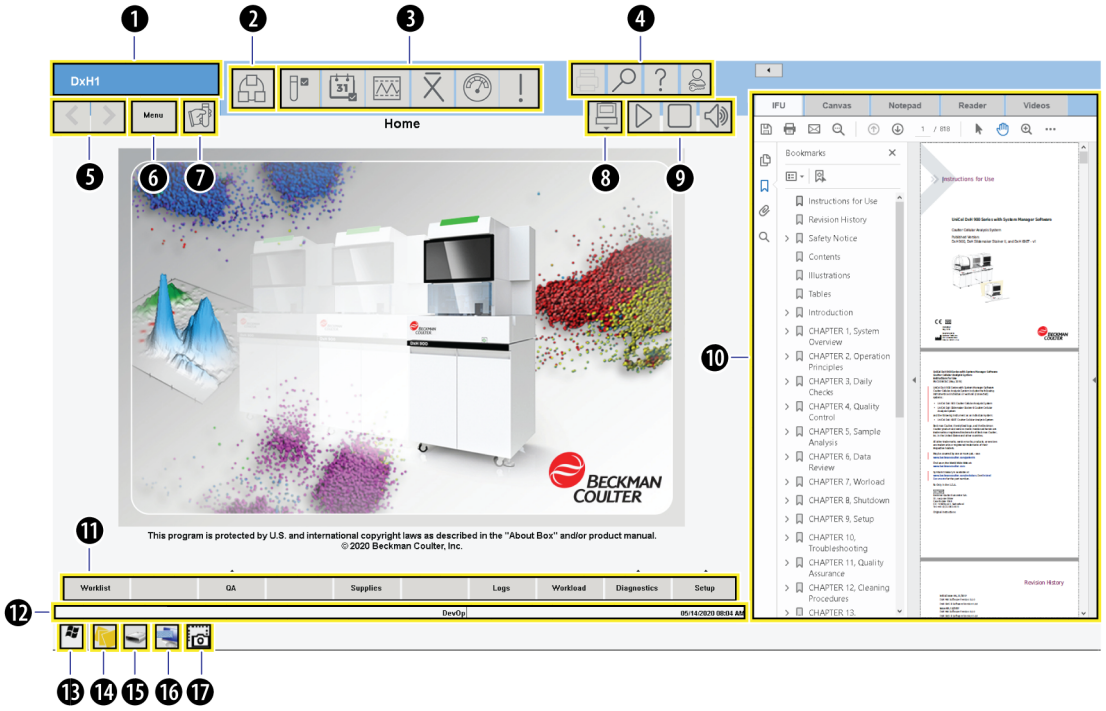
Figure 1.34 System Manager Menu Tree



Home Screen

The Home screen is the default startup screen for the System Manager.

Figure 1.35 Home Screen



Number	Screen Item	Number	Screen Item
1	Status Area	10	Workspace for Displaying the IFU, Canvas, Notepad, Reader, or Videos
2	System Status Icon (See Application Icons and/or Buttons)	11	Local Navigation Bar
3	Alert Status Icons	12	Status Bar
4	Utility Icons	13	Windows Icon - launches the Start menu
5	Previous/Next Navigation Icons	14	"Sticky" Notes
6	Global Menu Icon	15	E Drive
7	Single-Tube Presentation Icon	16	On-Screen Keyboard
8	Select Instrument Icon (See Application Icons and/or Buttons)	17	Print Screen - prints a screen shot of the screen, excluding the workspace on the right and the shortcuts on the lower left portion of the screen
9	System Icons		

Status Area

The top-left corner of every screen is the Status Area (see Figure 1.35, Home Screen). It displays the name of the selected SPM. If the SPM is in single-tube presentation mode, this area will also contain information and prompts related to it.

Previous/Next Navigation Icons

The **Previous/Next** icons at the top-left corner of any screen (see Figure 1.35, Home Screen) let you go back or forward a maximum of five times.

Global Menu Icon

The Global Menu icon (see Figure 1.35, Home Screen) displays the application buttons for navigating through the system.

Single-Tube Presentation Icon

The **Single-Tube Presentation** icon (see Figure 1.35, Home Screen) displays the Single-Tube Presentation dialog box where you can scan or enter the information required.

Local Navigation Bar

The local navigation bar is displayed at the bottom of every screen (see Figure 1.35, Home Screen). The active buttons change depending on the screen that is open.

NOTE The *Print* and *Save Configuration* functions (**Setup** > **System** > **System Configuration**) are not fully functional at this time. Use *Database Backup* and/or display the printouts to maintain a record of the system configuration.

Status Bar

The status bar at the bottom of every screen (see Figure 1.35, Home Screen) displays the following:

- Operator ID of the operator who is logged on (middle of the bar)
- Date and Time (right side of the bar)

"Sticky" Notes

The "Sticky" Notes icon (see Figure 1.35, Home Screen) located in the banner section lets you add notes and paste them on the screen.

You can customize the note:

- To resize the note, select the bottom right corner and drag it.

- To change the color of the note, press the note and hold or right-click on the note. Then, select a color (blue, green, pink, purple, white, or yellow).

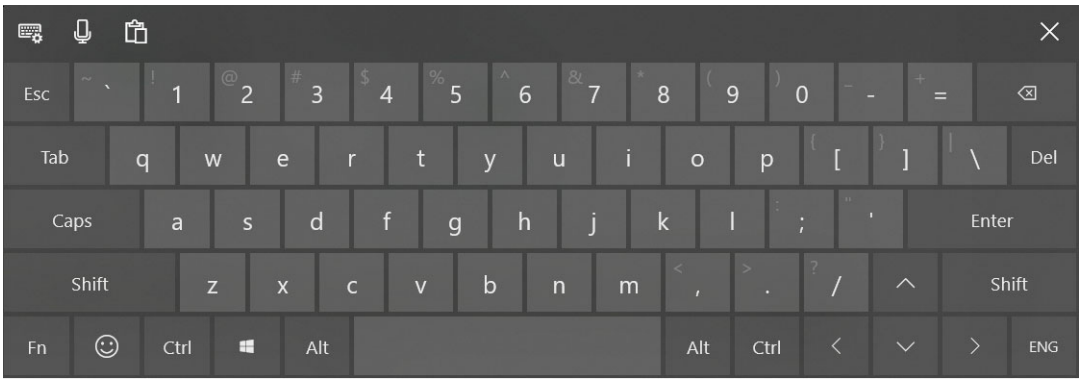
E Drive

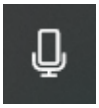
The E Drive icon (see Figure 1.35, Home Screen) located in the banner section lets you go directly to the E drive.

On-Screen Keyboard

The On-Screen Keyboard icon (see Figure 1.35, Home Screen) located at the bottom of the screen lets you select a virtual keyboard similar to the one shown below.

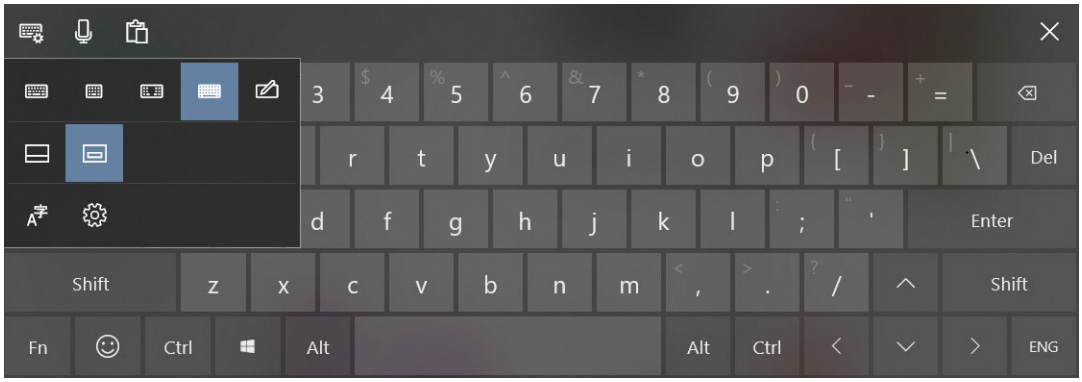
Figure 1.36 On-Screen or Virtual Keyboard



Icon Above Keyboard	Description
	Displays keyboard settings as shown in the following table
	Provides dictation capability when used with a microphone (not available with the instrument)
	Provides access to items in the clipboard
X	Exits the keyboard. You can also use the mouse or select the on-screen keyboard to exit.

The on-screen or virtual keyboard contains several options to choose from as described below.

Figure 1.37 On-Screen or Virtual Keyboard Settings



Icon	Description
	Displays options for keyboard layouts
	Displays a writing pad option
	Displays an icon for moving the keyboard and an icon for docking the keyboard at the bottom of the screen
	Not functional at this time.

Application Icons and/or Buttons

Select an icon at the top of the screen or select **Menu** to display the applicable button (see Figure 1.35, Home Screen).

Button or Icon	Description
Patient Results	Displays results in dynamic mode.
 or **System Status**	Alerts or displays the status of the workcell or stand-alone instrument, depending on the system configuration.
 or **Worklist**	Displays the Worklist.
QA	Displays QA selections for the selected module.

 or **Supplies**	Displays the Supplies for the selected module.
 or **Logs**	Displays the logs including the Event Log.
Workload	Displays the Workload for the selected module.
Diagnostics	Displays the Diagnostic menu for the selected module.
Setup	Displays the Setup menu selections.
Advanced	Displays the Advanced menu selections.
About DxH Solutions	Displays the software version information.

Submenus

QA

From the Menu, select **QA** to open the QA submenu and select the applicable button.

Button	Description
Daily Checks	Lets you ensure that your DxH instrument is working correctly.
QC	Lets you monitor the DxH instrument's performance and service.
XB	Lets you set up and review XB information.
XM	Lets you set up and review XM information.
Repeatability	Lets you perform and review repeatability.
Carryover	Lets you perform and review carryover.
CBC Calibration	Lets you set up and perform CBC calibration.

Diagnostics

From the Menu, select **Diagnostics** to open the Diagnostics submenu and select the applicable button.

Button	Description
Dx Tools	Lets you perform diagnostic functions.
System Monitor	Lets you monitor the system.
LIS	Lets you perform LIS troubleshooting functions.

Setup

From the Menu, select **Setup** to open the Setup submenu and select the applicable button.

Button	Description
System	Lets you set up the system.
Operators and Roles	Lets you set up operator IDs and roles.
Flagging/Rules	Lets you set up flagging and rules.
Reporting	Lets you set up reports.
Demographics	Lets you set up demographic information.
Quality Control	Lets you set up quality control functions.
Communications	Lets you set up communications when you select **LIS**. **NOTE** The **LIS** button is enabled, but is not functional when the LIS is OFF or during the transmission of queued reports.
Software Versions	Lets you view the software versions.
Hardware Information	Lets you view hardware information.

Advanced

From the Menu, select **Advanced** to open the Advanced submenu and select the applicable button.

Button	Description
Accessories	Lets you access **Paint** or **Wordpad**, when selected.
Windows Explorer	Displays the My Computer window.

Alert Status Icons

The Alert Status icons are always displayed at the top of the screen (see Figure 1.35, Home Screen). Select an Alert Status icon to navigate to a specific application. These icons also notify you of conditions that require further attention.

Each icon is displayed with a neutral, amber, or red background that indicates the following:

- Neutral background indicates a normal status.
- Amber background indicates a warning status that requires your attention. For example, supplies may be low. Select the icon for more information.
- Red background indicates an error status. Select the icon for more information.

Button	Icon	Description
System Status		Indicates the status of the workcell, stand-alone DxH 900, stand-alone DxH 690T, or stand-alone DxH Slidemaker Stainer II, and the associated LIS and printer connections. Select this icon to display the system connections.

Worklist		Indicates the status of specimen results on the worklist. Select this icon to display the Worklist.
Daily Checks		Indicates the status of Daily Checks. Select this icon to display Daily Checks.
QC		Indicates the status of a Quality Control. Select this icon to display Quality Control results.
XB/XM		Indicates the status of an XB/XM run. Double-tapping this icon switches between the XB and XM applications.
Supplies		Indicates the status of the supply levels for the selected module. Select this icon to display the Supplies screen.
Event Log		Indicates the status of the events on the General tab of the Event tab of the History Log. Select this icon to display the History Logs.

Utility Icons

The Utility icons are displayed in the top right-hand corner of the screen (see Figure 1.35, Home Screen) and include the following:

Button	Icon	Description
Print		Activates the dialog box for printing reports for the active screen. The content will change depending on the selected contents of the active screen.
Specimen Search		Displays the Specimen Search dialog box.
Help		Displays the System Help and the topics associated with the active screen.
Logon/Logoff		Displays the application's Logon/Logoff dialog box.

System Icons

The System icons are displayed at the top of the screen (see Figure 1.35, Home Screen) and include the following:

Button	Icon	Description
Select Instrument		Displays a list of instruments in a workcell for selection when you select the arrow.
Start		Places a DxH Slidemaker Stainer II or SPM online.
Stop		Places an SPM or DxH Slidemaker Stainer II offline and stops processing.
Turn Off Alarm		Turns off the audible alarm.

Guided Help Icons

Guided Help is available from the General tab on the Event Log.

Guided Help for maximum control file capacity and maximum control run capacity is available only on the System Manager.

Guided help for maximum consecutive voteouts is available on both the System Manager and the Review Station.

When you use Guided Help, the event is automatically marked as *Reviewed* by the operator logged into the workstation.

The Guided Help check boxes are located in the *Fix* column on the *General* tab for the History Logs screen. The **Unreviewed** and **Guided Help Available** buttons are located on the right side of the screen.

Button/Filter	Icon	Description
Fix		Leads you through the guided help to fix the event.
Resume		Resumes the guided help to fix the event.
Timed Out/Expired		Lets you know that the event has expired.
Completed		Lets you know that the guided help to fix the event has been completed.

Button/Filter	Icon	Description
Unreviewed	No icon	Lets you view only the unreviewed events.
Guided Help Available	No icon	Lets you view only the events with **Guided Help Available**, or Guided Help events that are still active.

Workspace for Displaying the IFU, Canvas, Notepad, Reader, or Videos

The workspace for displaying the IFU, canvas, notepad, reader, or videos is on the right side of the screen (see Figure 1.35, Home Screen).

Displaying the IFU

Besides displaying the System Help (see System Help in the Introduction), a PDF version of the IFU is also available for you to read in standard or expanded view.

1 Select **IFU**.

2 View the IFU PDF using the scroll bars.

To expand the view, select  at the top of the screen. The button contracts when the IFU is expanded. Select it again to go back to standard view.

3 If applicable, select an icon from the toolbar:

Icon	Description
	Save the PDF to the directory you select
	Print the PDF
	Email the document
	Find text
	Go to the previous page

Icon	Description
	Go to the next page
	View the page number of the current screen displayed and the number of pages in the document, or enter a page number to go to that page in the document
	Select an item
	Pan or move on the screen
	Select to zoom
	Select to see more tools that include file view modes, and undocking or docking page controls

Displaying the Canvas

Use the canvas to add notes with the online **Pen** button.

1 Select **Canvas**.

2 Select **New** to create a new canvas
OR
Select **Open** to open an existing canvas.

3 Select an option from the toolbar to do the following:

- **Pen** - To draw or write in the workspace.
- **Eraser** - To erase any content you have previously added.
- **Highlighter** - to highlight any content you have added to the workspace.

NOTE You can change the size of the brush by selecting a size from the **Brush Size** drop-down list. You can also change the highlighter color by selecting a color from the **Color** drop-down list.

4 Select **Save** to save the canvas.

NOTE You can also print the canvas by selecting **Print** and following the prompts.

Using the Notepad

Use the notepad to type notes.

1 Select **Notepad**.

2 Select **New** to create a new note
OR
Select **Open** to open an existing note.

3 Type a note.

4 Select **Save** to save the note. There is no limit to the number of notes that can be created.

NOTE You can also print the note by selecting **Print** and following the prompts.

Viewing Documents in the Reader

Use the reader to read PDF-formatted documents in standard or expanded view including documents that you have created and then saved as PDF.

To export documents to the E: drive so that they are available for viewing, see Add the Document to the E: Drive and View it in the Reader in APPENDIX H, Adding, Copying, and Exporting Files.

To remove documents from the reader, see Remove the Document from the Reader in APPENDIX H, Adding, Copying, and Exporting Files.

1 Select **Reader**.

2 Select **Open** and browse to the drive that contains the PDF document that you want to view.

3 Double-click the document to open it.

To expand the view, select  at the top of screen. The button contracts when the PDF is expanded. Select it again to go back to standard view.

Displaying the Videos

Use the **Videos** tab to display videos for certain procedures.

NOTE You can also display videos by selecting the applicable link within the online help file.

1 Select **Videos**.

2 Select the down arrow for one of the instrument categories to select a specific video to view.

3 Select  to play the video.

NOTE To pause a video, select  . To stop and exit from a video, select  .

Displaying the Toolbar and Bookmark for the IFU and Reader Tabs When Minimized

1 If the toolbar is not displayed, select the document until the toolbar appears:

Icon	Description
	Saves the PDF to the directory you select
	Prints the PDF
	Decreases the magnification of the entire page
	Increases the magnification of the entire page
	Displays the Adobe docked toolbars at the top and on the side of the IFU or Reader tab

2 Select  to display the Adobe docked toolbars at the top and on the side of the IFU tab or Reader tab.

NOTE To minimize the toolbars again, select > **File** > **View Modes** > **Read Mode**.

Refresh

The **Refresh** icon is displayed to the right of the screen title when new data is available for the screen being viewed. Select **Refresh** from the local navigation bar to refresh the display when you see this indicator.

A display may not appear to be refreshed with new information (black boxes may appear around the fields) in the Worklist, Daily Checks, or after a setup or configuration change. Exit and re-enter the screen to see the correct information on the screen, or use the mouse instead of the touchscreen.

Software Application Module Specifications

The software application module provides you with the following maximum data storage capabilities depending on the selected quality control file configurations. Selecting the larger number of control files and runs results in a decrease in patient database storage.

Results/Files	Quality Control Configuration	Standard Computer as System Manager	Power Computer as System Manager
Patient Results with Graphics	30 files with 150 runs per file	50,000	100,000
	60 files with 300 runs per file	35,000	60,000
Raw Data Files	N/A	12,000	36,000

Privacy and Security

The system has the following privacy and security capabilities:

- Windows firewall for the System Manager and the Review Station (default; cannot be disabled)
- White listing for the System Manager and the Review Station (default; cannot be disabled)
- Optional hard-drive encryption
  - If your system has the physical controls and your power computer is secure, hard-drive encryption may not be needed. Verify with your IT department if this feature is required.
  - Hard-drive encryption is available only on the power computer and is disabled by default. The standard computer does not support hard-drive encryption.

    A Solid State Drive (SSD) encryption password is necessary to enable hard-drive encryption. To configure or change the SSD encryption password on the power computer, a BIOS password is required.

    It is strongly recommended that password information be saved in a secure place. The password is required every time the System Manager is restarted.

IMPORTANT If the password is lost, all information stored in the hard drive will be unrecoverable. The instrument, or instruments in a workcell will not be functional.

If a privacy or security incident related to the product has occurred, contact your Beckman Coulter Representative.

Product Cybersecurity Information

Additional information regarding the Beckman Coulter Product Security and Coordinated Vulnerability Disclosure Process can be found on our website at www.beckmancoulter.com/en/about-beckman-coulter/product-security.

Slides Tab Review Indicators

A Worklist tab requiring review is identified by a colored tab as indicated in Table 1.5, Slides Tab Review Indicators. The tab indicator is displayed until the review condition for that tab is cleared.

NOTE Multiple review required tab indicators may be present. The global Worklist icon will always correspond to the highest priority review condition. Example: tab indicators

Table 1.5 Slides Tab Review Indicators

Tab	Description
Slides (amber)	Slides tab Filter name: Overdue STAT Pending Slides
Slides (red)	Slides tab Filter name: Unreviewed Slide Not Made Exceptions Exceptions for slides not made require review.

Daily Checks Indicator

If Daily Checks fails, the tab becomes red.

Selecting an Instrument

1 Select  .

2 Select the instrument from the drop-down list.

Viewing System Status

1 Select  to see an overview of the system.

The beacon at the top of each instrument or device indicates its status:

- For DxH 900/DxH 690T, see Figure 1.2, Front View of the Specimen Processing Module (SPM).
- For DxH Slidemaker Stainer II, see Figure 1.6, Front View of the DxH Slidemaker Stainer II.

A red LIS status indicator means that the last LIS transmission failed. Occasionally, the LIS status indicator on the System Status screen turns red after a period of inactivity on the line. The LIS status indicator is no longer red when a transmission occurs (upload or download). To avoid this, enable the Keep-Alive option. See Keep-Alive in CHAPTER 9, Setup.

In a connected system, all workstations (Review station and System Manager) indicate the errors for all instruments (SPM). Verify that the instrument displayed in the upper left-hand Status area is the instrument where the task, such as replenishing supplies, replacing reagent containers, running daily checks, or running diagnostics, needs to be performed.

2 Select **Menu > System Status**

OR

Select a specific instrument graphic on the screen to see the detailed status of that instrument.

DxH 900/DxH 690T Detailed Status

The DxH 900/DxH 690T detailed Status screen displays the same color for the status and the beacon for Daily Checks and Shutdown. If an instrument has a warning and an error, both the beacon and the instrument status will be red.

When the instrument beacon is amber, the instrument icon on the Status screen should be blue or green for the DxH 900/DxH 690T. Check all visual indicators to determine that your system is operating without indicating a warning or an error.

The status of transfer points on the STM is shown in the box below the module. The color will change from green to black if the operation of a transfer point is disabled.

You can stop or start the STM (transport) using the button on the module graphic.

DxH Slidemaker Stainer II Detailed Status

The DxH Slidemaker Stainer II detailed Status screen displays the same color for the status and the beacon on the Daily Checks and Shutdown fields if one of these features needs to be addressed. If an instrument has a warning and an error, both the beacon and the instrument status will be red.

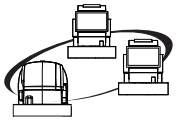
When the instrument beacon is amber, the instrument icon on the Status screen should be blue or green for the DxH Slidemaker Stainer, and may additionally blink blue or green. Check all visual indicators to determine that your system is operating without indicating a warning or an error. The Maker and Stainer fields display the status of the individual module (Active, Inactive, Disabled). The button next to the Stainer field is used to start or stop the Stainer module only.

IMPORTANT DO NOT stop the stainer from the detailed System Status screen. There is no option to cancel a Stop request. The stainer will become inactive and slides that are staining will be interrupted without proper removal by the system. Baskets in the active protocol remain in the baths.

The status of transfer points on the STM is shown in the box below the module. The color will change from green to black if the operation of a transfer point is disabled.

You can stop or start the STM (transport) using the button on the module graphic.

Restarting a Review Station



On the DxH 900-3 S workcells installed with an optional cart and review station, not all review stations will restart fully without manual intervention. In this case, the system displays *Waiting for server to become ready...* Perform the following steps on the review station to fully restart it.

1 Press  on the keyboard.

2 Select **All Programs**.

3 Select **DxH Folder**.

4 Select **DxH End Processes** and wait for the Windows desktop to be displayed.

5 Doubleclick  (DxH Startup icon) on the review station desktop to restart the application.

Supplies

To order consumables, contact your local Beckman Coulter Representative.

Reagents

See the individual reagent's Instructions for Use for more information.

COULTER DxH Diluent

COULTER DxH Diluent provides the ability to analyze portions of the diluted blood samples for different blood cell types and measure hemoglobin on the DxH 900/DxH 690T. It acts as a rinsing agent on all DxH 900/DxH 690T Systems. It is also a rinsing agent for the DxH Slidemaker Stainer II.

COULTER DxH Cell Lyse

COULTER DxH Cell Lyse is an erythrocyte lytic agent for quantitative determination of hemoglobin, enumeration of NRBC, and counting and sizing of leukocytes on the DxH 900/DxH 690T.

COULTER DxH Diff Pack

The COULTER DxH Diff Pack is an erythrolytic reagent and a leukocyte preservative used to perform a five-part differential analysis using VCSn technology on the DxH 900/DxH 690T.

COULTER DxH Retic Pack

The COULTER DxH Retic Pack clears red cells and stains reticulocytes on the DxH 900/DxH 690T.

The COULTER DxH Retic Pack contains the following:

- New Methylene Blue (Reagent A), a supravital dye, is incubated with a whole-blood sample. The dye precipitates the basophilic RNA network found in reticulocytes.
- A clearing reagent (Reagent B) removes hemoglobin and unbound stain from the erythrocytes (red blood cells or RBCs) while keeping the cell and its membranes intact and without removing the precipitated dye - RNA complex. This process results in clear spherical mature RBCs and darkly stained reticulocytes that are ready for analysis.

COULTER DxH Cleaner

DxH Cleaner is a cleaning agent for use on the DxH 900/DxH 690T System and the DxH Slidemaker Stainer II components that come in contact with blood samples.

Stains and Buffers

Beckman Coulter TruColor Reagents for use on the DxH Slidemaker Stainer II

- TruColor Wright Stain and TruColor Wright Buffer
- TruColor Wright-Giemsa Stain and TruColor Wright-Giemsa Buffer

Coulter TruColor Giemsa and May Grunwald Stains are not validated by Beckman Coulter for use through current default protocols on the system.

Use of non-Beckman Coulter Stains and Buffers:

- Beckman Coulter has not validated non-Beckman Coulter stains and buffers for use following current default staining protocols on the UniCel DxH Slidemaker Stainer II. Laboratories are responsible for the validation of their chosen stain and buffer. The Hardware on the instrument cannot be altered by the user. Please contact your Beckman Coulter Sales Representative.

- If non-Beckman Coulter stains and buffers are used, refer to the stain and buffer manufacturer's instructions for cleaning procedures to ensure the UniCel DxH Slidemaker Stainer II perform as intended.

Fixative

Methanol is used as a fixative for whole-blood smears in preparation for staining. Anhydrous methanol (chromatography grade, 99.8% or higher quality) is recommended.

Deionized Water

Deionized water is used to rinse the stained smears before drying. CLSI Type CLRW water is recommended.

Safety Data Sheets (SDS)

To obtain an SDS for Beckman Coulter reagents used on the DxH 900/DxH 690T System and the DxH Slidemaker Stainer II:

- On the Internet, go to www.beckmancoulter.com
  - Select **Safety Data Sheets (SDS/MSDS)** from the *Support* menu.
  - Follow the instructions on the screen.
- Alternately, contact your Beckman Coulter Representative.

Controls and Calibrators

COULTER LATRON CP-X Control

COULTER LATRON CP-X monitors the stability of the electrical processing and the fluidic flow rate systems used to measure the VCSn parameters.

COULTER S-CAL Calibrator

The COULTER S-CAL Calibrator is intended for the determination of calibration factors for directly measured CBC parameters.

COULTER 6C Cell Control

The COULTER 6C Cell Control is an integrated control that enables monitoring of system performance for CBC, Diff, and NRBC parameters.

COULTER Retic-X Cell Control

The COULTER Retic-X Cell Control is recommended for monitoring system performance of the reticulocyte parameters.

COULTER Body Fluid Control

COULTER Body Fluid Control is recommended for monitoring system performance of the body fluid cycle's RBC and TNC parameters. COULTER Body Fluid Control can also be used for verification of the analytical measuring range for TNC and RBC.

COULTER LIN-X Linearity Control

COULTER LIN-X Linearity Control is recommended for calibration assessment and verification of the analytical measuring range for WBC, RBC, HGB, and PLT parameters.

Consumables - DxH Slidemaker Stainer II

Slides

Beckman Coulter recommends slides developed especially for the DxH Slidemaker Stainer II. The painted area prevents multiple slide adhesion and provides a surface for printing. See Slide Specifications in APPENDIX A, Special Equipment for more information.

Printer Ribbon

Go to www.beckmancoulter.com to order replacements.

Baths, Bottles, Cubes, and Cleaning Bottles

Go to www.beckmancoulter.com for information on order replacements for baths, bottles, cubes, and cleaning bottles.

Physical Specifications

Table 1.6 Physical Specifications for DxH 900/DxH 690T Systems and the DxH Slidemaker Stainer II

Specification	**DxH 900/DxH 690T**	**DxH Slidemaker Stainer** II
Temperature	15.5 to 32°C (60 to 90°F)	20 to 26.6°C (68 to 80°F)
Relative Humidity (Non-condensing)	• < 85% at 16 to 29°C (60 to 84°F) • < 70% at > 29 to 32°C (>84 to 90°F)	< 70% at > 20 to 26.6°C (68 to 80°F)
Ventilation	N/A	Install in a well-ventilated area. Do not obstruct the top and rear fans.
Installation	Category II	Category II
Pollution Degree	2	2
Acoustic Noise Level	≤ 60 dBa	≤ 63.5 dBa measured 1.0 m (3.3 ft.)
Circuit	Independent and protected	Independent and protected

Table 1.6 Physical Specifications for DxH 900/DxH 690T Systems and the DxH Slidemaker Stainer II *(Continued)*

Input	AC outlet A three-wire NEMA 5-20 R (120 Vac, 20 A) receptacle furnishing single-phase input power for 105-120 V, 20 A DxH 900/DxH 690T Systems 100-240 Vac, 8.0 - 2.8 A, 48-62 Hz	A three-wire outlet supplying 100 to 240 Vac, nominal; 5.0 to 2.1 A; 48 to 62 Hz; single-phase power
Ground Path	Cable capable of carrying the full current of the circuit (confirmed third-wire earth ground)	Cable capable of carrying the full current of the circuit (confirmed third-wire earth ground)
Primary Power Cord	The 3 m (10 ft) primary power cord on the rear of the SPM must be plugged directly into the receptacle. Do not use an extension cord.	The 3 m (10 ft) primary power cord on the rear of the DxH Slidemaker Stainer II must be plugged directly into the receptacle. Do not use an extension cord.
Consumption	DxH 900/DxH 690T SPM, 520 W (1775 BTU/Hour) DxH Standard Computer, 160 W (546 BTU/Hour) Monitor 35W (120 BTU/Hour) DxH Power Computer, 160 W (546 BTU/Hour)	DxH Slidemaker Stainer II SPM, 550 W (1877 BTU/Hour) DxH Standard Computer, 160 W (546 BTU/Hour)
Drainage	The waste produced by the DxH 900/DxH 690T is commingled waste (reagents and patient samples) and should be disposed of in compliance with your local requirements. That includes handling, storage, classification, and disposal of the waste.	The DxH Slidemaker Stainer II produces biohazardous and stain wastes. **Biohazardous**: Waste can be disposed of into two waste containers or directly into the laboratory drain. If you choose to drain the biohazardous waste into a laboratory drain, ensure: • The drain is chemically resistant and is appropriate for biohazardous waste. • The drain is not located more than 76 cm (30 in.) above the floor and is within 3.7 m (12 ft.) of the area designated for the DxH Slidemaker Stainer II. • The tubing is mechanically secured to the floor drain. **Stain Waste**: Methanol-based stain waste is flammable and must be collected in the designated container. Refer to the product's Safety Data Sheet (SDS) when using stain chemicals not listed in this manual.

Power Supply Specifications

A three-wire AC outlet, single phase power, supplying 90 to 264 Vac at 48 to 62 Hz.

Peripheral Setup

Beckman Coulter encourages connecting the instrument to an uninterruptible power supply (UPS) to eliminate downtime from power interruptions.

Radio Frequency Immunity

The DxH 900/DxH 690T Systems meet the immunity requirements for RF and other interference from electronic devices as required by the product level standards EN 61326-1 (Electrical Equipment for Measurement, Control, and Laboratory Use - EMC Requirements), and EN 61326-2-6 (Part 2, Specific Requirements for In-Vitro Diagnostic Devices).

Dimensions

Workcell dimensions are the sum of the individual components and system module measurements. Your configuration will vary depending on the options selected. Spacing between the connected DxH 900 and the DxH Slidemaker Stainer II is .96 cm (.38 in.). Additional clearance is needed on the far left and far right sides of the workcell only. No additional clearance is needed between the individual DxH 900 and DxH Slidemaker Stainer II instruments.

Space and Accessibility Requirements - DxH 900

Table 1.7 Instrument Dimensions for the DxH 900 with Floor Stand

Specifications	DxH 900 with Floor Stand
Height (with cover closed)	176.53 cm (69.5 in.)
Height (with cover open)	199.39 cm (78.5 in.)
Width	76.2 cm (30 in.)
Additional clearance on each side for troubleshooting	15.2 cm (6.0 in.) per side
Depth (including the removable back panel)	83.82 cm (33 in.)
Depth (excluding the removable back panel)	80 cm (31.5 in.)
Additional clearance behind instrument for sufficient cooling	3.8 cm (1.5 in.)
Weight (including monitor and computer) [1]	≈ 292.11 kg (644 lbs.)
Weight (excluding computer) [1]	≈ 287.12 kg (633 lbs.)
[1] Mouse, keyboard, bar-code scanner, and reagents are not included in weight.	

Space and Accessibility Requirements - DxH 690T

Table 1.8 Instrument Dimensions for the DxH 690T

Specifications	DxH 690T
Height (with cover closed)	90.17 cm (35.5 in.)
Height (with cover open)	113.03 cm (44.5 in.)
Width	76.2 cm (30 in.)
Additional clearance on each side for troubleshooting	15.2 cm (6.0 in.) per side
Depth (including the removable back panel)	83.82 cm (33 in.)

Table 1.8 Instrument Dimensions for the DxH 690T *(Continued)*

Specifications	DxH 690T
Depth (excluding the removable back panel)	80 cm (31.5 in.)
Additional clearance behind instrument for sufficient cooling	3.8 cm (1.5 in.)
Weight (including monitor) [1]	≈ 141.97 kg (313 lbs.)
Weight (excluding computer) [1]	≈ 136.98 kg (302 lbs.)
[1] Mouse, keyboard, bar-code scanner, and reagents are not included in weight.	

Space and Accessibility Requirements - DxH Slidemaker Stainer II

Table 1.9 Instrument Dimensions for the DxH Slidemaker Stainer II with Floor Stand

Specifications	DxH Slidemaker Stainer II with Floor Stand
Height	204.5 cm (80.5 in.)
Width	94 cm (37 in.)
Additional clearance on each side for troubleshooting (per side)	15.2 cm (6.0 in.)
Depth	78.74 cm (31 in.)
Additional clearance behind instrument for sufficient cooling	3.8 cm (1.5 in.)
Weight (excluding reagents)	353.84 kg (780 lbs.)

Laboratory Automation System (LAS)

The Laboratory Automation System (LAS) feature lets you connect your DxH 900 and DxH Slidemaker Stainer II or any workcell configuration to a Laboratory Automation System. You can use a dynamic connection if you choose to do so.

Performance

Anticoagulant

NOTE All performance claims in this manual are based on data from specimens collected into the anticoagulants indicated below.

⚠ CAUTION

Risk of erroneous results. These anticoagulants are recommended by Beckman Coulter. Use of other anticoagulants may yield misleading results.

⚠ CAUTION

Risk of erroneous results. Follow the tube manufacturer's recommended procedure for the correct specimen collection.

Table 1.10 Samples and Anticoagulants

Sample	Anticoagulant
Whole blood Prediluted anti-coagulated blood Serous fluids (peritoneal, pleural)	K_2 or K_3 EDTA
Synovial fluids (pretreated with Hyaluronidase)	K_2 or K_3 EDTA or heparin
Cerebrospinal fluid	No anticoagulant requirement

Aspiration

Table 1.11 Aspiration

Sample	Volume	Description
Whole Blood	165 µL	For the DxH 900/DxH 690T SPM in cassette or single-tube presentation
Predilute	50 µL whole blood into 200 µL of diluent	Represents a x5 dilution for CBC analysis in single-tube presentation (predil X5 panel)
Whole Blood	90 µL	For the DxH Slidemaker Stainer II. Up to four smears can be obtained from a single aspiration in cassette or single-tube presentation. Up to 12 smears can be obtained from one tube (three aspirations) in cassette presentation.

Tube dead volume varies depending on the tube's physical characteristics (length, diameter), tube bottom adjustments and the sampling presentation. The least dead volume is required by the spring-loaded side of the Single-Tube presentation station.

Accuracy

CBC - Whole Blood

Accuracy for the CBC parameters is assessed by comparison of the results from the DxH 900/DxH 690T and a comparator hematology instrument. The estimation of the difference is determined as

described in *CLSI EP09-A3* [45]. When specimens covering the analytical measuring range with no system messages are analyzed by both the DxH 900/DxH 690T and a comparator hematology instrument, the DxH 900/DxH 690T meets specification if the results are within the limits defined in Table 1.12, Accuracy Specifications, Whole Blood - CBC.

Table 1.12 Accuracy Specifications, Whole Blood - CBC

Parameter	Units	Analytical Measuring Range	Difference (whichever is greater)	
WBC	$x10^3$ cells/µL	0.050–2.000	± 0.1	± 10%
		>2.000–100.000	± 0.2	± 3.0%
		>100.000–400.000	N/A	± 5%
RBC	$x10^6$ cells/µL	0.005–8.500	± 0.05	± 2.0%
HGB	g/dL	0.10–25.50	± 0.2	± 3.0%
MCV	fL	50.00–150.00	N/A	± 2%[a]*
RDW	%	10.00–40.00	± 0.5	± 5.0%
RDW-SD	fL	15.00–150.00	± 3.0	± 10.0%
PLT	$x10^3$ cells/µL	3.0–3000.0	± 10.0	± 7.0%
MPV	fL	5.00-25.00	N/A	± 7.0%

a. Due to the effect of temperature on red cell size, the specification applies to the temperature range of 70–80° F (21.1–26.7° C)

Differential

Accuracy for the Differential parameters is assessed by comparison of the results from the DxH 900/DxH 690T and a comparative method. Results may be compared to either a comparator hematology analyzer or to a 400 cell manual differential prepared according to *CLSI H20-A2* [52].

The estimation of the bias/difference is described in *CLSI EP09-A3* [45]. When morphologically normal specimens covering the analytical measuring range with no system messages are analyzed by the DxH 900/DxH 690T and by 400 cell manual differential, the DxH 900/DxH 690T meets specification if the results are within the bias defined in Table 1.13, Accuracy Specifications (Manual Diff), Whole Blood - Differential - CLSI H20-A2 52.

Table 1.13 Accuracy Specifications (Manual Diff), Whole Blood - Differential - *CLSI H20-A2* [52]

Parameter	Units	Analytical Measuring Range	Bias (whichever is greater)	
NE	%	0.00–100.00	± 2.0	± 10%
LY	%	0.00–100.00	± 3.0	± 10%
MO	%	0.00–100.00	± 3.0	± 10%
EO	%	0.00–100.00	± 1.0	± 10%
BA	%	0.00–100.00	± 1.0	± 10%

When specimens covering the measuring range with no system messages are analyzed by the DxH 900/DxH 690T System and a comparator hematology instrument, the DxH 900/DxH 690T System meets specifications if the results are within the difference defined in Table 1.14, Accuracy Specifications (Comparator Hematology Instrument), Whole Blood - Differential *.

Table 1.14 Accuracy Specifications (Comparator Hematology Instrument), Whole Blood - Differential *

Parameter	Units	Analytical Measuring Range	Difference (whichever is greater)	
NE	%	0.00–100.00	± 2.0	± 10%
LY	%	0.00–100.00	± 1.5	± 10%
MO	%	0.00–100.00	± 1.0	± 10%
EO	%	0.00–100.00	± 0.5	± 10%
BA	%	0.00–100.00	± 0.5	± 10%

* DxH 900/DxH 690T results with System Messages are excluded.

Reticulocyte

Accuracy for the Reticulocyte parameters is assessed by comparison of results from the DxH 900/DxH 690T and a comparator hematology instrument. Estimation of difference is determined using *CLSI EP09-A3* [45]. The DxH 900/DxH 690T meets specification if results meet the limits defined in Table 1.15, Accuracy Specification, Whole Blood - Reticulocytes.

Table 1.15 Accuracy Specification, Whole Blood - Reticulocytes

Parameter	Units	Analytical Measuring Range	Difference
RET	%	0.000–30.000	± 0.5 or ± 10% (whichever is greater)
IRF	—	0.000–1.000	± 0.2
MRV	fL	50.00–190.00	± 15.0

NRBC

Accuracy for the NRBC parameters are assessed by comparison of the results from the DxH 900/DxH 690T and a comparative method. Results may be compared to either a comparator hematology analyzer or to a 400 cell manual differential prepared according to CLSI *H20-A2* [52].

When specimens covering the analytical measuring range without system messages are analyzed by the DxH 900/DxH 690T and a manual method as described by CLSI *H20-A2* [52], the DxH 900/DxH 690T meets specification if the results are within limits defined in Table 1.16, Accuracy Specifications, Whole Blood - NRBC.

When specimens covering the analytical measuring range without system messages are analyzed by the DxH 900/DxH 690T and a comparator hematology instrument, the DxH 900/DxH 690T meets specification if the results are within limits defined in Table 1.16, Accuracy Specifications, Whole Blood - NRBC.

Table 1.16 Accuracy Specifications, Whole Blood - NRBC

Parameter	Units	Analytical Measuring Range	Correlation Coefficient
NRBC	per 100 WBC	0.00–600.00	r ≥ 0.90

Body Fluids

Accuracy for body fluid parameters is assessed by comparison of the results from the DxH 900/DxH 690T to manual counts or a comparator hematology instrument. The estimation of the bias is determined as described in *CLSI EP09-A3* [45]. When specimens covering the analytical measuring range without system messages are analyzed by both the DxH 900/DxH 690T and by the manual method, the DxH 900/DxH 690T meets specification if the results are within the limits defined in Table 1.17, Accuracy Specifications - Body Fluids.

Table 1.17 Accuracy Specifications - Body Fluids

Parameter	Units	Analytical Measuring Range	Bias (whichever is greater)
TNC	cells/mm^3	20–89,000	± 5 or ± 10%
RBC	cells/mm^3	1,000–6,200,000	± 500 or ± 5.0%

Repeatability

Repeatability is assessed by replicate analysis of the same specimen (n=10). Specimens with system messages and/or suspect messages should not be used.

Table 1.18 Repeatability - Whole Blood CBC, DIFF, Retic (N=10)

Parameter	Units	Range	Limit
WBC	x10^3 cells/µL	0.500–2.000 5.000–10.000	≤ 5.0% CV ≤ 3.0% CV
RBC	x10^6 cells/µL	4.500–5.500	≤ 1.5% CV
HGB	g/dL	14.00–16.00	≤ 1.5% CV
MCV	fL	80.00–90.00	≤ 1.0% CV
RDW	%	12.00–14.00	≤ 2.5% CV
RDW-SD	fL	33.00–48.00	≤ 2.5% CV
PLT	x10^3 cells/µL	10.0–15.0 200.0–400.0	≤ 12.0% CV ≤ 3.5% CV
MPV	fL	8.0–10.0	≤ 2.5% CV @PLT > 100x10^3 cells/µL
NE	%	50.00–60.00	≤ 3.5% CV @WBC > 4.0x10^3 cells/µL
LY	%	25.00–35.00	≤ 5% CV @WBC > 4.0x10^3 cells/µL
MO	%	5.00–10.00	≤ 10.0% CV @WBC > 4.0x10^3 cells/µL

Table 1.18 Repeatability - Whole Blood CBC, DIFF, Retic (N=10) *(Continued)*

Parameter	Units	Range	Limit
EO	%	2.00–5.00	SD ≤ 0.5 or ≤ 13.5% CV @WBC > 4.0x10^3 cells/µL
BA	%	0.50–1.50	SD ≤ 0.5 @WBC > 4.0x10^3 cells/µL
NRBC	/100 WBC	1.00–2.00 > 2.00–15.00 > 15.00	SD ≤ 0.3 ≤ 20% CV ≤ 15% CV
RET	%	0.000–1.500 > 1.500–4.000 > 4.000–15.000	SD ≤ 0.25 SD ≤ 0.70 ≤ 7% CV
IRF	—	RBC ≥3.0 x 10^6 µL and RETIC 1.0–4.0% and IRF ≥ 0.2	≤ 20% CV
MRV	fL	100.00–120.00	≤ 5% CV

Table 1.19 Repeatability - Prediluted Blood (N=10)

Parameter	Units	Range	Limit
WBC	x10^3 cells/µL	5.000–10.000	≤ 6.0% CV
RBC	x10^6 cells/µL	4.500–5.500	≤ 3.0% CV
HGB	g/dL	14.00–16.00	≤ 3.0% CV
PLT	x10^3 cells/µL	200.0–400.0	≤ 7.0% CV

Table 1.20 Repeatability - CSF, Serous, or Synovial Body Fluid Count (N=10)

Parameter	Unit	Repeatability	Limit
RBC	cells/mm^3	10,000–15,000	≤ 10.0% CV
TNC	cells/mm^3	50–2,000	≤ 15.0% CV

Analytical Measuring and Operating Ranges

Analytical Measuring Range

Analytical measuring range is the manufacturer-determined upper and lower limits of the amount, activity, or potency of a specific analyte between which measurement is possible on the measuring system within specific limits. This includes results from prediluted samples. Analytical measuring range can be assessed using commercially available materials qualified for use on the DxH 900/DxH 690T System.

Operating Range

Operating range is the range over which the system, inclusive of the predilute functionality, will report (display, print, and/or transmit) results. Values that are between the analytical measuring range and operating range are flagged. The operating range usually exceeds the analytical measuring range.

Linearity

Linearity can be assessed by testing levels of an analyte that are known by formulation or by using commercially available materials qualified for use on the DxH 900/DxH 690T System. For instructions on processing linearity results, see *eIQAP* on the Beckman Coulter website.

NOTE Only one cassette can be processed at a time during linearity studies, regardless of whether you use the Studies or Repeatability feature.

Table 1.21 Whole Blood Analytical Measuring and Operating Ranges, and Linearity

Parameter	Units	Analytical Measuring Range	Operating Range	Linearity (r^2)
WBC[a]	10^3 cells/µL	0.050–400.000	0.000–999.999	> 0.95
RBC	10^6 cells/µL	0.005–8.500	0.000–10.000	> 0.95
HGB	g/dL	0.10–25.50	0.00–30.00	> 0.95
HCT	%	N/A	0.00–85.00	N/A
MCV	fL	50.00–150.00	40.00–200.00	N/A
MCH	pg	N/A	0.00–99.99	N/A
MCHC	g/dL	N/A	0.00–99.99	N/A
RDW	%	10.00–40.00	0.00–70.00	N/A
RDW-SD	fL	15.00–150.00	0.00–340.00	N/A
PLT	10^3 cells/µL	3.0–3000.0	0.0–7000.0	> 0.95
MPV	fL	5.00–25.00	0.00–25.00	N/A
NE	%	0.00–100.00	0.00–100.00	N/A
NE#	10^3 cells/µL	0.000–400.000	0.000–600.000	N/A
LY	%	0.00–100.00	0.00–100.00	N/A
LY#	10^3 cells/µL	0.000–400.000	0.000–600.000	N/A
MO	%	0.00–100.00	0.00–100.00	N/A
MO#	10^3 cells/µL	0.000–400.000	0.000–600.000	N/A
EO	%	0.00–100.00	0.00–100.00	N/A
EO#	10^3 cells/µL	0.000–400.000	0.000–600.000	N/A
BA	%	0.00–100.00	0.00–100.00	N/A
BA #	10^3 cells/µL	0.000–400.000	0.000–600.000	N/A
NRBC	/100 WBC	0.00–600.00	0.00–600.00	N/A
NRBC#	10^3 cells/µL	N/A	0.000–600.000	N/A
RET	%	0.000–30.000	0.000–50.000	N/A
RET#	10^6 cells/µL	0.00000–1.00000	0.00000–2.50000	N/A
IRF	—	0.000–1.000	0.000–1.000	N/A
MRV	fL	50.00–190.00	0.00–500.00	N/A

a. Operating range achieved when using predilute capability.

Body Fluid Analysis

Beckman Coulter recommends that a diluent be run as a Body Fluid sample prior to analysis of Body Fluid specimens. Backgrounds within specifications can influence the reported results on the samples with low abnormal or normal values. Beckman Coulter recommends that each laboratory establish criteria for evaluation of the impact of background on the reported results.

Table 1.22 Body Fluids (CSF, Serous, Synovial) Analytical Measuring and Operating Ranges

Parameter	Units	Analytical Measuring Range	Operating Range
RBC	cells/mm^3	1,000–6,200,000	0–10,000,000
TNC	cells/mm^3	20–89,000	0–600,000

An RBC is reported for a Body Fluid panel even if the RBC reporting is disabled.

Carryover

Carryover results should not exceed the following limits:

Table 1.23 High to Low Carryover

Parameter	Limit
WBC	≤ 0.5%
RBC	≤ 0.5%
HGB	≤ 1.0%
PLT	≤ 1.0%
NRBC	≤ 75 events at WBC 0.000 to 300.000 X 10^3/µL ≤ 100 events at WBC > 300.000 X 10^3/µL
DIFF	≤ 200 events
RET	≤ 600 events

CBC High to Low Carryover is measured per ICSH guidelines[4], and calculated as follows:

Carryover = [(1st Diluent - 3rd Diluent) / (3rd Sample - 3rd Diluent)] x 100

For DIFF, Retic, and NRBC, the event count for each diluent should be within limits as stated in Table 1.23, High to Low Carryover.

High to Low Carryover for Body Fluids is measured by analyzing a whole blood specimen followed by a diluent analyzed as a body fluid. The diluent sample should not exceed the Background limits. The system should not require more than two diluents to be within acceptable Background limits.

Carryover on the DxH Slidemaker Stainer II is ≤ 1 cell in 400 WBCs (≤ 0.25%) in the working area of the slide when smears are read according to *CLSI H20-A2* [52].

Background Counts

Table 1.24 DxH 900/DxH 690T Background - Daily Checks

Parameter	Limit
WBC	≤ 0.05 x 10^3 cells/µL
RBC	≤ 0.005 x 10^6 cells/µL

Table 1.24 DxH 900/DxH 690T Background - Daily Checks *(Continued)*

Parameter	Limit
HGB	≤ 0.10 g/dL
PLT	≤ 3.0 x 10^3 cells/µL
NRBC Region	≤ 10 events
NRBC Total	≤ 60 events
DIFF	≤ 100 events
RET	≤ 600 events

Table 1.25 DxH 900/DxH 690T Background - Body Fluids[a]

Parameter	Limit
TNC	≤ 20 cells/mm^3
RBC	≤ 1000 cells/mm^3

a. Analyzed by running a diluent using the Body Fluid Count cycle.

Throughput

The DxH 900/DxH 690T achieves the average throughput defined in the table below, when used in a routine laboratory environment with whole blood samples having hematology parameters with the values defined below. Throughput is achieved when cellular concentrations are in the following ranges:

WBC = 7.00–10.00 x 10^3 cells/µL, RBC = 4.000–5.000 x 10^6 cells/µL, PLT = 250.0–400.0 x 10^3 cells/µL.

Table 1.26 Throughput per Test Panel Mode

Test Panel	Specimens per Hour
CBC	≥ 100
CBC and Differential	≥ 100
CBC and Differential with NRBC	≥ 90
Any Retic Cycle	≥ 45
Mixed Samples 80% CBC/Diff with NRBC 20% CBC/Diff/Retic with NRBC	≥ 72

Under a steady state, the DxH Slidemaker Stainer II achieves a throughput of up to 140 unstained dry blood films per hour using normal whole blood under the following conditions:

- Consumables and waste containers are at acceptable levels.
- Each specimen is presented as a single aspiration and a single slide.
- Cassettes are fully loaded.

Reference Range Studies

A Normal Range study was conducted to assess the Reference Ranges. Whole-blood samples were collected from approximately 240 donors (males and females). The selection of donors was consistent with guidelines stated in *CLSI EP28-A3c* [46].

Use these Reference Intervals to verify that the ranges are adequate for your laboratory. Your laboratory's patient population may be different.

Reference range values are shown in Table 1.27, Whole Blood Reference Ranges - Overall, Table 1.28, Whole Blood Reference Ranges - Male, and Table 1.29, Whole Blood Reference Ranges - Female.

Body Fluids Reference Ranges

Reportable body fluid results may exceed commonly accepted normal reference ranges for all body fluids. Results should always be interpreted in light of the total clinical presentation of the patient, including clinical history, data from additional tests, and other appropriate information.

Cerebrospinal Fluid

The inability to collect cerebrospinal fluid specimen in the normal, non-diseased population limits the ability to determine reference ranges. Literature[1] suggests the following normal reference ranges.

- WBC 0–5 cells/mm^3 in adults
- WBC 0–30 cells/mm^3 in children 1 to 4 years of age
- WBC 0–20 cells/mm^3 in children 5 years of age to puberty
- RBC none to few

Serous Fluids

The accumulation of fluid in a serous cavity is an indication of a disease state. The normal, non-diseased population has no fluid accumulation. Therefore, there are no normal reference ranges for serous fluids. However, the number of cells present in a serous fluid are used to aid in the classification, diagnosis, and treatment of disease.[1]

Synovial Fluid

The inability to collect synovial fluid specimens in the normal, non-diseased population limits the ability to determine reference ranges. Literature[1] suggests the following normal reference ranges.

- WBC 0–150 cells/mm^3
- RBC none

Table 1.27 Whole Blood Reference Ranges - Overall

Parameter	Units	Overall		
		Mean	95% Confidence Low Limit	95% Confidence High Limit
WBC	x10^3 cells/µl	6.3	3.6	11.2
RBC	x10^6 cells/µl	4.52	3.73	5.50

Table 1.27 Whole Blood Reference Ranges - Overall *(Continued)*

Parameter	Units	Overall		
		Mean	**95% Confidence Low Limit**	**95% Confidence High Limit**
HGB	g/dl	13.4	11.4	15.9
HCT	%	39.0	33.3	45.7
MCV	fL	86.4	73.7	95.5
MCH	pg	29.6	24.3	33.2
MCHC	g/dl	34.2	32.5	35.8
RDW	%	13.8	12.3	17.0
RDW-SD	fL	41.4	37.1	47.8
PLT	$x10^3$ cells/µl	257	159	386
MPV	fL	9.2	7.5	11.2
NE	%	58.5	43.3	76.6
LY	%	29.6	16.0	43.5
MO	%	8.3	4.5	12.5
EO	%	2.8	0.6	7.9
BA	%	0.7	0.2	1.4
NE#	$x10^3$ cells/µl	3.7	1.8	7.8
LY#	$x10^3$ cells/µl	1.8	1.0	3.0
MO#	$x10^3$ cells/µl	0.5	0.3	1.0
EO#	$x10^3$ cells/µl	0.2	0.0	0.5
BA#	$x10^3$ cells/µl	0.0	0.0	0.1
NRBC	/100 WBC	0.1	0.0	0.4
NRBC#	$x10^3$ cells/µl	0.01	0.00	0.02
RET	%	1.10	0.50	2.17
RET#	$x10^6$ cells/µl	0.0498	0.0221	0.0963
MRV	fL	108.8	97.4	120.2
IRF	—	0.40	0.29	0.53

Table 1.28 Whole Blood Reference Ranges - Male

Parameter	Units	Male		
		Mean	**95% Confidence Low Limit**	**95% Confidence High Limit**
WBC	$x10^3$ cells/µl	5.9	3.6	10.2
RBC	$x10^6$ cells/µl	4.81	4.06	5.63
HGB	g/dl	14.2	12.5	16.3
HCT	%	41.3	36.7	47.1

Table 1.28 Whole Blood Reference Ranges - Male *(Continued)*

Parameter	Units	Male		
		Mean	95% Confidence Low Limit	95% Confidence High Limit
MCV	fL	86.1	73.0	96.2
MCH	pg	29.6	23.8	33.4
MCHC	g/dl	34.4	32.5	36.3
RDW	%	13.6	12.1	16.2
RDW-SD	fL	40.8	36.5	45.9
PLT	$x10^3$ cells/µl	234	152	348
MPV	fL	9.2	7.4	11.4
NE	%	57.3	43.5	73.5
LY	%	29.8	15.2	43.3
MO	%	9.0	5.5	13.7
EO	%	3.2	0.8	8.1
BA	%	0.7	0.2	1.5
NE#	$x10^3$ cells/µl	3.4	1.7	7.6
LY#	$x10^3$ cells/µl	1.7	1.0	3.2
MO#	$x10^3$ cells/µl	0.5	0.3	1.1
EO#	$x10^3$ cells/µl	0.2	0.0	0.5
BA#	$x10^3$ cells/µl	0.0	0.0	0.1
NRBC	/100 WBC	0.2	0.0	0.6
NRBC#	$x10^3$ cells/µl	0.01	0.00	0.02
RET	%	1.09	0.42	2.23
RET#	$x10^6$ cells/µl	0.0523	0.0188	0.1086
MRV	fL	109.5	97.5	122.7
IRF	—	0.41	0.30	0.54

Table 1.29 Whole Blood Reference Ranges - Female

Parameter	Units	Female		
		Mean	95% Confidence Low Limit	95% Confidence High Limit
WBC	$x10^3$ cells/µl	6.7	3.8	11.8
RBC	$x10^6$ cells/µl	4.26	3.63	4.92
HGB	g/dl	12.6	10.9	14.3
HCT	%	36.9	31.2	41.9
MCV	fL	86.8	75.5	95.3
MCH	pg	29.6	24.7	32.8

Table 1.29 Whole Blood Reference Ranges - Female *(Continued)*

Parameter	Units	Female		
		Mean	95% Confidence Low Limit	95% Confidence High Limit
MCHC	g/dl	34.1	32.3	35.6
RDW	%	14.0	12.3	17.7
RDW-SD	fL	42.0	37.6	50.3
PLT	$x10^3$ cells/µl	278	179	408
MPV	fL	9.2	7.9	10.8
NE	%	59.7	42.7	76.8
LY	%	29.4	16.0	45.9
MO	%	7.6	4.3	10.9
EO	%	2.4	0.5	7.0
BA	%	0.7	0.2	1.3
NE#	$x10^3$ cells/µl	4.1	1.9	8.2
LY#	$x10^3$ cells/µl	1.9	1.1	3.1
MO#	$x10^3$ cells/µl	0.5	0.2	0.9
EO#	$x10^3$ cells/µl	0.2	0.0	0.5
BA#	$x10^3$ cells/µl	0.0	0.0	0.1
NRBC	/100 WBC	0.1	0.0	0.3
NRBC#	$x10^3$ cells/µl	0.01	0.00	0.02
RET	%	1.11	0.51	2.17
RET#	$x10^6$ cells/µl	0.0474	0.0230	0.0935
MRV	fL	108.1	96.4	118.0
IRF	—	0.40	0.26	0.52

For pediatric and adolescent populations (birth to <21 years of age) reference intervals (age- and sex- specific) for the DxH 900 Analyzer were established using a robust statistical method in accordance with CLSI EP28-A3C. All data is contained within referenced article on Caliper hematology reference standards (I) pertaining to laboratory test interpretation in children using DxH 900 hematology analyzer[57].

Sample Stability and Storage

IMPORTANT Refer to *CLSI GP44-A4* [49] for guidelines.

Sample stability is measured by the ability of results to be within the stated specifications for a given period of time and storage condition. A minimum of ten (10) samples are analyzed in duplicate at time zero and the defined temperatures. The mean of those results is compared to the mean of the same samples analyzed at the times and storage conditions noted in those tables. The

difference in mean results is within the stability ranges. Beckman Coulter recommends analyzing all non-refrigerated whole blood samples within 24 hours.

Whole Blood

Long term stability is determined by comparing results from the initial analysis (within two hours of collection) to results from samples stored at controlled room temperature for 24 hours and refrigerated temperature for 48 hours. Upon removal from refrigerated storage, samples are hand-mixed by inversion 20 times, allowed to warm at room temperature for a minimum of 30 minutes, and then hand-mixed by inversion 20 times prior to analysis.

Table 1.30 Sample Stability (Whole Blood)

Parameter	Stability Range	At Controlled Room Temperature (18 to 26°C or 64 to 79°F) Time	At Refrigerated Temperature (2 to 8°C or 35.6 to 46.4°F) Time
WBC ($x10^3$ cells/µL)	≤ 0.50	24 hours	48 hours
RBC ($x10^6$ cells/µL	≤ 0.10	24 hours	48 hours
HGB (g/dL)	≤ 0.2	24 hours	48 hours
MCV fL	≤ 3.0	24 hours	48 hours
RDW (%)	≤ 1.00	24 hours	48 hours
RDW-SD	≤ 5.0	24 hours	48 hours
PLT ($x10^3$ cells/µL)	≤ 30.0	24 hours	48 hours
MPV fL	≤ 1.0	24 hours	48 hours
NE (%)	≤ 5.0	24 hours	48 hours
LY (%)	≤ 4.0	24 hours	48 hours
MO (%)	≤ 3.0	24 hours	48 hours
EO (%)	≤ 1.5	24 hours	48 hours
BA (%)	≤ 1.5	24 hours	48 hours
NRBC (%)	≤ 0.5	24 hours	24 hours
RET (%)	≤ 0.30	24 hours	72 hours
MRV fL	≤ 4.0	24 hours	72 hours
IRF	≤ 0.30	24 hours	72 hours

Prediluted Whole Blood

Results from prediluted samples analyzed between 5 minutes and 1 hour after preparation and compared to those same samples from whole blood analyses should agree within the limits shown in Table 1.31, Sample Stability (Prediluted Whole Blood).

Table 1.31 Sample Stability (Prediluted Whole Blood)

Parameter	Difference (whichever is greater)
WBC x 10^3 cells/µL	± 0.4 or ± 10%
RBC x 10^6 cells/µL	± 0.1 or ± 4%
HGB g/dL	± 0.4 or ± 6%
PLT x 10^3 cells/µL	± 10.0 or ± 15%

Body Fluids

Per established literature, CLSI H56-A. *Body Fluid Analysis for Cellular Composition*[56], body fluid samples should be stored at room temperature and analyzed within 1 hour of collection.

Clinical Sensitivity and Specificity

Clinical sensitivity and specificity of WBC differential flagging performance can be influenced by a number of factors relating to instrument technology, cellular frequency, uncertainty in the reference determination of a "positive," and the sample population evaluated. The DxH 900/DxH 690T provides the ability to set the levels and sensitivities of a variety of Flags and Messages to meet individual laboratory requirements. Beckman Coulter recommends completion of sensitivity and specificity studies using your sample population to establish these settings.

Specimen Tubes

The DxH 900/DxH 690T Systems are capable of processing a wide variety of specimen tubes. See Recommended Tubes in APPENDIX A, Special Equipment for tube specifications.

Venous and Capillary Sample Performance Characteristics

Whole blood venous and capillary specimens (total of 53) were analyzed from normal Beckman Coulter donors on the predicate DxH 800 instrument. A number of specimens did not provide parameter results and were excluded from the analysis. The results of the study are shown below.

Table 1.32 Venous and Capillary Sample Performance Characteristics

					Mean		
Parameter	**n**	**Correlation**	**Intercept**	**Slope**	**Venous**	**Capillary**	**Units**
WBC	51	0.964	-0.333	1.083	6.185	6.367	x10^3 cells/µL
RBC	52	0.934	0.123	1.009	4.484	4.648	x10^6 cells/µL
HGB	52	0.884	1.830	0.897	13.48	13.92	g/dL
MCV	52	0.995	1.745	0.979	88.29	88.14	fL
PLT	46	0.874	1.012	0.904	237.9	216.0	x10^3 cells/µL
MPV	46	0.949	1.278	0.933	9.20	9.86	fL

Table 1.32 Venous and Capillary Sample Performance Characteristics *(Continued)*

					Mean		
Parameter	**n**	**Correlation**	**Intercept**	**Slope**	**Venous**	**Capillary**	**Units**
RDW	52	0.957	0.146	0.990	13.86	13.86	CV%
RDW-SD	52	0.902	1.743	0.957	41.92	41.85	fL
NE	51	0.990	1.496	0.969	54.48	54.28	%
LY	51	0.990	0.941	0.978	33.28	33.48	%
MO	51	0.941	0.689	0.892	8.50	8.27	%
EO	51	0.992	0.086	0.984	3.00	3.04	%
BA	51	0.131	0.824	0.134	0.74	0.92	%
NRBC	51	-0.048	0.194	-0.266	0.05	0.18	%
RET	52	0.898	0.195	0.890	1.332	1.381	%
MRV	52	0.945	5.166	0.958	108.59	109.14	fL
IRF	52	0.816	0.067	0.809	0.334	0.337	N/A

Closed and Open Vial Characteristics

Specimens (total of 45) were collected from normal Beckman Coulter donors and analyzed on the predicate DxH 800 instrument as closed vial and open vial specimens. A number of specimens did not provide parameter results and were excluded from the analysis. The results of the study are shown in Table 1.33, Closed and Open Vial Performance Characteristics.

Table 1.33 Closed and Open Vial Performance Characteristics

					Mean		
Parameter	**n**	**Correlation**	**Intercept**	**Slope**	**Closed Vial**	**Open Vial**	**Units**
WBC	43	0.999	-0.019	1.003	6.041	6.039	$x10^3$ cells/µL
RBC	44	0.999	0.024	0.992	4.117	4.110	$x10^6$ cells/µL
HGB	44	0.999	-0.003	1.001	12.36	12.37	g/dL
MCV	44	0.998	1.265	0.986	90.02	90.00	fL
PLT	43	0.999	-3.670	1.019	240.4	241.3	$x10^3$ cells/µL
MPV	43	0.978	0.657	0.930	9.15	9.16	fL
RDW	44	0.998	-0.235	1.018	15.31	15.35	CV%
RDW-SD	44	0.997	-0.413	1.012	47.21	47.35	fL
NE	41	0.996	1.392	0.982	55.06	55.44	%
LY	41	0.983	-0.560	1.001	32.10	31.57	%
MO	41	0.970	0.684	0.912	8.07	8.04	%
EO	41	0.997	0.106	0.949	4.02	3.92	%
BA	40	0.707	0.232	0.678	0.76	0.75	%

Table 1.33 Closed and Open Vial Performance Characteristics *(Continued)*

					Mean		
Parameter	**n**	**Correlation**	**Intercept**	**Slope**	**Closed Vial**	**Open Vial**	**Units**
NRBC	44	1.000	0.012	0.980	1.07	1.06	%
RET	44	0.977	-0.092	1.053	1.426	1.409	%
MRV	44	0.987	-0.777	1.002	114.45	113.86	fL
IRF	44	0.908	0.029	0.925	0.383	0.383	N/A

Whole Blood and Predilute Performance Characteristics

Specimens (total of 57) were analyzed as whole blood and predilute on the predicate DxH 800 instrument. A number of specimens did not provide parameter results and were excluded from the analysis. The results of the study are shown in Table 1.34, Whole Blood and Predilute Performance Characteristics.

Table 1.34 Whole Blood and Predilute Performance Characteristics

					Mean		
Parameter	**n**	**Correlation**	**Intercept**	**Slope**	**Whole Blood**	**Predilute**	**Units**
WBC	55	0.999	-0.575	1.001	21.487	20.926	$x10^3$ cells/µL
RBC	56	0.993	0.075	0.956	3.960	3.860	$x10^6$ cells/µL
HGB	55	0.989	0.252	0.976	12.07	12.03	g/dL
MCV	56	0.998	-2.509	1.012	91.10	89.68	fL
PLT	53	0.997	-6.731	0.982	256.3	244.8	$x10^3$ cells/µL
MPV	53	0.934	1.301	0.830	9.00	8.77	fL
RDW	56	0.996	-0.020	0.973	16.50	16.04	CV%
RDW-SD	56	0.981	1.857	0.919	50.90	48.64	fL

Limitations

For the DxH Slidemaker Stainer II, no interfering substances will be observed other than the ones experienced using the manual method.

Table 1.35 Limitations

Parameter	Limitation
All Specimens	Misleading results can occur: • If the specimen is not properly collected, stored or transported. Beckman Coulter recommends that you follow CLSI or equivalent procedures to ensure proper specimen collection, storage, and transport. Always follow manufacturer's recommendations when using microcollection devices for capillary specimen collection. • If specimens contain clots. Always use good laboratory practices for inspecting specimens for clots and verifying results. • If the specimen is not properly mixed. Always use good laboratory practices to ensure specimens are appropriately mixed. Do not bypass or circumvent the automated mixing process used on the DxH 900/DxH 690T. **NOTE** When running a test panel, with NRBC analysis enabled, the information from the NRBC analysis is used to supplement interference detection, flagging, and correction.
WBC and TNC	NRBCs, giant platelets, platelet clumps, malarial parasites, precipitated elevated proteins, cryoglobulin, microlymphoblasts, very small lymphocytes, fragmented white cells, agglutinated white cells, lyse resistant red cells, unlysed particles > 35 fL in size. Elevated WBC counts may have a carryover effect on subsequent leukopenic specimens, within the limits specified in the Carryover section. In many instances, the WBC is corrected automatically without an R flag. This is when the instrument has high confidence in the accuracy of the WBC. If there is an R flag with the WBC, determine the underlying condition and handle it accordingly. How you correct the WBC depends on the specific underlying condition causing the R flag.
RBC	Very high WBC count, high concentration of very large platelets, auto-agglutination. If hemolysis is occurring in vivo, the instrument RBC may be flagged as low, reflecting the true circulating cells. If, however, the hemolysis is in vitro, the specimen may give falsely low RBC results. Cell counts due to in vitro hemolysis do not represent the number of circulating red blood cells.
HGB	Severe lipemia, heparin, certain unusual RBC abnormalities that resist lysing.
MCV	Very high WBC count, high concentration of very large platelets, auto-agglutination.
RDW, RDW-SD	Very high WBC count, high concentration of very large platelets, auto-agglutination.
PLT	Giant Platelets, platelet clumps, white cell fragments, electronic noise, very small red cells, red cell fragments.
HCT	Known interferences related to RBC and MCV.
MCH	Known interferences related to HGB and RBC.
MCHC	Known interferences related to HGB, RBC, and MCV.
NRBC	Known interferences may be related to the following: • Lyse-resistant red cells • Malarial parasites • Very small or multi-population lymphocytes • Precipitated elevated proteins

Table 1.35 Limitations *(Continued)*

Parameter	Limitation
Differential	• Hypogranular granulocytes, agranular granulocytes, lyse resistant red cells, very small or multi-population lymphocytes, elevated triglycerides, precipitated elevated proteins. • A transient basophilia may be observed in samples that have been exposed to high temperatures (~ 90°F or ~ 32°C). The temporary basophilia should resolve after stabilization at room temperature (~ 72°F or ~ 22°C). • Blasts are detected, but not enumerated, by internal algorithms using acquired events, histogram and dataplot patterns, and sophisticated statistical methods for all available data for the sample analyzed. A standard trigger value or limit corresponding to enumeration on peripheral smear cannot be established because: — Laboratories differ in their desired sensitivity to abnormal flagging and messaging. — Laboratories differ in their definition of blasts. — Mature and immature abnormal cell types may be identified as blasts. — Blasts can be rare events. Blasts can represent a mixed population of cells often associated with specimen abnormalities that alter the white cell population's pattern distribution in dataplots and histograms away from a normal distribution. The presence of blast cells may trigger other available suspect messages. Not all blood samples that contain blasts may report a suspect message. A blast suspect message is not diagnostic. You should not rely upon instrument results alone to replace the need for manual microscopic review of blood samples if indicated by other clinical and laboratory features of the patient. Further diagnostic procedures and clinical evaluation must be evaluated for diagnosis. See Processing Results in CHAPTER 6, Data Review for complete information on all available messaging and flagging options on the system.
Reticulocytes	Erythrocyte inclusions stained by New Methylene Blue, if sufficiently numerous within a sample, and some hemoglobinopathies (SS, SC) might affect the accuracy of the reticulocyte enumeration[2].
Body Fluids	• Clotted specimens may lead to misleading or erroneous results. Follow standard operating procedure for inspecting specimens for clots. • Improperly mixed specimens may lead to misleading or erroneous results. • Cellular debris may lead to misleading or erroneous results. • Results should be interpreted in light of the total clinical presentation of the patient, including clinical history, data from additional tests, smear review, and other appropriate information.
Cerebrospinal Fluid	• The low levels of albumin and lipids in cerebrospinal fluid may accelerate cell lysis, leading to decreased manual counts and an apparent lack of correlation.[3] • Delays in processing may lead to misleading or erroneous results.
Synovial Fluid	• Fat globules may lead to misleading or erroneous results. • Crystals may lead to misleading or erroneous results. • Highly viscous synovial fluids may trap cells leading to misleading or erroneous results.

CHAPTER 2

Operation Principles

CBC Analysis

History of the Coulter Principle

W.H. Coulter (1956) describes the Coulter Principle [5]:

A suspension of blood cells is passed thru [sic] a small orifice simultaneously with an electric current. The individual blood cells passing through the orifice introduce an impedance change in the orifice determined by the size of the cell. The system counts the individual cells and provides cell size distribution. The number of cells counted per sample is approximately 100 times greater than the usual microscope count to reduce the statistical error by a factor of approximately 10 times.

This substantial improvement in precision over previous methods helped to establish the erythrocyte count as a sensitive index of erythropoietic dyscrasia, particularly when considered together with HCT and HGB measurements. [6]

The COULTER COUNTER Model S analyzer was the first instrument that automated simultaneous multiparameter measurements on blood. Brittin et al., Gottmann, and Hamilton and Davidson, reviewed the performance and clinical value of the Model S. [7, 8, 9]

Refinements of the COULTER COUNTER analyzer to provide accurate size (volume) distribution data led to a reawakening of interest in pathological erythrocyte size distribution, first sparked by Price-Jones. [10, 11]

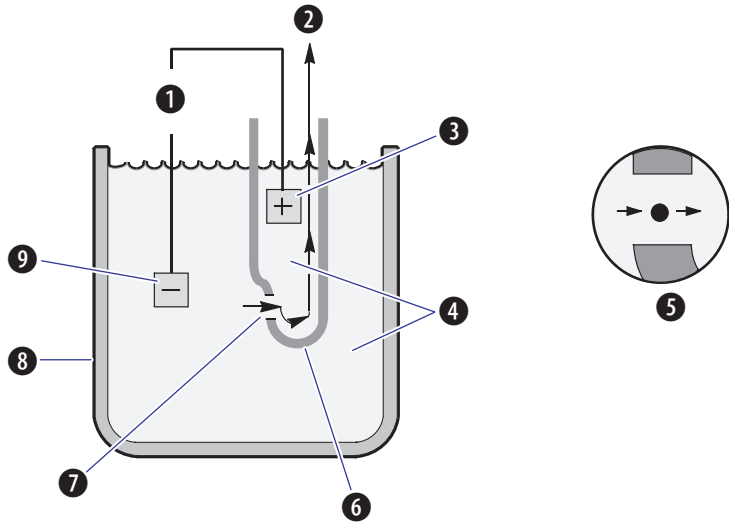
Among the advantages offered by the Coulter method of counting and sizing was the ability to derive an accurate HCT measurement by summing the electronic volume of erythrocytes. England et al. speculated that electronic HCT measurements did not contain the trapped plasma error of centrifugal HCT measurements. [12]

Bull et al. described the use of a COULTER COUNTER analyzer for counting thrombocytes. [13] This method, useful as it was, depended on preparing thrombocyte-rich plasma to avoid counting erythrocytes as thrombocytes. Mundschenk et al. and Schulz and Thom discussed the possibility of counting thrombocytes in the presence of erythrocytes and classifying them by size. [14, 15] Electronic refinements in the Model S-PLUS enhanced the accuracy of the hydrodynamic method. Von Behrens and Paulus have also cited the feasibility of counting thrombocytes by the Coulter method. [16, 17]

Method

The Coulter Principle accurately counts and sizes cells by detecting and measuring changes in electrical resistance when a particle (such as a cell) in a conductive liquid passes through a small aperture as shown in Figure 2.1, Coulter Principle.

Figure 2.1 Coulter Principle



Number	Description	Number	Description
1	Aperture Current	6	Aperture Tube
2	Vacuum	7	Aperture
3	Internal Electrode	8	Sample Beaker
4	Blood Cell Suspension	9	External Electrode
5	Detail of Aperture		

Each cell suspended in a conductive liquid (diluent) acts as an insulator. As each cell goes through the aperture, it momentarily increases the resistance of the electrical path between the submerged electrodes on either side of the aperture. This causes a measurable electronic pulse. For counting, the vacuum used to pull the diluted suspension of cells through the aperture must be at a regulated volume. [18, 19, 20, 21] While the number of pulses indicates particle count, the size of the electrical pulse is proportional to the cell volume.

The DxH 900/DxH 690T CBC analysis is based on the Coulter Principle. The complete blood count, the CBC, is the fundamental analytical test that evaluates the three main cellular components: white blood cells, red blood cells, and platelets. Sample preparation and data collection occur in the SAM and CBC modules on the DxH 900/DxH 690T. The data analysis is handled by the System Manager.

The SAM and CBC modules and analysis is handled by the System Manager. See Abbreviations and Acronyms.

Sample Preparation

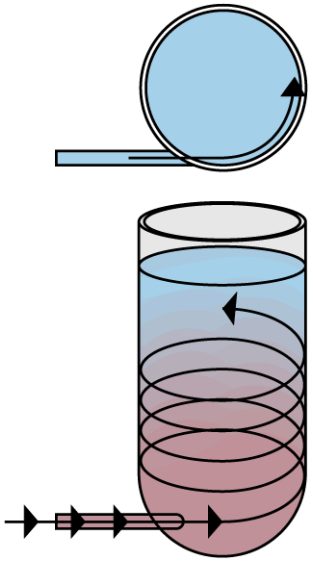
The aspiration pump activates and aspirates 165 µL of sample. After the probe is removed from the specimen tube a second pull of the aspiration pump draws the blood through the BSV pathway, verifying a proper aspiration at the blood detectors.

With each cycle, the BSV directs the delivery of sample and DxH Diluent to the WBC and RBC triple aperture baths.

The RBC diluent and WBC diluent/Lyse dilutions enter through a port in the bath that is located at the bottom and tangential to a sloping surface for bubble free delivery and mixing.

In the WBC bath, ~6.0 mL of DxH diluent and ~28 µL of sample are combined with ~1.08 mL of DxH Cell Lyse for a final dilution of 1:251. In the RBC bath, ~10 mL of DxH diluent and ~1.6 µL of sample are combined for a final dilution of 1:6250.

Figure 2.2 Tangential Mixing



Detection/Sensing

After the mixing and incubation of sample and reagents, 6 inches of vacuum and aperture current are applied to the apertures simultaneously for the measurements of cell count and cell volume. The RBC and PLT count includes the application of sweep flow to prevent the recirculation of cells behind the aperture. All pulses generated by the apertures are collected and sent to the Signal Conditioner Analyzer Card for analog to digital conversion. The process provides the following raw counts and digital measurements to the System Manager:

- Time
- Volume (pulse peak amplitude)
- Count rate
- Wait time
- Pulse width

The System Manager processes the measurements. The process includes:

- Coincidence correction
- Voting
- The generation of 256 channel histograms for WBC, RBC, and PLT and their voting pattern analysis
- Interference correction

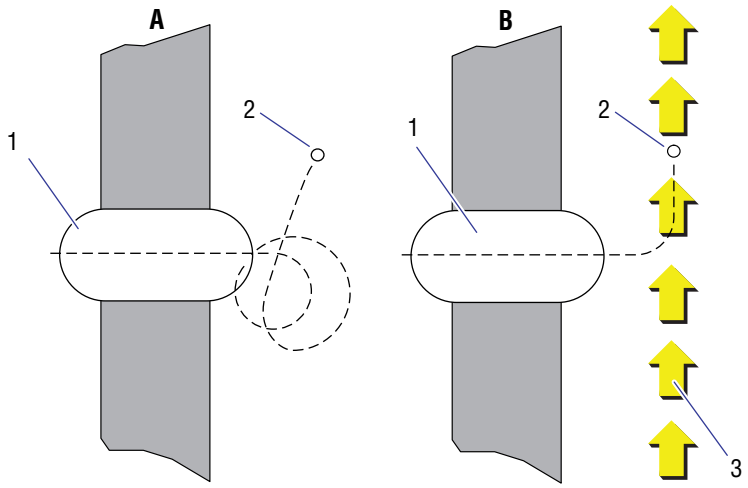
Pulse Editing

When cells pass through the aperture near the edge or at an angle rather than at the center, they create atypical pulses. These atypical pulses are excluded from analysis because they distort the true size of the cell. This prevents the atypical pulses from influencing size measurement.

Sweep Flow

The sweep flow is a steady stream of diluent that flows behind the RBC aperture during the sensing period. This prevents cells from re-entering the sensing zone and being counted as platelets. See Figure 2.3, Sweep Flow.

Figure 2.3 Sweep Flow



Example A: No Sweep Flow

1. Sensing Zone
2. Cell Recirculates

Example B: Sweep Flow Added

1. Sensing Zone
2. Cell Carried to Waste
3. Sweep Flow

Counting/Sizing

The RBC and WBC baths each have three discrete apertures that function as independent systems, utilizing the Coulter Principle to accurately count and size cells.

Coincidence Correction

Occasionally, more than one cell passes through the aperture at one time. When cells coincide, only one combined pulse is counted. As the frequency of coincidence is proportional to the actual count, the system automatically corrects results for coincidence.

Scaling

Scaling adjusts for calibration and reportable format.

Voting and Averaging

To prevent data errors due to statistical outliers or obstructions that may block an aperture, the WBC, RBC, MCV, RDW, PLT, and MPV parameters are measured in triplicate from the three apertures on the analyzer and voting is performed comparing data for all three apertures. Results are produced by averaging the parameters obtained from the apertures that are within the established statistical range. For voting, if two or more apertures do not agree, a Total Voteout is triggered, an event is posted to the event log, the parameter is replaced with a ----- code, and derived parameters are replaced with a ..... code. If one aperture does not agree, the analyzer will average the other two aperture results, a Partial Voteout is triggered, an event is posted to the service log, and the single aperture voteout can be seen in the aperture values for the parameter via the additional data screen. Total Voteouts and Partial Voteouts are tracked separately. If consecutive occurrences of Total Voteouts for a specific parameter occur, an event will be triggered and posted to the event log. If consecutive occurrences of Partial Voteouts for a specific aperture of a specific parameter occur, an event will be triggered and posted to the event log. The events triggered for maximum consecutive Total or maximum consecutive Partial Voteouts are different. See Flags and Codes in CHAPTER 6, Data Review for codes and messages that appear in these circumstances.

Hemoglobinometry

The lytic reagent used for the WBC prepares the blood so the system can count leukocytes and measure the amount of hemoglobin. The lytic reagent rapidly and simultaneously destroys the erythrocytes and converts a substantial proportion of the hemoglobin to a stable pigment while it leaves leukocyte nuclei intact. The absorbance of the pigment is directly proportional to the hemoglobin concentration of the sample.

The accuracy of this method equals that of the hemiglobincyanide method, the reference method of choice for hemoglobinometry recommended by the International Committee for Standardization in Hematology. [38]

After the WBC are counted, the lysed WBC dilution drains into the hemoglobin cuvette for HGB measurement. HGB is measured photometrically at 525 nm using the sample from the WBC analysis. A blank is introduced into the cuvette during each operating cycle. The HGB blank provides a reference to which the sample signal is compared.

Generation of Histograms

The digital information from each WBC and RBC aperture is stored according to volume in a 256-channel, size distribution histogram. Histograms show only the relative, not actual, number of cells in each size range.

IMPORTANT Do not estimate the number of cells from the distribution curves.

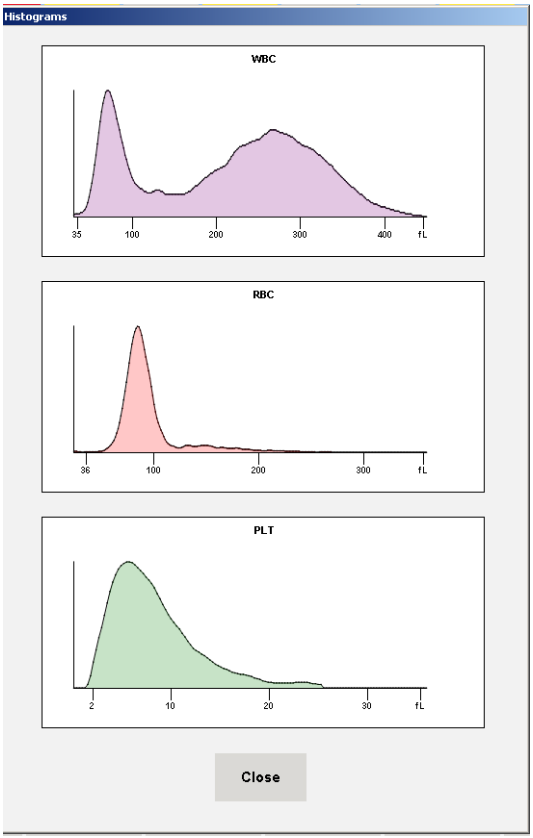
To ensure that the size distribution curves accurately reflect the true cell population, the sensing may be extended whenever the data accumulations are below a predetermined value.

Double-clicking a histogram displays a larger view of the histogram. Each histogram is drawn in a black line and the area under the line is shaded as follows:

- WBC - light purple/lavender
- RBC - reddish orange/pink
- PLT - light green

IMPORTANT Histograms show only the relative, not actual, number of cells in each size range. Do not estimate the number of cells from the distribution curves.

Figure 2.4 Histogram



VCSn Analysis

VCS Technology

The COULTER VCS established WBC differential technology using three measurements: individual cell volume, high-frequency conductivity and laser-light scatter. The combination of low-

frequency current, high-frequency current and light-scattering technology provided abundant cell-by-cell information that is translated by the SPM into dataplots.

Volume Analysis

Electronic Leukocyte Volume Analysis using low-frequency current, has been used since 1967. [22] It has been evaluated as a possible adjunct to the differential white cell count. [23, 24, 25, 26]

Conductivity Analysis

Cell walls act as conductors to high frequency current. The current, while passing through the cell walls and through each cell interior, detects differences in the insulating properties of the cell components. The current characterizes the nuclear and granular constituents and the chemical composition of the cell interior. [27, 28, 29]

Light Scatter Analysis

Coulter's experience in flow cytometry dates back decades to Fulwyler's pioneering use of light scatter for cell analysis. Loken et al. and Jovin et al. discuss the relationship of particle size and refractivity to the angle of light scattered from a laser beam. [30, 31, 32]

TTM and MTM

Historically, Beckman Coulter analyzers housed a flow cell in a Triple Transducer Module (TTM), first introduced commercially in the 1980s. The TTM flow cell was the location for detection of the processed samples. The TTM produced three measurement signals – volume, conductivity, and light scatter.

The DxH 900/DxH 690T replaces the TTM with the Multi-transducer Module (MTM), which measures additional multiple angles of light scatter, a major improvement over the single light scatter measured by the TTM.

All Diff, NRBC, and Retic analysis occurs in the VCSn module. The VCSn module is responsible for controlled sample preparation and delivery of the prepared sample to the flow cell for analysis of the WBC differential, reticulocytes and NRBC. The VCSn module includes the Air Mix and Temperature Control (AMTC) Module and the Multi-transducer Module (MTM).

Differential

Sample preparation occurs at the Diff mix chamber where sample and reagents are added in the following order: Diff Lyse, blood, additional Diff Lyse followed by an air mix. Next, Diff preservative is added, followed by a second air mix, and an incubation period. The prepared sample is transferred to the MTM where cells are counted in an isometric sample stream. The algorithm analysis separates the WBC into five major populations.

NRBC

Sample preparation occurs at the NRBC Diff mix chamber where sample and reagents are added in the following order: Diluent, blood, additional Diluent followed by an air mix. Next, DxH Cell Lyse is added, followed by a second air mix, and an incubation period. The prepared sample is transferred to the MTM where cells are counted in an isometric sample stream. The algorithm analysis separates NRBC from WBC.

Reticulocytes

Reticulocytes are immature, non-nucleated erythrocytes retaining a small network of basophilic organelles, consisting of RNA and protoporphyrin. The enumeration of reticulocytes provides a simple, effective means to determine red cell production and regeneration. [33, 34, 35, 36]

The most common means of measuring reticulocytes is to use supravital dyes, such as New Methylene Blue or Brilliant Cresyl Blue. These dyes precipitate and aggregate the basophilic substances within the reticulocyte, resulting in a granular, staining pattern easily seen with light microscopy. [37]

Reticulocyte immaturity is related to cell volume and light scatter. Since more immature reticulocytes are larger, contain more RNA and cause increased light scatter, the cell volume and light scatter will increase with immaturity of the cell.

Sample Preparation

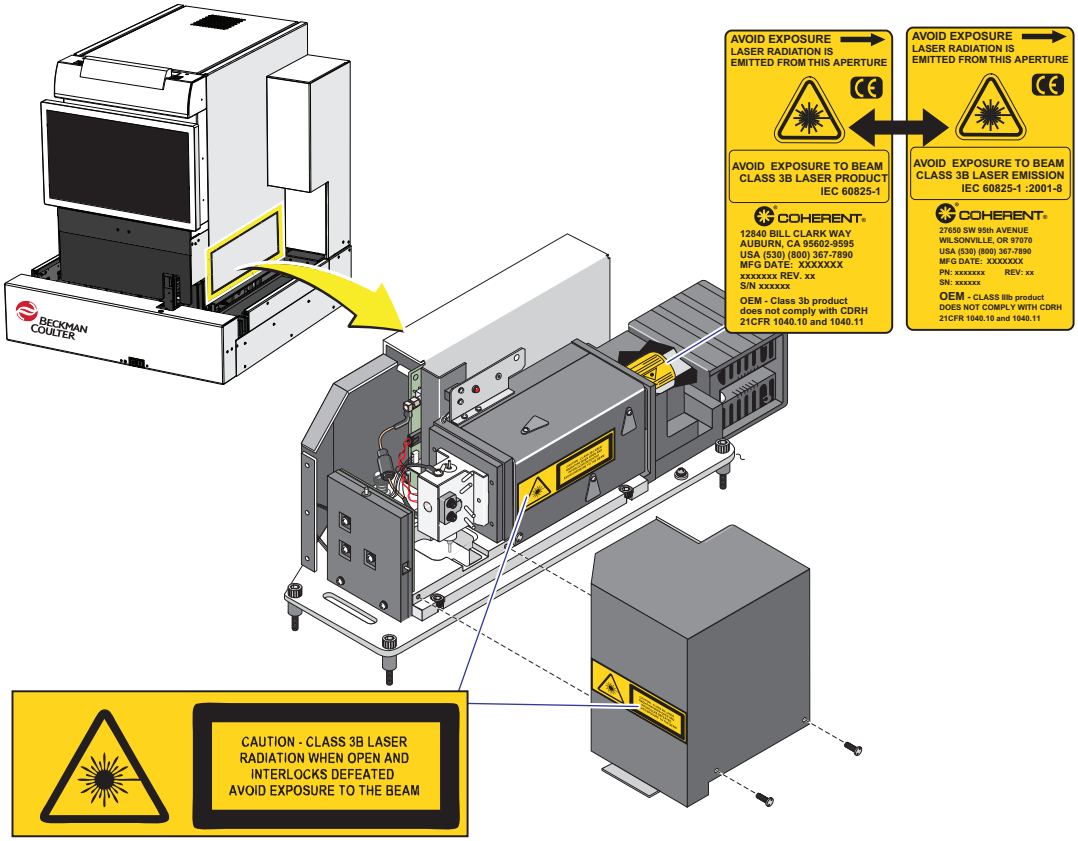
The sample preparation for Diff, NRBC, and Retic analysis occurs in the mix chambers in the AMTC module of the VCSn module. The blood samples used for analysis are delivered by the SAM and dispensed directly to the appropriate mix chamber. Next, the temperature-controlled reagents are delivered and the sample and reagents are mixed using a focused jet of air regulated to 4 psi. The mix chambers, reagents, and air are all temperature-controlled.

Detection/Sensing

Once the sample is prepared, the sample is delivered via the Distribution Valve (DV) to the MTM for sample detection.

The MTM measures particle light scatter by utilizing a flow cell to pass particles through a sensing zone one cell at a time. Figure 2.5, Multi-Transducer Module with Protective Housing Cut Away shows the MTM without its protective housing to display the laser and flow cell and label locations. As the particles pass through the sensing zone, a diode laser illuminates the particles. The MTM flow cell measures volume, conductivity, multiple angles of light scatter, and axial light loss.

Figure 2.5 Multi-Transducer Module with Protective Housing Cut Away



Volume and Conductivity

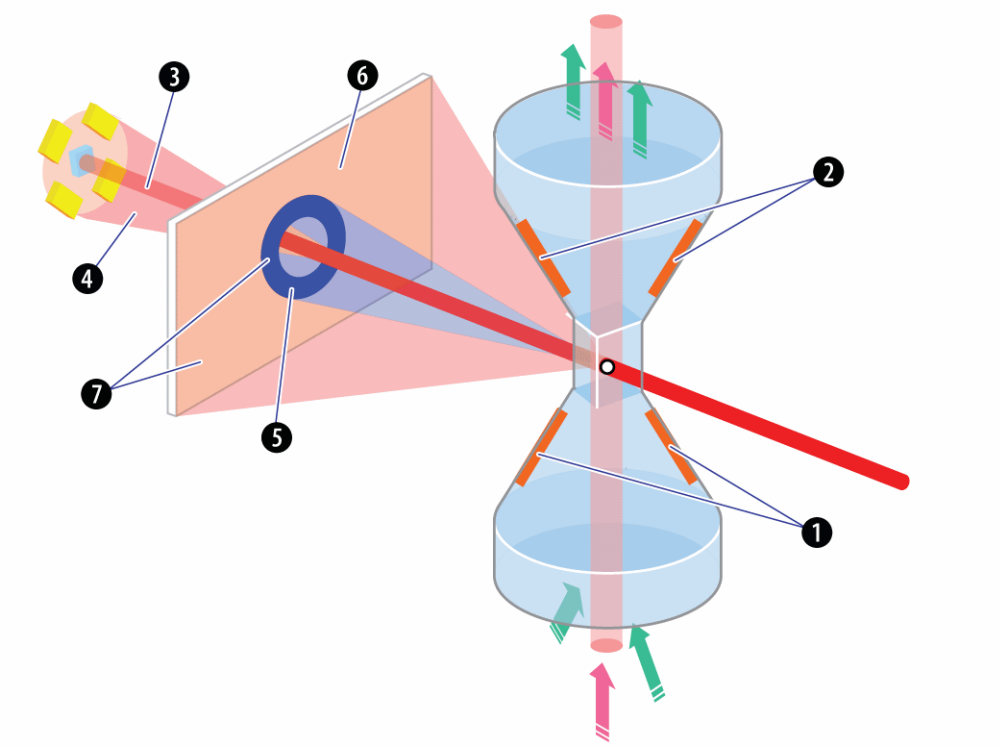
In the flow cell, low-frequency, direct current measures volume, while high-frequency (RF) current senses cellular internal content through measuring changes in conductivity.

Light Scatter Measurements

The MTM utilizes a flow cell to pass particles through a sensing zone one particle at a time and a diode laser to illuminate the particles. The illuminated particles both scatter and absorb a portion of the incident light. Sensors strategically placed around the flow cell collect the scattered light of interest.

An additional sensor placed in the laser path measures the amount of light removed due to light scatter and absorption. This measurement is called *Axial Light Loss*.

Figure 2.6 Light Scatter on the DxH 900/DxH 690T



Number	Description
1	Lower Electrode (Direct Current [DC] and Radio Frequency [RF])
2	Upper Electrode (DC and RF)
3	Axial Light Loss (ALL) 0°
4	Low Angle Light Scatter (LALS) 5.1°
5	Lower Median Angle Light Scatter (LMALS) 10° - 20°
6	Upper Median Angle Light Scatter (UMALS) 20° - 42°
7	The fifth light scatter channel is the sum of the UMALS and the LMALS regions (called MALS).

Dataplot Development

The System Manager performs a series of operations on the stored digital raw values received from the flow cell to identify populations and calculate the frequency of cells within each population. The system produces the Dataplot displays for visual representation of the Differential, NRBC, and Reticulocyte population and density.

The DxH 900/DxH 690T System algorithm uses tools designed for finding optimal separation between overlapping clusters of data. The algorithm can:

- Adapt to unusual population shifts and overlaps
- Define highly irregular separation
- Make subsequent analysis of the identified regions

- Correct deficiencies in separation

A maximum of three tabs display dataplots, depending on the test order, according to the following rules:

- If Diff was ordered, 5PD1 and NRBC1 tabs and dataplots are displayed.
- If Retic was ordered, a RETIC1 tab and dataplot are displayed.
- If a module is disabled, the corresponding dataplot is not displayed.

In the Dataplots, different colors represent different populations (types of cells). Shades of colors represent density (concentration): dark colors for low density, bright colors for high density.

Table 2.1 Dataplot Development

Diff Analysis		**NRBC Analysis**		**Retic Analysis**	
Lymphocyte	Blue	NRBC	Red	WBC	Blue
Monocyte	Green	Other *	Green	RBC	Red
Neutrophil	Purple	WBC	Blue	PLT/Debris	Green
Eosinophil	Orange			RETIC	Purple
Basophil	White				
Non-White Cell	Red				

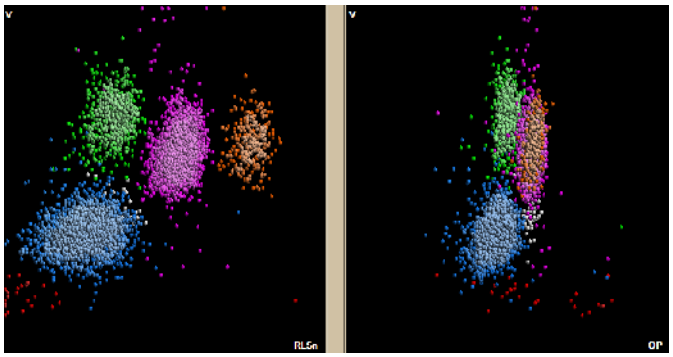
*Other includes RBC, PLT debris, etc.

Two-Dimensional (2D) Dataplots

DIFF

The dataplot for the five-part differential 5PD1 shows the five main populations: lymphocytes (LY), monocytes (MO), neutrophils (NE), eosinophils (EO), and basophils (BA), plus the non-white cell populations. Volume (V) is plotted on the Y-axis; Rotated Light Scatter (RLSn) is plotted on the X-axis. The 5PD2 dataplot shows Volume (V) on the Y-axis and Opacity (OP) on the X-axis.

Figure 2.7 Diff 2D Dataplot

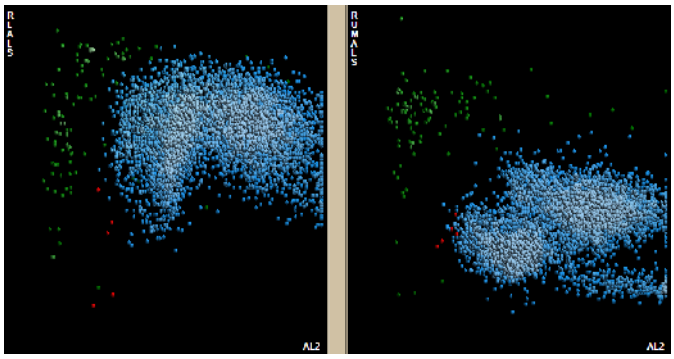


NRBC

The NRBC Dataplot shows two main populations: NRBC and WBC. On the NRBC1 Dataplot, Axial Light Loss (AL2) is shown on the X-axis; Rotated Low Angle Light Scatter (RLALS) is shown on the Y-

axis. On the NRBC2 Dataplot, Rotated Upper Medium Angle Light Scatter (RUMALS) is shown on the Y-axis while Axial Light Loss (AL2) is shown on the X-axis.

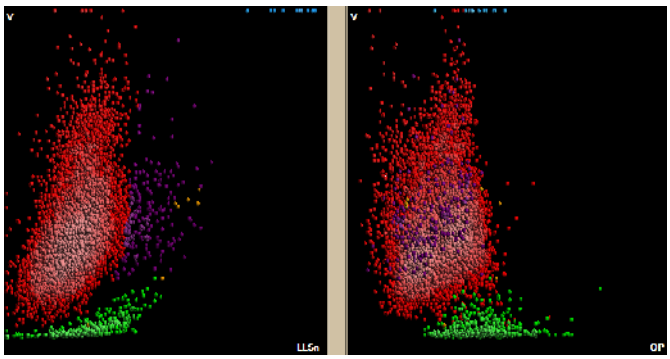
Figure 2.8 NRBC 2D Dataplot



RETIC

The Reticulocyte Dataplot shows mature red cells and Reticulocytes. On the RETIC1 Dataplot, cell volume (V) is plotted on the Y-axis, and Linear Light Scatter (LLSn) is plotted on the X-axis. On the RETIC2 Dataplot, Opacity (OP) is plotted on the X-axis while Volume (V) is shown on the Y-axis.

Figure 2.9 RETIC 2D Dataplot



Three-Dimensional (3D) Dataplots

The 3D Dataplot view classifies by density, light scatter, and opacity. The axes are color-coded.

Figure 2.10 3D Dataplot

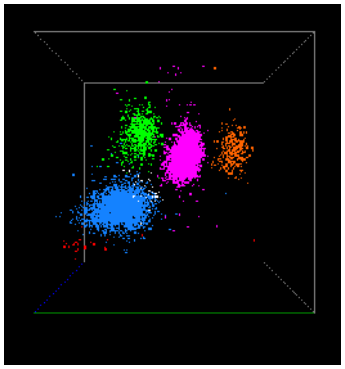


Table 2.2 3D Data Plots (Cube)

Cube Axis Color	3D Data Plots (Cube)		
	DIFF	**NRBC**	**RETIC**
Red	Volume (V)	Volume (V)	Volume (V)
Green	Rotated Light Scatter (RLS)	Rotated Light Scatter (RLS)	Log Light Scatter (LLS)
Blue	Opacity (OP)	Opacity (OP)	Opacity (OP)

Surface Plots

Surface plots (see Viewing All VCSn Graphics in CHAPTER 6, Data Review) show the same populations as the 2D Dataplots, with the addition of density in the Z direction (for example, peak height).

Figure 2.11 Surface Plots

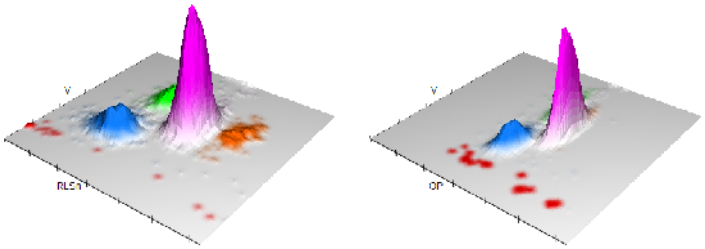


Table 2.3 Surface Plots

Axis	Surface Plots					
	DIFF1	**DIFF2**	**NRBC1**	**NRBC2**	**RETIC1**	**RETIC2**
X	RLSn	OP	AL2	AL2	LLSn	OP
Y	V	V	RLALS	RUMALS	V	V
Z	Density & Peak Height	Density & Peak Height	Density & Peak Height	Density & Peak Height	Density & Peak Height	Density & Peak Height

Parameter Measurement, Derivation, and Calculation

Table 2.4 Parameters and Their Derivation

Parameter (Reporting Units in US-1 Format)	Method	Description
WBC	Coulter Principle	**White Blood Cell Count or Leukocyte Count** • Measured directly, multiplied by the calibration factor. • Corrected for interference if necessary. If no correction is required, then WBC = UWBC. • If in doubt, always use the *uncorrected* WBC (**UWBC**) count to manually correct the results for NRBC interference. • WBC = N x 10^3 cells/µL
UWBC	Coulter Principle	**Uncorrected White Blood Cell** • Measured directly, multiplied by the calibration factor. • UWBC = N x 10^3 cells/µL • UWBC is an intermediate value in the calculation of WBC.
RBC	Coulter Principle	**Red Blood Cell Count or Erythrocyte Count** • Measured directly, multiplied by the calibration factor • Corrected when WBC > 140 x 10^3 cells/µL for whole bloods. The corrected RBC = (RBC - WBC). All ranges of RBC are corrected for WBC in the body fluid cycle. • RBC = N x 10^6 cells/µL for whole blood samples; N cells/mm^3 (or cells/µL) for body fluid samples
HGB	Photometric Measurement	**Hemoglobin or Hemoglobin Concentration** • Transmittance of light at 525 nm through a lysed WBC solution in the HGB cuvette, compared to the transmittance of the same light through a reagent blank. The system converts this ratio to the HGB value using a calibration factor. • Weight (mass) of HGB determined from the degree of absorbance found through photo current transmittance expressed in g/dL. • Corrected for WBC interference when UWBC > 11 x 10^3 cells/µL. The correction is not made in the presence of UWBC > 11 x 10^3 cells/µL and the **HGB Inter: WBC** system message. • HGB (g/dL) = [constant X $\log_{10}$ (Reference %T/Sample %T)]
HCT	Calculated	**Hematocrit** • The relative volume of packed erythocytes to whole blood • The HCT is calculated using any corrected RBC and/or MCV, when appropriate. • HCT (%) = (RBC X MCV)/10

Table 2.4 Parameters and Their Derivation *(Continued)*

Parameter (Reporting Units in US-1 Format)	Method	Description
MCV	Derived from RBC Histogram	**Mean Corpuscular Volume** • The average volume of individual erythrocytes derived from the RBC histogram, multiplied by a calibration factor • Corrected for WBC interference when WBC > 140 x 10^3 cells/µL and WBC particles were observed on the RBC histogram. • Expressed in fL.
MCH	Calculated	**Mean Corpuscular Hemoglobin** • The weight of HGB in the average erythrocyte • The MCH is calculated using any corrected RBC and/or HGB, when appropriate. • MCH (pg) = (HGB/RBC) x 10
MCHC	Calculated	**Mean Corpuscular Hemoglobin Concentration** • The average weight of HGB in a measured dilution • The MCHC is calculated using any corrected HGB and/or HCT, when appropriate. • MCHC (g/dL) = (HGB/HCT) x 100
RDW	Derived from RBC Histogram	**Red Cell Distribution Width** • The size distribution spread of the erythrocyte population derived from the RBC histogram. • Corrected when WBC > 140 x 10^3 cells/µL and the WBC particles were observed on the RBC histogram. • Expressed as coefficient of variation (%)
RDW-SD	Derived from RBC Histogram	**Red Cell Distribution Width - SD** • The size distribution spread of the erythrocyte population derived from the RBC histogram. • Corrected when WBC > 140 x 10^3 cells/µL and the WBC particles were observed on the RBC histogram. • Expressed as a standard deviation in fL
PLT	Coulter Principle	**Platelet Count or Thrombocyte Count** • The number of platelets derived from the Plt histogram, multiplied by a calibration factor • Plt = N x 10^3 cells/µL
MPV	Derived from Plt Histogram	**Mean Platelet Volume** • The average volume of individual platelets derived from the Plt histogram, multiple by a calibration factor • Expressed in fL
NE	VCSn Technology	**Neutrophil Percent** • [NE events/(NE+LY+MO+EO+BA events)] x 100 • Expressed as a percentage (%)

Table 2.4 Parameters and Their Derivation *(Continued)*

Parameter (Reporting Units in US-1 Format)	Method	Description
LY	VCSn Technology	**Lymphocyte Percent** • [LY events/(NE+LY+MO+EO+BA events)] x 100 • Expressed as a percentage (%)
MO	VCSn Technology	**Monocyte Percent** • [MO events/(NE+LY+MO+EO+BA events)] x 100 • Expressed as a percentage (%)
EO	VCSn Technology	**Eosinophil Percent** • [EO events/NE+LY+MO+EO+BA events)] x 100 • Expressed as a percentage (%)
BA	VCSn Technology	**Basophil Percent** • [BA events/(NE+LY+MO+EO+BA events)] x 100 • Expressed as a percentage (%)
NRBC	VCSn Technology	**Nucleated Red Blood Cell Count** • The number of nucleated red blood cells (NRBC) per 100 WBC • Expressed as NRBC/100 WBC
NE#	Calculated	**Neutrophil Absolute Count** • NE# (10^3/µL) = (NE/100) x WBC
LY#	Calculated	**Lymphocyte Absolute Count** • LY# (10^3/µL) = (LY/100) x WBC
MO#	Calculated	**Monocyte Absolute Count** • MO# (10^3/µL) =(MO/100) x WBC
EO#	Calculated	**Eosinophil Absolute Count** • EO# (10^3/µL) = (EO/100) x WBC
BA#	Calculated	**Basophil Absolute Count** • BA# (10^3/µL) = (BA/100) x WBC
NRBC#	Calculated	**Nucleated Red Blood Cell Absolute Count** • Represents the total number of nucleated red blood cells • NRBC# (10^3/µL) = (NRBC/100) x WBC
RET	VCSn Technology	**Reticulocyte Percent** • The number of reticulocytes per 100 RBC • Ratio of retics to the total number of red cells • RET% = (Retic Events / Red Cell Events) x 100 expressed as a percentage (%)
RET#	Calculated	**Reticulocyte Absolute Number** • RET# (10^6/µL) = (RET/100) x RBC

Table 2.4 Parameters and Their Derivation *(Continued)*

Parameter (Reporting Units in US-1 Format)	Method	Description
IRF	Calculated	**Immature Reticulocyte Fraction** • A ratio of the count of the highest light scatter retics (the most immature retics) relative to the total retic count • Expressed as a decimal ratio • IRF = (Retic Events Regions 3-10) / (Retic Events Regions 1-10)
MRV	Calculated	**Mean Reticulocyte Volume** • The average volume of all retic events
TNC	Coulter Principle	**Total Nucleated Cell Count** • Measured directly, multiplied by the calibration factor • TNC = cells/µL or cells/mm^3 • Applies to body fluid samples

History of Slidemaking and Staining

Blood smears or films have multiple uses in hematology. They can be used:

- To determine the leukocyte differential count
- To check the leukocyte distribution to determine whether any abnormal leukocyte cells are present
- To study erythrocytes and platelets [1]

Romanowsky stains have routinely been used in the hematology laboratory to stain peripheral blood films. The staining methodologies used, usually incorporate some combination of Methylene Blue and Eosin. Romanowsky stains commonly used in the United States are Wright Giemsa and modified Wright Giemsa. May-Grunwald, Leishman, and Jenner methods are also Romanowsky stains, but are used more extensively in other parts of the world.

Romanowsky stains are considered polychromatic in that the dyes which comprise the stain impart multiple colors when applied to cells and cellular components. Staining takes place due to ionization of the dyes when buffer is added to the stain. Azure B, the oxidative by-product of methylene blue, is positively charged and attaches to and imparts a blue to purple color to the acid structures of the cells (nucleic acids and nucleoproteins). Eosin, either B or Y, is negatively charged and stains the basic components of cells (cytoplasmic constituents and hemoglobin) an orange to a pink color.

Romanowsky stains are of particular value due to the fact that they stain leukocyte granules differentially. Neutrophil granules have a slight basic excess and stain weakly with the azure component. Granules of eosinophils contain a strongly basic derivative of spermine and stain strongly with eosin. Basophil granules contain an acid protein (heparin) and show a strong affinity for the basic component of the stain.

All of the Romanowsky stains are insoluble in water, but are readily soluble in methyl alcohol. The stains must be free of water since even a small amount will cause red cell artifacts. Fixation of the blood film in anhydrous methyl alcohol will prevent morphologic changes, even if some water contamination of the stain exists.

COULTER introduced slidemaking with the COULTER GEN•S SM in 1998. Peripheral blood films were prepared using the wedge-pull technique. After a drop of mixed blood is deposited on one end of a slide, a second slide is placed at about a 45-degree angle to the first slide and quickly pushed to the other end of the first slide to spread the blood. The technology is also used on the Coulter LH Slidemaker [2] and the DxH Slidemaker Stainer. COULTER introduced staining with the COULTER GEN•S ST in 2001.

Slidemaking and Staining

Overview

The DxH Slidemaker Stainer II allows for adaptation of the smear appearance and stain methodology according to user preferences. Blood smears produced by the Slidemaker portion of the DxH Slidemaker Stainer II are moved to baskets for transfer to the Stainer portion by a robot.

Microscopic examination of the stained blood smears can be used to help determine the hematologic status of a patient.

A stained blood film:

- Allows for the differentiation of white blood cells
- Facilitates the characterization of red blood cells and platelets
- Aids in the identification of blood components and cellular abnormalities

On a stand-alone DxH Slidemaker Stainer, you must wait until a slide is completed before adding a new slide request to an existing test order using the Patient Results screen.

If a software error occurs, the slide orders in progress may be deleted from the database.

Slidemaking

The aspiration probe aspirates 90 µL of mixed sample. The aspirated sample is transported through the hemasphere, blood detector, and finally into the dispense probe where 25 µL of the sample is discarded. The probe moves to the drop placement position. Approximately 4 µL of blood is placed on the slide located on the smear shuttle.

A second slide is picked up by the smear truck and used to spread the drop on the first slide using the wedge technique. The prepared slide is transferred from the smear shuttle into the print shuttle, and then into the basket elevator for drying. The dispense probe is cleaned in the dispense wash cup after the initial 25 µL of sample is discarded, and after drop placement on the slide.

A maximum of four smears can be obtained from an aspiration (single-tube or cassette presentation). A maximum of 12 smears can be obtained from three aspirations in the cassette presentation only.

Bar Code Reading Station

The specimen ID is read at the bar code reading station.

Initial Slide Transport

Slides in the slide chute are dispensed by the ejector blade from the park position into the drop position on the ejector register. The slide is picked up by the smear truck for placement on the smear shuttle.

Wedge Smears

A clean spreader slide held at a 22-degree angle is used to spread (wick) the drop almost to the width of the slide. The spreader slide is quickly pushed to the opposite end of the slide, pulling the blood behind it.

NOTE Blood smears should be made within four hours of collection to ensure best results.

Slide Labeling

The slide is pushed from the smear shuttle into the print shuttle. The print shuttle rotates 90 degrees and advances under the slide printer head. Information is thermally printed on the painted portion of the slide.

Smear Drying

A printed slide is loaded into a basket that sits in one of two basket elevators. Slides can be dried using a fan or a heater/fan combination.

Basket Transfer

After drying, the baskets are transferred by the robot to the stainer baths, or to the I/O drawer, depending on the test order.

Staining

The basket is dipped into each bath (1 to 5) for a staining time according to the active protocol. Each bath is configured to receive reagent from a predetermined supply source configured by the user. Each bath holds a maximum of 250 mL of reagent.

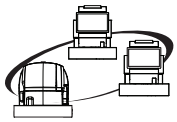
The stainer is designed so that reagents are automatically refilled (auto top off). Baths 1 and 5 top off when sensors in the baths detect a low trigger level. Baths 2, 3, and 4 automatically top off every five baskets, and after one hour of idle time. No slides are in the baths during top off.

Slides are dried after staining. The basket of stained slides is placed in the right-side stain dryer where excess water is blotted from the basket bottom. The robot moves the basket to the left-side stain dryer to complete the drying cycle.

Stain Only Cycle

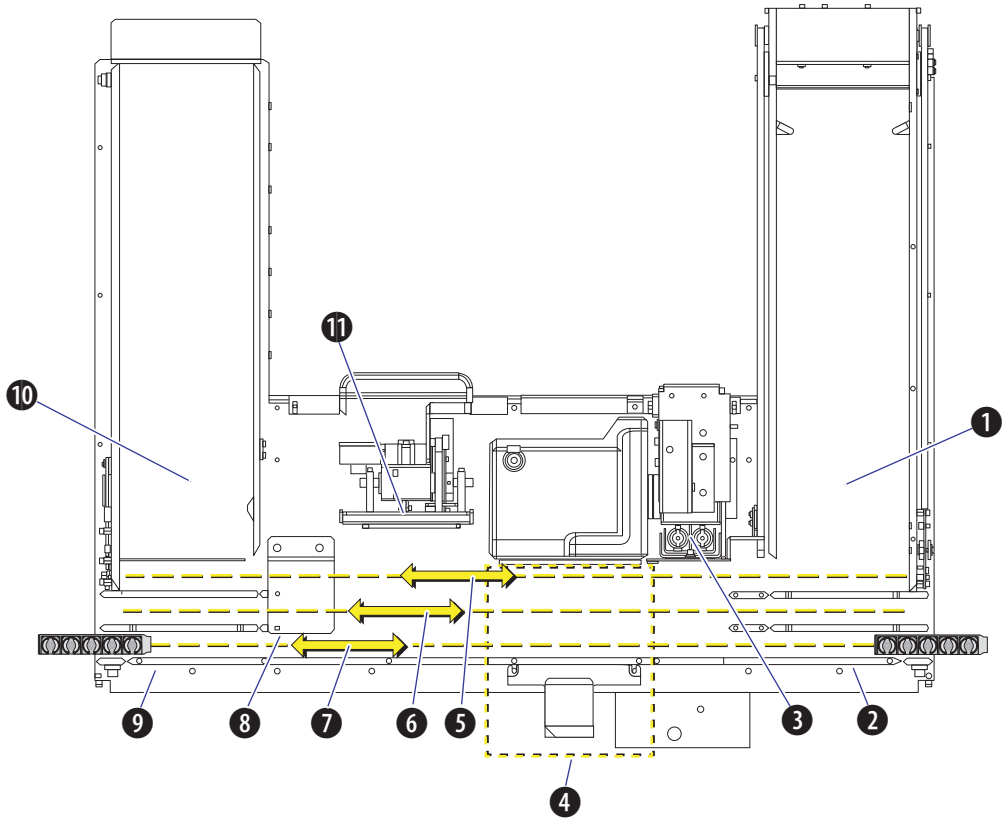
A basket containing prepared slides ready for staining is loaded by the user at the I/O drawer in one of the first six positions. The robot transfers the basket from the I/O drawer into the stain bath.

DxH 900 Sample Flow



The System Manager distributes samples throughout a workcell and within a module, dependent on your configuration and the laboratory's workflow. The System Manager distributes samples to ensure maximum efficiency in testing, and to keep the Primary Bar Code Reader available.

Figure 2.12 DxH 900 with Connectivity Sample Flow



Number	Component	Number	Component
1	Input Buffer	7	Front Lane
2	Right Transfer Station	8	Swap Station
3	Single-Tube Station	9	Left Transfer Station
4	Primary Bar Code Reading Station	10	Output Buffer
5	Process Lane	11	Mix Station
6	Middle Lane		

Physical Movement Within the Workcell

The workcell software ensures that the analysis is completed efficiently by keeping travel lanes clear and directing samples to the most available module (pipelining). Pipelining achieves optimum throughput.

NOTE The following description applies to an independent workcell. A workcell connected to a Lab Automation system may function slightly differently depending on the design of the LAS.

1. A cassette can be introduced at any Input Buffer.
   a. A cassette introduced at the furthest right Input Buffer (as you face the workcell) flows from right to left in the Process Lane to be read at the Primary Bar Code Read Station (Primary BCR).
   b. Cassettes are always read at the Primary BCR on the module where they are introduced and the module where they will be analyzed.
   c. The first cassette placed in the Input Buffer is load-balanced between all modules capable of performing the test assigned to the first tube in each cassette.

      NOTE Avoid partially-loaded cassettes. The workcell is designed to function optimally with full cassettes. When cassettes contain only one to three samples, especially when there is a mixture of panels and retests, a gridlock situation may occur (no movement). Some slide orders may be missed and cassettes will need to be reloaded.

2. A cassette travels down the Process Lane to a Mix Station.

   A cassette intended for analysis on a different module travels forward to the Front Lane for analysis at a module to the left, or forward to the Middle Lane for analysis at a module to the right, and then through the Transfer Station to the selected analysis module.
3. A cassette remains in the Mix Station until all of its results for the current instrument are available (and retesting at that location is not needed) or until another cassette pushes it out, or until the instrument is taken offline.
   a. If retesting is necessary for any of the samples in that cassette, some tubes may be shuttled to a different module for testing.
   b. Within a module, tubes 1 to 4 in a cassette finish processing before that cassette leaves the Mix Station.
4. Immediately after tube 5 in a cassette is aspirated, the cassette moves from the Mix Station to the parking position in the Output Buffer if another cassette is waiting for analysis. The parking position is located in the Process Lane immediately in front of the Output Buffer.

5. A new cassette enters the Mix Station. Processing begins on this new cassette while the sample analysis for tube 5 from the previous cassette is still in process.
6. If tube 5 in the first cassette needs retesting, that cassette moves from left to right to the Swap Station.
7. With the first cassette parked at the Output Buffer and the second cassette at the Mix Station, a third cassette can move into the Primary BCR Station. A maximum of three active cassettes can be in the Process Lane for any module at one time.
8. The second cassette moves to the Output Buffer and the third cassette moves into the Mix Station. The first and second cassettes are swapped.
9. The first cassette moves from the Swap Station, then travels left to right in the Middle Lane to the Primary BCR where the label is read prior to retesting on the same module.
10. Complete cassettes are moved into the furthest (left) available Output Buffer.

NOTE The parking position for the Output Buffer is a hands-on area. The Swap Station is a covered hands-off area. If you unload a cassette from the parking position, the retesting of that cassette may change from an automatic procedure that does not require your interaction to a manual procedure that requires you to find that cassette for reloading in the Input Buffer.

Workcell Logic

The workcell tries to perform the most tests on the instrument with the most available panels. For a CBC/Diff/Retic test order, the specimen is sent to a location that can run CBC, Diff, NRBC, and RET as opposed to a location that has NRBC disabled. For example, if two of three locations in a DxH 900-3 S have NRBC disabled, and a CBC is ordered, all CBCs move to the test location with NRBC enabled in preference to those with NRBC disabled. Although these movements may appear to restrict workflow, the logic is designed with Data Fusion in mind. The goal is to provide the most complete information available for each test order.

Workcell Sample Flow

Workcell sample flow is dependent on:

- Module status
- Test order status
- Release rules
- Whether decision rules are implemented at the System Manager, the LIS or middleware, or both

The System Manager can manage more than one active TO (Test Order) per specimen at the same time such as a retest (DxH 900 or slide panel, rerun, or reflex) via the host or by the System Manager while a slide order is still in progress. A TO remains active until ALL work is completed and released by the System Manager. Slide panels are not released until the slide basket reaches the I/O drawer.

When the release rule is *Release all* and the retest is downloaded from the host:

- A retest is added as a new TO.
- The sample must be located in the Output Buffer and moved to the Input Buffer manually for retesting if the TO is not received on time.

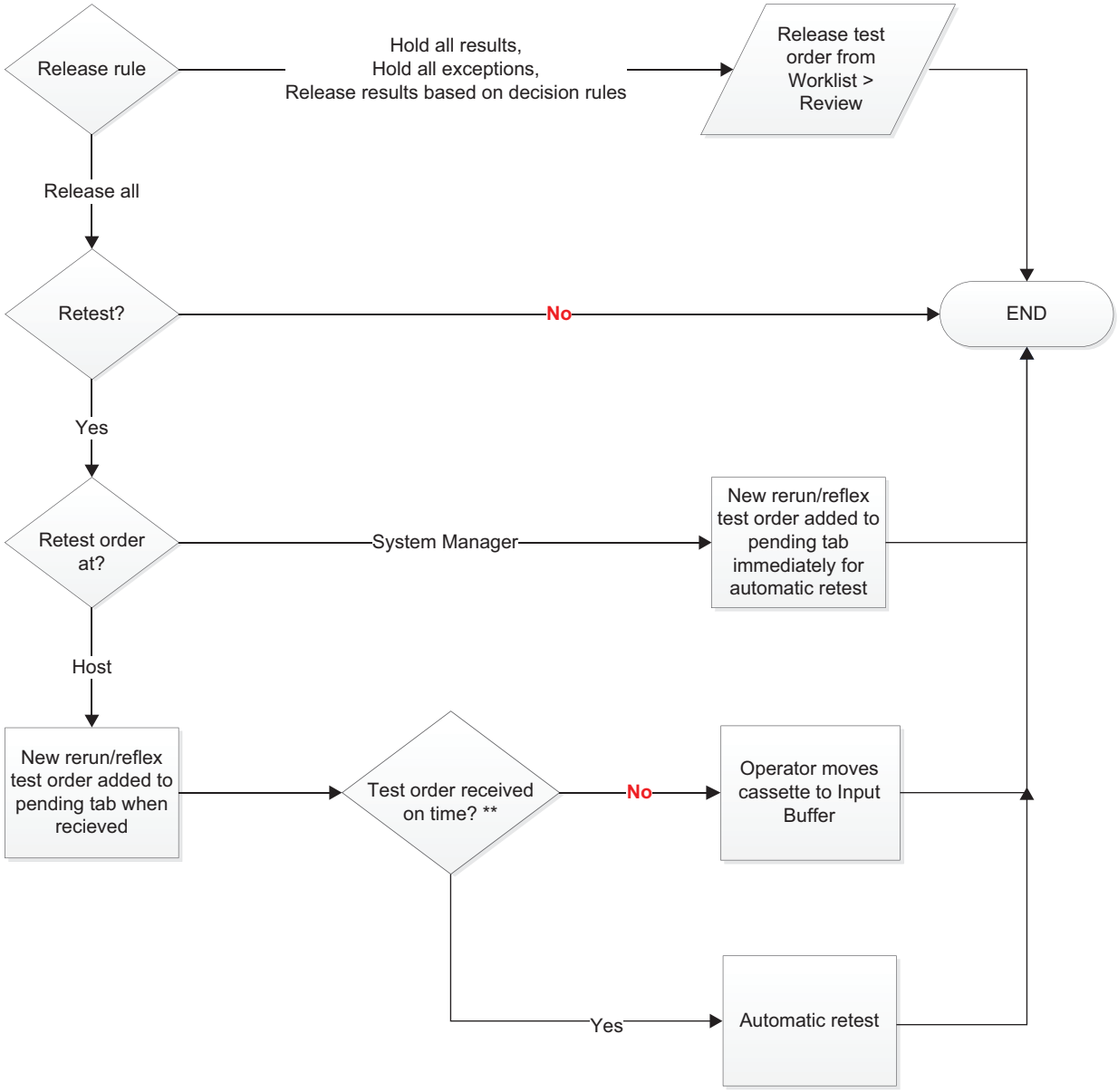
- If the sample's cassette has not exited the system and the TO is received on time, sample processing will occur without re-introducing the cassette to the system.

When the release rule is *Release all* and the retest is ordered by a decision rule in the System Manager:

- A new Rerun/Reflex TO is added and sample processing will occur without re-introducing the cassette to the system.
- Samples waiting to be displayed on the *Pending* tab can be located using the advanced search function on the *Custom* tab for the Worklist. Enter **Make Slides** or **Make Slides and Stain** when the order release status is *Not Released*.

When the release rule is *Release results based on decision rules*, and a decision rule contains ONLY a slide order, any panel results from the DxH 900 are released after analysis. The DxH 900 panel results from the original order are also auto-released.

Figure 2.13 Workcell Sample Flow

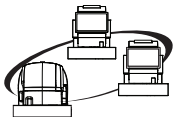


** Time is specified in the Host Transmission Manual. This also depends on the Specimen Exit Delay configuration.

CHAPTER 3
Daily Checks

Daily Checks

Daily Checks (**Menu > QA > Daily Checks**) lets you ensure that your DxH instrument is running correctly. Run Daily Checks on a clean system and immediately after a shutdown.



Set up **Auto Configuration > Configure Daily Checks** for each individual SPM to perform automatic Daily Checks at the discretion of the laboratory. The System Manager and review stations are not available during Daily Checks.

Daily Checks can also be performed by initiating the process manually. The System Manager or review station where the Daily Checks is initiated will not be available until the procedure is completed.

IMPORTANT For DxH 900/DxH 690T systems, it is important to perform Daily Checks, the recommended maintenance, and Quality Control checks on *each* individual SPM within the workcell on a daily basis as described in this manual. See these chapters for more information:

- CHAPTER 3, Daily Checks
- CHAPTER 4, Quality Control
- CHAPTER 8, Shutdown
- CHAPTER 12, Cleaning Procedures

For the DxH Slidemaker Stainer II, it is important to perform Shutdown and Daily Checks, to clean the stainer baths and tray, and to check smear quality on a daily basis as described in this manual. See these chapters for more information:

- CHAPTER 3, Daily Checks
- Checking Smear Quality - DxH Slidemaker Stainer II in CHAPTER 4, Quality Control, and APPENDIX E, Stain Protocol Optimization, if necessary
- CHAPTER 8, Shutdown
- Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED) in CHAPTER 12, Cleaning Procedures

Automatic Daily Checks

Daily Checks can be set up to occur automatically. See Daily Checks Auto Configuration in CHAPTER 9, Setup.

Logging On to the System Manager

1 Select  if the dialog box is not open, and enter your user name.

2 Enter your password.

NOTE If you forgot your password, contact your laboratory administrator to have your password reset.

Running Daily Checks on Individual Instruments

1 Select  from the top of any screen to display Daily Checks. The Summary tab displays the results of the most recent Daily Checks.

2 Select **Daily Checks** from the local navigation bar. A dialog box displays the following:
You have requested to perform Daily Checks. Select OK or Cancel.

3 Select **OK** to run Daily Checks
OR
Select **Cancel**.

4 Review Daily Checks.

Be aware that the system *automatically* repeats a failed Daily Checks due to Background one time. For that failed Daily Check:

- The automatic retry is logged in the service log and counted for workflow recording.
- The initial failed run is noted in the Daily Checks data summary log, but is not displayed on the Daily Checks screen.
-  does not turn red.
- No audible alarms are activated.
- No entry is placed in the General Event log.

If the retry fails, review the results in question and take troubleshooting measures.

If Daily Checks pass, the **Review** button is disabled.

If any of the Daily Checks do not pass,  is red and:

- The problematic result is backlit in red on the Summary tab.
- The tab that contains the problematic result is red.

5 Select the individual tabs to view those results. If there are any failures, you must select **Review** in order to proceed with further analysis.

The button options on the local navigation bar at the bottom of the Daily Checks screen are described below.

Button	Function
Daily Checks	Runs Daily Checks.
Shutdown	Shuts down the system.
Auto Report	Lets you configure auto reporting for Daily Checks.
Auto Configuration	Lets you configure auto running of Daily Checks and Shutdown.
Export	Exports Daily Checks results to a CD-ROM or your local drive.
Review	Marks Daily Checks results as reviewed.
View Log	Displays the History Log screen.

Exporting Daily Checks

The **Export** button on the local navigation bar exports Daily Checks results in an INF/DAT format.

1 Select a **Destination**.

2 Select **Start**.

Printing Daily Checks

Select  at the top of the Daily Checks screen to manually print Daily Checks Summary or Detail reports. Report can also be set up to Auto Print. See QA Auto Report in CHAPTER 9, Setup.

Comments are not printed for the Daily Checks Data Summary log. To view comments, go to Event Logs, select Data Summary Logs from the Log Type drop-down menu and select the Daily Checks tab. Select the Comments button to view the comments.

Viewing Comments for the Daily Checks Data Summary Log

1 Go to **Event Logs**.

2 From the *Log Type* drop-down list, select **Data Summary Logs**.

3 Select the **Daily Checks** tab.

4 Select **Comments** to view the comments.

Enabling Daily Checks Auto Report

1 Select 
OR
Select **Menu > QA > Daily Checks.**

2 Select **Auto Report** from the local navigation bar.

3 Insert a checkmark next to *Enable auto Detail report generation* and/or *Enable auto Summary report generation*, and select **OK**.

CHAPTER 4

Quality Control

Overview

Quality Control is the routine monitoring of performance and service using commercial or patient controls. Controls have known characteristics when run on a given system and are analyzed periodically in the same manner that patient specimens are analyzed. The results of analyzed controls are then compared to the known characteristics using statistical methods. This comparison allows changes in the system performance to be detected. You can then take some action if the changes detected are significant.

The DxH 900/DxH 690T System lets you use multiple quality control techniques that are outlined in this chapter. Beckman Coulter recommends that Quality Control checks be performed using patient and/or commercial controls at intervals established by your lab. When using a commercial control, refer to the instructions for use to determine which method of presentation to use. Failure to recover control values within your lab's expected limits or the presence of unexplained shifts or trends in any method of presentation should be investigated. If control problems cannot be resolved, call your Beckman Coulter Representative.

Timely Quality Control monitoring includes Intelligent Quality monitoring (IQM), which monitors event notification and recovery within the system on an on-going basis. IQM monitors sensor and hardware status in real-time, and also provides tracking and trending of event notifications via the Alert Status icons, alarms, and the **History Event Log > QC** tab. Events can be addressed as they occur. The availability of IQM optimizes system availability and minimizes possible repeat patient testing for failed QC. The combination of these methods provides the assurance of complete quality control and should be applied separately or in combination, in accordance with your laboratory and accreditation requirements.

Navigating to Control Files

You can get to QC by selecting **Menu > QA > QC** or by selecting  .

The module name displayed as a selectable field immediately above the Control Group box (upper left portion of the Control Data Review screen) may not match the name in the Status area. The data displayed is from the module listed above the Control Group box.

To navigate through the control runs for a specific instrument, select:

-  to go to the runs for the previous file
-  to go to the runs for the next control file

The system uses QC selection sort order to determine the next or previous QC file to display.

Select:

-  to go to the previous file based on the QC selection order
-  to go to the next file based on the QC selection order

If you insert a checkmark in the *Unreviewed* checkbox, select  and  to navigate to the files with runs that have not yet been reviewed.

You can also navigate to the control files by following the steps in Selecting a Control.

To view QC for another SPM, select the instrument from the *Instrument* drop-down list on the top left side of the screen above the Control Group box.

Quality Control Principles

Daily Checks

Daily Checks automatically starts a series of quality control checks that will determine if the SPM is running properly, such as Background Counts. You can review the results of the Daily Checks on the System Manager. For additional information on doing and reviewing Daily Checks, see CHAPTER 3, Daily Checks.

Commercial Controls

Run commercial controls as needed to verify the performance of the SPM. See Analyzing Commercial Controls in CHAPTER 4, Quality Control for more information about running controls.

Extended QC

Extended QC Rules are derived from the German Quality Control Guidelines for the Medical Laboratory, known in Germany as Rili-BÄK (Guidelines of the Federal Chamber of Physicians). Extended QC Rules were first published in 1987 and amended in 1990 and 1993 covering clinical chemistry, immunochemistry and other tests, but not hematology. In 2003, the guidelines were extended to include hematology and were updated in 2008. Extended QC only applies for WBC, RBC, HGB, HCT, and PLT, but it is available for the rest of the parameters.

Extended QC consists of additional QC rules for verification of the following:

- Random error or imprecision: If the CV falls outside the Random Error Limits, the method is considered out of control. This is expressed as the maximum allowable coefficient of variation (CV%).
  - If the control file has N ≥ 2 and N < 15, and the CV exceeds the Random Error Limit. The CV value for that parameter is highlighted in yellow in the statistics section of the QC Summary Results screen.
  - If the control has N ≥ 15, and the CV exceeds the Random Error Limit. The CV value for that parameter is highlighted in red in the statistics section of the QC Summary Results screen. You must acknowledge the alert. The event is posted to the History log.
- Systematic error or bias: A Systematic Error (Bias) is defined as the deviation of the mean from the target value. The method is considered out of control if the deviation falls outside the Systematic Error Limits.

  $$\text{Systematic Error Limit is } \left(\frac{\textbf{absolute Delta Diff}}{\textbf{Target Value}}\right)\times 100$$

  - If the control file has N ≥ 2 and N < 15, and the deviation exceeds the Systematic Error Limit, the Delta Diff for the parameter is highlighted in yellow in the statistics section of the QC Summary Results screen.
  - If the control has N ≥ 15, and the deviation exceeds the Systematic Error Limit, the Delta Diff for the parameter is highlighted in red in the statistics section of the QC Summary Results screen. You must acknowledge the alert. The event is posted to the History log.
- Total error, inaccuracy, or Root Mean Squared Error (RMSE): Total Error is Extended QC's measurement of inaccuracy as compared to an established limit. Total error is defined as the deviation of a single measurement from the target value. The formula for Total Error is:

  $$\textbf{Target Value} \pm \frac{(\textbf{Target Value}\times \textbf{Total Error Limit})}{\textbf{100}}$$

  . If the result is outside of the upper or lower range, the result is highlighted in yellow on the parameter itself. Your laboratory may choose to evaluate the target value as either the Beckman Coulter Assigned Value or as the Mean-to-Lab Target value.

RMSE is measured within a control file with Extended QC enabled. RMSE is a statistical result that is compared to the limits for Single Measurement Error. The software will perform the Extended QC calculations and flagging with runs N ≥ 2 and < 15 (values exceeding limits are highlighted in yellow), but does not require acknowledgment of a QC Out condition until there are N ≥ 15 runs (values exceeding limits are highlighted in red).

RMSE is $\Delta = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - x_0)^2} = \sqrt{\frac{n-1}{n}s^2 + \delta^2}$ where:

- Δ = RMSE
- x_0 = target value
- x_i = individual measurement value
- x_i = number of individual values

- s = empirical SD
- $\delta = \bar{x} - x_0$ = systematic error of measurement

RMSE is used to calculate Relative RMSE which is displayed in the software. Relative RMSE is $\left(\Delta / x_o\right) x100$ where:

- Δ = RMSE
- x_0 = target value

Extended QC Troubleshooting

Basic troubleshooting is similar to any other Quality Control routine:

- If there is a total error (a result is out of range), repeat the control process.
- If the result is still out of range, repeat the process with a new control. Also, verify the proper handling and mixing of the control vials in accordance with the product insert instructions.
- If a parameter has a systematic (bias) error, verify the calibration.
- If there is a random (imprecision) error, verify the reproducibility using a patient sample. If this fails, call your Beckman Coulter Representative.

XB Analysis

Dennis B. Dorsey, MD proposed in 1963 that the relatively constant blood cell indices could be used to follow the performance of hematology instrumentation. [39] Brian Bull, MD improved the technique and it is termed XB Analysis. [40]

XB Analysis uses a “weighted moving average” of patient sample results because Koepke and Protextor said that QC materials “ideally should be similar in structure and in reactivity to the patient constituent being measured. Therefore freshly drawn patient blood samples seem to be the most appropriate [QC material].” [41] Bull explains, “The analyzer [sic] is considered to be ‘in control’ when mean MCV, MCH, and MCHC determined on a batch of 20 patients by use of the algorithm XB are within 3% of the expected mean indices of the population.” [42]

RBC Indices in XB

MCV, MCH, and MCHC are fairly stable parameters for RBC indices for individual patients from day to day. MCV, MCH, and MCHC are also stable for a patient population over time. You can establish *target values* or mean values for your patient population.

A *target value* is an average value for each parameter that is calculated from large numbers of patient results. Target values should reflect the entire patient population of the laboratory and include all ages and disease states.

Bull's target values are suggested starting values to use until laboratory values are established. These values are based on the general population across the U.S.A.:

- MCV = 89.0
- MCH = 30.5
- MCHC = 34.0

Enable XB

Before you enable XB, ensure the following:

- The instrument is clean.
- The instrument is calibrated.
- There are no instrument problems.
- Sufficient data has been collected.

Bull's target values are the default values already in the system.

1 From the Run Configuration screen, select **Enable XB**.

2 Run the samples to collect batches of the patient samples.

3 Save the printouts.

4 Collect data to reflect the entire patient population (all ages and disease states).

5 Collect results from at least 250, but ideally 1,000 blood samples to find your laboratory's target values. Include all types of patients (oncological, presurgical, obstetrical, patients on dialysis, outpatients, and others).

6 Collect printouts of the XB batches.

7 Calculate the mean and %CV for each of the XB parameters.

8 Verify that the lab's means do not exceed Bull's target values by more than 3%.

9 Verify that the %CV is less than 1.5%.

10 Use the calculated means as the new target values.

11 Enter the new values in the Workstation setup screen.

Out of Control Batches

An *out of control* batch may indicate a:

- Problem with the instrument. This may be a gradual change that may indicate a part going bad over time, a calibration drift, or an instrument problem. The batch results will go back in control after the part is replaced, the instrument is calibrated, or the instrument problem is fixed.
- Problem with a reagent
- Problem with sample handling
- Problem with calibration
- Change in the patient population. This may be due to one or more new types of patients being added to the patient population, one or more types of patients being removed from the patient population, or seasonal changes in the patient population.
- Non-random patient sampling indicating that the batch may go outside the ± 3% limits because the batch is biased. Each subsequent batch should move closer to the target and be back in control within 3 to 4 batches. Add a comment in the XB Batch Mean table indicating that the batch was out due to non-random sampling.
- Batch of patients that is biased by several abnormal patients of a certain type

Troubleshooting When a Batch is Out of Control

Follow these steps to troubleshoot when a batch is out of control:

1 Determine which parameter is out by viewing the batch results. Parameters that are out are flagged with *H* or *L*.

2 Determine where the parameter comes from:

- MCV: Derived from the RBC histogram
- MCH: Calculated as $$MCH = \frac{Hgb \times 10}{RBC}$$
- MCHC: Calculated as $$MCHC = \frac{Hgb \times 100}{Hct} \quad \text{where the Hct} = \frac{RBC \times MCV}{10}$$

Two of the XB parameters are calculated using the RBC results. Troubleshoot those items that can affect the parameters used in the calculations.

3 Review this table for more information on what to look for when XB parameters are out:

	MCV Low	MCV High	MCH Low	MCH High	MCHC Low	MCHC High
MCV	dec	inc	---	---	inc	dec
RBC	---	---	inc	dec	inc	dec
HGB	---	---	dec	inc	dec	inc
HCT	dec	inc	---	---	inc	dec

XM Analysis

XM Analysis is a quality-control method that uses an Exponentially Weighted Moving Average (EWMA) of CBC, Diff, NRBC, and Reticulocyte parameters and compares them with known target values, to monitor instrument performance. Although XB and XM are both ways to monitor moving averages, the EWMA used in XM and Bull's algorithm used in XB are different.

XM provides a way to monitor calibration stability and calibration uniformity within a method or instrument. XM uses any of the four XM parameter groups: CBC, DIFF, RETIC, and RETIC Calc. Batch size can be configured independently for the four parameter groups from 2 to 1,000.

The target value is an average value for each parameter calculated from large numbers of patient results. Target values should reflect the majority of the laboratory's patient population and include all ages and disease states. The target value may be static (fixed) or moving (auto-updated with each new batch mean when auto-update is enabled).

Enable XM

Before you enable XM, ensure the following:

- The instrument is clean.
- The instrument is calibrated.
- There are no instrument problems.
- Sufficient data has been collected (a minimum of six months of data is recommended).

1 From the Run Configuration screen, select **Enable XM**.

2 Configure your requirements in the system.

3. Use historically established means and limits to begin or run samples to collect batches of patient samples.

4. Set up a large batch (250 to 1,000+) for the data collection.

5. Collect data to reflect the entire patient population (all ages and disease states).

6. Consider an adequate number of runs in a reasonable time frame, a relatively homogeneous population over time (or else the mean may drift), and no excessive biological variation within the time frames.

7. Collect results from at least six months of data to find the laboratory's target values.

8. After you collect the data, compare the means and limits calculated using auto-update to establish static values or to make adjustments to previously entered historic values.

Out of Control Batches

An *out of control* batch may indicate a:

- Problem with the instrument. This may be a gradual change that may indicate a part going bad over time, a calibration drift, or an instrument problem. The batch results will go back in control after the part is replaced, the instrument is calibrated, or the instrument problem is fixed.
- Problem with a reagent
- Problem with sample handling
- Problem with calibration
- Change in the patient population. This may be due to one or more new types of patients being added to the patient population, one or more types of patients being removed from the patient population, or seasonal changes in the patient population.
- Non-random patient sampling. Each subsequent batch should move closer to the target and be back in control within 3 to 4 batches. Add a comment in the Batch Mean table indicating that the batch was out due to non-random sampling.
- Batch of patients that is biased by several abnormal patients of a certain type

Troubleshooting When a Batch is Out of Control

Follow these steps to troubleshoot when a batch is out of control:

1 Determine which parameter is out by viewing the batch results. Parameters that are out are flagged with *H* or *L*.

2 Determine where the parameter comes from:

- Is it a directly measured parameter?
- Is it a parameter derived from a histogram?
- Is it a calculated parameter?

Interlaboratory Quality Assurance (IQAP)

The Interlaboratory Quality Assurance Program (IQAP) is a Beckman Coulter program available to you through enrollment that complements and enhances your laboratory's in-house quality control. IQAP lets you submit your control recovery data to Beckman Coulter and in return, receive a personalized report that summarizes your results and compares them to those of your peer group (pool).

Setting Up Controls

See Quality Control in CHAPTER 9, Setup for information on setting up controls. Automatic configuration and printing, transmission, and Auto Stop due to OUT controls are defined in CHAPTER 9, Setup.

See Setting Up a QC Run Reminder, Setting Up QC Auto Rerun, and Setting Up QC Auto Exporting in CHAPTER 9, Setup for information on setting up these options.

The capacity for the number of control files and runs within a file is configurable. See Configuring the Number of Control Files and Runs in CHAPTER 9, Setup.

Analyzing Commercial Controls

IMPORTANT Do not load patient samples and/or patient controls in the same cassette with COULTER Cell Controls. Otherwise, the cassette will be skipped and the sample processing module will go offline.

Run LATRON immediately after a successful shutdown and Daily Checks have passed. Confirm that LATRON is within limits before the analysis of commercial controls.

Always prepare and run a control according to the instructions for use. The control tube needs to be well-mixed and at room temperature.

Run COULTER Cell Controls immediately after LATRON Control has been run and has passed.

Do not load two or more control vials with the same lot number in a cassette when the control is set up to run on more than one DxH 900 within a workcell configuration. After initial analysis of the control vials, the instrument will be stalled. To recover, power OFF and power ON the stalled DxH 900 instrument. When the cassette exits, remove any duplicate vials from the cassette and present the cassette again to process the applicable control.

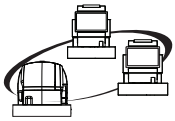
When an inactive control exists and the system auto-configures another control with the same ID as the inactive control, if you change the state from inactive to active, the system will detect a duplicate control ID and generate an error. Delete one of the active control files in order to be able to activate the inactive control and to reuse the ID.

Run Body Fluid controls in single-tube presentation on only one SPM at a time in a workcell.

Confirm that commercial controls are within limits before processing patient samples according to your laboratory procedures and/or local and state or national requirements.

NOTE For Retic-X controls, if there are no values entered for the Targets and Limits for MRV and IRF, no flags will be triggered for these parameters.

QC Only



For a workcell, use QC Only to run or rerun controls only on a specific DxH 900 within the workcell and to prevent patient specimens from being processed on the specific DxH 900. For stand-alone instruments, use QC Only to prevent patient samples from being processed. QC Only suspends the analysis of patient samples and lets you troubleshoot and perform a rerun on the affected SPM. Patient specimens will be routed to the other available modules for analysis (DxH 900 workcell only).

If there are patient samples in cassettes in the Input Buffer that require analysis for the SPM in QC Only, remove and place those cassettes in another testing location in the workcell.

IMPORTANT Attempting to rerun the QC runs by placing the controls in any input buffer without selecting **QC Only** causes the controls to be analyzed on all DxH 900s in the workcell.

For DxH 900 stand-alone instruments and DxH 690T instruments that are set to QC only mode, any cassettes with patient specimens will be skipped and routed to the Output Buffer. The specimen icon and beacon will turn red.

Set Up QC Only Mode

1 Select the specific DxH 900/DxH 690T from the System Status screen.

2 Select the Offline icon to stop processing specimens in the SPM.

3 Double-click for the DxH status.

4 Select **QC Only** from the local navigation bar.

5 From the Configure QC Only dialog box, select the **QC Only** checkbox and **OK**.

6 Place the instrument online. *QC Only* will be displayed.

7 Process the controls.

8 Place the DxH 900/DxH 690T offline, select **QC Only**, deselect the checkbox, and check **OK** to exit QC Only.

NOTE Enabling and disabling QC Only is noted in the audit log.

When QC Only is enabled on a module, the message QC Only is displayed in red text on the:

- System Status screen below the instrument name field and above the module graphic (workcell)
- DxH Status screen to the right of the module graphic (workcell and individual instruments)

Auto-configuration of the controls occurs for all instruments within the workcell regardless of whether or not QC Only is enabled on any of the modules.

9 Place the DxH 900/DxH 690T online.

Using QC Auto Rerun

This feature applies to active controls when QC Auto Rerun is enabled. See Setting Up QC Auto Rerun in CHAPTER 9, Setup. The automatic rerun is initiated when QC fails (see If a Control is OUT). QC failures may be due to a flag, code, or expired control.

IMPORTANT Do not load patient samples and/or patient controls in the same cassette with COULTER Cell controls. Otherwise, the cassette will be skipped and the sample processing module will go offline.

The System Manager determines that an auto-rerun is required when the result is outside the limits upon completion of all control analysis within a cassette.

Confirm that commercial controls are within limits before processing patient samples according to your laboratory procedures and/or local and state requirements.

If a Control is OUT

Under *OUT* conditions,  at the top of the screen is red. If more than one lot is *OUT*, a dialog box is displayed. All lots that are *OUT* for any instrument are displayed on the dialog box.

To view a specific lot, follow these steps.

1 Highlight the lot number to select it.

2 Select **OK**.

When a Commercial Control is Outside Its Expected Range

1 Ensure the control:

- Material was mixed properly. If not, mix it according to the instructions for use.
- Identification information was entered correctly. If using a bar code reader, ensure the bar code labels are clean and positioned correctly. If entering the ID manually, ensure that you entered the correct information.
- Setup information (assigned values and expected ranges) matches either the control's instructions for use, or your lab's established values. If they do not, change the control's information to match. Also check for sufficient volume.

NOTE For Retic-X controls, ensure that Target and Limits are set up when reporting MRV and IRF parameters.

2 If any of the problems mentioned in step 1 above existed and QC Auto Rerun is not enabled, rerun the control to ensure the problem was not a statistical outlier.

If Coulter Control Auto Rerun is enabled, a second run is processed automatically. The System Manager determines that an auto-rerun is required when the result is outside the limits upon completion of all control analysis within a casette.

⚠ CAUTION

Risk of erroneous results. Patient results obtained between the last acceptable run and an unacceptable control run should be re-evaluated to determine if patient test results have been adversely affected. Take corrective action, if necessary.

3 Ensure the control material was not contaminated by running another vial or level of control.

4 Ensure there are no errors during the cycle. If necessary, call your Beckman Coulter Representative.

NOTE For a workcell, a laboratory may occasionally experience a Control Out situation on one module within a connected system. Select **QC Only** to troubleshoot and process controls only on the module in question.

When a COULTER LATRON CP-X Control is Outside Its Expected Range

1 Ensure that the system has successfully completed a Shutdown followed by a successful Daily Checks before the analysis of the LATRON control.

2 Ensure the control setup information (assigned values and expected ranges) matches those on the instructions for use. If it does not, change the control information to match the instructions for use; then re-run the control if the auto rerun is disabled. If the auto rerun is enabled, the system repeats the analysis of the control automatically when the results are sent to the System Manager.

3 Check the control to ensure the control is not contaminated, properly mixed, not expired, and that you have a sufficient volume of sample. If necessary, use a new control vial. Be sure to mix it according to the directions on your instructions for use.

4 Ensure the flow cell is clear by performing the Flush Flow Cell procedure. See Performing the Flush Flow Cell Procedure in CHAPTER 10, Troubleshooting.

⚠ CAUTION

Risk of erroneous results. Patient results obtained between the last acceptable run and an unacceptable control run should be re-evaluated to determine if patient test results have been adversely affected. Take corrective action, if necessary.

5 Rerun the control if QC Auto Rerun is not enabled to ensure the problem was not a statistical outlier. If QC Auto Rerun is enabled, a second run is processed automatically. If the control is still outside the expected ranges, call your Beckman Coulter Representative. You can set the SPM to CBC mode and continue to process CBC samples only.

NOTE Other controls or specimens in the cassettes that follow will continue to be processed until the QC Out condition is triggered when Auto Stop is enabled.

Clearing a QC Alert

Review the QC alerts. A control out or expired condition takes hierarchy over a reminder. The QC run reminder is also cleared when the reminder is disabled.

Follow these steps to clear a red or yellow QC run alert.

1 Select  when displayed with a red or yellow background.

2 From the dialog box, select the control file with a red or yellow dot for review:

- Red dot - indicates that a control is expired or out. Reviewing the control run with the condition clears the condition for the selected file. Replace the control (see If a Control is OUT).
- Yellow dot - indicates that a control run is pending for the control type listed. Running any level for the control type clears the Run Reminder for that control type.

NOTE The QC Alert is red until all runs with this condition are cleared. The QC Alert switches to yellow until all pending QC runs are completed. Gray indicates there is no alert.

Using Guided Help to Recover from a Maximum Control Run Capacity Event by Exporting, Transferring IQAP to BCI, and/or Printing, and Deleting Control Runs

This procedure is available for Level 3 operators from the System Manager only.

NOTE You can export and delete control runs separately or perform both functions together. You can also transfer IQAP to Beckman Coulter and print the QC Summary Report for the file to which the maximum run capacity applies.

For information on the guided help icons, see Guided Help Icons in CHAPTER 1, System Overview.

To delete control runs manually, see Deleting Control Runs.

1 From the History Logs screen displays, select the row that indicates that the control run count maximum limit has been reached.

2 Select  .

3 On the Guided Help window, read the information displayed and follow the prompts under *Control Options* to select one or more of the following options:

IMPORTANT Ensure that the control options are completed before deleting any data.

- To export control runs to a .csv file, select **Export to CSV File**.
- To export IQAP to a file, select **Export IQAP to File**.
- To transfer IQAP to BCI, select **Transfer IQAP to BCI**.
- To print a QC summary report, select **Print QC Summary Report**.
- To delete the oldest control runs, select **Delete Oldest Runs**, enter the number of runs to delete, select **Next**, and go to step 8.

4 Select **Next**.

5 Select **OK** to begin executing the selected control options.

6 Wait for the execution of the control options to be done. Before deleting any runs, ensure that a report has been printed.

NOTE If you select **Back** or **Close**, the state will change to Resume.

7 Select **Next**.

8 If you have selected runs to delete, select **OK** to delete the number of runs you have entered.

9 If you have selected runs to delete, select **OK** when the control runs have been deleted.

Using Guided Help to Recover from a Maximum Control File Capacity Event by Exporting, Transferring IQAP to BCI, and/or Printing, and Deleting Control Files

This procedure is available for Level 3 operators from the System Manager only.

NOTE You can export and delete control files separately or perform both functions together. You can also transfer IQAP to Beckman Coulter and print the QC Summary Report for the selected files.

For information on the guided help icons, see Guided Help Icons in CHAPTER 1, System Overview.

To delete control files manually, see Deleting Control Runs.

1 From the History Logs screen displays, select the row that indicates that the control file count maximum limit has been reached.

2 Select  .

3 Select the file(s) that you want to export and/or delete.

4 On the Guided Help window, read the information displayed and follow the prompts under *Control Options* to select one or more of the following options:

IMPORTANT Ensure that the control options are completed before deleting any data.

- To export control files to a .csv file, select **Export to CSV File**.
- To export IQAP to a file, select **Export IQAP to File**.
- To transfer IQAP to BCI, select **Transfer IQAP to BCI**.
- To print a QC summary report, select **Print QC Summary Report**.
- To delete control files, select **Delete Selected Files**, select **Next**, and go to step 9.

5 Select **Next**.

6 Select **OK** to begin executing the selected control options.

7 Wait for the execution of the control options to be done. Before deleting any files, ensure that a report has been printed.

NOTE If you select **Back** or **Close**, the state will change to Resume.

8 Select **Next**.

9 If you have selected files to delete, select **OK** to delete the files, and then select **OK** again when the control files have been deleted.

Viewing Control Files

To view control files on the Quality Control (Data View) screen, follow the steps below. To view control run details, see Viewing Details of a Control Run.

1 Select **Menu** > **QA** > **QC** or select 

2 Select the SPM to be reviewed. See Navigating to Control Files.

NOTE When no controls are out (in Review state), selecting  defaults to the QC file last viewed.

The Quality Control - Data View screen displays the most recently analyzed control lot with the most recently analyzed run selected by default. If controls have not been reviewed, a dialog box displays a list of those *out* controls that have not been reviewed.

The Quality Control (Data View) screen includes summary data, configuration data, a filter section, QC run data, run status and one thumbnail Levey-Jennings Graph for the selected parameter (row). For instructions on selecting a control, see Selecting a Control.

For Retic-X controls, MRV and IRF are shown on the summary file screen, included in control details, included in the Graphs view, transmitted to host, included on printed reports, and are available in the export file and for IQAP submission.

Quality Control (Data View) Screen - Components

Component	Description
Delta Diff	The difference between the calculated mean and the assigned target of the parameter within the specified filter. **NOTE** If the Extended QC is enabled and Extended QC limits have been configured and the absolute Delta Diff is greater than the Systematic Error Limit, the Delta Diff will be highlighted in amber for that parameter if N ≥ 2 and N < 15 or in red if N ≥ 15. If Extended QC is enabled and the values for Delta Diff and RMSE are printed as blank in the Extended QC Summary Report, this implies an internal formatting error. Run QC again to correct the error. If printing a blank Delta Diff and RMSE persists, call your Beckman Coulter Representative. If the parameter's target is not applicable, *N/A* is displayed in this field.
Mean	The calculated mean of the included points within the specified filter.
2SD	The calculated SD of the included points within the specified filter.
%CV	The calculated Coefficient of Variation of the included points within the specified filter. **NOTE** If the Extended QC is enabled and Extended QC limits have been configured and the CV value is greater than the Random Error limit, the %CV will be highlighted in amber for that parameter if N ≥ 2 and N < 15 or in red if N ≥ 15.
RMSE	Root Mean Square Error is displayed when Extended QC is enabled (see the figure in Viewing Control Files. The RMSE is a Single Measurement Error. If the value exceeds the Single Measurement Error limit, the RMSE value will be highlighted in amber for that parameter. If the parameter's target is not applicable, *N/A* is displayed in this field.
N	The number of included points within the specified filter.

Component	Description
Target (Assigned or Mean)	The assigned target of the parameter being used in your lab at the time of the control analysis. The target used for Extended QC will be based on what has been configured for Traditional QC (either assigned or Mean to Target values). If Beckman Coulter or manually-entered targets are used, then the label below this heading reads *Assigned*; if means are used, then the label below the heading reads *Mean*. If the parameter's target is not applicable, *N/A* is displayed in this field.
Limit (Manual, 2SD, or Lab)	The traditional expected limit of the parameter in use in your lab at the time of the control analysis. If assigned limits are used, then the label below this heading reads *Manual*. If SDs or Lab Limits are used, then the label below this heading reads *2SD* or *Lab*, respectively. Your lab limits are applied when there are two or more runs in the file.
Date/Time	The date and time of the control analysis.
Exclude	Lets you exclude the results of that run from the control statistics calculations.
Reviewed By	Displays one of the following: • If the run has not yet been reviewed: A **Click to Review** link that lets you review the run. • If the run has been reviewed: The reviewer's username and the review date and time. **NOTE** If a run has been previously marked as *reviewed*, the system updates the information with any subsequent review. When you change the inclusion status of a run in a control file, the run is already marked as *reviewed*.
Presentation	Displays the method of presentation for each run in the control file. • C = Cassette Presentation • S = Single-Tube Presentation
Comment	 is displayed in this column if any comments have been added.
Ref. RBC	If the control type is a RETIC only, a *REF. RBC* heading and numeric value is displayed on the left side of the screen under the Summary Data columns. If the control is RETIC only *and* the Reference RBC Target and Limit are not set, *No Value* is displayed in the Ref. RBC field.

Thumbnail Levey-Jennings Graph

The thumbnail graph on the Quality Control (Data View) screen displays the ten latest run points for the selected parameter (row).

Quality Control (Data View) Screen - Local Navigation Bar

Button	Description
Select Control	Lets you select a control file to view. See Selecting a Control for additional information.
View Graph (or View Data)	**View Graph** (on the Data View screen) - Lets you view the control file results graphically. **View Data** (on the Graph View screen) - Lets you view the control file results in table view.
View Log	Lets you view the History Log and default to the QC filter with the History Logs. See Viewing Logs.
Details	Lets you view control run details. See Viewing Details of a Control Run.

Button	Description
Comment	Lets you add, modify, or delete a comment for a run or control file. See Adding, Modifying, or Deleting Comments.
Filter	Lets you filter the view of a control file by using the following criteria: • Number of Past Days • Specific Date and Time Range • Shift See Filtering the View for additional information.
Delete	Lets you delete a selected run, all runs in the current filter, or all runs in the current control file.
Transmit	Lets you transmit data to an LIS.
Systematic Random Review	Lets you review systematic random errors, and single measurement errors. This button is only displayed on the Quality Control screen if Extended QC is enable. See Enabling Extended QC in CHAPTER 9, Setup.
More Options	Lets you choose between the following options: • IQAP Web • Export - to Export control file data to a .csv format viewable using any major spreadsheet program, such as Microsoft® Excel®, or to export raw data in INF/DAT format. • QC Setup - to display the Quality Control Setup screen, including the option to set up Extended QC, Quality Control Capacity, QC Run Reminder, QC Auto Rerun, and QC Auto Export.

Selecting a Control

1 From the Quality Control (Data View) screen or the Quality Control (Graph View) screen, select **Select Control** from the local navigation bar to display the QC Select Controls dialog box. The screen displays the last instrument QC dialog box that was opened.

2 If necessary, select an instrument from the *Instrument* drop-down list.

3 Select a control and select **OK**.

Viewing Control File Graphs

1 Select **Menu > QA > QC**.

2 From the Quality Control (Data View) screen, select **View Graph**
OR
Select a parameter (row) and double-tap the Thumbnail Levey-Jennings graph.

The Quality Control (Graph View) screen displays:

- Up to 31 thumbnail Levey-Jennings graphs, one graph per parameter
- An expanded Levey-Jennings graph for the selected parameter data
- Summary data for the selected parameter
- Selected control lot status information
- Selected filter information

Thumbnail Levey-Jennings Graph

The top half of the Quality Control (Graph View) screen displays all parameters associated with controls. Up to 31 Thumbnail Levey-Jennings graphs display the latest run points for all parameters. Each graph displays up to 10 points and these points change to reflect the scrolling of the expanded graph. The points shown in the blue-shaded window of the expanded graph reflect those shown in the thumbnail graphs.

If you select a thumbnail graph, that graph is displayed as the expanded graph in the screen. Any thumbnail graph's border displays red if it contains a QC Out point. Once all runs in a graph are reviewed, its border will return to normal color, but the QC Out point will remain red in the graph. If the result violates the extended QC Single Measurement Error, the point will be amber.

Expanded Levey-Jennings Graph

The expanded Levey-Jennings graph at the bottom of the Quality Control (Graph View) screen displays all of the results for a selected parameter in the control file. The blue-shaded window on the expanded graph, which contains up to 10 points and the point cursor, determines the points and cursor displayed in the thumbnail graphs. Use the right and left arrows on the scroll bar under the expanded graph to view all of the data points.

Point Cursor

The point cursor is a blue vertical line on the graph that reflects the date selected in the Data View. The cursor can be moved left or right by either using the scroll bar or by selecting either the data points on the graph or the control run analysis *Date/Times* (column heading) in the Data View table.

If the cursor moves to another point within the window, the window remains in place, and the cursor moves within the window. The cursors in the thumbnail graphs move as well.

If the cursor moves to a point outside the window, the window shifts so that the new point is displayed in the window as the furthest right or left point (depending on where the new point is). The points displayed in the thumbnail graphs reflect those displayed in the window.

A vertical dotted line next to the point cursor indicates that the target and the control limits of a file, already in use, have been edited. The new edited limits are used for future runs without affecting the flagging of the results from earlier runs.

Y-Axis (Assigned Values)

The Y-axis scale displays five coordinates. These are the expected limits, in currently configured units, at the mean and +1 and +2 traditional expected limit and -1 and -2 traditional expected limit.

For Body Fluid Level 1, only the upper section (values above 0) is displayed, since the control does not have a target +/- limit, but instead has an assigned upper limit.

X-Axis (Individual Control Runs)
The X-axis displays up to 50 control runs. Ticks, representing each new day, are displayed above the X-axis. The name of the month is displayed above the tick representing the first day of a new month.

Points
Multiple runs for a single date are displayed in chronological order, starting on the tick representing that day. For example, three points for the date 12/1 are displayed as three points in order between 12/1 and 12/2.

- Points within range will be displayed as a black circle.
- Points above or below the Y-axis scale are displayed as a red up-triangle or red down-triangle, respectively.
- Out conditions are displayed as red points.
- Excluded points are displayed with a strike through them.
- Points with Extended QC Single Measurement Error are displayed in amber.
- Runs that are deleted from the control file will not be shown in the graph or data view.
- Results that have non-numeric values, whether in an Included or an Excluded run, are not plotted; however, a space on the X-axis is displayed where the result would have been if it had been a numeric value.

NOTE See Quality Control (Data View) Screen - Local Navigation Bar for additional information about the options on the local navigation bar.

Viewing Logs

You can view History logs for control files by selecting **View Log** on the Quality Control (Data View) screen or the Quality Control (Graph View) screen. It will take you to the Quality Control tab on the History Logs screen. See APPENDIX C, Logs for additional information on viewing logs.

Viewing Details of a Control Run

You can view control run details on the QC Run Details screen.

1 From the Quality Control - Data View screen, select a run and then select **Details**
OR
From the Quality Control (Graph View), select **Details**.

2 View the components on the QC Run Details screen as described below:

Component	Description
Control ID	Read-only field that displays the Control ID.
Source	Read-only field that displays the control source.

Component	Description
Type	Read-only field that displays the control type.
Level	Read-only field that displays the control level.
Exp. Date	Read-only field that displays the control expiration date.
Instrument	Read-only field that displays the instrument ID.
Tube Pos. ID	Read-only field that displays the position of the tube in the cassette.
Date/Time	Read-only field that displays the analysis date and time.
Presentation	Read-only field that displays the presentation.
Presented By	Read-only field that displays one of the following: • System - If the control was cassette-presented, regardless of the operator logged into the system at the time of presentation. • An Operator ID - If the control was single-tube presented, this is the Operator ID of the operator that was logged into the system at that time.
Report Status	Read-only field that displays the report status for manually and automatically printed reports.
LIS Status	Read-only field that displays the status of the control results transmission to the LIS.
System Status	Read-only field that displays the information related to the status of the SPM when the specimen was run.
System Message	Read-only field that displays the additional information related to specific codes and flags.
Result Windows	Read-only windows that display the result and flag data in up to 3 groups. If the traditional QC is Out, the result is displayed in red. If the result is outside of the upper and lower Extended QC Single Measurement Error limits, the background color of the result is amber.
Histograms	For LATRON Controls, 3 tabs are displayed: DIFF, RETIC, and NRBC. Each tab includes up to 7 histograms: V, C, LALS, AL2, LMALS, MALS, and UMALS. LATRON histograms are not transmitted to the host. For Beckman Coulter non-LATRON controls, histograms will be displayed, depending on the control type: • CDR: WBC, RBC, and PLT • Body Fluids: TNC, RBC

<table>
<tr><th>Component</th><th colspan="2">Description</th></tr>
<tr><td>Dataplots</td><td colspan="2">One 2D dataplot is displayed. The type and tabs displayed on the dataplot depend on the control type.
If a type of analysis is disabled, then the corresponding dataplot is not displayed, and as a result, the tab is not displayed as well.
The default tab that is displayed depends on what is available.</td></tr>
<tr><td></td><td>Control Type</td><td>Dataplot Displayed/Tab</td></tr>
<tr><td></td><td>CBC/DIFF</td><td>5PD1 and NRBC1</td></tr>
<tr><td></td><td>CBC/RETIC</td><td>RETIC1</td></tr>
<tr><td></td><td>CBC/DIFF/RETIC
(patient control only)</td><td>5PD1, NRBC1, and RETIC1</td></tr>
<tr><td></td><td>RETIC</td><td>RETIC1</td></tr>
<tr><td>View All VCS Graphics</td><td colspan="2">Displays all the VCSn graphics for the selected control run.</td></tr>
<tr><td>Additional Data</td><td colspan="2">Select this button to display the Additional Data window. See View Additional Data for more information.</td></tr>
<tr><td>Print</td><td colspan="2">Select this button to manually print the Quality Control Reports.</td></tr>
</table>

View Additional Data

The Additional Data dialog box lets you view additional data for a control run.

1 From the QC Run Details screen, select **Additional Data** to display the Additional Data dialog box. The Additional Data dialog box displays four tabbed views: CBC, DIFF, NRBC, and RETIC.

2 See Additional Data in CHAPTER 6, Data Review for component descriptions of this screen.

Adding, Modifying, or Deleting Comments

You can add, modify, or delete comments to control file records.

1 From the Quality Control (Data View) or Quality Control (Graph View) screen, select **Comment** to display the QC Comment dialog box.

2 Add, modify, or delete a comment as follows:

To...	Do This...
Add or modify a comment on a control run	Select the **Run** tab, enter or modify a comment in the text box, and select **OK**.
Add or modify a comment on a control file	Select the **File** tab, enter or modify a comment in the text box, and select **OK.**
Delete a comment	Select **Delete**.

NOTE The creation date/time, last modified date/time, and last modified Operator ID fields will not be populated until comment entries have been completed.

See Adding, Modifying, and Deleting Comments for information on XB Comments.

Filtering the View

You can filter the view on the Quality Control (Data View) screen and the Quality Control (Graph View) screen using the following criteria:

- All QC results within a number of days prior to and including the present day (Past Days)
- Specific date and time range
- Shift

1 From the Quality Control screen, select **Filter** to display the QC Filter dialog box.

2 In the *Choose Range* box, select one of the filter option buttons:

- **All** - to view all the results
- **Past** - to view results from a specific number of past days.
  - Enter a number in the **Past Days** text box.
- Specify Date and Time Range
  - Enter a date or select a **From** and **To Date.**
  - Enter a time or select a **From** and **To Time**.

3 In the *Shift* box, select one of the following options to filter by shift:

- **All** - to view all shifts.
- **1** - to view only results from shift one
- **2** - to view only results from shift two.
- **3** - to view only results from shift three.

4 Select **OK** to save your filter selections.

Deleting Control Runs

You can delete control runs from the Quality Control (Data View) screen.

1 Select a run to delete and select **Delete** to display the Delete dialog box.

2 Select one of the following options:

- **Selected Run** - to delete the selected run.
- **All Runs in Current Filter** - to delete all the runs in the current filtered view.
- **All Runs in Current Control File** - to delete all runs in the current control file, regardless of the filter applied to the view, if any.

3 Select **OK** to delete the selected runs. A warning dialog box is displayed.

The selected control runs will be permanently deleted from the system. Select OK to continue.

4 Select **OK** to permanently delete the control runs
OR
Select **Cancel** to close the dialog box without deleting the control runs.

NOTE A control run cannot be deleted if any of the following conditions exist:

- Control runs are being modified by another user.
- Control runs are waiting to be sent to the LIS.

When a Patient control file is deleted and no other control file exists with the same control ID, that specific ID is no longer treated as a reserved control identifier.

Deleting Control Files

You can delete control files from the Quality Control Setup screen.

1 Select **Menu > Setup > Quality Control**.

2 Select the control file(s) you want to delete.

NOTE A control file cannot be deleted if any of the following conditions exist:

- The control runs are being modified by another operator.
- The control runs are waiting to be sent to the LIS.

3 Select **Delete Control** from the local navigation bar. The system displays the following warning message: *Selected X control for deletion. The following control files are selected for deletion: Lot Number: XXXXX.*

4 Select **OK** to continue. The system displays the following warning message: *The control file and all its control runs will be permanently deleted from the system.*

5 Select **OK** to permanently delete the control file(s)
OR
Select **Cancel** to close the dialog box without deleting the control file(s).

NOTE When a patient control file is deleted and no other control file exists with the same control ID, that specific ID is no longer treated as a reserved control identifier.

Transmitting Control Files

You can automatically or manually transmit control files to a Laboratory Information System (LIS).

Select **Menu** > **Setup** > **Quality Control** for automatic transmission.

Follow the steps below to manually transmit control files.

1 From the Quality Control (Data View) screen, select the run that you want to manually transmit and select **Transmit**. The Transmit dialog box is displayed.

2 Select one of the following options:

- **Selected Run** - to transmit the selected run only.
- **All Runs in Current Filter** - to transmit only the runs currently displayed in a filtered view.
- **All Runs in Current Control File** - to transmit all runs in the current control file, regardless of the filtered view, if any.

3 Select **OK** to transmit the runs.

NOTE The system will display a message when the report transmission is in process.

Exporting Quality Control Data

The shift value in .csv and IQAP export files is always 0 (indicating all shifts). Print the QC Run Details report or view the QC Run Details screen to determine the shift for an individual run.

1 Select **Menu > QA > QC > More Options > Export**.

2 Select a **Format** from the *Type* drop-down list.

3 In the *Data Selection* option box, select the data to export.

4 Select a **Destination**.

5 Select **Start**.

NOTE No warning is displayed by the System Manager nor on the **History Log** > **General** tab when an IQAP export to RMS is unsuccessful. This may occur when the RMS hardware (RAP box) is disconnected.

QC Run Reminder

QC Run Reminder applies to Beckman Coulter controls and can be used to trigger a notification via the QC Alert Indicator when a particular control type has not been run for a specified frequency. QC Run Reminder changes are captured in the audit log.

QC Run Reminder begins tracking after a minimum of one run is present in a control file.

Automatically Exporting Quality Control Files

This feature applies to active Beckman Coulter controls. When auto export is configured, all of the selected active control file types are exported to the location and in the frequency selected.

NOTE The time needed to complete auto export is dependent on the number of instruments and the number of active control files.

You can also set up a QC Run Reminder. See Setting Up a QC Run Reminder in CHAPTER 9, Setup.

Reports

Report Types

You can manually print the following types of reports from the Quality Control screen:

- Run Details Report
- Summary Report
- Extended QC Summary Report (If extended QC is enabled)

See APPENDIX D, Reports for examples of reports.

Printing Reports

1 Select  at the top of the Quality Control screen to display the QC Report dialog box.

2 Select one of the following options from the Report Type drop-down list:

- **Run Details Report**
- **Summary Report**
- **Extended QC Summary** Report (if extended QC is enabled)

3 Select one of the following option buttons from the **Print** option box:

- **Selected Run** - to print the selected run only
- **All (Filtered Runs)** - to print only the runs displayed in the current filtered view
- **All Runs** - to print all runs in the file selected

4 Select one or both of the following **Print Options**:

- **Histograms** - to print histograms
- **Dataplots** - to print dataplots

5 Select **Print** to print the report. The system default printer is always displayed instead of the printer selected at *Default Printer for Control Reports* (if the printer is different).

XB Information

Navigating to XB

Navigate to XB by selecting **Menu > QA > XB** or by selecting  at the top of any screen.

The instrument displayed under  on the XB Batch Means screen may not match the name in the Status area. The data displayed is from the module listed next to *Instrument* on the top left side of the screen.

To view XB from another module, select the module from the *Instrument* drop-down list on the top left side of the screen.

If the XB/XM icon turns red, the display does not automatically go to the test location screen where the error occurred. Navigate through the individual instrument's XB/XM screens to determine the location of any error.

Setting Up XB Analysis

For instructions on setting up XB Analysis, see Enabling/Disabling XB in CHAPTER 9, Setup.

Reviewing XB Analysis

Review the results of XB Analysis from the XB Batch Means screen or the XB Batch Details screen.

Review the XB Batch Means Screen

1 Select  from the top of any screen to display the XB Batch Means screen.

NOTE To toggle between XB and XM results, select  again to display the alternate screen.

The XB Batch Means screen combines statistics data and thumbnail Levey-Jennings graphs for MCV, MCH, and MCHC for all completed XB batches. Out of range batch means and percent differences for MCV, MCH, and MCHC are displayed in red.

The XM batch in progress cannot be printed.

Move the point cursor on XB graphs by selecting the appropriate row in the table. The ability to move the point cursor by choosing a specific point on the graph is not functional.

2 View the screen components as described in the following table:

Component	Description
Batch Date/Time	Displays the batch completion date and time. If the batch out condition triggers an XB/XM icon alert (red), the Batch Date/Time are displayed in red. **NOTE** P indicates P.M. and A indicates A.M. in the Batch Date/Time column.
Reviewed By	Displays the reviewer's ID and the review date and time for the batch. If a batch has not been reviewed, **Click to Review** is displayed in this column for that batch. Select **Click to Review** in the Reviewed By column to review a batch. **NOTE** If a run has been previously marked as *reviewed*, the system updates the information with any subsequent review. When you change the inclusion status of a run in a control file, the run is already marked as *reviewed*.
Comment	Displays  if a comment has been written for a batch. **NOTE** To view the comment, select the batch row and select **Comment**.
Delete	Deletes the selected batch.

Review the XB Batch Details Screen

Selecting **Batch Details** on the XB Batch Means screen displays the XB Batch Details screen of the selected batch.

Exclude a Run

From the **XB Batch Details** screen, select the **Exclude** check box to exclude a run from statistical calculations. Exclusions can only be made after the batch has been completed.

Graphics

Thumbnail Levey-Jennings Graphs

The XB Batch Means and XB Batch Details screens both display a thumbnail separate graph for MCV, MCH, and MCHC. Each thumbnail graph displays all result points (up to 20 points) in the batch.

Point Cursor

The point cursor is a blue vertical line on the graph that reflects the analysis date of the selected run in the date grid. The cursor can be moved left or right by either selecting another row in the grid or by selecting the data points on the screen.

Y-Axis Assigned Values
The Y-axis scale displays 5 coordinates. These are the assigned values in currently configured units at the Target and at (Target + Limit), (Target - Limit), (Target +2x Limit), and (Target -2x Limit).

NOTE Assigned values that are entered as percentages are converted and displayed on the screen as calculated values.

X-Axis
The X-axis displays up to 20 runs. Ticks representing each new day are displayed below the X-axis. The name of the month is displayed below the tick representing the first day of a new month. Only dates with points to plot are displayed.

Points
Multiple batch runs for a single date are displayed in chronological order, starting on the tick representing the current day and ending before the tick representing the next day; for example, three for the date 12/1 are displayed as three points in order between 12/1 and 12/2.

- Points within range are displayed in black.
- Points above or below the Y-axis scale are displayed as red up or down triangles respectively.
- Excluded points are displayed with a strike through them.

Adding, Modifying, and Deleting Comments

1 Select **Comments** to display the XB Comment dialog box.

2 Enter or modify a comment for a batch in the text box and select **OK**
OR
To delete a comment, select **Delete**.

Deleting an XB Batch

IMPORTANT Deleted runs are not displayed on the graphs.

1 From the XB Batch Means screen, select **Delete** from the local navigation bar.

2 Note that if you selected the current (batch in progress), the current will be deleted; otherwise, the last completed batch will be deleted.

XB Batch Reports

You can manually print both XB Batch Details and XB Batch Means reports.

See APPENDIX D, Reports for examples of reports. See Enabling/Disabling XB in CHAPTER 9, Setup to configure automatic reporting.

Manually Print XB Batch Reports

1 Select  at the top of the XB review screens to display the Print XB Batch Reports dialog box from the selected instrument.

The report header is not printed on the XB Detail report. Ensure that all of the pages are kept together.

2 Select from the following options:

- **XB Batch Details Report** - **Selected Batch** or **All Batches** with or without **Levey-Jenning Graphs**
- **XB Batch Means Report** with or without **Levey-Jennings Graphs**

3 Select the printer from the drop-down list.

4 Select **Print**.

Exporting XB Results

You can export XB results to a CD-ROM or a local drive on the System Manager. The exported data is in a .csv format which can be read on any other computer that has a spreadsheet program.

The exported XB Batch Details Report file displays the target mean value in error where the high limit is expected.

1 Select **Export** to display the XB Batch Export dialog box.

2 Select from the following options:

- **XB Batch Details Data**
  - **Currently Viewed Batch**
  - **All Batches**
- **XB Batch Means Data**

3 Select a **Destination**.

4 Select **Start**.

XM Information

Navigating to XM

Navigate to XM by selecting **Menu > QA > XM** or by selecting  at the top of any screen.

The instrument displayed under  on the XM Batch Means screen may not match the name in the Status area. The data displayed is from the module listed next to *Instrument* on the top left side of the screen.

To view XM from another module, select the module from the *Instrument* drop-down list on the top left side of the screen.

If the XB/XM icon turns red, the display does not automatically go to the test location screen where the error occurred. Navigate through the individual instrument's XB/XM screens to determine the location of any error.

Setting Up XM Quality Control

For instructions on setting up XM Quality Control, see Quality Control in CHAPTER 9, Setup.

Reviewing XM Analysis

Review the XM Batch Means Screen

1 Select  twice from the top of any screen to display XM.

NOTE If XB is enabled, you must tap  twice.

2 View the screen components as described in the following table:

Component	Description
Batch/Date Time	Displays the batch completion date and time for the batch. If the batch is Out, the Batch/Date Time is displayed in red. If the current batch has not been completed, *Current Batch* will be displayed in the Batch/Date Time column for that batch.
Reviewed By	The Reviewed By column displays the reviewer's ID and the review date and time if a batch has been reviewed. If a batch has not yet been reviewed, *Click to Review* will be displayed in the Reviewed By column. *No Data Available* is displayed in the Reviewed By column if there is no data for the current batch. *In Progress* is displayed in the Reviewed By column if there are some runs for the current batch, however no data is displayed in the parameter columns. **NOTE** If a run has been previously marked as *reviewed*, the system updates the information with any subsequent review. When you change the inclusion status of a run in a control file, the run is already marked as *reviewed*.
Comment	Displays  if a comment has been written for a batch.

3 View, modify, or delete an item as described:

To...	Select...
View batch details	**Batch Details**
View, modify, or delete a comment associated with a batch	The batch row and select **Comment**

View Subsets from the XM Batch Means Screen

NOTE When the XM Batch Means (Data View) screen is initially displayed, it defaults to the tab or group with an Out condition. If no Out condition exists, the default is the first enabled group in the following order: CBC, DIFF, RETIC, and RETIC CALC. If no group is enabled, the default tab is CBC.

Each tab includes batch size, total batches, and calculated statistics data for each batch. When a subset or test group is disabled, the tab for that subset displays the group name and the word *Disabled*, for example, *CBC Disabled.*

Summary Statistics

The summary statistics for all batches in a group or subset are displayed at the bottom of each tab on the XM Batch Means (Data View) screen. The data headings for the Summary Statistics on the XM Batch Means (Data View) screen are defined below.

Component	Description
N	Displays the number of runs in the current batch.
Batch Size	Displays the batch size for this group or subset.

Component	Description
Total Batches	Displays the number of batches for which statistics are calculated. The system will store the last 20 completed batches.
Target	Displays the target value for each parameter in the subset or group. **NOTE** For instructions on defining parameters for a group or subset, see Enabling/Disabling XM in CHAPTER 9, Setup.
High Limit	Displays the high limit value for each parameter in a test group.
Low Limit	Displays the low limit value for each parameter in a test group.

Mark a Batch as Reviewed

1 Mark a batch as reviewed by selecting **Click to Review** in the *Reviewed By* column. The Reviewed Batches dialog box is displayed.

2 Select one of the following options:

- **Selected Batch** (Default)
- **All OUT Batches**
- **All IN Batches**
- **All Batches**

3 Select **OK** to mark the appropriate batches as reviewed.

NOTE Reviewed batches can not be reviewed again. If you attempt to review a batch that has already been reviewed, the following message is displayed: *This batch has been reviewed and cannot be reviewed again*.

Viewing XM Batch Means (Graph View)

The XM Batch Means (Graph View) displays Levey-Jennings graphs for each test group or subset of the XM Analysis.

1 Select **View Graph** from the XM Batch Means (Data View) screen. The XM Batch Means (Graph View) defaults to the tab view displayed by the XM Batch Means (Data View) screen.

Group Tabs

Each tab on the XM Batch Means (Graph View) screen displays Levey-Jennings graphs for a specific test group. The title of the tab is the test name, such as CBC, DIFF, RETIC, or RETIC CALC. If a particular test is disabled, the tab displays the test name and the word *Disabled*, such as *CBC Disabled*.

Thumbnail Levey-Jennings Graphs

A separate thumbnail Levey-Jennings graph is displayed for each test in a group. The thumbnail graph shows all batch mean points for a maximum of 20 completed batches.

The point cursor, a vertical line on each thumbnail graph, is synchronized with the selected row in the data grid on the XM Batch Means (Data View) screen.

A Levey-Jennings graph is not displayed for a test if any of the following conditions are met:

- The limit is set as manual update and the target value exceeds the low and high limits.
- The target value is equal to the low and high limits.
- The target value is empty.
- No data was collected.

Point Cursor

The point cursor is a blue vertical line on the graph that reflects the batch position (row) of the selected batch in the list of batches. The cursor can be moved to the left or right by selecting another row in the grid.

Y-Axis Assigned Values

The Y-axis displays the XM test values. The Y-axis displays the following coordinates for each configured test in a group:

- Target Value
- Low Limit Value
- High Limit Value
- High Limit + (High Limit - Low Limit)/2
- Low Limit - (High Limit - Low Limit)/2

X- Axis Assigned Values

The X-axis displays the number of batches included in the statistical analysis. The X-axis displays a maximum of 20 batch means. Ticks, representing each new batch, are displayed below the X-axis.

Points

Points represent a batch mean value for a specific batch and are displayed in chronological order. When a new batch is completed, it is displayed in the right-most tick in the X-axis. Move your cursor or finger over the point to display the batch completion date and time.

Points within range are displayed in black. Points that cause violations will be displayed as follows:

- Points above or below the Y-axis scale are displayed as a red up or down triangle.
- Points in XM Out conditions are displayed in red.

View XM Batch Details

1 From the XM Batch Means screen, select a batch data row.

2 Select **Batch Details** to display the XM Batch Details screen.

NOTE Use the scroll bar at the bottom of the screen to view additional data.

Exclude a Run

From the XM Batch Details screen, select the **Exclude** check box to exclude a run from the statistical calculations.

Add XM Comments

1 To add comments for XM batches, select a batch data row and then select **Comments** at the bottom of the XM Batch Means screen to display the XM Comment dialog box.

2 Select the **Batch** tab to add a comment about the batch.

3 Enter a comment in the text box and click **OK** to save the comment
OR
Select **Cancel** to exit the dialog box without saving the comment.

Modify XM Comments

1 From the XM Batch Means (Data View) screen, select a batch with  in the **Comment** column, and then select **Comment** at the bottom of the screen.

2 Enter a comment in the text box and select **OK** to save the change.

Delete XM Comments

1 From the XM Batch Means (Data View) screen, select a batch with  in the **Comment** column, and then select **Comment** at the bottom of the screen.

2 Select **Delete** on the XM Comment dialog box to delete the change.

Deleting XM

From the XM Batch Means (Data View) screen, select **Delete** to delete the Last XM Batch, All XM Data in the Selected Group or All XM Data in All Groups.

The last complete XM batch is not deleted unless an In Progress batch has started.

XM Reports

The following types of reports can be manually printed from the XM Review screens:

- XM Batch Details Report
- XM Batch Means Report
- Levey-Jennings Graphs

See APPENDIX D, Reports for examples of reports. See Enabling/Disabling XM in CHAPTER 9, Setup to configure automatic reporting.

Manually Print Reports

1 Select the  at the top of the XM Review screens to display the Print XM Batch Reports dialog box.

2 Select from the following options:

- **XM Batch Details Report**
  - **Selected Batch**
  - **All Batches in Selected Group**

  NOTE The report header is not printed on the XM Detail report.

- **XM Batch Means Report**
  - **CBC**
  - **DIFF**
  - **RETIC**
  - **RETIC CALC**
  - **Levey-Jennings Graphs** (for any group selected)

3 Select a **Printer** from the drop-down list.

4 Select **OK** to print the selected reports.

Exporting XM Results

You can export XM results to a CD-ROM or a local drive on the System Manager. The exported data is in a .csv format which can be read on any other computer that has a spreadsheet program.

1 From any XM Batch Means screen, select **Export** to display the XM Batch Export dialog box.

2 Select from the following options:

- **XM Batch Details Data**
  - **Selected Batch**
  - **All Batches in Selected Group**
- **CBC**
- **DIFF**
- **RETIC**
- **RETIC CALC**

3 Select the **CD Recorder** option if you want to export the data to a CD-ROM.

NOTE This process may take several minutes.

OR

To save to a local drive, select the **Local Drive** option, and then select **Select Folder**. The Select Folder dialog box is displayed. Select or create a folder and select **OK**.

Checking Smear Quality - DxH Slidemaker Stainer II

Smear quality may be affected by several factors including the quality of the glass slide, the condition of the blood specimen, and the instrument's performance as described below:

- Slide Quality

  Beckman Coulter slides have been manufactured to maximize compatibility with your DxH Slidemaker Stainer II. They are double-washed to ensure cleanliness and specially packaged to reduce humidity and debris. The slides have also been designed with strategically placed painted areas to help prevent multiple slides from sticking together. But because excessive humidity could cause even these slides to stick together, you should load the slide chute with only those slides needed for one day of DxH Slidemaker Stainer II operation. Be sure

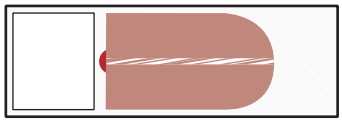
to store the slides in a low-humidity environment and bring them to ambient room temperature before you open the slide package.

You should also avoid touching the smearing surface of the slides when you are loading slides into the slide chute to avoid fingerprints, which could cause vacuoles in your smears.

Lesser quality slides could result in excessive debris, multiple streaks, irregular vacuoles, or an increase in slide jams. Glass debris may contribute to disrupted feathered edges.

- **Characteristics of a Good Smear**

  The film should show a gradual transition in thickness from the thick to thin areas. Automated slides may show ridges or troughs at the far end of the slide, but it does not affect the cellular distribution in the working area. The field of examination should range from an area where there is 50% overlap of erythrocytes to a region where erythrocytes show a tendency toward linear orientation.

Smear	Description
	**Normal Smear** Acceptable Smear Length: 2.5 cm (0.98 in.) minimum and 4.3 cm (1.7 in) maximum
	**Long Smear** Probable Cause: Low hemoglobin, diluted sample, or smear speed misadjustment
	**Large or Irregular Drop Pattern** Probable Cause: Dispense probe/wash cup contamination
	**Streak Through Middle of Smear** Probable Cause: Air bubble or clot present in sample or dispense probe/wash cup contamination

- **Specimen Condition**

  Morphological artifacts on the smear could be the result of prolonged storage or inadequate mixing of the blood sample.

- **Instrument Performance**

  Mechanical problems could result in streaks or smears that are too short, too thick, or too thin.

- **Variability**

  Blood collection and handling techniques as well as film fixation and staining methods, while generally controllable when closely monitored, may be a source of random variability.

  Sample characteristics such as low hematocrits, viscosity, cell type and size, and sample age are considered uncontrollable, but significant sources of variability.

- **Laboratory Conditions**

  Laboratory conditions, especially extremes in humidity and temperature, may adversely affect slide shelf life and hence, blood film quality.

In addition, a good quality smear should have the following characteristics:

- An adequate working area with an acceptable morphology and minimum distributional distortion.
- A gradual decrease in thickness of sample.
- A minimum film of 2.5 cm (0.98 in).
- Edges narrower than the slide width.
- A far end without streaks that is at least 1 cm (0.39 in) from the end of the slide.
- Negligible artifacts are derived from the technique.

CHAPTER 5

Sample Analysis

Specimen Collection

Whole Blood

Collect whole blood in EDTA according to tube manufacturer's instructions and procedures in: [5, 6, 7]

- *CLSI GP41-A6* [47] (formerly *H3-A6*) for venipuncture [9]
- *CLSI GP42-A6* [48] (formerly *H4-A5*) for capillary [8]

See recommendations for anticoagulants in Performance in CHAPTER 1, System Overview.

⚠ CAUTION

Risk of erroneous results. Misleading results could occur if you fail to leave space at the top of the tube between the sample and the cap. Ensure you leave space at the top of the tube between the sample and the cap to facilitate mixing. Follow the manufacturer's recommendations and the Beckman Coulter Tube List instructions for use of microcollection and venipuncture devices.

⚠ CAUTION

Risk of erroneous results. For cassette presentation, 0.5 mL is a typical minimum volume for a 13 x 75 mm tube. Actual dead volume depends on tube attributes (length, diameter, thickness, type of cap) and tube bottom adjustment settings. Insufficient volume results in increased Partial Aspiration messages.

Body Fluids

Beckman Coulter recommends that a diluent be run as a Body Fluid sample prior to analysis of Body Fluid specimens. Backgrounds within specifications can influence the reported results on the samples with low abnormal or normal values. Beckman Coulter recommends that each laboratory establish criteria for evaluation of the impact of the background on the reported results.

The aspiration error *P* flag may be present when the diluent blank is run to verify background counts prior to body fluid analysis. The diluent blank result with a *P* flag can be accepted except when accompanied by other system event messages indicating a hardware parameter such as voltage, temperature, or pressure is out of limit. This includes System Event: RBC or TNC.

To reduce body fluid sample viscosity, use hyaluronidase to treat synovial fluids prior to analysis according to your laboratory standards. Add in the ratio of 1 mL of synovial fluid to 5 mg of hyaluronidase. Mix for 5 minutes.

Affixing a Bar Code Label to a Tube

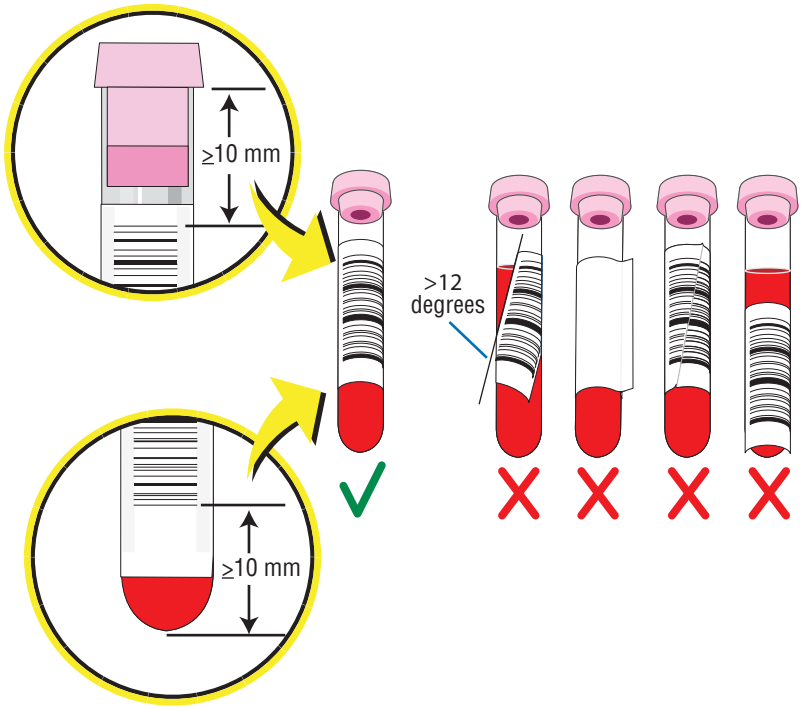
⚠ CAUTION

Risk of misidentification. Use of poor quality, dirty, improperly placed or damaged bar code labels could keep the SPM from reading the bar code labels. Ensure the bar code labels are not damaged. Ensure the bar code labels conform to the specifications provided in the Bar Code Label Specifications section of APPENDIX A, Special Equipment.

IMPORTANT When affixing a label to a tube:

- Ensure the label is flattened smooth against the tube.
- Press the label down securely, including all the edges and the corners.
- Ensure that no part of the label is loose.
- Do not affix more than three labels to a tube.
- Do not affix the label to the bottom 10 mm of the tube or the top 10 mm of the tube or skew the label more than 12 degrees. These areas are not viewable due to the curvature of the tube and the cassette window. The top 10 mm dimension is measured from the bottom edge of the cap.

Figure 5.1 Affixing a Bar Code Label to a Tube



Loading Cassettes

The cassette is the carrier for the sample tubes (patient or control) used in cassette presentation where automatic loading, mixing, and aspiration occurs. Always hold the cassette firmly by its

edges. Do not try to hold or lift a cassette by grabbing a tube. The weight of the remaining tubes could cause the cassette to fall.

⚠ WARNING

Risk of personal injury. Forcing a tube into the cassette improperly could cause it to break. If a tube should break, use your laboratory's safety procedure for cleaning the broken glass.

⚠ WARNING

Risk of personal contamination. Do not mix false-bottom (short pierce) tubes with full pierce tubes in a cassette where the tube bottom adjustment is set for full pierce. The false-bottom tube could be punctured by the force of the aspiration probe, resulting in a spill.

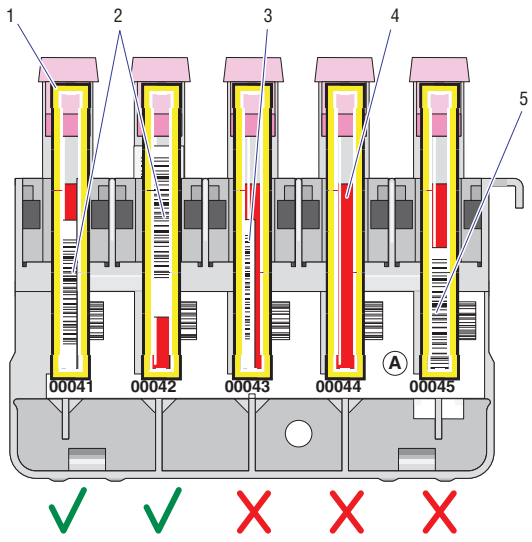
⚠ CAUTION

Risk of sample misidentification. Sample misidentification could occur if the appropriate bar code labels are not placed on the sample tubes and aligned properly. Workcells and the stand-alone DxH Slidemaker Stainer II must have a specimen ID bar code on tubes.

1 Slide each sample firmly into the cassette.

2 Ensure that the bar codes are facing up within the cassette window.

NOTE In the figure below, 1 and 2 are examples of good placement; 3 to 5 are examples of incorrect placement.



Test Orders

You can add a test order by automatically downloading the order from the LIS or by manual entry.

Configuring an Automatic Test Order Download from the LIS

See CHAPTER 9, Setup as well as the Host Transmission Manual for information on configuring a download from the LIS.

Manually Entering a Test Order

NOTE If a Secondary ID is entered for a manually entered test order and during Sample Analysis, the specimen was skipped with a Secondary ID Mismatch because the Secondary ID entered does not match the Tube Position in which the sample was placed, the sample must be run manually or the order deleted and resubmitted with the correct Secondary ID. Beckman Coulter recommends using only the Primary Identifier when manually entering test orders.

1 Select **Menu > Worklist > Pending** tab.

2 From the Worklist - Pending Tab screen, select **Add Order** to display the Add Order screen.

NOTE Batching must be disabled in order to manually add a test order. Batching can be enabled/disabled by module. See Batching in CHAPTER 9, Setup for additional instructions.

Previous DxH Slidemaker Stainer II test orders must be manually cleared before a new test order for the same ID is added. Carefully check the panel and slide order selections for accuracy before submission.

3 Press (Tab) to move through each section and follow the steps for Add Specimen Information, Select an Available Panel, and Add Patient Information.

Add Specimen Information

1 Enter a **Specimen ID** and press (Tab).

2 Select a **Specimen Type** from the drop-down list.

3 Complete the remaining optional fields as desired. Mandatory fields are indicated by an asterisk (*).

Select an Available Panel

Once you have selected a panel, it is displayed as the Default Panel the next time you add an order.

NOTE For slide orders, select **Make**, or **Make and Stain**, and the number of slides. The default is *none*. A non-slide test order can be added to an existing slide order using *Add Test Order*.

1 Verify or select the panel and/or slide order. See Table 5.1, Available Panels for a list of available panels.

You can add patient information at this time, if desired.

2 Select **Make**, or **Make and Stain** slides, if required.

NOTE Select **None** for samples without a test order when your system is using the LIS to populate the worklist. The samples without test orders will be skipped.

3 Select the number of slides to be prepared using the + or - button or by changing the default value of 1.

4 Select **Submit**.

NOTE Orders that are added to the system, but have not yet been analyzed, can be viewed on the Worklist - Pending screen.

Table 5.1 Available Panels

Whole Blood	CSF, Synovial, Pleural, Peritoneal, Pericardial
CBC	BFC
CD	
CDR	
CR	
H&H	
PLT	
PREDI x5 (Predilute Whole Blood)	
RETIC	
WBC	
WBC-NE#	
WHP	

Add Patient Information

1 To add patient demographics to an order, enter the **Patient ID** in the *Patient Information* panel and press (Tab) to display the Find Patient dialog box.

2 Select a **Patient ID**, then **OK** to add the patient's demographics to the order
OR
Select **Add Patient** to add a new patient demographic to the database.

NOTE To edit a patient's demographics, select **Edit Patient**. See Demographics in CHAPTER 9, Setup for additional instructions.

When a Patient demographic is associated with the test order, a **Patient** button is enabled from the local navigation bar on the Add Order and Edit Order screens which lets you select from the following options. Select **OK** when the dialog box is displayed to confirm the action.

- **Clear Patient**: Lets you disassociate the currently selected patient from the Test Order. In other words, it clears the patient demographic.
- **Edit Patient**: Displays the Edit Patient Demographics Dialog. Lets you edit all of the patient demographics with the exception of the Patient ID.
- **Rectify Patient ID**: Lets you enter the correct patient ID (in case the patient ID is wrong). See Rectify Patient ID in CHAPTER 9, Setup for additional information.

Adding Comments to a Test Order

NOTE When you use the LIS to add comments to test orders, do not manually add comments in the workstation to prevent the comments originating from the host to be edited. This occurs when comments are received from the LIS.

If comments are added to a test order prior to making changes to the patient associated to the test order, the added comments for the order will be deleted. View the test order and re-enter the previously added comments.

1 Select **Pending** tab **> Add Order > Enter Specimen ID > Comments.**

2 Select **Comments** from the local navigation bar.

3 Select **Add.**

4 Select the **Type** of comment.

5 Enter a comment in the text box or select **System Comment** to add a System Comment.

NOTE If you enter a comment here, that comment will be available for future selection in the list of System Comments.

6 Select the **Lab Use Only** check box if this comment is for lab use only.

7 Select **OK**.

8 Select **Close** to exit.

9 Select **Submit** to accept the changes
OR
Select **Cancel** to cancel the changes.

Editing a Test Order

1 Select **Menu** > **Worklist** > **Pending** tab.

2 Highlight the order you want to edit and select **Edit Order** from the local navigation bar.

NOTE When a Patient ID is edited, the results are not saved and the flagging limit resets to *Adult*. An exception is generated causing the application to crash.

3 Edit the information on the screen and select **Submit**.

Running Samples

You must be online to run samples. You can run samples using:

- Cassette Presentation
- Single-Tube Presentation
- Predilute Panel (PREDIx5)

Cassette Presentation

⚠ WARNING

Risk of personal injury. Attempting to correct an SPM problem while the SPM continues to process samples could injure you.

⚠ CAUTION

Risk of erroneous results. To avoid erroneous results, do not use Cassette Presentation for Body Fluid or Predilute samples.

IMPORTANT When there are three DxH 900 instruments in a workcell, ensure that the cassettes are all loaded for Sample Analysis in the input buffer of the rightmost instrument or are distributed among the input buffers for all three DxH 900 instruments to obtain the best possible workload distribution.

1 Ensure the SPM is set up for the appropriate test for your workflow. For additional information on manually adding a test order to the worklist, see Test Orders.

2 Ensure your specimens have been:

- Collected properly (see Anticoagulant in CHAPTER 1, System Overview)
- Stored and handled properly (see Sample Stability and Storage in CHAPTER 1, System Overview)

⚠ CAUTION

Risk of erroneous results. Misleading results can occur if specimens contain clots. Inspect specimens for clots and use good laboratory practices for verifying results to ensure you do not receive misleading results.

⚠ CAUTION

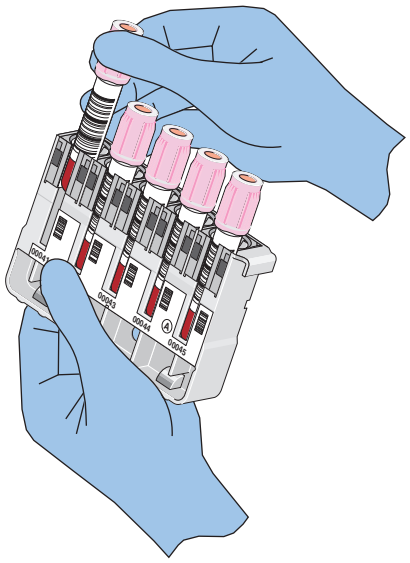
Risk of erroneous results. Narrow tubes with small internal diameters will require manual premixing prior to analysis to ensure proper cell and plasma distribution and to avoid possible erroneous results. Premix these tubes before placing them in the cassette and then analyze the cassette by placing it in the Stat position of the Input Buffer.

⚠ CAUTION

Risk of specimen leakage or clogging. Possible specimen leakage or clogging of the system can occur. Excessive piercing of sample tubes may cause coring of the stopper. The number of pierces without problems can vary among sample tube types and manufacturers. Do not pierce a blood collection tube more than five times.

Verify the instructions for use for the tube. Some tube types have more restrictive instructions for use and limitations on the number of pierces.

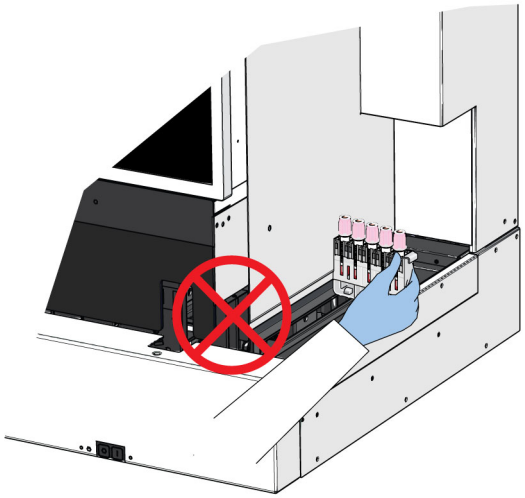
3 Load the specimens into the cassettes. See Loading Cassettes for additional instructions.



⚠ WARNING

Risk of personal injury. To avoid serious injury, DO NOT place your hand through the cassette presentation opening on the SPM.

4 Place the cassettes into the input buffer. The SPM automatically begins cycling the cassettes.



5 After the SPM cycles the samples, review the sample results at the System Manager. See CHAPTER 6, Data Review for information on reviewing sample results.

Single-Tube Presentation

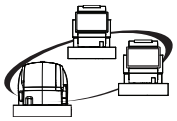
⚠ WARNING

Risk of personal injury. Attempting to correct an SPM problem while the SPM continues to process samples could injure you.

⚠ CAUTION

Risk of erroneous results. To avoid erroneous results, do not run a Body Fluid sample in the whole blood analyzing mode and do not run a whole blood sample in any body fluid analyzing mode.

NOTE Beckman Coulter recommends that a diluent be run as a Body Fluid sample prior to analysis of body fluid controls or patient specimens to verify acceptable backgrounds.



When you begin a diagnostic procedure from the System Manager or the Review Station, the instrument will not run patient samples. You can monitor the workcell by using the other computer that is not being used to access diagnostics.

When a test location is busy processing other automatically presented samples, the response from a single-tube station may be delayed. To minimize this delay, use the test location furthest to the left within a workcell for single-tube processing.

Using short tubes below the minimum tube height of 55 mm in the left (lavender) position will result in an error message being displayed: *Tube not detected*. If *Unable to Switch Instrument State* is displayed, select **OK**, request single-tube presentation again, and remove the tube. Replace the tube with a tube that meets the minimum tube height requirement.

The single-tube presentation is also used to analyze STAT samples.

---

1 Ensure your specimens have been collected and stored properly.

⚠ CAUTION

Risk of erroneous results. Misleading results can occur if specimens contain clots. Inspect specimens for clots and use good laboratory practices for verifying results.

---

2 If you want to redistribute the cassettes at the SPM that you will use during single-tube processing, place the instrument offline by selecting **Stop** in the upper right side of the screen. No cassettes will be sent to the offline SPM until the instrument is brought back online

OR

Go to the next step.

---

3 Select  at the top of any screen.

---

4 From the Select Instrument dialog box, select the down arrow for the name of the instrument to place in single-tube processing mode and select **OK**.

5 Place the specimen on the bar code reader platform of the Single-Tube Presentation Station with the bar code facing the SPM to allow the Single-Tube Presentation Bar Code Reader to scan the specimen label

NOTE If the bar code label is unreadable, try moving the tube off the indentation and nearer to the camera for a re-scan attempt.

OR

Enter the **Specimen Identifier**

OR

Scan the bar code with the handheld scanner. See Using the Handheld Scanner for additional instructions.

6 Verify the **Specimen Identifier** and submit a **Test** request, if prompted to do so.

7 Select the **Control** checkbox if you are running a Body Fluid control.

8 Press (Enter) to indicate that you accept the bar code label read or a manual entry.

⚠ CAUTION

Risk of erroneous results. The sample must be properly mixed before analysis. To avoid an improperly mixed sample, do not overfill the sample tube.

⚠ CAUTION

Risk of erroneous results. Narrow tubes with small internal diameters will require manual pre-mixing prior to analysis to ensure proper cell and plasma distribution and avoid possible erroneous results. Pre-mix these tubes immediately before placing them in the Single-Tube Station cradle.

9 Mix the specimen according to your laboratory standards.

⚠ WARNING

Risk of personal injury. To avoid serious injury, do not place your hands through the manual Single-Tube Station opening when the SPM is powered ON.

⚠ CAUTION

Risk of erroneous results. Do not place a closed tube or a 16 mm diameter tube in the right position of the Single-Tube Station. Doing so could result in an incomplete aspiration and an erroneous result.

⚠ WARNING

Risk of contamination. When loading a tube, push the tube all the way down into the station.

10 Place the specimen into the desired position of the Single-Tube Station. The Single-Tube Station will retract into the instrument and begin analysis. The system will provide information on the state of the instrument.

IMPORTANT If more than two minutes elapse from the time the Specimen ID is entered to the time the specimen is placed into the Single-Tube Station, the station will retract and the System Manager will exit the Single-Tube Presentation. If you do not remove the completed sample from the Single-Tube Station, the station will retract and the System Manager will exit Single-Tube Presentation. Re-enter the Single-Tube Presentation to retrieve the tube that remained in the Single-Tube Station after retraction.

NOTE At any time during single-tube analysis, the Single-Tube Presentation screen may be hidden by selecting **Hide**. Display the screen on again by selecting the Single-Tube Presentation icon.

11 Retrieve the tube from the Single-Tube Station. Select **Exit** and **Yes** from the dialog box to end the single-tube analysis. Return any offline SPM and/or any stand-alone DxH Slidemaker Stainer II to the online state.

Using the Handheld Scanner

Your DxH handheld scanner is a camera that takes a picture of the bar code.

⚠ CAUTION

Risk of sample misidentification. When using the handheld scanner, occasional misread errors can occur as a result of partial label scans and damaged or misapplied labels. Beckman Coulter recommends that you verify each bar code reading to ensure correct patient identification.

1 Aim the scanner at the bar code as if you were taking a picture.

2 Slowly move the scanner closer to the bar code (allow the camera to focus) until you hear a beep. If you do not hear a beep, ensure that the scanner is correctly connected to the computer and configured for your labels.

Predilute Panel (PREDIx5)

The Predilute panel on the DxH 900/DxH 690T may be used to analyze diluted specimens that exceed the reportable range or meet specific laboratory criteria for analysis. The Predilute panel is abbreviated *PREDIx5*. PREDIx5 provides a CBC analyzed via Single-Tube Presentation.

The dilution factor is set to 5. The Single-Tube Presentation requires 165 µL. For analysis and predilute preparation, 50 µL whole blood in 200 µL diluent are required for analysis and predilute preparation.

The diluted sample results analyzed using the PREDIx5 panel and Single-Tube Presentation are automatically multiplied by 5.

A simple dilution is one in which a unit of sample volume is combined with the appropriate volume of diluent to achieve a desired concentration. The dilution factor is the total number of unit volumes in which the blood sample will be dissolved. For example, a 1:2 dilution combines one (1) unit volume of blood sample and one (1) unit volume of diluent. The results dilution factor is two (2 = 1 + 1).

Obtain Diluent

1 Have a clean empty tube ready to collect the dispensed diluent.

2 Select  .

3 Select **Dispense Diluent** and follow the prompts on the screen to acquire diluent (approximately 1 mL per dispense) by placing an empty tube in the left side of the Single-Tube Station.

NOTE Light blue coloring may be visible in the first diluent sample dispensed after Daily Checks or after processing a sample in the R, CR, or CDR panel, when the Reticulocyte module is enabled. This residual retic stain does not affect result accuracy. To obtain a clear diluent sample, discard the first sample and dispense the diluent again.

Run the Predilute Sample

1 Identify the Specimen ID by placing the specimen on the platform in front of the Single-Tube Presentation Station bar code reader
OR
Enter the Specimen Identifier
OR
Use the handheld bar code scanner. See Using the Handheld Scanner for additional instructions.

IMPORTANT If no sample is placed in the Single-Tube processing station within approximately two minutes, the System Manager exits the Single-Tube Presentation.

2 Select **PREDIx5** from the Test drop-down list on the Single-Tube Presentation dialog box.

3 Verify the **Specimen Identifier** and **Test** request.

4 Move the cursor to the end of the ID field by touching the end of the ID or using the mouse to click at the end of the ID. Then, press (Enter) . Acknowledging the ID that is displayed on the System Manager screen by pressing (Enter) indicates that you accept the bar code label read or manual entry.

⚠ WARNING

Risk of personal injury. To avoid serious injury, do not place your hands through the manual Single-Tube Station opening when the SPM is powered ON.

5 Place the prediluted specimen into the correct single-tube position.

IMPORTANT If more than two minutes elapse from the time the Specimen ID is entered to the time the specimen is placed into the Single-Tube Presentation station, the station retracts and the System Manager exits Single-Tube Presentation.

Setting Up Stain-Only Priority

Set up the stain-only feature to prioritize the staining cycle when the information is not downloaded from the LIS.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 On the SMS Configuration screen, select **Stain-Only Priority** from the local navigation bar.

5 Select the appropriate option for your stain-only processing priority:

- **STAT** = immediately
- **ASAP** = as soon as possible
- **Routine** = as configured by your lab. See Basket Settings - DxH Slidemaker Stainer II in CHAPTER 9, Setup for more information.

6 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Studies

Studies lets you run samples without test orders multiple times without using Rerun or Reflex analysis. Batching is automatically enabled. Studies results can be viewed on the Worklist - Custom screen by using the Studies filter. The first three characters of the Specimen ID for Studies results are always *XS-*. Decision rules are not invoked for Studies samples.

NOTE Specimen IDs may be truncated when running in Studies. The addition of the XS- characters to the identifiers may cause the number of characters to exceed the normal screen display limit.

Batching

Batching lets you run samples of one panel type with a default test order. You cannot run replicates. You cannot have any Pending Orders with the same Specimen ID as those you are attempting to analyze. A Default Test Order must be defined for batched samples. See Batching in CHAPTER 9, Setup for additional instructions.

Alarms

An audible or visible alarm on the DxH 900/DxH 690T System should be addressed by reviewing the Event Logs on the History Log screen. See APPENDIX C, Logs for additional information on History Logs.

To silence an audible alarm, select  in the upper right corner of the screen.

To configure audible alarms, see Configuring an Alarm to be Audible in CHAPTER 9, Setup.

Basket Management

This feature lets you view the location of each basket in process within the DxH Slidemaker Stainer II and the details associated with each slide.

The Basket Management screen may show a Stain Time Exceeded exception for a basket when the exception has not occurred. Estimated Time to Completion (ETTC) may appear inconsistent between protocol time to complete and actual screen display because the system adjusts for available baskets, workload, etc.

Use the slide priority as listed in the Worklist view.

When the Stainer is disabled and a Make and Stain slide order is introduced:

- The Stainer Disabled Exception is not reported on the Basket Management screen, Basket Details dialog box, or in the Patient Report details.
- The Event Logs do not record that the Stainer is disabled.
- The order is displayed as completed when it was never stained.

Viewing Basket Details

1 Select  and the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 Select **Basket Management** from the local navigation bar to view the Basket Management screen.

On this screen, you can manage baskets or get basket information anywhere in the Basket loader, the Stainer module, and the Basket Transport module.

4 Review the information under *Basket Data*:

- Type
- State
- Priority
- Load Date
- Load Time
- Unload Date
- Unload Time
- Duration
- Elapsed Time
- Remaining Time
- ETC
- Exceptions (see Table 6.7, Slide Exceptions From the Patient Detail Screen in CHAPTER 6, Data Review for more information)

NOTE The information in the Basket Data section on this screen varies with the basket in progress and the completed baskets.

5 Select a basket and then select **Basket Details** from the local navigation bar to display a dialog box containing specific patient information for the slides in the selected location.

NOTE See Slide Exceptions from the Patient Detail Screen in CHAPTER 6, Data Review for more information.

6 View the details and select **OK** when you are done
OR
Select **Cancel** to exit the screen.

Advancing a Basket

Follow these steps to advance a selected basket to the I/O drawer.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar on the DxH Slidemaker Stainer II Status screen.

3 Select **Basket Management** from the local navigation bar to view the Basket Management screen.

4 Select the basket to advance.

NOTE You can advance a basket from the elevators (pre-stain drying) or from the post-stain dryers only.

5 Select **Advance Basket** from the local navigation bar to display the Advance Basket dialog box.

NOTE The baskets/slides may be wet before the post-stain drying cycle is complete.

6 On the DxH Solutions dialog box, select **OK** to forward the basket to the I/O drawer.

7 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Selecting a Basket to Stain Next

Follow these steps to schedule the next basket with slides for staining.

1 Select  to display the System Status screen.

2 Select **Details Status** from the local navigation bar.

3 Select **Basket Management** from the local navigation bar to view the Basket Management screen.

4 Select the basket to stain next.

NOTE Stain Next changes the staining priority for baskets that are ready to stain in the system.

5 Select **Stain Next** from the local navigation bar to display the Stain Next dialog box.

6 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Cancelling Staining

This command cancels all staining in progress and all slides waiting to be stained. Slides that are in the stainer will advance to the dryer and then to the I/O drawer. Slides in the basket elevator will advance to the I/O drawer.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 Select **Basket Management** from the local navigation bar to view the Basket Management screen.

4 Select **Cancel Staining** from the local navigation bar to display the Cancel Staining dialog box.

5 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Loading or Removing Baskets at the Input/Output (I/O) Drawer

⚠ WARNING

Risk of personal injury and contamination. The processing areas could contain prepared smears and/or broken glass with biohazardous material. Handle with care and avoid skin contact.

1 Press the I/O drawer open/close button on the left-side door to access the I/O drawer.

⚠ WARNING

Risk of personal injury and contamination. The instrument could continue to move or have delayed movement. Wait a few seconds to ensure that all movement has ended before pulling the I/O drawer. Do not place your hands inside the I/O drawer.

⚠ CAUTION

Risk of erroneous results. Using baskets with any water on them could affect stain quality. Ensure that all baskets are completely dry before placing them into the instrument.

2 Once the drawer has stopped moving, pull the handle towards you until it stops.

3 Remove and/or load the baskets. Ensure that the baskets are thoroughly dry prior to loading. Remove any baskets from the I/O drawer before going into Diagnostics.

NOTE Ensure that the I/O drawer has three or more empty positions at all times.

The indicator lights on the top left of each basket-holding position indicate the following:

- Blinking green - when the basket is ready for you to remove it
- Steady green - when the basket is ready to be used by the system
- Blinking red - when the basket is in an error state
- Blinking blue - when the basket is loaded with slides for staining only

4 Push the handle toward the instrument until it stops. The drawer will automatically return into position inside the instrument.

NOTE The system always processes the baskets in first-in, first-out order.

Staining Manually Prepared Slides (Stain-Only Priority)

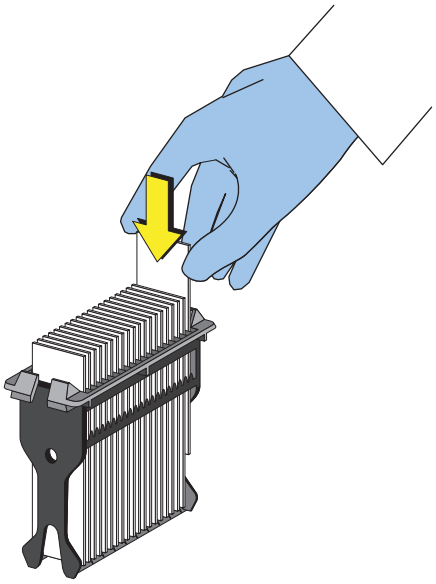
⚠ WARNING

Risk of personal injury and contamination. The processing areas could contain prepared smears and/or broken glass with biohazardous material. Handle with care and avoid skin contact.

Follow these steps to stain a manually prepared slide.

1 Fill an empty basket with slides for a Stain Only cycle as follows:

- Load the slides with the painted end on top to prevent the staining of sample information.
- Load all smears in the same direction facing the back of the next smear.



2 Open and pull out the I/O drawer.

3 Place the basket back in the I/O drawer in any position from 1 to 6.

4 Press the number where the basket is placed.

NOTE The system always processes the baskets in first-in, first-out order.

5 Push the drawer in for staining to begin.

Making Slides (No Staining)

Follow this step to make slides that do not require staining:

1 From the DxH Slidemaker Stainer II Status screen, select **Make Slide** on the Default Slide Order for the applicable cassette or single-tube presentation
OR
Add or edit a test order from the **Worklist Slides** tab
OR
Load samples for test orders from the LIS download.

NOTE Enable batching to run with Default Slide Order.

Making Slides and Staining

Follow this step to make slides and stain them:

1 From the Status screen, select **Make Slide and Stain** on the Default Slide Order for the applicable cassette or single-tube presentation
OR
Add or edit a test order from the **Worklist Slides** tab
OR
Load samples for test orders from the LIS download.

CHAPTER 6

Data Review

Worklist Screen

The Worklist screen, accessed by selecting  , manages test orders and results within the database. The Worklist screen lets you:

- Use predefined filters for display and monitoring of patient test orders and results.
- Specify sort/filter criteria for display and monitoring of patient test orders and results.
- Add, delete, and modify patient test orders.
- Print, transmit, and export patient results.
- Locate a specimen by selecting the highlighted ID on the selected row. The Specimen Search Result dialog box is displayed when the search is completed.
- Clear notification for specimens that were not processed.

To access the Worklist screen:

Select  from the top of any screen
OR
Select **Menu > Worklist**.

Worklist Screen Layout

The six tabs on the Worklist screen are:

- **Pending** - See Pending Tab for more information.
- **Not Processed** - See Not Processed Tab for more information.
- **Review** - See Review Tab for more information.
- **Released** - See Released Tab for more information.
- **Custom** - See Custom Tab for more information.
- **Slides** - See Slides Tab for more information.

Each tab displays a particular filter view of the database. The Review, Released, and Custom tabs organize information according to the currently selected filter. Only one tab can be viewed at a time.

Each tab carries specially filtered data. For all tabs:

- Parameter results from disabled modules (via **Menu** > **Setup** > **System** > **Analysis**) are disabled (grayed out) on any tab.
- Parameters disabled (via **Menu** > **Setup** > **Reporting** > **Test**) are not displayed on any tab.
- For unreleased results with multiple runs, the last run (most recent) is highlighted.
- Rejected results are displayed with ##### signs.
- Unreleased results are displayed in brackets.
- Unordered but received parameters are displayed in a grayed out color.
-  is displayed in the first column for any result that is saved, meaning it cannot be removed, pruned, or deleted.
- Data that does not match the filter criteria is not displayed.
- If a row no longer matches the filter criteria (for example, the **Pending** tab is selected and all tests are now completed), all fields are displayed in a disabled color.
- The last selected sort is not saved when changing filters or navigating to other screens within a current session.

Specimens with edited Primary Identifiers do not display the *E* flag on the Worklist. The Audit Log contains this information.

Pending Tab

The Pending tab (**Menu > Worklist > Pending** tab) displays all patient test orders with a pending or partially complete result status (any result status that is not complete).

The default sort order on the Pending tab for a new use session is listed below. The default sort order within the same user session is the last selected sort order.

- Primary: Order Received Date/Time, oldest to newest
- Secondary: Primary Identifier in ascending order

The components on the Worklist- Pending screen are outlined below. Use the scroll bar to move the screen from left to right.

Component	Description
Results Found	Read-only field that displays the total number of results found for the tab. If no entries are found, this field displays 0 (zero)
Specimen ID	Specimen's unique identifier
Order Received Date/Time	Date and time that the order was received
Request Date/Time	Date and time that the order was requested
Specimen Status	Status of the specimen
Action Status	Displays the follow-up work to be performed on a specimen, such as Rerun or Reflex, or both
Priority	Priority of the specimen

Component	Description
Patient ID	ID assigned to the patient
Last Name	Patient's last name
First Name	Patient's first name
Requests	Requests
Patient Location	Patient's location
Physician	Physician's name
CBC, Diff, Retic, and BFC	Panel results
Add Order	Lets you add a test order. For instructions on adding and order, see Test Orders in CHAPTER 5, Sample Analysis.
Edit Order	Lets you edit a test order. For instructions on editing an order, see Editing a Test Order in CHAPTER 5, Sample Analysis.
Details	Lets you display the details for the pending order on the Patient Results screen
Remove	Lets you remove all selected test orders or all test orders in current filter
View Log	Lets you display the History Log screen
Delete	Lets you delete all selected test orders or all test orders in current filter
Refresh	Lets you refresh the screen so that it reflects the most recent changes
More	Lets you save (prevent deletion) or unsave (allow deletion) a Test Order

Removing Pending Orders

Remove hides a pending order from view on the worklist tab, although it remains pending.

1 Select the orders that you want to remove on the Remove pending orders dialog box and select **OK**.

2 View removed orders from the Custom tab by selecting the **Remove** filter.

NOTE Removed filters will be deleted from the database according to the Database Cleanup features selected.

Deleting Pending Orders

You can delete pending orders automatically or manually. See Setting Up Database Cleanup in CHAPTER 9, Setup for additional information on automatic deletion.

To manually delete pending orders:

1 Select **Delete Order** from the local navigation bar on the Worklist - Pending screen to delete selected orders from the database.

NOTE Orders are no longer viewable or accessible when deleted from any tab.

Saving Orders

Follow these steps to prevent an order from being manually or automatically deleted by any automated database maintenance routines that you may have configured.

1 Select **More > Save** from the local navigation bar on the Worklist - Pending screen.

2 On the dialog box, select **OK** to save the changes
OR
Select **Cancel** to cancel the changes

Unsaving Orders

Follow these steps to allow an order to be deleted manually or by any automated database maintenance routines that you have configured.

1 Select **More > Unsave** from the local navigation bar on the Worklist - Pending screen.

2 On the dialog box, select **OK** to save the changes
OR
Select **Cancel** to cancel the changes

Not Processed Tab

The Worklist - Not Processed tab (**Menu > Worklist > Not Processed** tab) is lit and displays exceptions for specimens that have been skipped.

You need to address the problem and reload the skipped specimens for processing. When exceptions are posted to the Not Processed tab,  is red. This tab view is automatically displayed when you select  .

Specimens skipped because of a **No Read** or a **No Match** are posted to the Not Processed tab. A corresponding Event is posted in the Event Log for each. See APPENDIX C, Logs for information on working with logs.

The components on the Worklist - Not Processed screen are outlined below:

Component	Description
Results Found	Read-only field that displays the total number of results found for the tab
Date Time of Event	Date and time of the event that placed the skipped specimen into the Not Processed group
Exception Status	Exception Status, such as No Read
Specimen ID	Specimen's unique identifier
Tube Pos. ID	Tube position ID
Message	Message associated with the Exception that caused the specimen to be skipped (includes where the skip occurred)
Clear	Lets you clear exceptions on skipped specimens
View Log	Lets you display the History Logs screen
Refresh	Lets you refresh the screen
Locate	Lets you locate a selected specimen. **NOTE** If *Locate* does not find the specimen: **1.** Access the Worklist screen. **2.** Select the **Not Processed** tab and identify the Not Processed Specimen from the list. **3.** Search the output buffer(s) for the specimen.

Clear an Exception from the Not Processed Tab

1 From the Not Processed tab on the Worklist screen, select the exceptions you want to clear.

2 Select **Clear** to display the Clear Exceptions dialog box.

3 Select from the following options:

- **Selected Exceptions**
- **All Exceptions in Current Filter**

4 Select **OK** to clear the selected exceptions.

Locate a Specimen

1 From the *Not Processed* tab, highlight the selected ID by selecting a row on the grid.

2 Select **Locate** on the local navigation bar to perform the specimen search. The system displays the Specimen Search dialog box when the search has been completed.

Review Tab

The Worklist - Review tab (**Menu > Worklist > Review** tab) is lit and displays specimens that have been held (not released) and require attention.

The Specimen ID cannot be edited while the results are still on the Review tab. The results in review are not re-evaluated when flagging and messaging limit sets are changed while those results are in review.

The bell icon may appear on both the Review and Pending tabs when a STAT specimen is in the Pending tab, but no STATs are awaiting review.

Use the scroll bar to view all the components and data on this screen. The filter on the top right lets you search by the following:

- All Held
- Held with Exception Status
- Overdue STAT Held
- Partial Release

To release a result, you must be at the Patient Results screen. Double click or double-tap a result to display the Patient Results screen, See Releasing Results or Rejecting Results for more information.

The options on the Worklist - Review tab are described below:

Component	Function
Specimen ID	Specimen's unique identifier
Order Received Date/Time	Date and time that the order was received

Component	Function
Request Date/Time	Date and time that the order was requested
Specimen Status	Status of a specimen
Action Status	Displays the follow-up work to be performed on a specimen, such as Rerun or Reflex, or both
Priority	Test order priority
Requests	Requests
Exception Status	Exception Status, such as Default Test Order or Inconsistent Demographics
Patient ID	Patient's unique identifier
Last Name	Patient's last name
First Name	Patient's first name
Instrument	Instrument used to run the test
Patient Location	Patient location
Physician	Physician who ordered the test
CBC	Results for CBC Parameters
Diff	Results for Diff Parameters
Retic	Results for Retic Parameters
BFC	Results for Body Fluid Count
Edit Order	Lets you edit a test order. For instructions on editing an order, see Editing a Test Order in CHAPTER 5, Sample Analysis.
Details	Lets you display the details for the order on the Patient Results screen
View Log	Lets you display the History Log screen
Delete Order	Lets you delete all selected test orders or all test orders in current filter
Export	Lets you export data
Refresh	Lets you refresh the screen so that it reflects the most recent changes
More	Lets you save (prevent deletion) or unsave (allow deletion) of a Test Order

Released Tab

The Worklist - Released tab (**Menu > Worklist > Released** tab) displays the released results according to the filter that you select.

The Filter Name drop-down list at the top right of the Released tab lets you filter by the following:

- All
- All (Last 30 Days)
- Amended
- Amended Released

The components on the Released tab are described below.

Component	Function
Specimen ID	If Specimen ID is the selected primary identifier, then this is the specimen's unique identifier.
Patient ID	Patient's unique identifier
Last Name	Patient's last name
First Name	Patient's first name
Priority	Test order priority
Requests	Requests
Release Status	Release status
Report Transmitted	Report transmitted
Lab Report	Lab report
Chartable Report	Chartable report
Analysis Date/Time	Analysis date and time
Instrument	Instrument used to run the tests
Patient Location	Patient location
Physician	Physician who ordered the test
CBC	Results for CBC Parameters
Diff	Results for Diff Parameters
Retic	Results for Retic Parameters
BFC	Results for Body Fluid Count
Transmit	Lets you transmit Released Results to an LIS
Edit Order	Lets you edit a test order. For instructions on editing an order, see Editing a Test Order in CHAPTER 5, Sample Analysis.
Details	Lets you display the details of the pending order on the Patient Results screen
View Log	Lets you display the History Log screen
Delete Orders	Lets you delete all selected test orders or all test orders in current filter
Export	Lets you export data
Refresh	Lets you refresh the screen so that it reflects the most recent changes
More	Lets you save (prevent deletion) or unsave (allow deletion) of a Test Order

NOTE If a test order has a released panel, but a slide order is still in progress, the released panel is not displayed on the *Released* tab until the slide order is complete. The results can be viewed from the Patient Results or Details screens.

Manually Transmit Released Results to the LIS

1 From the Worklist - Release Results screen, select **Transmit** to display the Transmit dialog box.

2 Select an option under *Transmit*:

- **Selected Results**
- **All Results in Current Filter**

NOTE Results will be transmitted in the same order as listed in the Analysis Date/Time column in the Released and Customer Worklist tabs. Ensure that results are sorted in the same chronological order as you wish to transmit.

3 Select **OK** to transmit the results.

Export Released Results

Results can be exported in two formats:

- .csv (importable to a spreadsheet program such as Microsoft Excel)
- .inf/.dat files (raw data)

Exports to .csv and .inf/.dat should be performed on the System Manager for systems equipped with both System Manager and Review Stations. Do not use the Review Station for exporting.

Exporting large amounts of data to a USB drive can take a significant amount of time. Plan accordingly.

In a connected configuration, exporting CSV files (INF/DAT) for any QC files, should be done from the System Manager. Exporting from the review station is not recommended because the files reside within the System Manager.

1 Select **Released** tab **> Export**.

2 Select a type of file to export.

NOTE Exported patient files contain columns that appear to be duplicates for some categories. There is a column labeled *RBC for CBC* and a different column labeled *RBC for Body Fluids*.

3 Select the data to export from the *Data Selection* option box.

4 Select **CD Recorder** and insert a CD in the CD-ROM drive
OR
Select **Local Drive** and select an existing folder and rename it, if necessary, or create a new folder under *Destination*

An export to a .csv overwrites the previous file information if the same file name is used. The system does not prompt for confirmation that you have changed the file name.

5 Select **Start**.

Slides Tab

The Worklist - Slides tab (**Menu > Worklist > Slides** tab) lets you select from predefined search filters. Slides introduced usually Manually Made test orders are not tracked.

Custom Tab

The Worklist - Custom tab (**Menu > Worklist > Custom** tab) lets you select from predefined or user-defined filters.

Custom Tab Filter

Select from the following options in the Filter Name drop-down list:

- Chartable Report Not Printed
- Lab Report Not Printed
- Not Transmitted (all results are currently displayed regardless of transmission state; not functional at this time)
- Rejected
- Removed (this tab is not functional at this time)
- Studies
- Custom filters you have created, saved, and named. See Custom Worklist Filter in CHAPTER 9, Setup for instructions on configuring your custom filter. The Time Limit drop-down box is disabled while any custom search is in progress.

Reviewing Patient Results

To access the Patient Results screen, do one of the following:

Select **Menu** > **Patient Results**
OR
Highlight a specimen and select it from the Worklist.

Some components on the Patient Results screen are described below.

Item	Function
Tabs	Indicates requests run on a patient and results being displayed. Different tabs are displayed in different views; for example, by panel name, history, or rerun. The Worklist Not Processed tab turns red when specimens are skipped. The Worklist Review tab turns amber when results are held for review.
Exceptions	Area above Lab Action that displays Exception messages.
Display Mode	Dynamic (Locked or Unlocked) or selected filter; for example, Released.
Show Delta/Previous	Lets you toggle between Delta values and previous results.
More	Lets you access the Rules Trigger and Reject buttons.

On the Patient Results screen:

- Results are highlighted with an amber background if action limits are exceeded.
- Results are highlighted with a red background if critical limits are exceeded.
- Flags are contained in a column next to results.
- Codes replace results.
- A History tab will be available on the Patient Results screen if there is one or more released specimens associated with the Patient ID.
- A Rerun tab will be displayed if a Rerun or Reflex test has been ordered or performed.
- The Release tab will be displayed if results have been released.
- Additional tabs will be displayed if you use the Partial Release feature. See the information on partial release in Releasing Results.

Patient Slide Results with Exceptions

The *Edit* option is not present on this screen. Edit the Specimen ID by selecting **Slide > Pending** filter **> Add/Edit Order**.

The *Additional Data* option occasionally displays the incorrect number of slides when there are multiple slides ordered for the same patient specimen. The Patient Results screen displays the number of slides correctly.

The items on the Patient Slide Results screen are as follows:

Item	Description
Order Type	Test order type for the active slide order of a specimen.
Order Status	Status of the active slide order of the specimen. Value displays *Completed.* If the slides have been cancelled for this specimen, the slide order status displays *Cancelled*.
Slides Completed	Value is 0 if no slides have been completed.
Slides Ordered	Number of slides ordered for the specimen. It does not include cancelled slides.
Slide Completed Date/Time	Date and time of the latest slide completed for the specimen. This value is updated as each slide is completed.

Item	Description
Slide Ordered Date/Time	Date and time that the slide was ordered.
Number	Display the number of the slide. The maximum number of slides in a single aspiration is 4.
ETTC (min:sec)	Estimated Time to Completion given in expressed MM:SS for all slides in progress. It will be blank for any pending slides.
Slide Location	Value is blank if no slides are in progress. Slides can be found inside the system. When the slide is completed, it will display the I/O Drawer. When the slide is pending, it will display *Unknown*.
Slide Made Date/Time	Date and time of the first slide made for the active slide order.
Slide Exceptions	Description of the highest priority slide exception associated with any slide for the specimen.
Slide Comment	Display of the latest slide comment defined for the specimen. If a comment is truncated due to space, the suffix ... is appended. If additional comments are added, then + is displayed.
Add Slides	Lets you add additional slides.
Review Exceptions	Exceptions to be reviewed.
View Logs	Displays the History Log window.
Additional Data	Displays the Additional Data window.
Comment	Lets you add a comment.
More	Lets you save (prevent deletion) or unsave (allow deletion) of a slide order.

Viewing Previous or Next Patient Results

You can view previous or next patient results from the Patient Results screen using the navigation buttons on the bottom right-hand corner of the screen.

The data displayed depends on the worklist sort order; for example, the newest data at the top, the oldest at the bottom.

Dynamic Mode

When the Patient Results screen is accessed by selecting **Patient Results** on the Main menu or  , the screen will be displayed in Dynamic Mode. In Dynamic Mode, all results processed by the System Manager will be available, with the most recent currently visible. When a new specimen is analyzed, its results appear on the screen, replacing the currently displayed specimen's results. When the screen is in Dynamic Mode, you can lock it so that it does not update dynamically when reviewing results. All other Worklist views are static; for example, custom searches. As soon as it is unlocked, the results of the last specimen analyzed are displayed.

Locked/Unlocked Status

The Patient Results screen indicates the lock status as Dynamic (Unlocked) or Dynamic (Locked) in the upper right hand corner.

Lock/Unlock the Screen

To lock the screen, select the *unlocked* icon from the navigation panel on the Patient Results screen.

To unlock the screen, select the *lock*ed icon.

Filter Mode

The Patient Results screen is in Filter mode when the screen is accessed via the Worklist.

From the Worklist Tab

The name of the Worklist tab from which you accessed the Patient Results screen is displayed in the Filter field on the Patient Results screen. Using the arrow keys on the keyboard, you can navigate through a fixed set of results filtered by the current Worklist tab.

Auto-Refresh
If you access the Patient Results screen from the Review tab of the Worklist screen, when the last item in the list is addressed, the system will automatically refresh to display any new results. Items not addressed continue to be displayed.

Quick Search Mode

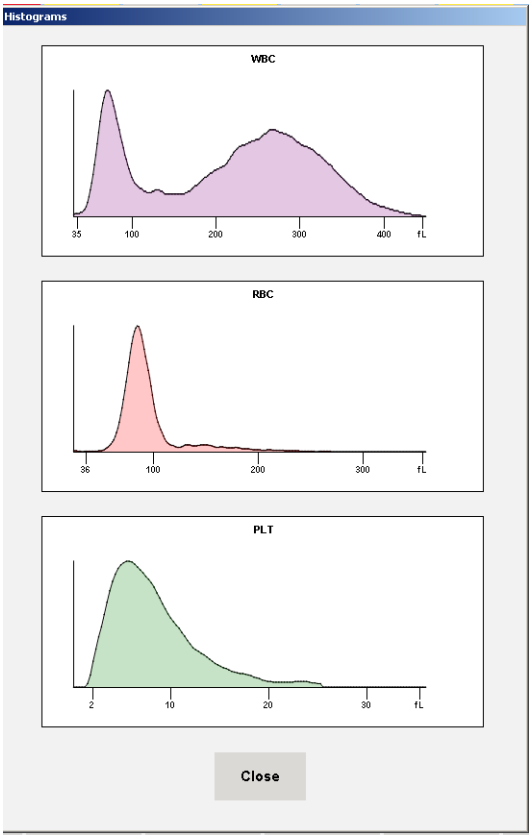
The Patient Results screen will be in a Filter mode when accessed via the Specimen Search function. The Status Indicator field displays Specimen Search. In this mode, you can only review the one result selected from the Specimen Search.

Description of Histogram/Dataplot Content on the Patient Results Screen

Histograms

The main Patient Results screen displays WBC, RBC, and PLT histograms. For BFC panels, a TNC and RBC histogram are available. Double-clicking or tapping a histogram will enlarge the image.

Figure 6.1 Histogram



Histograms show relative cell frequency versus size. They provide information about erythrocyte, leukocyte, and thrombocyte frequency. Histograms provide a means of comparing the sizes of a patient's cells with normal populations.

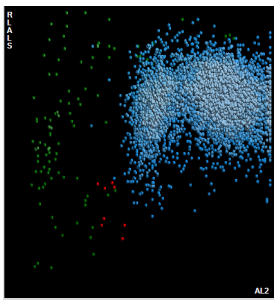
IMPORTANT Histograms show only the relative, not actual, number of cells in each size range. Do not estimate the number of cells from the distribution curves.

Dataplots

A maximum of three tabs display dataplots, depending on the test order, according to the following rules:

- If Diff was ordered, 5PD1 and NRBC1 tabs and dataplots are displayed.
- If Retic was ordered, a RETIC1 tab and dataplot are displayed.
- If a module is disabled, the corresponding dataplot is not displayed.

Figure 6.2 NRBC1

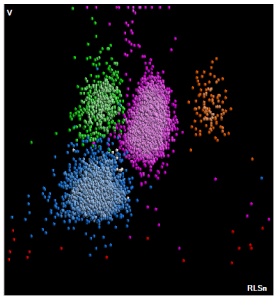


For each type of graph and tabbed dataplot, the colors correlate to populations with the light, bright colors representing a dense or greater number of cells and dark colors representing the least dense or least number of cells.

Population colors for the NRBC Dataplot are:

- NRBC - Light to dark true red
- Other - Light fluorescent green to dark green.
- WBC - Light bright blue to dark blue.

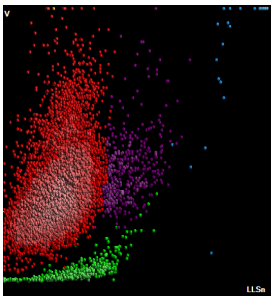
Figure 6.3 5PD1



Populations colors for the WBC Differential Dataplot are:

- Lymphocytes - Light bright blue to dark blue.
- Neutrophils - Light bright pink/purple to dark purplish red.
- Eosinophils - Light bright orange to dark reddish orange.
- Monocytes - Light fluorescent green to dark green.
- Basophils - White to bright yellow.
- Non-whites - Light to dark true red.

Figure 6.4 RETIC1



Population colors for the Reticulocyte Dataplot are:

- RBCs - Light to dark true red.
- Reticulocytes - Light to dark purple.
- Other - Light fluorescent green to dark green.
- White Blood Cells - Light bright blue to dark blue.

Additional Data

From the Patient Results screen, select **Additional Data** to display the Additional Data screen.

The Additional Data Screen provides you with a view of additional data for four run modes:

- CBC
- Diff
- NRBC
- Retic

For BFC panels, a BFC tab displays:

- TNC and RBC test results
- Corresponding histograms

Additional Data - CBC Tab

Select the **CBC** tab on the Additional Data screen to display additional CBC data.

You can toggle the check box next to each aperture to alternately display or remove the histogram data displayed for that aperture. The histograms, to the left of the aperture data, display the histogram data for WBC, RBC, and PLT.

The lines are color-coded to correspond to the apertures:

- Aperture 1 is purple.
- Aperture 2 is blue.

- Aperture 3 is yellow.

The average histogram is black.

If partial voteout has occurred, the field in the Aperture group box will be highlighted in amber.

Additional Data - DIFF Tab

Select the **DIFF** tab on the Additional Data screen to display additional DIFF data.

Additional Data - NRBC Tab

Select the **NRBC** tab on the Additional Data screen to display additional NRBC data.

Additional Data - RETIC Tab

Select the **RETIC** tab on the Additional Data screen to display additional RETIC data.

Additional Data - RELEASE Tab

Select the **RELEASE** tab on the Additional Data screen to track analysis and release time for the test order.

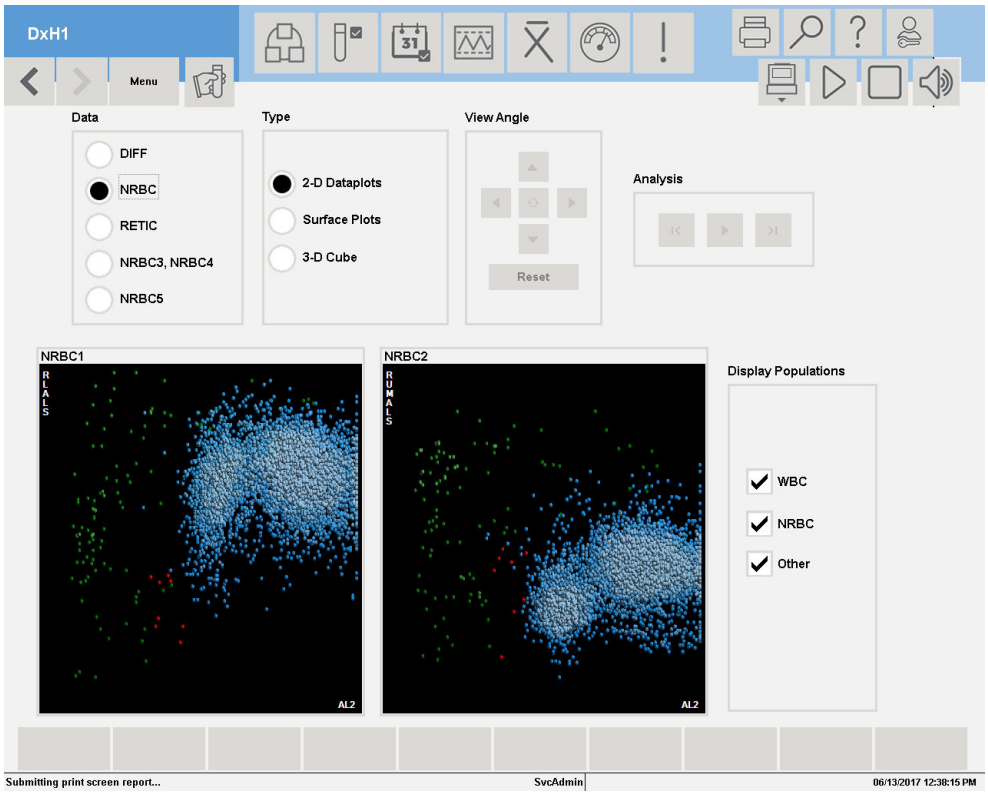
Additional Data - Slides Tab

Select the **SLIDES** tab on the Additional Data screen to view slide information.

Viewing All VCSn Graphics

Histograms and 2D Dataplots of the patient results are displayed on the Patient Results screen. To view specific population and test panels as well as 3D dataplots, select **View All VCSn Graphics** on the Patient Results screen. The View All VCSn Graphics screen is displayed.

Figure 6.5 View all VCSn Graphics Screen



The components on the View All VCSn Graphics dialog box are described below.

Component	Function
Data Box	Select the data option to view for DIFF, NRBC, or RETIC.
Type Box	Select the graphic option to view for 2D dataplots, Surface Plots, or a 3D Cube.
View Angle Box (disabled for 2D Surface Plots)	Select the angle of Surface plots and 3D Cubes using any of the six buttons. You can also use the mouse to click and drag over the graphic to change the view angle. **Reset**: Lets you reset the view back to the default angle. **Auto Rotate**: Lets you set the graphic into rotational motion. Selecting it again stops the motion.
Analysis Box	This box applies to Surface Plots and 3D Cube. It is disabled for 2D dataplots.Three buttons let you Rewind, Play, and Fast Forward. **Rewind**: Resets the graphic to the beginning of data collection (time = 0). No data is displayed. **Play**: Graph updates with incoming data in an animated fashion. Starting at time=0 and proceeding until time=end, the data is displayed in the order that it was collected.

Component	Function
	Fast Forward: Resets the graphic to the end of data collection. All data is displayed.
Display Populations	Lets you select populations to include in or remove from the graphic. Enabled for all display types.

View Individual VCSn Graphics

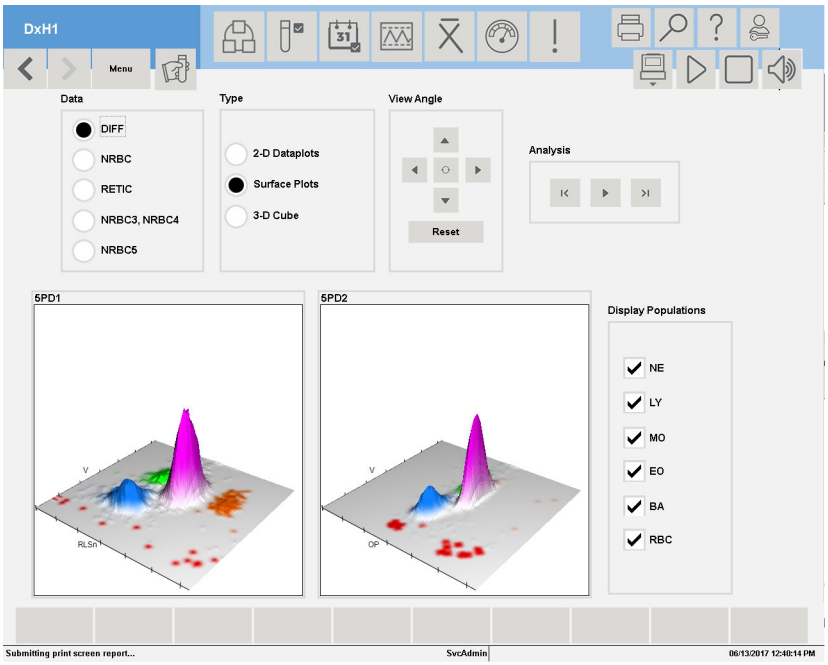
1 Select a test panel from the *Data* panel option: **Diff**, **NRBC**, or **Retic**.

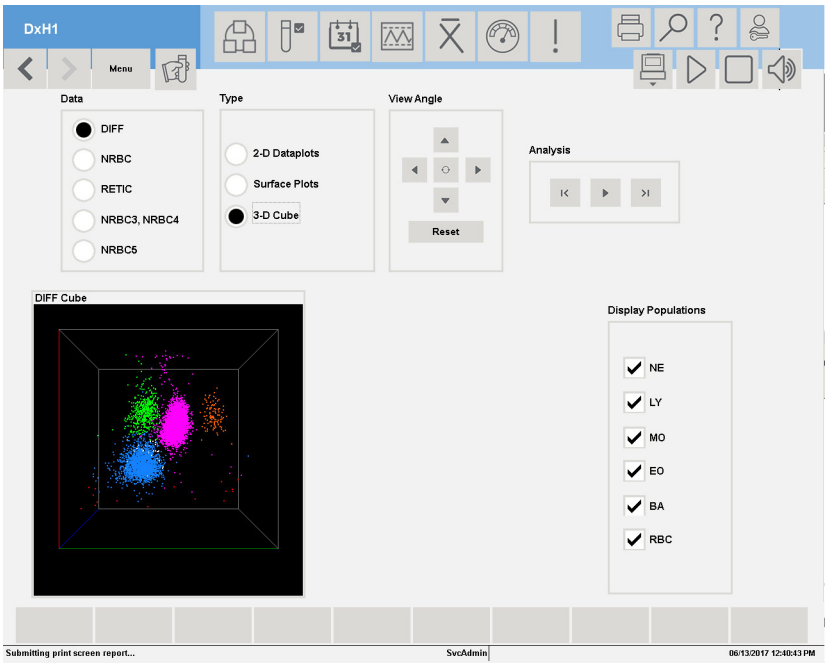
2 Select a type of graphic from the *Type* panel option: **2D Dataplots, Surface Plots**, **3D Cube.**

3 In the *Display Populations* panel, uncheck the populations not to be displayed. (All are displayed by default.)

4 If you selected **Surface Plot** (see the first figure below) or **3D Cube** (see the second figure below), use **View Angle** and **Analysis** to change your view of the graphic.

NOTE Select **Circular Arrow** to rotate the graphic in a continuous circle. Select **Circular Arrow** again to stop it. The **Analysis** buttons let you view the accumulation of populations.





Viewing Rules Triggered

Use this option (**Menu > Patient Results > More > Rules Triggered**) to view all Decision Rules triggered on a specific set of results.

Viewing Collation

Collation (**Menu > Patient Results > More > View Collation**) enables the addition of a Retic-, C-, or CD-panel to a previously analyzed and released Retic, C or CD panel for a specific patient. The panel order that is added must have the same Specimen ID and Patient ID of the specimen panel previously released.

After analysis of the added Retic panel the Patient Results screen will display the C or CD results with the added Retic results. The display will state that the results were collated.

See Setting Up Collation in CHAPTER 9, Setup for instructions on enabling Auto Collation. From the Collated view, select **More > View Source** to display the initial panel in the collation for that patient.

NOTE The **View Collation** and **View Source** buttons are only displayed on samples that have actually been collated.

View dates and times of analysis for collated results from the Patient Results display, not from the Additional Data screen.

Viewing Source

If the current specimen is collated, select **Patient Results > More > View Source** to shift the current specimen being viewed to the specimen used as the source of the collation. Select **More > View Collation** to return to the collated specimen.

NOTE If the screen is in dynamic mode, the screen will be locked. The screen will remain locked when the screen returns to the collated specimen, until unlocked by the operator.

Viewing Previous or Next Patient Results

You can view previous or next patient results from the Patient Results screen using the navigation buttons at the bottom right hand corner of the screen.

1. First result in the database, depending on the Specimen ID sort order in the Worklist
2. Last result in the database, depending on the Specimen ID sort order in the Worklist
3. Previous
4. Next

Viewing the Rerun Tab

A Rerun tab is displayed on the Patient Results screen if a Rerun or Reflex has occurred.

On the Rerun tab:

- Comments are indicated by  at the top right of the Patient Results screen. This also applies to the results on any tab.
- The most recent run for the specimen is displayed on the left side.
- You can view up to three reruns and/or reflex result sets, and the release result set, for a specific specimen.
- The graphics, comment, lab actions and messages are displayed for the checked run. Use the check box to toggle between runs.
- Local navigation buttons function for the checked results.

Viewing the History Tab

A History tab is displayed on the Patient Results screen if one or more released specimens are associated with a Patient ID.

On the History tab:

- History is based on Patient ID.
- You can view up to three analyses from the same Patient ID. The three analysis are the three most recently released results.
- You can see the current run (the selected run for the most current results if more than one run is available).
- Graphics, comments, lab actions, and messages are shown for the result set highlighted in blue.

Rerun and Reflex

After reviewing patient results, you can *rerun* a sample with the same tests that were originally ordered or *reflex* a sample to add new tests. These can be ordered automatically based on decision rules from the System Manager or host, or manually through the System Manager. When *Release All* is configured, you can submit a single-tube default order when a slide order only is active. You do not need to enter patient demographics.

The Patient Results screen displays a *Rerun* tab when a rerun or reflex is presented for analysis. Pending tests can also be cancelled.

If the sample's cassette and test order are received on time, a rerun or reflex test order can be executed automatically without re-introducing the cassette to the system. See Setting Up Specimen Exit Delay in CHAPTER 9, Setup.

Manually Order a Rerun

1 Select **Reflex/Rerun** > **Rerun** to rerun the sample.

NOTE If **Release All** is selected, you will not be able to order a Rerun.

2 Select **OK** to rerun the panel
OR
Select **Cancel** to exit the dialog box without running the panel.

If you select **OK** and the specimen is still *active* in the system, the Rerun will run automatically. If the specimen is in the output buffer, retrieve the specimen and place it in the input buffer.

Manually Order a Reflex

1 Select **Reflex/Rerun > Reflex** on the Patient Results screen to display the Select Panels to Reflex pop-up window.

NOTE You can only reflex a panel that has not already been run on a test order.

If **Release All** is selected, you will not be able to order a Reflex.

2 Select from the list of available panels and then select **Add.**

NOTE If slides are needed, select the slides to make, or make and stain.

3 Select **OK** to run the reflex. If the specimen is still *active* in the system, the Reflex will run automatically. If the specimen is in the output buffer, you need to retrieve it and place the specimen in the input buffer.

Viewing a Log

See APPENDIX C, Logs for information on viewing History Logs.

Editing Patient Results

NOTE The option to Edit is not available for released results. The option to Amend is available for released results. See Amending Patient Results for information.

Edit is an option on the Review tab that lets you edit patient results before release. Results that cannot be edited on the Edit Patient Results dialog box are grayed out. Edited results are flagged with *E*. Results calculated from edited results are flagged *e*.

1 From the Patient Results screen, select **Edit** to display the Edit Patient Results dialog box.

If the Specimen ID is edited, an *E* is displayed next to Specimen ID.

Amending Patient Results

Amend is an option on the Released tab that lets you edit released results. The Specimen ID cannot be edited. Instead of an *E*, an *M* is displayed in the first position after an amended result. Results calculated from amended results are flagged *m*. Limit sets are reevaluated when results are amended. Decision rules are not re-evaluated.

Processing Results

Overview

The DxH 900/DxH 690T System Manager includes Flags, Codes, and Messages to alert you to issues with patient or control results. You can also customize the flagging of results and define rules for flagging sample results.

For instructions on setting up Flagging Limits, see Flagging Limits in CHAPTER 9, Setup.

⚠ CAUTION

Risk of erroneous results. Flags, Codes, and Messages are evaluated when the sample is analyzed. Flags are reevaluated when results are manually edited, or when new results are received for a pending sample. Flags (including Delta Checks) and Decision Rules are not reevaluated upon a change of flagging limits for results already in the database.

Beckman Coulter does not claim to identify every abnormality in all samples. Beckman Coulter suggests using all available options to optimize the sensitivity of instrument results. All options include:

- **Codes**
- **Flags**
- **Reference range limits**
- **Action limits**
- **Critical limits**
- **Delta checks**
- **Definitive messages**
- **System messages**
- **Suspect messages**
- **Status and exception messages**
- **Decision rules**

Beckman Coulter recommends avoiding the use of one type of message or output to summarize results or patient conditions. There may be situations where the presence of a rare event may fail to trigger a suspect message.

Look for data patterns when examining Flags, Codes, and Messages. For example, determine if some, all, or related sets of results (for example, WBC and differential results) exhibit Flags, Codes, and

Messages. For some parameters, flagging occurs as a result of the flagging or editing of other parameters. In all cases, follow your laboratory's policy for reviewing the sample.

⚠ CAUTION

Risk of erroneous results. See Table 1.35, Limitations in CHAPTER 1, System Overview for the interfering substances that might effect each parameter. It is possible that the presence of a rare event cell can fail to trigger a suspect message. Beckman Coulter recommends a slide review per your laboratory protocol.

Customization

You can customize Flags, Codes, and Messages to suit the needs of your laboratory. You can define:

- Default reference ranges (high/low limits based on gender, age, location, and specimen type)
- Action limits that exceed default reference ranges, or define an action limit alone
- Critical limits that exceed the action limits, or define a critical limit alone
- Definitive messages based on reference ranges, or values manually entered by the lab
- Delta checks

You do not need to define these all at once. You can use the default sets and gradually edit or add additional limits based on your laboratory's assessment.

You can also define Decision Rules to identify sample results that meet a set of criteria. For example, you can automatically generate a Lab Action and/or Comment message such as *Perform Retic Count* when the System Manager receives a sample result with a HGB < 10.5 and an MCV < 65.

Results can be configured to be held at the Review tab for the Worklist or transmitted to a host, or selectively printed.

Flags

Flags appear to the right of the result. For some parameters, flagging occurs as a result of the flagging or editing of other parameters.

Flags are shown in order of placement on screens and printouts, with the highest priority flags at the top within each space.

Flags appear in one of four positions to the right of the result (as shown in Table 6.1, Result Flags). The flags are listed in order of priority within each space. It is possible to have flags in each of the four positions. For some parameters, flagging occurs as a result of the flagging or editing of other parameters.

Table 6.1 Result Flags

Flag & Position				Description
1	2	3	4	
E				Manual edit of a primary parameter for an active sample
e				Automatic edit of a calculated parameter for an active sample
M				Manual edit of a primary parameter on a released result (amended)
m				Automatic edit of a calculated parameter on a released result (amended)
+				Result above the analytical measuring range
-				Result below the analytical measuring range
R				Review the result. * Special handling is required for editing a result flagged with *R*. Any parameter derived from an *R*-flagged parameter cannot be recalculated until the *R*-flagged parameter is edited. *R* flags may also indicate a System Message has occurred. Check the *message area on the Patient Result screen* and the **History Log** > **General** tab for details.*
	c	L		Low critical limit exceeded
	c	H		High critical limit exceeded
	a	L		Low action limit exceeded
	a	H		High action limit exceeded
		H		High reference range limit exceeded
		L		Low reference range limit exceeded
			P	Partial aspiration detected during sample analysis *
			N	Non-blood sample detected *
			D	Delta check triggered

* These flags are also associated with System Messages. See System Messages for more information.

Codes

Codes appear in place of results when the system cannot generate results. Codes are also called *non-numeric results*.

Codes in the following table are shown in order of placement on screens and printouts, with the highest priority flags at the top within each space.

Table 6.2 Codes

=====	Analysis was disabled at the configuration level of the System Manager (**Menu** > **Setup** > **System** > **Analysis**). For example: If NRBC is temporarily disabled, any results with an NRBC enumeration in the panel will display ===== in place of the NRBC values. The ===== persists in the database after the analysis has been re-enabled.*
xxxxx	Although available on a panel, this parameter was not enabled as a test (**Menu** > **Setup** > **Reporting** > **Tests**) at the time of analysis; however, after this analysis, the parameter was enabled as a Test. For example: Sample *A* was analyzed for a CR panel, but the IRF and MRV were not enabled as Tests. Later, IRF and MRV were enabled as Tests; therefore, the system will not display the IRF and MRV parameters for CR panel results, but, for Sample *A*, xxxxx is displayed in place of a value for those parameters.
:::::	Flow cell clog was detected.*
-----	Total voteout occurred. No average histogram will appear for the affected parameter.
.....	Incomplete computation.* May occur in place of calculated parameters because a voteout or overrange occurred for a primary parameter used in the calculation. Occurs when the instrument cover is opened. Can also indicate a condition where the results have been suppressed such as out-of-range events, invalid pulses, or partial clogs.
+++++	Result exceeds the operating range.
?????	Result is outside of the range of values that can be formatted for display.
#####	Results were rejected.

*These codes can also be associated with System or System Status messages. See System Messages and System Status Messages for more information.

Messages That Appear with Results

Several types of messages are generated on the DxH 900/DxH 690T along with specimen results: Suspect, System, System Status, Definitive, and Exception.

The Suspect, System, and Definitive messages are displayed in the **Susp/Sys/Def Msgs** box just below the patient demographics at the top of the screen. Suspect messages are red; System Messages are green; and Definitive messages are blue. Messages are listed alphabetically within their type.

The System Status messages are displayed below the patient demographics, and to the right of the tabs. Also displayed in this area are the Exceptions Message, (indicating that an exception has occurred for this specimen) and  (indicating that there are comments for this specimen). Exceptions and the respective details are also displayed on the Additional Data screen.

Suspect Messages

Suspect messages are generated by internal algorithms to convey that a clinical condition may exist with a specimen based on an abnormal cell distribution or population. Beckman Coulter recommends the review of results displaying a suspect message appropriate to your patient population and laboratory practice.

Laboratories may differ in their desired sensitivity to abnormal cell types or patterns. The DxH 900/DxH 690T provides the laboratory with the ability to adjust the sensitivity of several of the Suspect messages, to meet individual lab requirements. The sensitivity of the following suspect messages can be adjusted: Variant Lymphs, Left Shift, and Immature Granulocytes. Left Shift can also be disabled. In order to optimize efficiency, Beckman Coulter recommends completion of sensitivity and specificity studies using your sample population prior to adjusting Suspect message flagging sensitivity.

Blasts

Blasts are detected, but not enumerated, by internal algorithms using acquired events, histogram and dataplot patterns, and sophisticated statistical methods for all available data for the sample analyzed. A standard trigger value or limit corresponding to enumeration on peripheral smear cannot be established because:

- Laboratories differ in their desired sensitivity to abnormal flagging and messaging.
- Laboratories differ in their definition of blasts.
- Mature and immature abnormal cell types may be identified as blasts.
- Blasts can be rare events.

Blasts can represent a mixed population of cells often associated with specimen abnormalities that alter the white cell population's pattern distribution in dataplots and histograms away from a normal distribution. The presence of blast cells may trigger other available suspect messages. Not all blood samples that contain blasts may report a suspect message.

A blast suspect message is not diagnostic. You should not rely upon instrument results alone to replace the need for manual microscopic review of blood samples if indicated by other clinical and laboratory features of the patient. Further diagnostic procedures and clinical evaluation must be evaluated for diagnosis.

See Processing Results for complete information on all available messaging and flagging options on the system.

Table 6.3 Suspect Messages

Suspect Message	Description
Abn Hemoglobin	Pattern characteristic of specimen with abnormal hemoglobin clearing observed during retic analysis
Cellular Inter	Pattern consistent with NRBC detection during a CBC only cycle (NRBC module not disabled). This Cellular Interference Suspect message is not associated with a Review (R) flag. If a CBC with a DIFF is ordered, the message will not need to appear because an NRBC will be reported. The analyzer is able to count all the NRBCs.
Dimorphic Reds	Evidence of the presence of at least two populations of red cells
Giant Platelets	Patterns characteristic of specimen containing Giant Platelets
Imm Grans	Pattern characteristic of specimen containing: a) metamyelocytes and myelocytes and/or promyelocytes, or b) myelocytes and/or promyelocytes without metamyelocytes.
Left Shift	Pattern is characteristic of specimen containing metamyelocytes, but without myelocytes, promyelocytes, or blasts.
LY Blast	Blasts in the Lymphocyte region of the dataplot

Table 6.3 Suspect Messages *(Continued)*

Suspect Message	Description
MO Blast	Blasts in the Monocyte region of the dataplot
NE Blast	Blasts in the Neutrophil region of the dataplot
NRBC	CBC and Diff pattern is characteristic of specimen with NRBCs. This Suspect message applies when the NRBC analysis is disabled but a CD or CDR cycle is run.
RBC Frag/Micro	The specimen may contain red cell fragments and/or some microcytic red cells
Red Cell Aggl	Red cells may be clumped or display rouleaux on peripheral smear
Sickled Cells	Pattern characteristic of specimen containing irreversibly sickled cells observed during a Reticulocyte analysis
Variant LY	Pattern characteristic of specimen with variant lymphs, including mature lymphocytes such as those observed in viral infections, as well as immature and/or abnormal lymphocytes.

System Messages

All system messages are accompanied by R (Review) flags. Exceptions are the system messages associated with an Aspiration Error (P flag) and the Non-Blood Specimen message (N Flag).

A system message indicates an event occurrence that may affect the operation of the system or the quality of the results, or requires operator intervention. The occurrence of any system message is shown in the History Log.

Table 6.4 System Messages

System Message	Description
Abn Diff Pattern	Undefined abnormal Diff pattern observed during Diff analysis.
Abn NRBC Pattern	Undefined abnormal NRBC pattern observed during NRBC analysis.
Abn RBC Pattern	Undefined abnormal RBC pattern observed during CBC analysis.
Abn Retic Pattern	Undefined abnormal Retic pattern observed during Retic analysis.
Abn TNC Pattern	Undefined abnormal TNC pattern observed during Body Fluid analysis.
Abn WBC Pattern	Undefined abnormal WBC pattern observed during any CBC analysis.
Aged Sample	Aged sample detected during Diff analysis.
AL2 Blank Voltage: N	AL2 blank voltages out of range during NRBC analysis.
AL2 Blank Voltage: R	AL2 blank voltages out of range during Retic analysis.
Bubbles	A specific Aspiration Error; P Flag.
Carryover	A specific Aspiration Error; P Flag.
Cellular Inter	Poor separation between a WBC population and interference, or a TNC population and interference. WBC correction was performed as a best estimation, and the WBC was flagged with R. **NOTE** A green-colored message without an R flag for WBC, Diffs, and NRBC is not valid.

Table 6.4 System Messages *(Continued)*

System Message	Description
Cover Opened	The instrument cover was opened while the specimen was being analyzed. When the *Cover Opened* event occurs, the SPM immediately stops operation. The SPM is taken offline. If there was a sample in progress at the time of the event, the results for that sample will be reported as *incomplete*.
Data Disc: D	Flow cell temporarily blocked during Diff data acquisition.
Data Disc: N	Flow cell temporarily blocked during NRBC data acquisition.
Data Disc: R	Flow cell temporarily blocked during Retic data acquisition.
Excessive Debris: D	The number of debris events too high compared to white events during Diff analysis.
Flow Cell Clog: D	Hardware detected a flow cell was clogged during Diff analysis.
Flow Cell Clog: N	Hardware detected a flow cell was clogged during NRBC analysis.
Flow Cell Clog: R	Hardware detected a flow cell was clogged during Retic analysis.
HGB Blank Shift	HGB blank reading was inconsistent with previous values. **NOTE** If you see an HGB Blank Shift system message when you run a patient specimen or a COULTER 6C Cell Control, run Daily Checks and repeat the test.
HGB Inter: WBC	The instrument corrected HGB for WBC interference, but the result requires review.
High Event Rate: D	High data event acquisition rate during Diff analysis.
High Event Rate: N	High data event acquisition rate during NRBC analysis.
High Event Rate: R	High data event acquisition rate during Retic analysis.
High OP Events: D	Too many high OP events during Diff analysis.
High RF Events: D	The number of events with maximum RF is to high during Diff analysis.
Low AL2 Events: N	Too many low AL2 events during NRBC analysis.
Low DC Events: N	Too many bad DC events in the NRBC analysis.
Low Event Rate: D	Low data acquisition rate during Diff analysis. If the acquisition rate is severely affected, the test reports a FULL CLOG (:::::).
Low Event Rate: N	Low data acquisition rate during NRBC analysis. If the acquisition rate is severely affected, the test reports a FULL CLOG (:::::).
Low Event Rate: R	Low data acquisition rate during Retic analysis. If the acquisition rate is severely affected, the test reports a FULL CLOG (:::::).
Low Events: D	Not enough good white events during Diff analysis.
Low Events: N	Not enough good white events during NRBC analysis.
Low Events: R	Not enough good red events during Retic analysis.
Low OP Events: D	Opacity Main Peak too low during Diff analysis.
Low RMALS Events: D	RMALS mode location too low during Diff analysis.
MCV Inter: PLT	Interference with MCV, RBC, and RDW and RDW-SD due to PLT.
MCV Inter: WBC	The instrument corrected MCV for WBC interference, but the result requires review.
MO-NE Overlap	Population labeled as neutrophils appeared in the monocyte region during Diff analysis.
NE-EO Overlap	Neutrophil and eosinophil populations were shifted or overlapped during Diff analysis.

Table 6.4 System Messages *(Continued)*

System Message	Description
No Aspiration	A specific Aspiration Error; P Flag.
Non-blood Specimen	The blood detector detected that a non-blood specimen was correctly aspirated. N Flag.
NRBC Inter	Interference in NRBC region can't be separated from NRBC during NRBC analysis.
NRBC-LY Overlap	Algorithm could not separate the NRBC and LY populations during NRBC analysis.
Nucleated Cells	Small WBC or NRBC interfered with the Retic analysis (observable on dataplot).
Partial Aspiration	A specific Aspiration Error; P Flag.
Platelet Clumps	Pattern is characteristic of specimen containing platelet clumps.
PLT Carryover	The estimated PLT carryover, based on the PLT from the preceding sample and the expected PLT carryover percent, was high enough to significantly affect the PLT results for the current specimen.
PLT Inter: Debris	Interference with smaller platelets, or system issues such as electronic noise, cellular debris, or recirculating RBCs due to disruption of sweep flow.
RBC-PLT Overlap	Interference with larger platelets; may occur with the Giant Platelet Suspect message.
Range Error	Blood detector hardware error. Check the History Log.
RET Inter: Debris	The debris population interfered with the Retic measurement.
RET Inter: PLT	The platelet population interfered with the Retic measurement.
RET-RBC Overlap	The reticulocytes could not be clearly separated from the mature red cells.
System Event: D	Hardware parameters out of limit for some item that could affect Diff analysis (voltage, temperature, pressure)
System Event: HGB	Hardware parameters out of limit for some item that could affect HGB analysis (voltage, temperature, pressure).
System Event: N	Hardware parameters out of limit for some item that could affect NRBC analysis (voltage, temperature, pressure).
System Event: PLT	Hardware parameters out of limit for some item that could affect PLT analysis (voltage, temperature, pressure).
System Event: R	Hardware parameters out of limit for some item that could affect Retic analysis (voltage, temperature, pressure).
System Event: RBC	Hardware parameters out of limit for some item that could affect RBC analysis (voltage, temperature, pressure).
System Event: TNC	Hardware parameters out of limit for some item that could affect TNC analysis (voltage, temperature, pressure).
System Event: WBC	Hardware parameters are out of limit for some items that could affect WBC analysis (voltage, temperature, pressure).
TNC Carryover	The estimated TNC carryover, based on the uncorrected WBC or TNC from the preceding sample and the expected TNC carryover percent, was high enough to significantly affect the TNC results for the current specimen.
Undefined Pop: D	A single population was found in the granulocyte region(s) of the dataplot.
Unknown Error	A specific aspiration error

Table 6.4 System Messages *(Continued)*

System Message	Description
Unknown Events: R	There are too many unclassified events during the RET analysis indicating a probable instrument malfunction.
WBC Carryover	The estimated WBC carryover, based on the uncorrected WBC or TNC from the preceding sample and the expected WBC carryover percent, was high enough to significantly affect the WBC results for the current specimen.

Definitive Messages

Definitive messages appear for results based on exceeded limits configured as part of an individual flagging set. Definitive messages can be created by copying reference ranges, or by manual entry of your own message definition. See Flagging Limits in CHAPTER 9, Setup for instructions.

Some definitive limits can be reported with gradient ranges (1+, 2+, 3+). Limits for definitive messages with gradients that are defined only at Level 1 (1+) will print without the gradient message (that is, Microcytosis as opposed to Microcytosis 1+).

Table 6.5 Definitive Messages

Definitive Message	Description
Anemia	Low RBC or Low HGB
Basophilia	High BA (percentage)
Basophilia#	High BA #
Eosinophilia	High EO (percentage)
Eosinophilia#	High EO #
Erythrocytosis	High RBC
Hypochromia (1+, 2+, 3+)	Low MCH
Leukocytosis	High WBC
Leukopenia	Low WBC
Lymphocytosis	High LY (percentage)
Lymphocytosis#	High LY#
Lymphopenia	Low LY (percentage)
Lymphopenia#	Low LY#
Monocytosis	High MO (percentage)
Monocytosis#	High MO#
Neutropenia	Low NE (percentage)
Neutropenia#	Low NE#
Neutrophilia	High NE (percentage)
Neutrophilia#	High NE#
Anisocytosis (1+, 2+, 3+)	High RDW
Large Platelets	High MPV

Table 6.5 Definitive Messages *(Continued)*

Definitive Message	Description
Small Platelets	Low MPV
Thrombocytopenia	Low PLT
Thrombocytosis	High PLT
Macrocytosis (1+, 2+, 3+)	High MCV
Microcytosis (1+, 2+, 3+)	Low MCV
Reticulocytosis	High RET
Reticulocytosis#	High RET# *
NRBCs Present	Exceeds defined NRBC

* If RET# is flagged with an H and is greater than 2.5, the RET # is above operating range. Follow your laboratory's standard operating procedure for control parameters that exceed operating range.

HGB/HCT Check

The H&H Check Failed is a special Definitive Message that can be enabled by selecting **H&H Check** on the Flagging Limits tab of the Flags Setup screen. See H&H Check in CHAPTER 9, Setup for instructions.

The values for agreement are defaulted to 3.0. Any value between 2.0 and 4.0 can be entered.

System Status Messages

System Status messages indicate that the instrument was operating in some non-standard state when a specimen was analyzed. These states are usually the result of some user action (for example, operating with the cover opened). They do not indicate that any problem was seen when the specimen was analyzed; instead, they indicate that the system was being operated in a manner in which some problems might not be detected.

Table 6.6 System Status Messages

System Status Message	Description
Interlocks Bypassed	The cover interlock was disabled at any time during specimen analysis. The message IB is displayed on printouts. The message will be displayed on every screen, print on every display, and be sent with every transmission until the cover interlock is re-established.
Analysis Disabled: D	Diff analysis on the analyzer has been disabled. The message AD: D is displayed on printout.
Analysis Disabled: N	NRBC analysis on the analyzer has been disabled. The message AD: N is displayed on printout.
Analysis Disabled: R	Retic analysis on the analyzer has been disabled. The message AD: R is displayed on printout.
Test Order Nullified	The message Null is displayed on printout.

Table 6.6 System Status Messages

System Status Message	Description
Edit Detected. Review Rules.	A decision rule was edited after results were posted to the database, but still in review. The operator should ensure that a previous decision rule on unreleased results was not posted in error. The message ED is displayed on printout.
Specimen Deleted	A specimen was deleted from the database while viewing results on the screen (for example, deleted by the Auto Prune function). See Setting Up Database Cleanup in CHAPTER 9, Setup for an explanation of the Auto Prune function.
Temperature Disable	VCSn temperature control was disabled. The message *TD* is displayed on the printout.

Slide Exceptions from the Patient Detail Screen

The system displays messages to indicate the exceptions associated with slides processed. You can review slide exceptions from the Patient Detail screen.

Slide exceptions are displayed in the Worklist under the Slides tab to provide additional information on a slide that was processed whether the status is completed or not.

Table 6.7 Slide Exceptions From the Patient Detail Screen

System Message	Code	Description
Aspiration Error	AE	Aspiration error occurred (for example, partial aspiration). A partial aspiration will display a flag *P* on the slide label information.
Default Smear Parameters	DSP	Smear parameters set to default were not determined based on hemasphere information.
Maker Dryer Disabled	MDD	Slide made when pre-stain heater was disabled.
Stainer Dryer Disabled	SDD	Slide made when post-stain heater was disabled.
Slide Not Made	SNM	System determined that a slide could not be made or labeled due to a hardware error.
Stainer Disabled	SD	System was not able to make and stain because the stainer was temporarily disabled.
Stainer Inoperative	SI	System was not able to make and stain because the stainer was inoperable due to a hardware failure.
Staining Cancelled	SC	System was not able to complete the staining protocol because it was cancelled.
Stain Time Exceeded	STE	System continued to stain slides after a hardware error occurred or a power failure recovery resulted in a *bath duration time exceeded* error.
Basket Removed	BR	The cover was opened and the system determined that a basket was removed.
Interlock Bypassed	IB	Interlocks for instrument covers (transport shield, front cover, slidestainer, and I/O drawer) were bypassed while the slide was made or stained.

Exception Messages

If there are any exceptions for a specimen, a comments indicator is displayed in the System Status Message area below the patient demographics. Select **Additional Data** to view the Exceptions and

any available detail. The only possible exceptions for specimens with results are those that indicate *No* below Specimen Skipped in the Exception list.

Table 6.8 Exception Messages

Exception Message	Description	Specimen Skipped
No Read	The Specimen ID could not be read when the Specimen ID is the primary identifier.	Yes
ID Verification Failure	The primary and/or secondary identifier, that is read initially at introduction of the specimen at the mix station, does not match the primary and/or secondary identifier read immediately prior to the aspiration of the specimen.	Yes
Cassette Type Undetermined	The Tube Position ID was not read for the first position; consequently the cassette type cannot be determined.	Yes
Duplicate Specimen ID	An identical specimen ID was read for a second specimen that has not been released. This applies to specimens across all modules of a workcell.	Yes
Incompatible Presentation Mode	A body fluid specimen was presented inappropriately in cassette presentation.	Yes
Default Test Order	A test order could not be determined, so a No Match occurred. A default test order was used for the specimen. Results are available in the Review tab of the Worklist. If the tests ordered are: • *Adequate* based on what was ordered in the LIS, no further action is needed. • *Inadequate*, ensure the appropriate test order is submitted. Then, reload the specimens for processing.	No
No Match	No matching test order for a specimen could be found on an existing list of active test orders queried from the LIS and there is no default test order defined. If the LIS is: • *Configured for batch download*, ensure the test order is downloaded before reloading the specimen for processing. • *Configured for host query*, reload the specimen for processing. • *Not configured*, ensure the test order is added before reloading the specimen for processing.	Yes
Specimen ID Reuse	A specimen has been seen and the matching test order has been *nullified*.	Yes
Specimen Skipped	A specimen was skipped possibly due to an Exception or a fault condition.	Yes
Secondary ID Mismatch	A pre-assigned secondary identifier in test order and a secondary identifier, read the first time specimen was seen, don't match (mis-match).	Yes
Secondary ID Verification Failure	The secondary identifier read for the current run of the specimen did not match the secondary identifier read for the previous run of the specimen.	Yes

Table 6.8 Exception Messages *(Continued)*

Exception Message	Description	Specimen Skipped
Inconsistent Demographics	The patient's name, gender, or DOB changed from the patient's previously available demographics. Results available in the Review tab of the Worklist.	No
Non-Studies Specimen	A specimen with a matching patient test order was seen during Studies specimen processing.	Yes
Inconsistent Flagging	A flagging limit changed after analysis, even though the actual flags and messages generated for the results did not change. This can only occur when specimens are collated.	No

Lab Actions

Lab Actions triggered by Decision Rules are listed in the Lab Actions area of the Patient Results screen. Lab Actions are linked to a run, not to the specimen. The Lab Actions available as default are as follows:

- Call Physician
- Reflex
- Rerun
- Slide Review
- Verify H&H

NOTE For instructions on setting up operator-defined lab actions, see Inserting a Lab Action in CHAPTER 9, Setup.

Lab Actions are not included in summary reports for the Patient Results lists and the Slide Summary.

Comments

Comments are added by operators as needed. There will be a comments indicator in the System Status Message area below the patient demographics to indicate the presence of a comment. In order to view the comments, select **Comments** from the local navigation bar.

Comments associated with Decision Rules are linked to the specimen, not the run. The comment appears with all runs for a particular patient (both the original run and any rerun or reflex).

This section is similar to Lab Actions. You can add comments by:

- Entering your comments in the *Lab Action* field on the Decision Rule Setup screen, OR
- Using the **Select System Comment** feature to add a comment to the System list. This comment is maintained in the database for reuse. There are no predefined comments for the patient.

Releasing Results

Patient Results can be released from the Panels, Rerun, or Release tabs.

Panel Tab on a Single Run

From the Panel tab on a single run, you can:

- **Release Run** (release the entire single run)
- **Partial Release** (preliminarily release portions of the single run)
  When you select Partial Release, a Release tab is displayed.

Panel Tab on Multiple Runs

From the Panel tab on multiple runs, you can:

- **Partial Release** (preliminarily release portions of multiple runs)
  When you select Partial Release, a release tab is displayed.
  You cannot release an entire run from the panel tab when a Rerun/Reflex is present.

Rerun Tab on Multiple Runs

From the Rerun tab on multiple runs, you can:

- **Partial Release** (preliminary release portions of multiple runs)
  When you select Partial Release, a Release tab appears.
- **Release Run** (release one entire run from two or three selections)
  - Rerun is the default tab when multiple runs are present.
  - The most recent run is located furthest to the left.
  - The Panel tab defaults to the most recent run.
  - If you select a run other than the most recent, the Panel tab reflects that run (for example, 2CDR, 1 CD). For example, if you run a CD followed by a Reflex CDR, after the CDR is completed, the screen defaults to the Rerun tab with the Run 2 furthest left. The Panel tab will show 2 CDR. You can select Run 1 at the Rerun tab, and the Panel tab will show 1 CD.
  - When you select Release Run from the Rerun tab, the following message is displayed: *This will release the selected orders, and remove any partial release selections.*

Release Tab on Multiple Runs

From the Release tab on multiple runs, which is displayed after partial Release is selected, you can:

- Release entire runs by checking all the group boxes individually or selecting the entire run at **Select Groups**.
- Release groups from multiple runs.

Test groups selected will be shown in the far right column labeled *Release*.
Results are shown in brackets until released using Release Selected.
You can select the following groups:

- CBC - WBC
- CBC - RBC
- CBC - PLT
- DIFF
- RETIC

IMPORTANT

- If DIFF is partial released without a WBC subpanel, differential absolute results are inhibited. If RETIC is partial released without an RBC subpanel, the RETIC absolute result is inhibited.
- WBC, RBC, or PLT subgroups must be released from the same CBC group. You can mix CBC, DIFF, and RETIC groups from up to three different runs.
- You cannot edit results that have been selected for partial release (even if those results have not been final released).
- Only R flags associated with a System message are retained when recalculated results are merged in the release process. All System messages from all associated runs are retained.
- If demographics are updated after some results have been partially released, the updated demographics may trigger a different limit set. Final released results may reflect flagging from both the original and updated flagging set.

Selecting **Deselect Groups** clears selections that are not released.

1 Select **Release Selected** after you have decided which runs or groups to release. A DxH dialog box displays the following: *Are you sure you want to release these results? (CDR)*

2 Select **OK** to release the results
OR
Select **Cancel** to exit the dialog box without releasing the results.

Rejecting Results

Patient Results can be rejected from the:

- Panels tab when only one run is available. Rejecting from the Panels tab rejects all results.
- Rerun tab when more than one run is available. Rejecting from the Rerun tab rejects the selected run.
- Release tab if **Partial Release** has been selected. If you have selected Partial Release, you can select **Reject All** results or **Reject Unselected** results. If you select **Reject All** results, any unreleased partial release selections will be cleared.

Rejected results can be viewed (grayed out with strikeout) on the Patient Results screen. Fully rejected specimens are displayed in the Custom tab of the worklist (using the **Rejected** filter). Partially rejected specimens will be displayed in the Release tab of the worklist.

1 Select **Reject** on the Patient Results screen to reject the results. A DxH dialog box displays the following message: *This will clear all partial release selections and reject all results for this specimen. Select OK to continue.*

2 Select **OK** to reject the results
OR
Select **Cancel** to exit the dialog box without releasing the results.

Viewing Rejected Results

You can view rejected results on the Custom tab of the Worklist screen by selecting **Rejected** from the drop-down list. Fully rejected results on the Custom Worklist are displayed as *#####*. Partially rejected results in the Released Worklist are displayed as *#####*. You can view the actual results by selecting **Details** on individual samples. Results will be grayed out and show a strikeout through the results.

Reports

Types of Reports

You can manually print three types of reports from the Patient Results screen:

- Chartable Reports
- Laboratory Reports
- Patient Cumulative Reports
- Patient Results List Summary Report - provides a line item list of patient specimens and their current status for selected or all (filtered) test orders

Lab Actions are displayed on Laboratory Reports, but not on Chartable Reports. See APPENDIX D, Reports for example reports. For instructions on configuring automatic printing, see Report Setup in CHAPTER 9, Setup.

The report status information is not printed on a Laboratory Report. It is available by selecting **Worklist > Custom** tab **> Not Transmitted** filter.

Printing Reports

1 Select  at the top of the Patient Results screen to display the Print Specimens Report dialog box.

2 Select the report type from the drop-down list.

3 The default printer is displayed. Select another printer from the drop-down if you wish to print somewhere other than on the default printer.

Specimen ID Search

1 Select  to search for patient results by **Specimen ID**, **Patient ID**, **Last Name**, or **First Name**.

2 On the Specimen Search dialog box, enter the appropriate information and select **OK**.

CHAPTER 7

Workload

Workload Management

The Workload screen helps you manage your laboratory by displaying Workload statistics for the workcell module such as number of cycles run for specific shifts and the busiest hour. The workcell module must be selected at the System Status screen.

The Shift feature is not configurable for a stand-alone DxH Slidemaker Stainer II. The Reflex and Rerun features are not functional for a stand-alone DxH Slidemaker Stainer II.

Workload Graph View

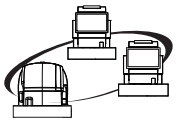
You can view workload graphs by selecting **Menu > Workload > Graphic View**. When you change Presentation or Workload Category, select **Refresh** to view the update.

The check boxes displayed on the right of the screen vary with the selection in the Workload Category drop-down list.

Workload Table View

You can view workload table by selecting **Menu > Workload > Graphic View > Table View**. Workload statistics cannot be reset. When you change Presentation or Workload category, select **Refresh** to view the update.

The printout for Table View does not contain a column header for the furthest left column (hour).



Workload statistics refer to individual workcell modules, not to the overall workcell.

The column headings on the Workload (Table View) screen vary with the selection in the Workload Category drop-down list. Use the scroll bars at the bottom and to the right of the table to view all of the data displayed.

The following features are not functional:

- Date Range filters
- Shift filters
- Reagent type
- Reagent amount consumed
- Maintenance cycle information

Filtering a Workload by Presentation and Workload Category

1 Select a method from the *Presentation* drop-down list:

- **Cassette**
- **Single**
- **Both**

2 Select an option from the *Workload Category* drop-down list:

- **PATIENT**
- **CONTROL**
- **CALIBRATION**
- **REPEATABILITY**
- **CARRYOVER**
- **STUDIES**
- **DAILY CHECKS/SHUTDOWN**
- **MAINTENANCE**
- **ALL**

NOTE The **ALL** and **MAINTENANCE** categories are for export to a .csv file only and cannot be viewed in Table or Graph View.

3 Select a **Start Date** and an **End Date** from the drop-down calendars.

4 Select a **Shift** from the drop-down list.

5 Select from the available check boxes at the right of the screen.

6 Select the **Show Labels** check box at the bottom of the screen if you want to display labels on the graph.

7 Select **Refresh** to refresh the screen and display the filtered data.

NOTE If no data matches your selected criteria, the following message is displayed: *There is no data matching the specified criteria.* If you selected **Maintenance** or **ALL** in the Workload Category drop-down list, the following message is displayed: *The category selected is only for exporting data. Select OK to continue.* See Exporting Maintenance and ALL Workload Data for instructions.

Viewable Workload Data - DxH 900/DxH 690T

You can export all displayed Workload Data.

See Exporting Maintenance and ALL Workload Data for instructions on exporting Maintenance and ALL Workload data as a .csv file.

Exporting Viewable Workload Data

1. Select **Export** at the bottom of the Workload screen. The following DxH message is displayed: *Are you sure you want to export the displayed workload data?*
2. Select **OK** to export the data
   OR
   Select **Cancel** to end.
3. Select **OK** displays the Select Folder dialog box.
4. Select a folder and select **OK**.

Exporting Maintenance and ALL Workload Data

Follow these steps to export data to a .csv file.

1. On the Workload screen, select **Maintenance** or **ALL** from the Workload Category drop-down list.
2. Make your other selections on the Workload screen and select **Refresh.** A dialog box displays the message: *The category selected is only for exporting data. Select OK to continue.*
3. Select **OK**.
4. Select a folder on your local drive, name the file, and select **Start**.

CHAPTER 8

Shutdown

Overview

The DxH 900/DxH 690T SPM, System Manager, and monitor are connected to an uninterruptible power supply (UPS). In the event of a power outage at your facility, the components will continue to operate for a short time so that you can power down the system. If your system has a printer, it should be connected directly to the facility power. For troubleshooting purposes, you may be directed to power OFF or power DOWN selected pieces of the system or workcell.

System Manager

IMPORTANT Power DOWN the System Manager in the order shown below. Powering OFF of the System Manager without performing a Windows Shut Down can lead to database corruption, and should only be considered as a last resort (example, when the computer will not respond to keyboard or mouse input).

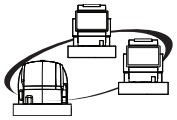
Log Off

When the operator logs off the instrument, they will be prompted with a message.

Select **OK** when prompted by: *You have successfully logged off from DxH Solutions.*

Shut Down

Use the routine Windows application to shut down the operating system.



The Transport at a test location during Shutdown is active, but the Input Buffer for that location is not active.

NOTE After initiating Daily Checks or Shutdown, leaving the screen and returning disables **View Log**. Wait for Daily Checks or Shutdown to be completed before selecting **View Log**.

Daily Shutdown

Beckman Coulter recommends that the modules remain in cleaner for at least 30 minutes every 24 hours. If a DxH 900/DxH 690T has power, the Distribution Valve cycles every 24 hours (timed from the last blood cycle).

Shutdown can be initiated manually or automatically. See Enabling Automatic Shutdown in CHAPTER 9, Setup for additional instructions.

Shutdown removes diluent and replaces it with cleaner. At the end of the user-specified time, the cleaner is replaced by diluent. Then, the compressor automatically shuts off. Shutdown monitors the WBC aperture voltages for clogs. If a clog is detected, a repair cycle is initiated to remove the clog.

Performing a Manual Shutdown

IMPORTANT Perform a manual shutdown by leaving the modules in cleaner for 30 minutes. Then, perform Daily Checks after shutdown is complete.

After a successful Daily Checks, the instrument can be powered OFF, if desired.

1 Select 
OR
Select **Menu > QA > Daily Checks**.

2 From the Daily Checks screen, select **Shutdown** to display the Manual Shutdown dialog box and select the instrument you want to shut down (the default is blank).

3 Select the **Perform Daily Checks After Shutdown** check box to automatically begin Daily Checks after Shutdown.

NOTE For information on Daily Checks, see CHAPTER 3, Daily Checks.

4 Enter a number in the **Time in Cleaner Hours** and **Minutes** check boxes to determine the time in cleaner. The default time in cleaner is 30 minutes.

5 Select **OK** to begin shutdown
OR
Select **Cancel** to exit the pop-up window without starting shutdown.

Running Prolonged Shutdown (48 Hours to 7 Days) - DxH 900/DxH 690T

Prolonged shutdown should be performed when the SPM will be idle for over 48 hours, but less than seven days.

NOTE For the DxH 900/DxH 690T SPM, perform a manual shutdown by leaving the SPM in cleaner for 30 minutes. Then perform Daily Checks. After a successful Daily Checks, you may power off the SPM.

1 Perform a Manual Shutdown by leaving the SPM in cleaner for 30 minutes.

2 Perform Daily Checks.

3 Power OFF the SPM after a successful Daily Checks, if desired.

Running Prolonged Shutdown (48 Hours to 7 Days) - DxH Slidemaker Stainer II

Follow this prolonged shutdown procedure when you are not going to operate the system for 48 hours to 7 days.

1 Drain all baths.

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v.2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

2 Remove the pickup tubes from the reagent containers and place them in methanol.

3 Fill and drain all baths once with methanol.

4 Remove the pickup tubes from the methanol and place them in a clean sealable plastic bag.

5 Fill the 4 baths one at a time.

6 Let air flow through the pickup tubes for less than 2 minutes and select **Cancel**. This prevents the *Reagent Out* warning from being displayed.

7 Perform the Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes in CHAPTER 12, Cleaning Procedures.

8 See Performing a Manual Shutdown.

9 Go to Placing the DxH Slidemaker Stainer II in Operational Mode After Prolonged Shutdown to operate the system.

Running an Extended Shutdown (One Week or More)

Extended Shutdown should be performed when any module will be idle for over seven days, but less than 45 days. Call your Beckman Coulter Representative for assistance with the appropriate actions to take. This could include the complete replacement of routine reagents with a specific blend of reagents designed to maintain the system.

For shutdown or storage beyond 45 days, call your Beckman Coulter Representative for assistance.

Removing Cleaner

The procedure for removing cleaner is a duplication of the second portion of the standard Shutdown procedure. This procedure is used to clear the Shutdown Procedure incomplete events and takes approximately nine minutes to complete. After running the Remove Cleaner procedure, run Daily Checks prior to processing patient or control samples.

NOTE If the Remove Cleaner operation is not successful, the system will not allow any other operation to be performed, except repeating the Remove Cleaner process.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Remove Cleaner** from the drop-down list.

3 Select **Start** to initiate the process.

4 Select **Finish** after the successful completion.

5 Perform Daily Checks.

Placing the DxH Slidemaker Stainer II in Operational Mode After Prolonged Shutdown

If the workstation was previously shut down, log into the application.

If the module was previously disabled, see Enabling the Stainer and Enabling the Maker in CHAPTER 9, Setup before performing this procedure.

1 Restore the pickup tubing to Supplies 1 to 4.

2 Select **Menu > Diagnostics > Dx Tools**.

3 Select the **Slidestainer** tab.

4 Select the **Fluidics** option and select **Fill All Baths** from the pull-down list.

5 Select **Start** to begin filling the baths.

6 Select **Fluidics** and then drain all of the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

7 Select **Start** to begin.

8 Repeat steps 6 and 7.

9 Select **Finish** and **Yes** to end the Diagnostics mode.

10 Select **Online** to turn on the compressor. The system automatically refills all the baths with the appropriate reagents.

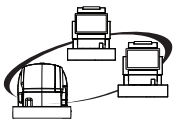
Power States

Power ON and Power OFF are achieved by selecting the switch on the front of the module (SPM or DxH Slidemaker Stainer II) or the computer.

- The Power ON/OFF functions are independent for the module and the computer.
- The computers may be shut down. The SPMs (instruments) may be powered OFF in any order.
- For a Power ON, follow this order to avoid any system startup issues:
  1. Power ON the server and wait until it is fully powered ON.
  2. Power ON the computers and ensure that the logon is successful.
  3. Power ON the SPMs (instruments) and wait for the screen to display an offline status.
  4. Start up other instruments, one at a time, in the same order indicated above.

Power UP and Power DOWN are buttons on the screen that restore or remove power from the individual modules.

- Minimal voltage remains at the module.
- Power UP/DOWN does not affect the computer.



If the computers and SPMs require a Power OFF/Power ON cycle, remove all of the cassettes from the system. After Power ON is complete, the workcell is ready for processing.

Table 8.1 Power States

State	Module	Computer
Power ON	Switch-driven	• Switch-driven • Log into the computer. • During Power ON, the operation indicator(s) move from black to green during synchronization with the module(s).
Power OFF	• Switch-driven • Computer does not have to be turned off.	• Switch-driven • Close the application (**Exit Workstation** > **Shut Down Computer** > **OK**). • Power OFF also removes power from the monitor (the monitor does not need to be switched off separately). • There is no need to power OFF the computer on a regular basis. • Wait until the Stainer work is complete before powering OFF.
Power UP	**Power UP** button on the Status screen for the individual module (local navigation bar).	N/A

Table 8.1 Power States *(Continued)*

State	Module	Computer
Power DOWN	• **Power DOWN** button on the Status screen for the individual module (local navigation bar). • Computer does not have to be turned off. • Enough power remains to run the embedded software in the module; the module is of limited use. • Places the instrument in a standby state. • On the DxH Slidemaker Stainer II, the Stainer module will complete the work in progress.	N/A
Offline	• **Stop** button located in the upper right of every screen. • Required for specific functions (example: setup, Dx Tools) as directed in IFU procedures or software. • Transport can still be active. • Stainer can still be active.	
Online	**Start** button located in the upper right of every screen.	
Transport Start/Stop	• On the Status screen for the individual module. • Starts or stops the STM. • Module can be online or offline.	
Idle Instrument	• Button on the Status screen for the individual module. • Same as performing Power DOWN. Turns off the compressor.	
Stainer Start/Stop	• Select **Start** to move the Stainer to active. • Select **Stop** to move the Stainer to inactive.	

Power Down

Power down the System Manager computer followed by the Review Station computers.

Power Up

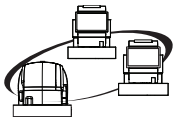
Power up the System Manager computer and wait for the DxH Application to start. Then Power Up the Review Station computers.

CHAPTER 9

Setup

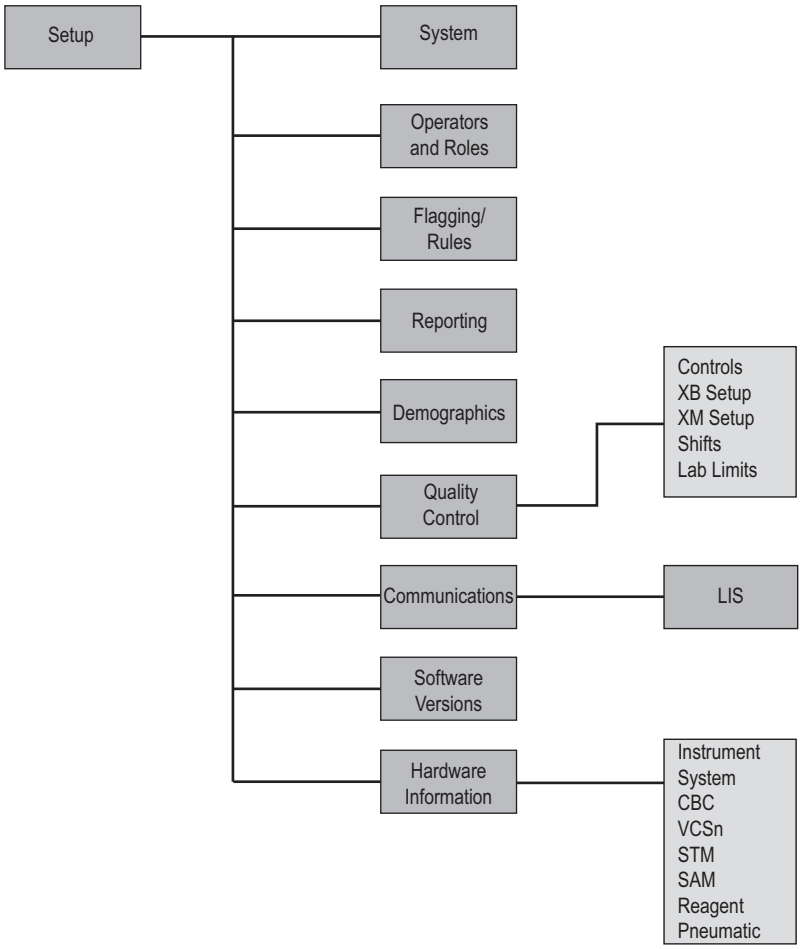
Overview

This chapter provides the instructions that you need for setting up your system from the Setup menu as shown in Figure 9.1, Setup Menu Tree. Go to the appropriate procedure to set up your system.



Perform all Setup procedures using the System Manager for workcells equipped with both System Manager and Review Stations. Do not perform a Setup procedure using the Review Station computer.

Figure 9.1 Setup Menu Tree



Peripheral Configuration

1 Connect the dongles for the wireless keyboard and mouse into the USB port behind the monitor on the front of the instrument. The keyboard and mouse may not work properly if the dongles are connected to the back of the computer located on the floor stand.

2 Connect the cable for the wired handheld bar code scanner into the USB port in front of the computer that is inside the floor stand.

Container Configuration

The DxH 900 System runs with one (single) diluent container, two (dual) diluent containers, or four diluent (quad) containers (default). The quad container configuration automatically switches between two pairs of diluent containers. Each instrument must be configured individually.

To change the container configuration from quad (default) to another configuration, call your Beckman Coulter Representative.

The DxH 690T does not have a quad container configuration.

Low-Level Condition Configuration

The Configure Low Level option lets you set a warning level to alert you when a reagent supply is running low based on the remaining percentage of that supply. Each module must be configured individually.

1 Select  or **Menu > Supplies > Configure Low Level**.

NOTE You must configure the low-level notification for reagents for both the Slidemaker and Slidestainer tabs.

2 On the Configure Low Level Condition screen, select a low-level percentage from the drop-down list (default is 10%).

3 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Supplies

The Supplies screen ( > **Setup** OR **Menu > Supplies**) displays the status of the supplies.

Supplies must be configured individually by module. In a workcell, select  to switch between instruments.

The Beckman Coulter supplies are displayed graphically as colored bottles. The colors on the supply screen correlate with the colors of the consumable connection tubes. See SPM and Consumable Connections in APPENDIX F, System and Module Connections.

The handheld bar code scanner lets you automatically upload DxH Supply information from the Setup Supplies dialog box.

The value shown in *Cycles Remaining* is an estimate. This value is estimated by actual analysis cycles and may not include added primes, flushes, or repeats that occur in each laboratory's situation. In addition, some variability exists between *Cycles Remaining* and the percentage shown in the graphics displayed at the top of the screen. The system lets laboratories select the level at which the alarm is initiated, 5, 10, or 15%, to account for the variability and for laboratory practices.

Setting Up DxH 900 Supplies

1 Select  > **Setup**
OR
Select **Menu > Supplies**.

See Replacing Reagent Containers - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures for information on replacing the reagent containers.

⚠ CAUTION

Risk of erroneous results. Do not mix different lot numbers within a diluent pair.

2 Scan the bar codes on the Beckman Coulter reagent container. The supply information is automatically updated.

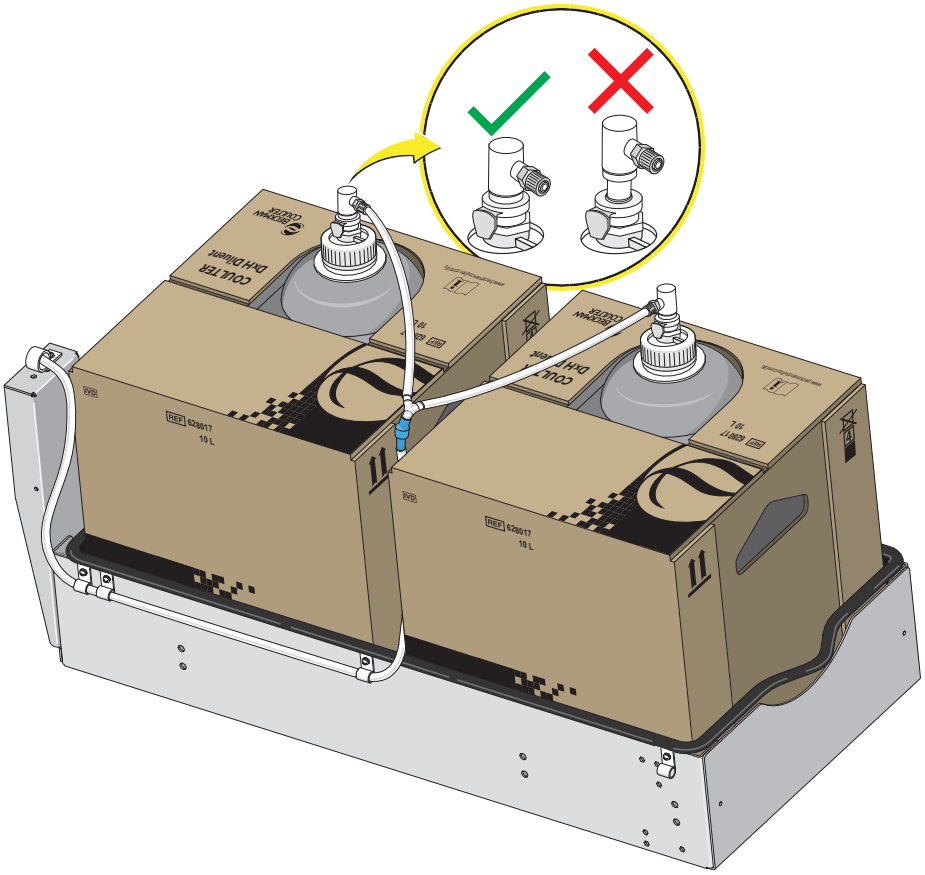
3 Replace the old containers with the new containers.

A quad diluent configuration is the default for the DxH 900. Single or dual diluent configuration must be set up by your Beckman Coulter Representative. See Container Configuration.

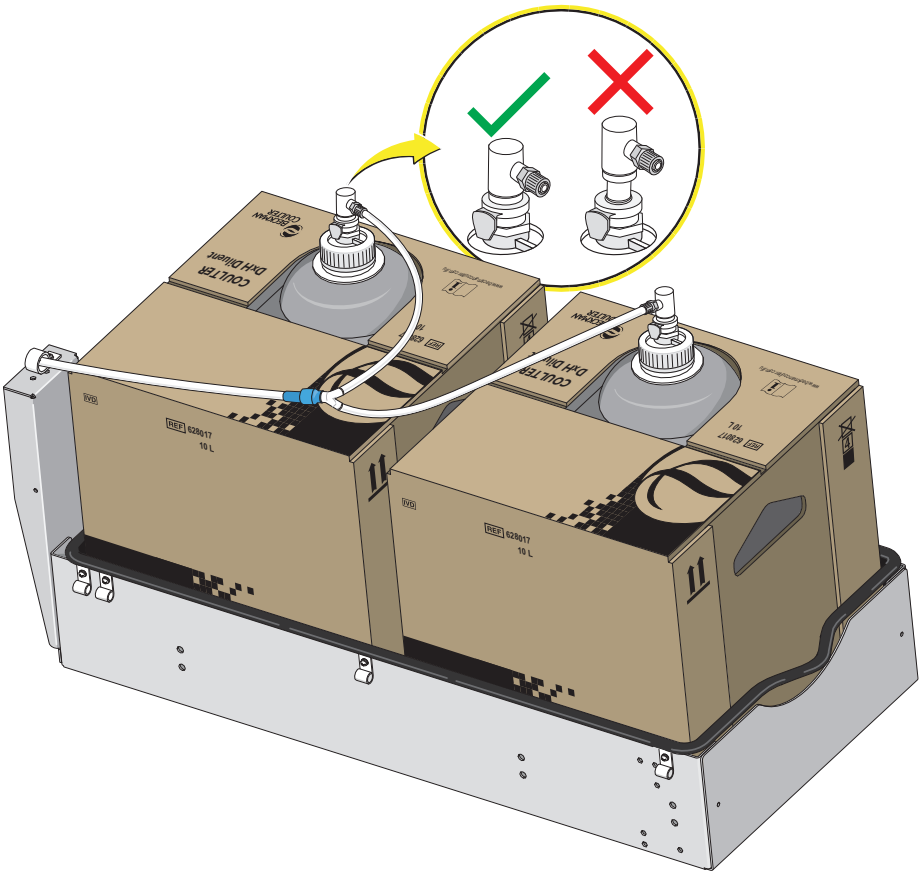
NOTE For the DxH 900 quad container diluent setup, the lot numbers for diluent pair 1 must be identical to each other. The lot numbers for diluent pair 2 must be identical to each other. There is no scanning order.

For dual or quad diluent configuration, the system defaults to the out or expired diluent after scanning in a new diluent or new diluent pair. If the diluent configuration is dual, scan the bar code for the new diluent container, either the first or the second container. If the diluent configuration is quad, scan the bar code for the new diluent container from the first pair and then scan the bar code for the second new diluent container from the first pair.

Diluent in Top Drawer



Diluent in Bottom Drawer



4 For the diluent and cleaner containers, verify that the quick disconnect connector for each pickup tube has clicked and locked into place as shown in the preceding illustrations. Pull the tubing back, if necessary, to confirm.

5 Select **OK** to complete the setup
OR
Select **Next** to configure another supply.

Setting Up DxH 690T Supplies

1 Select  **> Setup**
OR
Select **Menu > Supplies**.

See Replacing Reagent Containers - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures for information on replacing the reagent containers.

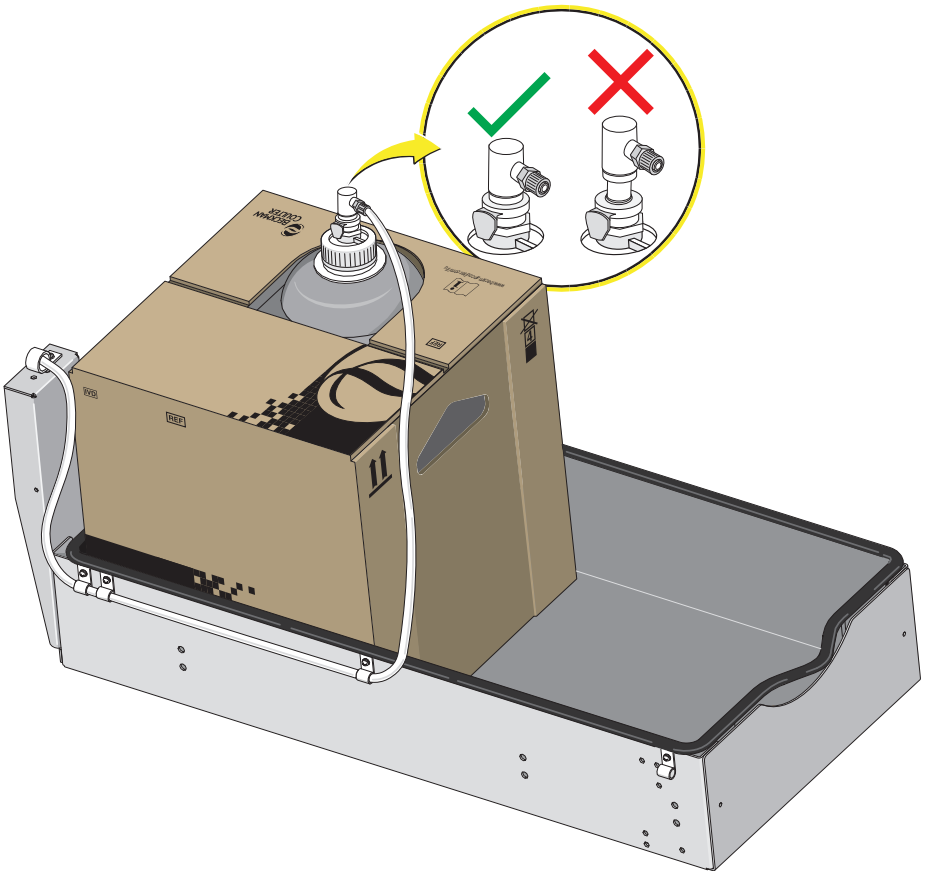
2 Scan the bar codes on the Beckman Coulter reagent container. The supply information is automatically updated.

3 Replace the old containers with the new containers.

Dual diluent setup is the default for the DxH 690T. To change the container configuration, call your Beckman Coulter Representative. See Container Configuration.

NOTE For dual diluent configuration, the system defaults to the out or expired diluent after scanning in a new diluent. If the diluent configuration is dual, scan the bar code for the new diluent container, either the first or the second container.

Diluent



4 For the diluent and cleaner containers, verify that the quick disconnect connector for each pickup tube has clicked and locked into place as shown in the illustrations above. Pull the tubing back, if necessary, to confirm.

5 Select **OK** to complete the setup
OR
Select **Next** to configure another supply.

Setting Up DxH Slidemaker Stainer II Reagents

NOTE For any non-Beckman Coulter reagent, select **Setup Other** and manually enter the bar code information. You can enter up to five supplies.

1 Select 
OR
Select **Menu > Supplies > Slidemaker** tab.

2 On the Supplies screen, select **Setup** from the local navigation bar.

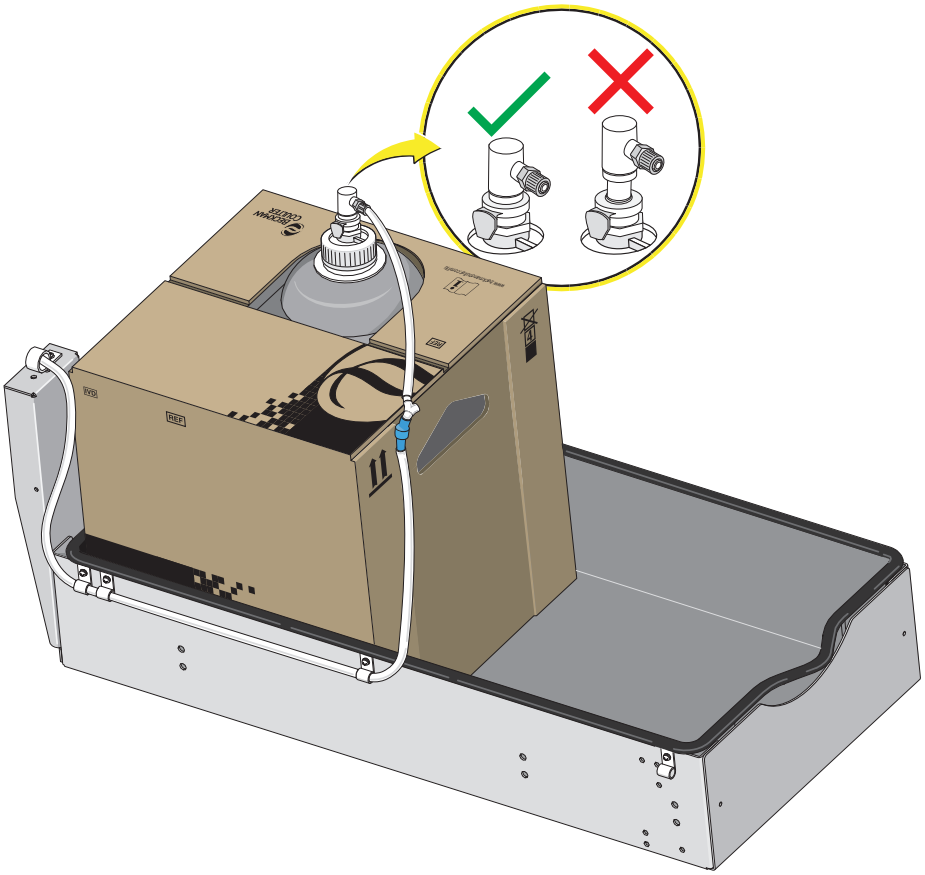
3 On the Setup Supplies dialog box, scan or manually enter the bar codes into *Bar Code* fields 1 and 2, and select **OK**.

4 If prompted, from the *Supply Type* drop-down list, choose **Diluent 1** or **Diluent 2** to be replaced and select **OK**.

NOTE The fields on the Setup Supplies screen are automatically populated from the bar code information. The Supply screen updates the percent (%) remaining for the supply bottle graphics.

When you configure Stainer supplies, ensure that the Shelf Life Exp entered is prior to January 19, 2038 (for software versions prior to v.2.0.0).

5 For the diluent and cleaner containers, verify that the quick disconnect connector for each pickup tube has clicked and is locked into place as shown in the illustration below. Pull the tubing back, if necessary, to confirm.



6 Select **OK** to verify the reagent has been replaced
OR
Select **Cancel** to go back to the previous screen.

7 Repeat this procedure for each remaining supply.

Set Up/Edit Other Reagents

Set up a supply (such as reagents, stains, methanol, or CLRW water) without a bar code, or any non-Beckman Coulter supplies.

1 Select the DxH Slidemaker Stainer II.

2 Select **Menu > Supplies > Slidestainer** to display a Supplies screen.

3 Select **Setup** from the local navigation bar to display the Setup Supplies dialog box.

4 Select **Setup Other** from the Setup Supplies screen.

5 Select **Yes** to accept the disclaimer
OR
Select **No** to go back to the previous screen.

6 On the next dialog box, select the desired supply (1 to 5).

7 Select **OK** to confirm your selection and display the Setup Other supply screen
OR
Select **Cancel** to go back to the previous screen.

8 Manually enter the reagent information for the selected supply.

IMPORTANT The system does not accept a Shelf Life Exp beyond January 18, 2038.

9 Select **OK**.

10 Repeat steps 2 to 9 above for each supply.

11 Select **Details** from the local navigation bar to display information for each supply.

NOTE Required Supplies indicates the supplies required for the active staining protocol set for the instrument. See Setting Up the Active Stain Protocol.

Set Up Agitation

Set up agitation to facilitate the staining process.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 On the SMS Configuration screen, select **Agitation Settings** from the local navigation bar.

5 On the Agitation Settings dialog box, verify that a checkmark appears next to **Stainer Agitation Enabled** to enable agitation.

6 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Set Up Heater Availability

Set up the heater to dry the smears through warming.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 On the Status screen, select **SMS Configuration** from the local navigation bar.

5 On the SMS Configuration screen, select **Heater Availability** from the local navigation bar.

6 On the Heater Availability dialog box, verify that a checkmark appears next to your selections for enabling heaters.

Both heaters enable drying by heat.

- **Pre-Stain Heater** provides heat for drying smears that just received printing information and are waiting in the basket elevator.
- **Post-Stain Heater** provides heat for drying smears in baskets located in the stainer dryer.

NOTE Slides made while heaters are not selected will generate slide exceptions. See Table 6.7, Slide Exceptions From the Patient Detail Screen in CHAPTER 6, Data Review for information on slide exceptions. Use this configuration only when instructed by your Beckman Coulter Representative.

7 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Set Up Smear Settings

Set up smear settings to manipulate the smear as needed for testing and user preferences.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 On the SMS Configuration screen, select **Smear Settings** from the local navigation bar.

5 On the Smear Settings dialog box, use the arrows to make your selections for the smear's length, thickness, round or square edge, wicking position as it relates to the amount of blood drop used, and blood drop position near or away from the sample information area.

NOTE All bars are centered for default settings.

6 Select **OK** to save your changes
OR
Select **Cancel** to go back to the previous screen.

Stainer Setup

Setting up the stainer includes the following:

- Adding or copying a stain protocol
- Installing reagents according to a selected protocol
- Setting an active protocol

Any protocol can be edited except for the default protocols in bold in the Staining Protocols table.

Setting Up the Active Stain Protocol

Set up the active staining protocol to run the stainer.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

When you change a protocol and reagents for the new active protocol, perform steps 3 through 18 in the Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0) procedure in CHAPTER 12, Cleaning Procedures to remove current reagents and clear the lines.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 Select **Staining Protocols** from the local navigation bar.

5 Select the appropriate staining protocol from the list displayed on the screen.

6 Select **Set Active Protocol** from the local navigation bar.

7 Select **OK** to set the selected protocol
OR
Select **Cancel** to go back to the previous screen.

The system will display the following message:
The selected protocol is not consistent with the consumable configuration of the instrument. Do you still want to set it as the active protocol?

NOTE See Setting Up DxH Slidemaker Stainer II Reagents.

8 Verify that the stain supplies are appropriate for the selected protocol on the **Slidestainer Supplies** tab on the Supplies screen and select **Yes** to set it as the active protocol
OR
Select **No** if the stain supplies are not appropriate and you do not want to set this as the active protocol.

Adding/Editing a Staining Protocol

IMPORTANT Create or edit a stain protocol before placing reagents on a new system or adjusting a reagent setup on an existing system.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

This option is allowed only in user-defined protocols. Default protocols (in bold text) cannot be altered.

When you change a protocol and reagents for the new active protocol, perform steps 3 through 18 in the Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0) procedure in CHAPTER 12, Cleaning Procedures to remove current reagents and clear the lines.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 Select **Staining Protocols** from the local navigation bar.

5 Select **Add Protocol** or **Edit Protocol** from the local navigation bar on the Staining Protocol Options screen to display the Staining Protocol screen.

6 Name the protocol and set the various configurations if you want to change from the default settings.

7 Select **OK** to confirm your selection
OR
Select **Configure Baths** and see Configuring Baths (Mapping) to the Bath Location
OR
Select **Cancel** to go back to the previous screen.

Configuring Baths (Mapping) to the Bath Location

IMPORTANT Create or edit a stain protocol before placing reagents on a new system or adjusting a reagent setup on an existing system.

1 Select **Add Protocol**, **Copy Protocol**, or **Edit Protocol** (cannot edit default).

2 Select **Configure Baths** on the Staining Protocol screen.

3 Select the names for the supplies that will be used for the selected bath by selecting the current supply under the Supply bottle.

4 Connect all the baths to their supply types:

- Select the bath. The supply types available for connection are shown in bold type.
- Select the supply type(s) you need (select **None**, select a supply type from the list, and select **Select**). The lines connecting the bath and supply will be displayed in the same color as the supply type bottle.

NOTE Configuration is required for all baths that are associated with a supply type. For Baths 2, 3, and 4, you may configure up to two supplies to go into one bath. Baths 1 and 5 can each accommodate one supply.

The system will display **Configuration Required* to the left of the Supply Type graphic above the **Configure Bath** button. An asterisk will also be displayed next to the bath name.

5 Select **Configure Bath**.

6 Configure the bath content in *Bath Content* and the frequency required in *Auto Drain and Refill*.

When more than one supply type is configured for a bath, you can define the ratio of one supply to the other in the % fields. The bath content for combined supplies must equal 100%.

Set the time that the basket will stay in the bath in the *Duration* field.

From the *When* drop-down list, you can set *Auto Drain and Refill* to occur:

- **Never**
- **At Specified Time** - lets you select times when the baths will drain and refill at the same time
- **After Elapsed Time** - tells the system to perform this function upon completion of a time duration
- **Every Specified Number of Baskets** - counts the number of baskets carrying slides into the stainer bath

NOTE **After Elapsed Time** and **Every Specified Number of Baskets** may cause the drain and refill function to occur independently from each stainer bath.

You can enable recirculation in Stainer Bath 5 for a possible reduction of precipitate on slides that may occur depending on your stain selection and protocol. To enable recirculation, select **Enable Recirculate** and then select **OK** on the Bath 5 dialog box. Re-verify the performance of the staining protocol whenever you enable/disable recirculation.

7 Select **OK** to confirm your selection
OR
Select **Cancel** to go back to the previous screen.

8 Select the **Preview Protocol** checkbox to display the selected mapping for the staining protocol. Deselect the checkbox to return to the Staining Protocol screen.

9 Select the post-stain drying duration (amount of time the slide is allowed to dry after staining). Select **OK** to return to the Staining Protocol table.

Copying a Staining Protocol

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

5 Select **Staining Protocols** from the local navigation bar on the DxH Slidemaker Stainer II screen.

6 Select a protocol to copy from the displayed list.

7 Select **Copy Protocol** from the local navigation bar. The Staining Protocol window for the protocol you selected is displayed.

8 Rename the copy.

9 Select **OK** to save your settings
OR
Select **Cancel** to go back to the previous screen.

Deleting a Staining Protocol

NOTE This option is allowed only in user-defined protocols. Default protocols (in bold text) cannot be altered. The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen and select the DxH Slidemaker Stainer II.

2 Select **Details Status** from the local navigation bar.

3 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

4 Select **Staining Protocols** from the local navigation bar on the DxH Slidemaker Stainer II screen.

5 Select the protocol you want to delete from the Staining Protocols list.

6 Select **Delete Protocol** from the local navigation bar.

7 Select **OK** to delete the protocol
OR
Select **Cancel** to go back to the previous screen.

Setting Up a Quick Rinse

Follow this procedure, when needed, to reduce stain precipitate on the slide for the Wright Giemsa QR default stain protocol.

⚠ WARNING

Risk of personal injury or contamination. Failure to properly shield yourself while using or servicing the instrument may result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire including gloves, a laboratory coat, and eye protection.

You will need the following materials:

- Methanol
- CLRW water
- Empty reagent bottle with a 2 L capacity, provided in the accessory kit
- Funnel
- Beaker with a minimum volume capacity of 2 L

Prepare a Quick Rinse

1 Obtain an empty 2 L reagent bottle and label it **QR** for Quick Rinse or Supply 3.

2 Add 500 mL of methanol to 1500 mL of CLRW water in a beaker.

3 Use the funnel to transfer the 2 L mixture from the previous step into the QR quick rinse bottle and load the quick rinse bottle on the floor stand behind Supply 3.

4 Carefully insert the Supply 3 pickup tube assembly into the new quick rinse bottle and tighten the cap.

NOTE The pickup tube assembly has several tubes that may bend when you insert them into the new container. Use a slight twisting motion if you experience difficulty.

5 Access the Fill Bath option by selecting **Menu** > **Diagnostics** > **DxTools** > **Slidestainer** > **Fluidics**.

6 Select **Fill Bath 4** from the drop-down list and select **Start** from the local navigation bar.

NOTE Drain and **Fill Bath 4** one additional time to prime the system.

7 Select **Finish** to end the diagnostics and place the instrument back online to resume operation.

8 See Set Up/Edit Other Reagents for information on how to enter the reagent information manually.

Process a Quick Rinse

1 Ensure that the active protocol requires a quick rinse supply.

2 Prepare the quick rinse according to the instructions in this section.

3 Load the quick rinse reagent bottle on the instrument.

4 Place the instrument online. The instrument automatically primes and fills all of the baths.

5 Load the specimen to run the active stain protocol with the quick rinse.

Review Results of a Quick Rinse

1 Review the slides for smear quality if this is your initial setup.

2 Refill the quick rinse bottle, as needed.

System Setup

Set up the system from the System screen (**Menu > Setup > System**). Select the option to set up from the local navigation bar.

Setting Up Backup and Recover

The DxH 900/DxH 690T gives you the option of performing a backup in case you should ever need to recover your database (**Menu > Setup > System > Backup and Recover**). Backups are saved to the removable hard drive that comes with your System Manager. You can configure an automatic backup or perform a manual backup from the Backup and Recover screen.

IMPORTANT To prevent shutdown failures, after performing a database recovery, ensure that shutdowns are not performed during a database backup.

Back up your files periodically using the automatic or manual procedures below.

⚠ CAUTION

Risk of overwriting data. Restoration of previous information may negate changes made since the configuration was last recovered (or the database was last backed up). Please verify the appropriateness of setup/configuration information before proceeding. Backups always overwrite the current content of the backup hard drive.

IMPORTANT Always scan removable/portable media (CD, DVD, or USB flash drive) before it is connected to a PC (server/client) and/or instrument. The System Manager and Review Station should not be used for this task.

Set Up an Automatic Backup

⚠ CAUTION

Risk of overwriting data. Restoration of previous information may negate changes made since the configuration was last recovered (or the database was last backed up). Verify the appropriateness of the setup/configuration information before proceeding. Backups will always overwrite the current content of the backup hard drive.

IMPORTANT Always scan removable/portable media (CD, DVD, or USB flash drive) before it is connected to a PC (server/client) and/or instrument. The System Manager and Review Station should not be used for this task.

1 Select **Menu > Setup > System > Backup and Recover > Auto Backup**.

2 To enable Automatic Backup, select the **Enable Automatic Backup** check box.

3 Select the frequency for automatic backup from the *Frequency* drop-down list.

4 Select a time to start automatic backup from the *Start Time* drop-down list.

5 Select **OK**.

Set Up a Manual Backup

⚠ CAUTION

Risk of overwriting data. Manual backups will always overwrite the contents of the backup hard drive. Be sure the correct hard drive is in place for the backup.

IMPORTANT Always scan removable/portable media (CD, DVD, or USB flash drive) before it is connected to a PC (server/client) and/or instrument. The System Manager and Review Station should not be used for this task.

1 Select **Menu > Setup > System > Backup and Recover > Manual Backup**.

2 To back up the system to your backup hard drive, select **OK** to continue with the manual backup.

Setting Up Database Cleanup

The Auto Prune function lets you automatically delete released patient results that have been in the database beyond a defined number of days. You can also automatically remove unused pending test orders from the Worklist. This enhances database performance.

NOTE History and event logs are not deleted by Auto Prune.

1 Select **Menu > Setup > System > Database Cleanup**.

2 To automatically prune patient results older than a specified number of days, select the **Auto prune patient results older than** check box in the *Patient results* area of the Database Cleanup dialog box.

3 Enter the number of days in the **days** text box.

4 Indicate the **Time of day to perform** the Auto prune.

5 To automatically remove pending test orders older than a specified number of days or hours, enter that number in the *Auto remove pending test orders older than* text box.

6 Select **Days** or **Hours** from the drop-down list.

7 If you selected Days, indicate the **Time of day to perform** the removal.

8 Select **OK**.

Setting Up the Printer

1 Select **Menu > Setup > System > Printers > Printer Setup**.

NOTE Print report settings apply to all modules in a workcell.

2 Select the **Disable All Auto Printed Reports** check box to disable auto print.

NOTE This check box lets you quickly disable auto printing from any source if a printing problem is encountered.

3 Select a **Printer Name** from the drop-down list.

4 Select a **Paper Size** specific to the selected printer from the drop-down list.

5 Select a **Paper Source** from the drop-down list.

6 To print in color, select **Color** from the *Color* drop-down list. The system default is to set to print in black and white.

7 Select a report under *Report name*.

8 Select the **Number of Copies** to print for each Patient Results report.

NOTE The value of *Number of Copies* must be **1** or **2**.

9 Select **OK**.

Set Up the Default Printer

1 Select **Menu > Setup > System > Printers > Default Printer**.

2 On the Default Printer Setup dialog box, select a default printer from the drop-down list next to *System Default Printer*.

3 Select **OK**.

Check the Printer Status of Any Connected Printers

1 Select **System Status**.

2 Select **Print** from the local navigation bar.

3 Select **Printers** to view the Printers Status screen.

Setting Up Date and Time

IMPORTANT This date and time setup overrides the operating system date and time. Date and time changes apply to all modules within a workcell.

A date and/or time change is allowed when the Stainer is active and Slidemaker is offline.

1 Select **Menu > Setup > System > Date and Time**.

2 Select a date format from the *Date Format* drop-down list
OR
Enter a date in the format that you've selected.

3 Select a time format from the *Time Format* drop-down list. Time formats are incorrect in some language translations.

4 Select a date from the *Date* drop-down list.

5 Enter the time in the *Time* text box.

NOTE Include AM or PM if your selected Time Format requires that field.

6 Select **OK**.

NOTE The DxH Slidemaker Stainer II will reboot automatically after a time change.

Setting Up Bar Codes

Discover the Bar Code Label Type

1 Select **Menu > Setup > System > Bar Code Setup**.

2 Select **Discover Barcode Label Type** from the *Barcode Procedures* drop-down list.

NOTE A description is displayed on the right-hand side of the screen to assist you with the procedure. Messages are displayed during and after completion of the procedure; these will indicate the bar code label type.

Update the Bar Code Reader Configuration

1 Select **Barcode Configuration**.

NOTE Beckman Coulter recommends that you enable checksum for bar code labels.

2 Configure the system to read your bar code. The available selections are:

- Code 39 (with or without checksum)
- Interleaved 2 of 5 (with or without checksum)
- Codabar AIM-16 (with checksum)

- Codabar NW7 (with checksum)
- Codabar (without checksum)

NOTE If you are using interleaved 2 of 5 bar code labels, enter the exact **Number of Characters** from the bar code in the *Length 1* text box and the *Length 2* text box. (You can enter and use up to two different lengths of bar codes such as 11 and 13.)

If the Enable Checksum check box is selected, the numbers should be odd numbers between three and 21.

If the Enable Checksum check box is not selected, the numbers should be even numbers between four and 22.

The DxH supports AIM-16 checksum technology with the leading and trailing character A only.

3 Select **OK** to save the configuration.

Configuring an Alarm to be Audible

Audible alarms exist for both the SPM (instrument) and the System Manager (review station). The alarms can function independently.

Audible alarms need to be set up from each individual computer. Audible alarms for some consumable error fault conditions are not implemented.

1 Select **Menu > Setup > System > Audible Alarms**.

2 On the Instrument tab, select the instrument from the *Select Instrument* drop-down list.

3 To enable the audible alarm, select the **Audible Alarm** check box.

4 Adjust the volume of the audible alarm using the arrow in the *Adjust Volume* panel.

5 On the Workstation tab, select the workstation.

6 Select the **Audible Alarm** check box.

7 Use the arrows in the *Adjust Volume* panel to adjust the volume.

8 Select **OK**.

Enabling Studies

NOTE You must be offline to enable Studies. Do not use Studies mode for patient specimen processing.

Studies lets you run samples without test orders. The samples are run in a batch process, without the use of decision rules. Examples of the use of Studies include linearity studies.

In order to use studies, a Default Test Order must be configured and batching must be enabled prior to enabling studies. See Batching for instructions on enabling batching.

Samples analyzed in Studies contain the leading figures XS- in the Specimen ID or Tube Position ID field.

1 Select **Menu > System Status > DxH Status > Studies.**

2 Select the **Enable studies** check box.

3 To automatically print reports for Studies, select the **Auto print lab report for studies** check box.

4 To transmit Studies results to a host, select the **Transmit to LIS** check box.

5 Select additional **Aspirations/Tube** from the drop-down list.

6 Select **OK**.

7 Use the Studies filter in the Custom Worklist to find completed results for Studies samples.

NOTE When finished with your Studies, return your system to its normal operating configuration.

Analysis - Disable Temporarily

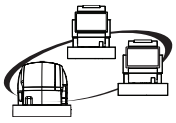
If there is a problem with either the Diff, NRBC, or Retic modules, temporarily disabling the analysis lets you run the SPM without using this module and without generating tests results for the temporarily disabled analysis.

Disabling Analysis Temporarily

1 Select **Menu > Setup > System > Analysis > Disable Temporarily**.

2 Select the modes of analysis that you want to disable on the *Analysis* panel by selecting the appropriate check box and then select **OK**.

NOTE To enable a mode, remove the check from the check box and then select **OK**. The system will prompt you to do a system verification when re-enabling modes of Analysis that have been disabled.



NOTE Temporarily disabling any MTM module may cause an issue with the reporting of results from specimens processed with a test order containing parameters from the disabled module. Avoid reflexing to a test order containing parameters from a disabled module. If results cannot be released nor merged due to the absence of results from a disabled module, these specimens may need to be re-analyzed using a test panel without the parameters from the disabled module.

Retic Analysis - Disable Permanently

If you choose not to run Retics in your laboratory, you can permanently disable retic analysis in order to save reagents by running without reticulocyte reagents on your system.

Disabling Retic Analysis Permanently

1 Select **Menu > Setup > System > Analysis > Disable Permanently**.

2 Select the **Retic** check box and select **OK**.

NOTE The system will display the following warning message in a DxH pop-up dialog box:
You have requested to permanently disable an analysis. Please note that disabling Retic analysis makes it impossible to re-enable it at a future time without a service call.

Any decision rules that use panels containing Retic tests will be disabled.
Any active test orders that include pending Retic tests should be cancelled from the test orders.
Any individual Retic tests to be disabled should be done manually.
Any reagents related to this analysis should be removed.
All panels containing Retic tests will be disabled.

Do you want to continue with this request?

3 Select **OK** to permanently disable Retic analysis.

4 Perform the Removing Retic Reagents procedure in CHAPTER 10, Troubleshooting to remove the reticulocyte reagents from your system.

Instrument Name Setup

Setting the Instrument Name

1 Select **Menu > Setup > System > More > Set Instrument Name**.

2 Select the appropriate module at the System Status screen.

3 Select **More > Set Instrument Name**, enter an Instrument Name, and select **OK**. The Instrument Name is not displayed on some screens; instead, the system serial number or Instrument ID is displayed.

Remote Management

The Remote Management screen is where your system's hardware is registered with Beckman Coulter's ProService. Registration creates an account that allows remote monitoring of your system. Remote Management, through ProService, can also be used for direct communication with your system software by Beckman Coulter Service personnel, for troubleshooting services. The *Allow Control Settings* give you the ability to allow access for 24 hours, allow access with lab authorization, or to automatically deny access.

Setting Up Remote Management

1 Select **Menu > Setup > System > More > Remote Management**.

2 Select an option in the *Allow Control Settings* option box.

NOTE The Allow Control Settings can be changed as needed after enrollment.

3 Enter a number in the *Instance Number* text box. Service will supply you with the instance number.

4 Select **Enroll** to enroll.

5 Select **OK** to save the settings.

Transport Configuration

The system's default functional state for the single-tube and cassette transports, STM, output buffer, and bar code readers as the input buffer and mixer, is enabled.

For troubleshooting purposes, you can disable different functional sites and continue running samples using other methods of presentation.

When you disable a setting, the Transfer box on the Details Status screen will change from green to black.

Configuring Transport

1 Select **Menu > System > More > Configure Transport**.

2 Check the function you want to disable.

3 Select **OK**.

Setting Up Specimen Exit Delay

Enabling Specimen Exit Delay allows orders to rerun and reflex from the middleware or the LIS. Samples are automatically analyzed without cassettes exiting to the Output Buffer and will not require user intervention. As the System Manager waits for a reply from a host and the system attempts to keep the transport clear for ongoing sample analysis, you may notice up to a 45-second delay. Result transmission for a completed analysis is not delayed. When Specimen Exit Delay remains disabled, there is a possibility that samples requiring rerun and reflex testing may exit to the Output Buffer before feedback is received at the System Manager, especially in high throughput situations.

1 Select **Menu** > **Setup** > **More** > **Specimen Exit Delay**.

2 Select **Specimen Exit Delay Enabled** in the Specimen Exit Delay dialog box.

3 Select **OK**.

Aspiration Retry

Enable this feature if you want the system to automatically retry an aspiration, after an aspiration error occurs. The system will not automatically retry an aspiration if the original aspiration error was encountered in the single-tube presentation or for a specimen in a Type B or Type D cassette.

Enabling Aspiration Retry

1 Select **Menu** > **Setup** > **System** > **More** > **Aspiration Retry**.

2 Select **Enable Retry Aspiration**.

3 Select **OK**.

Operators and Roles

The lab administrator can assign operator roles and access level from the Operators and Roles screen. The password for a new operator is temporary, and the new operator is prompted to change the password when logging on for the first time.

The User Password complexity rules must follow the Beckman Coulter privacy and security guidelines.

The rules below apply to new passwords and resetting passwords:

- Must have one or more upper case letters.
- Must have one or more lowercase letters.
- Must have at least one number.
- Must have at least one special character: !, @, #, $, %, ^, &, *.

- Must be 10 to 20 characters in length, which has to be a combination of above mentioned character sets.

When changing to a new password, the password complexity rules apply. In addition, the password must differ from your current password by at least 3 characters. In order to meet this requirement, characters that exist in a current password cannot be reused in a new password. Upper and lower case letter changes are considered to be different characters when changing the password. Therefore, when upper case and lower case letters are used in a different sequence to change a password, they will be accepted.

Example:

The current password is Lab@123456 and the new password is Lab@123456431.

The new password will not be accepted. This is because the new password contains 3 characters already used within the current password. An acceptable new password to use would be Lab@123456789.

Example:

The current password is Tech@12345 and the new password is 12345@Tech.

The new password will not be accepted because the same characters were used in a new order. An acceptable new password to use would be tEcH@12345 because the upper case and lower case characters are used in a different sequence.

If the password does not meet the requirements, the operator will be prompted to re-enter the password based on the password policy requirements.

Adding a New Operator

1 Select **Menu > Setup > Operators and Roles > New Operator**.

2 Enter the appropriate information.

3 Select an **Access Level** from the drop-down list. See APPENDIX B, Operator Access for a list of Operator Roles and Access.

NOTE The Account Status defaults to *Active*. Change it to **Inactive**, if necessary.

4 Select **OK** to create the new operator.

Editing an Existing Operator

The lab administrator can edit access levels and account status.

1 Select **Menu > Setup > Operators and Roles > Edit Operator**.

2 Enter the changes, if necessary.

3 Select the appropriate **Access Level** from the drop-down list.

4 Select an **Account Status** option.

NOTE The Account Status defaults to *Active*. Change it to **Inactive**, if necessary.

5 Select **OK** to save the changes.

Resetting an Operator's Password

If you forgot your password, an operator at the lab administration level can reset it for you. The new password is a temporary password and you will be prompted to change you password after logging on.

1 Select **Menu > Setup > Operators and Roles > Reset Password**.

2 Select the **Operator ID**.

3 Enter the operator's **New Password** and enter it again in the *Confirm Password* text box.

NOTE Passwords must be alphanumeric and 3 to 9 characters in length.

4 Select **OK** to save the new password.

Changing Your Password

You can change your password at any time.

1 Select **Menu > Setup > Operators and Roles > Change Password**.

2 Enter your **Old Password** or the password that was assigned during a reset password procedure.

3 Enter your **New Password**.

4 Enter your new password again in the **Confirm Password** text box.

NOTE Passwords must be alphanumeric and 3 to 9 characters in length.

5 Select **OK** to save the new password.

Setting Timeout

A lab administrator can determine if your lab will use password expiration. These settings are optional and are designed to enhance your security.

1 Select **Menu > Setup > Operators and Roles > Timeout Settings**.

2 To enable *Password Expiration (Days)*, select the *Password Expiration (Days)* **Enabled** check box.

3 Select **30, 60, or 90 Days** to expiration from the *Password Expiration (Days)* drop-down list.

NOTE

- *Auto Lockout* can be disabled on the Timeout Settings dialog box.
- If a lockout occurred, any user with the same access level or higher than the previous user can log on.

4 Select **OK** to save the new settings.

User Lockout Settings

- User Lockout Settings for Level I and Level II Operators can only be configured by a Level III Operator from the System Manager.
- The default for the Maximum Invalid Login Attempts is 5, and for the Account Lockout Duration, the default is 30 minutes.
- Level I, Level II, and Level III user accounts will be locked out of the system based on the User Lockout Account settings.
- The user account status will change from active to inactive if locked out.
- If the account lockout occurs for Level I or Level II users, contact the Level III Operator to have the password reset and account reactivated.

1 Select **Menu** > **Setup** > **Operators and Roles** > **User Lockout Settings**

2 Enter the **Maximum Invalid Login Attempts** value from (3-5).

3 For the **Account Lockout Duration**, select a value from 5 to 30 minutes from the drop-down list.

4 Select **OK**.

How to unlock a Level I or Level II Operator

- Level III Operator can unlock the locked Level I and Level II users from the Edit Operator screen. See Editing an Existing Operator.
- Level III Operator will need to change the account status from inactive to active.

How to unlock a Level III Operator

- If a Level III Operator is locked out, another Level III Operator can unlock the account from the Edit Operator screen. See Editing an Existing Operator. If other Level III Operator does not exist, contact your Beckman Coulter Representative.

Active Directory Setup

- The Active Directory can only be enabled or disabled by a Level III Operator from the System Manager.
- The hospital/lab network contains the list of operator IDs and operator passwords. The credentials are mapped to the instrument application when the Active Directory is enabled.
- The user(s) needs to be added in the DxH application.
- The hospital/lab network user ID and password is used to log in to the DxH Application. This helps to uniquely identify the user within the hospital/lab network.
- Active Directory integration helps to manage users from a centralized location.
- This provides an enhancement in the overall privacy and security of the DxH application.
- When an operator is logged in Active Directory, the Password Expiration is disabled automatically in Timeout Settings on the DxH application.
- Once Active Directory connection has been established, to reset or change the password, contact your hospital/lab network's IT department.
- The DxH Application can only support one Active Directory.
- When the operator's Active Directory password has expired, the operator will be prompted with: *The password entered is incorrect. Please re-enter the password information or contact your laboratory supervisor for assistance.*

Connect Active Directory

1 Select **Menu** > **Setup** > **Operatory and Roles** > **Active Directory Setup**.

2 Enter the **Domain Name, User Name, Password,** and select **Connect**.

NOTE A unique Domain Name shall be provided by the hospital's IT department. Enter User Name and Password of an authorized user to enable the Active Directory.

3 Select **OK** when prompted by: *Connection to Active Directory successful.*

Disconnect Active Directory

1 Select **Menu** > **Setup** > **Operatory and Roles** > **Active Directory Setup**.

2 Select **Disconnect**.

3 Select **OK** when prompted by: *Are you sure you want to disconnect from Active Directory integration?*

4 Select **OK** when prompted by: *Disconnection from Active Directory successful.*

Searching/Adding a User in the Active Directory

- The Active Directory can only be enabled and disabled by a Level III Operator from the System Manager.
- Active directory users will be the only operators listed in Operators and Roles when Active Directory is connected.
- Users can be searched in the Active Directory list.
- Searching for an Operator in the Active Directory can be done by First Name, Last Name, or Operator ID.
- The Access Level and Account Status of Active Directory Operators can only be edited by a Level III Operator through the DxH Application while the Active Directory is connected.

1 Select **Menu** > **Setup** > **Operatory and Roles** > **New Operator**.

2 Select the radio button **First Name, Last Name,** or **Operator ID**.

3 Enter the **Operator Name or ID**, and select **Search**.

NOTE You may need to re-enter the user credentials for the Active Directory user search, if prompted.

4 Select the Operator from the list, and select **OK**.

5 Select the **Access Level** from the drop-down list.

6 Select the **Account Status** radio button, and select **OK**.

Non-Active Directory to Active Directory Conversion

- If an Operator ID exists in the non-Active Directory and a Level III operator tried to add the same Operator ID in the Active Directory (provided the same Operator ID (case-sensitive) also exists in the Active Directory server) then after successful authentication a prompt message will be displayed asking the Level III operator to confirm or reject.
- Once the Level III operator confirms, the added operator will be successfully converted to the Active Directory.
- If Level III operator does not confirm, the operator will remain in the non-Active Directory.

NOTE The rule above applies for Active Directory to non-Active Directory conversion as well.

Banner Setup

- The banner message can only be enabled or disabled by a Level III Operator from the System Manager.
- When the banner is set up and enabled, the message will prompt when any operator logs in.
- Anytime Banner Setup is enabled, disabled, or modified, the DxH system will record an entry in the Audit Log.
- The operator will need to confirm before proceeding to use the application.
- This message is configurable and may be enabled or disabled at anytime.

Enable Banner Setup

1 Select **Menu** > **Setup** > **System** > **More** > **Banner Setup**.

2 Select the **Enable Banner Setup** checkbox (disabled by default).

3 Type the Title of the banner (up to 128 characters).

4 Type the Message (up to 2048 characters).

5 Select **OK**.

Disable Banner Setup

1 Select **Menu** > **Setup** > **System** > **More** > **Banner Setup**.

2 Deselect the **Enable Banner Setup** checkbox.

3 Select **OK**.

Flagging and Rules

⚠ CAUTION

Risk of erroneous results:

- **Flagging Limits and Delta Checks are reevaluated for a sample when active results are manually edited, or amended when new results are received for a pending sample. Decision rules are not reevaluated.**
- **Flagging Limits, Delta Checks, Flagging Sensitivity, and Decision Rules are not reevaluated upon a change of those settings for results already released in the database.**

Beckman Coulter recommends using all available flagging options to optimize the sensitivity of instrument results. All flagging options include reference intervals (H/L), action and critical limits, Definitive, Suspect and System messages, parameter codes, delta checks, decision rules, and System Status and Exception messages. Beckman Coulter recommends avoiding the use of single messages or outputs to summarize specimen results or patient conditions.

Flags

You can set Delta Checks, Flagging Limits, and Flagging Sensitivity from their individual tabs at the Flags Setup window by selecting **Menu > Setup > Flagging/Rules > Flags**.

Delta Checks

1 Select **Menu > Setup > Flagging/Rules > Flags > Delta Checks** tab.

2 Enter either the **Difference** or **% Difference,** and **Delta Time** in the columns in the **CBC**, **DIFF**, and **Retic** panels and select **Save.**

NOTE Delta Time is in Days.

Flagging Limits

IMPORTANT To prevent database errors, ensure all instruments are offline when adding or editing Flagging Limits.

Flagging Limits include reference ranges, action and critical limits, and definitive messages. Flagging Limits are defined by unique age ranges, specimen type, and can be associated with location. The system has six default sets of limits pre-named for use for adults. Only the Adult whole blood range contains default limits.

Add Flagging Limits

1 Select **Menu > Setup > Flagging/Rules > Flags**.

2 From the Flagging Limits tab, select **Add Limit** from the local navigation bar.

The Flagging Limits Setup dialog box defaults to the Reference tab view. To view the Action/Critical, Definitive Male, or Definitive Female tab views, select the corresponding tab.

3 Select a specimen type from the *Specimen Type* drop-down list. Selecting a **Specimen Type** will populate the reference panel with the corresponding tests for which you can set Flagging Limits, as outlined in the following sections.

4 Enter a **Limit Name**. It must be a different name from the one already on the list.

5 OPTION: Select a **Location** from the drop-down list or select ⊕ to add a **Location**.

For additional instructions on adding a location, see Inserting Location.

6 Define the **Age Range**. The Age Range cannot overlap other existing Age Ranges. Use **View Age Range** to see a graphical display of ranges to help avoid an age range overlap violation message.

7 To enable this limit as the system default for this specimen type, select the **System Default** check box.

Reference Interval Limits

These ranges are used to set the System Manager reference interval flags. Your adult patient population ranges may be different from the preset Adult ranges.

1 From the Reference tab with a limit set open, if applicable, fill in the empty ranges by entering the limits
OR
Select **Copy Limit** to copy the limits from an existing set.

2 Select **OK**.

Action/Critical Limits

1 Select the **Action/Critical** tab.

2 Fill in the empty ranges by entering values
OR
Select **Copy Limit** to transfer values from an existing set

Definitive Limits

Definitive Limits define values that trigger text messages to be displayed when those values are exceeded.

1 Select the Definitive Male or Definitive Female tabs.

2 Fill in the empty ranges by entering values
OR
Select **Copy Limit** to transfer values from another limit set
OR
Select **Create Definitive Limits** to transfer Reference limits to the definitive tabs

H&H Check

The H&H Check is a special definitive message.

1 Select **Menu > Setup > Flagging/Rules > Flags > Flagging Limits > H&H Check**.

2 Select **Enable H&H Check** to enable H&H check.

3 Enter a value in the text box to complete the formula (any values between 2.0 and 4.0). The default value is 3.

4 Select **OK**.

Flagging Sensitivity

Flagging Sensitivity for specific Differential Suspect messages should not be changed from the default High settings unless you have clinical data supporting the reason for the change.

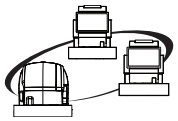
Set Flagging Sensitivity

1 Select **Menu > Setup > Flagging/Rules > Flags > Flagging Sensitivity** tab.

2 Select **High**, **Medium** or **Low** to set the sensitivity for **Variant Lymphs**, **Left Shift** and **Immature Granulocytes.** All suspect messages are defaulted to high sensitivity.

3 If desired, disable the Left Shift messages by deselecting the **Left Shift** check box.

Rerun/Reflex Preferences



You can independently select the preferences for processing Rerun or Reflex test orders within a workcell.

1 Select **Menu > Setup > Flagging/Rules.**

2 Select **Rerun/Reflex Preference** from the local navigation bar.

3 Select **No Preference**, **Same Instrument**, or **Different Instrument**.

NOTE The preference selected applies across the workcell and is automatically applied for retesting orders dictated by decision rules, manual Rerun, and/or manual Reflex.

Setting Up Physicians

1 Select **Menu > Setup > Flagging/Rules > Physicians**. This screen can be accessed from several locations throughout the application. You can also add a primary physician by following the Adding Patient Demographics procedure.

2 Select **Add**.

3 Enter the appropriate information in the text boxes:

- **Physician ID**
- **Last Name**
- **First Name**
- **Middle Name**
- **Suffix**

4 Select **OK** to save. The physician-specific comments will be stored in the database for future use.

NOTE If a Physician ID was deleted, the System Manager is not updated when the same Physician ID is downloaded on a new order. You cannot re-create a Physician or Physician ID that has been previously deleted.

Setting Up Locations

NOTE You can also add a location by following the Adding Patient Demographics procedure.

1 Select **Menu > Setup > Flagging/Rules > Locations**. This screen can be accessed from several locations throughout the application. You can also add a location by following the Adding Patient Demographics procedure.

2 Select **Add**.

3 Enter a **Location** in the text box and select **OK** to save.
The location-specific information will be added to the database for future use.

Setting Up Auto Stop

Auto Stop selections that are set up at a workcell's System Manager apply to all of that workcell's locations.

NOTE Auto Stop is associated with skipped specimens and No Match events which force the system to go offline.

Specimens that experience Auto Stop conditions within the presentation time-out window are skipped, but do not trigger a No Match event (avoiding the offline condition).

Disable **Auto Stop** for Specimen ID Reuse, Pre-assigned Secondary ID Mismatch, and Rerun ID Verification Failure. In addition, avoid erroneous warning messages for these fields by entering **10** in the boxes even though the fields are disabled.

1 Select **Menu > Setup > Flagging/Rules > Auto Stop.** This screen can be accessed from other locations throughout the application.

Auto Stop for Tube Position No Read is not functional.

2 Select from the following Auto Stop Criteria. The default number of occurrences is five; if necessary, enter a different trigger value in the associated text box.

3 Select **OK** to save your settings.

Setting Up Collation

Collation enables the addition of a Retic panel to a previously analyzed and released CBC or CD panel, or vice versa, for a specific patient. The panel order that is added must have the same Specimen ID and Patient ID of the released panel. The SPM must be offline to set up collation.

1 Select **Menu > Setup > Flagging/Rules > Collation.**

2 Select the **Auto Collation Enabled** check box.

3 Enter an **Auto Collation Time** in the text box and select **OK** to save.

Rules

Rules let you define conditions that will initiate system or laboratory follow-up actions.

The **Rules** button (**Menu > Setup > Flagging/Rules > Rules**) takes you to screens where you can select Release Rules, add or edit rules at the Decision Rules Workbench tab, or view Active Decision Rules.

⚠ CAUTION

Risk of erroneous results. You must validate any new decision rules that you add or modify in order to avoid erroneous results.

The instrument must be offline in order to save and activate Decision Rule changes.

Predefined Rules

The predefined rules are consensus rules that were created by an international committee of Hematology experts. If you select **Restore Predefined Rules**, after acknowledging a dialog box, it will post 41 rules, named CR1 to CR41. These Consensus rules are disabled by default.

To modify a Predefined rule for your own laboratory policies, you must copy, edit, validate, activate, and enable the rule.

Viewing Active Decision Rules

1 Select **Menu > Setup > Flagging/Rules > Rules > Active Decision Rules.**

2 Select the appropriate arrow next to *Rule Order* at the bottom of the screen to change the order and priority of a rule on the list.

Activating Rules

Rules are moved from the Decision Rules Workbench to the Active Decision Rules tab to be enabled and used in a routine workflow. Rules that are in use are not available in the Decision Rules Workbench.

IMPORTANT Do not delete decision rules if they have been triggered on patient specimens. If the rule is no longer valid, disable the rule by selecting **Menu > Setup > Flagging/Rules > Rules > Active Decision Rules** tab. Select the rule to be disabled and select **Disable Rule**.

1 If there is a current list of rules, select a row or under that row where you will insert the rules to be activated.

2 Select **Activate Rules (Menu > Setup > Flagging/Rules > Rules > Active Decision Rules** tab **> Activate Rules).**

3 Select the rule(s) to be activated and their location in any current list. Multiple rules can be selected using standard Windows commands.

You must validate any new decision rule that you add or modify in order to ensure that rules work as intended. Select **Yes** to continue or **No** to cancel.

4 Select **Enable Rule** to enable the rule. A checkmark appears in the Enabled column of the Active Decision Rules table.

Decision Rules Workbench Tab

The Decision Rules Workbench tab provides the following options:

- **Add Rule**
- **Edit Rule**
- **Copy Rule**
- **Delete Rule**
- **Restore Predefined Rules**

Adding/Editing a Rule

Add a Rule

1 Select **Add Rule** from the local navigation bar of the Decision Rule Workbench to display the Decision Rule Setup dialog box.

2 Enter a **Rule Name**.

3 Enter an optional **Description**.

4 Select a **Specimen Type** from the drop-down box. The selections available in the IF conditions are dependent on the Specimen Type selected. You can string multiple conditions into one rule.

5 Select **Insert** to add IF conditions to the Decision Rule (**4**). You can create an IF condition based on the following:

- Test Result - see Inserting a Test Result.
- Panels - see Inserting Panels.
- Test Flags and Codes - see Inserting Test Flags and Codes.

- Delta Check State - see Inserting Delta Check State.
- Messages (Suspect, System, Definitive) - see Inserting Suspect, System, or Definitive Messages.
- Exceptions (Specimen and Slides [if Slidemaker Stainer is present]) - see Inserting Exceptions.
- Patient Information (ID, Age, Gender, Ethnicity) - see Inserting Patient Information.
- Specimen Age - see Inserting Specimen Age.
- Physician - see Inserting Ordering Physician.
- Location - see Inserting Location.
- Diagnosis - see Inserting Diagnosis.
- Priority - see Inserting Priority.
- Specimen ID - see Inserting Specimen ID.
- Other (Instrument Type: allows selection of DxH 900/DxH 690T or DxH Slidemaker Stainer II)

Multiple conditions can be strung together in one rule. Select **and**, **or**, or **nesting** ( ) to string together the selected IF conditions.

Nesting allows the selection of a group of IF conditions that must logically occur together as part of a larger rule.

Suppose a rule has three IF conditions and one THEN action:

- WBC <1.0 and
- NE# <0.5 and
- For nesting, select **WBC <1.0** AND **NE# <0.5**; then select **( )** to nest the two conditions.
- Suspect Message = NE Blast, THEN Review Smear

Your laboratory wants the WBC and NE conditions to occur together. Both conditions must be triggered before the Suspect message is evaluated. Your rule will be displayed as:

IF (WBC < 1.0 and NE# < 0.5) and (Suspect Message - NE Blast), THEN “Review Smear”

When only the WBC or NE condition occurs without the other, the NE Blast condition is not evaluated.

---

6 Add a THEN action to your decision rule. You can choose to add:

- **Lab Actions** - Select a lab action from the default list, or add your own. See Inserting a Lab Action.
- **Comments** - Enter a new comment or select a **System Comment**. See Adding Comments.
- **Hold Slides, All Tests, or Test Groups** - These samples are held in the Review tab for the Worklist.
- **Cancel Slides** - Select the slide(s) to cancel.
- **Stop Processing Rules** - Select the checkbox to stop further rule processing when the specific IF conditions are met.
- **Additional Tests** - Run a Rerun and/or Reflex to a Panel or Slide.

7 In the *Additional Test* panel, select the **Rerun** checkbox to rerun the test and/or select **Reflex**, if applicable.

8 Select **OK** to save the decision rule.

9 Verify that the Decision Rule was added correctly.

Edit a Rule

1 From the Decision Rules Workbench, select a Decision Rule and select **Edit Rule** to display the Decision Rule Setup dialog box.

2 Highlight a rule and select **Edit**.

NOTE Predefined rules cannot be edited, but can be copied and then edited.

3 Follow the instructions for using the Decision Rule Setup dialog box in Flagging and Rules to edit the rule and select **OK**.

NOTE Select **Delete** to delete conditions, if needed.

4 Verify that the Decision Rule was edited correctly.

IF Condition Menu Selections

You can select **Setup > Flagging/Rules > Rules > Decision Rules Workbench** to set up IF conditions. The selections available in IF conditions are dependent on the Specimen Type selected. You can string together multiple conditions into one rule after selecting **Add Rule**. See Adding/Editing a Rule.

Restoring Decision Rules

1 **Menu > Setup > Flagging/Rules > Rules > Active Decision Rules** tab

2 Select **Restore Rules**.

3 Under *Source*, select a file name and select **Select File**.

4 Under *Configuration Selection*, select **Decision Rules**.

NOTE The action to HOLD is not allowed in the existing Decision Rules being restored if the releases rules are set to *Release all results*. When a hold is present in a rule, the system provides a notification of an incompatible release criterion and the rule is automatically disabled after confirmation. The action and the name of the disabled rule are noted in the audit log.

5 Select **Restore**.

Inserting a Test Result

1 From the Decision Rule Setup screen, **(Add Rule > Insert > Test Result),** select a Test Result from the drop-down list.

2 Select a test result from the *Test Result* drop-down list.

3 From the next drop-down list, select an operand (<, ≤, ≥, >).

4 Enter a value in the third field to complete the statement and select **OK**.

Inserting Panels

1 From the Panels dialog box, select a panel from *Available* and select **Add** to move the panel to the *Selected* field.

NOTE Multiple selected panels are joined by *or*.

2 Select **OK** to save your selections.

Inserting Test Flags and Codes

1. Select a test name from the *Test Name* drop-down list.
2. Select an operand from the *Test Flags and Codes* drop-down list.
3. Select **Add**.
4. Select **OK** to save your selections. When multiple panels are selected, they will be joined by an *or*.

Inserting Delta Check State

1. Select a test name from the *Test Name* drop-down list.
2. Select an option from the *Delta Check State* drop-down list.
3. Select **OK**.

Inserting Suspect, System, or Definitive Messages

1. Select the type of message.
2. Select one of the operands from the drop-down list.
3. Select the message under *Available* and select **Add** to move them to the selected field.
4. Select **OK** to save your selections. When multiple panels are selected, they will be joined by an *or*.

Inserting Exceptions

1. Select **Specimen** or **Slide Exceptions**. Then, select the specific exception message from the drop-down list.
2. Select **Add** to move it to the *Selected* field.
3. Select **OK**.

Inserting Patient Information

1. Select **Menu > Setup > Flagging/Rules > Decision Rules > Insert > Patient Information > Patient ID**.
2. Select one of the operands from the *Patient ID* drop-down list.
3. If you selected **Equal To** or **Not Equal To**, enter a value in the text box to complete the conditional statement.
4. Select **OK**.

Inserting Patient Age

1. From the *Patient Age* drop-down list, select an operand.
2. Enter a number and make a unit selection (for example, hours) from the second drop-down list.
3. Select **OK**.

Inserting Patient Gender

1 Select from the *Gender* drop-down list.

2 Select **OK**.

Inserting Patient Ethnicity

1 Select from the *Ethnicity* drop-down list.

2 Select **OK**.

Inserting Specimen Age

1 From the *Specimen Age* drop-down list, select an operand.

2 Enter a number and a time interval from the second drop-down list.

3 Select **OK**.

Inserting Ordering Physician

1 Select an operand from the *Ordering Physician* drop-down list.

2 Select a physician under *Available* and select **Add** to move the physician to the selected field.

3 Select **OK** to save your selections.

Inserting Location

1 Select an operand from the *Location* drop-down list.

2 Select a location from *Available* and select **Add** to move it to the Selected field.

3 Select **OK**.

Inserting Diagnosis

1 Select an operand from the *Diagnosis* drop-down list.

2 Enter information in the text box to complete the statement and select **OK**.

Inserting Priority

1 Select an operand from the *Priority* drop-down list.

2 Select a priority from the second drop-down list:

3 Select **OK** to save your selections.

Inserting Specimen ID

1 Select an operand from the *Specimen ID* drop-down list.

2 Enter information in the text box to complete the conditional statement and select **OK**.

Adding Lab Actions

Lab Actions are associated with a particular specimen run. If a Lab Action is triggered based on a Decision Rule, it is associated with that run only, not the rerun or reflex.

Beckman Coulter provides five preset Lab Actions.

1 Select **Menu > Setup > Flagging/Rules > Lab Actions**.

2 Select a lab action from the preset list
OR
Select **Add** and enter your own lab action (saved for future use)

3 Select **Close**.

Adding Comments

Comments associated with Decision Rules are linked to the Patient. The Comment will appear with all runs of a particular patient (both the original run and a rerun).

You can add comments by:

- Entering your comments in the *Comment* field text box on the Decision Rule Setup screen, or
- Using the **Select System Comment** feature to add a comment to the System List. This comment will be maintained in the database for reuse. There are no predefined Comments for the Patient.

Copying Decision Rules

You can copy an Active Rule to the Workbench for editing, or copy a rule that already exists on the Workbench.

Copy Decision Rules From the Workbench Tab

1 Select **Menu > Setup > Flagging/Rules > Rules > Decision Rules Workbench**.

2 Select a rule or a series of rules to copy.

3 Select **Copy Rule** to display the Decision Rule Setup dialog box.

4 When the system displays:
Are you sure you want to copy the selected rules?
select **Yes** to automatically copy the rule to the end of the existing list in the Workbench tab.

NOTE The rule copy is named *Copy of XXX*. You can edit the name and rule.

Copy Decision Rules From the Active Decision Rule Tab

1 Select a rule or a series of rules to copy.

2 Select **Copy Rule to Workbench** to display the Decision Rule Setup dialog box.

3 When the system displays:
Are you sure you want to copy the selected rules?
select **Yes** to automatically copy the rule to the end of the existing list in the Workbench tab.

4 When the system displays:
Copied 1 rule to the decision rule workbench
(if one rule was selected)
select **OK** to put a copy of the rule on the Decision Rule Workbench

NOTE The copy has the same name as the rule on the Active Decision Rule tab. It does not say *Copy of XXX*. You can edit the name and rule.

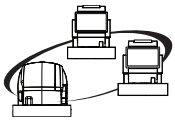
Release Rules

You can set up Release Rules from the Release Rules tab (**Menu > Setup > Flagging/Rules > Release Rules** tab). The selection of Release Rules affects your ability to write Decision Rules using specific configurations. For example, if your Release Rule is set to Release All Results, you cannot write a Decision Rule with *Hold* in the action.

The Release Rules tab lets you select from the following options:

- **Hold all results** - All processed results are held at the Worklist Review tab.
- **Hold all exceptions** - All processed results with exceptions are held at the Worklist Review tab.
- **Release all results** - All processed results are reported (printed or transmitted as the system is configured) including any triggered Decision Rules actions. This selection overrides the setting for the HOLD within the THEN portion of a Lab Action in a Decision rule.

- **Release results based on decision rules** - All results that trigger a Decision Rule action except a slide order only or a Comment are held at the Worklist Review tab. This selection overrides the setting for the HOLD within the THEN portion of a Lab Action in a Decision rule.



NOTE The system verifies that the Release Rules and Decision Rule actions are compatible, and provides notification for incompatible criteria.

Report Setup

1 Select **Menu** > **Setup** > **Reporting**.

2 Select one of the report options available by selecting a button from the local navigation bar.

Lab Information

1 From the Reporting screen, select **Lab Information**.

2 Enter information in the Field text boxes, as needed.

3 Enter your **IQAP** number in the text box.

4 Select **OK** to save. The results can be displayed on the Lab, Chartable, or Cumulative report. See APPENDIX D, Report Examples for sample reports.

Units Format

The unit formats that are available are JAPAN, SI-1, SI-2, SI-3, SI-4, SI-5, SI-6, US-1 and US-2. If you choose to Enable Digit for a white blood parameter, your result will be displayed with the extra decimal place that is shown in brackets, for example, [#]. You can select extra digits of precision for the CBC, Diff, or Retic tests.

NOTE Using extra digits of precision may impact the rounding of results. The system should not be configured to use extra digits of precision.

In addition to the predefined selections, you can configure Custom Units for each parameter independently from a combination of all possible units available. Diff parameters must all be reported with the same unit configuration (all % or ratio).

The reporting units available for Body Fluid are listed below. Notice that the selections available for Body Fluids are different from the selections of reporting units available for Whole Blood.

	TNC		RBC	
Reporting Units	**Display Format**	**Conversion Factor**	**Display Format**	**Conversion Factor**
Cells/mm^3	###,##0	Default	##,###,##0	Default
10^6/L	###,##0	1	##,###,##0	1
Cells/µL	###,##0	1	##,###,##0	1
10^3/µL	##0.###	10^{-3}	N/A	N/A
10^2/µL	#,##0.##	10^{-2}	N/A	N/A
10^9/L	##0.###	10^{-3}	N/A	N/A
10^6/µL	N/A	N/A	#0.###	10^{-6}
10^4/µL	N/A	N/A	#,##0.####	10^{-4}
10^{12}/L	N/A	N/A	#0.####	10^{-6}

The following table shows the possible conversions for a typical Level 1 Body Fluid Control.

Reporting Units	**TNC**	**RBC**
Cells/mm^3	96 ± 40	12059 ± 1800
10^6/L	96 ± 40	12059 ± 1800
Cells/µL	96 ± 40	12059 ± 1800
10^3/µL	0.096 ± 0.040	N/A
10^2/µL	0.96 ± 0.40	N/A
10^9/L	0.096 ± 0.040	N/A
10^6/µL	N/A	0.012059 ± 0.0018
10^4/µL	N/A	1.2059 ± 0.18
10^{12}/L	N/A	0.012059 ± 0.0018

1 From the Reporting screen, select **Units Format** to display the Test Unit Selection screen in the default Whole Blood view. Select your unit formats from the drop-down list.

2 Select the **Body Fluids** tab.

3 Select the desired formats from the TNC and RBC drop down lists. The TNC and RBC report formats do not have to match.

Label Names

1 From the Reporting screen, select **Label Names** to display the Label Names dialog box. These label names appear in the Patient Information section of the Add Order screen, and in the Add Patient Demographics dialog box (**Setup > Demographics > Patient > Add** or **Edit**).

2 Select the field label that you want to define and enter a **Label Name** in the text box.

3 Select **OK** to save.

Auto Report

1 From the Reporting screen, select **Auto Report** to display the Auto Report Criteria screen for Patient Results. You can configure automatic reports to print when results are available (as each analysis is completed), when results are partially or final released, and when results are held.

2 Select the **Print Lab Report As Each Analysis is Completed** check box if you want to print reports after all analyses or the selected analysis is complete. Depending on your configuration, results are available for review or have been released. If the user selects this checkbox, the left checkboxes for Lab Report are disabled and grayed out.

NOTE Auto Print can be configured to print RUO and slide results on laboratory, chartable, cumulative, and/or summary reports (**Setup** > **Reporting** > **Patient Report**). See the following table of AutoPrint report examples:

#	Release Rule	Auto Print Selection	Slide Option	Report Outcome for Test Order = [Panel + Slide]
1	Release All	When results final-release	Enabled	• Panel results are released. The initial report is two pages. The first page contains the panel results and the second page is the slide result noted as *In Progress*. • Slide is released and in the I/O drawer. The second report is two pages. The first page contains the panel results and the second page is the slide result noted as *Completed*.
2	Release All	When results final-release	Disabled	• Panel results are released. The initial report is one page containing the panel results. • Slide is released and in the I/O drawer. A second report is not generated.
3	Hold All	When results are held	Enabled	• Panel results are held. The initial report is two pages. The first page contains the panel results and the second page is the slide result noted as *In Progress*. • Slide results are held. A second report is generated.
4	Hold All	When results are held	Disabled	• Panel results are held. The initial report is one page containing the panel results. • Slide results are held. A second report is not generated.

3 If you selected **Print Lab Report As Each Analysis is Completed**, select from the following options:

- **Print lab report for all results**
  OR
- **Only print lab report for abnormal results containing one or more of the following:**
  - Delta Checks
  - Reference Range Flags
  - Action Limit Flags
  - Critical Limit Flags
  - Suspect Messages
  - System Messages
  - Definitive Messages
  - Specimen Exceptions
  - Codes

— Instrument Flags
— Decision Rule Triggered

4 Select **OK** to save your selections.

5 In the Automatically Report When Results Final Released option box, select from one or a combination of the following options:

- **Lab Report**
- **Chartable Report**
- **Cumulative Report**
- **Transmit Report**

NOTE This also applies to results that are partially released.

6 In the Automatically Report When Results Held option box, select from one or both of the following options. No results have been partially received.

- **Lab Report**
- **Chartable Report**

WBC Options

1 Select **Menu > Setup > Reporting > WBC Options**.

2 Select a reporting option and select **OK**.

Patient Reports

1 Select **Menu > Setup > Reporting > Patient Report**.

2 Select reporting options and select **OK**.

Patient results can include one or more grids for the manual entry of microscopic examination reports. The grids are associated with specific panels.

Test	Manual DIFF	Manual DIFF Morphology	Manual RETIC	Body Fluid DIFF	Comment
CBC					
CD	X	X			X
CDR	X	X	X		X
CR			X		X
H&H					
PLT					
PREDIx5					
RETIC			X		X
WBC					X
WBC-NE#	X	X			X
WHP					
BF				X	X

These panels are not associated with any grid:

- CBC
- H&H
- PLT
- PREDIx5
- WHP

Tests

1 From the Reporting screen, select **Tests** to enable or disable the displaying and reporting of specific test results.

2 Select tests to enable or disable and select **OK**.

QA Auto Report

You can set up Auto Reporting for Repeatability, Carryover, and CBC Calibration on the QA Auto Report screen. See

Demographics

You can add or edit patient demographics information associated with test orders and results.

1 Select **Menu** > **Setup** > **Demographics**.

Adding Patient Demographics

1 Select **Add**.

⚠ CAUTION

Risk of misidentification. Do not use the characters # @ [\ ] ` { | } ~ ? “ * in demographics, including the Specimen or Patient ID. Do not use spaces in the leading or trailing position of a Specimen or Patient ID.

2 Enter the patient ID and name in the *Patient ID*, *Last Name*, *First Name*, and *Middle Name* fields. If you enter Patient ID, the other information is optional.

3 Enter the *Date of Birth*.

NOTE If a host downloads *Age* and not *Date of Birth*, *Age* is shown as a read-only field.

4 Select *Gender* and *Ethnicity* from the drop-down lists.

5 Enter information in *User Field 1*, *User Field 2*, and *User Field 3*, as necessary.

6 Select the primary physician and patient location from the *Primary Physician* and *Patient Location* drop-down lists.

7 Enter a location in *Location Field*.

8 Select **OK**.

Delete Patient Demographics

1 Select **Delete**.

2 Select an option on the Patient Demographic Delete dialog box to delete and select **OK**.

Editing Patient Demographics

1 Select **Edit**.

2 Enter information, or select the new or modified information, and select **OK**.

NOTE To edit the Patient ID, select **Rectify Patient ID**. See Rectify Patient ID for more information.

Rectify Patient ID

1 Select **Rectify Patient ID** to correct the patient ID associated with a demographic.

⚠ CAUTION

Risk of misidentification. Do not use the characters # @ [\ ] ` { | } ~ ? “ * in demographics, including the Specimen or Patient ID. Do not use spaces in the leading or trailing position of a Specimen or Patient ID.

2 Enter the correct Patient ID in the field and select **OK**.

NOTE Patient IDs that are rectified for active orders are flagged with *E*. Those rectified for inactive orders are flagged with *C*.

The indicators for a modified Patient ID are:

- **Pending tab**: None
- **Review tab**: *E* next to the Patient ID on the Review tab; *C* next to the same Patient ID on the Released tab for existing released specimens
- **Released tab**: Rectification of the Patient ID for released results alone is not allowed.

Adding a Patient Comment

1 Select **Menu > Setup > Demographics**.

2 Select a patient from the list and select **Comment** from the local navigation bar.

3 Select **Add**, enter a comment, and select **OK** and **Close**.

Quality Control

Configuring the Number of Control Files and Runs

Both the number of individual control files and the number of runs in an individual control can be configured on your System Manager. Contact your Beckman Coulter Representative for assistance with adjusting the configuration.

Control files are not individually configurable. An increase in the number of control files or runs results in a decrease in patient database storage. The selections available for configuration are:

- 30 files with 150 runs per file
- 60 files with 300 runs per file

Commercial Controls

1 From any screen, select **Menu > Setup > Quality Control**.

2 Select the **Controls** tab.

The available Setup options are displayed in the local navigation bar.

Auto Configuring Beckman Coulter Controls

You can set up the SPM to automatically configure the Beckman Coulter Controls. The Auto Configure option will automatically set up a control file for a control that is presented to the system, where a control file is NOT present. That control file does not contain assigned values or expected ranges; these can be configured at a later date. Previously analyzed controls will remain flagged after control configuration.

1 From the Quality Control Setup - Controls screen, select **Auto Config**.

2 Select the option boxes to choose controls that will use the Auto Configure feature. Select the option to auto-configure a control presented for the specific instrument highlighted at System Status.

NOTE Auto Stop is automatically enabled as a default.

3 Select **OK** to save your selections.

New Patient Control

You can use a patient sample as a control by following the New Patient Control procedure.

NOTE When a patient control file is in an inactive state and no other active or accumulating control file exists with the same control ID, then the specific ID is no longer treated as a reserved control identifier.

1 From the Quality Control Setup - Controls screen, select **New Patient Control**.

2 Enter a **Specimen ID** in the text box.

3 Select a Level from the drop-down list.

4 Select the **Search for Patient Specimen Results** field.

5 Select one of the following test types from the *Type* drop-down list:

- **CBC**
- **CD**
- **CDR**
- **CR**
- **Retic**

6 Select a level from the *Level* drop-down list.

7 Select **Create Control** to display the Create Control dialog box.

NOTE The parameters that are displayed on the Create Control screen will vary depending on the type of test that is selected. You will be prompted to select the Specimen ID from a drop-down list. After selecting the corresponding specimen, the *Assigned Target* fields will automatically be populated.

8 Select an expiration date from the *Expiration Date* drop-down list.

9 Select the **Auto Transmit** check box to automatically transmit control results to your LIS.

10 Select the **Auto Stop** check box to automatically stop the control run if the limits are out of range.

11 Select the **Auto Print** check box to automatically print control run results.

12 Enter a value in the **Assigned Target** and an **Expected Limi**t text boxes for the parameters that you want to use for QC flagging.

NOTE If lab Limits have been assigned, the Expected Limits will automatically be populated for the level you selected.

13 Select **Save** to save the patient control configuration.

Scanning New Beckman Coulter Controls from a Handheld Bar Code Scanner

1 From the Quality Control Setup - Controls screen, select **New Control from Bar Code**. The following message is displayed: *Waiting for 2D bar code to be scanned from assay sheet*. Scan the bar code.

After you scan the bar code, a dialog box is displayed that lets you select Auto Stop, Auto Print, and Auto Transmit for selected control files and instruments. The default selections are all files and all instruments, but no Auto Stop, Auto Print, or Auto Transmit.

Entering a Beckman Coulter Control Manually

1 From the Quality Control Setup - Controls tab screen, select **New Manual Entry**.

2 From the New Manual Control Entry dialog box, select a type from the *Type* drop-down list and a control level from the *Level* drop-down list. Then, select **New** to display the Create Control dialog box.

NOTE If you enter a Beckman Coulter Control manually and you enter an incorrect level, source, or type, the control file must be deleted and you must enter the control again.

⚠ CAUTION

Do not use hyphens when typing lot numbers for Beckman Coulter controls. A hyphen will cause the control results to be stored as patient results.

3 Enter a **Lot Number** (without hyphens) and select an **Expiration Date** from the drop-down list.

4 Select from the options available:

- **Auto Transmit**
- **Auto Stop**

  NOTE Auto Stop is enabled as a default setting.

- **Auto Print**

5 Enter the **Target** and **Limit** values established by your laboratory for the parameters, or choose from the Assigned Target and Expected Limit options available on the screen.

6 Select **Save** to save the control settings.

Editing a Control

1 Select **Menu > Setup > Quality Control > Edit Control**.

2 Make the changes to the control and select **Save Changes**.

Setting Up a QC Run Reminder

See QC Run Reminder in CHAPTER 4, Quality Control for details.

To clear a QC run reminder, see Clearing a QC Alert in CHAPTER 4, Quality Control.

Follow these steps to set up a QC run reminder for active Beckman Coulter controls.

1 Select **Menu > Setup > Quality Control**.

2 From the local navigation bar, select **More Options > QC Run Reminder**.

3 From the QC Run Reminder dialog box, select the down arrow next to each control type to select the number of hours (**None**, **1**, **2**, or up to **24** hours) and select **Save**.

Setting Up QC Auto Exporting

Follow these steps to set up QC auto exporting for all active Beckman Coulter (BCI) and Patient controls.

All runs for all active BCI and Patient control files will be exported. The default setting is disabled.

1 Select **Menu** > **Setup** > **Quality Control**.

2 Select **More Options** > **Auto Export Settings** from the local navigation bar.

3 Select the **Enable** checkbox for *BCI Control* or *Patient Control.*

4 Select the arrow under *Schedule* to select **Daily**, **Weekly**, or **Monthly**.

5 Under *Day*, select one of the following. For:

- Daily - Select **None**
- Weekly - Select the day of the week
- Monthly - Select the first day of the month

6 Under *Time*, select a time from the drop-down list for the *Day* you have already selected.

7 Select **Select Folder** where the export should go.

8 Select **OK**.

NOTE You can view the changes made to the QC Auto Export configuration in an audit log. See Audit Logs in APPENDIX C, Logs.

Setting Up QC Auto Rerun

QC Auto Rerun can be used to automatically trigger a rerun for a BCI control after a control out condition. If Auto Stop is enabled, the QC Auto Rerun failure will stop.

When Auto Rerun is enabled and a control is out,  turns red, the event is logged, and the results for the first run and rerun are displayed in the QC file. Auto Stop occurs if the rerun is out. If the rerun is in, Auto Stop is not triggered.

NOTE QC Auto Rerun is not applicable for patient controls. QC Auto Rerun applies to cassette presentation only.

1 Select **Menu > Setup > Quality Control**.

2 Select **More Options > Auto Rerun** from the local navigation bar.

3 Select the checkbox for **Enable Coulter Control Auto Rerun**.

4 Select **OK**.

NOTE The audit log keeps a history of QC Auto Rerun configuration changes.

Control States

Control files have filters that let you select a Control State. These filters are as follows:

- *Active* is the default state. Active control files are currently in use. Active control files are evaluated and stored. Event log messages, alarms and stop conditions are triggered as applicable.
- *Accumulating* control files are used during crossover studies. Accumulating control files will not trigger event log messages, alarms, and stop conditions. Processing is otherwise the same as the Active State.
- *Inactive* control lots are no longer in use. No new data will be added to a file in an Inactive state.

Change the state of a control, if desired, by selecting **Menu > Setup > Quality Control**.

Select **More Options** from the local navigation bar, then **Change State**.

NOTE The following control files cannot have the same lot numbers:

- Two active files
- Two accumulating files
- An active and an accumulating file

It is possible for the following to have the same lot number:

- An inactive and accumulating file
- An inactive and active file
- Different inactive files

Enabling Extended QC

1. From the Quality Control Setup screen, select **Extended QC**.
2. Click **Enable** under *Instrument* to select an instrument.
3. Select the tabs to view CBC, DIFF, RETIC, and BFC setup information.
4. Edit the text boxes, as needed.
5. Select **Save**.

Add Additional Information for Extended QC

Additional Information lets you enter a comment specific to the Extended QC.

1. From the Extended QC Setup screen, select **Additional Information**.
2. Enter the additional information, if necessary, and select **OK**.

Auto Print

You can display histograms and data plots on individual control runs that are auto-printed.

1 From the Quality Control Setup - Controls screen, select **Auto Print Setup**. (Automatic printing of control file results themselves must be configured inside the individual control file setup.)

2 Select the **Histograms** check box to automatically print QC histogram results.

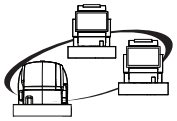
3 Select the **Dataplots** check box to automatically print QC dataplot results.

4 Select **OK** to save selected auto print settings.

Enabling/Disabling XB

1 Select **Menu** > **Setup** > **Quality Contro**l > **XB**.

NOTE At the System Status screen, you can turn XB on or off for the entire workcell by going to **More** > **Allow/Disallow XB on All Instruments**.



2 Select the instrument, then select the **Enable XB on This Instrument** check box to enable XB, and go to step 3
OR
Deselect the **Enable XB on This Instrument** check box to disable XB and select **Save**.

3 In the Target and Tolerance Settings panel, enter a **Target** value and **Limit(%) for MCV, MCH, and MCHC.**

4 In the XB Exclusions group box, select the **Exclude** check box next to any location that you want to exclude from XB analysis.

5 In the Reporting Options panel, select the Generate **XB Batch Details Report** check box if you want to generate detailed reports.

a. Select one of the following options to determine when the detailed reports print:

- **At the completion of each XB batch**
- **Whenever an XB batch is out** (out of range)

b. Select the Levey-Jennings Graphs check box to generate Levey-Jennings graphs with your details reports.

6 At the bottom of the Reporting Options panel, select the **Generate XB Batch Means Report after every 20 batches** check box if you want to generate XB Batch Means reports after every 20 batches.

Select the **Levey-Jennings Graphs** check box to generate Levey-Jennings graphs with the XB Batch Means reports.

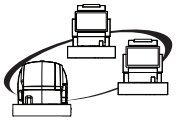
7 In the XB Alert Settings panel, select one of the following options to determine when the system generates an XB alert:

- **When one batch is out**
- **When two consecutive batches are out**
- **When three consecutive batches are out**

8 Select the **Auto Stop Instrument for XB Alert** check box if you want to stop the instrument when an XB is generated.

Enabling/Disabling XM

1 From the Quality Control - XB tab, select the **XM** tab.



NOTE At the System Status screen, you can turn XM on or off for the entire workcell by going to **More** > **Allow/Disallow XM on All instruments**.

2 Select the **Enable XM** check box for each XM parameter.

3 Select **Parameter Details** to set up parameter details.

4 Select the tabs to view CBC, Diff, Retic, and Retic Calc parameter details.

5 Edit the selections, as needed and select **OK**.

6 Configure the other selections, such as Reporting Options and Alert Settings. See Enabling/Disabling XB for additional instructions.

7 Select **Save** before exiting.

Setting Shifts

1 From the Quality Control Setup screen, select the **Shifts** tab.

2 Edit the text boxes, as needed, and select **Save**.

Setting Lab Limits

1 From the Quality Control Setup screen, select the **Limits** tab.

2 Select a **Source**, **Type,** and **Level** from the drop-down lists.

3 Enter the limits in the text boxes and select **Save**.

Setting Up IQAP Export

1 Select **Menu** > **Setup** > **Quality Control** > **Control** > **More Options** > **IQAP Export.**

2 Select **Export IQAP**.

IMPORTANT Submit IQAP results separately for each individual test location/SPM. For a connected workcell, select the individual instrument from the drop-down list before you transfer files to Beckman Coulter.

There may be instances where the value for the differential parameter with the largest percentage transmitted to IQAP disagrees with the value displayed on the screen by minor amounts (such as 88.8 versus 88.6). This is due to rounding differences; internal transmitted values are not rounded.

Laboratory Information System (LIS) Communications

Refer to the Host Transmission Manual (see Related Documents) for the Host communication data link protocol.

Setting Up the LIS

1 Select **Menu > Setup > Communications > LIS**.

2 Select **On** from the *LIS Interface* drop-down list to enable LIS communication. The *Enable Host Log* feature is defaulted to ON.

NOTE **Disable Host Log** - Disabling entries into the Host Log begins when the *Enable Host Log* checkbox is deselected. Depending on the number of entries in the log, items may persist and continue to roll out of the database over the next 30 days. The Host Log can be enabled/disabled at any time.

Keep-Alive

The system can be selected to automatically re-establish a TCP/IP connection when a network interruption is detected or the host/LIS is reconnected. This automatic action, known as *Keep-Alive*, can be enabled only when the LIS protocol is set to *NCCLS LIS 1-A* and *NCCLS LIS 2-A*, and the data transport is *Ethernet*.

Filtering LIS Information

1 Select **Menu > Diagnostics > LIS > Filter**.

2 On the Filter dialog box, select the date range to filter.

3 Select **OK**.

Exporting LIS Information

1 Select **Menu > Diagnostics > LIS > Export.**

2 On the Export dialog box, select the data to export and the destination.

3 Select **Start**.

Software Installation/Upgrading

On occasion, your Beckman Coulter Representative may request information regarding software component status from you over the telephone (**Menu > Setup > Software Versions**). The tabbed screens are supplied to help you easily locate that information.

Quality Assurance

Setting Up Repeatability

Repeatability setup is part of the Repeatability procedure. For instructions on setting up Repeatability, see Repeatability in CHAPTER 11, Quality Assurance.

Setting Up Carryover

Carryover setup is part of the Carryover procedure. For instructions on setting up Carryover, see Carryover in CHAPTER 11, Quality Assurance.

Setting Up CBC Calibration

CBC Calibration setup is part of the Calibration procedure. For instructions on setting up CBC Calibration, see Calibration in CHAPTER 11, Quality Assurance.

Setting Up an Automatic Notification to Verify Calibration

Beckman Coulter does not require routine calibration. See Calibration in CHAPTER 11, Quality Assurance on when to calibrate. If your laboratory verifies calibration, you can configure an automatic reminder by following these steps.

1 Select **Menu** > **QA** > **CBC Calibration** > **Calibration Setup** > **Calibration Reminder**.

2 Select a frequency (**None** or up to **12** months) and **OK**.

NOTE A notification will be displayed until the procedure is performed or you acknowledge the notification.

Setting Up QA Auto Report

1 Select **Menu** > **Setup** > **Reporting** > **QA Auto Report** to display the Reporting screen for Quality Assurance reports (Repeatability, Carryover, and CBC Calibration).

2 Select **QA Auto Report** on the Reporting screen to display the QA Auto Report Configuration dialog box.

3 In the *Repeatability* option box, if you enable auto report generation, you must also select which options to print. The options under *Enable Auto Report Generation* are:

- **Repeatability Summary report after procedure is accepted**
- **Print Detailed Summary report after each run is completed**

4 In the *Carryover* option box, select both options:

- **Enable auto report generation**
- **Carryover Summary report after procedure is accepted**

5 If Auto Report Generation is enabled under *CBC Calibration*, select which option to report. The options are:

- **Calibration Summary report after procedure is accepted.**
- **Print Detailed Summary report after each run is completed.**

6 Select **OK** to save your settings.

Daily Checks Auto Configuration

Enabling Automatic Daily Checks

1 From the Daily Checks screen, select **Auto Configuration > Configure Daily Checks**.

2 Select **Enable Automatic Daily Checks** to enable running daily checks automatically on your system.

3 Select one of the following options:

- **Perform Daily Checks After Shutdown**
- **Perform Daily Checks at a Specified Time**

4 If you selected **Perform Daily Checks After Shutdown**, select **OK** to save
OR
If you selected **Perform Daily Checks at a Specified Time**, select a time and day, and select **OK** to save.

5 Select **OK** to save your selections.

Enabling Automatic Shutdown

1 From the Daily Checks screen, select **Auto Configuration > Configure Shutdown**.

2 Select **Enable Automatic Shutdown** to enable running Shutdown automatically on your system.

3 Complete the following:

- Enter the time for automatic shutdown in **Hour** and **Minutes** in the text boxes.
- Select **AM** or **PM**.
- Select **Daily** or select specific days of the week to run Shutdown automatically.
- Enter the time the cleaner should remain in the SPM during the shutdown procedure in **Hours** and **Minutes (default time is 30 minutes)**.

4 Select **OK** to save your selections.

Default Test Order

The default test order for both Cassette and Single-Tube Presentations is displayed on the Status screen (**Menu > System Status**).

System Status Details

You can see system status details by selecting  and then selecting **System Status > Details Status**.

Cassette Aspiration Default Test Order

Set Whole Blood Specimen Type With Test Panel

1 Select the test panel for the default Automatic Test Order from the *Test* drop-down list:

- **None**
- **CBC**
- **CD**
- **CDR**
- **CR**
- **H&H**
- **PLT**
- **RETIC**
- **WBC**
- **WBC-NE#**
- **WHP**

NOTE On the individual module's screen, the *Automatic (Cassette) Specimen* drop-down list defaults to **Whole Blood**.

Setting Single-Tube Aspiration Default Test Order

1 From the System Status screen, select one of the following specimen types from the *(Single-tube) Specimen* drop-down list:

- **Whole Blood**
- **CSF***
- **Synovial***
- **Pleural***
- **Peritoneal***
- **Pericardial***

***** Default Test Orders cannot be set for any Body Fluid panel with single-tube presentation. The default will revert back to Whole Blood. If an attempt is made to assign a default to a Body Fluid panel, a dialog box is displayed giving you the option to edit or cancel the test order. Select **OK** to return to the Edit Test Order dialog box where you can select a Body Fluid test panel.

NOTE The *Test* drop-down list defaults to the BFC test panel for all of the specimen types listed above, except Whole Blood.

Whole Blood Specimen Type with Default Test Panel and Addition of Predilute

NOTE The following Test Panels can be selected for Whole Blood specimens:

- **None**
- **CBC**
- **CD**
- **CDR**
- **CR**
- **H&H**
- **PLT**
- **PREDIx5** (for single-tube whole blood specimens only)
- **RETIC**
- **WBC**
- **WBC-NE#**
- **WHP**

Checking Print Status

1 Select  .

2 On the System Status screen, select **Print > Printers.**

NOTE From the local navigation bar, you can also set up a printer by selecting **Print** > **Printer Setup**. See Setting Up the Printer for more information on setting up a printer.

3 Highlight a printer name and select **Details** to view details about that printer status.

Changing a Printer

1 Select  .

2 On the System Status screen, select **Print** > **Printers**.

NOTE From the local navigation bar, you can also set up a printer by selecting **Print** > **Printer Setup**. See Setting Up the Printer for more information on setting up a printer.

3 Highlight a printer name and select **Details** to view details about that printer status.

4 Select **Change Printer**.

NOTE This option is only available when you have more than one printer in the system.

5 Select an option under *Change Printer For*.

6 Select an option from the *Using* drop-down list.

7 Select an option from the *Change Printer To* drop-down list.

8 Select **OK**.

Cancelling a Report

1 Select  .

2 On the System Status screen, select **Print** > **Printers**.

NOTE From the local navigation bar, you can also set up a printer by selecting **Print** > **Printer Setup**. See Setting Up the Printer for more information on setting up a printer.

3 Highlight a printer name and select **Details** to view details about that printer status.

4 Select **Cancel Report**.

5 Select an option under *Cancel* and select an option from the drop-down list.

6 Select **OK**.

Batching

You can use batching when you want to analyze all your specimens with the same default test panel (for example, your LIS is down). You can enable batching on the SPM from the individual module's screen.

Setting Up Batching

1 Select the instrument on the System Status screen.

2 Double-click to display the individual module's status display.

3 Select the **Batching** checkbox, and then select **OK.**

All results will be labeled with the message *Default Test Order*.

Custom Worklist Filter

You can use the Advanced Search function to write powerful search criteria that will be implemented through the Custom Worklist (**Menu > Worklist > Custom** tab **> Advanced Search**.

Writing an Advanced Search is similar to writing a decision rule. See Flagging and Rules for additional information and instructions.

Insertable features that are included in Advanced Search, but not in Decision Rules, are described on the following pages.

Ensure that old values in the Specimen Search display are deleted before you activate a new search.

NOTE When the Advanced Search on the Custom tab for the Worklist includes *Presentation = Single Tube*, the result of the search may be incomplete. Conduct a new search to obtain a complete list by entering **Tube Pos. ID Contains 99999**.

Inserting a Test Result

1 Select **Advanced Search > Insert > Result > Test Result**.

2 Select a test from the *Test Result* drop-down list.

3 Select an option from the second drop-down list:

- **Less Than**
- **Less Than or Equal to**
- **Greater Than**
- **Greater Than or Equal to**

4 Select option from the third drop-down list.

5 Select **OK**.

Inserting Test Flags

1 Select **Advanced Search > Insert > Result > Test Flags**.

2 Select a name from the *Test Name* drop-down list.

3 Select an option from the *Test Flags* drop-down list.

4 Select an option from the list under *Available* and select **Add** to move it under *Selected*.

5 Select **OK**.

Inserting Suspect Messages

1 Select **Advanced Search > Insert > Result > Suspect Messages**

2 Select an option from the *Suspect Messages* drop-down list.

3 Select an option from the list under *Available* and select **Add** to move it under *Selected*.

NOTE When you select **ABN RBC Pattern** or **Cellular Inter** from the *System Messages* or *Suspect Messages* drop-down list, select both instances of the message to ensure that the message is retrieved when the search is executed.

4 Select **OK**.

Inserting System Messages

1 Select **Advanced Search > Insert > Result > System Messages**

2 Select an option from the *System Messages* drop-down list.

3 Select an option from the list under *Available* and select **Add** to move it under *Selected*.

NOTE When you select **ABN RBC Pattern** or **Cellular Inter** from the *System Messages* or *Suspect Messages* drop-down list, select both instances of the message to ensure that the message is retrieved when the search is executed.

4 Select **OK**.

Inserting Definitive Messages

1 Select **Advanced Search > Insert > Result > Definitive Messages**.

2 Select an option from the *Definitive Messages* drop-down list.

3 Select an option from the list under *Available* and select **Add** to move it under *Selected*.

4 Select **OK**.

Inserting Rules Triggered

1 Select **Advanced Search** > **Insert** > **Result** > **Rules Triggered**.

2 Select an option from the *Rules Triggered* drop-down list.

3 Select a rule name from the Available Rules and select **Add**.

NOTE You can select multiple names by pressing (Ctrl) while selecting each name.

4 Select **OK**.

Inserting a Lab Action

1 Select **Advanced Search** > **Insert** > **Result** > **Lab Action**

2 Select an operand from the *Lab Action* drop-down list and select **OK**.

3 Select **Select Lab Actions** to select an action from the preset list and select **OK**. New Lab Actions are limited to 120 characters if that Lab Action is to be transmitted to a host.

4 Select **OK** again.

5 Select **AND** or **OR**, and **Insert** to add more search criteria
OR
Select **Save Filter** to save the filter as is.

6 Select **Search**.

Inserting Panel Information

1 Select **Advanced Search** > **Insert** > **Panels**.

2 Select an option from the *Panels* drop-down list.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

Inserting an Action Status

1 Select **Advanced Search > Insert > Status > Action Status**.

2 Select an option from the *Action Status* drop-down list.

3 Select from the *Available* list and select **Add**.

4 Select **OK**.

Inserting an Exception Status

1 Select **Advanced Search > Insert > Specimen > Exception Status.**

2 Select an option from the *Exception Status* drop-down list.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

5 Select a filter name at the top of the screen
OR
Create a new filter by following the prompts at the bottom of the screen.

6 Select **Search**.

Inserting a Test Release Status

1 Select **Advanced Search > Insert > Status > Test Release Status.**

2 Select a name from the *Test* drop-down list:

3 Select an option from the *Release Status* drop-down list and from the third drop-down list.

4 Select **OK.**

Inserting a Panel Release Status

1 Select **Advanced Search > Insert > Status > Panel Release Status.**

2 Select a name from the *Panel* drop-down list:

3 Select an option from the *Release Status* drop-down list and from the third drop-down list.

4 Select **OK.**

Inserting an Order Release Status

1 Select **Advanced Search > Insert > Status > Order Release Status.**

2 Select a name from the *Order Release Status* drop-down list:

3 Select an option from the second drop-down list.

4 Select **OK**.

Inserting a Results Status

1 Select **Advanced Search > Insert > Status > Results Status**.

2 Select one of the options from the *Results Status* drop-down list:

- **Equal To**
- **Not Equal To**

3 Select one of the following options from the second drop-down list:

- **Pending**
- **Partially Complete**
- **Complete**

4 Select **OK** to save your selections.

Inserting a Saved Status

1 Select **Advanced Search > Insert > Status > Saved Status**.

2 Select one of the options from the *Saved Status* drop-down list:

- **Equal To**
- **Not Equal To**

3 Select one of the following options from the second drop-down list:

- **Not Saved**
- **Saved**

4 Select **OK** to save your selections.

Inserting a Specimen Status

1 Select **Advanced Search > Insert > Status > Specimen Status.**

2 Select one of the options from the *Specimen* submenu.

3 Select the applicable option depending on the type of status selected.

4 Select **OK** to save your selections.

Inserting a Patient ID

1 Select **Advanced Search > Insert > Patient > Patient ID.**

2 Select an option from the *Patient ID* drop-down list

3 Enter part of the patient ID in the second field.

4 Select **OK.**

Inserting a First Name

1 Select **Advanced Search > Insert > Patient > First Name.**

2 Select an option from the *First Name* drop-down list.

3 Enter part of the patient's first name in the second field.

4 Select **OK.**

Inserting a Last Name

1 Select **Advanced Search > Insert > Patient > Last Name.**

2 Select an option from the *Last Name* drop-down list.

3 Enter part of the patient's last name in the second field.

4 Select **OK**.

Inserting an Age

1 Select **Advanced Search > Insert > Patient > Age.**

2 Select an option from the *Age* drop-down list.

3 Enter a number in the second field.

4 Select an option from the third drop-down list.

5 Select **OK**.

Inserting User Field 1

1 Select **Advanced Search > Insert > Patient > User Field 1.**

2 Select an option from the *User Field 1* drop-down list.

3 Enter alphanumeric text in the second field.

4 Select **OK**.

Inserting a Physician Name

1 Select **Advanced Search > Insert > Patient > Physician.**

2 Select an option from the *Physician* drop-down list. Default sorting is *Physician ID* followed by *Last Name*. Both the *Physician* and *Physician ID* drop-down lists should be addressed when searching for specific last names to avoid overlooking an existing entry.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

Inserting a Patient Location

1 Select **Advanced Search > Insert > Patient > Patient Location.**

2 Select an option from the *Patient Location* drop-down list.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

Inserting a Priority

1 Select **Advanced Search > Insert > Specimen > Priority.**

2 Select an option from the *Priority* drop-down list.

3 Select an option from the second drop-down list.

4 Select **OK**.

Inserting a Specimen ID

1 Select **Advanced Search > Insert > Specimen > Specimen ID.**

2 Select an option from the *Specimen ID* drop-down list.

3 Enter part of the specimen ID in the second field.

4 Select **OK**.

Inserting a Tube Position ID

1 Select **Advanced Search > Insert > Specimen > Tube Pos. ID.**

2 Select an option from the *Tube Pos. ID* drop-down list.

3 Enter part of the tube position ID in the second field.

4 Select **OK**.

Inserting a Specimen Type

1 Select **Advanced Search > Insert > Specimen > Specimen Type.**

2 Select an option from the *Specimen Type* drop-down list.

3 Select an option from the second drop-down list.

4 Select **OK**.

Inserting a Draw Location

1 Select **Advanced Search > Insert > Specimen > Draw Location.**

2 Select an option from the *Draw Location* drop-down list.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

Inserting an Analysis Date/Time

1 Select **Advanced Search > Insert > Specimen > Analysis Date/Time**.

2 Select an Analysis Date/Time and select **OK**.

Inserting a Draw Date/Time

Collection Date and Time does not appear on printed patient reports. This information is available as *Draw Date and Time* on test order screens, result displays, and patient export files (.csv), and in specific fields in the host transmission.

1 Select **Advanced Search > Insert > Specimen > Draw Date/Time**.

2 Select a Draw/Date Time and select **OK**.

Inserting a Presentation

1 Select **Advanced Search > Insert > Presentation**.

2 Select **Equal To** from the *Presentation* drop-down list.

3 Select a presentation method from the drop-down list:

- **Cassette**
- **Single Tube**

Some results from the single-tube presentation may be displayed when searching for **Cassette** in Advanced Search.

4 Select **OK.**

Inserting a Test Instrument

1 Select **Advanced Search > Insert > Instruments > Test Instrument.**

2 Select a name from the *Test* drop-down list.

3 Select an option from the *Test Instrument* drop-down list.

4 Select an option from the *Available* section and select **Add**.

5 Select **OK**.

Inserting a Panel Instrument

1 Select **Advanced Search > Insert > Instruments > Panel Instrument.**

2 Select a name from the *Panel* drop-down list.

3 Select an option from the *Panel Instrument* drop-down list.

4 Select an option from the *Available* section and select **Add**.

5 Select **OK**.

Inserting an Order Instrument

1 Select **Advanced Search > Insert > Instruments > Order Instrument**.

2 Select an option from the *Order Instrument* drop-down list.

3 Select an option from the *Available* section and select **Add**.

4 Select **OK**.

Inserting a Logged Operator ID

1 Select **Advanced Search > Insert > Operator > Logged Operator ID**.

2 Select an option from the *Logged Operator ID* drop-down list:

- **Starts With**
- **Ends With**
- **Contains**
- **Does Not Contain**

3 Enter the operator identifier.

4 Select **OK**.

Inserting an Operator ID

1 Select **Advanced Search > Insert > Operator > Operator ID**.

2 Select an option from the *Operator ID* drop-down list:

- **Starts With**
- **Ends With**
- **Contains**
- **Does Not Contain**

3 Enter an Operator ID in the text box.

4 Select **OK**.

Inserting Comments

1 Select **Advanced Search > Insert > Comments**.

2 Select an option from the *Comments* drop-down list:

- **Contains**
- **Does not contain**

3 Enter a comment or select **Select a Comment**.

4 Select **OK**.

Inserting a Chartable Report

1 Select **Advanced Search > Insert > Report > Chartable Report**.

2 Select an option from the *Chartable Report* drop-down list:

- **Equal To**
- **Not Equal To**

3 Select one of the following options from the second drop-down list:

- **Not Sent**

- **Preliminary**
- **Amended**
- **Final**

4 Select **OK**.

Inserting a Lab Report

1 Select **Advanced Search > Insert > Report > Lab Report**.

2 Select an option from the *Lab Report* drop-down list:

- **Equal To**
- **Not Equal To**

3 Select one of the following options from the second drop-down list:

- **Not Sent**
- **Preliminary**
- **Amended**
- **Final**

4 Select **OK**.

Inserting a Report Transmitted Option

1 Select **Advanced Search > Insert > Patient > Report Transmitted**.

If the Report Transmitted State column does not display any information, select **Worklist > Custom** tab **> Not Transmitted** filter.

2 Select an option from the *Report Transmitted* drop-down list:

- **Equal To**
- **Not Equal To**

3 Select one of the following options from the second drop-down list:

- **Preliminary Not Sent**
- **Amended Not Sent**
- **Final Not Sent**
- **Preliminary Sending**
- **Amended Sending**
- **Final Sending**
- **Preliminary Queued**
- **Amended Queued**
- **Final Queued**
- **Preliminary Sent**
- **Amended Sent**
- **Final Sent**

4 Select **OK**.

Inserting a Has Slide Orders Option

1 Select **Advanced Search > Insert > Slides > Has Slide Orders**.

2 Select an option from the drop-down list.

3 Select **OK**.

Inserting a Slide Number

This feature is currently not functional.

Inserting a Slide Order Type

1 Select **Advanced Search > Insert > Slides > Slide Order Type**.

2 Select an option from the *Slide Order Type* drop-down list.

3 Select a slide order type from the second drop-down list.

4 Select **OK**.

Inserting a Slide Order State

1 Select **Advanced Search > Insert > Slides > Slide Order State**.

2 Select an option from the *Slide Order State* drop-down list.

3 Select a slide order state from the second drop-down list.

4 Select **OK**.

Inserting Slide Exceptions

This feature is currently not functional.

Inserting a Manually Made Option

1 Select **Advanced Search > Insert > Slides > Manually Made**.

2 Select an option from the drop-down list.

3 Select **OK**.

Specimen Warnings

You can set up warnings that alert you when more time has elapsed than expected for a STAT to begin analysis and/or for result release.

1 Select **Menu > Setup > System > More > Specimen Warnings**.

2 Select from the following options.

Initiating Event for STAT Specimen Time to Analysis:

- Date/Time of specimen collection
- Date/Time of specimen receipt

Initiating Event for STAT Specimen Time to Release:

- Date/Time of first result complete
- Date/Time of last result complete
- Date/Time of specimen receipt

NOTE The Specimen Warning alarm may be triggered before the specified time AFTER a last result.

3 Select **OK**.

Presentation Timeout

Presentation Timeout lets you set a time when the system can analyze a released specimen using a default test order.

Setting Up Presentation Timeout

1 Select **Menu > Setup > System > More > Presentation Timeout**.

NOTE The message in the dialog box above should state:
Configure the timeout for analysis of a released specimen when running a default test order.

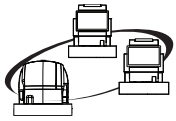
2 Select **0** to analyze the released Specimen ID again using a default test order
OR
Select **8**, **16**, or **24** hours to skip the specimen through that time period and show it as a No Match exception on the Not Processed tab for the Worklist.

3 Select **OK**.

Short Tube Rerun

Your lab may want to inhibit automatic rerun or reflex testing of specimens collected into short tubes which have been analyzed using cassette presentation (for example, pediatric specimens and specimens in short draw false-bottom tubes). These tube types are sampled from Type B and Type D cassettes. There may not be enough blood volume remaining for a second successful aspiration in cassette presentation.

The DxH 900 automatically denies a rerun or reflex request for Type B and Type D cassettes unless the short tube specimen rerun checkbox has been enabled.



Selecting **Setup > Flagging/Rules > Active Decision Rules > Short Tube Rerun** does not function if the original order contains both a DxH 900 panel and a DxH Slidemaker Stainer II; the sample is aspirated twice. Triggered reruns and reflexes ordered from the System Manager as part of decision rules are not performed as expected when Short Tube Rerun remains disabled.

Setting Up a Short Tube Rerun

Setting up a short tube rerun enables rerun or reflex requests for Type B and Type D cassettes.

NOTE When Short Tube Rerun is disabled, any reflex of tubes in Type B and Type D cassettes will not be performed automatically. You can present the cassette directly to the DxH Slidemaker Stainer II to process slide orders for a specimen.

1 Select **Menu > Setup > Flagging/Rules > Rules > Short Tube Rerun**.

2 Insert a checkmark next to *Allow short tube specimens to be rerun* to allow a rerun or reflex request for Type B and Type D cassettes.

3 Select **OK**.

Basket Settings - DxH Slidemaker Stainer II

Use basket settings to select the number and distribution of slides in each basket, the pre-stain slide drying time, and the time to advance baskets with different priorities through the Stainer module.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

Setting Up Basket Settings

1 Select  to display the System Status screen.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 Select **SMS Configuration** from the local navigation bar.

5 Select **Basket Settings** from the local navigation bar on the DxH Slidemaker Stainer II Configuration screen to display the Basket Settings dialog box.

6 Select whether you want to have a slide in every basket position or every other position.

7 Enter the number of slides you want to have in each basket.

8 Configure the **Advance Timeout** options by entering the minutes for each timeout (after which a basket will advance). The timer starts with the first slide entering the basket elevator.

NOTE Timeout is the amount of time set to move the basket after pre-drying (drying before staining). The timeout must be equal or greater than the amount of time for pre-drying.

9 Enter the **Pre-Staining Drying Time** in minutes and seconds by using the arrows.

10 Select **OK** to save the settings
OR
Select **Cancel** to go back to the previous screen.

Setting a Pre-Stain Drying Type

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

5 Select **Pre-Stain Drying** from the local navigation bar to display the Pre-Stain Dryer Settings dialog box.

6 Select **Heat and Fan Drying** or **Fan Drying**.

NOTE Selecting **Fan Drying** powers off the heaters and allows the smears to dry without heat.

7 Select **OK** to save settings
OR
Select **Cancel** to go back to the previous screen.

Configuring the Slide Label

This feature lets you assign sample information to print on the slide for identification.

NOTE The system must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

5 Select **Slide Labeling** from the local navigation bar to display the Label Configuration screen.

The DxH Slidemaker Stainer II incorrectly prints the Primary Physician information on the slide label when the *Ordering Physician* field is selected. The *Ordering Physician* field is optional. The Ordering Physician's name is on the Patient Report, is correctly transmitted to the host, and can be viewed by selecting **System Manager > Worklist > Release** tab **> Specimen ID > Collection** tab.

The lower case *w* character, and characters with accents are not legible when 17 or more characters are used in the *Specimen ID* field. The *Patient Name*, *Patient ID*, and *Ordering Physician* fields may also be affected when printing a lower case *w* and/or accented characters and more than 17 characters are used. Refer to the Slide List from the System Manager to identify the illegible characters in the *Specimen ID*.

The *Slide Label Configuration User Field 1* can be configured, but is not printed on the slide.

6 Select **Insert Field** from the local navigation bar to add a field to the slide label from the displayed list
OR
Select **Remove Field** to remove a field from the slide label.

NOTE The Specimen ID and Date/Time Made cannot be removed.

To improve visibility of STAT slides in a basket, ***STAT*** will be printed on a slide if:

- The specimen has STAT priority.
- The Priority field is configured to print on the slide.

7 Select the individual field to move to the desired location by using *drag and drop* or by using the arrows to move the field on the grid.

NOTE Red outlines indicate overlapping fields.

8 Use the arrows on the *Selected Field* drop-down list to change the font size to **Small** or **Large**.

9 Select **Specimen ID** from the labeling configuration screen to activate the **Print with Barcode** checkbox.

10 Enable the **Print with Barcode** checkbox to include the Specimen ID bar code on the slide label.

You can select to print the bar code label identical to the sample label or you can select a Data Matrix (2D) bar code label.

NOTE Slide bar code labels will default to 2D when the number of characters with certain symbologies exceed the printable area of the slides.

11 Move the **Darkness** scroll bar to adjust lighter or darker print.

12 Select **Option A** or **Option B** to determine the print orientation of the label.

13 Select **Save Changes** to save the label configuration updates
OR
Select **Discard Changes** to ignore the label configuration updates
OR
Select **Restore Default** to display the original instrument slide label configuration.

14 Select **OK** to confirm that you are discarding changes or restoring the default
OR
Select **Cancel** to go back to the previous screen.

NOTE If you are saving changes, the system will not ask for your confirmation.

Setting Up Basket Location Availability

This feature lets you enable and disable positions to place a basket in the I/O drawer and the internal storage area during operation.

NOTE The instrument must be offline and no staining should be in progress in order to perform this procedure.

1 Select  to display the System Status screen.

2 Select the DxH Slidemaker Stainer II.

3 Select **Details Status** from the local navigation bar.

4 On the SMS Status screen, select **SMS Configuration** from the local navigation bar.

5 Select **Basket Location Availability** from the local navigation bar on the DxH Slidemaker Stainer II Configuration screen to display the Basket Location Availability screen.

6 Click to enable or disable the positions for basket placement in the I/O drawer and the internal storage area.

The internal storage area holds seven additional storage positions that can be used when the I/O drawer is full or no remaining positions are available.

7 Select **OK** to save the settings
OR
Select **Cancel** to go back to the previous screen.

Auto Print History Log Configuration

Configuring an Auto Print History Log

Set up a schedule for automatically printing portions of a history log.

1 Select **Menu > Logs**.

2 Select **Auto Print** from the History Logs screen.

3 Select one of the following tabs:

- **Event Logs**
- **Data Summary Logs**
- **Audit Logs**
- **Maintenance Logs**

4 Make your selections and select **OK**.

Stainer Disabling/Enabling Temporarily - DxH Slidemaker Stainer II

Disabling the Stainer

1 Select **Menu > System Status.**

2 Select **Module > Disable Stainer** from the local navigation bar.

3 On the Disable Module dialog box, select **Stainer** and select **OK** to disable it.

⚠ CAUTION

Risk of instrument damage. Do not leave the stainer sitting with stain without draining it. Perform the cleaning procedures described in CHAPTER 12, Cleaning Procedures.

4 Select **Yes** when the system displays:

You have requested to temporarily disable a module. Do you want to continue with the request?

Enabling the Stainer

1 Select **Menu** > **System Status.**

2 Select **Module** > **Disable Stainer** from the local navigation bar.

3 Deselect **Stainer** and select **OK** to enable the stainer.

4 Select **Yes** when the system displays:

You have selected to enable a module. The System will automatically perform a Prime. Performance verification must be performed before patient samples can be analyzed. Do you want to continue?

Maker Disabling/Enabling Temporarily - DxH Slidemaker Stainer II

Disabling the Maker

1 Select **Menu** > **System Status.**

2 Select **Module** > **Disable Maker** from the local navigation bar.

3 On the Disable Module dialog box, select **Maker** and select **OK** to disable it.

4 Select **Yes** when the system displays:

You have requested to temporarily disable a module. Do you want to continue with the request?

Enabling the Maker

1 Select **Menu** > **System Status.**

2 Select **Module** > **Disable Maker** from the local navigation bar.

3 Deselect **Maker** and select **OK** to enable the maker.

4 Select **Yes** when the system displays:

You have selected to enable a module. The System will automatically perform a Prime. Performance verification must be performed before patient samples can be analyzed. Do you want to continue?

Activating a Feature

1 Select **Menu** > **Setup** > **System** > **Configure Features** > **Help**.

2 From the Configure Additional Features dialog box, view the Hardware Code and make a note of it.

3 Call your Beckman Coulter Representative and provide the Hardware Code to obtain a temporary password.

4 Enter the temporary password in *Feature Password* and press **Enter** or **Tab** on the keyboard.

5 Select the feature and select **OK**.

CHAPTER 10

Troubleshooting

Precautions/Hazards

General Precaution

⚠ WARNING

Risk of injury. Beckman Coulter urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but is not limited to, protective eyewear, gloves, and suitable laboratory attire.

Laser Radiation Statement

The DxH 900 and the DxH 690T are Class 1 Laser Products.

Beckman Coulter Inc. has complied with the requirements governing the use and application of a laser as stipulated in regulatory documents issued by:

- Center for Devices and Radiological Health (CDRH)
- IEC 60825-1 (Safety of Laser Products)

In compliance with these regulatory documents, every measure has been taken to ensure the health and safety of users and laboratory personnel from the possible dangers of laser use.

Laser Safety

⚠ WARNING

Possible harm to operator. Do not use any controls, make any adjustments, or perform any procedures other than those specified herein. To do so may result in hazardous radiation exposure.

The Multi-Transducer Module contains a laser. A laser is a unique light source that exhibits characteristics different from conventional light sources. The safe use of the laser depends upon familiarity with the instrument and the properties of coherent, intense beams of light. The beam can cause eye damage and instrument damage. There is enough power from the laser to ignite substances placed in the beam path, even at some distance. The beam might also cause damage if contacted indirectly from reflective surfaces (specular reflection). The laser on the DxH 900/DxH 690T is covered by a protective housing.

⚠ WARNING

Possible harm to operator. Do not attempt to remove the laser or to remove the MTM covers. Failure to comply can result in hazardous exposure to low radiation. If removal is required, it must be done only by a Beckman Coulter Representative.

Laser Warning Labels

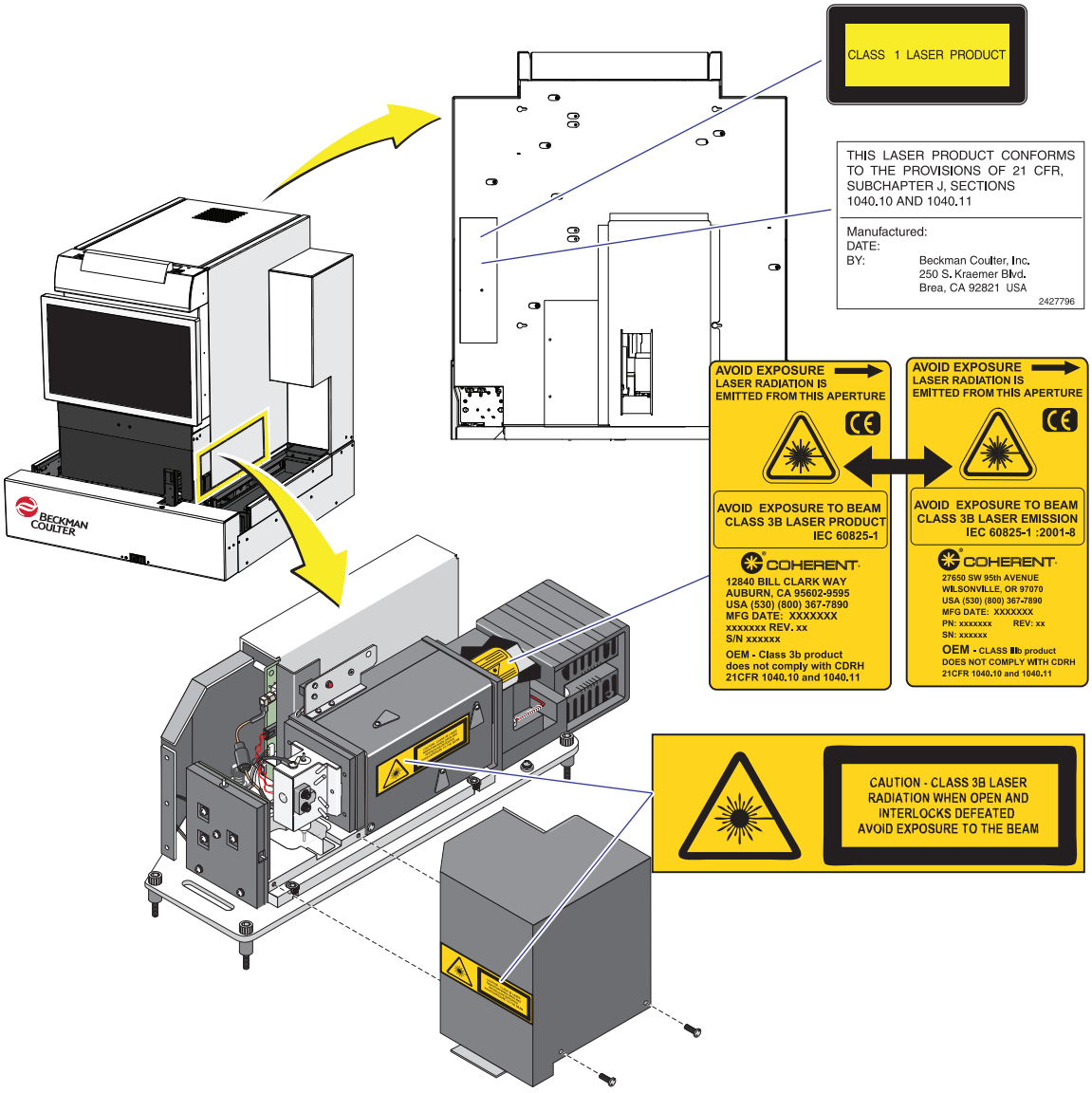
⚠ WARNING

Possible harm to operator. This instrument contains components dangerous to the operator. If any attempt has been made to defeat a safety feature, or if this instrument fails to perform as listed in this manual, disconnect power and call your Beckman Coulter Representative.

CDRH-approved labels are placed near or on those covers that, when removed, might expose laser radiation.

- Figure 10.1, Laser Warning Label Locations (Protective Housing Cut Away) shows the laser cover and the protective housing cut away. This illustration is intended only to show you what the system looks like, in compliance with CDRH, with the labels and their locations on the laser head.

Figure 10.1 Laser Warning Label Locations (Protective Housing Cut Away)



Electrostatic Discharge

⚠ CAUTION

Risk of damage to electronic components:

- **Electrostatic discharge (ESD) can damage add-in circuit cards and other electronic components. Perform any procedures, where there is a possibility of ESD damage at an ESD review station or wear an antistatic wrist strap attached to a metal part of the chassis that is connected to an earth ground.**

Electromagnetic Compatibility (EMC)

This device complies with the emissions and immunity requirements as specified in the EN/IEC 61326 series of Product Family Standards for a "basic electromagnetic environment." Such equipment is supplied directly at low voltage from public mains network. This equipment is not intended for residential use.

⚠ CAUTION

This device generates, uses, and can radiate unintentional radio-frequency (RF) energy. If this device is not installed and operated correctly, this RF energy can cause interference with other equipment. It is the responsibility of the end user to be sure that a compatible electromagnetic environment for the device can be maintained so that the device operates as intended. This equipment is designed for use in a PROFESSIONAL HEALTHCARE FACILITY ENVIRONMENT. It is likely to perform incorrectly if used in a HOME HEALTHCARE ENVIRONMENT. If it is suspected that performance is affected by electromagnetic interference, correct operation may be restored by increasing the distance between the equipment and the source of the interference.

In addition, other equipment can radiate RF energy to which this device is sensitive. If one suspects interference between this device and other equipment, Beckman Coulter recommends the following actions to correct the interference:

- Evaluate the electromagnetic environment before installation and operation of this device.
- Do not operate this device close to sources of strong electromagnetic radiation (for example: unshielded intentional RF sources), as these can interfere with proper operation. Examples of unshielded intentional radiators are handheld radio transmitters, cordless phones, and cellular phones.
- Do not place this device near medical electrical equipment that can be susceptible to malfunctions caused by close-proximity to electromagnetic fields.
- This device has been designed and tested to CISPR 11, Class A Group 1 emission limits. The device has been tested to the Immunity test levels of IEC 60601-1-2 for equipment intended to be used in PROFESSIONAL HEALTHCARE FACILITY ENVIRONMENT with no degradation of performance. In a domestic environment, this device can cause radio interference, in which case, you need to take measures to mitigate the interference.

Chemical

⚠ WARNING

Risk of injury. Methanol is dangerous, poisonous, and flammable, and requires special handling. Refer to the Safety Data Sheets (SDS) for details. Ensure that the STAIN WASTE container is clearly labeled and that it is not exposed to sparks or flame. Dispose of STAIN WASTE in accordance with federal, state, and local regulations. NEVER connect the STAIN WASTE tubing directly to a drain.

⚠ CAUTION

Risk of damage. Undiluted bleach is harmful to the instrument tubing and produces slide quality issues. Never allow bleach to come in contact with the system.

Electronic

⚠ WARNING

Risk of personal injury from electronic shock. Electronic components can shock and injure you. To prevent possible injury or shock, do not tamper with the instrument and do not remove any components (covers, doors, panels, and so forth) unless otherwise instructed in this document.

⚠ CAUTION

Risk of damage to electronic components:

- **Electrostatic discharge (ESD) can damage add-in circuit cards and other electronic components. Perform any procedures, where there is a possibility of ESD damage at an ESD review station or wear an antistatic wrist strap attached to a metal part of the chassis that is connected to an earth ground.**
- **If removal/replacement of printed circuit card or components is performed while the power is ON, damage to components may occur. To prevent damage to electronic components, always ensure that the power is OFF before removing or replacing printed circuit cards and components.**

Biological

⚠ WARNING

Risk of personal injury or contamination:

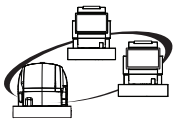
- **Failure to properly shield yourself while using or servicing the instrument can result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire, including gloves, a**

laboratory coat, and eye protection.

- **Operating the instrument while the waste level sensor is disconnected can cause biological contamination. Do not operate the instrument while the waste level sensor is disconnected.**

Use universal precautions when working with pathogenic materials. Means must be available for decontaminating the instrument and disposing of biohazardous waste.

Moving Parts



⚠ WARNING

Risk of personal injury:

- **Operating the instrument with doors and covers open can cause personal injury. Ensure that all covers and doors are closed.**
- **Operating the instrument with a loose or bent probe can cause personal injury. If the probe is loose or bent, do not run the instrument. Call your local Beckman Coulter Representative.**

The transport at a test location may be inactive during specific diagnostic procedures.

Glass Breakage and Biohazardous Contamination

⚠ WARNING

Risk of injury and biohazardous contamination. Clean up any broken glass or blood spill as quickly as possible. Handle with care. Avoid skin puncture. Dispose of all contaminated disposable cleaning materials and broken slides in accordance with your local regulations and acceptable laboratory practices.

Operational Hazards

Safety symbols alert you to potentially dangerous conditions.

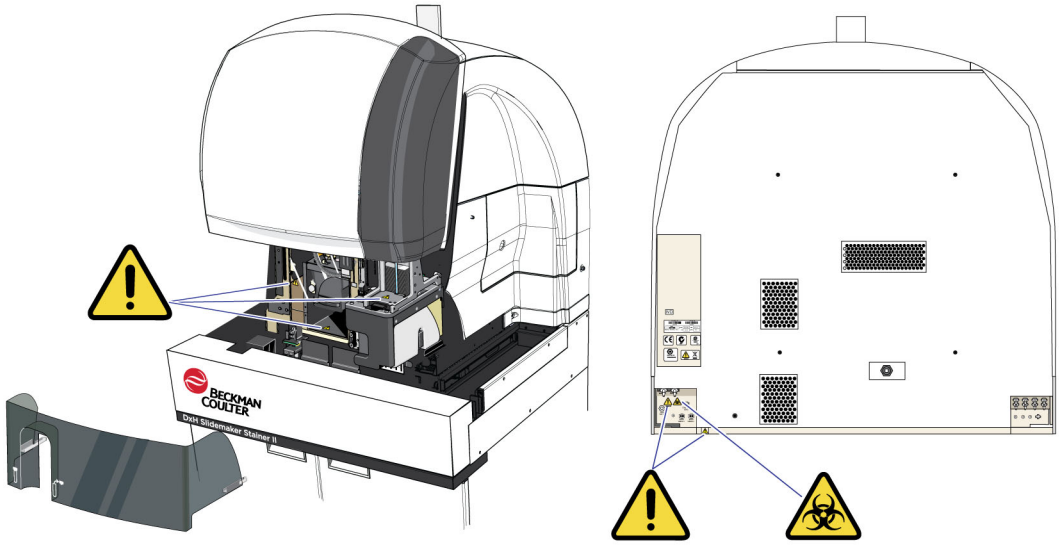
The symbol applies to specific procedures and appears as needed throughout this manual.

Symbol	Warning Condition	Action
	Biohazard	Use universal precautions when working with pathogenic materials. Means must be available to decontaminate the instrument and to dispose of biohazardous waste.
	Caution/Warning	See the Safety Notice in this manual for more information.
	Hot Surface	Hot surfaces in this area. Avoid contact with any surface in this area until you are sure that it has cooled down first.
	Pinch Point	Potential pinch or pierce point in this area. Be aware of the moving probe and carefully present the test sample to avoid injury.

Hazard Labels

Carefully read the hazard warning labels on the instrument. The hazard labels are located on the instrument as indicated.

Figure 10.2 Hazard Labels on DxH Slidemaker Stainer II



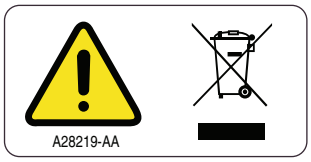
NOTE If the labels are unclear, call your Beckman Coulter Representative.

Disposal of Electrical Instrumentation

It is very important that customers understand and follow all laws regarding the safe and proper disposal of electrical instrumentation.

The symbol of a crossed-out wheeled bin on the product is required in accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Union. The presence of this marking on the product indicates:

1. The device was put on the European Market after August 13, 2005 and
2. The device is not to be disposed of via the municipal waste collection system of any member state of the European Union.



This system is considered an industrial waste, subject to special controls for infectious waste. Prior to disposal of the system, refer to the *Waste Disposal and Public Cleaning Law* for compliance procedures.

For products under the requirement of the WEEE directive, please contact your dealer or local Beckman Coulter office for the proper decontamination information and take back program which will facilitate the proper collection, treatment, recovery, recycling and safe disposal of device.

Waste Disposal Warning

Be sure to dispose of waste in accordance with environmental protection regulations.

⚠ WARNING

Biohazardous contamination could occur from contact with the waste container and its associated tubing if not handled with care. Avoid skin contact. Clean up spills immediately. Dispose of the contents of the waste container in accordance with your local regulations and acceptable laboratory procedures. Operating the instrument while the waste level sensor is disconnected can cause biological contamination. To prevent biological contamination, do not operate the instrument while the waste level sensor is disconnected.

The maximum waste line length is 3.7 m (12 ft). The waste drain tubing supplied with the system can be connected to either:

- An open drain, suitable for biohazardous waste, less than 76 cm (30 in.) above the floor
- A waste container with a minimum capacity of 10 L (2.5 gal.)

⚠ WARNING

Biohazardous contamination may occur when using an open drain instead of a waste container. Be sure to mechanically secure the waste tube into the drain so that the tube cannot accidentally come out of the drain. This prevents spillage.

CE Mark

A "CE" mark indicates that a product has been assessed before being placed on the market, and has been found to meet European Union safety, health, and/or environmental protection requirements.

RoHS Notice

These labels and materials declaration table (the Table of Hazardous Substance's Name and Concentration) are to meet People's Republic of China Electronic Industry Standard SJ/T11364-2006 "Marking for Control of Pollution Caused by Electronic Information Products" requirements.

China RoHS Caution Label

This label indicates that the electronic information product contains certain toxic or hazardous substances. The center number is the Environmentally Friendly Use Period (EFUP) date, and indicates the number of calendar years the product can be in operation. Upon the expiration of the EFUP, the product must be immediately recycled. The circling arrows indicate the product is recyclable. The date code on the label or product indicates the date of manufacture.

Covers and Shields

See the figure for the applicable instrument (DxH 900 or DxH Slidemaker Stainer II) in CHAPTER 1, System Overview for the location of the covers and shields.

Follow this order when **removing** the front cover and the transport shield:

1. Remove the Transport Shield
2. Lift the Front Cover

Follow this order when **installing** the front cover and the transport shield:

1. Lower the Front Cover
2. Install the Transport Shield

Front Cover - Lifting and Lowering

Lift the Front Cover

1 Grasp the sides of the front cover and lift upward.

Lower the Front Cover

1 Grasp the sides of the front cover and push downward.

Transport Shield - Removing and Installing

Remove the Transport Shield

⚠ WARNING

Risk of personal injury. To avoid personal injury, do not bypass any of the safety interlocks and do not open covers while the instrument is operational.

For some of the cleaning procedures, you need to remove the transport shield.

1 Grasp the transport shield on both sides and then pull it away from the instrument.

2 Select  to silence the alarm. The beacon turns red.

Install the Transport Shield

1 Locate the guides on the shield and align them with their corresponding rails on the front of the instrument.

2 Insert the guides into the rails and push the transport shield into place.

Side Covers - Removing and Installing

Remove the Side Cover

1 Lift and slide out the side cover (left or right), as applicable.

Install the Side Cover

1 Lower the side cover (left or right) and align it with the grooves on the top side of the instrument.

IMPORTANT Ensure that the cover is inside the input or output buffer. Do not obstruct either buffer.

2 Lift and slide the STM back into the instrument.

3 Select  .

4 Select the blue text on the screen and select **Review** to clear it.

Slide Printer Cover - Removing and Installing - DxH Slidemaker Stainer II

Remove the Slide Printer Cover

1 Select **Menu > Diagnostics > Dx Tools > Release SAM**.

2 Remove the Transport Shield.

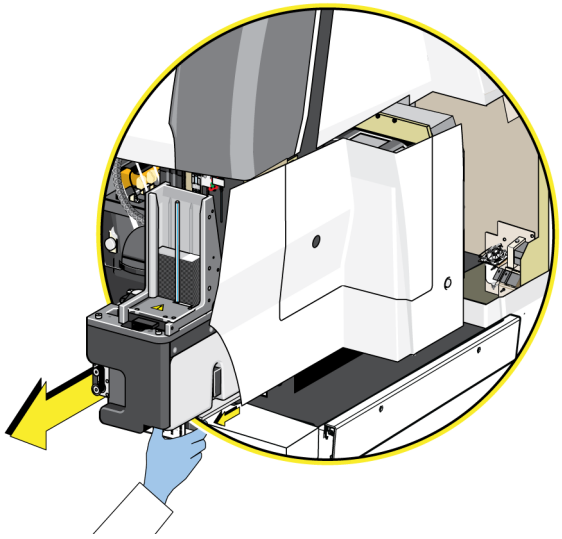
3 Lift the Front Cover.

⚠ CAUTION

Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

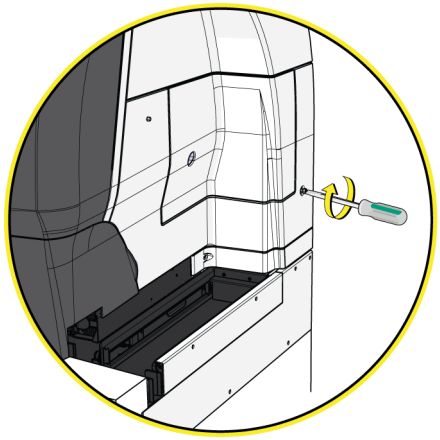
4 Pull the Slidemaker release handle.

5 Pull the Slidemaker out to the maintenance position.

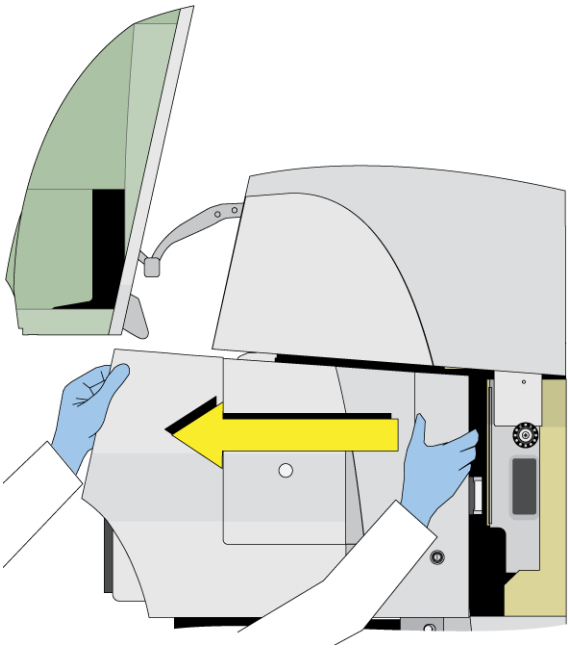


IMPORTANT Ensure that the front cover is in the lifted position to perform this step.

6 Unfasten the captive screw at the rear of the slide printer cover.

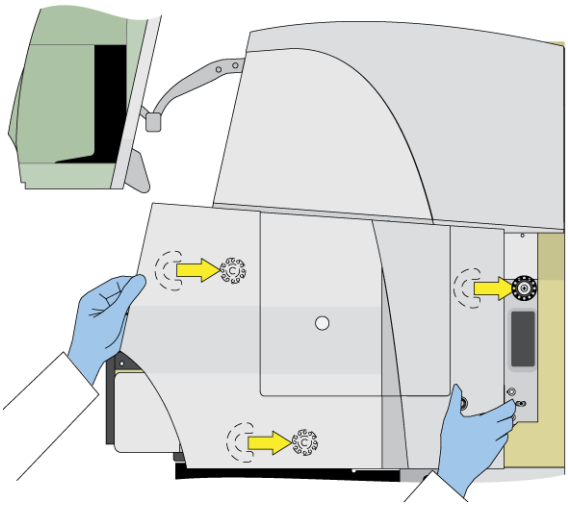


7 Pull the cover toward the front of the instrument to disengage the cover hangers.



Install the Slide Printer Cover

1 Position the cover to align the cover hanger bracket with the three cover hangers.



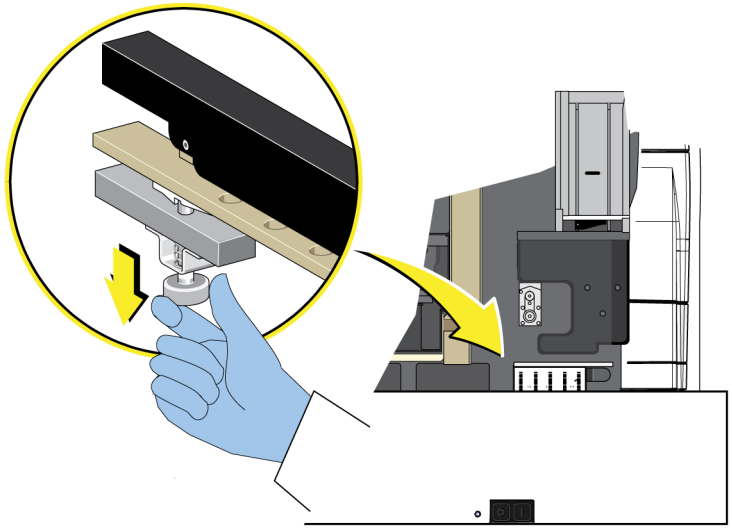
2 Slide the cover toward the rear of the instrument to engage the cover hanger bracket with the cover hangers.

3 Fasten the captive screw at the rear of the cover.

⚠ WARNING

Risk of hand injury. Use caution when pushing the Slidemaker back into position.

4 Pull the release pin down to unlock the Slidemaker.



5 Push the Slidemaker back until it locks into the operating position.

6 Lower the Front Cover.

7 Install the Transport Shield.

Upper Right-Side Cover - Removing and Installing - DxH Slidemaker Stainer II

Remove the Upper Right-Side Cover

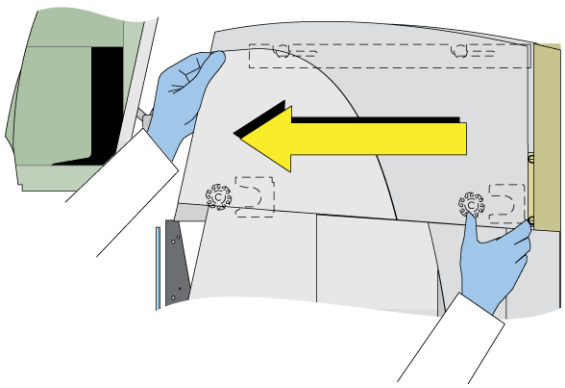
1 Remove the Transport Shield.

2 Lift the Front Cover.

3 Remove the Slide Printer Cover.

4 Grasp the front and back of the cover.

5 Slide the cover forward and then up and off the instrument.

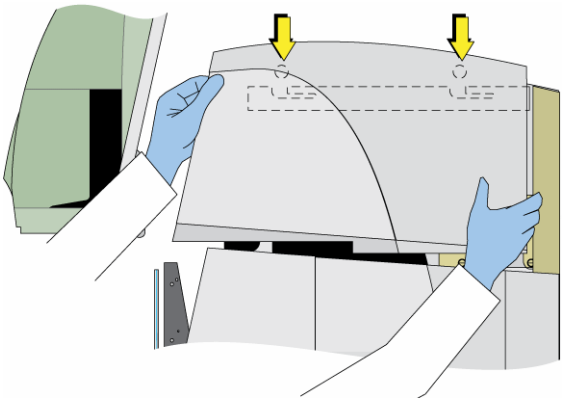


Install the Upper Right-Side Cover

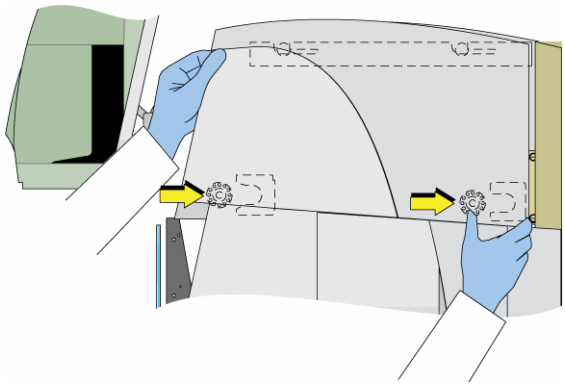
1 Grasp the front and back of the cover.

2 Lower the cover to engage the top slides in their mounting brackets.

IMPORTANT To engage the round slide on the top and bottom of the cover in its cutout in the frame, hold the cover almost vertical during installation. It is critical to align all four slides at the same time.



3 Align the two lower slides with their cutout in the frame.



4 Slide cover toward rear of instrument to engage all four slides.

5 Lower the Front Cover.

6 Install the Transport Shield.

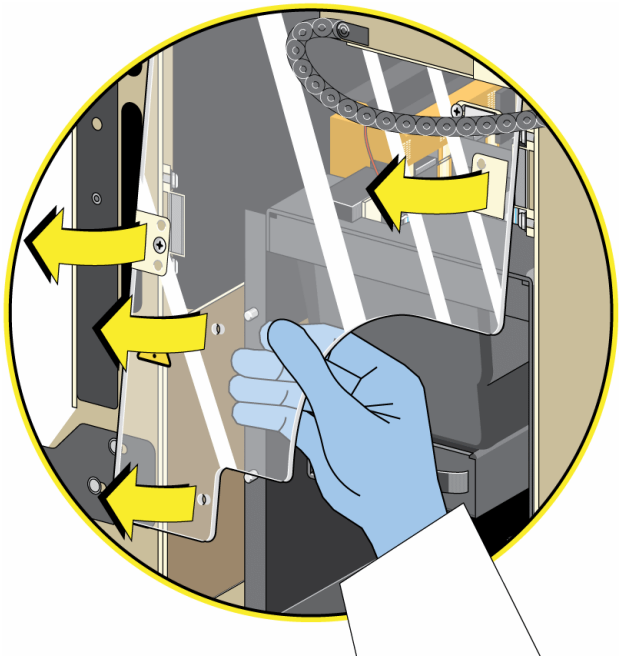
Stainer Shield - Removing and Installing - DxH Slidemaker Stainer II

Remove the Stainer Shield

1 Remove the Transport Shield.

2 Lift the Front Cover.

3 Pull the stainer shield forward to disengage it from the alignment pins and magnets.

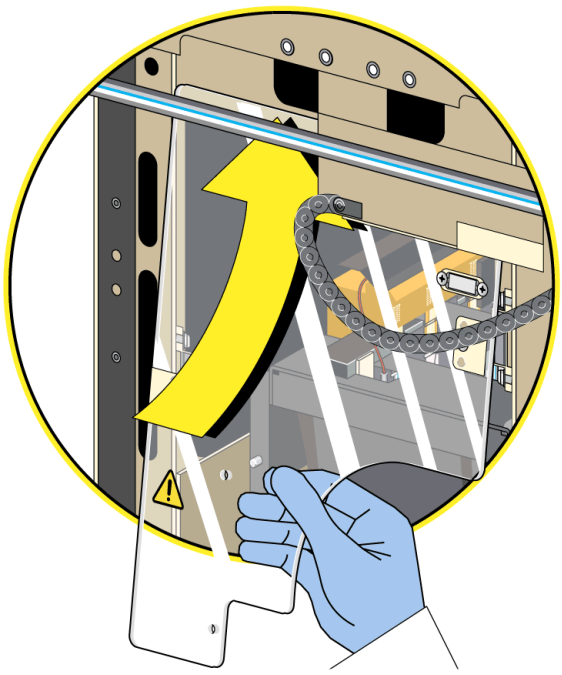


4 Slide the shield down and out.

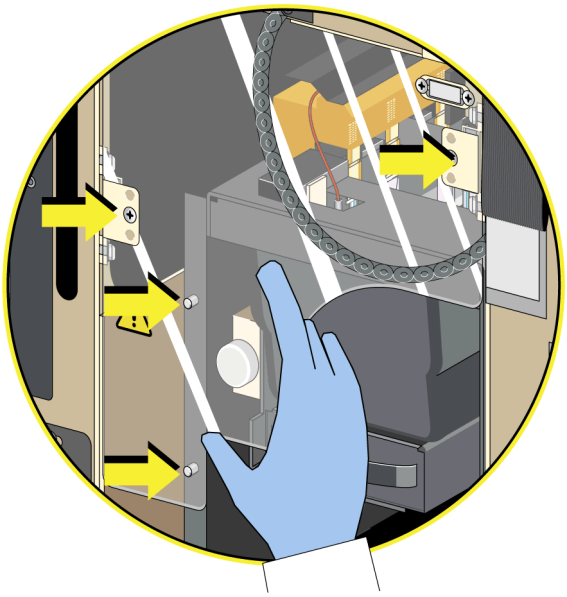
Install the Stainer Shield

1 Support the e-chain out of the way.

2 Slide the shield up and into place behind the e-chain.



3 Attach the shield in line with the alignment pins and magnets.



4 Lower the Front Cover.

5 Install the Transport Shield.

General Troubleshooting

Good troubleshooting is a result of being familiar with and understanding the features listed below. These features are an integral part of the Intelligent Quality Monitoring built into the system.

Alarms and operator alerts are displayed on both System Manager and Review Station monitors. Audible alarms sound at both monitors, and can be turned off at either one of the two monitors.

Table 10.1 Features of the System's Intelligent Quality Monitoring

Feature	Location in the IFU
History Logs and the Event Log alert status icon	APPENDIX C, Logs
Location of specific hardware items, such as the blood sampling valve	CHAPTER 1, System Overview
Cleaning procedures and schedules	CHAPTER 12, Cleaning Procedures
Replacement/Adjustment procedures and schedules	CHAPTER 13, Replacement/Adjustment Procedures
Using **Menu** > **Diagnostics**	Monitor the System in this chapter
Accessing individual procedures	Individual Troubleshooting in this chapter
Event Messages with specific diagnostics procedures	Event Messages from the System Manager in this chapter

History Logs record every event that occurs on the system. Logs are divided into separate categories based on the type of error. Events that cause a red alert status icon require operator action to continue operation. Events that cause an amber alert status icon will not stop operation, but should be reviewed to return the icon to neutral.

Examples of how to use History Logs, and their relationship to the specific event status icons, are given throughout the IFU, dependent on the function being described. For example, a QC Auto Stop condition would cause  to turn red. A Vacuum Chamber Overflow error warning would cause  to turn amber.

The DxH 900/DxH 690T System contains an extensive Diagnostics menu. Diagnostics help you solve problems and resume operation, especially when working in conjunction with Beckman Coulter Representatives. This chapter contains instructions for accessing procedures and an overview of frequently used screens.

Additional guidance with the most common individual diagnostic procedures is given in this chapter (example: Replace the Front Blood Detector).

Daily Checks

If Daily Checks are unacceptable, investigate the cause of the failure. Look for red highlighting and the X icon on tabs. After resolving the cause, repeat Daily Checks.

Diagnostic Procedures

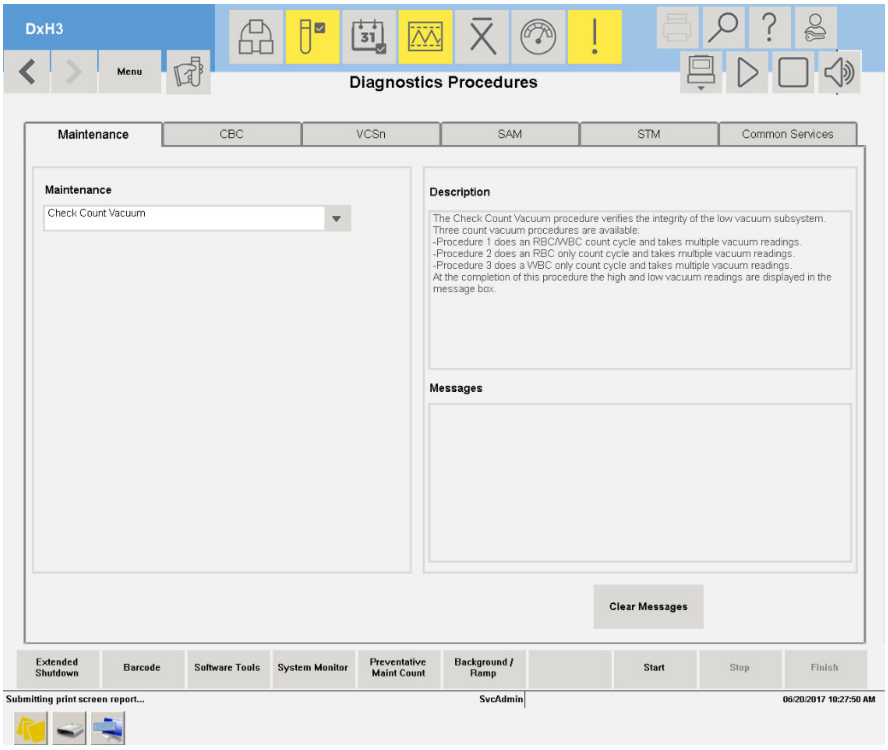
NOTE The SPM must be offline to run diagnostic procedures. If the system is online, the following DxH dialog box is displayed: *Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?* Select **OK** to continue or **Cancel** to cancel the procedure and remain online

IMPORTANT When you are finished running diagnostics and want to return to online processes, select **Finish** from the local navigation bar on the Diagnostics screen.

To access the diagnostic procedures select **Menu > Diagnostics > Dx Tools.** The Diagnostic Procedures screen displays tabs available for selection, such as **Maintenance**, **CBC**, **VCSn, SAM**, **STM**, and **Common Services.**

The most commonly used functions are listed on the Maintenance tab. Select the **Maintenance** tab to display the Diagnostic Procedures - Maintenance screen.

Figure 10.3 Diagnostic Procedures - Maintenance Screen



Select the tabs to display the Diagnostics Procedures screens for CBC, VCSn, SAM, STM, and Common Services procedures as directed within Troubleshooting or by Beckman Coulter service.

Monitor the System

1 Select the instrument to monitor from the System Status screen.

2 Select **Menu > Diagnostics > System Monitor**
OR
Select (F10) **Access System Monitor** to view the System Monitor screen.

NOTE (F10) **Access System Monitor** does not function from within dialog boxes.

The fields change color to indicate threshold range warnings and errors:

- Red = High Error or Low Error -The reading has surpassed the upper or lower operating error threshold level.
- Amber = High Warning and Low Warning - The reading has surpassed an upper or lower operating warning threshold level.

Grey, green, and red dots indicate statuses in various panels:

- Grey is OFF.
- Green is ON.
- Red indicates an ERROR.

Be aware that the System Monitor screen should be accessed during a diagnostics procedure; otherwise, you might see red or green (but meaningless) information until the diagnostics information is accessed by selecting **Start**.

Also, live readings in various fields are automatically updated during processing.

The local navigation bar applies to diagnostics in general.

The System Monitor screen displays information about the instrument in the following areas:

- STM/SAM/Fluidics - see Figure 10.5, DxH Slidemaker Stainer II System Monitor Screen - STM/SAM/Fluidics Tab.
- SAM Fluidics - see Figure 10.6, DxH Slidemaker Stainer II System Monitor Screen - SAM Fluidics Tab.
- Slide Transport - see Figure 10.7, DxH Slidemaker Stainer II System Monitor Screen - Slide Transport Tab.
- Basket Transport - Figure 10.8, DxH Slidemaker Stainer II System Monitor Screen - Basket Transport Tab.
- Stainer - Figure 10.9, DxH Slidemaker Stainer II System Monitor Screen - Stainer Tab (Monitor Mode).
- System - Figure 10.10, DxH Slidemaker Stainer II System Monitor Screen - System Tab.

The module buttons, circled in Figure 10.4, DxH 900/DxH 690T System Monitor Screen, let you choose and see functionality from two modules at the same time.

As seen in Figure 10.4, DxH 900/DxH 690T System Monitor Screen, fields on the Voltage, Temperature and Pressure panel display voltage, temperatures, or pressure readings. VL indicates a valve. The buttons under *Available Modules* let you choose and see the functionality from two modules at the same time.

Figure 10.4 DxH 900/DxH 690T System Monitor Screen

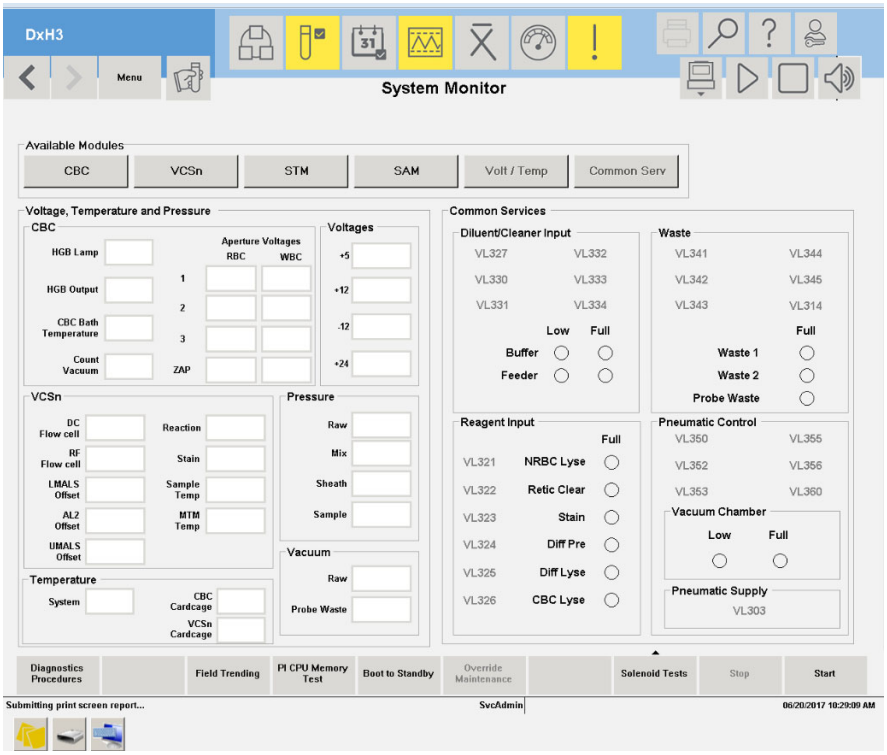


Figure 10.5 DxH Slidemaker Stainer II System Monitor Screen - STM/SAM/Fluidics Tab

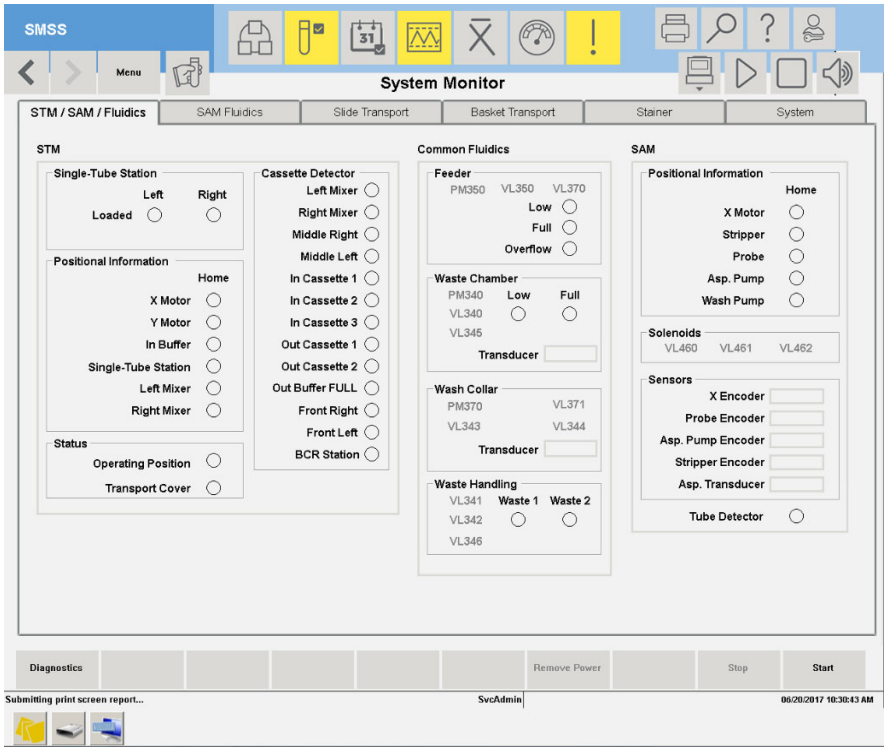


Figure 10.6 DxH Slidemaker Stainer II System Monitor Screen - SAM Fluidics Tab

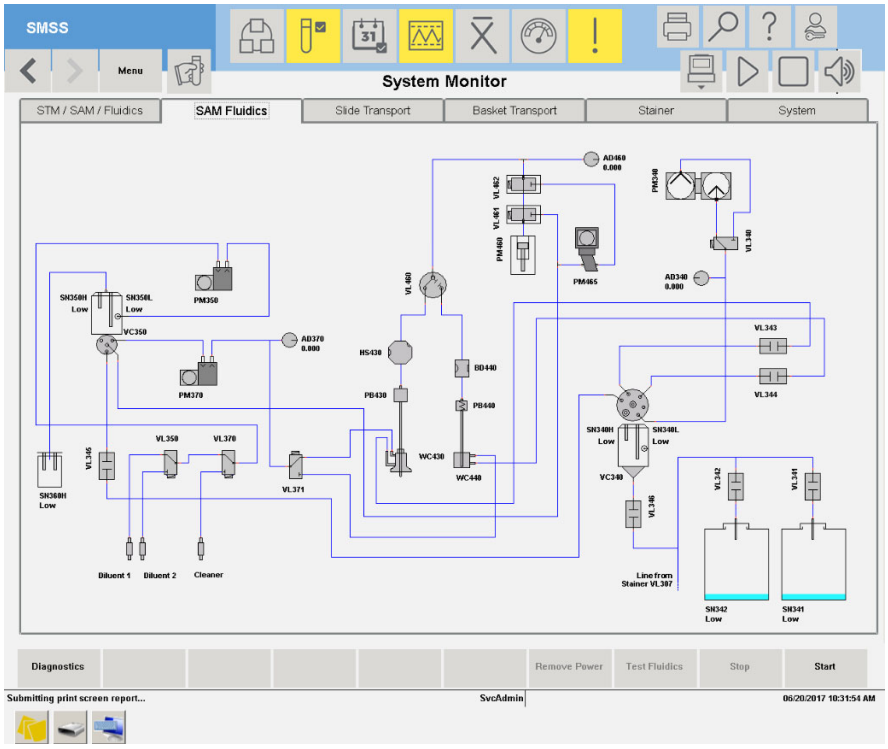


Figure 10.7 DxH Slidemaker Stainer II System Monitor Screen - Slide Transport Tab

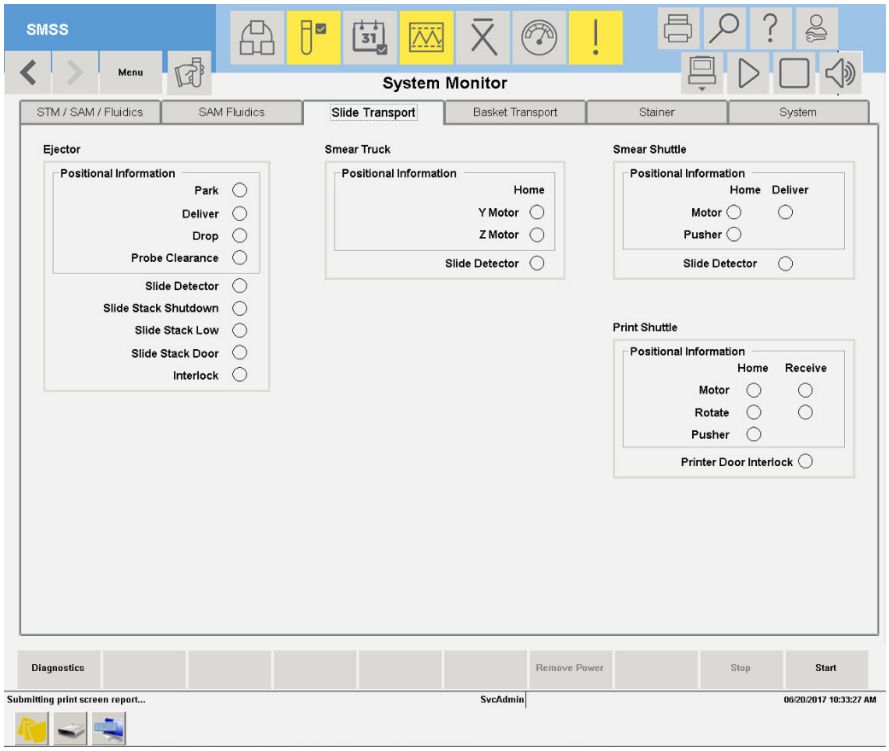


Figure 10.8 DxH Slidemaker Stainer II System Monitor Screen - Basket Transport Tab

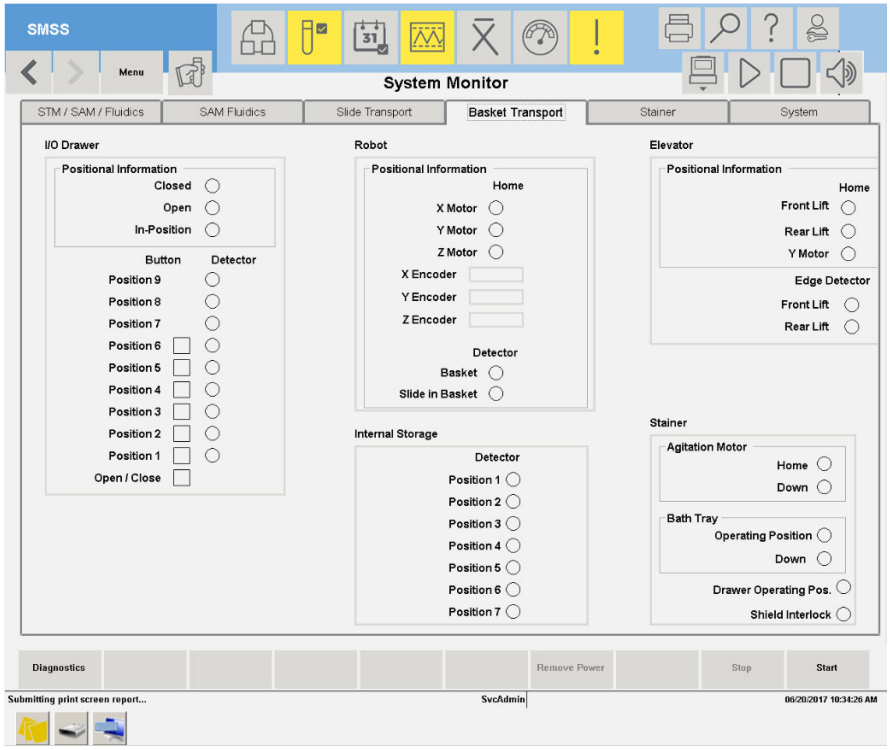


Figure 10.9 DxH Slidemaker Stainer II System Monitor Screen - Stainer Tab (Monitor Mode)

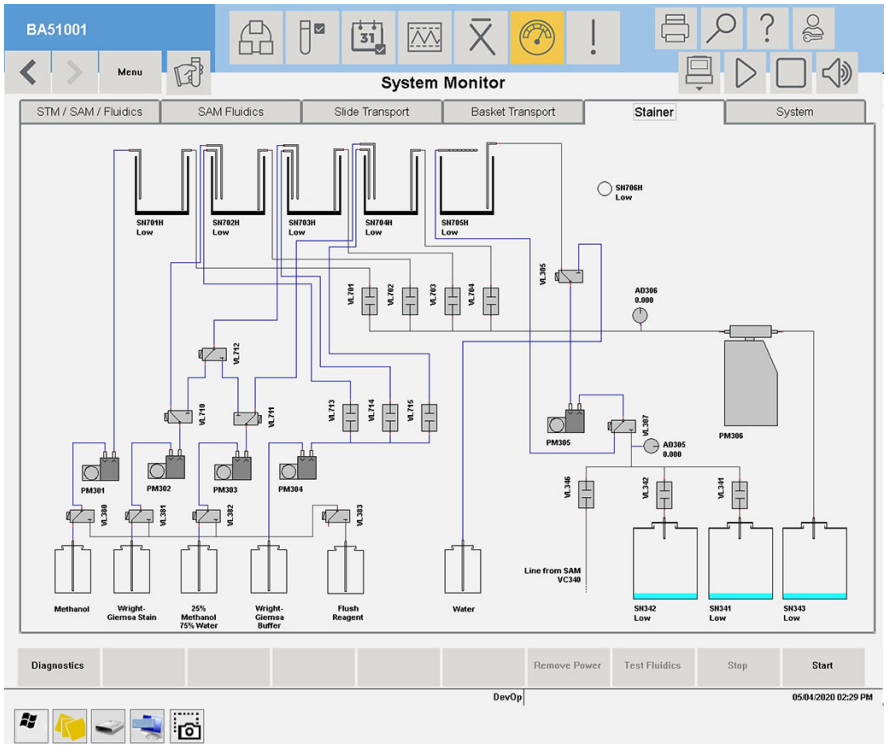
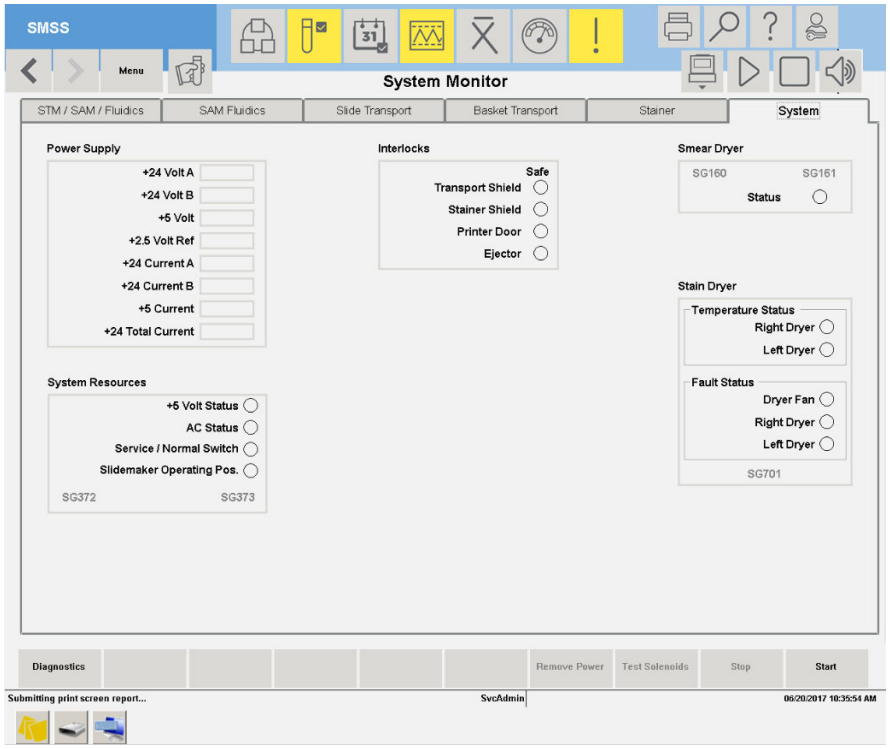


Figure 10.10 DxH Slidemaker Stainer II System Monitor Screen - System Tab



CBC Panel

You can view CBC and VCSn panels by selecting (F10) **> CBC and VCSn**.

STM Panel

You can view STM and SAM panels by selecting (F10) **> STM and SAM**.

Hardware Components Information

The Hardware Components Information screen may be referred to when communicating with your Beckman Coulter Representative.

Displaying Hardware Components Information

1. Select the instrument to monitor from the System Status screen.
2. Select **Menu** > **Setup** > **Hardware Information** to view the information for the available tabs.
3. Display a screen for a different module, as necessary, by selecting its corresponding tab.

Software Components Information

Displaying Software Components Information

1. Select **Menu > Setup > Software Versions**.
2. Review the software information.

Individual Troubleshooting

The troubleshooting procedures in this section are not common cleaning and replacement procedures. Some of these procedures require you to access diagnostic procedures, while others do not.

For information on common cleaning and replacement procedures, see CHAPTER 12, Cleaning Procedures and CHAPTER 13, Replacement/Adjustment Procedures.

Detecting and Resolving a Plugged Aperture

A plugged WBC or RBC aperture can increase the likelihood of voteouts and sample flagging and can also cause elevated background counts. Apertures can be plugged by protein buildup, cellular debris, or a small piece of tube stopper.

Detect a Plugged Aperture

You may not notice a single plugged aperture because the system will continue to report results as long as the other two apertures give results that are in agreement.

To determine if an aperture is plugged, select the **Additional Data** button on the Patient Results screen to view the individual aperture details.

An example of a system with a plugged WBC aperture is shown in the figure below. The result from the aperture that has voted out (Aperture 3 below) is backlit in amber.

		WBC	UWBC	RBC	MCV	RDW	PLT	MPV
Aperture 1	✓		4.477	4.315	93.95	13.42	112.2	10.51
Aperture 2	✓		4.492	4.338	93.86	13.21	115.4	10.38
Aperture 3	✓		1.506	4.351	92.88	13.61	120.5	10.50
	Avg	4.485	4.485	4.335	93.56	13.41	116.0	10.46

Resolve a Plugged Aperture

You can use three different procedures to resolve a plugged aperture:

- Zapping Apertures in this chapter
- Clearing a WBC Aperture in this chapter
- Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures

NOTE The Zap Apertures procedure is the simpler procedure and may be all that is needed to remove the blockage or buildup so always try the Zap Apertures procedure first.

1. Perform the Zapping Apertures procedure. The Zap Apertures procedure applies voltage across both the RBC and WBC apertures.
2. Go to Clearing a WBC Aperture.
3. Clean the apertures with bleach. See Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures. You may need to bleach the apertures to address decreased cell counts, increased MCV values, or increased voteouts.
4. If the problem persists, call your Beckman Coulter Representative.

Zapping Apertures

This procedure applies voltage across RBC and WBC apertures to remove protein buildup. The system:

- Drains and rinses the baths.
- Applies the Zap voltage across the apertures multiple times.
- Monitors and displays the Zap voltages on the System Monitor screen.

1. Select **Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.
2. Select **Zap Apertures** from the drop-down list.
3. Select **Start** to initiate the procedure.
4. Press (F10) **Access System Monitor** and select **Volt/Temp** to view the Zap Aperture voltages sensor status on the System Monitor.
5. Select **Finish**.

Clearing a WBC Aperture

Perform this procedure as needed when one or more WBC apertures are fully plugged. The cycle applies pressure to the rear of the apertures while vacuum is applied to the front of the apertures.

The transport in front of the SPM does not stop running during the cycle. The system is returned to a ready state for normal operations.

1 **Select Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 From the *Maintenance* drop-down list, select **Clear WBC Apertures**.

3 Select **Start** to initiate the procedure. The screen displays a description of the process.

4 Select **Finish** when the process is done.

NOTE If the plug is not removed, perform a shutdown, but cancel the procedure after five minutes. If the plug remains after this, perform a complete shutdown. If the plug still remains, bleach the apertures.

Clearing an RBC Aperture (Software v1.1.1 and Prior)

The *Clear RBC Apertures* procedure is disabled during instrument shutdown and Diagnostics procedures. This option is still displayed in the software, but should not be used. If you try to execute this procedure by selecting **Menu > Diagnostics > Dx Tools > Maintenance** tab **> Clear RBC Apertures** and selecting **Start**, the following occurs:

- *Clear RBC Aperture* is not executed and the system displays an error message: *-1 Error: Unexpected return code from table*. Any RBC aperture clogs are not cleared.
- The Service event logs display: *Clear RBC Apertures failed*.

For any RBC aperture clogs that are not cleared, follow Zapping Apertures in this chapter or Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures. This applies to all software versions.

If voteouts continue for the RBC apertures, call your Beckman Coulter Representative.

Clearing a Flow Cell Aperture

Follow this procedure only when the flow cell is fully clogged or low events are observed.

The indications of a full clog include:

- Inability to clear flow cell clogs (::::: for DIFF, NRBC, and/or RETIC)
- Offline conditions with errors in the *General* tab of the History log that include:
  - Too many flow cell clogs
  - Maximum number of consecutive DIFF, NRBC, or RETIC errors reached
  - Flow cell DC voltage exceeded the expected range

— One or more flow cell parameters exceeded the operating limits

The Clear Flow Cell Aperture cycle flushes the flow cell multiple times with Cleaner followed by a deep clean. The transport in front of the SPM does not stop running during the cycle. The instrument cannot go online until the Cleaner is removed from the VCSn module.

1 **Select Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 From the *Maintenance* drop-down list, select **Clear Flow Cell Aperture**.

3 Select **Start** to initiate the procedure. The screen displays a description of the process.

4 Select **Finish** when the process is done.

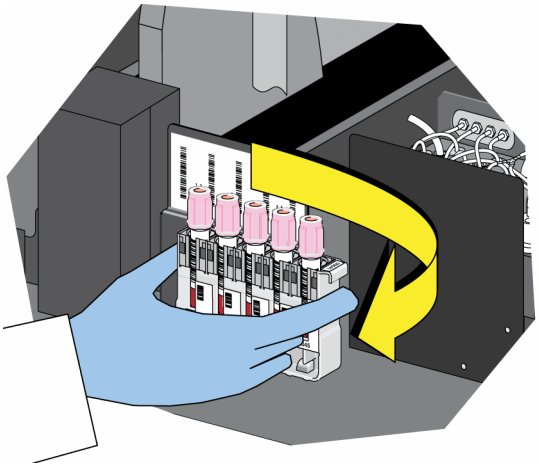
Removing a Jammed Cassette

To remove a cassette that is still engaged on the mixer wall, do the following:

1 Lift the front cover.

2 Select  to silence any alarms.

3 Slide the jammed cassette to the right to disengage it from the mixer wall and remove it.



4 Lower the cover and/or install the transport shield.

Checking Pneumatic Supply

The Check Pneumatic Supply procedure verifies the stability of the pneumatic supply and checks the integrity of the pneumatic subsystem and its associated components.

Three procedures are available:

- The Static procedure places the minimum load on the system.
- The Dynamic CNDR procedure simulates a normal CNDR load.
- The Dynamic CBC procedure simulates a normal CBC load.

During both procedures, the system:

- Monitors all pneumatic levels.
- Displays pneumatic levels on the System Monitor screen.

NOTE When you end this procedure, the time (in seconds) for raw pressure and raw vacuum to reach operating limits is displayed in the Messages box on the Diagnostic Procedures screen.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Check Pneumatic Supply** from the drop-down list.

3 Enter a number in the *Cycles* text box and select the **LF** (loop on failure) check box if you want the procedure to continue if a failure occurs.

4 Select **Start**.

5 Select from the following options:

- **Static** - to place the minimum load on the system.
- **Dynamic CNDR** - to simulate a normal CNDR load.
- **Dynamic CBC** - to simulate a normal CBC load.

6 Select **OK** to start the procedure.

7 Press (F10) **Access System Monitor** and select **Volt/Temp** to view live readings for Mix, Sheath, Sample, Raw Pressure, Raw Vacuum, and Count Vacuum on the System Monitor.

Checking Count Vacuum

The Check Count Vacuum procedure verifies the integrity of the low vacuum subsystem. Three count vacuum procedures are available:

- Procedure 1 does an RBC/WBC count cycle and takes multiple vacuum readings.
- Procedure 2 does an RBC only count cycle and takes multiple vacuum readings.
- Procedure 3 does a WBC only count cycle and takes multiple vacuum readings.

NOTE At the completion of this procedure, the high and low vacuum readings are displayed in the Messages box on the Diagnostic Procedures screen.

1 Select the instrument to monitor from the System Status screen.

2 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

3 Select **Check Count Vacuum** from the drop-down list.

4 Select **Start**.

5 Select one of the following options on the Select Baths dialog box:

- **WBC** - to do a WBC only count cycle during which multiple readings are taken.
- **RBC** - to do an RBC only count cycle during which multiple readings are taken.
- **Both** - to do both a WBC and RBC count cycle during which multiple readings are taken.

6 Press (F10) **Access System Monitor** and then select **Volt/Temp** to view the Count Vacuum status on the System Monitor.

7 Do the Setting the Count Vacuum Regulator.

8 Select **Finish**.

Setting the Count Vacuum Regulator

The Set Count Vacuum Procedure lets you adjust the Count Vacuum. The system places the SPM in safe mode and prompts you to adjust the Count Vacuum while displaying the Count Vacuum reading.

1 Select **Start**.

2 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

3 Select **Set Count Vacuum** from the drop-down list.
If the instrument is online, a dialog box will be displayed.

4 Select **OK** to continue.

5 When prompted, Remove the Transport Shield and Lift the Front Cover.

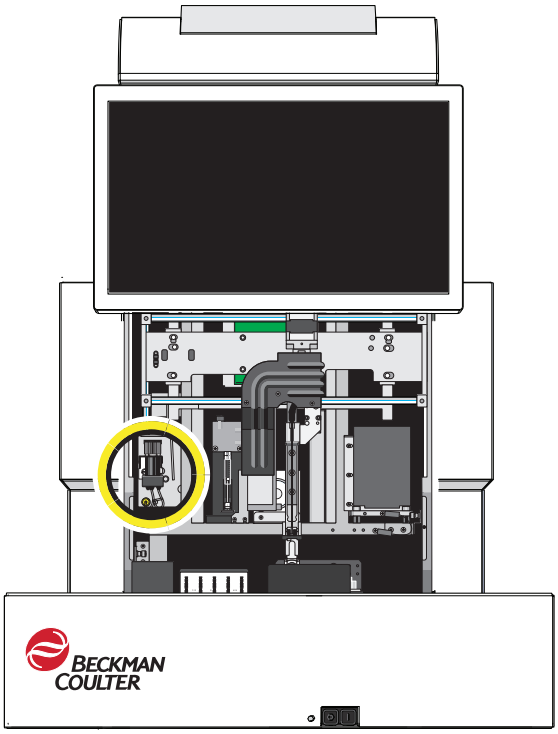
6 Select  to silence any alarms.

7 Wait until the second dialog box is displayed and disregard the value of the Count Vacuum.

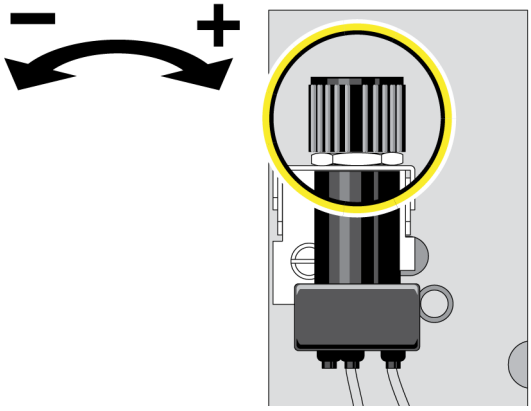
8 Press F10.

9 At the Access System Monitor, select **Volt/Temp** to view the Count Vacuum.

10 Locate the Count Vacuum Regulator.



11 Turn the knob at the top of the Count Vacuum Regulator clockwise or counter-clockwise to adjust the count vacuum.



12 Verify that Count Vacuum reads 6.0 +/- 0.1.

13 When the adjustment is complete, select the previous screen (back) arrow in the upper left corner of the screen.

IMPORTANT Failure to select the previous screen (back) arrow may result in a lockup of the System Manager.

14 Select **Stop when prompted by the dialog box.**

15 Lower the Front Cover and Install the Transport Shield.

16 Select **OK** when prompted by the dialog box.

17 Select **Finish** to end the procedure.

Removing Retic Reagents

The Remove Retic Reagents procedure flushes both Retic reagents out of the system and then dries the Retic channels.

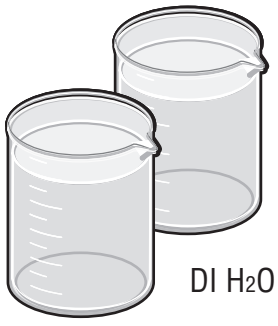
1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 Select **Remove Retic Reagents** from the drop-down list.

3 Select **Start**.

4 Obtain two 1 liter containers of distilled water.

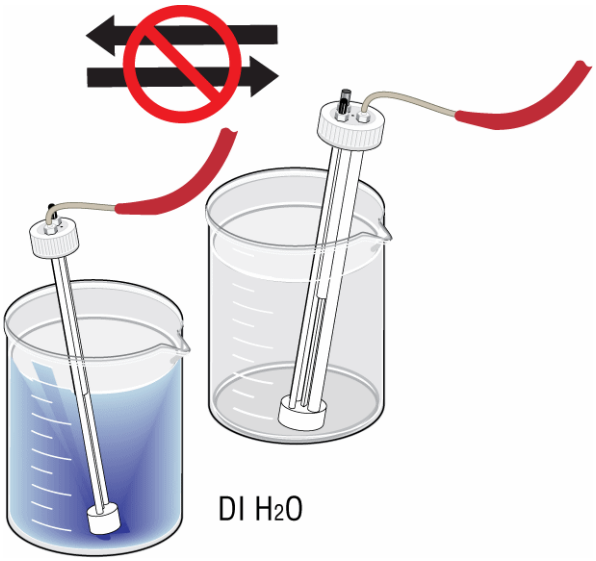
NOTE Refill the containers, if necessary.



5 Remove pickup tubes from Retic reagent package.

6 Place a single pickup tube in each container of distilled water.

IMPORTANT Do not switch the tubes.



7 Select **OK** to continue
OR
Select **Cancel** to end.

If you select **OK**, the following message is displayed: *System performing Remove Retic Reagent procedure. Please wait.*

When the flush portion of the procedure has been completed, the following dialog box is displayed: *Select OK to repeat the flush portion of this procedure or Cancel to proceed to the next step.*

8 If you selected **Cancel**, remove the pickup tubes from the distilled water containers, place them in a clean area and select **OK** to continue,

9 Select **OK** to repeat the drying portion of the procedure
OR
Select **Cancel** to end.

10 Select **Finish**.

Dispensing Diluent

NOTE Follow this procedure after changing the aspiration probe to verify the integrity of the aspiration path.

The Dispense Diluent procedure verifies the integrity of the aspiration path and that the probe cleaning pump is functional. The system:

1. Extends the single-tube station.
2. Prompts you to insert an empty tube.
3. Retracts the single-tube station.
4. Dispenses 1 mL of diluent from the probe cleaning pump, through the aspiration probe, and into the tube.
5. Extends the single-tube station again.
6. Prompts you to remove the tube.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Dispense Diluent** from the drop-down list.

NOTE Light blue coloring may be visible in the first diluent sample dispensed after Daily Checks or after processing a sample in the R, CR, or CDR panel, when the Reticulocyte module is enabled. This residual retic stain does not affect result accuracy. To obtain a clear diluent sample, discard the first sample and dispense the diluent again.

3 Select **Start** to extend the single-tube station.

4 Place an empty tube in the left position of the single-tube station to start the procedure
OR
Select **Cancel** to end the procedure.

5 When the procedure is completed, remove the tube from the left position of the single-tube station.

6 Select **Finish**.

Performing the Sweep Flow Procedure

The Prime Sweep Flow procedure primes the sweep-flow lines and the chambers behind the RBC apertures. The system:

1. Drains and rinses the RBC bath.

2. Applies vacuum to the sweep-flow lines.

The system monitors the raw vacuum and raw pressure sensors and displays the sensors' states on the System Monitor screen.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Prime Sweep Flow** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Press (F10) **Access System Monitor** and select **Volt/Temp** to view the raw vacuum and raw pressure sensors' status on the System Monitor - CBC panel.

5 Select **Finish**.

Performing the Cycle DV Procedure

The Cycle DV procedure verifies the DV motor, clutch, and optical sensors. The system:

- Rotates the DV (distribution valve) to the right and then to the left 10 times, without moving any liquids.
- Monitors the DV home and DV segment sensors.
- Displays the sensors' state on the System Monitor screen.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Cycle DV** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Press (F10) **Access System Monitor** and select **SAM** to view the sensors's status on the System Monitor SAM/Blood Transport panel.

5 Select **Finish**.

Unlocking DV

The Unlock DV procedure helps free the distribution valve when it is frozen and cannot rotate. The system:

1. Enables the self-clean function for 30 seconds.
2. Waits for 30 seconds.
3. Applies high power to cycle the valve while monitoring the DV home and DV segment sensors.
4. If the sensors do not detect a motion, the system repeats the procedure for a maximum of three times.

The system displays the sensors' state on the System Monitor screen.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Unlock DV** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Press (F10) **Access System Monitor** and select **SAM** to view the sensors's status on the System Monitor SAM/Blood Transport panel.

5 Select **Finish**.

Verifying the Blood Detector

The Verify Blood Detector procedure verifies that the air to diluent ratio is appropriate. The system:

1. Aspirates diluent and takes a blood detector reading.
2. Aspirates air and takes a blood detector reading. (This step is repeated two times.)
3. Displays the diluent and air ratio readings in the Messages box.

NOTE The ratios of both blood detectors are then stored by the system if they are within the system specifications.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance** tab.

2 Select **Verify Blood Detector** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Select **Finish** when the system is done.

The system indicates when the procedure has started and if the procedure has been completed successfully or not.

Performing the Flush Flow Cell Procedure

The Flush Flow Cell procedure is used to clear blockage or flush debris from the flow cell. The flow cell comprises an upper and lower chamber connected by an aperture.

Four procedures are available:

- The Flush Flow Cell procedure flushes both chambers and flushes the aperture to clear blockage.
- The Flush Lower Flow Cell procedure flushes the lower chamber only.
- The Flush Upper Flow Cell procedure flushes the upper chamber only.
- The Flush Flow Cell with Cleaner procedure flushes both chambers with cleaner. Then, a timer lets you leave the cleaner in the flow cell from 0 - 30 minutes. After the allowed time has elapsed, the system removes the cleaner from the flow cell and cleans all the areas contacted by the cleaner.

NOTE If the remove cleaner operation is not successful, the system will not allow any other operation except remove cleaner.

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 Select **Flush Flow Cell** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Select a procedure and select **OK**.

NOTE If you select **With Cleaner**, a **Time in Cleaner** text box will be displayed on the Flush Flowcell dialog box. The default time is **5** minutes. Enter your desired time in the cleaner in the text box and select **OK**.

5 Select **Finish**.

6 Perform Daily Checks.

Backwash Procedure

The Backwash procedure verifies that:

- The wash collar is aligned with the aspiration probe.
- The inside of the probe is flushed with the diluent.
- The waste is collected and drained.

The system:

1. Ensures the SAM is in the HOME position where it will remain stationary.
2. Flushes diluent through the aspiration probe, through the wash collar, and into the probe waste chamber.
3. Monitors the probe waste vacuum sensor and displays the sensor's state on the System Monitor screen.

1 Select **Menu > Diagnostics > Dx Tools > SAM**.

2 In the *Fluidic* option box on the Diagnostics Procedures - SAM screen, select **Select** and select **Backwash** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Press F10 **Access System Monitor** and select **Volt/Temp** to view the sensor status on the System Monitor. An item with a background in:

- Red indicates that an issue needs to be evaluated
- Amber indicates a status warning
- White indicates a normal range

5 Select **Finish**.

Performing the Bar Code Read Rate Procedure

The Bar Code Read Rate Procedure verifies the label symbology, number of digits and characters and that the bar code reader is aligned and functional.

The system:

1. Prompts you to place cassettes into the input buffer.
2. Runs the cassettes and reads each bar code, mimicking the SPM cycle.

   NOTE Specimen tubes are not pierced.

The system also:

- Displays a running summary identifying read rate for each tube position.
- References Failed Specimen ID reads by cassette sequence number (cassette/position) to allow for visual examination.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance tab > Bar Code.**

2 Select **Bar Code Read Rate** from the drop-down list.

3 Select **Start**.

4 Place a cassette with bar code labeled specimen tubes in the input buffer to initiate the procedure.

5 When the procedure is complete, select **Finish**.

Performing the Bar Code Alignment Procedure

The Bar Code Alignment procedure automatically aligns the bar code internal read window to optimize the read rate.

The system:

1. Prompts you to load a cassette into the input buffer.
2. Runs the cassette and performs 10 reads on each bar code using different angles.

   NOTE Specimen tubes are not pierced.

3. Automatically adjusts to the window that provides the best read rate.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance tab > Barcode.**

2 Select **Bar Code Alignment** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 Place a cassette with bar code labeled specimen tubes in the input buffer to initiate the Bar Code Alignment procedure.

5 Select **OK** to continue
OR
Select **Cancel** to end the procedure.

6 Select **Finish**.

Resetting SPM Fluidics

The Reset SPM Fluidics procedure resets the SPM fluidics. The system does the following:

- A power DOWN and power UP routine.
- A CNDR diluter cleaning cycle.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance tab**.

2 Select **Reset SPM Fluidic**s from the drop-down list.

3 Select **Start** to initiate the procedure.

4 When the procedure is complete, select **Finish**.

Starting Pneumatics

The Start Pneumatics procedure starts the Pneumatic Supply.

1 Select **Menu > Diagnostics > Dx Tools > Maintenance tab**.

2 Select **Start Pneumatics** from the drop-down list.

3 Select **Start** to initiate the procedure.

4 When the procedure is complete, select **Finish**.

Using Guided Help for RBC/WBC Maximum Consecutive Voteouts

This procedure is available for all levels of operators, and from the System Manager and Review Stations.

NOTE You can perform each part separately or perform both functions together.

For information on the guided help icons, see Guided Help Icons in CHAPTER 1, System Overview.

Viewing Maximum Number of Total Voteouts

1 From the History Logs screen display, select the row that indicates that the maximum number of total voteout events has been reached.

NOTE Guided help is available for maximum consecutive total voteouts and partial voteouts.

2 Select  .

NOTE You can also go directly to part 2 of the guided help as indicated in the dialog box. See Clean Apertures.

3 Select **Next** to place the instrument offline.

Part 1 of the guided help will return to online or offline status automatically (you do not need to acknowledge exiting):

- For consecutive WBC voteouts, both Zap and Clear WBC Apertures are executed.
- For consecutive RBC voteouts, only Zap Apertures is executed.

If either of the above procedures for WBC/RBC is not completed successfully, the system requires your intervention to retry, exit, or proceed to part 2.

4 If voteouts persist after running samples, go to Clean Apertures.

Clean Apertures

You should have already followed the procedure in Using Guided Help for RBC/WBC Maximum Consecutive Voteouts before following the steps below.

For information on the guided help icons, see Guided Help Icons in CHAPTER 1, System Overview.

1 From the History Logs screen displays, select the row that indicates that the maximum number of total voteout events has been reached and is in the Resume state.

NOTE Guided help is available for maximum consecutive total and partial voteouts.

2 Select  .

3 Select **Next** to place the instrument offline.

⚠ WARNING

Risk of injury. Beckman Coulter urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but is not limited to, protective eyewear, gloves, and suitable laboratory attire.

⚠ 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.

4 Select **Next**.

5 Go to Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures beginning with step 6.

When the DxH Slidemaker Stainer II is Unavailable

Within a workcell where the DxH Slidemaker Stainer II becomes unavailable for any reason and a slide order is processing, the system is unable to process any other orders for the same Specimen ID. In addition, it is not possible to delete the slides that are pending or in process. See Workcell Sample Flow in CHAPTER 2, Operation Principles for more information.

When the beacon on the DxH Slidemaker Stainer II turns red and the instrument cannot go back online, review the slide orders in process for additional pending activities.

A lengthy power outage results in an interrupted slide order with the status of *Not Completed*. When power is restored, completed slides in a partially completed order move to the I/O drawer; the remainder appears on the *Pending* tab. Complete the slide order by presenting the same cassette to the instrument.

Non-Routine Calibration

Some of the screens that are displayed on your System Manager are intended for non-routine testing and adjusting, or calibration performed by service only. When troubleshooting with a Beckman Coulter Service Representative by phone, you could be directed to such screen displays for informational purposes only.

Database Recovery

To successfully restore a database using the DxH System recovery procedure, a backup of the database must have been performed previously, either by you or the system. To set up automatic or manual backup, see Set Up an Automatic Backup or Set Up a Manual Backup in CHAPTER 9, Setup.

To recover a database that has been previously backup, follow these steps.

1. Power OFF the module.
2. Select  from the right-top corner of any screen.
3. Select **Exit Workstation** on the Logoff dialog box.
4. Select **Exit Workstation** on the Exit Workstation dialog box.
5. Select **OK** to close the DxH System application and view the desktop.
6. Press  on the keyboard.
7. Select **All Programs > DxH**.

8 Double-click the **Recover** application.

9 Select **Next** at the DxH Solutions Recover prompt.

NOTE If a database has not been backed up previously using the DxH System software, the following message is displayed: *A Recovery operation cannot be performed because software version XX-###4 was used to back up the workstation and the current system has software version XX-###5. Please install software version XX-1234 before performing a Recovery operation*.

10 Note that the Recover dialog box displays the following warning: *The existing data on the workstation will be overwritten by the data on the backup hard drive. Be sure the correct hard drive is inserted in the workstation.*

11 Select **Recover** to begin the recovery operation.

12 Select **OK** when the system displays *Recovery Successful.*

A database recovery operation can result in the restoration of supply values that are different from the actual amounts in the containers. If the restored supply value is lower than the actual supply, false warnings and/or a failure to switch diluents may occur. If the restored supply value is higher than the actual supply, consumables may be depleted with an alarm. These situations can be avoided if new consumables are placed on-board after database recovery.

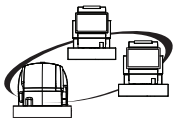
Diagnostic Procedures - DxH Slidemaker Stainer II

IMPORTANT The DxH Slidemaker Stainer II must be offline to run diagnostic procedures. If the system is online, the following message is displayed:

Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?

Select **OK** to continue or select **Cancel** to cancel the procedure and remain online.

When you are finished running diagnostics, select **Finish** from the local navigation bar on the Diagnostics screen and select  to go back online and continue processing specimens.

Accessing the Diagnostics Procedures 

When you begin a diagnostic procedure, the instrument will not run patient samples. You can monitor the workcell by using the computer from another SPM that is not being used to access diagnostics.

1 Select the DxH Slidemaker Stainer II to monitor from the System Status screen.

2 Select **Menu > Diagnostics > Dx Tools.**

The Diagnostics procedures screen displays five tabs available for selection:

- Slidemaker
- Slidestainer
- SAM
- STM
- System
- Maintenance

Maintenance Screen

Select the **Maintenance** tab to display the Diagnostics procedures - Maintenance screen. From this screen, you can access the procedures for:

- Replacing the Aspiration Probe - DxH Slidemaker Stainer II
- Replacing the Dispense Probe - DxH Slidemaker Stainer II

- Verifying the Aspiration Probe Alignment - DxH Slidemaker Stainer II
- Verifying the Blood Detector

Bar Codes

See Aligning the Bar Code Reader for proper bar code alignment.

See Verifying Bar Code Read Rate for the bar code read rate.

Aligning the Bar Code Reader

The bar code alignment procedure automatically aligns the bar code internal read window to optimize the read rate.

1. Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.
2. Select **Bar Code Reader Alignment** from the drop-down list.
3. Select **Start** to begin the process.
4. Place a cassette with the bar code labeled specimen tubes in the input buffer.
5. Select **OK** to continue
   OR
   Select **Cancel** to abort the procedure.
6. When done, select **Finish and Yes** to end the diagnostics mode.

Verifying Bar Code Read Rate

The bar code read rate procedure verifies the label symbology and the number of digits and characters. It also verifies that the bar code reader is aligned and functional.

1. Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.
2. Select **Bar Code Read Rate** from the drop-down list.

3 Select **Start**.

4 Place a cassette with bar code labeled specimen tubes in the input buffer to begin the process.

5 Select **Yes** to enter the diagnostics mode.

6 When done, select **Finish** and **Yes** to end the diagnostics mode.

Adjusting the SAM Bar Code Angle

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.

2 Select **SAM Bar Code Angular Adjustment** from the drop-down list.

3 Select **Start**.

4 Select **Yes** to enter the diagnostics mode.

5 Follow the screen prompts.

6 Listen for the steady beeping indicating that the bar code test is being performed and it is reading correctly.

NOTE The test will stop after five minutes or when you select **Cancel**.

No beep or intermittent beep could indicate the need for adjustment by Beckman Coulter service personnel. Call your Beckman Coulter Representative.

7 Ensure that the test is completed.

8 When done, select **Finish** and **Yes** to end the diagnostics mode.

Aligning the SAM Bar Code Reader

1. Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.
2. Select **SAM Bar Code Reader Alignment**.
3. Select **Start**.
4. Select **Yes** to enter the diagnostics mode.
5. Follow the screen prompts.
6. Ensure that the test is completed.
7. When done, select **Finish** and **Yes** to end the diagnostics mode.

Verifying the SAM Bar Code Read Rate

1. Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.
2. Select **SAM Bar Code Read Rate**.
3. Select **Start**.
4. Select **Yes** to enter the diagnostics mode.
5. Follow the screen prompts.
6. Ensure that the test is completed.
7. When done, select **Finish** and **Yes** to end the diagnostics mode.

Discovering the Bar Code Label Type

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **STM** tab > **Bar Code**.

2 Select **Discover Bar Code Label Type**.

3 Select **Start**.

4 Select **Yes** to enter the diagnostics mode.

5 Follow the screen prompts.

6 Ensure that the test is completed.

7 When done, select **Finish** and **Yes** to end the diagnostics mode.

Verifying the Aspiration Probe Alignment - DxH Slidemaker Stainer II

This procedure moves the aspiration probe and verifies vertical and horizontal alignment at the target position for the DxH Slidemaker Stainer II. Follow this procedure after replacing the aspiration probe.

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 Select **Verify Probe Alignment** from the drop-down list.

3 Select **Start** to initiate the process.

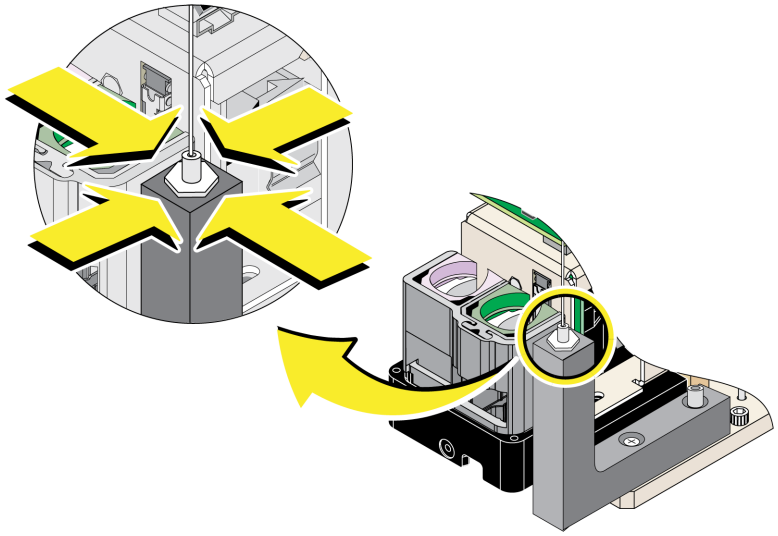
The system:

- Moves the aspiration probe to the alignment position
- Lets you verify the position of the probe.

4 Remove the Transport Shield and Lift the Front Cover.

5 Note that the system moves the aspiration probe to a target point. Visually verify that the target is touched by the aspiration probe tip.

IMPORTANT Call your Beckman Coulter Representative if the aspiration probe is misaligned.



6 Select **OK and Finish**.

The system indicates when the procedure has started and if the procedure has been completed successfully or not.

If the procedure has not been completed successfully, repeat the steps in Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.

Laboratory Information System (LIS)

Viewing LIS Diagnostics

1 Select **Menu > Diagnostics > LIS**.

2 Review the information.

3 Select **Menu** to exit the screen
OR
Select an option from the local navigation bar.

Filtering LIS

1 Select **Menu > Diagnostics > LIS.**

2 From the LIS Diagnostics screen, select **Filter.**

3 Select a **Date Range.**

4 Select **OK.**

Exporting LIS

1 From the LIS Diagnostics screen, select **Export.**

2 Select the data to export from the *Data Selection* options.

3 Select a **Destination.**

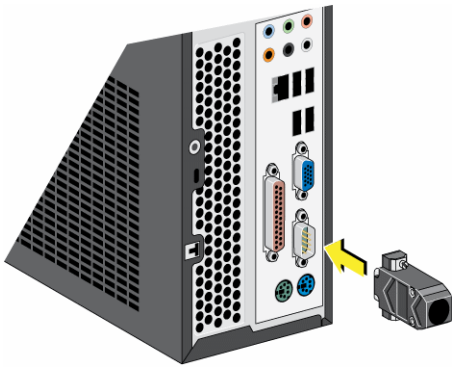
4 Select **Start.**

Performing a Loopback Check

1 Select **Menu > Diagnostics > LIS > Loopback Check.**

2 Attach the loopback connector as indicated.

NOTE If the LIS Data Transport is Ethernet, there is no need to attach a loopback connector. Select **OK** when you are prompted to attach a loopback connector.



3 Select **OK**.

Performing a Response Test

1 Select **Menu > Diagnostics > LIS > Response Test**.

2 Select **OK** to perform the response test.

Performing a Host Query

1 Select **Menu > Diagnostics > LIS > Host Query**.

2 Enter a Specimen ID and select **OK**.

When processing in the single-tube station:

- If the test order is not received within the configured time-out period, the system does not process the specimen with a default test order. After three minutes, the system times out without processing.

- Do not place the specimen into the tube holder until instructed to do so by the message on the screen indicating that a test order has been received. If a test order is not received, enter the order manually before placing the specimen in the single-tube station.

Lost Baskets - DxH Slidemaker Stainer II

Possible errors indicating a basket was dropped can occur when:

- Robot Z move cannot be verified.
- Basket pickup cannot be verified.

Multiple areas exist within the instrument where a slide basket can be lost or dropped. Visually inspect the different areas for the lost basket.

Retrieving Lost Baskets

1 Remove the Transport Shield.

NOTE The STM will be disabled and the internal lights will come on. The DxH Slidemaker Stainer II will continue the staining process.

2 Lift the Front Cover.

3 Remove power from the SAM:

a. Select **Menu** > **Diagnostics** > **Dx Tools.**

b. Select **Release SAM** from the local navigation bar.

c. Select **OK** at the prompt to continue.

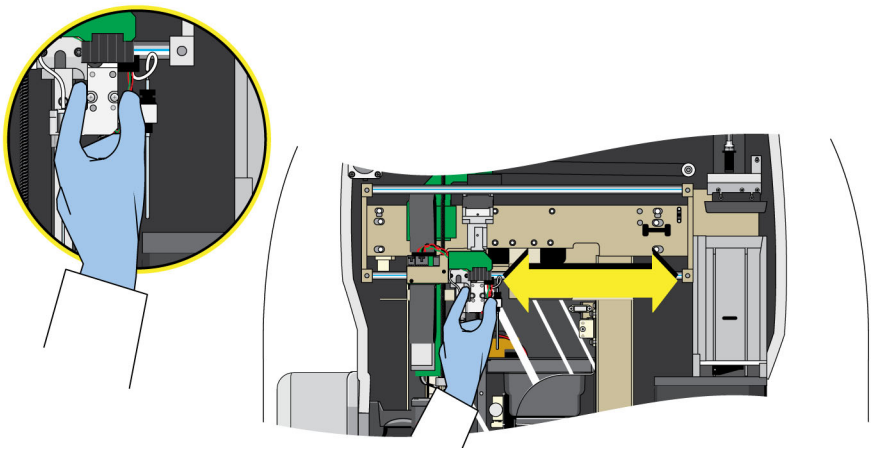
⚠ CAUTION

Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

4 Manually move the SAM:

- To the left if retrieving a basket from the Maker and then go to Retrieving a Lost Basket from the Slidemaker.

- To the right if retrieving a basket from the Stainer and then go to Retrieving a Lost Basket from the Stainer.

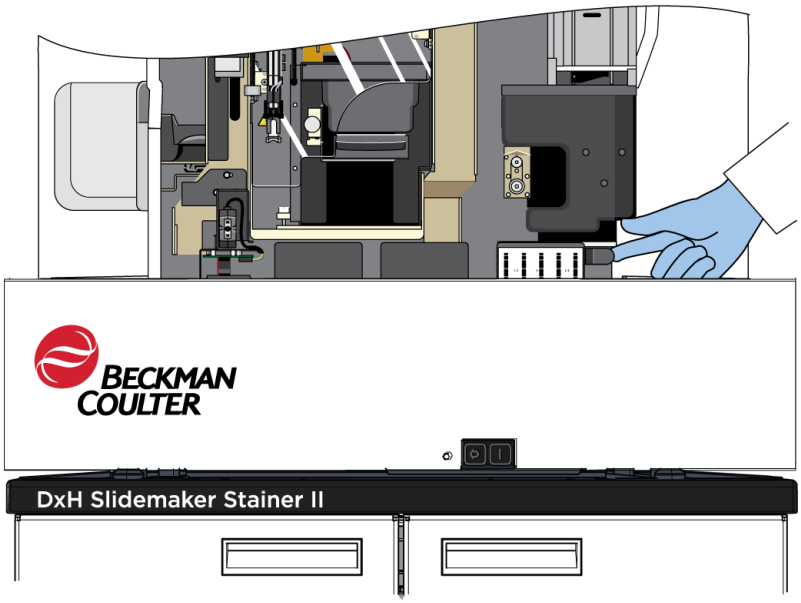


Retrieving a Lost Basket from the Slidemaker

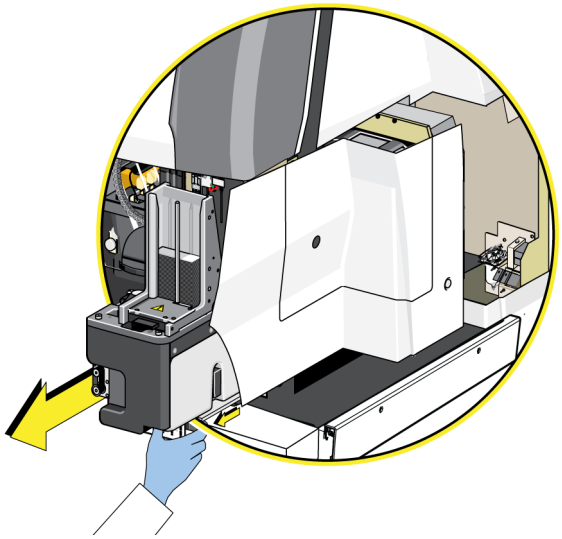
NOTE Follow the steps in Lost Baskets - DxH Slidemaker Stainer II before performing this procedure.

1 If necessary, Remove the Upper Right-Side Cover and Remove the Slide Printer Cover.

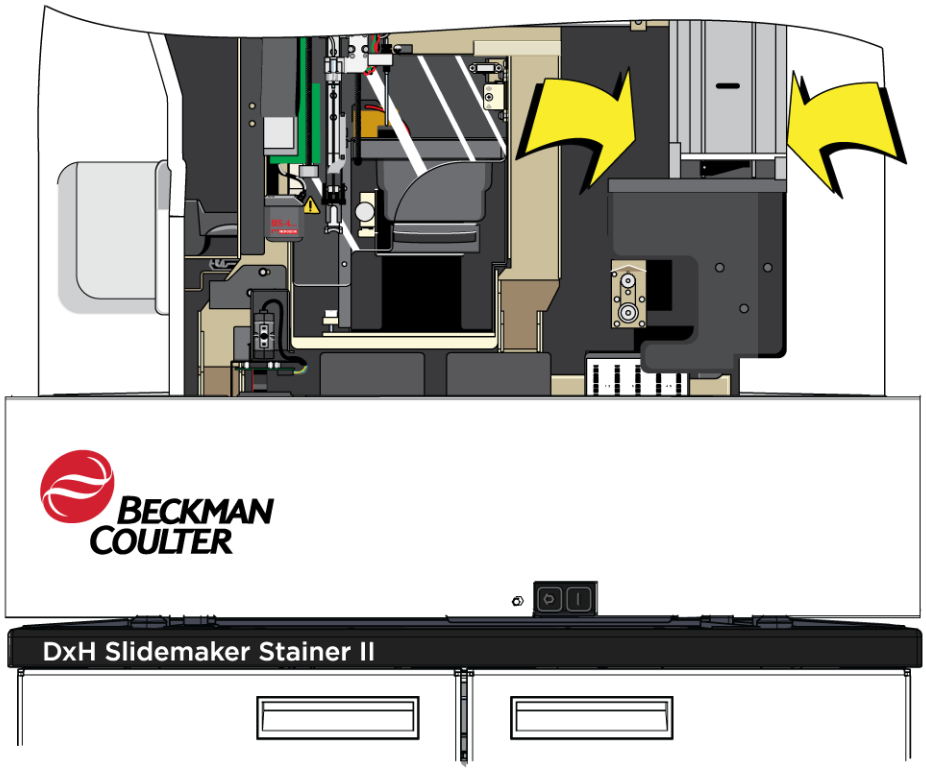
2 Locate the release handle behind the bar code reading station and release the Slidemaker.



3 Pull the DxH Slidemaker Stainer II forward until it locks into the maintenance position.



4 Inspect the visible area behind the DxH Slidemaker Stainer II for the lost basket.

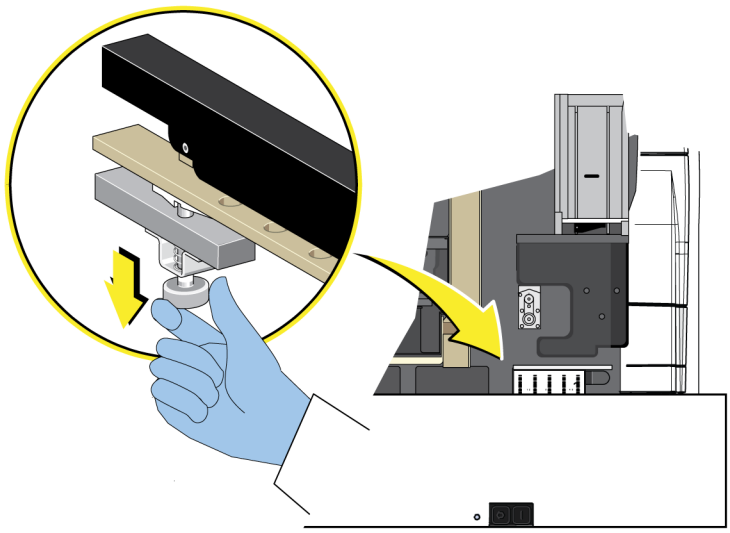


5 Retrieve the basket, if accessible.

⚠ WARNING

Risk of hand injury. Use caution when pushing the Slidemaker back into position.

6 Return the Slidemaker to the operating position by pulling the locking pin and pushing the Slidemaker back into position.



7 Install the Upper Right-Side Cover and Install the Slide Printer Cover.

8 Lower the Front Cover.

9 Install the Transport Shield.

10 Review any errors and place the instrument online to continue operation.

Retrieving a Lost Basket from the Stainer

NOTE Follow the steps in Lost Baskets - DxH Slidemaker Stainer II before performing this procedure.

1 Inspect the visible area behind the stainer shield.

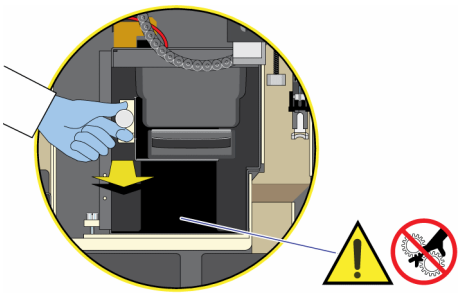
2 If a basket is located inside the Stainer, Remove the Stainer Shield.

NOTE The stainer will be disabled and the staining process will be interrupted.

WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath-tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath tray.

3 Pull the bath-tray release knob to lower the stainer bath tray.



4 Retrieve the basket, if accessible.

5 Install the Stainer Shield.

6 Lower the Front Cover.

7 Install the Transport Shield.

8 Review any errors and place the instrument online to continue operation.

Retrieving a Lost Basket from the I/O Drawer

WARNING

Risk of personal injury and contamination. The instrument could continue to move or could have delayed movement. Wait a few seconds to ensure that all movement has ended before pulling the I/O drawer. Do not place your hands inside the I/O drawer.

1 Open the I/O drawer and inspect the visible area of the I/O drawer.

2 Retrieve the basket, if accessible.

3 Place the empty baskets in the I/O drawer and close the drawer.

4 Lower the Front Cover.

5 Install the Transport Shield.

6 Review any errors and place the instrument online to continue operation.

Event Messages - DxH Slidemaker Stainer II

The event messages are divided into three types:

- Error - see Error Event Messages - DxH Slidemaker Stainer II.
- Information - see Informational Event Messages - DxH Slidemaker Stainer II.
- Warning - see Warning Event Messages - DxH Slidemaker Stainer II.

The string *%1* under *Description* in each of the tables is a variable that generates an actual value based on the event.

Clearing an Event

Events that cause an alert status icon to have an amber background will not stop operation. You should review the event in order to return the icon to a neutral background color.

Events that cause an alert status icon to have a red background require you to troubleshoot in order to continue operation.

Follow the steps below to clear an event before you attempt to troubleshoot.

1 Select the large red  at the top of the screen to display the event messages history log.

2 Select the red event from the left column.

3 Select **Review** from the local navigation bar.

4 Select **Online** to see if the instrument has recovered.

NOTE If the instrument has not recovered, follow the troubleshooting steps listed for that particular event. Search for the event message in the following tables in this section.

Table 10.2 Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Agitation motor down position cannot be verified	51CD	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Select **Start**. **4.** Ensure that the Messages box indicates that the test is completed. **5.** Select **System Monitor** at the bottom of the screen. **6.** Select **STM**/**SAM**/**Fluidics** tab > **Start** > **Remove Power**. **7.** Select **Basket Transport** tab > **Remove Power**. **8.** Remove the transport shield, lift the front cover, and remove the stainer shield. **9.** Pull the bath-tray release knob to lower the stainer bath tray and allow the bath tray to come down. **10.** Examine the top of the stainer and the left side for any visible obstructions. **11.** Remove any obstructions. **12.** Select **Stop** and **Yes** to end the diagnostics. **13.** Raise the bath tray to the locked position. **14.** Install all shields and covers. **15.** Resume normal operation. **16.** If the problem persists, power OFF and power ON the instrument. **17.** If the problem persists, call your Beckman Coulter Representative.
Agitation motor home position cannot be verified	51CC	**1.** Select **Diagnostics**>**Dx Tools**>**Slidestainer** tab>**Stainer Z-Axis Drive Verification**. **2.** Set the number of cycles to **10** and select **Start**. **3.** Press (F10). **4.** Select **Basket Transport** tab>**Start**. **5.** In the Stainer box, observe the status of the Agitation Motor Home sensor. **6.** Verify that the sensor's status changes from grey to green. **7.** Ensure that the Messages box indicates that the test is completed. **8.** Select **OK**. **9.** Select **Stop** and **Yes** to end the diagnostics. **10.** Resume normal operation. **11.** If the problem persists, power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Agitation motor position cannot be verified	509C	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Select **Start**. **4.** Ensure that the Messages box indicates that the test is completed. **5.** Select **System Monitor** > **Start** > **Remove Power**. **6.** Remove the transport shield, lift the front cover, and carefully move the SAM to the right until it stop. **7.** Remove the stainer shield. **8.** Pull the bath tray release knob to lower the stainer bath tray. **9.** Grasp the handle on the stainer drawer and pull the tray out to the maintenance position. **10.** Remove the bath tray and baths. **11.** Remove any obstructions. **12.** Replace the bath tray and baths, ensuring that they are seated properly. **13.** Close the stainer drawer, replace the stainer shield, lower the front cover, and reinstall the transport shield. **14.** Resume normal operation. **15.** Power OFF and power ON the instrument. **16.** If the problem persists, call your Beckman Coulter Representative.
All diluent containers are empty	51AC	**1.** Replace diluent reagents. **2.** Inspect supply container caps, pickup tubes and tubing. **3.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Fluidics** > **Prime SAM** procedure. **4.** Select **Start** and **Yes**. **5.** Ensure that the Messages box indicates that the test is successful. **6.** Select **Finish** and **Yes** to end the diagnostics. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
Aspiration probe home position cannot be verified	5133	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Mechanical**>**Initialize SAM** procedure. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Remove the transport shield and lift the front cover. **4.** Remove any obstructions. **5.** Lower the front cover and reinstall the transport shield. **6.** Power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Aspiration probe wash collar detects an unexpected tube	5035	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **3.** Select **Yes** to enter **Diagnostics**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the middle of the instrument. **6.** Clean the aspiration wash collar and the tube sensor with distilled water and a cotton-tipped applicator stick. **7.** Lower the front cover and reinstall the transport shield. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** Place the system online and resume normal operation. **10.** Call your Beckman Coulter Representative.
Aspiration pump home position cannot be verified	5140	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Mechanical**>**Exercise Aspiration Pump**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Ensure that the Messages box indicates that the test is completed. **4.** Select **Stop** and **Yes** to end the diagnostics. **5.** Resume normal operation. **6.** If the problem persists, power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.
Aspiration pump movement cannot be verified	527D	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Pump Test (from local navigation bar)** > **Exercise Aspiration Pump**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Ensure that the Messages box indicates that the test is completed. **4.** Select **Finish** and **Yes** to end the diagnostics. If the test failed, go to steps 8 and 9. **5.** Remove the transport shield and lift the front cover. **6.** Remove any obstructions. **7.** Lower the front cover and reinstall the transport shield. **8.** Power OFF and power ON the instrument. **9.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket delivery cannot not be verified by the robot	5041	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System**>**Robot Exerciser**>**Select 3 Point Exercise**. **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1,** and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket drop-off cannot be verified	527B	**1.** Select **Menu**>**Diagnostics**>**DxTools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to **I/O drawer 1,** set Point 2 to **Elevator 1**, and set Point 3 to I/**O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.
Basket dryer temperature exceeds limits	5196	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket elevator Y-home position cannot be verified	51BE	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the far left. **4.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **5.** Remove the slide printer cover. **6.** Remove any slides or baskets. **7.** Pull the locking pin and push the Slidemaker back to the operating position. **8.** Reinstall the Slidemaker covers and the transport shield. **9.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Basket Elevator Y-Axis Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Ensure that the Messages box indicates that the test is completed. **12.** Select **Finish** and **Yes** to end the diagnostics. **13.** Place the system online. **14.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket pickup cannot be verified	5027	**1.** Select **Menu**>**Diagnostics**>**DxTools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System**>**Robot Exerciser**>**3 Point Exerciser.** **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to I/**O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Stop** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.
Basket presence cannot be verified by robot	52AD	**1.** Remove the transport shield and lift the front cover. **2.** Remove the slide printer cover. **3.** Check inside the instrument for any misplaced or fallen baskets. **4.** Reinstall the slide printer cover, lower the front cover, and reinstall the transport shield. **5.** Resume normal operation. **6.** If the problem persists power OFF and power ON the instrument and resume normal operation. **7.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket presence cannot be verified by robot sensors	5042	**1.** Select **Menu**>**Diagnostics**>**DxTools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket presence on the robot cannot be verified before drop-off	50B7	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to I/**O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned with Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Bath drain cannot be verified	510D	**1.** Press (F10). **2.** Select **Stainer** tab>**Start**>**Test Fluidics**. Observe which sensor (SN701-SN706) is reading incorrectly. **3.** Select **Basket Transport** tab>**Remove Power**. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Remove Power**. **5.** Remove the transport shield, lift the front cover, and remove the stainer shield. **6.** Pull the bath tray forward and remove the tray and baths. **7.** Clean the sensor (SN701-SN706) with a cotton tipped applicator stick and alcohol. **8.** Reinstall all the baths, tray, shields, and covers. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **Slidestainer** tab>**Fluidics**>**Fill All Baths**. **11.** After the baths are filled, select System Monitor at the bottom of the screen. **12.** Select **Stainer** tab>**Start**>**Test Fluidics** and ensure that all the baths indicate being filled with reagent (in blue). **13.** Select **Stop** and **Yes** to end the diagnostics, and resume normal operation. **14.** If the problem persists, power OFF and power ON the instrument. **15.** Call your Beckman Coulter Representative.
Bath tray drawer is unexpectedly in down position	5287	**1.** Press (F10) to go to the System Monitor screen. **2.** Select **Basket Transport** tab > **Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Carefully move the SAM to the right and remove the stainer shield. **5.** If the bath tray is not lowered, carefully pull the bath tray release knob to lower the stainer bath tray and allow the tray to come down. **6.** On the System Monitor screen, in the Stainer box, view the status of the Bath Tray Down sensor. **7.** Verify that the sensor's status changes from grey to green. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** Carefully raise the bath tray to the locked position and verify that the sensor's status changes from green back to grey. **10.** Reinstall all the shields and covers. **11.** Resume normal operation. **12.** If the problem persists, power OFF and power ON the instrument. **13.** If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Bath tray drawer position cannot be verified	50BA	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Select **Start**. **4.** Ensure that the Messages box indicates that the procedure is completed. **5.** Select **System Monitor** > **Start** > **Remove Power**. **6.** Remove the transport shield and lift the front cover. **7.** Carefully move the SAM to the right until it stops. **8.** Select **Basket Transport** tab > **Start** > **Yes**. **9.** Remove the stainer shield and lower the bath tray. **10.** Remove any obstructions from the stainer area. **11.** In the Stainer box, observe the status of the Bath Tray Operating Position sensor and the Bath Tray Down sensor. **12.** Verify that when the bath tray is lowered, the statuses of both the sensors change from grey to green. **13.** Raise the bath tray to the locked position and verify that the statuses of both the sensors change back to grey. **14.** Select **Stop** and **Yes** to end the diagnostics. **15.** Reinstall all the shields and covers. **16.** Resume normal operation. **17.** If the problem persists, power OFF and power ON the instrument. **18.** If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Bath tray drawer position cannot be verified	50BB	**1.** Press (F10) to access the System Monitor screen. **2.** Select **Start**> **Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Carefully move the SAM to the right until it stops. **5.** Select **Basket Transport** tab>**Start**>**Yes**. **6.** Visually inspect that the bath tray is in the locked position. **7.** Remove the stainer shield, pull the bath tray release knob to lower the stainer bath tray, and allow the tray to come down. **8.** On the System Monitor screen, in the Stainer box, view the statuses of the Bath Tray Operating Position sensor and the Bath Tray Down sensor. **9.** Verify that with the bath tray lowered, the statuses of both sensors change from grey to green. **10.** Carefully raise the bath tray to the locked position and verify that the statuses of both sensors change from green back to grey. **11.** Select **Stop** and **Yes** to end the diagnostics. **12.** Reinstall all shields and covers. **13.** Resume normal operation. **14.** If the problem persists, power OFF and power ON the instrument. **15.** If the problem persists, call your Beckman Coulter Representative.
Bath tray drawer position cannot be verified	50BC	**1.** Press (F10) to access the System Monitor screen. **2.** Select **Start** > **Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Carefully move the SAM to the right until it stops. **5.** Select **Basket Transport** tab > **Start** > **Yes**. **6.** Visually inspect that the bath tray is in the locked position. **7.** Remove the stainer shield, pull the bath tray release knob to lower the stainer bath tray, and allow the tray to come down. **8.** On the System Monitor screen, in the Stainer box, view the statuses of the Bath Tray Operating Position sensor and the Bath Tray Down sensor. **9.** Verify that with the bath tray lowered, the statuses of both sensors change from grey to green. **10.** Carefully raise the bath tray to the locked position and verify that the statuses of both sensors change from green back to grey. **11.** Select **Stop** and **Yes** to end the diagnostics. **12.** Reinstall all shields and covers. **13.** Resume normal operation. **14.** If the problem persists, power OFF and power ON the instrument. **15.** If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Bath tray drawer position cannot be verified	50BA	**1.** Press (F10) to access the System Monitor screen. **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Carefully move the SAM to the right until it stops. **5.** Select **Stop** and **Yes** to end the diagnostics. **6.** Select **Basket Transport** tab>**Start**>**Yes**. **7.** Remove the stainer shield and lower the bath tray. **8.** Remove any obstructions from the stainer area. **9.** In the Stainer box, observe the status of the Bath Tray Operating Position sensor and the Bath Tray Down sensor. **10.** Verify that when the bath tray is lowered, the statuses of both the sensors change from grey to green. **11.** Raise the bath tray to the locked position and verify that the statuses of both the sensors change back to grey. **12.** Select **Stop** and **Yes** to end the diagnostics. **13.** Reinstall all the shields and covers. **14.** If the problem persists, power OFF and power ON the instrument. **15.** Call your Beckman Coulter Representative.
Bath tray drawer position cannot be verified	50B0	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidestainer** tab>**Mechanical**>**Stainer Z-Axis Drive Verification**. **2.** Set the number of cycles to **10** and select **Start**. **3.** Press (F10). **4.** Select **Basket Transport** tab>**Start**. **5.** In the Stainer box, observe the status of the Agitation Motor Home sensor. **6.** Verify that the sensor's status changes from grey to green. **7.** Ensure that the Messages box indicates that the test is completed. **8.** Select **OK**. **9.** Select **Stop** and **Yes** to end the diagnostics. **10.** Resume normal operation. **11.** If the problem persists, power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.
Blood detector cannot be calibrated	525A	None
Both bio-waste containers are full	51A5	**1.** Empty the waste containers. **2.** Ensure the caps on both waste containers are secure. **3.** Replace the waste tube double switch assembly. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Broken slide bin is full	51A1	Perform the Empty Broken Slide Bin procedure.
Cannot verify home position	51B1	Call your Beckman Coulter Representative.
Cannot verify home position	509D	Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cannot verify home position	5094	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Mechanical**, and select the procedure that initializes the suspect motor. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Cassette movement from STM front left transfer point not verified	5219	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface with distilled water. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Left Cassette Detector. **6.** Place a cassette in the transfer lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement from STM front right transfer point not verified	521A	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Right Cassette Detector. **6.** Place a cassette in the bypass lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the transport shield and Slidemaker covers. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette movement from STM left mixer cannot be verified	5216	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. Also clean the left mixer area with a cotton tip applicator stick and alcohol. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Left Mixer Cassette Detector. **6.** Place a cassette on the wall of the left mixer. **7.** Verify that the detector's status changes from gray to green. **8.** Select **Menu**>**Diagnostics**>**Dx Tools**> **STM**>**Mechanical**>**STM Test** and follow the screen prompts. **9.** Ensure that the Messages box indicates that the test is completed. **10.** Select **Finish** and **Yes** to end the diagnostics. **11.** Reinstall the Slidemaker covers and the transport shield. **12.** If the problem persists, power OFF and power ON the instrument. **13.** Call your Beckman Coulter Representative.
Cassette movement from STM middle left transfer point not verified	521B	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Middle Left Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement from STM middle right transfer point not verified	521C	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Middle Right Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select Stop and Yes to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette movement from STM right mixer cannot be verified	5217	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the right mixer area with a cotton tip applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Right Mixer Cassette Detector. **7.** Place a cassette on the wall of the right mixer and verify that the detector's status changes from gray to green. **8.** Select **Menu**>**Diagnostics**>**Dx Tools**> **STM**>**Mechanical**>**STM Test** and follow the screen prompts. **9.** Ensure that the Messages box indicates that the test is completed. **10.** Select **Finish** and **Yes** to end the diagnostics. **11.** Reinstall the Slidemaker covers and the transport shield. **12.** If the problem persists, power OFF and power ON the instrument. **13.** Call your Beckman Coulter Representative.
Cassette movement from bar code reading station cannot be verified	5215	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the BCR Station Cassette Detector. **6.** Place a cassette in the bar code reading station. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the transport shield and Slidemaker covers. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement from output buffer cannot be verified	5218	**1.** Remove the transport shield and lift the front cover. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Out Cassette 1 Cassette Detector. **6.** Place a cassette in the output buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Lower the front cover and reinstall the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette movement to the STM front left transfer point not verified	5210	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Left Cassette Detector. **6.** Place a cassette in the bypass lane reading station. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the STM front right transfer point not verified	5211	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Right Cassette Detector. **6.** Place a cassette in the front bypass lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the STM input buffer cannot be verified	520B	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the In Cassette 1 Cassette Detector. **6.** Place a cassette in the input buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette movement to the STM left mixer cannot be verified	520D	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Left Mixer Cassette Detector. **6.** Place a cassette on the left mixer wall. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the transport shield and Slidemaker covers. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the STM middle left transfer point not verified	5212	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Middle Left Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the STM middle right transfer point not verified	5213	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Middle Right Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette movement to the STM output buffer cannot be verified	520F	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Out Cassette 1 Cassette Detector. **6.** Place a cassette in the output buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the STM right mixer cannot be verified	520E	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the right mixer with a cotton tip applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Right Mixer Cassette Detector. **7.** Place a cassette on the right mixer wall and verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette movement to the bar code reading station not verified	520C	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the bar code reader station with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the BCR Station Cassette Detector. **7.** Place a cassette in the bar code reader station. **8.** Verify that the detector's status changes from gray to green. **9.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** If the problem persists, power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette not sensed on mixer wall during barcode verification routine	52AA	**1.** Remove the transport shield and lift the front cover. **2.** Check the left and right mix stations for obstructions. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the Cassette Detector box, observe the status of the Left Mixer detector or the Right Mixer detector. **6.** Place a cassette on the mixer wall. Verify that the detector's status changes from gray to green. **7.** Remove the cassette, lower the front cover and reinstall the transport shield. **8.** Resume normal operation. **9.** If the problem persists, power OFF and power ON the instrument and resume normal operation. **10.** Call your Beckman Coulter Representative.
Cassette not sensed on mixer wall during mix routine	5226	**1.** Remove the transport shield and Slidemaker covers. **2.** Remove any obstructions from the mix stations. **3.** Clean the mix station area with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Left Mixer Cassette Detector or the Right Mixer Cassette Detector. **7.** Place a cassette on the wall of the mixer. **8.** Verify that the detector's status changes from gray to green. **9.** Ensure that the Messages box indicates that the test is completed and remove the cassette. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** Power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.
Cassette presence at STM front left transfer point not verified	5207	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Left Cassette Detector. **6.** Place a cassette in the bypass lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette presence at STM front right transfer point not verified	5208	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Front Right Cassette Detector. **6.** Place a cassette in the bypass lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette presence at STM middle left transfer point not verified	5209	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM, observe the status of the Middle Left Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette presence at STM middle right transfer point not verified	520A	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Middle Right Cassette Detector. **6.** Place a cassette in the return lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette presence in STM bar code reading station not verified	5202	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the bar code reading station with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the BCR Station Cassette Detector. **7.** Place a cassette in the bar code reading station. **8.** Verify that the detector's status changes from gray to green. **9.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** If the problem persists, power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.
Cassette presence in STM left mixer cannot be verified	5204	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the left mixer area with a cotton tip applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Left Mixer Cassette Detector. **7.** Place a cassette on the left mixer wall. **8.** Verify that the detector's status changes from gray to green. **9.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** If the problem persists, power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.
Cassette presence in STM output buffer cannot be verified	5206	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Out Buffer 1 Cassette Detector. **6.** Place a cassette in the output buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Cassette presence on STM right mixer cannot be verified	5205	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Right Mixer Cassette Detector. **6.** Place a cassette on the right mixer wall. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Cassette unexpectedly detected in front of STM output buffer	50F4	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Out Cassette 1 Cassette Detector. **6.** Place a cassette in the output buffer lane. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Communication response was not acknowledged	5279	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Communication response was not acknowledged	5096	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the Instrument. **5.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Communication response was not acknowledged	51EE	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Communication timeout with instrument Module ID/Audio board	52AF	**1.** Power OFF and power ON the instrument. **2.** Resume normal operation. **3.** Call your Beckman Coulter Representative.
Could not verify basket elevator lowered the basket	528F	**1.** Remove the transport shield and the Slidemaker covers. **2.** Remove any obstructions from the basket elevator's front and rear lifts. **3.** Reinstall the Slidemaker covers and the transport shield. **4.** Perform the Basket Elevator Front Lift Verification procedure. (Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Basket Elevator Front Lift Drive Verification**). **5.** Perform the Basket Elevator Rear Lift Drive Verification procedure. **6.** Ensure that the Messages box indicates that the test is completed. **7.** Select **Finish** and **Yes** to end the diagnostics. **8.** If the problem persists, power OFF and power ON instrument. **9.** Call your Beckman Coulter Representative.
DI-water drain pathway pressure exceeds limits	5293	Call your Beckman Coulter Representative.
Data stored on instrument Module ID/Audio board EEPROM is corrupt	52AE	**1.** Power OFF and power ON the instrument. **2.** Resume normal operation. **3.** Call your Beckman Coulter Representative.
Default embedded configuration overridden	52A3	Call your Beckman Coulter Representative.
Diagnostic procedure terminated unexpectedly. System clean up required	52C0	None

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Diluent cleaner chamber level sensors reported an inconsistent state	503A	**1.** Press (F10). **2.** Select **SAM Fluidics** and examine the liquid level in the waste chamber (VC340). **3.** If the liquid level is contacting the upper sensor (SN340H), perform the following steps. **a.** Select **Start**>**Test Fluidics**. **b.** Select valves **VL340**, **VL346**, and **VL342** to activate the valves. **c.** Select the left side of pump PM340 to activate that side of the pump. **d.** Observe the liquid level in the waste chamber (VC340) to ensure that it drains. **e.** Select **Stop** and **Yes** to end the diagnostics. **4.** If the previous steps did not resolve the problem, power OFF and power ON the instrument. Then try to resume normal operation. **5.** Call your Beckman Coulter Representative.
Diluent cleaner chamber overflow detected	5281	**1.** Remove the transport shield and lift the front cover. **2.** Pull the STM out to the maintenance position. **3.** Inspect the diluent cleaner overflow chamber (it is on the left side of the instrument behind the output buffer) to ensure that no liquid is present. **4.** If liquid is present, lift the fluid sensor's cap and empty the diluent cleaner overflow chamber. **5.** Using a lint free material moistened with alcohol, clean the sensor probes. **6.** Reinstall the overflow chamber. **7.** Return the STM to the operating position, lower the front cover, and reinstall the transport shield. **8.** Press (F10) to display the System Monitor screen. **9.** Select **SAM Fluidics** tab>**Start**. **10.** Observe the status of the diluent cleaner chamber overflow sensor (SN360). • If the sensor's status is grey, select Stop and Yes to end the Diagnostics. • If the sensor's status is red, see Step 13. **11.** Place the system online. **12.** If SN360 remains red, power OFF and power ON the instrument. **13.** If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Ejector drop position cannot be verified	5063	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the far left. **4.** Remove any slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any broken slides. **7.** Lower the front cover and reinstall the transport shield. **NOTE** For operator safety, you close the instrument without the slide chute and run this particular test without delivering a slide. **8.** From the Diagnostics screen, select **Slidemaker** tab>**Mechanical**>**Ejector to Drop Position**>**Start**. **9.** Press (F10) and select **Slide Transport** tab>**Start**. **10.** In the Ejector box, observe the status of the Drop sensor. **11.** Verify that the sensor's state changes from grey to green and follow the screen prompts. **12.** Select **Stop** and **Yes** to end the diagnostics. **13.** Remove the transport shield and lift the front cover. **14.** Reinstall the slide chute and reload the slides. **15.** Lower the front cover and reinstall the transport shield. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Ejector eject position cannot be verified	5062	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the status of the Deliver sensor. **14.** Verify that the sensor's status changes from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Ejector park (home) position cannot be verified	51B2	**1.** Select **Menu**> **Diagnostics**> **Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Ejector park (home) position cannot be verified	51B6	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Ejector park position cannot be verified	5061	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Ejector position cannot be verified before ejecting the slide	50AB	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Ejector position cannot be verified by ejector position sensors	5064	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the far left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any broken slides. **7.** Lower the front cover and reinstall the transport shield. **NOTE** For operator safety, you close the instrument without the slide chute and run this particular test without delivering a slide. **8.** From the Diagnostics screen, select **Slidemaker** tab>**Mechanical**> **Ejector to Drop Position**>**Start**. **9.** Press (F10). **10.** Select **Slide Transport** tab>**Start**. **11.** In the Ejector box, observe the status of the Drop sensor. **12.** Verify that the sensor's status changes from grey to green. Follow the screen prompts. **13.** Select **Stop** and **Yes** to end the diagnostics. **14.** Remove the transport shield and lift the front cover. **15.** Reinstall the slide chute and reload slides. **16.** Lower the front cover and reinstall the transport shield. **17.** Power OFF and power ON the instrument. **18.** Call your Beckman Coulter Representative.
Ejector wash collar clearance position cannot be verified	51DB	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the status of the Probe Clearance sensor. **14.** Verify that the sensor's status changes from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Ejector wash collar clearance position cannot be verified	51B7	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to 3 and select Start. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the status of the Deliver and Probe Clearance sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Elevator front lift home position was not verified	51BF	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **7.** Remove the slide printer cover. **8.** Remove any obstructions in the basket elevator area. **9.** Pull the locking pin and push the Slidemaker back to the operating position. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Basket Elevator Front Lift Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Ensure that the Messages box indicates that the test is completed. **14.** Select **Finish** and **Yes** to end the diagnostics. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Elevator position could not be verified	51C4	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield, lift the front cover, and move the SAM to the left. **5.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **6.** Remove the slide printer cover. **7.** Remove any obstructions from the basket elevator area. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Dry Cycle**>**SAM and Slidemaker**. **11.** Set the number of cycles to **3** and select **Start**. **12.** Ensure the Messages box indicates that the test is complete. **13.** Select **Finish** and **Yes** to end the diagnostics. **14.** Power OFF and power ON the instrument. **15.** Call your Beckman Coulter Representative.
Elevator rear-lift home position cannot be verified	51C0	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **7.** Remove the slide printer cover. **8.** Remove any obstructions in the basket elevator area. **9.** Pull the locking pin and push the Slidemaker back to the operating position. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Mechanical**>**Basket Elevator Rear Lift Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Ensure that the Messages box indicates that the test is completed. **14.** Select **Finish** and **Yes** to end the diagnostics. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Excessive position error for servo motor	5190	**1.** Remove the transport shield and lift the front cover. **2.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **3.** Remove any obstructions. **4.** Pull the locking pin and push the Slidemaker back to the operating position. **5.** Lower the front cover and reinstall the transport shield. **6.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Smear Truck Y-Axis Drive Verification**. **7.** Set the number of cycles to **3** and select **Start**. **8.** Ensure that the Messages box indicates that the test is completed. **9.** Select **Finish** and **Yes** to end the diagnostics. **10.** Call your Beckman Coulter Representative.
Fan function in basket dryer cannot be verified	5195	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Firmware upgrade is incomplete	519F	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Heater function in basket dryer area cannot be verified	5197	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Heater function in smear heater area cannot be verified	5199	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Hemasphere diluent difference value is out of range	5036	**1.** Select **Menu**>**Diagnostic**>**Dx Tools**>**SAM** tab>**Fluidics**>**Clean Aspirate Probe** procedure. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Perform the Shutdown procedure. **4.** Perform the Daily Checks procedure. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Hemasphere diluent reading is out of range	5037	**1.** Select **Menu**>**Diagnostic**>**Dx Tools**>**SAM** tab>**Fluidics**>**Clean Aspirate Probe** procedure. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Perform the Shutdown procedure. **4.** Perform the Daily Checks procedure. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
High pressure detected in the aspiration pathway	51D9	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Aspiration Probe Backwash**. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Perform the Shutdown procedure. **4.** Perform the Daily Checks procedure. **5.** Replace the aspiration probe. Refer to Replacing the Aspiration Probe in the IFU. **6.** Power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
High pressure detected in the dispense pathway	51DA	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Dispense Probe Backwash**. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Perform the Shutdown procedure. **4.** Perform the Daily Checks procedure. **5.** Replace the dispense probe. Refer to Replacing the Dispense Probe in the IFU. **6.** Power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.
I/O drawer home position cannot be verified	511B	**1.** Press (F10) to display the System Monitor screen. **2.** Select **Basket Transport** tab>**Start**. **3.** Press the I/0 drawer open/close button to open the I/O drawer; remove any obstructions. **4.** In the I/O drawer box on the System Monitor screen, verify that the I/O Drawer Open and In-Position sensors' statuses are green and that the Closed sensor status is grey. **5.** Press the I/0 drawer open/close button to close the I/O drawer. **6.** On the System Monitor screen, verify that the I/O Drawer Closed and In-Position sensors' statuses are green and that the Open sensor's status is grey. **7.** Select **Stop**. **8.** Call your Beckman Coulter Representative.
I/O drawer state cannot be verified	5265	**1.** Verify the statuses of the I/O drawer sensors: **a.** Press (F10) to display the System Monitor screen. **b.** Select **Basket Transport** tab> **Start**. **c.** In the I/O Drawer box, observe the statuses of the Closed, Open, and In-Position sensors. **d.** Verify that with the I/O drawer in the operating position, the Closed and In-Position sensors' statuses are green. **e.** Press the I/O drawer open/close button to open the I/O drawer. **f.** Verify that with the I/O drawer open, the Open and In-Position sensors' statuses are green. **g.** Select **Stop** and **Yes** to end the diagnostics. **2.** Power OFF and power ON the instrument. **3.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
I/O drawer state cannot be verified	5263	**1.** Verify the statuses of the I/O drawer sensors: **a.** Press (F10) to display the System Monitor screen. **b.** Select **Basket Transport** tab> **Start**. **c.** In the I/O Drawer box, observe the statuses of the Closed, Open, and In-Position sensors. **d.** Verify that with the I/O drawer in the operating position, the Closed and In-Position sensors' statuses are green. **e.** Press the I/O drawer open/close button to open the I/O drawer. **f.** Verify that with the I/O drawer open, the Open and In-Position sensors' statuses are green. **g.** Select **Stop** and **Yes** to end the diagnostics. **2.** Power OFF and power ON the instrument. **3.** Call your Beckman Coulter Representative.
I/O drawer state cannot be verified	5264	**1.** Verify the statuses of the I/O drawer sensors: **a.** Press (F10) to display the System Monitor screen. **b.** Select **Basket Transport** tab> **Start**. **c.** In the I/O Drawer box, observe the statuses of the Closed, Open, and In-Position sensors. **d.** Verify that with the I/O drawer in the operating position, the Closed and In-Position sensors' statuses are green. **e.** Press the I/O drawer open/close button to open the I/O drawer. **f.** Verify that with the I/O drawer open, the Open and In-Position sensors' statuses are green. **g.** Select **Stop** and **Yes** to end the diagnostics. **2.** Power OFF and power ON the instrument. **3.** Call your Beckman Coulter Representative.
Image download to the printer cannot be verified	52BE	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select menu>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Improper A/D operation	507E	1. Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Improper A/D operation	5085	1. Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Improper A/D operation	5082	1. Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Improper A/D operation	5080	1. Select **Menu**>**Diagnostics**>**Dx Tool**s>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Improper A/D operation	5081	1. Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Improper MRC Diagnostics	51EC	1. Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. 2. Ensure that the Messages box indicates that the test is completed. 3. Select **Finish** and **Yes** to end the diagnostics. 4. If the problem persists, power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Improper MRC Diagnostics	51ED	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Improper MRC Diagnostics	51F6	**1.** Power OFF and power ON the instrument **2.** Call your Beckman Coulter Representative.
Improper MRC Diagnostics	51F7	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Improper MRC Diagnostics	5295	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Improper device configuration	5078	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Improper printer communication	508B	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reset**. **2.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot**. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communications Test**. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load Ribbon**. **5.** Ensure that the sensor for the ribbon loaded is green. **6.** Select **Finish** and **Yes** to end the diagnostics. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Improper printer hardware detected	50AC	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. (Wait 15 seconds.) **2.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot printer**. (Wait 15 seconds.) **4.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. (Wait 30 seconds.) **6.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
In buffer motor home position cannot be verified	5128	**1.** Remove all cassettes from the input buffer. **2.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Motor Test**>**STM Input Buffer Drive Verification**. **3.** Set the number of cycles to **3** and select **Start**. **4.** Ensure that the Messages box indicates that the test is completed. **5.** Select **Stop** and **Yes** to end the diagnostics. **6.** Power OFF and power ON the instrument **7.** Call your Beckman Coulter Representative.
Incorrect board is attached to MRC	5239	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Invalid liquid sensor state	5086	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Invalid printer response	50B3	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Invalid printer response	50AD	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.
Invalid reagent configuration	51AA	**1.** Verify the Stainer Consumables configuration. **2.** Verify the Staining Protocol configuration. **3.** Call your Beckman Coulter Representative.
Invalid staining protocol	5159	**1.** Verify Staining Protocol configuration. **2.** Call your Beckman Coulter Representative.
Invalid staining protocol	515B	**1.** Verify the Staining Protocol configuration. **2.** Call your Beckman Coulter Representative.
Invalid staining protocol	515A	**1.** Verify the Staining Protocol configuration. **2.** Call your Beckman Coulter Representative.
Invalid staining protocol	51AB	**1.** Verify the Staining Protocol configuration. **2.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Label format cannot be verified	515C	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.
Left mixer home position cannot be verified	5122	**1.** Remove the transport shield and lift the front cover. **2.** Remove any obstructions from the mix stations. **3.** Clean the mixer with a cotton-tipped applicator stick and alcohol. **4.** Lower the front cover and reinstall the transport shield. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Motor Test**>**STM Left Mixer Drive Verification**. **6.** Follow the screen prompts. Set the number of cycles to **3** and select **Start**. **7.** Ensure that the Messages box indicates that the test is completed. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** Power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
Loss of pressure detected in the aspiration pathway	51D7	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Aspiration Probe Backwash**. **2.** Select **Stop** and **Yes** to end the diagnostics. **3.** Perform the Shutdown procedure. **4.** Perform the Daily Checks procedure. **5.** Replace the aspiration probe. Refer to Replacing the Aspiration Probe in the IFU. **6.** Power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Loss of pressure detected in the dispense pathway	51D8	**1.** Perform the Daily Checks. On the SMS tab, verify that the pressure reading is acceptable. **2.** If the pressure is not within acceptable limits, remove the transport shield and lift the front cover. **3.** Examine the SAM for any loose tubing or air leak. **4.** Pull the STM forward to the maintenance position and examine the waste chamber for any loose tubing. The waste chamber is located behind the input buffer, on the right side. **5.** If you find loose tubing and do not know where to reattach it, call your Beckman Coulter Representative. **6.** Lower the front cover and reinstall the transport shield. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
MRC reported an invalid HostID	52BC	The following troubleshooting only applies for probable causes 1 and 2: **1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]> **Unidentified Information.** **2.** Select the entry in question and select **Edit**. **3.** Form the pull-down menu, select the appropriate HostID value and select **OK**. **4.** Select **Close** to return to the Hardware-Component-Information screen.
MRC reset unexpectedly	5187	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Missing expected slides	5011	**1.** Remove the transport shield and lift the front cover. **2.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Release SAM**. **3.** Move the SAM to the left. **4.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **5.** Remove any loose or broken slides. **6.** Remove the slide printer cover and examine the area around the print shuttle and basket elevators. **7.** Pull the locking pin and push the Slidemaker back to the operating position. **8.** Reinstall the covers and the transport shield. **9.** Place the system online and resume normal operation. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Mixer home position cannot be verified	50FB	**1.** Remove the transport shield and lift the front cover. **2.** Remove any obstructions from the mix stations. **3.** Clean the mix station area with a cotton-tipped applicator stick and alcohol. **4.** Lower the front cover and reinstall the transport shield. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Motor Test**>**STM Mixer Left Motor Verification** or **STM Mixer Right Motor Verification**. **6.** Set the number of cycles to **5** and select **Start**. **7.** Ensure that the Messages box indicates that the test is completed. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
Motor movement cannot be verified	5098	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Mechanical**, and select the procedure that initializes the suspect motor. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Motor position cannot be verified	507A	**1.** Remove the transport shield and the Slidemaker covers. **2.** Remove any obstructions. **3.** Reinstall the Slidemaker covers and the transport shield. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Mechanical**, and select the procedure that initializes the suspect motor. **5.** Ensure the Messages box indicates that the test is completed. **6.** Select **Finish** and **Yes** to end the diagnostics. **7.** Call your Beckman Coulter Representative.
NV Memory could not be initialized	52B6	**1.** Power OFF and power ON instrument **2.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Negative acknowledgement (NAK) received from the printer	50AE	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.
Out of slides	5003	**1.** Replenish slides and close the ejector door. **2.** Remove slides from the slide chute. **3.** Remove the slide chute and perform the Cleaning the Ejector Slide Chute procedure. **4.** Reinstall the slide chute and load slides. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Output buffer is full	50F3	**1.** Remove the transport shield and lift the front cover. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Out Buffer FULL Cassette Detector. **6.** Place a cassette in the back of the output buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Lower the front cover and reinstall the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Pneumatic pressure exceeds limits	50B5	**1.** Perform the Daily Checks procedure. **2.** When the Daily Checks procedure is completed, select the SMS tab and verify that the pressure reading for the Slidemaker is within range. **3.** Power OFF and power ON the instrument. **4.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Pneumatic pressure exceeds limits	502E	**1.** Perform the Daily Checks. On the SMS tab, verify that the pressure reading is acceptable. **2.** If the pressure is not within acceptable limits, remove the transport shield and lift the front cover. **3.** Examine the SAM for any loose tubing or air leak. **4.** Pull the STM forward to the maintenance position and examine the waste chamber for any loose tubing. The waste chamber is located behind the input buffer, on the right side. **5.** If you find loose tubing and do not know where to reattach it, call your Beckman Coulter Representative. **6.** Lower the front cover and reinstall the transport shield. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
Power supply exceeds operating limits	524D	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Presence of slide could not be verified at deliver position	505F	**1.** Select **Menu**> **Diagnostics**> **Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload the slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensors' statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Pressure exceeded limits in external probe wash path	528E	**1.** Remove the transport shield and lift the front cover. **2.** Pull the STM out to the maintenance position. **3.** Check the aspiration probe wash collar and dispense probe wash cup tubing for kinks or possible obstruction. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** Observe the probe-wipe pump transducer (AD370) on the SAM Fluidics screen. **7.** Verify that the value is within range. If it is red, see steps 11 and 12. **8.** Return the STM to the operating position. **9.** Reinstall the Slidemaker covers and transport shield. **10.** Place the system online. **11.** Power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.
Print head overheated	5228	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reset printer.** (Wait 15 seconds.) **2.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. (Wait 15 seconds.) **4.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Communication test**. (Wait 30 seconds.) **6.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle home position cannot be verified	51BA	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select Diagnostics from the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle X-Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Motor Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle position cannot be verified	50A6	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** from the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Dry Cycle**>**Mode-SAM and Slidemaker**. **14.** Select **3** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transpor**t tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Motor Receive sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select the back arrow when the test is completed. **20.** Ensure that the Completed cycle indicates **3** cycles and select **Cancel**. **21.** Select **Stop** and **Yes** to end the diagnostics. **22.** Power OFF and power ON the instrument. **23.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle position cannot be verified	5048	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** from the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **14.** Select **3** cycles and **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the statuses of the Motor Home and Motor Receive sensors. **18.** Verify that the sensors' statuses change from grey to green. **19.** Select the back arrow on the screen and verify that the Completed cycles box indicates 3. **20.** Select **Cancel** and verify that the Messages box indicates that the Completed cycles indicates **3**. **21.** Select **Stop** and **Yes** to end the diagnostics. **22.** Power OFF and power ON the instrument. **23.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle pusher extend position cannot be verified	504A	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** from the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Pusher Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Pusher Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle pusher home position cannot be verified	504C	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Pusher Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select S**lide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Pusher Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle pusher home sensor did not sense home	51BB	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Pusher Drive Verification.** **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Pusher Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle pusher receive slide position cannot be verified	504B	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Pusher Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Pusher Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle receive position cannot be verified	504D	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** from the lower left corner of the screen. **13.** Select the **Slidemaker** tab>**Dry Cycle**>**Mode-SAM and Slidemaker**. **14.** Select **3** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Motor Receive sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select the back arrow when the test is completed. **20.** Ensure that the Completed cycles indicates **3** cycles and select **Cancel**. **21.** Select **Stop** and **Yes** to end the diagnostics. **22.** Power OFF and power ON the instrument. **23.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle rotate home position cannot be verified	51BC	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Rotate Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab> **Start**. **17.** In the Print Shuttle box, observe the status of the Rotate Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle rotate position cannot be verified	50A2	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Rotate Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Rotate Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle rotate position cannot be verified	50A1	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Rotate Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the statuses of the Rotate Home and Rotate Receive sensors. **18.** Verify that the sensors' statuses change from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Print shuttle transfer position cannot be verified	50A5	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle X-Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Motor Home sensor. **18.** Verify that the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.
Printer did not reply to a command	50AF	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset ptinter**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Printer firmware upgrade is incomplete	51F9	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 2. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Download to printer**. Follow the screen prompts (wait time could vary by 10 -15 minutes). 3. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 4. Select **Finish** and **Yes** to end the diagnostics. 5. Power OFF and power ON the instrument. 6. Call your Beckman Coulter Representative.
Printer firmware upgrade is incomplete	51FA	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 2. Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Download to printer**. Follow the screen prompts (wait time could vary by 10-15 minutes). 3. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 4. Select **Finish** and **Yes** to end the diagnostics. 5. Power OFF and power ON the instrument. 6. Call your Beckman Coulter Representative.
Printer firmware upgrade is incomplete	51FB	1. Select **Menu**>**Diagnostics**> **Dx Tools** > **Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 2. Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Download to printer**. Follow the screen prompts (wait time could vary by 10-15 minutes). 3. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 4. Select **Finish** and **Yes** to end the diagnostics. 5. Power OFF and power ON the instrument. 6. Call your Beckman Coulter Representative.
Printer firmware upgrade is incomplete	51FC	1. Select **Menu**>**Diagnostics**>**Dx Tools** >**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 2. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Download to printer**. Follow the screen prompts (wait time could vary by 10-15 minutes). 3. Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). 4. Select **Finish** and **Yes** to end the diagnostics. 5. Power OFF and power ON the instrument. 6. Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Printer firmware upgrade is incomplete	50F0	**1.** Select **Menu**>**Diagnostics**> **Dx Tools** > **Slidemaker** tab>**Printer Diagnostics**> **Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). **2.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**> **Firmware**>**Download to printer**. Follow the screen prompts (wait time could vary by 10-15 minutes). **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Firmware**>**Upgrade**. Follow the screen prompts (wait time is approximately 2 minutes). **4.** Select **Finish** and **Yes** to end the diagnostics. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Printer is out of ribbon	51A2	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the cartridge cover. **8.** Load the new ribbon. **9.** Reinstall the cartridge cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Lower the front cover and reinstall the transport shield. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **14.** Select **OK** to load the ribbon. **15.** Select **Finish** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Printer not ready after printing	515D	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reset printer**. (Wait 15 seconds.) **2.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer**. (Wait 15 seconds.) **4.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Communication test**. (Wait 30 seconds.) **6.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Printer ready state cannot be verified	50B2	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reset printer.** (Wait 15 seconds.) **2.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab> **Printer Diagnostics**>**Reboot printer.** (Wait 15 seconds.) **4.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. (Wait 30 seconds.) **6.** Select **Finish** and **Yes** to end the diagnostics. Try to resume normal operation. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
Printer ribbon is not loaded properly	5013	**1.** Open the cartridge cover. **2.** Remove and reinstall the printer cartridge. **3.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **4.** Close the cartridge cover. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**> **Reset printer**. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**> **Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot printer**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Replace the printer cartridge. **14.** Select **Finish** and **Yes** to end the diagnostics. **15.** Resume normal operation by going back online. **16.** Process several specimens using Make Slide Only mode. **17.** Power OFF and power ON the instrument. **18.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Probe cleaning could not be verified	528D	**1.** Remove the transport shield. **2.** Lift the front cover. **3.** Remove the slide printer cover. **4.** Remove the upper right cover. **5.** Check the probe wipe pump, aspiration probe wash collar, and dispense wash cup tubing for leaks. **6.** Press (F10) to display the System Monitor screen. **7.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **8.** Observe the transducer on the SAM Fluidics screen. **9.** Verify that the value is within range. **10.** Reinstall the upper right cover. **11.** Reinstall the slide printer cover. **12.** Lower the front cover. **13.** Reinstall the transport shield. **14.** Rerun the specimen. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.
Probe cleaning could not be verified due to excessive bubbles	52B2	**1.** From the Diagnostic Procedures menu, select **Dx Tools** > **SAM** > **Fluidic** > **Prime SAM**. **2.** Perform Shutdown procedure. **3.** Perform Daily Checks procedure. **4.** Replace the aspiration probe. **5.** Power OFF and power ON the SPM. **6.** Call your Beckman Coulter Representative.
Probe cleaning could not be verified due to excessive bubbles	52B3	**1.** From the Diagnostic Procedures menu, select **Dx Tools** > **SAM** > **Fluidic** > **Prime SAM**. **2.** Perform Shutdown procedure. **3.** Perform Daily Checks procedure. **4.** Replace the dispense probe. **5.** Power OFF and power ON the SPM. **6.** Call your Beckman Coulter Representative.
Probe cleaning could not be verified due to excessive bubbles	52B4	**1.** From the Diagnostic Procedures menu, select **Dx Tools** > **SAM** > **Fluidic** > **Prime SAM**. **2.** Remove the transport shield and Slidemaker covers. **3.** Check and examine the probe wipe pump, aspiration probe wash collar, and dispense wash collar tubing for leaks. **4.** Press (F10) to display the System Monitor screen and select the **SAM Fluidics** tab. **5.** Press the **Start** button. **6.** Observe the transducer on the SAM Fluidics screen; ensure the value is within range. **7.** Replace the transport shield and Slidemaker covers. **8.** Run Daily Checks **9.** Rerun the specimen. **10.** Power OFF and power ON the SPM. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Probe motor movement cannot be verified	527C	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Mechanical**>**Initialize SAM** procedure. 2. Select **Stop** and **Yes** to end the diagnostics. 3. Remove the transport shield and lift the front cover. 4. Remove any obstructions. 5. Lower the front cover and reinstall the transport shield. 6. Power OFF and power ON the instrument. 7. Call your Beckman Coulter Representative.
Probe-wash pump home position cannot be verified	51D5	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Dispense Diluent from Probe Wash Pump**. 2. Select **Start**. The dispense probe is cleaned. (Wait time is approximately 15 seconds.) 3. Follow the screen prompts. 4. Ensure that the Messages box indicates that the is completed. 5. Select **Stop** and **Yes** to end the diagnostics. 6. If the problem persists, power OFF and power ON the instrument. 7. Call your Beckman Coulter Representative.
Probe-wash pump movement cannot be verified	5259	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Dispense Diluent from Probe Wash Pump**. 2. Select **Start**. The dispense probe is cleaned. (Wait time is approximately 15 seconds.) 3. Follow the screen prompts. 4. Ensure that the Messages box indicates that the text is completed. 5. Select **Stop** and **Yes** to end the diagnostics. 6. If the problem persists, power OFF and power ON the instrument. 7. Call your Beckman Coulter Representative.
Proper bar code acknowledgment not received	5106	1. Power OFF and power ON the instrument. 2. Call your Beckman Coulter Representative.
Right mixer home position cannot be verified	51CF	1. Remove the transport shield and the Slidemaker covers. 2. Remove any obstructions from the mix stations. 3. Reinstall the Slidemaker covers and the transport shield. 4. Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Motor Test**>**STM Right Mixer Drive Verification**. 5. Power OFF and power ON the instrument. 6. Call your Beckman Coulter Representative.
Robot X-home position cannot be verified	51C5	1. Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot X-Drive Verification** procedure. 2. Set the number of cycles to **3** and select **Start**. 3. Select **Finish** and **Yes** to end the diagnostics. 4. Power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Robot X-move could not be verified	51C8	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot X-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Robot Y-home position cannot be verified	51C6	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot Y-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Robot Y-move cannot be verified	51C9	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot Y-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Robot Z-home position cannot be verified	51C7	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot Z-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Robot Z-move cannot be verified	51CA	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot Z-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Robot cannot initialize	5286	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1,** and set Point 3 to **I/O drawer 5**. **12.** Select B**asket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Stop** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.
SAM X-home position cannot be verified	513B	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Move the SAM to the left and to the right and remove any obstructions **5.** Lower the front cover and reinstall the transport shield. **6.** Select **Diagnostics** in the lower left corner of the screen. **7.** Select **SAM** tab>**Mechanical**>**Initialize SAM**. **8.** Ensure that the Messages box indicates that the test is completed. **9.** Select **Stop** and **Yes** to end the diagnostics. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
SAM X-motor movement cannot be verified	513D	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Move the SAM to the left and to the right and remove any obstructions. **5.** Lower the front cover and reinstall the transport shield. **6.** Select **Diagnostics** in the lower left corner of the screen. **7.** Select **SAM** tab>**Mechanical**>**Initialize SAM**. **8.** Ensure that the Messages box indicates that the test is completed. **9.** Select **Stop** and **Yes** to end the diagnostics. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
SPI communication recovered	5150	Call your Beckman Coulter Representative.
STM X-motor home position cannot be verified	511E	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Mechanical**> **Initialize STM**. **2.** Set the number of cycles to **5** and select **Start**. **3.** Press (F10). **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the X Motor Home sensor. **6.** Verify that during the test the sensor's status changes from grey to green. **7.** Select **OK**. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
STM Y-motor home position cannot be verified	5120	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **STM** tab>**Mechanical**> **Initialize STM**. **2.** Set the number of cycles to **5** and select **Start**. **3.** Press (F10). **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the Y Motor Home sensor. **6.** Verify that during the test the sensor's status changes from grey to green. **7.** Select **OK**. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
Single-tube station failed to retract after bar code reading problem	52A2	None

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Single-tube station home position cannot be verified	51CB	**1.** Remove the transport shield and Slidemaker covers. **2.** Check the single-tube station for obstructions. Clean any liquid spills. Use a cotton tipped applicator stick and alcohol if necessary near the cradle. **3.** Reinstall the Slidemaker covers and the transport shield. **4.** Select **Menu**>**Diagnostics**> **Dx Tools**>**STM** tab>**Motor Test**>**STM Single-Tube Station Drive Verification**. **5.** Set the number of cycles to **3** and select **Start**. **6.** Ensure that the Messages box indicates that the test is completed. **7.** Select **Stop** and **Yes** to end the diagnostics. **8.** Power OFF and power ON the instrument. **9.** Call your Beckman Coulter Representative.
Slide is missing	5010	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Slide label printing cannot be verified	5049	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**> **Slidemaker** tab>**Printer Diagnostics**>**Reset printer**. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Reboot printer**. **5.** Select **Finish** and **Yes** to end the diagnostics. **6.** Resume normal operation by going back online. **7.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Communication test**. This test may take approximately 1 minute. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** Resume normal operation by going back online. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Printer Diagnostics**>**Load ribbon**. **11.** Select **Finish** and **Yes** to end the diagnostics. **12.** Resume normal operation by going back online. **13.** Power OFF and power ON the instrument. **14.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Slide presence cannot be verified	505A	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Slide presence on smear shuttle cannot be verified	5054	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Slide printer door is not installed	51B0	**1.** Remove and reinstall the printer cartridge cover. **2.** Press (F10) and select the **System** tab. **3.** In the Interlocks box, verify that the Printer Door Safe sensor's status is green. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Slide supply is out and ejector door was open too long	51DC	**1.** Verify that the ejector door is closing properly. **2.** Inspect the magnet located on the upper right side of the ejector door to ensure that it is in place. **3.** Inspect the inside of the door in this same location for any damaged wires going to the sensor. **4.** Replenish the slides and close the ejector door. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Slide supply status cannot be verified	51DE	**1.** Replenish slides and close the ejector door. **2.** Remove slides from the slide chute. **3.** Remove the slide chute and perform the Cleaning the Ejector Slide Chute procedure. **4.** Reinstall the slide chute and reload slides. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Slide transfer to print shuttle cannot be verified	50B8	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**> **Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3**, and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Slide transfer to the basket cannot be verified	5255	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **7.** Remove the slide printer cover. **8.** Remove any obstructions from the basket elevator area. **9.** Pull the locking pin and push the Slidemaker back to the operating position. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** Select **Menu**>**Diagnostics**>**Dx tools**>**Slidemaker** tab>**Mechanical**> **Basket Elevator Rear Lift Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Ensure that the Messages box indicates that the test is completed. **14.** Select **Finish** and **Yes** to end the diagnostics. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.
Slide transfer to the basket cannot be verified	5258	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove the slide printer cover. **8.** Remove any slides or debris from the print shuttle area. **9.** Reinstall the slide printer cover. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the covers and shields. **12.** Select **Diagnostics** in the lower left corner of the screen. **13.** Select **Slidemaker** tab>**Mechanical**>**Print Shuttle Pusher Drive Verification**. **14.** Select **5** cycles and select **Start**. **15.** Press (F10). **16.** Select **Slide Transport** tab>**Start**. **17.** In the Print Shuttle box, observe the status of the Pusher Home sensor. **18.** Verify the sensor's status changes from grey to green. **19.** Select **OK** when the test is completed. **20.** Select **Stop** and **Yes** to end the diagnostics. **21.** Power OFF and power ON the instrument. **22.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Slidemaker is not in the operating position	5260	Place the Slidemaker module in the operating position.
Smear shuttle motor home position cannot be verified	51B8	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Y-Drive Verification**. **12.** Set the number of cycles to **5** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear shuttle position cannot be verified	5057	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Powe**r. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions found on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Y-Drive Verification**. **12.** Set the number of cycles to **5** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear shuttle position cannot be verified	5052	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and move it to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab> **Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Motor Deliver sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear shuttle position cannot be verified by smear shuttle sensors.	5051	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Y-Drive Verification**. **12.** Set the number of cycles to **5** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear shuttle pusher extension cannot be verified	504F	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Pusher Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab >**Start**. **15.** In the Smear Shuttle box, observe the status of the Pusher Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear shuttle pusher home position cannot be verified	51B9	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power.** **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Pusher Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** Observe the status of the Pusher Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear shuttle pusher home position cannot be verified	5050	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport t**ab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Shuttle Pusher Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Pusher Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear shuttle pusher home sensor did not detect closed position	5056	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **5.** Remove any obstructions on the smear shuttle. **6.** Pull the locking pin and push the Slidemaker back to the operating position. **7.** Lower the front cover and reinstall the transport shield. **8.** Select **Diagnostics** in the lower left corner of the screen. **9.** Select **Slidemaker** tab> **Mechanical**>**Smear Shuttle Pusher Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10). **12.** Select **Slide Transport** tab>**Start**. **13.** In the Smear Shuttle box, observe the status of the Pusher Home sensor. **14.** Verify that the sensor's status changes from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** If the problem persists, power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Smear shuttle pusher home sensor did not detect open position	50A0	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab> **Mechanical**>**Smear Shuttle Pusher Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Pusher Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear shuttle slide detector in unexpected state	5055	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power.** **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear shuttle. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Shuttle box, observe the status of the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear truck Y-home position cannot be verified	528B	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Truck Y-Axis Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Y Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear truck Y-motor movement cannot be verified	528C	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Truck Y-Axis Drive Verification**. **12.** Set the number of cycles to **3**, and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Y Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear truck Z-home sensor position cannot be verified	51B3	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Mechanical**>**Smear Truck Z-Axis Drive Verification**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Z Motor Home sensor. **16.** Verify that the sensor's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Smear truck slide detector found unexpected slide	5058	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Sldiemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.
Smear truck slide detector in unexpected state	5059	**1.** Press (F10). **2.** Select **STM/SAM/Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left. **6.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **7.** Remove any obstructions on or near the smear truck. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Lower the front cover and reinstall the transport shield. **10.** Select **Diagnostics** in the lower left corner of the screen. **11.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **12.** Set the number of cycles to **3** and select **Start**. **13.** Press (F10). **14.** Select **Slide Transport** tab>**Start**. **15.** In the Smear Truck box, observe the status of the Slide Detector. **16.** Verify that the detector's status changes from grey to green. **17.** Select **Stop** and **Yes** to end the diagnostics. **18.** If the problem persists, power OFF and power ON the instrument. **19.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Software download to MRC is incomplete	5232	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Solenoid device is open	5083	**1.** Power OFF and power ON instrument. **2.** Call your Beckman Coulter Representative.
Solenoid device shorted	5084	**1.** Power OFF and power ON instrument. **2.** Call your Beckman Coulter Representative.
Specimen transport module is not in the operating position	525F	Place the Specimen Transport module in the operating position.
Stain/methanol drain pathway pressure exceeds limits	5294	None

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Stainer bath tray is full. Operator must empty bath tray.	50BE	1. Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. 2. Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. 3. Press (F10) to go to the System Monitor screen. 4. Verify that the status of sensor SN706 is grey. If SN706 is green, there may be liquid in the bath tray. 5. Remove the transport shield and lift the front cover. 6. Press the power OFF switch in front of the instrument. 7. Carefully move the SAM to the right and remove the stainer shield. 8. Pull the bath tray release knob to lower the stainer bath tray and allow the tray to come down carefully to AVOID POSSIBLE SPILLS. **⚠ CAUTION** **The baths might float.** 9. Carefully pull the tray handle towards you and visually examine the bath tray for excess liquid. 10. If the tray is full of liquid, carefully remove the tray and baths, and empty the excess liquid. 11. Clean the stainer sensors SN701-SN706 with an applicator stick moistened with methanol. Refer to Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes in CHAPTER 12, Cleaning Procedures. 12. Reinstall the baths and tray. 13. Carefully raise the bath tray to the locked position. 14. Reinstall all the shields and covers. 15. Press the power ON switch in the front of the instrument. 16. Resume normal operation. 17. If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Stainer bath tray liquid level cannot be verified	50BD	**1.** Select **Menu** > **Diagnostics** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Press (F10) to go to the System Monitor screen. **4.** Verify that the status of sensor SN706 is grey. If SN706 is green, there may be liquid in the bath tray. **5.** Remove the transport shield and lift the front cover. **6.** Press the power OFF switch in front of the instrument. **7.** Carefully move the SAM to the right and remove the stainer shield. **8.** Pull the bath tray release knob to lower the stainer bath tray and allow the tray to come down carefully to AVOID POSSIBLE SPILLS. **⚠ CAUTION** **The baths might float.** **9.** Carefully pull the tray handle towards you and visually examine the bath tray for excess liquid. **10.** If the tray is full of liquid, carefully remove the tray and baths, and empty the excess liquid. **11.** Clean the stainer sensors SN701-SN706 with an applicator stick moistened with methanol. Refer to Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes in CHAPTER 12, Cleaning Procedures. **12.** Reinstall the baths and tray. **13.** Carefully raise the bath tray to the locked position. **14.** Reinstall all the shields and covers. **15.** Press the power ON switch in the front of the instrument. **16.** Resume normal operation. **17.** If the problem persists, call your Beckman Coulter Representative.
Stainer module position cannot be verified	50B9	**1.** Power OFF and power ON the instrument. **2.** If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Stainer reagent over delivered	525C	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Ensure that the Messages box indicates the procedure is completed. **4.** Select **System Monitor** from the bottom of the screen. **5.** Select **Remove Power**. **6.** Select the **Basket Transport** tab. **7.** Remove the transport shield and lift the front cover. **8.** Carefully move the SAM to the right. **9.** Remove the stainer shield. **10.** Pull the bath tray release knob to lower the stainer bath tray and allow the tray to come down carefully to AVOID POSSIBLE Spills. **⚠ CAUTION** **The baths might float.** **11.** Grasp the handle on the stainer drawer and pull the tray out to the maintenance position. **12.** Examine the overflow tray for excess liquid, manually drain the tray, and remove it. **13.** If the stainer bath tray has liquid, use a cotton-tipped applicator stick with alcohol to clean the appropriate sensor (SN701- SN706). **14.** Reinstall the baths and trays. **15.** Raise the bath tray to the locked position. **16.** Reinstall the covers and shields. **17.** Resume normal operation. **18.** If the problem persists, power OFF and power ON the instrument. **19.** if the problem persists, call your Beckman Coulter Representative.
Stainer shield is not installed	5246	**1.** Remove the transport shield and lift the front cover. **2.** Remove and reinstall the stainer shield. **3.** Press (F10) to display the System Monitor screen. **4.** Select **System** tab>**Start**. **5.** In the Interlocks box, observe the status of the Stainer Shield Safe sensor. **6.** Verify that the sensor's status is green. If the sensor's status is red, see Steps 8 and 9. Select **Stop** and **Yes** to end the diagnostics. **7.** Lower the front cover and reinstall the transport shield. **8.** Power OFF and power ON the instrument. **9.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Stainer unexpectedly detected liquid	5291	Call your Beckman Coulter Representative.
Stainer unexpectedly detected liquid	5292	Call your Beckman Coulter Representative.
Stripper home position cannot be verified	5137	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Mechanical** > **Initialize SAM** > **Start**. **2.** Press (F10). **3.** Select **STM**/**SAM**/**Fluidics** tab > **Start** > **Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left and to the right and remove any obstructions. **6.** Lower the front cover and reinstall the transport shield. **7.** Select **Stop** and **Yes** to end the diagnostics. **8.** Resume normal operation. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
Stripper motor movement cannot be verified	5284	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Mechanical** > **Initialize SAM** > **Start**. **2.** Press (F10). **3.** Select **STM**/**SAM**/**Fluidics** tab > **Start** > **Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left and to the right and remove any obstructions. **6.** Lower the front cover and reinstall the transport shield. **7.** Select **Stop** and **Yes** to end the diagnostics. **8.** Resume normal operation. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
The %1 is not aligned.	52C2	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>Bar Code. **2.** Select **Bar Code Reader Alignment** if STM bar-code reader (BC560) needs alignment or select **SAM Barcode Reader Alignment** if verification bar-code reader (BCC401) needs alignment. **3.** Select **Start** and follow the screen prompts. **4.** Ensure that the Messages box indicates that the procedure is completed. **5.** Select **Finish** and **Yes** to end the diagnostics.
Too many consecutive broken slides	51A0	**1.** Replenish the slides and close the ejector door. **2.** Remove the slides from the slide chute. **3.** Remove the slide chute and perform the Cleaning the Ejector Slide Chute procedure. **4.** Reinstall the slide chute and load slides. **5.** Power OFF and power ON the instrument. **6.** Call your Beckman Coulter Representative.
Transducer baseline cannot be determined	529F	None

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Transport cannot be started.	52C1	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Mechanical** > **Initialize SAM** > **Start**. **2.** Press (F10). **3.** Select **STM**/**SAM**/**Fluidics** tab > **Start** > **Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Move the SAM to the left and to the right and remove any obstructions. **6.** Lower the front cover and reinstall the transport shield. **7.** Select **Stop** and **Yes** to end the diagnostics. **8.** Resume normal operation. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
Transport shield is not installed	5245	**1.** Remove the transport shield and ensure the magnet is in place. **2.** Ensure that all the magnets along the edge of the transport shield are in place. **3.** Reinstall the transport shield. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Tube was not detected	527E	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Press (F10). **3.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **4.** Remove the transport shield and lift the front cover. **5.** In the SAM box, observe the Tube Detector. **6.** Manually activate the aspiration wash collar (push up the wash collar and spring) and verify that the sensor's status changes from green to grey. **7.** Select **Stop** and **Yes** to end the diagnostics. **8.** Lower the front cover and reinstall the transport shield. **9.** Go online to resume normal operation. **10.** Power OFF and power ON the instrument.
Unable to confirm blood was cleaned from SAM	5253	**1.** Review the detailed message and all events related to this sample or cycle. **2.** Follow the troubleshooting for each related event.
Unable to drain cleaner	518B	**1.** Press (F10). **2.** Select **SAM Fluidics** tab>Start>**Test Fluidics**. **3.** Select valves **VL340**, **VL346**, and **VL342** to activate the valves. **4.** Select the left side of pump PM340 to activate that side of the pump. **5.** Verify that the liquid that was in the waste chamber (VC340) drained and that the status of the sensors in the chamber changed from green to grey. **6.** Select **Stop** and **Yes** to end the diagnostics. **7.** Power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.
Unable to drain stainer	5244	Empty the waste container.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Unable to drain stainer	5243	Empty the waste container.
Unable to drain the waste chamber	52BD	1. Empty the waste containers. 2. Ensure the caps on both waste containers are secure. 3. Replace the waste tube double switch assembly. 4. Power OFF and power ON the instrument. 5. Call your Beckman Coulter Representative.
Unable to drain the waste chamber	502F	1. Press (F10) to display the System Monitor screen. 2. Select **STM**/**SAM**/**Fluidics** tab>**Test Fluidics**. 3. Select **Start** and activate the following components: **VL341** or **VL342** (whichever is empty), **VL340**, **PM340**, and **VL346**. 4. Verify that chamber VC340 drains and that the sensors change from green to gray. 5. Select **Stop** when completed. 6. Power OFF and power ON the instrument. 7. Call your Beckman Coulter Representative.
Unexpected bar code reader data received	5103	1. Power OFF and power ON the instrument. 2. Call your Beckman Coulter Representative.
Unexpected bar code reader data received	5104	1. Power OFF and power ON the instrument. 2. Call your Beckman Coulter Representative.
Incomplete Flush Stainer Module procedure	52C7	1. Confirm that the stain and methanol wastes are not full. 2. Confirm that the stainer supplies and flush supply are full. 3. Rerun the **Drain all Baths and Flush** procedure. 4. If flushing the stainer module is not successful, call your Beckman Coulter Representative.
Out of flush reagent or hardware failure	52C8	1. Check if the flush reagent is depleted. 2. Refill the depleted flush reagent. 3. Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. 4. Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. 5. Select **Start**. 6. Ensure that the Messages box indicates that the test is completed. 7. Resume normal operation. 8. If the problem persists, call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Unexpected basket detected before pickup	5043	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System**>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to I/**O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.
Unexpected exception	50F7	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected exception	50F5	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected exception	5214	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected exception	50F2	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected exception	50F6	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected exception	5007	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Unexpected response received from bar code reader	5105	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected slide is at ejector deliver position	5067	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the left. **4.** Remove the slides from the slide chute. **5.** Remove the slide chute. **6.** Remove any obstructions on the ejector. **7.** Reinstall the slide chute and reload slides. **8.** Lower the front cover and reinstall the transport shield. **9.** Select **Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**>**Ejector Drive Verification**. **10.** Set the number of cycles to **3** and select **Start**. **11.** Press (F10) **12.** Select **Slide Transport** tab>**Start**. **13.** In the Ejector box, observe the statuses of the Park and Deliver sensors. **14.** Verify that the sensor's statuses change from grey to green. **15.** Select **Stop** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.
Unexpected software exception	5280	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>[Relevant tab]>**Electrical**, and select the procedure that checks the module. **2.** Ensure that the Messages box indicates that the test is completed. **3.** Select **Finish** and **Yes** to end the diagnostics. **4.** If the problem persists, power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Unexpected software exception	51F4	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected software exception	51E9	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected software exception	51EA	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected software exception	5095	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Unexpected software exception	50A9	**1.** Power OFF and power ON instrument. **2.** Call your Beckman Coulter Representative.
Unexpected software exception	504E	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.

Table 10.2 *(Continued)*Error Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Vacuum in the waste chamber below operating limits	5031	**1.** Perform the Daily Checks procedure. **2.** When the Daily Checks procedure is completed, select the SMS tab and verify that the Vacuum reading for the Slidemaker is within range. **3.** Remove the transport shield. **4.** Lift the front cover. **5.** Remove the slide printer cover. **6.** Remove the upper right cover. **7.** Pull the STM out to the maintenance position. **8.** Check VC340 and associated tubing for leaks. **9.** Inspect the foam trap and empty, if needed. **10.** Return the STM to the operating position. **11.** Reinstall the upper right cover. **12.** Reinstall the slide printer cover. **13.** Lower the front cover. **14.** Reinstall the transport shield. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.
Vacuum transducer function cannot be verified	50B4	**1.** Perform the Daily Checks procedure. **2.** When the Daily Checks procedure is completed, select the SMS tab and verify that the Vacuum reading for the Slidemaker is within range. **3.** Remove the transport shield. **4.** Lift the front cover. **5.** Remove the slide printer cover. **6.** Remove the upper right cover. **7.** Pull the STM out to the maintenance position. **8.** Check VC340 and associated tubing for leaks. **9.** Inspect the foam trap and empty, if needed. **10.** Return the STM to the operating position. **11.** Reinstall the upper right cover. **12.** Reinstall the slide printer cover. **13.** Lower the front cover. **14.** Reinstall the transport shield. **15.** Power OFF and power ON the instrument. **16.** Call your Beckman Coulter Representative.
Waste chamber level sensors reported an inconsistent state	5030	**1.** Press (F10) to display the System Monitor screen. **2.** Select **SAM Fluidics** tab>**Start**>**Test Fluidics**. **3.** Select valves **VL346** and **VL340** to activate the valves. **4.** Select the left side of pump PM340 to activate that side of the pump. **5.** On the screen, verify that the waste chamber (VC340) drained and that the statuses of the sensors inside the waste chamber changed from green to grey. **6.** Select **Stop** and **Yes** to end the diagnostics. **7.** If the problem persists, power OFF and power ON the instrument. **8.** If the problem persists, call your Beckman Coulter Representative.

Table 10.3 Informational Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Agitation motor home recovered	51CE	None
Aspiration error	526A	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity and inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.
Aspiration error	5269	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.
Aspiration error	5268	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.
Aspiration error	526C	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.

Table 10.3 Informational Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Aspiration error	5267	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.
Aspiration error	526B	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing. **3.** Perform Shutdown. See CHAPTER 8, Shutdown. **4.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures.
Aspiration error	51AE	**1.** Verify the specimen volume was adequate. **2.** Select **Menu**>**Diagnostics**>**Dx Tools**>**SAM** tab>**Fluidics**>**Prime SAM**. **3.** Ensure that the Messages box indicates that the test is completed. **4.** Select **Finish** and **Yes** to end the diagnostics. **5.** Perform the Shutdown procedure. **6.** Replace the aspiration probe. Refer to Replacing the Aspiration Probe in the IFU. **7.** If the problem persists, power OFF and power ON the instrument. **8.** Call your Beckman Coulter Representative.

Table 10.3 Informational Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Aspiration error	51AF	**1.** If you have sufficient specimen: **a.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Fluidics** > **Prime SAM** > **Start**. **b.** Ensure the Messages box indicates that the test is completed. **c.** Select **Finish** and **Yes** to end the diagnostics. **d.** Rerun the specimen. **2.** Perform Shutdown. See CHAPTER 8, Shutdown. **3.** Perform Daily Checks. See CHAPTER 3, Daily Checks. **4.** Rerun the specimen. **5.** Replace the aspiration probe. See Replacing the Aspiration Probe - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures. **6.** Select **Menu** > **Diagnostics** > **Dx Tools** > **SAM** tab > **Hemasphere** > **Verify** and follow the instructions on the System Manager screen. **7.** Ensure that the Messages box indicates that the test is completed. **8.** Select **Finish** and **Yes** to end the diagnostics. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Resume normal operation. **11.** Call your Beckman Coulter Representative.
Aspiration pump sensed home after successful recovery	5141	None
Bath %1 drained	5297	None
Bath %1 refilled	5298	None
Blood detector calibration reached maximum value	525B	None
Bypassed %1	529A	None
Disabled %1 bypass	5299	None
MRC type was reassigned	51E8	None
Out of reagent	509A	**1.** Place the DxH Slidemaker Stainer II offline. **2.** Replace the depleted reagent. **3.** Inspect the pickup tubes and replace them, if necessary. **4.** Resume normal operation. **5.** If the problem persists, call your Beckman Coulter Representative.
Printer hardware test recovered	5227	None
Printer hardware test recovered	5229	None
Probe vertical drive sensed home after successful recovery	5134	None
SAM horizontal drive sensed home after successful recovery	513C	None

Table 10.3 Informational Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Single-tube station motor home recovered	5254	None
Slide transfer recovered successfully	51BD	None
Smear truck Y-home recovered	51B5	None
Smear truck Z-home recovered	51B4	None
Staining canceled	528A	None
Staining duration has been exceeded for a basket	52A0	Create new slides if stain quality is not acceptable
Staining protocol configured	5296	None
Stripper vertical drive sensed home after successful recovery	5138	None
The input buffer mechanical sweeping functionality was enabled	524B	None
The instrument beaconing functionality was enabled	52A8	None
Unexpected slides in basket	51C3	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**>**Remove Power**. **3.** Select **Slide Transport** tab>**Remove Power**. **4.** Remove the transport shield, lift the front cover, and move the SAM to the left. **5.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **6.** Remove the slide printer cover. **7.** Remove any obstructions from the basket elevator area. **8.** Pull the locking pin and push the Slidemaker back to the operating position. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Mechanical**> **Basket Elevator Rear Lift Drive Verificatio**n. **11.** Set the number of cycles to **3** and select **Start**. **12.** Ensure the Messages box indicates that the test is completed. **13.** Select **Finish** and **Yes** to end the diagnostics. **14.** Power OFF and power ON the instrument. **15.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II

Description	Event #	Action
Basket data was deleted from NV Memory	52B8	None
Basket missing	50A7	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **3.** Select **Yes** to enter **Diagnostics**>**Remove Power**. **4.** Select **Basket Transport** tab>**Remove Power**. **5.** Remove the transport shield and lift the front cover. **6.** Move the SAM to the right. **7.** Visually check the stainer and basket dryer area for any fallen baskets. **8.** Remove the stainer shield, if necessary, to retrieve the fallen baskets. **9.** Reinstall the stainer shield. **10.** Lower the front cover and reinstall the transport shield. **11.** Select **Diagnostics** in the lower left corner of the screen. **12.** Select **System** tab>**Mechanical**>**Home Robot**. **13.** Set the number of cycles to **3** and select **Start**. **14.** Ensure that the Messages box indicates the test is completed. **15.** Select **Finish** and **Yes** to end the diagnostics. **16.** Power OFF and power ON the instrument. **17.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Basket was not picked up successfully	518A	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Basket was not picked up successfully	527A	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**>**Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly push the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **System** tab>**Robot Exerciser**>**3 Point Exerciser**. **11.** Set Point 1 to **I/O drawer 1**, set Point 2 to **Elevator 1**, and set Point 3 to **I/O drawer 5**. **12.** Select **Basket Elevator Y Position**, **Front Lift Aligned to Print Shuttle**. **13.** Select **Start**, ensure that there is an empty basket in position 1, and follow the screen prompts. **14.** Set the number of cycles to **1**. **15.** Select **OK**. **16.** Press (F10). **17.** Select **Basket Transport** tab>**Start**. **18.** In the Robot box, observe the status of the Basket Detector. **19.** Verify that the detector's status changes from green to grey as baskets are picked up and placed in the selected locations. **20.** Follow the screen prompts to open the I/O drawer and remove the basket. **21.** Select **OK**. **22.** Select **Diagnostics** in the lower left corner of the screen. **23.** Select **Finish** and **Yes** to end the diagnostics. **24.** Power OFF and power ON the instrument. **25.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Bath level is low	5285	**1.** Select **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**. **2.** Drain the baths: • For Software v1.2.0 and prior, select **Drain All Baths**. • For Software v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**. • For Software v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**. **3.** Ensure that the Messages box indicates that the test is completed. **4.** Press **(F10)**. **5.** Select **System Monitor** > **Start** > **Remove Power**. **6.** Remove the transport shield and lift the front cover. **7.** Carefully move the SAM to the right. **8.** Remove the stainer shield **9.** Pull the bath tray release knob to lower the stainer bath tray. **10.** Grasp the handle on the stainer drawer and pull the tray out to the maintenance position. **11.** Remove the bath tray and baths. **12.** Clean the bath reagent sensors (SN701-SN706) with alcohol and a cotton-tipped applicator stick. **13.** Reinstall all the baths and trays. **14.** Raise the bath tray to the locked position. **15.** Reinstall the shields and covers. **16.** Resume normal operation. **17.** If the problem persists, power OFF and power ON the instrument. **18.** If the problem persists, call your Beckman Coulter Representative.
Beacon Green (VL471) could not be operated	52A4	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Beacon Red (VL473) could not be operated	52A6	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Beacon Yellow (VL472) could not be operated	52A5	**1.** Power OFF and power ON the instrument. **2.** Call your Beckman Coulter Representative.
Cannot verify basket is empty	529B	None
Cannot verify slides are present in stain only basket	529C	None

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Cassette presence in STM input buffer cannot be verified	5203	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the In Cassette 1 Cassette Detector. **6.** Place a cassette in the input buffer. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the Slidemaker covers and the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative
I/O drawer is extended	51FE	**1.** Press (F10) to display the System Monitor screen. **2.** Select **Basket Transport** tab>**Start**. **3.** Press the I/0 drawer open/close button to open the I/O drawer and remove any obstructions. **4.** In the I/O Drawer box on the System Monitor screen, verify that the I/O Drawer Open and In-Position sensors' statuses are green and that the Closed sensor's status is grey. **5.** Press the I/0 drawer open/close button to close the I/O drawer. **6.** On the System Monitor screen, verify that the I/O Drawer Closed and In-Position sensors' statuses are green and that the Open sensor's status is grey. **7.** Select **Stop**. **8.** Power OFF and power ON the instrument. **9.** Call your Beckman Coulter Representative.
I/O drawer is extended during initialization	51FF	**1.** Press (F10) to display the System Monitor screen. **2.** Select **Basket Transport** tab>**Start**. **3.** Press the I/0 drawer open/close button to open the I/O drawer and remove any obstructions. **4.** In the I/O drawer box on the System Monitor screen, verify that the I/O Drawer Open and In-Position sensors' statuses are green and that the Closed sensor status is grey. **5.** Press the I/0 drawer open/close button to close the I/O drawer. **6.** On the System Monitor screen, verify that the I/O Drawer Closed and In-Position sensors' statuses are green and that the Open sensor's status is grey. **7.** Select **Stop**. **8.** Call your Beckman Coulter Representative.
I/O drawer was open longer than %1 minutes	529E	Close I/O Drawer
Incomplete removal of cleaner	5290	Perform the Shutdown procedure.
Instrument is finishing work in progress	529D	None

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Instrument is unable to synchronize date/time with System Manager	5275	**1.** Power OFF and power ON instrument. **2.** Call your Beckman Coulter Representative.
NV Memory was cleared	52B7	None
Output buffer is full	527F	**1.** Remove the cassettes from the STM output buffer. **2.** Power OFF and power ON the instrument. **3.** Call your Beckman Coulter Representative.
Printer ribbon is low	5249	**1.** Replace the printer ribbon. See Replacing the Printer Cartridge - DxH Slidemaker Stainer II in CHAPTER 13, Replacement/Adjustment Procedures. **2.** Select **Finish** and **Yes** to end the diagnostics. **3.** Resume normal operation by going back online. **4.** If the ribbon does not need replacement: **a.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidemaker** tab > **Printer Diagnostics**. **b.** Reset the printer. **c.** Reboot the printer. **d.** Select **Finish** and **Yes** to end the diagnostics. **5.** Resume normal operation by going back online. **6.** Power OFF and power ON the instrument. **7.** Call your Beckman Coulter Representative.
Robot Z-home position cannot be verified before move	5044	**1.** Select **Menu**>**Diagnostics**>**Dx Tools**>**System** tab>**Mechanical**>**Robot Z-Drive Verification**. **2.** Set the number of cycles to **3** and select **Start**. **3.** Select **Stop** and **Yes** to end the diagnostics. **4.** Power OFF and power ON the instrument. **5.** Call your Beckman Coulter Representative.
Slide data was deleted from NV Memory	52BA	None

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Slide is missing	5192	**1.** Press (F10). **2.** Select **STM**/**SAM**/**Fluidics** tab> **Start**>**Remove Power**. **3.** Remove the transport shield and lift the front cover. **4.** Move the SAM to the left. **5.** Remove the slides from the slide chute. **6.** Remove the slide chute. **7.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **8.** Remove the slide printer cover, if necessary. **9.** Examine the ejector, smear shuttle, smear truck, print shuttle, and basket elevator for any fallen slides. **10.** Pull the locking pin and push the Slidemaker back to the operating position. **11.** Reinstall the slide chute and reload the slides. **12.** Reinstall all the covers and shields. **13.** Select **Diagnostics** in the lower left corner of the screen. **14.** Select **Dry Cycle**>**Mode - SAM and Slidemaker**. **15.** Set the number of cycles to **5**. **16.** Select **Start** and follow the screen prompts. **17.** Select **Cancel**. When the screen prompt indicates Cancel, it also indicates the number of dry slides completed. **18.** Ensure that the Messages box indicates the test is completed. **19.** Select **Finish** and **Yes** to end the diagnostics. **20.** Power OFF and power ON the instrument. **21.** Call your Beckman Coulter Representative.
Slide label printed successfully after recovery	5289	None
Slide not labeled	52BB	**1.** Select **Menu**>**Worklist**. **2.** Find the order and modify the patient/specimen data referenced in the event. **3.** Rerun the specimen.
Slide supply is out and ejector door is open	51DD	**1.** Replenish the slides and close the ejector door. **2.** If the problem persists: **a.** Remove slides from the slide chute **b.** Remove the slide chute and perform the Cleaning the Slide Chute procedure. **c.** Reinstall the slide chute and load slides. **d.** Power OFF and power ON the instrument. **e.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Slide transfer to the basket cannot be verified	5288	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the far left. **4.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **5.** Remove the slide printer cover. **6.** Remove any slides or baskets. **7.** Pull the locking pin and push the Slidemaker back to the operating position. **8.** Reinstall the Slidemaker covers and the transport shield. **9.** Select **Finish** and **Yes** to end the diagnostics. **10.** Place the system online. **11.** Call your Beckman Coulter Representative.
Slides in basket cannot be verified during basket pickup	518D	**1.** Select **Menu**>**Diagnostics**>**DxTools**>**Slidemaker** tab>**Release SAM**. **2.** Press (F10). **3.** Select **Basket Transport** tab>**Start**> **Remove Power**. **4.** Remove the transport shield and lift the front cover. **5.** Slowly move the SAM to the right until it stops. **6.** Remove the stainer shield. **7.** Examine the area around the stainer and dryer for any fallen baskets. **8.** Reinstall the stainer shield, lower the front cover, and reinstall the transport shield. **9.** Select **Diagnostics** in the lower left corner of the screen. **10.** Select **Slidemaker** tab>**Dry Cycle**>**Mode - SAM and Slidemaker**. **11.** Set the number of cycles to **2**, select **Start**, and follow the screen prompts. **12.** Select **Cancel** when the cycles are completed. **13.** Ensure that the Messages box indicates that the test is completed. **14.** Select **System Status** screen>**Details Status** tab>**Basket Management**. **15.** Select the basket on the elevator that shows the two dry slides that were just completed. **16.** Select **Advance Basket** and follow the screen prompts. **17.** Press (F10). **18.** Select **Basket Transport** tab>**Start**. **19.** In the Robot box, observe the statuses of the Basket Detector and Slide in Basket Detector. **20.** Verify that the detectors' statuses change from green to grey as baskets are picked up and placed in the I/O drawer. **21.** Select **Stop** and **Yes** to end the diagnostics. **22.** If the problem persists, power OFF and power ON the instrument. **23.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Stain-only basket request was made while stainer was not available	52BF	None
Staining duration has been exceeded for stain-only basket	52A1	Create new slides if stain quality is not acceptable.
The STM input buffer mechanical sweeping functionality is disabled	524A	**1.** Remove the transport shield and lift the front cover. **2.** Pull the STM to the maintenance position. **3.** Move the input buffer belt. Remove any obstructions. **4.** Return the STM to the operating position, close the front cover, and reinstall the transport shield. **5.** Select **Menu**>**Diagnostics**>**Dx Tools**>**STM** tab>**Motor Test**>**STM Input Buffer Drive Verification**. **6.** Set the number of cycles to **3** and select **Start**. **7.** Ensure the Messages box indicates that the test is completed. **8.** Select **Stop** and **Yes** to end the diagnostics. **9.** Power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.
The instrument beaconing functionality was disabled	52A7	None
Unexpected basket detected	50A8	**1.** Remove baskets from the I/O drawer. **2.** Power OFF and power ON the instrument. **3.** Call your Beckman Coulter Representative.
Unexpected cassette detected in STM bar code reading station	521E	**1.** Remove the transport shield and lift the front cover. **2.** Clean the STM surface. **3.** Press (F10) to display the System Monitor screen. **4.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **5.** In the STM box, observe the status of the BCR Station Cassette Detector. **6.** Place a cassette in the bar code reading station. **7.** Verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Lower the front cover and reinstall the transport shield. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Unexpected cassette detected on left mixer	521F	**1.** Remove the transport shield and lift the front cover. **2.** Clean the STM surface. **3.** Clean the left mixer with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Left Mixer Cassette Detector. **7.** Place a cassette on the left mixer wall and verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Lower the front cover and reinstall the transport shield. **10.** If the problem persists, power OFF and power on the instrument. **11.** Call your Beckman Coulter Representative.
Unexpected cassette detected on right mixer	5220	**1.** Remove the transport shield and Slidemaker covers. **2.** Clean the STM surface. **3.** Clean the right mixer with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the status of the Right Mixer Cassette Detector. **7.** Place a cassette on the right mixer wall and verify that the detector's status changes from gray to green. **8.** Remove the cassette and select **Stop** and **Yes** to end the diagnostics. **9.** Reinstall the transport shield and Slidemaker covers. **10.** If the problem persists, power OFF and power ON the instrument. **11.** Call your Beckman Coulter Representative.
Unexpected slide detected	518C	**1.** Remove the transport shield and lift the front cover. **2.** Check for unexpected slides in the ejector area. Remove slides and slide chute, if necessary. **3.** Pull the release handle for the Slidemaker and pull the Slidemaker forward to the maintenance position. **4.** Remove the slide printer cover. **5.** Examine the basket elevator, smear shuttle, and print shuttle for any unexpected slides. **6.** Pull the locking pin and push the Slidemaker back to the operating position. **7.** Reinstall the covers and the transport shield. **8.** Place the system online and resume normal operation. **9.** If the problem persists, power OFF and power ON the instrument. **10.** Call your Beckman Coulter Representative.

Table 10.4 Warning Event Messages - DxH Slidemaker Stainer II *(Continued)*

Description	Event #	Action
Unexpected slide transfer to the basket	5257	**1.** Select **Menu** > **Diagnostics** > **Dx Tools** > **Release SAM**. **2.** Remove the transport shield and lift the front cover. **3.** Move the SAM to the far left. **4.** Pull the release handle for the Slidemaker and pull the Slidemaker forward. **5.** Remove the slide printer cover. **6.** Remove any slides or baskets. **7.** Pull the locking pin and push the Slidemaker back to the operating position. **8.** Reinstall the Slidemaker covers and the transport shield. **9.** Select **Finish** and **Yes** to end the diagnostics. **10.** Place the system online. **11.** Call your Beckman Coulter Representative.
Unexpected tube detected in single-tube station	514B	**1.** Remove the transport shield and Slidemaker covers. **2.** Remove any obstructions from the single-tube station. **3.** Inspect and clean the cradle. Ensure that nothing is physically broken. Clean the cradle with a cotton-tipped applicator stick and alcohol. **4.** Press (F10) to display the System Monitor screen. **5.** Select **STM**/**SAM**/**Fluidics** tab>**Start**. **6.** In the STM box, observe the statuses of the Loaded Left and Loaded Right Single-Tube Station sensors. **7.** Insert a tube into the left position of the single-tube station and verify that the sensor's status changes from gray to green. **8.** Insert a tube into the right position of the single-tube station and verify that the sensor's status changes from gray to green. **9.** Select **Stop** and **Yes** to end the diagnostics. OR If the status of a sensor did not change, go to step 12. **10.** Reinstall the Slidemaker covers and the transport shield. **11.** Power OFF and power ON the instrument. **12.** Call your Beckman Coulter Representative.

Event Messages from the System Manager

The Event Messages from the System Manager are divided into two sections:

- Event Messages from the System Manager with Action Required
- Event Messages from the System Manager That Require No Action

Event Messages from the System Manager with Action Required

The Event Messages are divided into three categories:

- Error Event Messages - trigger a red visual alarm and an audible alarm. You can configure the audible alarm. See Configuring an Alarm to be Audible in CHAPTER 9, Setup.
- Warning Event Messages - trigger an amber visual alarm and an audible alarm. You can configure the audible alarm. See Configuring an Alarm to be Audible in CHAPTER 9, Setup.
- Informational Event Messages - do not trigger any alarm

The string %# (for example, &1:SPM) indicates an actual value generated by the Error Handling process within the system. The value is generated based on the actual event.

NOTE If you encounter an event message that is NOT listed in Table 10.5, Error Event Messages, call your Beckman Coulter Representative.

Table 10.5 Error Event Messages

Description	Action
%1 procedure incomplete.	1. Check event log for cause of failure. 2. Correct the problem. 3. Run the Daily Checks procedure manually. See CHAPTER 3, Daily Checks.
A NULL or empty XML string was received for parsing.	Call your Beckman Coulter Representative.
A/D resource busy.	Power OFF and power ON the SPM.
A/D resource insufficient pairs.	Power OFF and power ON the SPM.
A/D resource not monitoring.	Power OFF and power ON the SPM.
A/D resource not ready.	Power OFF and power ON the SPM.
A/D resource timeout.	Power OFF and power ON the SPM.
All diluent supplies are depleted	1. Check the reagent on the system and replace it if low or empty. 2. Check the pick-up line and ensure it is properly connected.
An XML parsing error occurred.	Call your Beckman Coulter Representative.
An XML parsing error occurred: empty attribute set for object.	Call your Beckman Coulter Representative.
An XML parsing error occurred: invalid attribute value.	Call your Beckman Coulter Representative.
An invalid collation ID was received from the System Manager.	Call your Beckman Coulter Representative.
An invalid object type was parsed.	Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
An invalid primary ID was received.	Call your Beckman Coulter Representative.
An invalid secondary ID was received.	Call your Beckman Coulter Representative.
Attempt to acknowledge results receipt failed.	Call your Beckman Coulter Representative.
Attempt to perform auto stop failed.	Call your Beckman Coulter Representative.
Attempt to retrieve audible alarm setting failed.	Call your Beckman Coulter Representative.
Auto Stop triggered, an SPM has been taken offline.	Follow HELP instructions for the specific occurrence.
Auto Stop triggered, an SPM has been taken offline.	Follow HELP instructions for the specific occurrence.
CAN bus communication initialization failed.	Power OFF and power ON the SPM.
CAN bus impedance not terminated properly for %1 MRC (Host ID: %2)	Power OFF and power ON the SPM.
CAN bus impedance not terminated properly for %1 MRC (Host ID: %2).	Power OFF and power ON the SPM.
CBC MRC (Host ID: 10) not responding	Power OFF and power ON the SPM.
CLR framework error. Call your Beckman Coulter representative.	Call your Beckman Coulter Representative.
CPU and Workstation system settings from %1 were lost.	Call your Beckman Coulter Representative.
Cannot find system path in the system registry.	Call your Beckman Coulter Representative.
Cannot load language library for module.	Call your Beckman Coulter Representative.
Check single tube station.	The System Manager was powered down while in single tube presentation mode. Verify that the single tube station is empty.
Communication timeout with SPM Module ID/Audio board.	Power OFF and power ON the SPM.
Confirm Topology procedure was unsuccessful	**1.** Check that the transports for all the instruments in the workcell are in the stopped state. **2.** Call your Beckman Coulter Representative.
Control %1 setup incomplete.	Update the control setup.
Control %3 is out. Auto Stop triggered.	**1.** If a control is expired, replace the control. **2.** If a control is out, follow instructions in HELP ('What to do when a control is outside its expected ranges').
Correct XML parser not installed.	Call your Beckman Coulter Representative.
Could not determine unique specimen order.	Call your Beckman Coulter Representative.
Could not start maintenance procedure.	**1.** Wait until the current SPM operation is complete and then repeat request. **2.** Power OFF and power ON the SPM.
Daily Checks failed to start	**1.** Check Supplies or the event log for cause of failure. **2.** Correct the problem. **3.** Repeat Daily Checks
Daily Checks procedure has failed.	Repeat Daily Checks
Data stored on SPM Module ID/Audio board EEPROM is corrupt.	Power OFF and power ON the SPM.
Database error (code=%1) occurred:	Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
Database item validation error.	Call your Beckman Coulter Representative.
Default order contained an invalid test.	Call your Beckman Coulter Representative.
Disconnected expansion board for %1 MRC (Host ID: %2).	Power OFF and power ON the SPM.
Duplicate Cassette Labels Detected	Replace one of the duplicate cassette bar code labels with a different unique label.
Empty parameter definitions received.	Call your Beckman Coulter Representative.
Empty test panel definitions received.	Call your Beckman Coulter Representative.
Error formatting test values.	Call your Beckman Coulter Representative.
Event descriptor not found.	Call your Beckman Coulter Representative.
Exception during results processing.	Call your Beckman Coulter Representative.
Expansion ports communication error for %1 MRC (Host ID: %2)	Power OFF and power ON the SPM.
Expected database object not found.	Call your Beckman Coulter Representative.
Failed reading Events Expiration Rules XML file.	Call your Beckman Coulter Representative.
Failed to add test.	Call your Beckman Coulter Representative.
Failed to add/remove a panel. Exception occurred.	Call your Beckman Coulter Representative.
Failed to add/remove panel. Mismatched fluid types.	Call your Beckman Coulter Representative.
Failed to add/remove panel. Panel not available.	Call your Beckman Coulter Representative.
Failed to add/remove panel. The panel was already in progress.	Call your Beckman Coulter Representative.
Failed to add/remove panel. Unsupported or unknown panel type.	Call your Beckman Coulter Representative.
Failed to complete carryover procedure	Verify that the specimens presented for Carryover are placed in the appropriate order in the cassette: one blood specimen followed by three diluent specimens.
Failed to complete carryover procedure	Verify that the specimens presented for Carryover are placed in the appropriate order in the cassette: one blood specimen followed by three diluent specimens.
Failed to complete result calculations.	Call your Beckman Coulter Representative.
Failed to connect to System Manager.	Call your Beckman Coulter Representative.
Failed to connect to System Manager.	Call your Beckman Coulter Representative.
Failed to connect to System Manager.	Call your Beckman Coulter Representative.
Failed to connect to System Manager.	Call your Beckman Coulter Representative.
Failed to parse Worklist filter XML file.	Call your Beckman Coulter Representative.
Failed to read IQAP definition file.	Call your Beckman Coulter Representative.
Failed to read from the recovery configuration.	Call your Beckman Coulter Representative.
Failed to read whole blood limit.	Call your Beckman Coulter Representative.
Failed to remove a panel. Panel was not requested in the order.	Call your Beckman Coulter Representative.
Failed to restore configuration information.	Call your Beckman Coulter Representative.
Failed to retrieve barcode configuration, %1.	Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
Failed to retrieve batch mode.	Call your Beckman Coulter Representative.
Failed to retrieve configuration information.	Call your Beckman Coulter Representative.
Failed to retrieve enabled parameters.	Call your Beckman Coulter Representative.
Failed to retrieve parameter definitions.	Call your Beckman Coulter Representative.
Failed to retrieve report information.	Call your Beckman Coulter Representative.
Failed to retrieve test panel definitions.	Call your Beckman Coulter Representative.
Failed to save database information.	Retry backup
File exception error.	Call your Beckman Coulter Representative.
Group contains undefined parameter.	Call your Beckman Coulter Representative.
Host error: serial port properties not applied.	Call your Beckman Coulter Representative.
ID verification failure occurred.	Replace the label on cassette or tube.
Incompatible specimen type for label order.	Call your Beckman Coulter Representative.
Incompatible specimen type in default order.	Call your Beckman Coulter Representative.
Inconsistent database object.	Call your Beckman Coulter Representative.
Inconsistent database object.	Call your Beckman Coulter Representative.
Incorrect number of specimens for carryover procedure.	Verify that the specimens presented for Carryover are placed in the appropriate order in the cassette: one blood specimen followed by three diluent specimens.
Incorrect specimen type detected during Carryover procedure	Verify that the specimens presented for Carryover are placed in the appropriate order in the cassette: one blood specimen followed by three diluent specimens.
Invalid IQAP definitions read.	Call your Beckman Coulter Representative.
Invalid bar-code format for specimen ID label [I2of5] digits.	Check barcode configuration.
Invalid collation ID.	Call your Beckman Coulter Representative.
Invalid event log message from System Manager.	Call your Beckman Coulter Representative.
Invalid flag received.	Call your Beckman Coulter Representative.
Invalid parameter group definitions.	Call your Beckman Coulter Representative.
Invalid parameter received from System Manager.	Call your Beckman Coulter Representative.
Invalid parameter result generated by the System Manager algorithm.	Call your Beckman Coulter Representative.
Invalid reuse of specimen ID.	Check Worklist for duplicate IDs.
Invalid specimen type in default order.	Call your Beckman Coulter Representative.
Invalid state reported for liquid detector sensor.	Power OFF and power ON the SPM.
Invalid vector result sent for parameter.	Call your Beckman Coulter Representative.
Label order contained an invalid test.	Call your Beckman Coulter Representative.
Laboratory initialization: no operating limits defined.	Call your Beckman Coulter Representative.
Language prefix error.	Call your Beckman Coulter Representative.
Load library failed.	Call your Beckman Coulter Representative.
MFC exception occurred.	Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
MRC Unexpectedly Restarted.	Power OFF and power ON the SPM.
Maximum number of No Match events reached	**1.** Check the No Match Auto Stop setting to ensure it has been configured correctly. **2.** Check that the host orders are accepted by the instrument and logged in the Worklist Pending list. **3.** Check the bar code label on the specimen tube to ensure it is not damaged. **4.** Check that the bar code label information in the Worklist Pending list matches the bar code on the specimen as read by the instrument. **5.** Check that the bar code reader is reading the bar code labels on the specimen tubes.
Maximum number of No Read events has been reached	**1.** Check the No Read Auto Stop setting to ensure it has been configured correctly. **2.** Check the bar code label on the specimen tube to ensure it is not damaged. **3.** Check that the bar code reader is reading the bar code labels on the specimen tubes.
Maximum number of Partial Aspiration events reached	**1.** Check the Partial Aspiration Auto Stop setting to ensure it has been configured correctly. **2.** Verify there is sufficient sample in the tube. **3.** Perform Dispense Diluent procedure to verify the aspiration path is clear and does not contain any blockages. **4.** Run the Verify Blood Detector diagnostic procedure.
Maximum number of Total Voteout events reached	**1.** Verify that the CBC Lyse reagent is being dispensed to the WBC bath. **2.** Check the Voteout Auto Stop setting to ensure it has been configured correctly. **3.** Perform the Zap Aperture diagnostic procedure.
Maximum number of Tube Position ID No Read events reached	Call your Beckman Coulter Representative
Maximum number of consecutive CBC module errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.
Maximum number of consecutive CSM errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.
Maximum number of consecutive Diff errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.
Maximum number of consecutive ID Verification Exceptions reached	Inspect the label placement.
Maximum number of consecutive NRBC errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.
Maximum number of consecutive Retic errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.
Maximum number of consecutive SAM errors reached.	**1.** Check event log for cause of failure. **2.** Correct the problem.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
Missing parameter group definition for parameter.	Call your Beckman Coulter Representative.
More than %1 instrument(s) is registered with the complex	Power OFF the instrument and use the Remove Instrument function to remove the unwanted instrument
Motherboard memory test FAILED	Power OFF and power ON the SPM.
Motor encoder reported missed steps.	Remove obstruction.
Motor move to sensor timeout.	Power OFF and power ON SPM.
Multiple conflicting result values produced for a specimen.	Call your Beckman Coulter Representative.
No pending tests found for specimen.	Review Worklist for completed but not released specimens with matching specimen ID.
No test order and no default order defined.	**1.** Download the test order from LIS **2.** Manually order a test **3.** Configure a default order for the entry point
No test order could be generated.	Call your Beckman Coulter Representative.
No test order defined for batch processing.	Call your Beckman Coulter Representative.
No test order found to process results.	Call your Beckman Coulter Representative.
No values supplied for report job.	Call your Beckman Coulter Representative.
OLE dispatch error.	Call your Beckman Coulter Representative.
OLE error.	Call your Beckman Coulter Representative.
Object meta type incorrect.	Call your Beckman Coulter Representative.
Operating limit changed for test parameter.	Call your Beckman Coulter Representative.
PMI Upload Status	**1.** Power OFF and power ON the RAP Box and wait 5 minutes. **2.** Power OFF and power ON the System Manager. **3.** Call your Beckman Coulter Representative.
Panel contains undefined parameter.	Call your Beckman Coulter Representative.
Parameter deleted.	Call your Beckman Coulter Representative.
Persistent object not found.	Call your Beckman Coulter Representative.
Primary identifier not compatible with workcell configuration	Change primary identifier to Specimen ID.
QA procedure cannot continue	Clear the runs and restart procedure.
RAID Status Not Optimal	Power OFF the instrument and use the Remove Instrument function to remove the unwanted instrument
RS MRC (Host ID: 30) not responding	Power OFF and power ON the SPM.
Reagent is depleted.	**1.** Check the reagent on the system and replace the reagent if it is low or empty. **2.** Check the pick up line and ensure it is properly connected.
Reagent should be depleted.	Replace reagent. Make sure new reagent is set up on the Supplies screen.
Reagents not available.	Check reagents.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
Redundant Power Supply Status Not Optimal	Power OFF the instrument and use the Remove Instrument function to remove the unwanted instrument
Required parameter for generating dataplots missing.	Call your Beckman Coulter Representative.
Resource concurrent use conflict.	Power OFF and power ON instrument
Restart after unrecoverable exception.	Power OFF and power ON the SPM.
Restore attempt failed.	Call your Beckman Coulter Representative.
SAM MRC (Host ID: 40) not responding.	Power OFF and power ON the SPM.
SAX COM error.	Call your Beckman Coulter Representative.
SCA channel %3 is missing A/D codes	Power OFF and power ON the SPM.
SEH (kernel) exception.	Call your Beckman Coulter Representative.
SPM alarm command failed.	Call your Beckman Coulter Representative.
SPM has stopped because a reagent has expired.	Replace reagent if planning extended walk-away time
SPM serial number undefined	Power OFF and power ON the SPM.
STM MRC (Host ID: 50) not responding.	Power OFF and power ON the SPM.
Sample acquisition detected bad data for %3 SCA	Power OFF and power ON the SPM.
Sample acquisition detected bad data for %3 SCA	Power OFF and power ON the SPM.
Sample acquisition did not complete for %3 SCA	Power OFF and power ON the SPM.
Smear Parameters Not Determined	**1.** Verify sample. **2.** Perform Shutdown. **3.** Replace Aspiration Probe. **4.** Call your Beckman Coulter Representative.
Software application upgrade failed for %1 MRC (Host ID: %2)	Power OFF and power ON the SPM.
Software application upgrade failed for %1 SCA DSP	Power OFF and power ON the SPM.
Software application upgrade failed for %1 SCA FPGA	Power OFF and power ON the SPM.
Specimen %2 not processed - incompatible primary id	Set primary identifier to Specimen ID.
System storage limits exceeded.	Delete specimen orders, or use results auto-pruning with a short-enough time limit to prevent exceeding the specimen order limit.
Tests ordered could not be run.	Call your Beckman Coulter Representative.
The 24 hour DV exercise was unable to complete successfully	**1.** Inspect reagent levels and replace containers as necessary. **2.** Inspect waste levels and replace containers as necessary.
The database object was not found.	Call your Beckman Coulter Representative.
The maximum number of consecutive Duplicate Specimen ID events has been reached	**1.** Check the specimens for duplicate labels. **2.** Call your Beckman Coulter Representative.
The maximum number of consecutive Rerun Secondary ID Verification Exceptions has been reached for the workcell	**1.** Insert the tube in the cassette and position that matches the worklist. **2.** Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
The maximum number of consecutive Secondary ID Mismatches has been reached for workcell	**1.** Insert the tube in the cassette and position that matches the worklist. **2.** Call your Beckman Coulter Representative.
The maximum number of consecutive Specimen ID Reuses has been met for a workcell	**1.** Delete the test order. Submit a new test order with the correct patient and/or specimen identifier. **2.** Call your Beckman Coulter Representative.
The replacement of the consumable on SPM %1 was interrupted.	Restart the procedure.
Timeout during processing of System Manager message.	Call your Beckman Coulter Representative.
Timeout waiting for shift information retrieval.	Call your Beckman Coulter Representative.
Timeout waiting for unit conversion.	Call your Beckman Coulter Representative.
Too many flow cell clogs	**1.** Try a different specimen, this problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists. **3.** Verify Latron recovery.
Tube Position No Read ID	**1.** Put a valid cassette label on the cassette. **2.** Verify the cassette label is not obstructed and can be read by the barcode reading device.
UI Consumables Alarm Log Event	No message is necessary as this is routine reagent replacement procedures.
UI Daily Checks Alarm Log Event	No message is necessary as this is routine reagent replacement procedures.
Unable to access %1 CPU NVRAM	Power OFF and power ON the SPM.
Unable to access the software update	**1.** Power OFF and power ON the RAP Box and wait 5 minutes. **2.** Power OFF and power ON the server computer. **3.** Call your Beckman Coulter Representative.
Unable to add SPM to workcell	**1.** When new SPMs are added to a workcell, SPMs must be powered on one at a time. Wait for an SPM to go Offline before powering on the next SPM. **2.** Call your Beckman Coulter Representative.
Unable to add STM to workcell	**1.** Ensure all STMs are stopped. **2.** Power OFF the SPM. Wait for the adjacent SPM(s) to go Offline. Then power ON the SPM. **3.** If unsuccessful, call your Beckman Coulter Representative.
Unable to apply the optical WBC Calibration Factors.	**1.** Rerun the Optical WBC control. **2.** Perform Shutdown. **3.** Replace Aspiration Probe. **4.** Call your Beckman Coulter Representative.
Unable to communicate with bar-code reader.	Power OFF and power ON the SPM.
Unable to configure handheld barcode reader.	Call your Beckman Coulter Representative.
Unable to create window %1.	Call your Beckman Coulter Representative.
Unable to initialize database.	Call your Beckman Coulter Representative.

Table 10.5 Error Event Messages *(Continued)*

Description	Action
Unable to load language text %1.	Call your Beckman Coulter Representative.
Unable to query database.	Call your Beckman Coulter Representative.
Unable to read application image while upgrading the %1 MRC (Host ID: %2)	Power OFF and power ON the SPM.
Unable to read application image while upgrading the %1 SCA DSP	Power OFF and power ON the SPM.
Unable to read application image while upgrading the %1 SCA FPGA	Power OFF and power ON the SPM.
Unable to register Client with System Manager.	Call your Beckman Coulter Representative.
Unable to retrieve SPM configuration, %1	Call your Beckman Coulter Representative.
Unable to sense diluent	**1.** Check the reagent on the system and replace the reagent if it is low or empty. **2.** Check the pick up line and ensure it is properly connected.
Unable to update Server.	Call your Beckman Coulter Representative.
Unable to write to handheld barcode reader.	Call your Beckman Coulter Representative.
Unexpected CDATA during XML parsing.	Call your Beckman Coulter Representative.
Unexpected character data during XML parsing.	Call your Beckman Coulter Representative.
Unexpected document end during XML parsing.	Call your Beckman Coulter Representative.
Unexpected end tag during XML parsing.	Call your Beckman Coulter Representative.
Unexpected framework error. Call your Beckman Coulter representative.	Call your Beckman Coulter Representative.
Unexpected start tag during XML parsing.	Call your Beckman Coulter Representative.
Unsupported result type received from System Manager.	Call your Beckman Coulter Representative.
VCSn MRC (Host ID: 20) not responding.	Power OFF and power ON the SPM.
VME POST failed for CBC SCA card.	Power OFF and power ON the SPM.
VME POST failed for Comm I/F card.	Power OFF and power ON the SPM.
VME POST failed for VCSn SCA card.	Power OFF and power ON the SPM.
Waste container is full.	**1.** Check the waste containers and replace or empty any waste container that is full. **2.** Check that waste sensor is properly installed in container
XML is missing the format specification.	Call your Beckman Coulter Representative.
XML parsing error.	Call your Beckman Coulter Representative.
XML parsing error: duplicate start tag in object.	Call your Beckman Coulter Representative.
XML parsing error: no attributes found.	Call your Beckman Coulter Representative.

Table 10.6 Warning Event Messages

Description	Action
A matching patient specimen was found. Studies mode is enabled.	Check Worklist for duplicate IDs.
An XML parser warning has occurred.	Call your Beckman Coulter Representative.
An XML parsing error: unknown start tag in object.	Call your Beckman Coulter Representative.
An XML parsing warning: unknown end tag in object.	Call your Beckman Coulter Representative.
An unknown attribute was encountered while parsing object.	Call your Beckman Coulter Representative.
Application exited while backup was in progress.	Retry backup.
Automatic backup operation failed: registry	Call your Beckman Coulter Representative.
CBC Calibration reminder	A configurable reminder to the user to perform CBC Calibration.
CBC calibrator lot mismatch.	**1.** Check the Calibration Setup screen and ensure the proper calibrator lot number was entered. **2.** Verify that the lot number of the calibrator being processed matches the lot number of the Calibration Setup screen.
Cannot process QC specimen.	Delete the existing control configuration file and set up a new control file or re-label a new control to match the correct control file.
Cannot process QC specimen.	Enable automatic control file configuration or manually configure control file.
Conflicting decision rules found.	Check Decision Rules for conflicts with disabled tests or analysis.
Conflicting decision rules were automatically disabled.	Check Decision Rules for conflicts with disabled tests or analysis.
Control %3 is out. Auto Stop is not enabled.	**1.** If a control is expired, replace the control. **2.** If a control is out, follow instructions in HELP ('What to do when a control is outside its expected ranges').
Control specimen cannot be processed.	**1.** Verify that you are using the correct control. **2.** Run the Barcode Reader Alignment procedure.
Could not read specimen ID or cassette bar codes.	**1.** Verify the barcode label. **2.** Perform the Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.
Daily Check procedure has failed	Restart the application
Daily Checks failed	Restart the SPM and System Manager.
Daily Checks failed	Wait for instrument to finish rebooting and repeat Daily Checks
Daily Checks failed	Repeat Daily Checks
Daily Checks failed	Repeat Daily Checks
Daily Checks failed	Repeat Daily Checks
Daily Checks failed	Repeat Daily Checks
Daily Checks failed	Repeat Daily Checks

Table 10.6 Warning Event Messages *(Continued)*

Description	Action
Daily Checks failed to start	Check the reagents on the system and replace any reagents that might be low or empty.
Daily Checks failed to start	Restart the application
Daily Checks failed to start	Wait for instrument to finish rebooting and repeat Daily Checks
Diluent source switched.	Check the waste containers and replace or empty any waste container that might be almost full.
Download received while batching is enabled.	Disable either LIS or batching.
Host error: transmission to LIS failed.	**1.** Verify the connections on the System Manager. **2.** Contact the LIS vendor.
ID verification failure occurred.	Replace the label on cassette or tube.
IQAP export cancelled: system restart.	**1.** Power ON the System Manager. **2.** Request the IQAP export again when the system is running.
IQAP export failed: RMS service not available.	Request the IQAP export again. If the failure recurs, call your Beckman Coulter representative.
IQAP export failed: RMS transfer not completed.	Request the IQAP export again. If the failure recurs, call your Beckman Coulter Representative.
IQAP export failed: duplicate transaction.	Wait for completion of the export in progress and request the IQAP export again. If the failure recurs, call your Beckman Coulter representative.
IQAP export failed: not enrolled in RMS.	Enroll this system installation in the Beckman Coulter Remote Management System.
IQAP export failed: system error.	Call your Beckman Coulter Representative.
Incompatible presentation mode for control specimen.	Retry operation using correct presentation.
Incompatible presentation mode for specimen.	Retry operation using correct presentation.
Instrument %1 cannot go Online now.	Run Daily Checks manually.
Invalid label found on a control specimen.	**1.** Inspect specimen label for invalid characters or invalid format. **2.** Try another control.
Manual backup operation failed: instrument.	Perform backup when the instrument is not busy
Maximum number of No Match events reached	**1.** Check the No Match Auto Stop setting to ensure it has been configured correctly. **2.** Check that the host orders are accepted by the instrument and logged in the Worklist Pending list. **3.** Check the bar code label on the specimen tube to ensure it is not damaged. **4.** Check that the bar code label information in the Worklist Pending list matches the bar code on the specimen as read by the instrument. **5.** Check that the bar code reader is reading the bar code labels on the specimen tubes.

Table 10.6 Warning Event Messages *(Continued)*

Description	Action
Maximum number of No Read events has been reached	1. Check the No Read Auto Stop setting to ensure it has been configured correctly. 2. Check the bar code label on the specimen tube to ensure it is not damaged. 3. Check that the bar code reader is reading the bar code labels on the specimen tubes.
Maximum number of Partial Aspiration events reached	1. Check the Partial Aspiration Auto Stop setting to ensure it has been configured correctly. 2. Verify there is sufficient sample in the tube. 3. Perform Dispense Diluent procedure to verify the aspiration path is clear and does not contain any blockages. 4. Run the Verify Blood Detector diagnostic procedure.
Maximum number of Total Voteout events reached	1. Verify that the CBC Lyse reagent is being dispensed to the WBC bath. 2. Check the Voteout Auto Stop setting to ensure it has been configured correctly. 3. Perform the Zap Aperture diagnostic procedure.
Maximum number of consecutive partial voteouts reached	1. Run Zap Apertures procedure. 2. Run Clean Apertures procedure.
No system default printer available.	Update the printer setup.
Operator ID %1 was skipped when restoring configuration.	1. Upon completion of the restore, verify the operator's role and access level are correct. 2. If necessary, modify the operator's role and access level.
Perform weekly stainer maintenance	Perform the weekly stainer maintenance. See Performing the Flush Stainer Module Procedure - DxH Slidemaker Stainer II - Automatic Procedure (Software v1.2.0 and Prior) in CHAPTER 12, Cleaning Procedures.
Prime procedure was not successful.	1. Inspect reagent levels and replace containers as necessary. 2. Inspect waste levels and replace containers as necessary.
Printer is unavailable to generate automatic reports.	Update the printer setup.
Processed specimen was not removed on time.	Remove the specimen from the manual station.
Processed specimen was not removed on time.	Remove the specimen from the manual station.
Reagent is expired	Replace reagent.
Reagent is low.	Check the reagents on the system and replace any reagents that might be almost empty.
Reagent is low.	Replace reagent if planning extended walk-away time
Rerun secondary ID did not match value in test order.	1. Place the tube back on the original carrier in the pre-assigned position 2. Do not pre-assign secondary identifiers if you want to move specimens to other cassettes.
SPM %1 cannot go Online	Enable the Slidemaker.

Table 10.6 Warning Event Messages *(Continued)*

Description	Action
Scheduled %1 procedure skipped.	Run the procedure manually.
Scheduled backup not performed.	Allow the current backup to run without interruption.
Scheduled procedure skipped.	Run the procedure manually.
Scheduled procedure skipped.	Run the procedure manually.
Scheduled procedure skipped.	Run the procedure manually.
Scheduled procedure skipped.	Run prime.
Scheduled procedure skipped.	**1.** Run prime. **2.** Run procedure manually.
Secondary ID did not match the value in test order.	**1.** Place the specimen back in the specified cassette, in the pre-assigned position. **2.** Do not pre-assign secondary identifiers if you want to move specimens to other cassettes.
Shutdown failed	Perform the maintenance procedure Remove Cleaner. Repeat Shutdown
Shutdown failed	Perform the maintenance procedure Remove Cleaner. Repeat Shutdown
Shutdown failed	**1.** Check Supplies or the event log for cause of failure. **2.** Correct the problem. **3.** Repeat Shutdown
Shutdown failed	Repeat Shutdown
Shutdown failed	Repeat Shutdown
Shutdown failed to start	Perform the maintenance procedure Remove Cleaner. Repeat Shutdown
Shutdown failed to start	Wait for instrument to finish rebooting and repeat Daily Checks
Shutdown failed to start	**1.** Wait until the instrument is ready. **2.** Repeat Shutdown.
Shutdown failed to start	**1.** Restart the SPM and the System Manager. **2.** Repeat Shutdown.
Shutdown procedure incomplete.	**1.** Check event log for cause of failure. **2.** Correct the problem. **3.** Run Prime or rerun Shutdown procedure.
Smear Parameters Not Determined	**1.** Verify sample. **2.** Perform Shutdown. **3.** Replace Aspiration Probe. **4.** Call your Beckman Coulter Representative.
Specimen ID verification failed.	**1.** Verify the barcode label. **2.** Perform Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.
Specimen ID verification failure for a specimen	**1.** Verify the barcode label. **2.** Perform Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.

Table 10.6 Warning Event Messages *(Continued)*

Description	Action
Specimen ID verification failure for a specimen.	**1.** Verify the barcode label. **2.** Perform Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.
Specimen skipped	Clear the runs and restart procedure.
System backup not performed. SPM was busy.	Reschedule a backup when the instrument is not busy
System default printer has been replaced by %1.	Verify that the default printer is powered ON and appropriately connected.
System storage exceeded recommended limits.	Delete specimen orders, or use results auto-pruning with a short-enough time limit to prevent exceeding the specimen order limit.
System storage nearing capacity limits.	Delete specimen orders, or use results auto-pruning with a short-enough time limit to prevent exceeding the specimen order limit.
System unexpectedly exited while backup was in progress.	Retry backup.
Test panel definition contains an unrecognized specimen type.	Call your Beckman Coulter Representative.
The 24 hour DV exercise was unable to complete successfully	**1.** Inspect reagent levels and replace containers as necessary. **2.** Inspect waste levels and replace containers as necessary.
The Instrument Logging Service has failed.	Reboot Workstation.
The control lot you are running has expired.	Replace the control.
The maximum number of consecutive Duplicate Specimen ID events has been reached for the workcell	**1.** Check the specimens for duplicate labels. **2.** Call your Beckman Coulter Representative.
The maximum number of consecutive Rerun Secondary ID Verification Exceptions has been reached for the workcell	**1.** Insert the tube in the cassette and position that matches the worklist. **2.** Call your Beckman Coulter Representative.
The maximum number of consecutive Secondary ID Mismatches has been reached for workcell	**1.** Insert the tube in the cassette and position that matches the worklist. **2.** Call your Beckman Coulter Representative.
The maximum number of consecutive Specimen ID Reuses has been met for a workcell.	**1.** Delete the test order. Submit a new test order with the correct patient and/or specimen identifier. **2.** Call your Beckman Coulter Representative.
Tube Position No Read ID	**1.** Put a valid cassette label on the cassette. **2.** Verify the cassette label is not obstructed and can be read by the barcode reading device.
Tube position ID no read	**1.** Verify the cassette barcode label. **2.** Perform Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.
UI Consumables Alarm Log Event	No message is necessary as this is routine reagent replacement procedures.
Unable to process patient control specimen %1.	Update the control setup.

Table 10.6 Warning Event Messages *(Continued)*

Description	Action
Unable to start timer for starting timeout for Host Query Request.	Restart the System Manager.
Unexpected CDATA received during XML parsing.	Call your Beckman Coulter Representative.
Unexpected characters during XML parsing.	Call your Beckman Coulter Representative.
Unprocessed specimen was not removed on time.	Remove the specimen from the manual station.
Unprocessed specimen was not removed on time.	Remove the specimen from the manual station.
XB is out on SPM, Auto Stop is not enabled.	Follow HELP instructions for XB out.
XM is out at SPM, Auto Stop is not enabled.	Follow HELP instructions for XM out.
XML parsing warning.	Call your Beckman Coulter Representative.

Table 10.7 Informational Event Messages

Description	Action
A report could not be generated: No data source found.	Call your Beckman Coulter Representative.
A report could not be generated: Required sub-report not found.	Call your Beckman Coulter Representative.
Auto report generation error.	Call Beckman Coulter Representative.
CBC Calibration reminder	A configurable reminder to the user to perform CBC Calibration.
CBC calibrator lot has expired	**1.** Check the Calibration Setup screen and ensure the correct expiration date has been entered. **2.** Replace calibration material with one that has not expired.
Cassette exited due to No Read during specimen label confirmation	**1.** Try a different tube label. **2.** Refer to the system help to clean the bar code reader lens.
Cassette exited due to a No Read during cassette label confirmation	**1.** Try a different cassette. **2.** Refer to the system help to clean the bar code reader lens.
Cassette exited due to cassette label mismatch	Retry operation.
Cassette exited due to excessive cassette traffic	Retry operation.
Cassette exited due to specimen label mismatch	Retry operation.
Cassette exited due to tube missing from the cassette	Retry operation.
Control Override	Run Daily Checks manually.
Could not read specimen bar code.	**1.** Verify the barcode label. **2.** Perform Barcode Reader Alignment procedure. **3.** Perform Barcode Read Rate test.
Data summary Daily Checks: unknown parameter.	Call your Beckman Coulter Representative.
Duplicate specimen ID.	Do not run duplicate patient samples specimen on transport simultaneously.

Table 10.7 Informational Event Messages *(Continued)*

Description	Action
FORCED test order deletion.	Delete specimen orders, or enable results auto-pruning with a short enough time limit to avoid exceeding the storage limits.
Failed reading data while trying to save to file.	Call your Beckman Coulter Representative.
Failed to add data to report job. Report job cancelled.	Call Beckman Coulter Representative.
Failed to process host data %1	Resubmit test order information from LIS.
Failed to process report.	Call your Beckman Coulter Representative.
HELP ID %1 not found in HELP file.	Call your Beckman Coulter Representative.
Hardware Configuration Changed	Check the waste containers and replace or empty any waste container that might be almost full.
High event rate in Diff	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
High event rate in NRBC	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
High event rate in RETIC	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
Host data error (Patient record).	Contact the LIS vendor.
Host data error (Patient record). Invalid data for patient with ID: %1	Contact the LIS vendor.
Host data error (Test Order record).	Contact the LIS vendor.
Host data error (Test Order record). Invalid data for test order: %1.	Contact the LIS vendor.
Host data error (Test Order record): invalid data in required field.	Contact the LIS vendor.
Host data error: Invalid data received in Comment record.	Contact the LIS vendor.
Host data error: cannot create new test order.	Contact the LIS vendor.
Host data error: comment not associated with patient demographics.	Contact the LIS vendor.
Host data error: comment not associated with specimen.	Contact the LIS vendor.
Host data error: duplicate tests cannot be added.	Contact the LIS vendor.
Host data error: invalid data received in Header record.	Contact the LIS vendor.
Host data error: missing primary identifier.	Contact the LIS vendor.
Host data error: specimen ID is reserved for control ID.	Contact the LIS vendor.
Host data error: specimen type cannot be changed.	Contact the LIS vendor.
Host data error: specimen type cannot be modified.	Contact the LIS vendor.
Host data error: specimen type not supported.	Contact the LIS vendor.
Host data error: test panel(s) not supported or enabled.	Contact the LIS vendor.
Host data error: tests not added.	Call your Beckman Coulter Representative.

Table 10.7 Informational Event Messages *(Continued)*

Description	Action
Host data error: tests not canceled.	Contact the LIS vendor.
Host data error: tests not consistent with specimen type.	Contact the LIS vendor.
Host data error: transmitted patient ID is different.	**1.** Delete the existing order from the Worklist. **2.** Retransmit the order from the LIS.
Host parsing error (Header record): record length invalid.	Contact the LIS vendor.
Host parsing error: <CR><LF> character missing.	Contact the LIS vendor.
Host parsing error: <CR><LF> character missing.	Contact the LIS vendor.
Host parsing error: <CR><LF> character missing.	Contact the LIS vendor.
Host parsing error: <CR><LF> character missing.	Contact the LIS vendor.
Host parsing error: <CR><LF> pair missing.	Contact the LIS vendor.
Host parsing error: <ETB>/<ETX> character missing.	Contact the LIS vendor.
Host parsing error: <ETB>/<ETX> character missing.	Contact the LIS vendor.
Host parsing error: <ETB>/<ETX> character missing.	Contact the LIS vendor.
Host parsing error: <ETB>/<ETX> character missing.	Contact the LIS vendor.
Host parsing error: <ETB>/<ETX> character missing.	Contact the LIS vendor.
Host parsing error: <STX> character missing.	Contact the LIS vendor.
Host parsing error: <STX> character missing.	Contact the LIS vendor.
Host parsing error: <STX> character missing.	Contact the LIS vendor.
Host parsing error: <STX> character missing.	Contact the LIS vendor.
Host parsing error: Header record missing in LIS message.	Contact the LIS vendor.
Host parsing error: Header record out of sequence in LIS message.	Contact the LIS vendor.
Host parsing error: Patient record missing in LIS message.	Contact the LIS vendor.
Host parsing error: Terminator record missing in LIS message.	Contact the LIS vendor.
Host parsing error: field delimiter missing.	Contact the LIS vendor.
Host parsing error: field delimiter missing.	Contact the LIS vendor.
Host parsing error: field delimiter missing.	Contact the LIS vendor.
Host parsing error: field delimiter missing.	Contact the LIS vendor.
Host parsing error: field delimiter missing.	Contact the LIS vendor.
Host parsing error: incorrect CRC.	Contact the LIS vendor.
Host parsing error: incorrect CRC.	Contact the LIS vendor.
Host parsing error: incorrect CRC.	Contact the LIS vendor.
Host parsing error: incorrect CRC.	Contact the LIS vendor.
Host parsing error: incorrect CRC.	Contact the LIS vendor.
Host parsing error: invalid escape sequence.	Contact the LIS vendor.
Host parsing error: invalid sequence number.	Contact the LIS vendor.
Host parsing error: invalid sequence number.	Contact the LIS vendor.
Host parsing error: invalid sequence number.	Contact the LIS vendor.

Table 10.7 Informational Event Messages *(Continued)*

Description	Action
Host parsing error: invalid sequence number.	Contact the LIS vendor.
Host parsing error: missing component delimiter.	Contact the LIS vendor.
Host parsing error: record terminator character missing.	Contact the LIS vendor.
Host parsing error: record terminator character missing.	Contact the LIS vendor.
Host parsing error: record terminator character missing.	Contact the LIS vendor.
Host parsing error: record terminator character missing.	Contact the LIS vendor.
Host parsing error: record type not supported.	Contact the LIS vendor.
Host parsing error: start of text <STX> character missing.	Contact the LIS vendor.
Host parsing error: terminator character missing.	Contact the LIS vendor.
Invalid CDATA element in report job result value.	Call your Beckman Coulter Representative.
Invalid CDATA elements were found in a report job.	Call your Beckman Coulter Representative.
Invalid data for report job.	Call your Beckman Coulter Representative.
Invalid data set used in report job.	Call your Beckman Coulter Representative.
Invalid log on to System Manager.	Contact your lab administrator.
Invalid or missing report file for report job.	Call your Beckman Coulter Representative.
Invalid printer specified for report job %1.	Update the printer setup.
Invalid printer used in system controller report job %1.	Update the printer setup.
Invalid report request received from System Manager.	Call your Beckman Coulter Representative.
Low event rate in Diff	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
Low event rate in NRBC	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
Low event rate in RETIC	**1.** Repeat the sample analysis. The problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists.
Motherboard memory test PASSED	Power OFF and power ON the SPM.
Partial voteout occurred	**1.** Run Zap Apertures procedure. **2.** Run Clean Apertures procedure.
Printing error: out of paper.	Fill paper supply.
RAID Status Optimal	Power OFF the instrument and use the Remove Instrument function to remove the unwanted instrument
Redundant Power Supply Status Optimal	Power OFF the instrument and use the Remove Instrument function to remove the unwanted instrument
Report data set not defined. Report job creation failed.	Call Beckman Coulter Representative.
Report failed.	Call Beckman Coulter Representative.
Report failed.	Call your Beckman Coulter Representative.

Table 10.7 Informational Event Messages *(Continued)*

Description	Action
The 24 hour DV exercise completed successfully	**1.** Inspect reagent levels and replace containers as necessary. **2.** Inspect waste levels and replace containers as necessary.
Too many partial clogs	**1.** Try a different specimen, this problem could be specific to one sample. **2.** Run Purge Flow Cell if the problem persists. **3.** Verify Latron recovery.
Total Voteout detected	**1.** Repeat sample analysis. **2.** Verify that the CBC Lyse reagent is being dispensed to the WBC bath. **3.** Perform the Zap Aperture diagnostic procedure.
Unable to export to IQAP.	Enter a valid IQAP number.
Unable to install software update.	**1.** Reinstall the software update. **2.** Call your Beckman Coulter Representative.

Event Messages from the System Manager That Require No Action

Table 10.8 Error Event Messages

Description	Action
ALARM TEST.	None
Added missing operating limit for test.	None
An Unrecoverable Table Error has occurred.	
Attempt to submit specimen order failed.	None
Communication Timeout Waiting for Reply from MRC board or SCA DSP.	None
Communication Timeout error with MRC board or SCA DSP.	None
Communication with the LAS Dynamic Interface has been lost	None
Communication with the LAS has been lost	None
Communications failure transmitting test order for specimen.	None
Controls configuration restore.	None
Could not create network message server on %1	None
Created missing System Manager parameter.	None
Decision rules restore.	None
Delete specimen request failed for specimen.	None
Diff Module Failure	None
Duplicate network address in use	None
Event test System Error: Error	None
Exceeded maximum A/D devices for %1 MRC (Host ID: %2).	None
Failed Processing INF File.	None

Table 10.8 Error Event Messages *(Continued)*

Description	Action
Failed to publish specimen order for specimen.	None
Failed to read group definitions file.	None
Failed to retrieve QC Only	None
General Communication error with MRC board or SCA DSP.	None
General Configuration restore.	None
General Error test event.	None
Host error: serial port not initialized.	None
Incomplete Configuration changes.	None
Incorrect board detected for %1 MRC (Host ID: %2).	None
Invalid label reuse of specimen ID.	None
MRC resource (Host ID: %1), reported unknown device number error.	None
MRC resource (Host ID: %1), reported unknown device type error.	None
Maximum number of runs for the procedure has been reached.	None
PS MRC (Host ID: 31) not responding.	none
Raw data integrity failed verification	None
Remote management communication error	None
Remote management enrollment failed.	None
Repeatability Procedure cannot continue.	None
Replaced display name for parameter %1.	None
SPM not found during software install.	None
Solenoid is disconnected.	None
Solenoid is shorted.	None
System - Daily Checks test event.	None
System - QA test event.	None
System - QC test event.	None
System - Supplies test event.	None
System - XB test event.	None
System Error test event.	None
System Patient test event.	None
System variables (CRC) from %1 cannot be validated.	None
Tests not available.	None
The SPM CPU is using the default network address	None
The control file count maximum limit reached	None
The control run count maximum limit reached	None
Unable to launch application %1.	None
Web access failed	None

Table 10.9 Warning Event Messages

Description	Action
Automated recovery was not successful.	None
Automated recovery was not successful.	None
Automated recovery was not successful.	None
Automated recovery was not successful.	None
Automated recovery was not successful.	None
Automatic backup operation failed: system.	None
Automatic backup operation failed: backup drive.	None
Automatic backup operation failed: instrument.	None
BCI Calibrator is presented for automatic processing.	None
Control %2 is out. Auto rerun triggered.	None
Control %3 is out. Not in Active state.	None
Daily Check was cancelled.	None
Daily Checks failed to start	None
Default test order was used.	None
Event test System Error: Warning	None
Label test order used for specimen %1.	None
Manual backup operation failed: backup drive.	None
Manual backup operation failed: registry.	None
Manual backup operation failed: system.	None
Maximum number of Tube Position ID No Read reached	None
Missing or invalid hardware configuration file.	None
No operator for single tube processing: %1	None
Partial INF/DAT export.	None
Primary identifier changed to Specimen ID	None
Repair Command Initiation Failed	None
STAT specimen time to analysis exceeded.	None
STAT specimen time to release exceeded.	None
Specimen Presentation has Timed Out	None
System backup was not performed. DB maintenance was in progress.	None
System variables (time stamp) from %1 cannot be validated	None
System variables (time stamp) from %1 cannot be validated	None
Test orders have blank Specimen IDs	None
The control file count is approaching its maximum limit	None
The control run count is approaching its maximum limit	None
The hardware configuration is missing for %1.	None
Waste container is almost full.	None
Workstation %1 failed to connect to network message server.	None

Table 10.10 Informational Event Messages

Description	Action
%1	None
%1	None
%1 Control run reminder	None
%1 Control run reminder cleared	None
A control file has been deleted.	None
A new control file has automatically been created.	None
A report could not be generated: database log on failed.	None
A report did not contain an expected image table.	None
AL2 Sensitivity calibration factor was updated on SPM %1.	None
Added QC data.	None
Added configuration item.	None
Added patient data item.	None
All XM batches deleted in a group.	None
Amended patient data item.	None
An existing order was used for a specimen. Batching is enabled.	None
Auto Configure Control settings changed.	None
Auto Stop configuration	None
Automated recovery was successful.	None
Automatic Cycle Configuration Changed.	None
Automatic Daily Checks retry initiated	None
BCI default limits restored.	None
Background procedure completed successfully	None
Bar code configuration changed	None
Block Reaction Temperature Control System Setting Changed	None
CBC Calibration has been completed	None
CBC Calibration has been completed	None
CBC calibration factors were changed on SPM %1.	None
CBC calibration factors were updated for the instrument %1.	None
CBC calibration information has been modified	None
CBC calibration information has been modified.	None
CBC calibration information has been modified.	None
CBC calibration reminder configuration change.	None
CBC gain calibration status is: CALIBRATED.	None
CBC gain calibration status is: EDITED.	None
CBC gain calibration status is: FAIL.	None
CBC gain calibration status is: FORCED CALIBRATION.	None
CBC gain calibration status is: NOT ALLOWED.	None
CBC gain calibration status is: PASS.	None

Table 10.10 Informational Event Messages *(Continued)*

Description	Action
Carryover procedure completed	None
Cassette exited due to an unexpected tube in the cassette	None
Changed QC data.	None
Changed configuration item Decision Rule: evaluation order.	None
Changed configuration item Patient report.	None
Changed configuration item System Settings: system time.	None
Changed configuration item Test Unit Selection.	None
Changed configuration item.	None
Changed patient data item.	None
Communication failed to workstation %2.	None
Configuration changed for SPM %1.	None
Configuration changed for automatic %1 cycle on instrument %2 .	None
Confirm Topology procedure was successful	None
Consensus rules restored.	None
Consumable on SPM.	None
Control Run Reminder Frequencies modified	None
Control file modified.	None
Control file reviewed	None
Control runs deleted.	None
Copy of event.	None
Could not find required report data for report %1.	None
Could not unlock required report data for report %1.	None
Count Rate Compensation calibration factors were updated on SPM %1.	None
Count Rate Compensation procedure status.	None
Cover interlock bypass disabled.	None
Cover interlock bypass enabled.	None
Daily Checks completed	None
Default test order changed for %1 Presentation on SPM %2.	None
Deleted QC data.	None
Deleted configuration item.	None
Deleted patient data item.	None
Diagnostic procedure %1 %2 on Instrument %3	None
Diluent Container Configuration Changed	None
Event ID test System: Patient	None
Event test Audit Trail: Configuration	None
Event test Audit Trail: Patient Data	None
Event test Audit Trail: QC	None

Table 10.10 Informational Event Messages *(Continued)*

Description	Action
Event test System Error: Info	None
Event test System: Maintenance	None
Event test System: QA	None
Event test System: QC	None
Event test System: Service	None
Event test System: Supplies	None
Event test System: System Status	None
Event test System: XB	None
Event test daily summary: system checks	None
Event test data summary: consumables	None
Event(s) were deleted as part of auto-trimming process.	None
Event(s) were manually deleted.	None
Files have been downloaded	None
Hardware Config changed on %1	None
Host data error	None
Host data error: duplicate test order.	None
Host data error: invalid data received in message	None
Host data error: tests not cancelled.	None
Host order data modified a deleted physician with ID %1.	None
Host order data modified a physician with ID %1.	None
Host parsing error (Test order record)	None
Host parsing error (Test order record)	None
Host parsing error (Test order record)	None
Host parsing error: Invalid delimiters	None
Host parsing error: Order record missing in LIS message.	None
Host patient data modified a deleted physician with ID %1.	None
Host patient data modified a physician with ID %1.	None
Host: test order accepted in place of default test order.	None
IQAP In Transit	None
IQAP Received Files	None
LAS Dynamic Interface Enabled Setting	None
LAS Enabled Setting	None
Manual backup operation started.	None
Manual selection of flagging limit for test order.	None
New control file created.	None
New patient demographics created.	None
On %2, %3, %1 changed Settings.	None
Operator access configuration created.	None

Table 10.10 Informational Event Messages *(Continued)*

Description	Action
Operator access configuration modified.	None
Optical WBC calibration factors were updated on SPM %1.	None
Password changed.	None
Password reset.	None
Patient ID was rectified.	None
Patient demographics deleted.	None
Patient demographics modified.	None
Patient demographics were modified.	None
Patient results were dispatched.	None
Prime procedure was successful.	None
QC Auto Export Configuration is modified.	None
QC Auto Export Failed.	None
QC Auto Rerun Configuration is modified.	None
QC Lab limits changed.	None
QC review comment deleted	None
RAMP Test Status	None
Ramp test completed	None
Re-marking XB batch after editing	None
Re-marking XM batch after editing	None
Reagent changed on SPM %1	None
Remote desktop sharing ended.	None
Remote desktop sharing started.	None
Remote management configuration update	None
Remote management enrollment submitted.	None
Remote management enrollment was successful.	None
Remote management instrument could not be unenrolled.	None
Remote management instrument has been unenrolled.	None
Repeatability procedure data cleared.	None
Repeatability summary.	None
Results summary of Daily Checks.	None
SPM audible alarm setting changed.	None
SPM has been calibrated	None
SPM has been calibrated	None
SPM prime succeeded.	None
Scheduled backup operation started.	None
Settings changed on SPM %1.	None
Shutdown procedure cancelled	None
Shutdown procedure successful	None

Table 10.10 Informational Event Messages *(Continued)*

Description	Action
Shutdown procedure successful	None
Software application upgraded for %1 MRC (Host ID: %2)	None
Software application upgraded for %1 SCA DSP	None
Software application upgraded for %1 SCA FPGA	None
Software update %1 is available for installation	None
Software update has been downloaded	None
Software update installed.	None
Specimen identifier was not submitted on time.	None
Specimen identifier was not submitted on time.	None
Specimen was not found. Associated test order cannot be modified.	None
Specimen was not presented on time.	None
Specimen was not presented on time.	None
Suspended test order modification.	None
System Manager audible alarm setting changed.	None
System Manager shutdown request.	None
System backup operation successful.	None
System maintenance test event.	None
System recovery operation successful.	None
System service test event.	None
System storage returned to normal status.	None
Systematic/random review for control.	None
Test order partial release for Primary ID %1.	None
Test order partial release selections modified for ID %1.	None
Test order was collated.	None
Test order was deleted.	None
Test order was hidden.	None
Test order was modified.	None
Test order was rejected.	None
Test order was released.	None
Test order was restored to release status.	None
The comment for the event was deleted	None
The configuration has been successfully restored.	None
The configuration has been successfully saved.	None
The destination printer did not support the requested paper source.	None
Troubleshooting development test event.	None
Troubleshooting host test event.	None
Unable to manually backup.	None
User updated test configuration.	None

Table 10.10 Informational Event Messages *(Continued)*

Description	Action
Workload history has been cleared	None
Workstation connected: %1.	None
Workstation connection failed: %1.	None
Workstation disconnected: %1	None
XB batches deleted.	None
XB configuration has changed.	None
XB review comment deleted	None
XM batches deleted.	None
XM configuration has changed.	None
XM review comment deleted	None
[NESTED EVENT]	None

Event Messages from the SPM

The Event Messages are divided into three categories:

- Error Event Messages - trigger a red visual alarm and an audible alarm. You can configure the audible alarm. See Configuring an Alarm to be Audible in CHAPTER 9, Setup.
- Warning Event Messages - trigger an amber visual alarm and an audible alarm. You can configure the audible alarm. See Configuring an Alarm to be Audible in CHAPTER 9, Setup.
- Informational Event Messages - do not trigger any alarm

Table 10.11 Error Event Messages

Description	Event Number	Action
CBC Module unable to proceed.	E_31950 D310581 D310582 D312661 D312662 D315201 D315221 D315241	**1.** Review the detailed message and all events related to this sample or cycle. **2.** Follow the troubleshooting for the related event.
Cassette mixer did not move out of home.	E_35107 D353103	**1.** Manually rotate mixer wall up and back (away from home) and inspect sensor and indicator. A red LED indicates the sensor can see the "not blocked" state. Move the mixer wall home. The flag should block the sensor and the red LED should extinguish. **2.** Call your Beckman Coulter Representative for assistance with the Mix Home Alignment procedure. This procedure automatically measures and stores the home (vertical) offset position of the mixer wall.
Cassette mixer did not sense home.	E_35101 D353101	**1.** Manually rotate mixer wall up and back (away from home) and inspect sensor and indicator. A red LED indicates the sensor can see the "not blocked" state. Move the mixer wall home. The flag should block the sensor and the red LED should extinguish. **2.** Call your Beckman Coulter Representative for assistance with the Mix Home Alignment procedure. This procedure automatically measures and stores the home (vertical) offset position of the mixer wall.
Cassette mixer missed steps while mixing.	E_35102 D353102	**1.** Look for an obstruction on the STM platform that would interfere with mixer wall. **2.** Call your Beckman Coulter Representative for assistance with the Mix Home Alignment procedure. This procedure automatically measures and stores the home (vertical) offset position of the mixer wall.
Cassette not sensed on mixer wall during mix routine. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35105 D353501	**1.** Remove the cassette at or near the mix station and check it for damage. **2.** If the cassette is damaged discard the cassette.
Cassette unable to move into or out of the bar code point. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35411 D355201 D355301 D355401 D355501	**1.** Remove the transport shield, if needed. **2.** Check for a spill at the bar code point area. **3.** Remove cassette, if present. **4.** Replace the transport shield, if needed, and address any warnings or errors at the System Manager.

Table 10.11 Error Event Messages *(Continued)*

Description	Event Number	Action
Cassette unable to move into or out of the left front lane transfer station. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35551 D355221 D355521	**1.** Remove the transport shield, if needed. **2.** Check for a spill at the left front lane transfer station. **3.** Remove cassette, if present. **4.** Replace the transport shield, if needed, and address any warnings or errors at the System Manager.
Cassette unable to move into or out of the left middle lane transfer station. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35651 D355341 D355441	**1.** Remove the transport shield, if needed. **2.** Check for a spill at the left middle lane transfer station area. **3.** Remove cassette, if present. **4.** Replace the transport shield, if needed, and address any warnings or errors at the System Manager.
Cassette unable to move into or out of the mix station. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35103 D353801 D353821 D353841 D353861	**1.** Remove the transport shield, if needed. **2.** Remove jammed cassette from mixer wall. Refer to System Help for instructions. **3.** Check the platform in front of the mixer for debris and clean if necessary. **4.** Replace the transport shield, if needed, and address any warnings or error messages at the System Manager.
Cassette unable to move into or out of the output buffer. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35251 D354101 D354301 D354401	**1.** Remove cassettes and any other loose items. Refer to System Help for instructions. **2.** Clean the bottom and sides of the cassette and the platform at the portal of the output buffer. Refer to System Help for instructions.
Cassette unable to move into or out of the right front lane transfer station. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35601 D355321 D355421	**1.** Remove the transport shield, if needed. **2.** Check for a spill at the right front lane transfer station. **3.** Remove cassette, if present. **4.** Replace the transport shield, if needed, and address any warnings or errors at the System Manager.
Cassette unable to move into or out of the right middle lane transfer station. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35701 D355241 D355541	**1.** Remove the transport shield, if needed. **2.** Check for a spill at the right middle lane transfer station. **3.** Remove cassette, if present. **4.** Replace the transport shield, if needed, and address any warnings or errors at the System Manager.
Cassette unable to move out of the input buffer. OPERATOR MUST CLEAR ALL CASSETTES FROM STM.	E_35202	**1.** Clean the platform at the exit of the input buffer. Refer to System Help for instructions. **2.** Observe operation. If cassettes move clear of input buffer, inspect LED indicators on input queue sensor PWA. Four of the reflective sensors are mounted on the Input Sensor PWA (IS501). Three sensors (STM Input CASSETTE 1 [SN521], STM Input CASSETTE 2 [SN522] and STM input CASSETTE 3 [SN523]) face left into the input buffer and monitor the first three cassette locations. If the sensor is dirty, it could falsely indicate the presence of a cassette. **3.** Clean the sensors. Refer to System Help for instructions.
Common Services unable to proceed.	E_33950 D331001 D333202	Review the detailed message and all events related to this sample or cycle. Follow the troubleshooting for the related event.

Table 10.11 Error Event Messages *(Continued)*

Description	Event Number	Action
Incomplete cleaner or bleach removal.	E_36009 D365431 D365432 D365433	Remove cleaner or bleach again from Flow cell or system.
Operating position of STM could not be verified.	E_35451 D350082	**1.** Slide the STM all the way back into the operating position. Refer to System Help for instructions. **2.** Place instrument online.
Output buffer is full.	E_35253 D354501	Remove cassettes from the rear of the output buffer.
Pneumatic Sensor hardware failure.	E_33064 D334001 D334002 D334003 D334004 D334005 D334006 D334007	Perform the Static Pneumatic Supply diagnostic procedure.
Prime Diluent needs to be performed.	E_36011 D365434	Perform the Prime Diluent diagnostic procedure.
SAM unable to proceed.	E_34950 D347001 D347101 D347251 D347252 D347253 D347254	Review the detailed message and all events related to this sample or cycle. Follow the troubleshooting for the related event.
STM XY truck did not sense home on the X-axis.	E_35011 D350241	If the error recurs, call your Beckman Coulter Representative.
STM XY truck did not sense home on the Y-axis.	E_35021 D350242	If the error recurs, call your Beckman Coulter Representative.
STM XY truck recovered from missed steps on the X-axis.	E_35012 D350243	None
STM XY truck recovered from missed steps on the Y-axis.	E_35022 D350244	None
STM unable to proceed.	E_35950	Review the detailed message and all the events in the Error Log with the same activity ID as the detailed message.
Single-tube station home position or tube cradle status could not be verified.	E_35501 D351101	**1.** Repeatedly enter and exit Single-Tube Presentation to move the single-tube station in and out. Note if errors recur. **2.** If errors recur and single-tube station is left in the load position, manually move the single-tube station to the back position so that Cassette presentation can be used. Call your Beckman Coulter Representative.
Transport shield and/or cover was opened.	E_34701 D349000	Close transport shield and/or cover.

Table 10.11 Error Event Messages *(Continued)*

Description	Event Number	Action
VCSn module unable to proceed.	E_32950 D327521 D327541 D327561 D327581 D327601	Review the detailed message and all events related to this sample or cycle. Follow the troubleshooting for the related event.
Vacuum chamber drain did not sense empty.	E_33501 D336041	Power OFF and power ON to restart the SPM.
Vacuum chamber overflow detected.	E_33502 D336001 D336002	**1.** Power OFF and power ON to restart the SPM. **2.** Inspect the vacuum trap at the Pneumatic Supply module. **3.** If problem continues, call your Beckman Coulter Representative.
Vent/overflow chamber detected overflow.	E_31991 D336201	**1.** Power OFF and power ON to restart the SPM. **2.** If problem continues, call your Beckman Coulter Representative.
Vent/overflow chamber drain did not sense empty.	E_31992 D336221	**1.** Power OFF and power ON to restart the SPM. **2.** If problem continues, call your Beckman Coulter Representative.

Table 10.12 Warning Event Messages

Description	Event Number	Action
Ambient temperature exceeded the operating limits.	E_33011 D330201	**1.** Check the lab temperature. **2.** Check system fans.
Blood detector reading is approaching the operating limits.	E_34804 D341291 D341292	**1.** Verify sample path integrity by performing the Dispense Diluent procedure. If this fails, call your Beckman Coulter Representative. **2.** Perform the Clean Aspiration Probe procedure. **3.** Perform the Change Aspiration Probe procedure.
CBC count vacuum is approaching the operating limits.	E_31052 D311642	**1.** Perform the Static cycle procedure to start the pneumatics. **2.** Monitor CBC Count Vacuum on the System Monitor screen using the Volt/Temp tab. **3.** Set count vacuum to nominal. If adjustment was required, rerun the procedure to verify and observe reading for stability.
Input buffer pushers did not sense home.	E_35201 D352001	**1.** Attempt to recover the system by placing it offline, then online again. **2.** If step one failed to recover operational status, remove all cassettes from the input buffer and call your Beckman Coulter Representative for assistance with the Input Buffer Motor Test. Select 10 cycles. If completed without error, return to normal operation.
Invalid Request.	E_36010 D360011	Check instrument configuration to correct condition.
Output buffer is full.	E_35254 D354502 D354601	Remove cassettes from the rear of the output buffer.
Unable to change the status of a module.	E_36008 D365381 D365382 D365383 D365384	Correct any module errors.

Table 10.12 Warning Event Messages *(Continued)*

Description	Event Number	Action
VCSn phase alignment did not complete successfully.	E_32200 D321921	**1.** Ensure there is sufficient volume of control to repeat the test. **2.** Ensure that the COULTER LATRON CP-X control was correctly prepared.
VCSn temperature was not in operating range limits. Try again in 10 minutes.	E_32404	**1.** Check lab's environmental control system. **2.** Check system fans for operation.

Table 10.13 Informational Event Messages

Description	Event Number	Action
A/D or MRC reference voltage exceeded the operating limits.	E_32901 D321421 D321441	Go to the System Monitor screen and check the live status of the monitored parameters.
A/D or MRC reference voltage is approaching the operating limits.	E_32902 D321422 D321442	Go to the System Monitor screen and check the live status of the monitored parameters.
Ambient temperature is approaching the operating limits.	E_33012 D330202	**1.** Check the lab temperature. **2.** Check system fans.
Aspiration error.	E_34801 D341122 D341123 D341124 D341125 D341126	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity; inspect the aspiration tubing.
Aspiration syringe pump did not sense home.	E_34601 D340501 D343001	Call your Beckman Coulter Representative for assistance with the Exercise Aspiration Syringe Pump procedure.
Aspiration syringe pump move could not be verified.	E_34603 D340519 D340749 D341002 D341009 D341016 D341508 D341513 D341581 D342507 D342515 D342517 D342525 D343005	Call your Beckman Coulter Representative for assistance with the Exercise Aspiration Syringe Pump procedure.
Aspiration syringe pump sensed home after successful recovery.	E_34602 D340502 D343002	Call your Beckman Coulter Representative for assistance with the Exercise Aspiration Syringe Pump procedure.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
BSV position could not be verified.	E_34101 D340510 D340681 D341017 D341526 D343010 D343011	**1.** Call your Beckman Coulter Representative for assistance with the Cycle BSV procedure. **2.** Clean the BSV with distilled water (Refer to System Help for instructions) and call your Beckman Coulter Representative for assistance with the Cycle BSV procedure until functioning properly.
Bleach or Disinfect Solution has been introduced into system.	E_36002 D360077 D360078	Complete the maintenance procedure to remove the bleach or disinfecting solution from the system.
Blood detector reading exceeded the operating limits.	E_34802 D341231 D341232	**1.** Verify sample path integrity by performing the Dispense Diluent procedure. If this fails, call your Beckman Coulter Representative. **2.** Perform the Clean Aspiration Probe procedure. **3.** Perform the Change Aspiration Probe procedure.
Blood detector variance readings exceeded the operating limits.	E_34803 D346081 D346082	**1.** Verify sample path integrity by performing the Dispense Diluent procedure. If this fails, call your Beckman Coulter Representative. **2.** Perform the Clean Aspiration Probe procedure. **3.** Perform the Change Aspiration Probe procedure.
CBC SCA card temperature exceeded the operating limits.	E_31953 D315641	**1.** Check the system fan and air pathway. **2.** Check the lab temperature.
CBC SCA card temperature is approaching the operating limits.	E_31952 D315642	**1.** Check the system fan and air pathway. **2.** Check the lab temperature.
CBC count vacuum exceeded the operating limits.	E_31051 D311641	Perform Check Count Vacuum procedure.
CBC diluent temperature exceeded the operating limits.	E_31111 D311621	**1.** Check the lab temperature. **2.** Check system fans.
CBC diluent temperature is approaching the operating limits.	E_31112 D311622	**1.** Check the lab temperature. **2.** Check system fans.
CBC lyse pump delivery could not be verified.	E_31012 D312507	Call your Beckman Coulter Representative for assistance with the Sample to HGB chamber procedure.
CBC lyse pump did not sense home.	E_31011 D312506	Call your Beckman Coulter Representative for assistance with the Sample to HGB chamber procedure.
CBC waste chamber drain did not sense empty.	E_31151 D310501 D311001 D312009 D312505	**1.** Access the System Monitor screen, select CBC and Common Serv tabs. **2.** Under sensors, in the CBC section, check the Waste Chamber indicator. If it is green, call your Beckman Coulter Representative.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
DC or RF flow cell voltage exceeded the operating limits.	E_32903 D321461 D321481	Go to the System Monitor screen and check the live status of the monitored parameters.
DC or RF flow cell voltage is approaching the operating limits.	E_32904 D321462 D321482	Go to the System Monitor screen and check the live status of the monitored parameters.
Diff lyse pump delivery could not be verified.	E_32052 D322004	Call your Beckman Coulter Representative for assistance with the Prime Diff Lyse procedure.
Diff lyse pump did not sense home.	E_32051 D322003	Call your Beckman Coulter Representative for assistance with the Prime Diff Lyse procedure.
Diff preservative pump delivery could not be verified.	E_32042 D322006	Call your Beckman Coulter Representative for assistance with the Prime Diff Preservative procedure.
Diff preservative pump did not sense home.	E_32041 D322005	Call your Beckman Coulter Representative for assistance with the Prime Diff Preservative procedure.
Distribution valve did not report expected position.	E_32003 D321862 D321932 D321954 D322302 D324704 D326461	Perform the Cycle DV procedure.
Distribution valve did not sense home.	E_32001 D320801 D321952 D324701	Perform the Unlock DV procedure.
Distribution valve home recovered.	E_32002 D321953 D324702	None.
Distribution valve recovered expected position.	E_32004 D321955 D322303 D324705	None.
Electronic Supply module current exceeded the operating limits.	E_33055 D332182 D332202 D332222 D332262	**1.** Check to ensure that the three fans are on. **2.** Verify voltages on System Monitor screen from the Volt / Temp tab.
Electronic Supply module current is approaching the operating limits.	E_33054 D332181 D332201 D332221 D332261 D332281	**1.** Check to ensure that the three fans are on. **2.** Verify voltages on System Monitor screen from the Volt / Temp tab.
Electronic Supply module in service mode.	E_33053 D332003	Call your Beckman Coulter Representative.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
Electronic Supply module voltage exceeded the operating limits.	E_33052 D332022 D332042 D332082 D332102 D332122 D332142 D332162	**1.** Check to ensure that the three fans are on. **2.** Verify voltages on System Monitor screen from the Volt / Temp tab.
Electronic Supply module voltage is approaching the operating limits.	E_33051 D332021 D332041 D332081 D332101 D332121 D332141 D332161	**1.** Check to ensure that the three fans are on. **2.** Verify voltages on System Monitor screen from the Volt / Temp tab.
Flow cell DC voltage exceeded the expected range. Possible full clog.	E_32101 D321005	Perform the Clear Flow Cell Aperture procedure.
HGB blank exceeded the operating limits.	E_31801 D312021 D312061 D312081	**1.** Perform HGB Blank Verification procedure. **2.** Perform Daily Checks.
HGB blank is approaching the operating limits.	E_31802 D312022 D312062 D312082	**1.** Perform the HGB Blank Verification procedure. **2.** Perform Daily Checks.
Initial Aspiration error.	E_34805	**1.** Check the specimen and ensure: **a.** The volume was sufficient **b.** It does not contain clots or fibrin. **c.** It was collected and stored properly. **2.** Verify sample path integrity, inspect aspiration tubing.
Input buffer pushers missed steps during a sweep.	E_35203 D352002	**1.** Remove all cassettes from the input buffer. **2.** Call your Beckman Coulter Representative for assistance with the In buffer Motor Test. Type "4" in the Cycles text box and select the LF (Loop on Failure) option. Monitor the message box for reported skipped steps.
Light scatter offset exceeded the operating limits.	E_32905 D321501 D321521 D321541	Go to the System Monitor screen and check the live status of the monitored parameters.
Light scatter offset is approaching the operating limits.	E_32906 D321502 D321522 D321542	Go to the System Monitor screen and check the live status of the monitored parameters.
Mix pressure exceeded the operating limits.	E_32621 D320714 D323209 D324205	**1.** Perform the Check Pneumatic Supply procedure. **2.** Select **Static cycle** and adjust, as needed.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
Mix pressure is approaching the operating limits.	E_32622 D320715 D323210 D324206	**1.** Perform the Check Pneumatic Supply procedure. **2.** Select **Static cycle** and adjust, as needed.
NRBC lyse pump delivery could not be verified.	E_32012 D322008	Call your Beckman Coulter Representative for assistance with the Prime NRBC Lyse.
NRBC lyse pump did not sense home.	E_32011 D322007	Call your Beckman Coulter Representative for assistance with the Prime NRBC Lyse.
One or more Flow cell parameters exceeded operating limits.	E_32102 D321003	**1.** Perform the Flush Flow Cell procedure. **2.** Select the **Both** option.
Pneumatic Supply module exceeded the operating limits.	E_33062 D333022 D333042	**1.** Verify the proper operation of the Pneumatic Supply module by inspecting the front panel LEDs. Confirm both LEDs are green. **2.** Perform the Check Pneumatic procedure Static option. Observe raw pressure and vacuum and adjust, as necessary.
Pneumatic Supply module is approaching the operating limits.	E_33061 D333021 D333041	**1.** Verify the proper operation of the Pneumatic Supply module by inspecting the front panel LEDs. Confirm both LEDs are green. **2.** Perform the Check Pneumatic Supply procedure Static option. Observe raw pressure and vacuum and adjust, as necessary.
Possible tube bottom detected before expected.	E_34204 D341034 D341084	**1.** Check tube types and ensure they are in the correct cassettes. **2.** Call your Beckman Coulter Representative for assistance with checking Tube Bottom Calibration.
Probe clean valve is not operating properly.	E_34507 D340511 D340741 D341010 D341141 D341507 D341514 D342501 D342518 D343004 D343012	Call your Beckman Coulter Representative.
Probe cleaning pump delivery could not be verified.	E_34022 D340513 D341015 D341146 D341519 D342503 D342523 D343014	Perform the Dispense Diluent procedure.
Probe cleaning pump did not sense home.	E_34021 D340512 D341014 D341145 D341518 D342502 D342522 D343013	Perform the Clean Aspiration Probe procedure.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
Probe vertical drive did not sense home.	E_34201 D340505 D340514 D340522 D340562 D341011 D341018 D341029 D341142 D341201 D341502 D341509 D341515 D342504 D342509 D342519 D343006 D343015 D343044	Call your Beckman Coulter Representative for assistance with the Initialize SAM procedure.
Probe vertical drive move could not be verified.	E_34203 D340516 D341001 D341006 D341081 D341512 D342514 D342516	**1.** Call your Beckman Coulter Representative for assistance with Extend/Retract Aspiration Probe procedure. **2.** Remove cover and check for obstruction.
Probe vertical drive sensed home after successful recovery.	E_34202 D340506 D340515 D340523 D340563 D341012 D341019 D341030 D341143 D341202 D341503 D341510 D341516 D342505 D342510 D342520 D343007 D343016	Call your Beckman Coulter Representative for assistance with the Initialize SAM procedure.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
Probe waste chamber vacuum error recovered.	E_34503 D340517 D341026 D341147 D341522 D341524 D341527 D342526 D342528 D342530 D343018 D343020	Perform the Check Count Vacuum procedure.
Probe waste chamber vacuum exceeded the operating limits.	E_34502 D340518 D340748 D341027 D341148 D341523 D341525 D341528 D342527 D342529 D342531 D343019 D343021	**1.** Perform the Check Count Vacuum procedure. **2.** Check the Pneumatic Supply module. **3.** Adjust the pressure and vacuum to the proper value.
Probe waste drain did not sense empty.	E_34505 D341033 D343009 D343101	**1.** Call your Beckman Coulter Representative for assistance with the Drain Probe Waste Chamber procedure. **2.** Check probe waste fluid DETECT sensor (SN340L) and cable.
RBC or WBC ZAP voltage exceeded the operating limits.	E_31903 D312741 D312761	**1.** Perform the ZAP Apertures procedure. Repeat, as required. **2.** Monitor RBC or WBC ZAP aperture voltages on the System Monitor screen using the Volt/Temp tab. **3.** Perform the Clean Aperture procedure, if required.
RBC or WBC ZAP voltage is approaching the operating limits.	E_31904 D312742 D312762	**1.** Perform the ZAP Apertures procedure. Repeat, as required. **2.** Monitor RBC or WBC ZAP aperture voltages on the System Monitor screen using the Volt/Temp tab. **3.** Perform Clean Aperture procedure, if required.
RBC or WBC aperture voltage exceeded the air limits.	E_31901 D311661 D311681	Call your Beckman Coulter Representative.
RBC or WBC aperture voltage exceeded the clog limits.	E_31902 D311662 D311682	**1.** Perform the Zap Apertures procedure. **2.** For WBC aperture, perform the WBC Clear Aperture procedure, if needed. **3.** Perform the Clean Aperture procedure, if required.
RBC or WBC reference voltage exceeded the operating limits.	E_31803 D311741	Call your Beckman Coulter Representative.
RBC or WBC reference voltage is approaching the operating limits.	E_31804 D311742	Call your Beckman Coulter Representative.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
RBC pump delivery could not be verified.	E_31042 D310503 D312008 D312502	**1.** Perform the Rinse Bath procedure. **2.** Perform the Deliver blank to HGB procedure.
RBC pump did not sense home.	E_31041 D310502 D312007 D312501	**1.** Call your Beckman Coulter Representative for assistance with the Rinse Bath procedure. **2.** Call your Beckman Coulter Representative for assistance with the Deliver Blank to HGB procedure.
Ramp test unable to proceed.	E_36007	**1.** Power OFF and power ON to restart the SPM. **2.** If problem continues, call your Beckman Coulter Representative.
Reagent Services hardware failure.	E_33201 D330503 D330504 D330505 D331102 D331202 D331302 D331402 D331502 D331602	Power OFF and on to restart the SPM.
Retic clear pump delivery could not be verified.	E_32022 D322015	Call your Beckman Coulter Representative for assistance with the Prime Retic Clear procedure.
Retic clear pump did not sense home.	E_32021 D322014	Call your Beckman Coulter Representative for assistance with the Prime Retic Clear procedure.
Retic stain pump delivery could not be verified.	E_32032 D322010	Call your Beckman Coulter Representative for assistance with the Prime Retic Stain procedure.
Retic stain pump did not sense home.	E_32031 D322009	Call your Beckman Coulter Representative for assistance with the Prime Retic Stain procedure.
SAM horizontal drive assembly did not sense home.	E_34401 D340520 D343041	**1.** Remove the transport shield and look for an obstruction such as a tube out of a cassette. **2.** Replace the transport shield and perform the Initialize SAM procedure.
SAM horizontal drive assembly move could not be verified.	E_34403 D340504 D340561 D341028 D341501 D342508	**1.** Remove the transport shield and look for an obstruction such as a tube out of a cassette. **2.** Replace the transport shield and perform the Initialize SAM procedure.
SAM horizontal drive assembly sensed home after successful recovery.	E_34402 D340521	**1.** Remove the transport shield and look for an obstruction such as a tube out of a cassette. **2.** Replace the transport shield and perform the Initialize SAM procedure.
Sample or sheath pressure exceeded the operating limits.	E_32801 D321561 D321581	**1.** Perform the Check Pneumatic Supply procedure. **2.** Adjust pressure and vacuum to appropriate value.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
Sample or sheath pressure is approaching the operating limits.	E_32802 D321562 D321582	Perform the Check Pneumatic Supply procedure. **1.** Select **Static**. **2.** Press **F10** to view the System Monitor. **3.** Adjust the regulator. **4.** Return to the Diagnostics Procedures screen and select **Stop**.
Sheath or sample tank did not indicate full condition.	E_32701 D320501 D320502 D320503 D320521 D320541	**1.** Check diluent supply. **2.** Call your Beckman Coulter Representative for assistance with the Verify Sample Tank Operation and/or Verify Sheath Tank Operation procedures.
Single-tube station recovered while extending or retracting.	E_35502 D351102 D351103	None.
Stripper vertical drive did not sense home.	E_34301 D340508 D340524 D340565 D341021 D341024 D341031 D341204 D341206 D341505 D342512	Perform the Initialize SAM procedure.
Stripper vertical drive sensed home after successful recovery.	E_34302 D340509 D340525 D340566 D341025 D341032 D341205 D341506 D342513	Perform the Initialize SAM procedure.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
System timeout occurred.	E_36001 D310001 D365101 D365102 D365103 D365104 D365105 D365106 D365107 D365108 D365109 D365110 D365111 D365112 D365113 D365114 D365115 D365116 D365117 D365118 D365119 D365120 D365122 D365126	**1.** Power OFF and power ON to restart the SPM. **2.** If the problem continues, call your Beckman Coulter Representative.
Tube was detected after a successful recovery.	E_34312 D341004 D341008 D341062 D341083	Call your Beckman Coulter Service Representative for assistance with the Simulate CNDR Cycle procedure.
Tube was not detected.	E_34313 D341005 D341007 D341063	Call your Beckman Coulter Service Representative for assistance with the Simulate CNDR Cycle procedure.
Tube was unexpectedly detected.	E_34311 D341003 D341036 D341061	Call your Beckman Coulter Service Representative for assistance with the Simulate CNDR Cycle procedure.
Two or more CBC apertures had one or more parameters that exceeded the operating limits.	E_31905 D313541	**1.** Perform the Zap Apertures procedure. Repeat, as required. **2.** Perform Clean Aperture procedure, if required.
Unable to read waste status.	E_33421 D331702 D331704 D331706 D331707 D331708 D331709	**1.** Check identified container for suspect level sense connection. **2.** Replace float sensor.
Unexpected Software Exception.	E_36005 D360001	**1.** Power OFF and power ON to restart the SPM. **2.** If the problem continues, call your Beckman Coulter Representative.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
VCS diluent pump delivery could not be verified.	E_32062 D320717 D322002 D322012 D322202 D322313 D322315 D322402 D323212 D324208 D326363 D326442 D326464 D326466 D326468	Call your Beckman Coulter Representative for assistance with the Prime VCSn Module procedure.
VCS diluent pump did not sense home.	E_32061 D320716 D322001 D322011 D322201 D322312 D322314 D322401 D323211 D324207 D326362 D326441 D326463 D326465 D326467	Call your Beckman Coulter Representative for assistance with the Prime VCSn Module procedure.
VCS temperature exceeded the operating limits.	E_32401 D321341 D321351 D321361 D321371	**1.** Check the lab's environmental control system. **2.** Check system fans for operation.
VCS temperature is approaching the operating limits.	E_32402 D321342 D321352 D321362 D321372	Check the lab's environmental control system.
VCS waste chamber drain did not sense empty.	E_32221 D320581 D322013 D326443 D326469	Perform the Check Pneumatic Supply procedure.
VCSn SCA card temperature exceeded the operating limits.	E_32953 D328361	**1.** Check the system fan and air pathway. **2.** Check the lab temperature.
VCSn SCA card temperature is approaching the operating limits.	E_32952 D328362	**1.** Check the system fan and air pathway. **2.** Check the lab temperature.

Table 10.13 Informational Event Messages *(Continued)*

Description	Event Number	Action
VCSn acquisition did not match expected time.	E_32103 D321922 D321923	N/A
Vacuum chamber detected liquid.	E_33503 D336003	**1.** Inspect the vacuum trap at the Pneumatic Supply module. **2.** Power OFF and power ON to restart the SPM. **3.** If problem continues, call your Beckman Coulter Representative.
WBC pump delivery could not be verified.	E_31032 D312504	Call your Beckman Coulter Representative for assistance with the Rinse Bath procedure.
WBC pump did not sense home.	E_31031 D312503	Call your Beckman Coulter Representative for assistance with the Rinse Bath procedure.

Additional Troubleshooting

The following table provides information about observed behaviors and actions you can take to resolve them. If the actions do not resolve the issue, call your Beckman Coulter Representative.

Table 10.14 Additional Troubleshooting

Category	Description	Action
.csv Export	The system fails to export .csv files.	**1.** Restart the System Manager. **2.** Wait for the System Manager to be ready. **3.** Export the control files to .csv.
	When trying to export .csv files to an unformatted CD, the software restarts.	**1.** Wait for the System Manager to be ready. **2.** Insert the formatted CD. **3.** Export the control .csv files to the CD.
Diagnostics	During the Diagnostic Barcode Read Rate, the barcode is not read by the instrument because the barcode label contains special escape characters. The system will not process the specimen.	Perform a Diagnostic Read Rate with labels that do not include special escape characters.

Table 10.14 Additional Troubleshooting *(Continued)*

Category	Description	Action
Dispense Diluent	When requesting a Diluent Dispense, the system displays *Unable to Switch Instrument State*. The tube remains in the retracted single-tube presentation cradle.	**1.** Request single-tube presentation to remove the empty tube. **2.** Remove the empty tube. **3.** Select **Dispense Diluent**. **4.** Insert the empty tube into the cradle. **5.** If the message *Unable to Switch Instrument State* is displayed again, use a longer tube to dispense the diluent.
	When the diluent is being dispensed in a single-tube presentation, this message is displayed: *Stripper Already Home*. The instrument performs a short recovery cycle and prompts you to remove the tube. When you remove the tube and acknowledge the prompt, the cradle does not automatically retract.	**1.** Place the SPM offline and then online to retract the cradle. **2.** Request single-tube presentation. **3.** Select **Dispense Diluent**. **4.** Insert the empty tube into the cradle.
	When the diluent is being dispensed in a single-tube presentation, if a probe encoder error is detected, the instrument is placed offline without running a recovery cycle. When you try to place the instrument online, the system primes the instrument and runs a recovery cycle.	**1.** Place the SPM online and let the system complete the recovery cycle. **2.** Request single-tube presentation. **3.** Select **Dispense Diluent**. **4.** Insert the empty tube into the cradle.
Single-tube Presentation	In a workcell, if an SPM is in QC-only mode, running a sample in single-tube presentation on another SPM using the server may display the following message without starting the single-tube presentation: *Unable to start single-tube presentation. The instrument is already performing single-tube processing on another workstation.*	**1.** Restart the System Manager. **2.** Start Single-tube Presentation to run samples in single-tube presentation.
Slidemaker Stainer II	The DxH Slidemaker Stainer II is intermittently disconnected due to unexpected exception when left idle.	**1.** Power OFF and power ON the DxH Slidemaker Stainer II. **2.** Continue processing when the DxH Slidemaker Stainer II is ready.
Studies	In a workcell, some cassettes will be stalled in the studies-mode instrument when the following items occur: • One instrument is in studies mode. • The other two instruments are not in studies mode. • More than 3 cassettes are introduced.	**1.** Place the instrument offline to exit the stalled cassettes. **2.** Reload the cassettes that were skipped. **3.** Load a maximum of 3 cassettes with study specimens in the input buffer. **4.** Place the studies instrument online.

Table 10.14 Additional Troubleshooting *(Continued)*

Category	Description	Action
Troubleshooting	The instrument state is disconnected during a System Manager recovery when a software crash occurs.	**1.** Restart the System Manager. **2.** Power OFF and power ON the SPM(s).
	The instrument may go offline when you manually interrupt a cassette being processed in a workcell.	**1.** Remove the transport shield, if needed. **2.** Remove the cassette, if present. **3.** Replace the transport shield, if needed, and place the SPM online. **4.** Reload all of the specimens that were skipped for processing.
	A specimen is skipped and any remaining specimens on the transport at that time are skipped if the transport shield is open during specimen processing immediately prior to the specimen being aspirated and the workstation is shut down.	**1.** Replace the transport shield, if needed, and place the SPM online. **2.** Identify specimens with incomplete results and specimens that were skipped. **3.** Reload specimens with incomplete results and specimens that were skipped for processing.
	Incomplete results are generated for a specimen and any remaining specimens on the transport at that time are skipped if the transport shield is open during specimen processing immediately prior to the specimen being aspirated.	**1.** Replace the transport shield, if needed, and place the SPM online. **2.** Identify specimens with incomplete results and specimens that were skipped. **3.** Reload specimens with incomplete results and specimens that were skipped for processing.
	One or more instruments in the workcell is disconnected and needs to be online.	**1.** Restart the System Manager. **2.** Power OFF and power ON the SPM. **3.** Place the instrument(s) online.
	An unexpected framework error may be generated on the server if the operator access is changed from the client during diagnostics.	Wait a few minutes for the DxH application to restart.

CHAPTER 11

Quality Assurance

Calibration

The calibration procedure consists of comparing instrument measurements to known values for WBC, RBC, HGB, MCV, PLT, and MPV. Calibration assures that an instrument's data output accurately reflects sample input. Calibration is performed using materials based on or traceable to known reference preparations or materials. In general, the procedure may indicate that the instrument requires standardization, by first determining the deviation from *calibrator reference*, and then applying recommended correction factors (CAL factors).

Your laboratory is responsible for the final calibration of the CBC parameters. Beckman Coulter recommends COULTER 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, verify and calibrate all the CBC parameters. The WBC differential, NRBC and Retic parameters are calibrated by an authorized Beckman Coulter Representative in your laboratory. The VCSn parameters do not require calibration in the laboratory.

NOTE Ensure your SPM is properly maintained and the apertures are clean prior to calibration.

When to Verify

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 or 6° C from the calibrating temperature.

If the procedure indicates you need to calibrate, continue with the calibration procedure.

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.
- If you fail the verify calibration procedure.

NOTE You can also set up an automatic notification to let you know when to calibrate a workcell. See Setting Up an Automatic Notification to Verify Calibration in CHAPTER 9, Setup.

Clearing a Calibration Run Reminder

The calibration run reminder triggers a yellow background in the Event Log Alert Status icon. Select the calibration run reminder event and select **Review** to clear the event log indicator. The reminder will be triggered once per week until CBC Calibration is run.

Calibrating with COULTER S-CAL Calibrator

NOTE The calibration procedure is performed on a selected SPM. Before you can start or restart the calibration process, the SPM must be offline. If the system is online, the following DxH dialog box displays the following message when you select **Calibration Setup**: *Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?* Select **OK** to continue or **Cancel** to cancel the procedure and remain online.

1 Select **Menu > QA > CBC Calibration**.

2 Select **Calibration Setup** on the CBC Calibration Screen.

IMPORTANT If calibration data exists, the system will display: *Existing data will be deleted*. Select **OK** to continue.

3 Type **10** in the *Number of Aspirations* text box.

4 Select **Cassette** from the *Presentation* drop-down list.

5 Select **BCI** from the *Calibrator Type* drop-down list.

6 Select **New Control From Bar Code** and use the handheld bar code scanner to scan the 2D bar code on the product insert or enter/select the following information:

- **Lot #**
- **Expiration Date**
- **Reference Values**

7 Select **OK** and follow the screen prompts.

8 Place the calibrator in a cassette.

9 Place the cassette in the input buffer and select **OK**.

10 Review the calibration results.

11 Select **Finish** at the bottom of the screen.

12 Verify your calibration with controls. When the calibration procedure is complete, the CBC Calibration (Summary) screen is displayed.

The background color of the Factor %Diff, %CV, and Difference cells change color when the presented value is out of the reference value as follows:

- Amber for Difference indicates that the value is out of range, which means that calibration is recommended.
- Red only applies to the %CV and indicates that the statistical value is NOT within range and the system does NOT allow calibration.

When all results are acceptable, **Edit System Recommendations** at the bottom right hand corner of the screen is enabled. This button lets you modify the calibration recommended by the system by selecting or deselecting check boxes.

On the report printout, the last section displays *Instrument Calibrated* and any of the following items:

- *PASS* - Calibration is not required by the system (no checkmark is displayed). The In Use Cal Factor(s) remains.
- *FAIL* - Calibration is recommended by the system (the checkmark is displayed). The operator has declined the recommendation (the checkmark was deselected by the operator). The In Use Cal Factor(s) remains.
- *CALIBRATED* - Calibration is recommended by the system (the checkmark is displayed). The operator accepted the system recommendation. The Calibration factor was updated to the New Cal Factor.
- *NOT ALLOW* - The system determined that the % CV statistical value is not within range or the Cal Factor is out of limits. Before performing calibration with COULTER S-CAL, ensure that it has been appropriately prepared as stated in its IFU. If a problem persists, contact your Beckman Coulter Representative.

Calibrating With Whole Blood

NOTE Before you can start or restart the calibration process, the SPM must be offline. If the system is online, the following DxH dialog box is displayed when you select **Calibration Setup**: *Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?* Select **OK** to continue or **Cancel** to cancel the procedure and remain online.

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. If you use vacuum collection tubes, ensure they are filled to correct capacity.

Obtain 20 normal, fresh whole blood specimens. You need enough of each to cycle three samples on the comparator instrument and three samples on the DxH 900/DxH 690T. If not using a comparator instrument, the following reference 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 - Hemiglobincyanide spectrophotometric procedure that follows *CLSI H15-A3* [51]. This method employs modified Drabkins (Ziljstra) Reagent and is references to NIST-certified filters and ICSH standards.
- MCV - Packed cell volume measured by a hematocrit procedure that follows *CLSI H07-A3* [50]. The PCV is not corrected for trapped plasma. MCV is calculated: PCV/RBC x 10.
- PLT - Phase-contrast microscopy.
- MPV - Reference against latex particles.

Calibrate with Whole Blood

1 Select **Calibration Setup** on the CBC Calibration screen to display the CBC Calibration Setup dialog box.

2 Type **3** in the *Number of Aspirations* text box.

3 Select the **Cassette** from the *Presentation* drop-down list.

4 Select **Whole Blood** from the *Calibrator Type* drop-down list.

5 Enter the whole blood reference values obtained from a comparator instrument or from reference methods.

6 Select **OK** to close the CBC Calibration Setup dialog box.

7 Place the 20 samples in cassettes, place the cassettes in the input buffer, and select **OK**.

When the calibration procedure is complete, the CBC Calibration (Summary) screen is displayed.

8 Review the calibration results. The System Manager assesses the calibration status, and indicates when calibration is recommended in the check boxes below the data.

The background color of the Factor %Diff, %CV, and Difference cells change color when the presented value is out of the normal range as follows:

- Amber for Difference indicates that the value is out of range, which means that calibration is recommended.
- Red only applies to the %CV and indicates that the statistical value is NOT within range and the system does NOT allow calibration.

When all results are acceptable, **Edit System Recommendations** at the bottom right hand corner of the screen is enabled. This button lets you modify the calibration recommended by the system by selecting or deselecting check boxes.

9 Select **Finish** at the bottom of the screen.

10 Verify your calibration with controls.

Repeatability

Sample Requirements

For Repeatability studies, ensure the patient has normal erythrocyte, leukocyte, and platelet morphology. You can view a suggested reference range in Performance in CHAPTER 1, System Overview.

NOTE Repeatability is performed on a selected SPM. Before you can start or restart the Repeatability process, the SPM must be offline. If the system is online, the following DxH dialog box displays the following message when you select **Repeatability Setup**: *Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?* Select **OK** to continue or **Cancel** to cancel the procedure and remain online.

Performing Repeatability

1 Select the instrument where Repeatability is going to be performed.

2 Select **Menu > QA > Repeatability**.

3 Ensure you have enough normal whole blood from a single donor for a minimum of 10 cycles.

4 Select **Repeatability Setup**.

IMPORTANT If repeatability data exists, the system will display: *Existing data will be deleted*. Select **OK** to continue.

Repeatability in Cassette Presentation

1 From the Repeatability Setup dialog box, select a test panel from the *Test Panel* drop-down list.

NOTE The Repeatability Setup dialog box defaults to **CASSETTE**.

2 Type **5** in the *Number of Aspirations* text box.

3 Select **OK** and follow the screen prompts.

⚠ CAUTION

Risk of specimen leakage or clogging. Possible specimen leakage or clogging of the system can occur. Excessive piercing of sample tubes may cause coring of the stopper. The number of pierces without problems can vary among sample tube types and manufacturers. Do not pierce a blood collection tube more than five times.

Verify the instructions for use from the tube manufacturer. Some tube types have more restrictive instructions for use and limitations on the number of pierces.

4 Select **OK** to start the Repeatability test.

5 Separate the well-mixed normal specimen into two tubes.

6 Place the tubes into consecutive positions in a cassette and place the cassette in the input buffer.

7 Select **OK** on the DxH dialog box to start the cycle.

8 When the cycle has been completed, review the results on the Repeatability screen.

NOTE Use the scroll bar to review results that do not appear in the results panel.

9 Verify that the CV (Coefficient of Variation) does not exceed the established Repeatability Limits.

NOTE Refer to Repeatability in CHAPTER 1, System Overview for Repeatability performance.

10 Verify the results and if satisfied, select **Finish**.

NOTE The **Finish** button is active only when each parameter has two or more valid results.

Repeatability in Single-Tube Presentation

Follow the instructions in the Repeatability in Cassette Presentation procedure using the Single-Tube Presentation Station to present each specimen tube.

Repeatability Run and Details

When the Repeatability procedure is complete, the results are displayed on the Repeatability screen.

To view the details of a particular run, select a run by highlighting it, and then select **Details** from the local navigation bar.

Carryover

NOTE The carryover procedure is performed on a specific SPM. Before you can start or restart the Carryover process, the instrument must be offline. If the system is online, the following DxH dialog box is displayed when you select **Carryover Setup**: *Putting the instrument offline will stop processing specimens and any cassette in progress will be routed to the output buffer. Do you still want to continue with the request?* Select **OK** to continue or **Cancel** to cancel the procedure and remain online.

1 Select **Menu > QA > Carryover**.

NOTE The Blood 1, Blood 2, and Blood 3 row headings on the carryover screen represent three aspirations of a single blood specimen.

2 Select **Carryover Setup**.

3 Select a test panel from the *Test Panel* drop-down list, select **OK**, and follow the screen prompts.

4 Select **OK** to start a carryover procedure.

5 Place a cassette in the input buffer with one blood tube followed by three diluent tubes and select **OK** to start carryover.

NOTE The carryover procedure is aborted and the cassette is routed to the output buffer if the following occur:

- At least one value has an aspiration or system error
- Cassette Position ID verification failure

6 When carryover is complete, review the results on the Carryover screen.

When performing a carryover procedure, the calculated % carryover and/or background for each parameter is compared to the carryover and background limits for acceptability.

The status of each parameter is based on the following criteria:

a. The status of the parameter is Pass for carryover, if

- Diluents 1, 2, and 3 are within the Background limits as defined in Performance in CHAPTER 1, System Overview for WBC, RBC, HGB, PLT, Diff, Retic, or NRBC, as applicable to the panel.
- The calculated % Carryover for the WBC, RBC, HGB, and PLT parameters and the total events for Diluents 1 and 2 for Diff, Retic, and NRBC are within background limits AND
  Diluent 3 sample results for WBC, RBC, HGB, PLT, Diff, Retic, and NRBC are within background limits.

b. The status of the parameter is FAIL for carryover if the criteria described above are not met.

Carryover Messages

You can select **Menu > QA > Carryover > Messages** to display System Status and System Messages. Select **Close** to close the dialog box.

NOTE The **Messages** button is only active if messages are encountered during the carryover test.

Exporting Quality Assurance Data

1 Select **Export** from the local navigation bar at the bottom of the CBC Calibration, Repeatability and Carryover screen.

2 Select the **Type** of file from the drop-down list.

3 Select a **Destination** for the export and select **Start**.

CHAPTER 12

Cleaning Procedures

IMPORTANT Maintenance and replacement/adjustment procedures are performed on a module basis. Ensure the appropriate instrument is selected before initiating a procedure.

When, Why, and How to Perform Each Procedure - DxH 900/DxH 690T

Table 12.1 Matrix of Frequency for Cleaning Procedures - DxH 900/DxH 690T

Procedure	Purpose	Tools/Supplies	Frequency
Performing a Manual Shutdown in CHAPTER 8, Shutdown	To shut down the DxH 900/DxH 690T instrument	None	Daily
Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T	To address: • Failure to recover control values • Decreased cell counts, increased MCV values, or increased voteouts	• High-quality, fragrance-free, gel-free bleach (5 to 6% solution of sodium hypochlorite - available chlorine) • Distilled water • Container for bleach-distilled water solution • Container for distilled water	As needed
Cleaning the Aspiration Probe - DxH 900/DxH 690T	To remove buildup	None	As needed
Cleaning the BSV Externally - DxH 900/DxH 690T	To remove blood or reagent buildup	• Lint-free tissue • Distilled water	Every month or when crystallization is observed on the outside of the BSV, whichever comes first
Cleaning the Pneumatic Supply Module Fan Filter - DxH 900/DxH 690T	To prevent damage to the power supply	• Soap • Water	As needed
Cleaning the STM - DxH 900/DxH 690T	To prevent debris from interrupting the transportation of specimens	• Lint-free tissue • Diluent	Every six months or as needed
Cleaning the Air Mix Temperature Control (AMTC) Module - DxH 900/DxH 690T	To remove buildup	• Lint-free tissue • Diluent	As needed

Table 12.1 Matrix of Frequency for Cleaning Procedures - DxH 900/DxH 690T *(Continued)*

Procedure	Purpose	Tools/Supplies	Frequency
Cleaning the Vacuum Trap - DxH 900/DxH 690T	To remove accumulated debris	Water	As needed
Cleaning the Optical Sensors - DxH 900/DxH 690T	To remove buildup	• Distilled water • Lint-free swab	As needed
Cleaning the Handheld Bar Code Scanner - DxH 900/DxH 690T	To remove accumulated dirt or dust	• Water • Detergent • Soft, lint-free cloth or tissue	As needed

Why, When, and How to Perform Each Procedure - DxH Slidemaker Stainer II

Table 12.2 Matrix of Frequency for Cleaning Procedures - DxH Slidemaker Stainer II

Procedure	Purpose	Tools/Supplies	Frequency
Performing a Manual Shutdown in CHAPTER 8, Shutdown	To shut down the instrument	None	Daily
Cleaning the Baskets - DxH Slidemaker Stainer II	To remove buildup	• Methanol • Empty bath tray • Lint-free cloth	Once a week or as needed
Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED)	To remove stain buildup	• Methanol • Lint-free cloth	Daily
Flush Stainer and Clean Stainer Baths and Tray (Software v2.0.0 if Drain All Baths and Flush Stainer is Enabled and the Proper Hardware is Installed)	• To remove stain buildup • To reduce clogging of the stain supply lines and ports	• Methanol • Empty bath tray	Daily
Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes	To remove stain buildup	• Methanol • Lint-free cloth or swab	Once a week or as needed
Extensive Cleaning of Fill Probes and Drain Probes - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES	To remove stain buildup and unclog fill and drain probes	• Methanol • Lint-free cloth • Plastic 10 ml syringe • Extra tubing	Once a week or as needed

Table 12.2 Matrix of Frequency for Cleaning Procedures - DxH Slidemaker Stainer II *(Continued)*

Procedure	Purpose	Tools/Supplies	Frequency
Performing the Flush Stainer Module Procedure - DxH Slidemaker Stainer II - Automatic Procedure (Software v1.2.0 and Prior)	To automatically flush the stainer supply lines and valves	• Methanol	Once a week or as needed
Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0)	To remove stain buildup and to remove reagent in lines when changing reagent type	• Methanol • Extra cleaning bottles (1 L or 2 L) • Unstained smears for QC	As needed
Cleaning the STM - DxH Slidemaker Stainer II	To prevent debris from interrupting the monitoring of specimens	• Lint-free cloth or swab • Deionized water	Every six months or as needed
Cleaning the Aspiration Probe - DxH Slidemaker Stainer II	To remove buildup	None	As needed
Cleaning the Dispense Probe - DxH Slidemaker Stainer II	To remove buildup	None	As needed
Cleaning the STM Optical Sensors - DxH Slidemaker Stainer II	To prevent dirt from interrupting the monitoring of specimens	• Lint-free swab • Deionized water	As needed
Cleaning the Vacuum Trap - DxH Slidemaker Stainer II	To remove fluids and crystalization that accumulates	Water	As needed
Emptying the Broken Slides Bin - DxH Slidemaker Stainer II	To remove broken slides from bin	None	As needed
Cleaning the Slide Chute - DxH Slidemaker Stainer II	To remove broken slides and related debris	Small brush	As needed
Cleaning the STM Bar Code Scanner, SAM Bar Code Scanner, and the Single-Tube Station Bar Code Scanner - DxH Slidemaker Stainer II	To remove dirt or dust that has accumulated	• Deionized water • Lint-free cloth	As needed

Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T

⚠ WARNING

Risk of injury. Beckman Coulter urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but is not limited to, protective eyewear, gloves, and suitable laboratory attire.

⚠ 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.

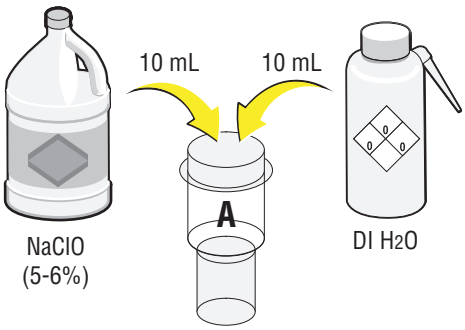
NOTE At the completion of this procedure and prior to sample analysis, you must perform a shutdown and then run Daily Checks.

1 Prepare a 20 mL solution of bleach and distilled water. Mix together:

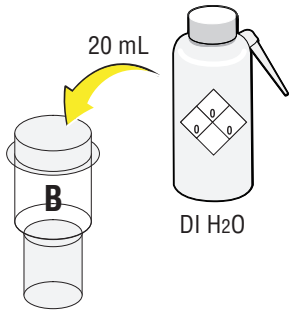
- 10 mL of high quality, fragrance-free, gel-free bleach (5 to 6% solution of sodium hypochlorite - available chlorine)

  NOTE If you are using bleach that is not a 5 to 6% solution of sodium hypochlorite - available chlorine, see Prepare a Bleach Solution and then go to the next step in this procedure.

- 10 mL of distilled water.



2 Put 20 mL of distilled water in a second container.



3 From the System Manager, select **Menu** > **Diagnostics** > **Dx Tools**.

4 Select the **Maintenance** tab to display the Diagnostic Procedures - Maintenance screen.

5 Select **Clean Apertures** from the drop-down list.

6 If the system is offline, select **Start**. The system places the SAM in safe mode and drains the baths.

OR

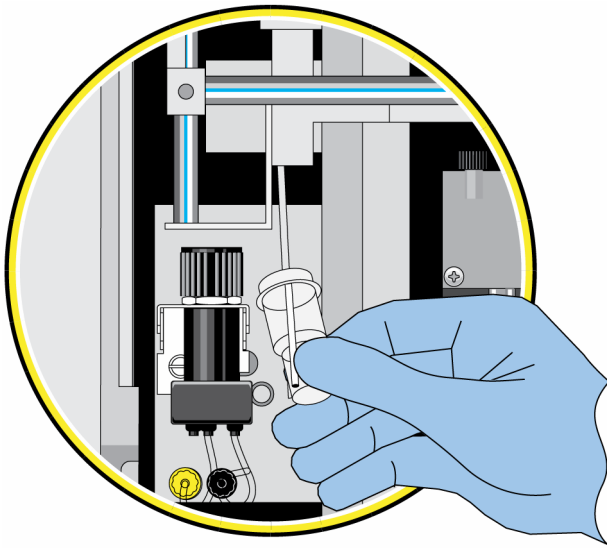
If the system is online, this message is displayed: *This function is only allowed when the instrument is offline. Would you like to place the instrument offline?* Select **OK** to proceed.

7 Remove the Transport Shield and Lift the Front Cover, and select **OK**.

8 Locate the bleach probe.

9 Insert the probe into the container with the bleach and distilled water solution, and ensure the probe reaches the bottom of the container. Select **OK**.

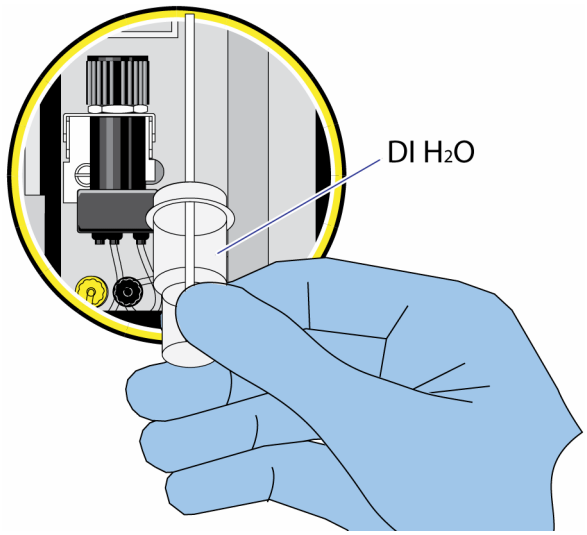
The system aspirates the bleach solution, draws it through the apertures, and then drains the baths.



10 Remove the empty bleach solution container. Select **OK** to begin the aperture cleaning. A dialog box displays the time elapsed as the aperture bleaching takes place.

NOTE A maximum of 15 minutes of aperture bleaching is suggested.

11 When the prompt is displayed, insert the probe in the distilled water (20 ml). Ensure the probe reaches the bottom of the container. Select **OK** to continue.



12 Remove the empty distilled water container and select **OK** to continue.

The system displays: *System performing Clean Aperture procedure. Please wait.*

13 When the prompt is displayed, Lower the Front Cover, Install the Transport Shield, and select **OK**.

14 Select **Finish** and **Yes** to exit from the diagnostics mode.

For workcells, the STM transport can be started after **Finish** has been selected within a Diagnostic procedure. This allows the cassettes to travel across a module for testing at other modules.

15 Run Shutdown.

NOTE Do not select the **Perform Startup (Daily Checks) after Shutdown** check box on the Manual Shutdown dialog box.

16 Select **Cancel** from the local navigation bar when you see the timing bar at the lower right-hand side of the screen start to count down.

17 Run Daily Checks. Refer to Running Daily Checks on Individual Instruments in CHAPTER 3, Daily Checks.

Prepare a Bleach Solution

The procedure for Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T requires 20 mL of a diluted bleach concentration at 2 to 3% active bleach. Prepare a diluted bleach solution using the following guideline.

1 Find the bleach concentration displayed on the container; for example, germicidal bleach at 12%.

2 Use the following formula to determine how much distilled water to add to the concentrated bleach:

[chlorine% from container]/[chlorine% desired] - 1 = parts of distilled water to be added to each 1 part of concentrated bleach

Example: Concentrated bleach at 12%

([12/3] - 1) = 3; Add 3 parts of distilled water to each 1 part of concentrated bleach (4 parts total).

You need a minimum of 20 mL diluted bleach solution; divide 20 mL by 4 parts to obtain the multiplier (N = 5).

Add 15 mL of distilled water (5 x 3 parts) to 5 mL concentrated bleach (5 x 1 part) for a total of 20 mL diluted bleach solution at 3%.

NOTE *Parts* can be used for any unit of measure (ounce, liter, or gallon) or any container used for measuring, such as a pitcher. In countries where French products are available, the amount of active chlorine is usually express in degrees chlorum. One chlorum is equivalent to 0.3% active chlorine.

Cleaning the Aspiration Probe - DxH 900/DxH 690T

NOTE Beckman Coulter recommends that you do the Dispense Diluent procedure after cleaning the aspiration probe to verify the integrity of the aspiration path.

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab.

2 Select **Clean Aspiration Probe** from the drop-down list.

3 Select **Start**. The system:

- Moves the SAM to a position between the cassette mixer and the AMTC module.
- Lowers the probe assembly and extends the aspiration probe, exposing it behind the transport shield.
- Flushes the outside of the aspiration probe with diluent as the probe retracts.

4 Press (F10) **Access System Monitor**, if necessary, to view the Probe Waste Vacuum sensor's state on the System Monitor screen.

5 Perform the Dispense Diluent procedure. See Dispensing Diluent in CHAPTER 10, Troubleshooting for instructions.

6 When the procedure is complete, select **Finish**.

Cleaning the BSV Externally - DxH 900/DxH 690T

⚠ WARNING

Risk of personal contamination. The BSV can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

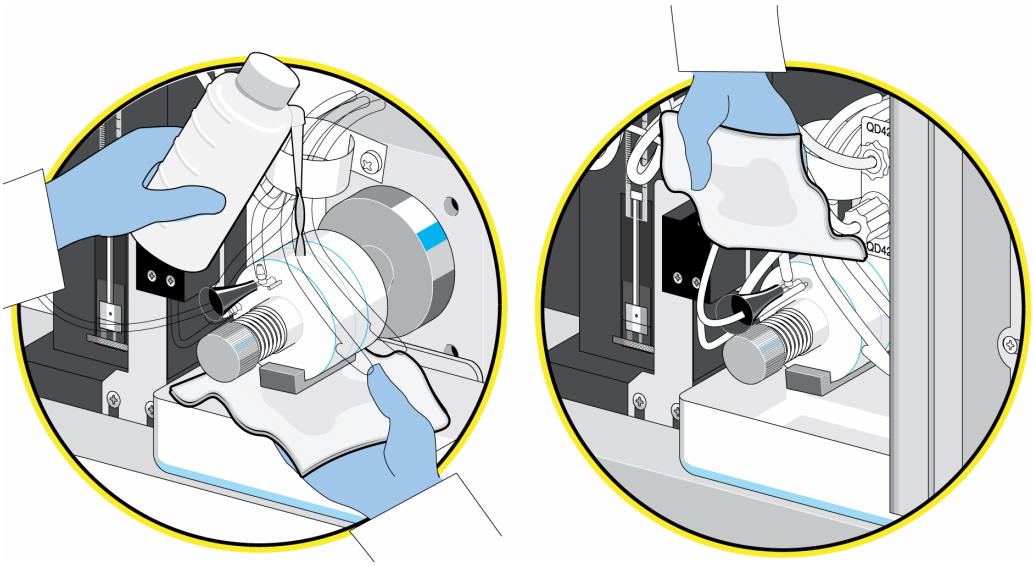
NOTE Clean the outside of the BSV if there is an excessive buildup of dried diluent on the outside. Note that crystallized Beckman Coulter cleaning agent on the outside of the BSV is normal.

1 Power OFF the SPM.

2 Remove the Transport Shield and Lift the Front Cover.

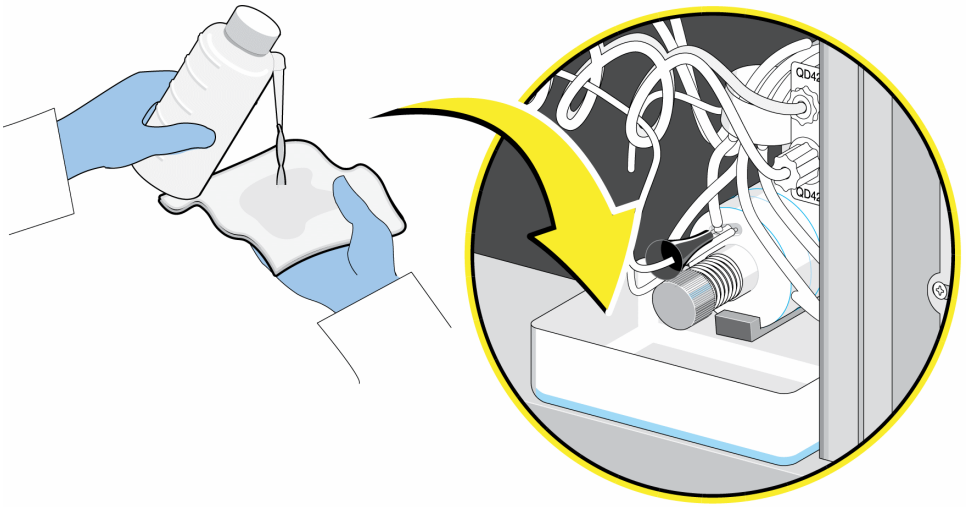
3 Locate the BSV.

4 Place a lint-free tissue on the drip tray, squirt distilled water from a squeeze bottle over the BSV, and dry the BSV with a lint-free tissue.



5 Remove the wet lint-free tissue from the drip tray.

6 Wipe the drip tray under the BSV with a lint-free tissue dampened with distilled water.



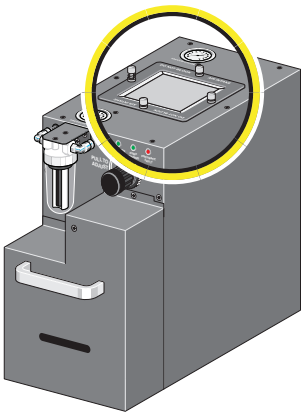
7 Lower the Front Cover and Install the Transport Shield

8 Power ON the SPM.

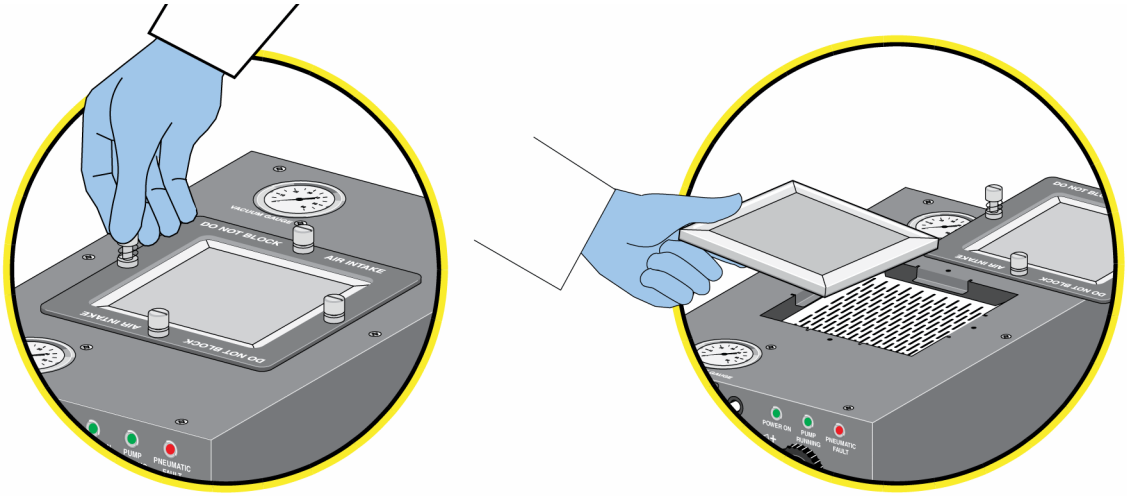
Cleaning the Pneumatic Supply Module Fan Filter - DxH 900/DxH 690T

1 Power OFF the SPM.

2 Locate the filter on the top of the PSM.



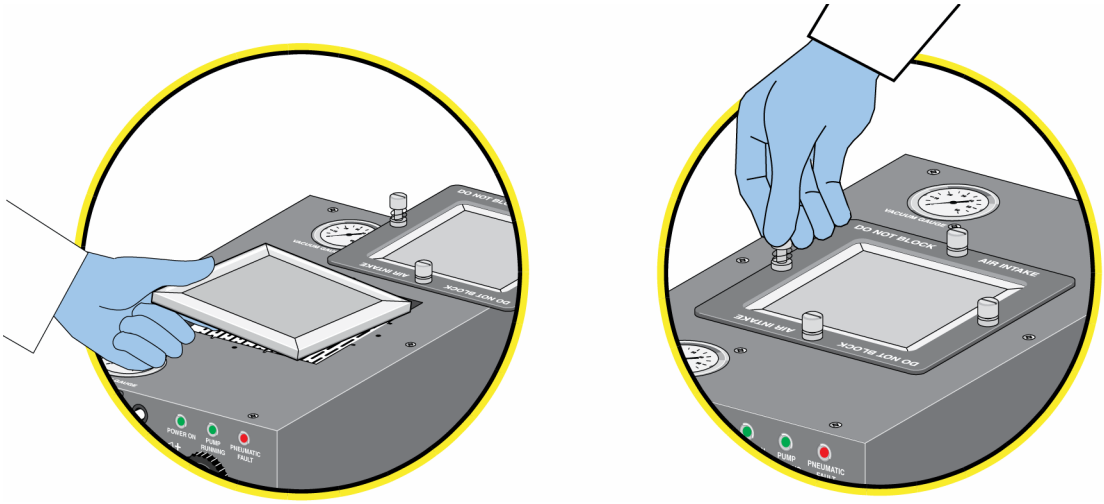
3 Using a flathead screwdriver or your hand, loosen the thumbscrews that secure the filter retaining plate and remove the filter from the PSM.



4 Wash the filter in soap and water, and rinse and dry it completely.

NOTE 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.

5 Return the clean air filter and retaining plate to their original location and fasten the thumbscrews to secure the filter.



6 Power ON the SPM.

Cleaning the STM - DxH 900/DxH 690T

⚠ WARNING

Risk of personal contamination. The STM can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

1. Power OFF the SPM.
2. Remove any cassettes in the input or output buffer.
3. Remove the Transport Shield.
4. Lift the Front Cover.
5. Grasp the front of the STM from the top. Then, lift and pull the STM towards you to open it.
6. Locate and examine the drip trays behind the mixer and behind the pending buffer.
7. Use a lint-free tissue dampened with distilled water to clean the inside of the STM and drip trays, wiping up any spills or buildup.

⚠ CAUTION

Risk of damage to drip trays. Using bleach to clean the STM drip trays can damage the surface of the drip trays.

8. Dry the inside of the STM by wiping with a dry lint-free tissue.
9. Grasp the front of the STM from the top. Then, lift and push the STM back into place.
10. Lower the front cover and install the transport shield.

11 Power ON the SPM.

Cleaning the Air Mix Temperature Control (AMTC) Module - DxH 900/DxH 690T

⚠ WARNING

Risk of personal contamination. The AMTC can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

1 Power OFF the SPM.

2 Remove the Transport Shield and Lift the Front Cover.

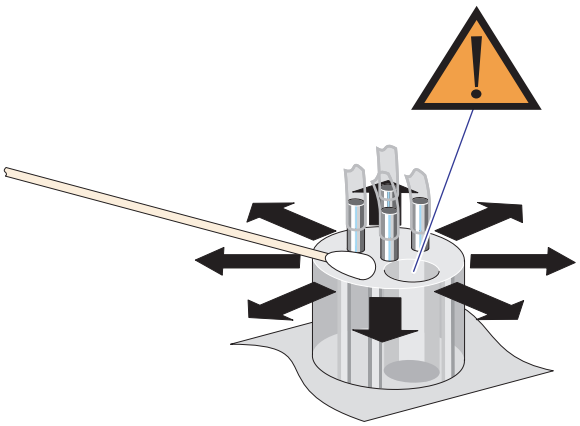
3 Grasp the front of the STM from the top. Then, left and pull the STM towards you to open it.

4 Dampen a lint-free applicator stick with distilled water.

NOTE You can use a fabric-tipped applicator to clean the top of the AMTC.

5 Carefully use the tip of the applicator stick to wipe debris away from the ports on the AMTC.

NOTE It is important to avoid getting debris in the holes at the top of the AMTC during this procedure.



6 Grasp the front of the STM from the top. Then, lift and push the STM back into place.

7 Lower the Front Cover and Install the Transport Shield.

8 Power ON the SPM.

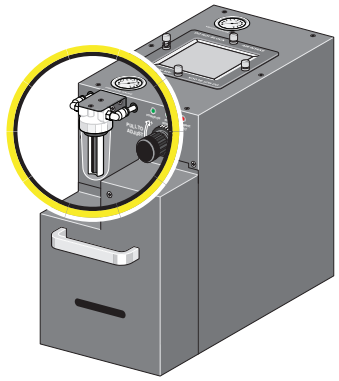
Cleaning the Vacuum Trap - DxH 900/DxH 690T

⚠ WARNING

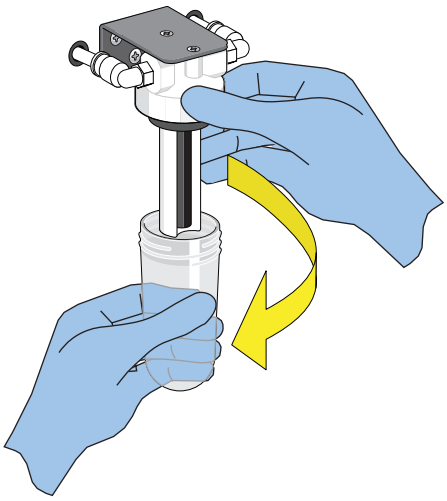
Risk of personal contamination. The vacuum trap can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

1 Power OFF the SPM.

2 Locate the vacuum trap.

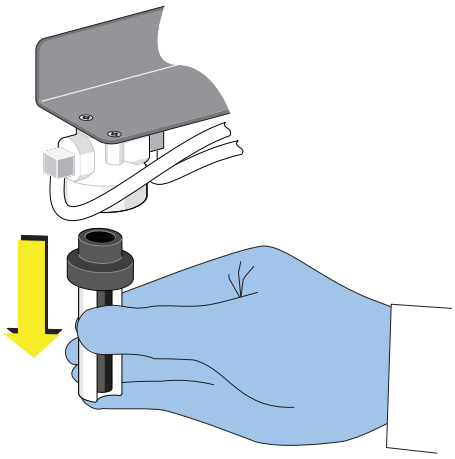


3 Unscrew the vacuum trap jar.



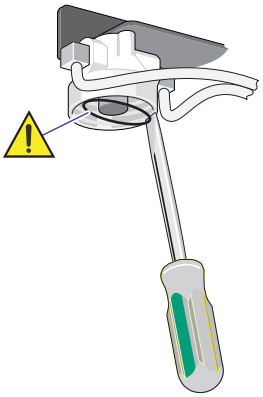
4 Empty the vacuum trap jar according to your local environmental regulations and your laboratory's procedures.

5 Remove the float from the trap jar.



6 Remove the O-ring in one of these ways:

- If the O-ring is seated in the housing, carefully remove it with a flathead screwdriver.



- If the O-ring is on the rim of the vacuum trap jar, separate it from the jar.

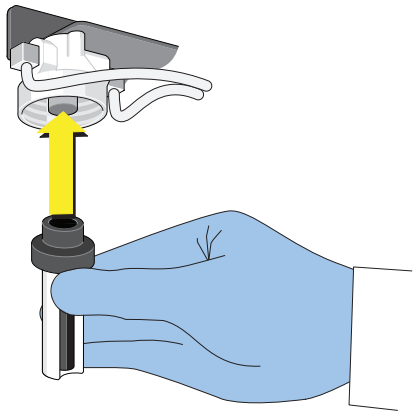
7 Rinse the vacuum trap jar and the O-ring with water and dry them with a lint-free tissue.

8 Take the float apart and rinse with water.

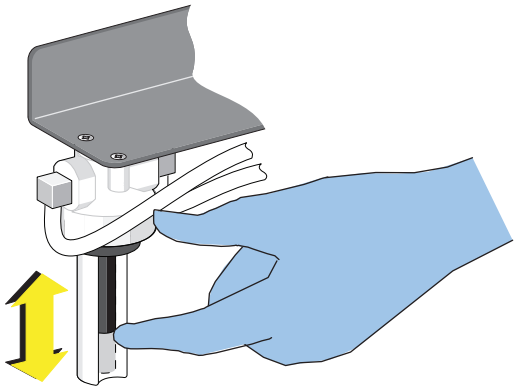
9 Dry all the parts with a lint-free tissue and put them back together.

NOTE Ensure that the black center post is positioned upward.

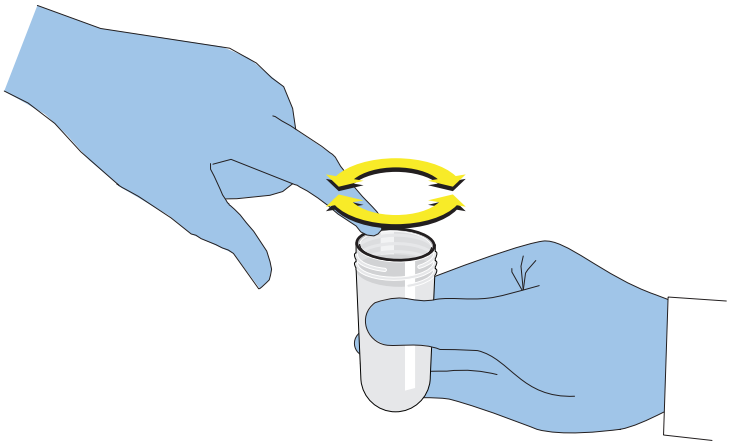
10 Reinstall the float in the trap jar.



11 Ensure that the black center post moves up and down freely.



12 Install the O-ring around the rim of the vacuum trap jar.



13 Carefully align the threads on the vacuum trap jar with the threads on the vacuum trap assembly and screw the vacuum trap jar into place.

NOTE Do not overtighten the vacuum trap jar in place.

14 Wipe up any spills, push the pneumatic supply shelf back into the lower cabinet, and close the cabinet door.

15 Power ON the SPM.

Cleaning the Optical Sensors - DxH 900/DxH 690T

⚠ WARNING

Risk of personal contamination. The optical sensors can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

1. Power OFF the SPM.
2. Remove the Transport Shield and Lift the Front Cover.
3. Locate the optical sensor. Three are located at the input buffer and two at the output buffer. Refer to Figure 1.9, Specimen Transport Module (STM) - DxH 900/DxH 690T - Top-Level View.
4. Dampen a lint-free swab with distilled water.
5. Swab the optical sensor to remove buildup.
6. Lower the Front Cover and Install the Transport Shield.
7. Power ON the SPM.

Cleaning the Cassettes - DxH 900/DxH 690T

⚠ WARNING

Risk of personal contamination. The cassettes can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

Wash the cassettes as needed in warm soapy water and rinse thoroughly. Do not use an abrasive. Keep the cassettes free of dried blood, bleach, or diluent. Be careful not to scratch or deface the bar code labels. Dirt, smears, pencil lead, and grease can affect bar code label reading.

Cleaning the Handheld Bar Code Scanner - DxH 900/DxH 690T

⚠ CAUTION

To avoid damaging the handheld scanner, do not submerge the scanner in water and do not use abrasive cloth or tissue on the window. Never use solvents (for example, acetone, benzene, ether, or phenol-based agents) on the housing or window. Solvents can damage the finish or the window.

If the scan window is visibly dirty, or if the scanner is not scanning well, clean the scan window with a soft cloth or lens tissue dampened with water (or a mild detergent-water solution). If a detergent solution is used, rinse with a clean lens tissue dampened with water only. The scanner housing can be cleaned the same way.

Cleaning the Aspiration Probe - DxH Slidemaker Stainer II

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **SAM** tab.

3 In the *Fluidics* option box, select **Clean Aspiration Probe** from the drop-down list.

4 Select **Start** from the local navigation bar. The system:

- Ensures the SAM is in the Home position, where it will remain stationary.
- Lowers the stripper and extends the aspiration probe, exposing it behind the transport shield.
- Flushes the outside of the aspiration probe with diluent as the probe retracts.

5 Press (F10) or select **System Monitor** from the local navigation bar to view the waste chamber transducer.

6 Select **Start** on the **STM**/**SAM**/**Fluidics** tab to display the sensor's state in the **Common Fluidics** box.

7 When the procedure is complete, select **Finish**.

Cleaning the Dispense Probe - DxH Slidemaker Stainer II

NOTE Beckman Coulter recommends that you perform the Dispensing Diluent - DxH Slidemaker Stainer II (from Probe Wash Pump) procedure in CHAPTER 13, Replacement/Adjustment Procedures after cleaning the dispense probe to verify the integrity of the aspiration path and that the probe wash pump is functional.

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **SAM** tab.

3 In the *Fluidics* option box, select **Clean Dispense Probe** from the drop-down list.

4 Select **Start**. The system:

- Ensures the dispense probe is in the dispense wash cup where it will remain stationary.
- Flushes the outside of the dispense probe with diluent.

5 Press (F10) or select **System Monitor** from the local navigation bar to view the waste chamber transducer.

6 Select **Start** on the **STM/SAM/Fluidics** tab to display the sensor's state in the **Common Fluidics** box.

7 When the procedure is complete, select **Finish**.

Cleaning the STM - DxH Slidemaker Stainer II

⚠ WARNING

Risk of personal contamination. The STM can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

⚠ CAUTION

Risk of equipment damage. Using bleach to clean the STM drip trays can damage the surface of the drip trays.

⚠ CAUTION

Risk of cassette transit problems. Ensure that the STM is free of substances or glass to prevent cassette transit problems.

1 Power OFF the instrument.

2 Remove any cassettes in the input or output buffer.

3 Remove the Transport Shield.

4 Grasp the front of the STM from the top. Then, lift and pull the STM towards you to open it.

⚠ WARNING

Risk of personal injury and possible biohazardous contamination. Do not blow or direct compressed or pressurized air into any area of the DxH Slidemaker Stainer II due to the possibility of creating airborne particles that might include dust, blood, reagents, or broken fragments of slides. Follow your laboratory's safety procedure when working with broken glass.

5 Remove any glass particles, if necessary, on the surfaces inside of the STM.

6 Locate and examine the left and right mixers, the drip trays, and the bar code reading station wall.

7 Use a lint-free tissue moistened with deionized water to clean the left and right mixers, the drip trays, the bar code reading station wall and the STM surfaces inside of the STM. Wipe up any spills and buildup.

⚠ CAUTION

Risk of biohazardous contamination. Discard waste in a biohazard waste container.

8 Dry the inside of the STM by wiping with a dry lint-free tissue.

9 Grasp the front of the STM from the top. Then, lift and push the STM back into place.

10 Install the Transport Shield.

11 Power ON the instrument.

Cleaning the STM Optical Sensors - DxH Slidemaker Stainer II

1 Power OFF the instrument

2 Remove any cassettes in the input or output buffer.

3 Remove the Transport Shield and Lift the Front Cover.

4 Locate the five optical sensors.

5 Lightly moisten a lint-free swab with deionized water.

IMPORTANT Be careful not to excessively wet the tip of the swab.

6 Swab the optical sensors to remove any buildup.

7 Lower the Front Cover and Install the Transport Shield.

8 Power ON the instrument.

Cleaning the Vacuum Trap - DxH Slidemaker Stainer II

⚠ WARNING

Risk of personal contamination. The vacuum trap can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

1 Power OFF the instrument.

2 Remove the Transport Shield.

NOTE Follow steps 2 to 6 if you have limited access to the right side of the DxH Slidemaker Stainer II. Otherwise, go to step 7.

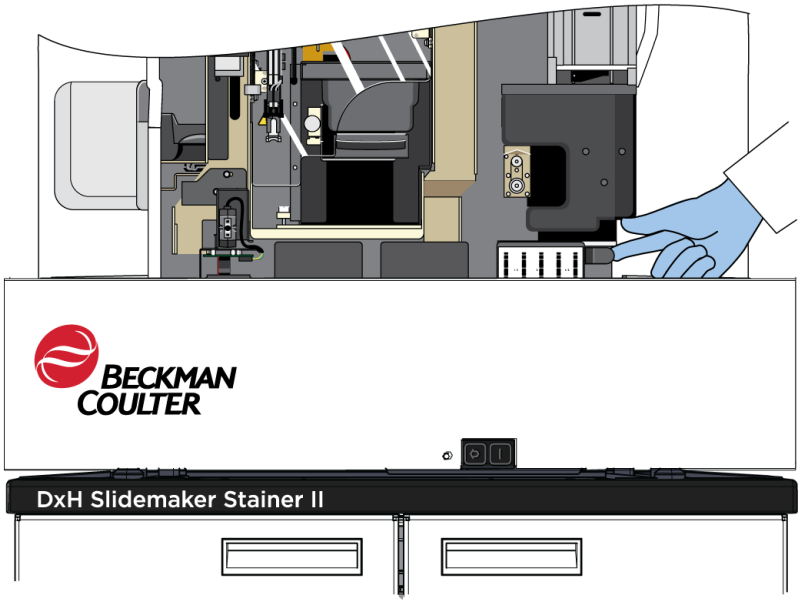
3 Lift the Front Cover.

⚠ CAUTION

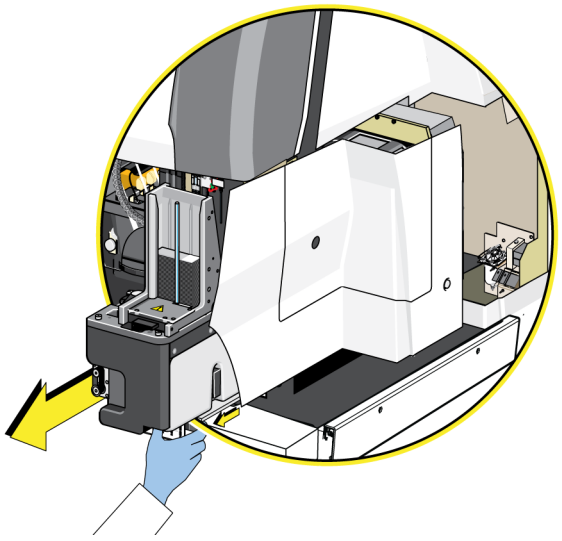
Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

4 Move the SAM to your left.

5 Locate the release handle behind the bar code reading station and release the Slidemaker.



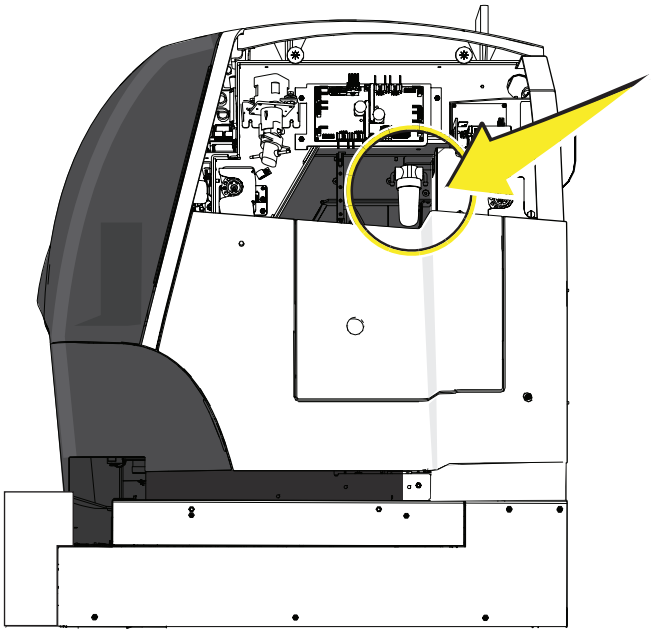
6 Pull the DxH Slidemaker Stainer II forward until it locks into the maintenance position.



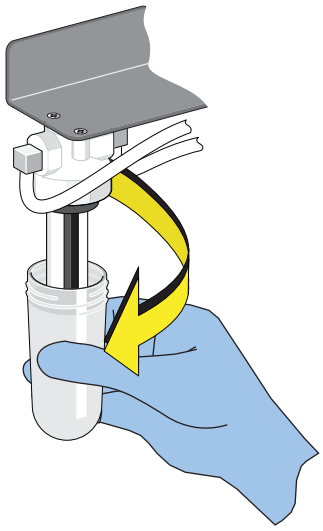
7 Remove the Slide Printer Cover.

8 Remove the Upper Right-Side Cover.

9 Locate the vacuum trap.

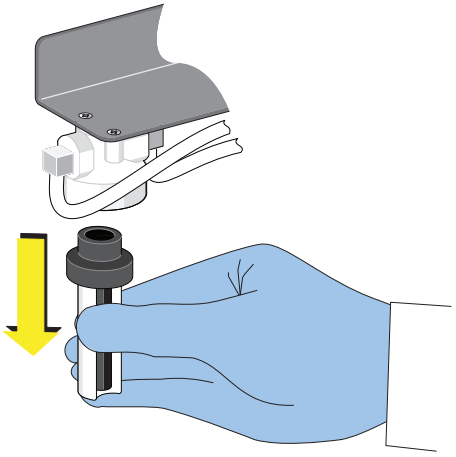


10 Grasp the vacuum trap jar, unscrew it, and remove it.



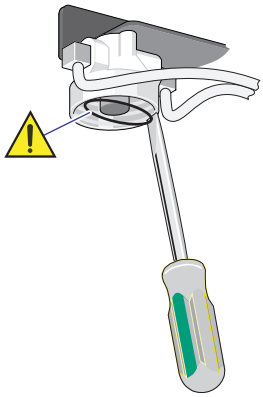
11 Empty the vacuum trap jar according to your local environmental regulations and your laboratory's procedures.

12 Remove the float from the trap jar.



13 Remove the O-ring in one of these ways:

- If the O-ring is seated in the housing, carefully remove it with a flathead screwdriver.



- If the O-ring is on the rim of the vacuum trap jar, separate it from the jar.

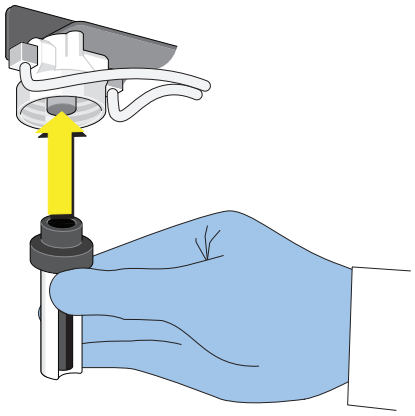
14 Rinse the vacuum trap jar and the O-ring with water and dry them with a lint-free tissue.

15 Take the float apart and rinse with water.

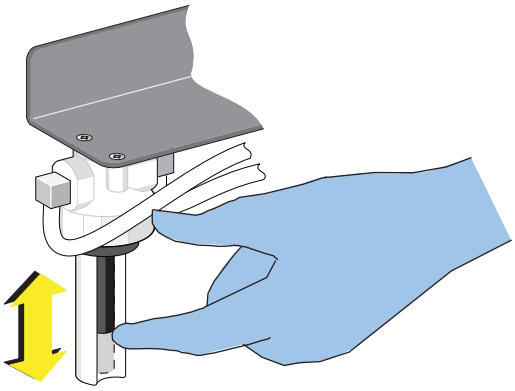
16 Dry all the parts with a lint-free tissue and put them back together.

NOTE Ensure that the black center post is positioned upward.

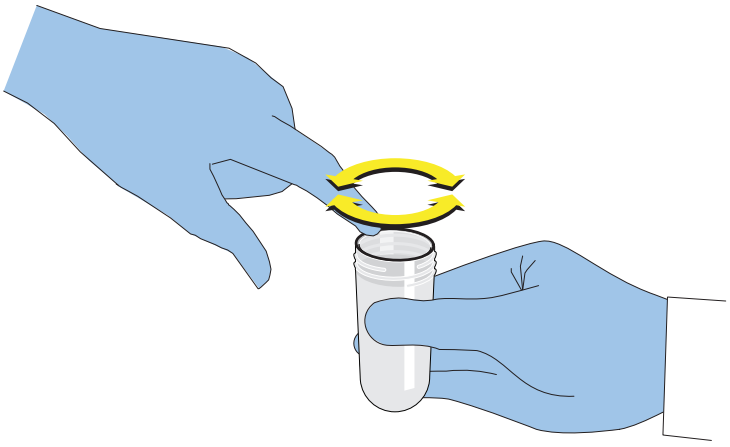
17 Reinstall the float in the trap jar.



18 Ensure that the black center post moves up and down freely.



19 Install the O-ring around the rim of the vacuum trap jar.



20 Carefully align the threads on the vacuum trap jar with the threads on the vacuum trap assembly and screw the vacuum trap jar in place.

NOTE Do not overtighten the vacuum trap jar in place.

21 Wipe up any spills.

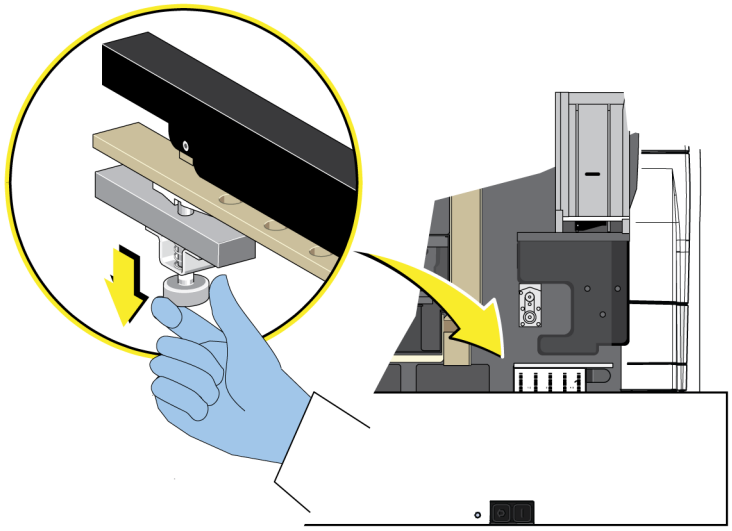
22 Install the Upper Right-Side Cover.

23 Install the Slide Printer Cover.

WARNING

Risk of hand injury. Use caution when pushing the Slidemaker back into position.

24 Return the Slidemaker to the operating position by pulling the locking pin and pushing the Slidemaker back into position.



NOTE Follow steps 24 to 27 if you followed steps 2 to 6. Otherwise, go to step 27.

25 Lower the Front Cover.

26 Install the Transport Shield.

27 Power ON the instrument.

Emptying the Broken Slides Bin - DxH Slidemaker Stainer II

⚠ WARNING

Risk of personal injury and possible biohazardous contamination. Do not blow or direct compressed or pressurized air into any area of the DxH Slidemaker Stainer II due to the possibility of creating airborne particles that might include dust, blood, reagents, or broken fragments of slides. Use your laboratory's safety procedure when working with broken glass.

1 Select 
OR
Select **Menu** > **Supplies**.

2 Select the Slidemaker tab.

3 Select **Empty Broken Slides** from the local navigation bar.

4 Remove the Transport Shield.

5 Go to the next step in the process to begin emptying the bin
OR
Select **Cancel** to empty the bin at another time.

6 Lift up the black lever to unlock the broken slide bin.

7 Pull the bin out and away from the instrument.

8 Empty any broken slides visible in the bottom of the bin.

9 Replace the bin and push the black lever down to lock it.

10 Install the Transport Shield.

11 Select **OK**.

Performing the Flush Stainer Module Procedure - DxH Slidemaker Stainer II - Automatic Procedure (Software v1.2.0 and Prior)

Perform this procedure to automatically flush the stainer supply lines and valves with methanol or when prompted by the system.

No other activity can be performed at this workstation while this procedure is being executed.

⚠ WARNING

Risk of personal injury or contamination. Failure to properly shield yourself while using or servicing the instrument may result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire including gloves, a laboratory coat, and eye protection.

Failure to perform cycle may result in safety risks (biohazard exposure, damage to instrument, and damage to environment).

IMPORTANT Do not interrupt the procedure while it is in progress.

1 View the system message displayed: *Perform weekly stainer maintenance*.

2 Ensure that you have:

- Reagent supplies - 1/4 full on board
- Flush reagent (methanol) - 2L for flushing
- A connected flush reagent container

See the illustration in step 3 in Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0).

3 Select **Menu > Diagnostics > Dx Tools > Slidestainer**.

4 From the *Fluidics* option box, select **Flush Stainer Module**.

5 Select **OK** to begin. The system displays the following cycle progress messages and procedure completion messages:

- Progress Message 1 (phase for setting the stainer module in flush only mode):
  Initializing Flush Stainer Module procedure is in progress. Please wait...
- Progress Message 2:
  Draining stainer supplies and filling with flush reagent is in progress. Please wait...
- Progress Message 3:
  Soaking flush reagent is in progress. Please wait... Time Remaining (HH:MM:SS):
- Progress Message 4:
  Draining stainer supplies and filling with flush reagent is in progress. Please wait...
- Progress Message 5:
  Flush Stainer Module is in progress. Please wait...
- Progress Message 6 (phase for setting the stainer module to normal mode):
  Finishing Flush Stainer Module procedure is in progress. Please wait...

The procedure completion messages displayed on the screen are available in the event log.

NOTE If the Flush Stainer Module procedure is not completed successfully or if the procedure is interrupted, the system displays the following event log message:

The Flush Stainer Module procedure was not completed successfully. In order to activate the stainer module, ensure that the Flush Stainer Module procedure is completed.

Repeat this procedure. If it is unsuccessful, call your Beckman Coulter Representative.

6 Remove the supply line from the 2L flush container.

7 Wrap the supply line tip in gauze or clean dry paper towels to remove excess fluid.

8 Empty any remaining flush reagent from the 2L container. Dispose of the methanol in accordance with your laboratory standards and local government regulations.

9 Return the empty 2L flush container to the reagent supply cart and reconnect the supply line.

10 Select **Finish** to end the diagnostic cycle.

Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0)

Perform this procedure for any lines delivering stain. Read the entire procedure first. See APPENDIX G, Job Aids for more information if you are using Wright Stain or Wright Giemsa Stain.

⚠ WARNING

Risk of personal injury or contamination. Failure to properly shield yourself while using or servicing the instrument may result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire including gloves, a laboratory coat, and eye protection. Failure to perform cycle may result in safety risks (biohazard exposure, damage to instrument, and damage to environment).

1 Access the **Drain All Baths** function:

a. Select **Menu** > **Diagnostics** > **Dx Tools**

b. Select the **Slidestainer** tab.

c. Select **Fluidics**.

d. Drain the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

2 Select **Start** from the local navigation bar.

The following message appears: *Drain/Fill is in progress. Please wait.*

NOTE If all the baths do not drain completely, repeat step 1 to drain the baths.

If all five baths still do not drain completely, call your Beckman Coulter Representative.

3 Locate the cleaning bottle in the supply drawer and fill it with methanol.

4 Remove the pickup tube assembly from the supply.

NOTE Wrap the pickup tube assembly in clean gauze to prevent dripping.

5 Turn the assembly upside-down (position it vertically).

6 In the *Fluidics* option box, select **Fill Bath 2** to remove the reagent from the line.

7 Wait two minutes. Then, select **Cancel** to stop the fill process.

8 In the *Fluidics* option box, select **Drain Bath 2** to remove the excess supply from the bath.

9 Repeat steps 4 to 8 for Baths 3 and 4.

10 Transfer the reagent pickup tube assembly from the reagent supply to the cleaning bottle(s).

11 In the *Fluidics* option box, select **Fill Bath 2** from the drop-down list. Then, select **Start** from the local navigation bar.

The following message appears: *Drain/Fill is in progress. Please wait.*

12 Repeat step 11 for Baths 3 and 4, as needed.

Alternately, if several cleaning bottles are used, select **Fill All Baths**.

13 Repeat **Drain All Baths and Fill All Baths** two to three times to clean any debris from the supply lines:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

14 Let methanol sit in the baths for at least 15 minutes.

15 Select **Fluidics**.

16 Drain the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

17 Select **Start**.

⚠ CAUTION

Risk of erroneous results. Excess methanol on a pickup tube assembly could dilute the reagent supply. Before transferring a pickup tube assembly from a cleaning bottle to a reagent supply, blot the assembly with an absorbent lint-free material to remove any excess methanol. Dispose of methanol in accordance with your local regulations and acceptable laboratory procedures.

⚠ CAUTION

Risk of erroneous results. Any water in the supply lines, except for Bath 5, could affect stain quality. Never flush water through lines designated for stain delivery.

18 Remove the pickup tubes from the methanol cleaning bottle(s).

NOTE Place the pickup tubes in clean gauze to catch any drips.

19 Ensure that the filters from the supplies are positioned vertically with the output of the filter facing down.

NOTE You must position the filters vertically to ensure that all the methanol is removed from the filter.

20 Select **Fill Baths** 1 through 4 individually to draw air into the lines and remove the excess methanol.

21 Wait two minutes. Then, select **Cancel**.

22 Drain the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

23 After the baths have drained, transfer the reagent pickup tube assembly back to its corresponding reagent supply.

24 If you need to clean the stainer bath and tray, complete the procedure to Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED) or to Flush Stainer and Clean Stainer Baths and Tray (Software v2.0.0 if Drain All Baths and Flush Stainer is Enabled and the Proper Hardware is Installed).

NOTE You have already drained all of the baths.

25 If you need to clean the probes, complete the procedure beginning with step 7 in Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes before proceeding to steps 27 through 29.

26 Select **Finish** and **Yes** to end the Diagnostics mode.

27 Place the instrument back in the online mode to resume instrument operation.

28 Run a **Stain Only** cycle to test the smear stain quality.

NOTE Collect extra smears from patient samples and stain within two hours to assess stain quality. See APPENDIX E, Stain Protocol Optimization for more information.

If you continue to have stain problems or if you are changing stains, replace the stainer reagent line filters. See Replacing the Stainer Reagent Line Filters - DxH Slidemaker Stainer II in CHAPTER 13, Replacement/Adjustment Procedures.

29 Dispose of the methanol in accordance with your laboratory standards and local government regulations.

Flush Stainer and Clean Stainer Baths and Tray (Software v2.0.0 if *Drain All Baths and Flush Stainer* is Enabled and the Proper Hardware is Installed)

This procedure is for Software v2.0.0 with the proper hardware installed. See Table 12.2, Matrix of Frequency for Cleaning Procedures - DxH Slidemaker Stainer II to determine what to do for other versions.

Perform *Drain All Baths and Flush* daily before removing the baths and bath tray from the instrument. Executing this function automatically flushes the stainer module with methanol as well. Ensure that the cleaning bottle has a minimum of 100 mL of methanol and the waste container is not full before starting the procedure.

Follow this procedure when:

- Slide stain quality has degraded.
- Stain has built up in the baths.
- Reducing the clogging of the stain supply lines and ports.
- Stainer has been idle for an extended period with stain in the baths.
- Preparing to fill the stainer with fresh stain to allow for optimal performance.

IMPORTANT **No other activity can be performed at this workstation while this procedure is being executed.**

IMPORTANT Do not interrupt the procedure while it is in progress.

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Slidestainer** tab > **Fluidics**.

2 Select **Drain All Baths and Flush** from the drop-down list.

3 Select **Start** to begin draining the baths and flushing the stainer.

4 Select **OK** to confirm the Safety warning.

⚠ WARNING

Risk of personal injury or contamination. Failure to properly shield yourself while using or servicing the instrument may result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire including gloves, a laboratory coat, and eye protection.

Failure to perform the cycle may result in safety risks (biohazard exposure, damage to instrument, and damage to environment).

5 Select **OK** to confirm the flushing supply and waste.

6 Ensure that you have:

- Reagent supplies - 1/4 full on board.
- Flush reagent (for methanol-based stains, methanol) - 2L for flushing
- Empty stain and methanol waste containers

7 Select **Yes** to confirm going offline and beginning the procedure. The system displays the cycle progress and completion status in the *Messages* window and displays pop-up messages indicating the progress. The procedure completion messages displayed in the *Messages* window are available in the event log. Upon successful completion, the system displays *Drain All Baths and Flush procedure was successfully completed*.

8 Select **OK** to continue with cleaning the stainer baths and tray.

NOTE If the Flush Stainer portion of the procedure is not completed successfully or if the procedure is interrupted, the system may trigger the following message posted to the event log: *The Flush Stainer Module procedure was not completed successfully*. If this event is triggered, ensure that the Flush Stainer Module procedure is completed before the stainer module is activated. Follow the Incomplete Flush Stainer Module troubleshooting procedure in Event 52C7. If the troubleshooting procedure is unsuccessful, call your Beckman Coulter Representative.

9 Select **Menu > Diagnostics > Dx Tools > Release SAM**.

10 Remove the Transport Shield.

11 Lift the Front Cover.

⚠ CAUTION

Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

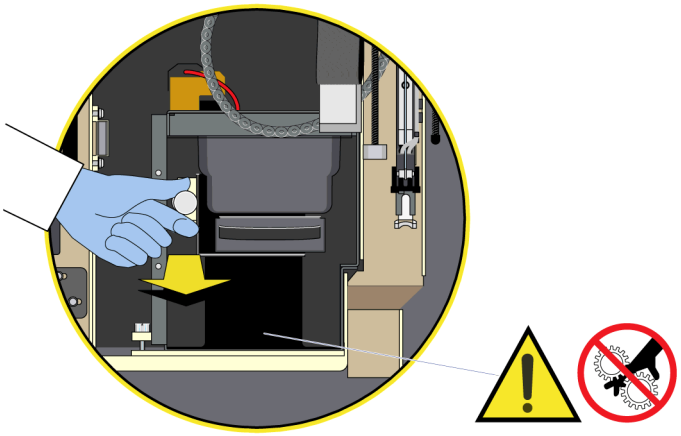
12 Move the SAM to the right.

13 Remove the Stainer Shield.

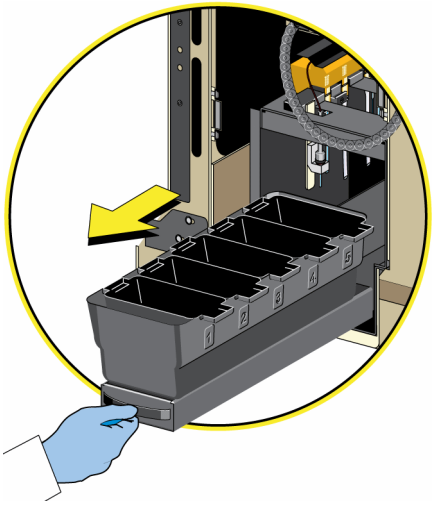
⚠ WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath tray.

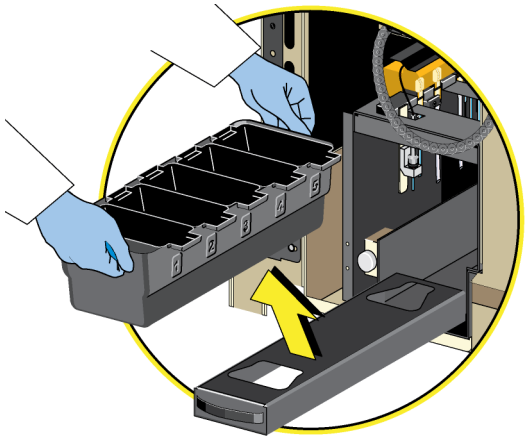
14 Pull the bath tray release knob to lower the stainer bath tray.



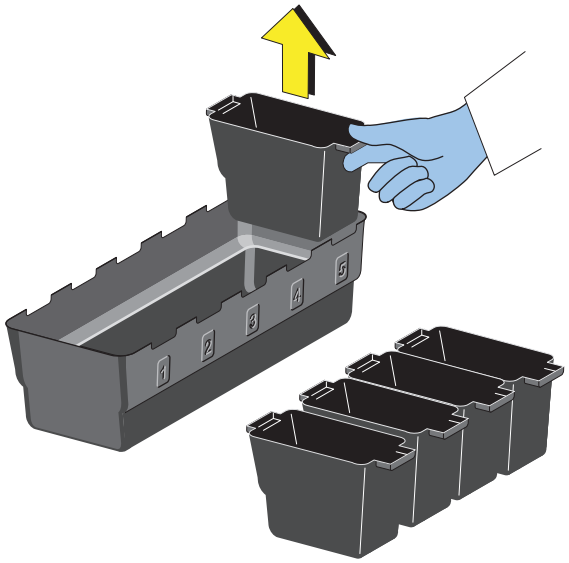
15 Grasp the handle on the stainer drawer and pull the tray out to the maintenance position.



16 Lift up the bath tray and remove it from the instrument.

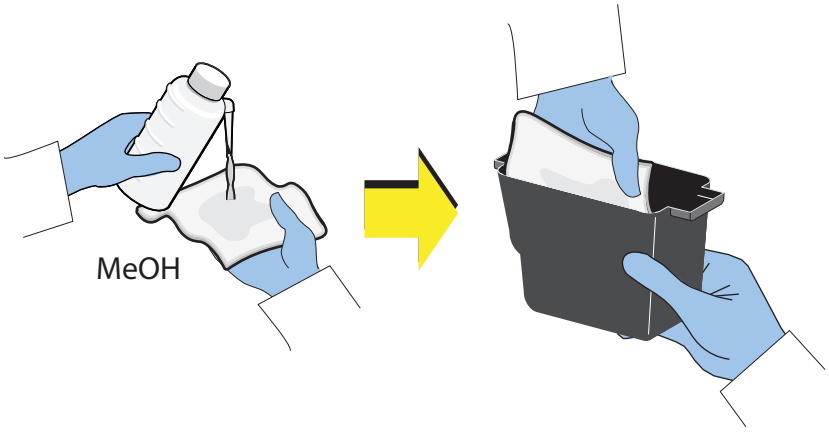


17 Remove all the baths from the tray.



18 Wipe each bath with a lint-free cloth moistened with methanol to remove any stain buildup, old stain, or stain precipitate (soak, if necessary).

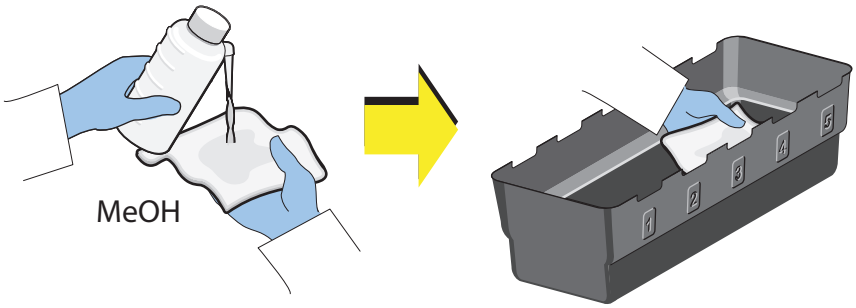
IMPORTANT All baths must be thoroughly dry before returning them to the Stainer tray. Water in the stain system may interfere with stain quality.



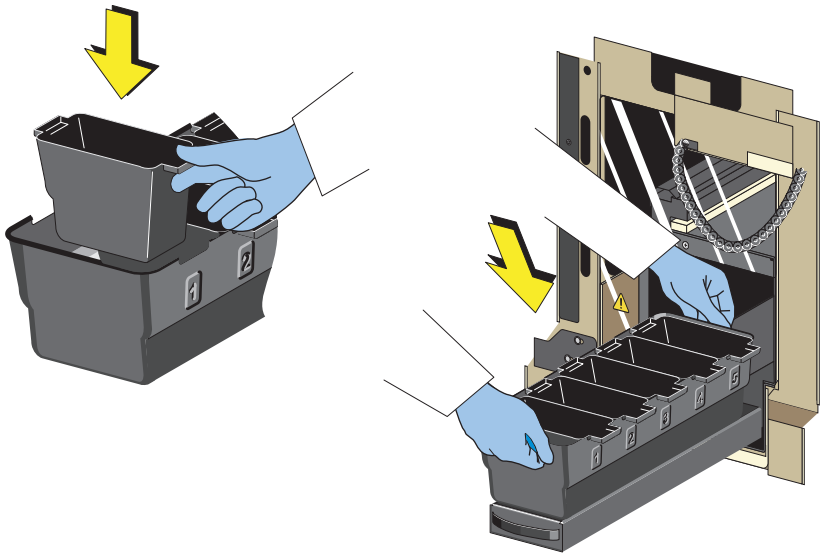
⚠ CAUTION

Dispose of methanol in accordance with your local regulations and acceptable laboratory procedures.

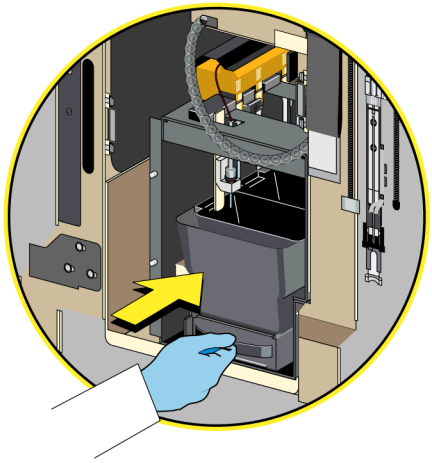
19 Clean the tray with a lint-free cloth moistened with methanol.



20 Return all the baths to the tray and place the bath tray back in the stainer drawer.



21 Push the drawer back into the Stainer until it clicks into position.



22 Install the Stainer Shield.

23 Lower the Front Cover.

24 Install the Transport Shield.

25 In the *Fluidics* option box, select **Fill All Baths** from the drop-down list.

26 Select **Start** from the local navigation bar.

27 Select **Finish** and **Yes** to end the Diagnostics mode.

28 Place the DxH Slidemaker Stainer online to resume operation.

Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if *Drain All Baths and Flush Stainer* is DISABLED)

Follow this procedure when:

- Slide stain quality has degraded.
- Stain has built up in the baths.
- Stainer has been idle for an extended period with stain in the baths.
- Preparing to fill the stainer with fresh stain to allow for optimal performance.

1 Select **Menu** > **Diagnostics** > **Dx Tools** > **Release SAM**.

2 Select the **Slidestainer** tab.

3 Select **Fluidics**.

4 Drain the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

5 Select **Start** to begin draining the baths and wait for the prompt to go to the next step.

6 Remove the Transport Shield and Lift the Front Cover.

⚠ CAUTION

Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

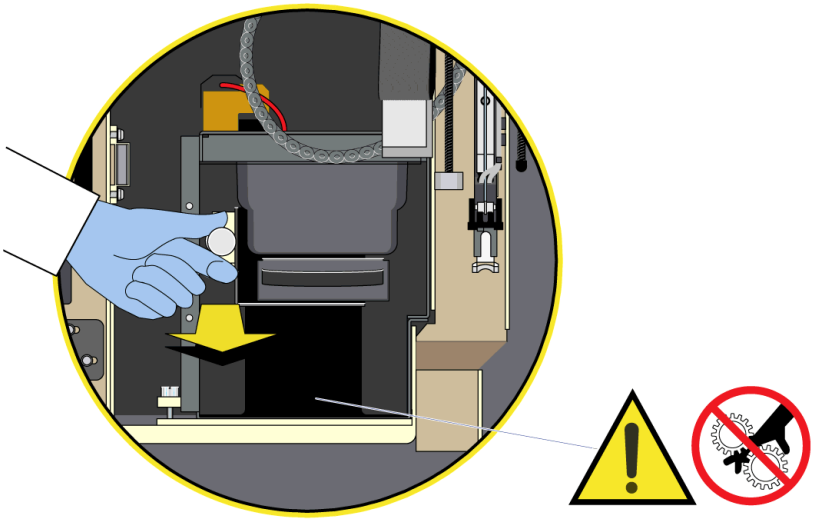
7 Move the SAM to the right.

8 Remove the Stainer Shield.

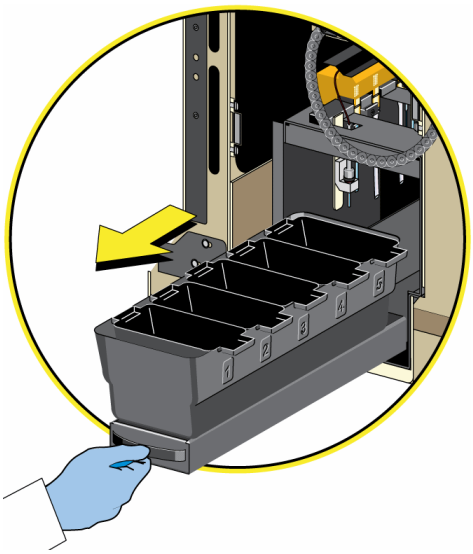
⚠ WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath tray.

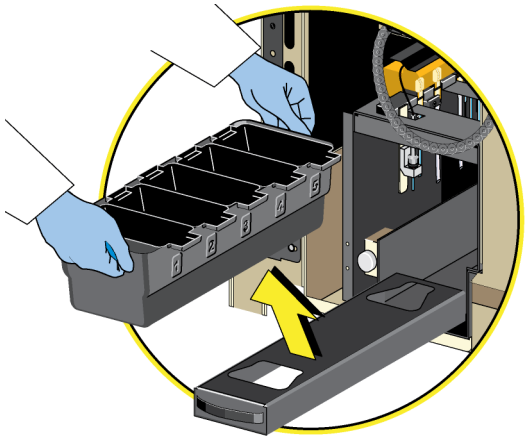
9 Pull the bath tray release knob to lower the stainer bath tray.



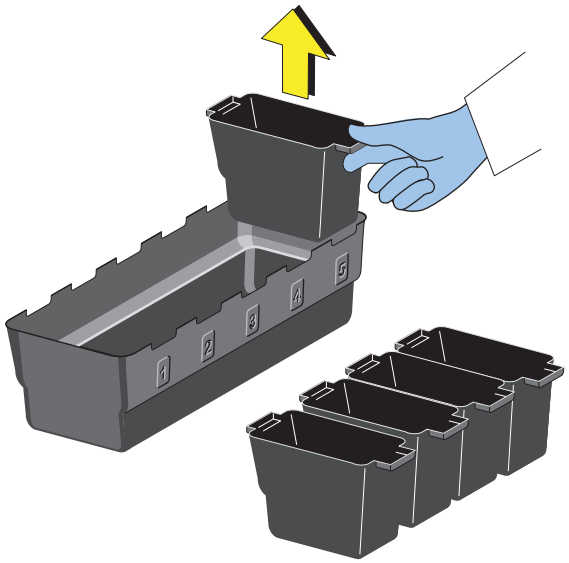
10 Grasp the handle on the stainer drawer and pull the tray out to the maintenance position.



11 Lift up the bath tray and remove it from the instrument.

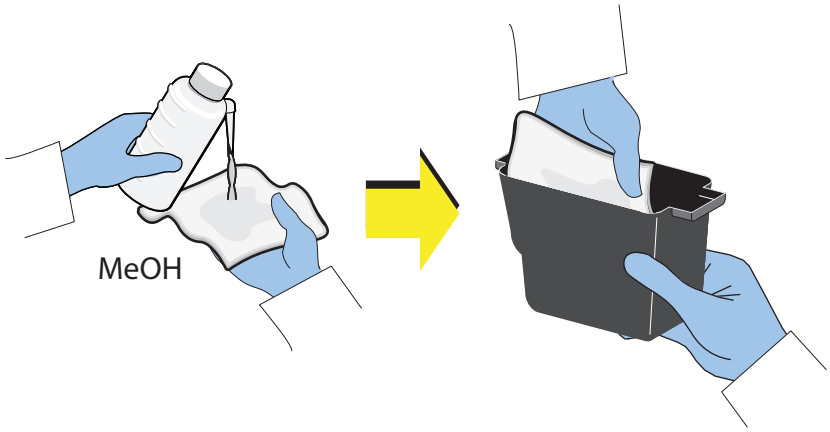


12 Remove all the baths from the tray.



13 Wipe each bath with a lint-free cloth moistened with methanol to remove any stain buildup, old stain, or stain precipitate (soak, if necessary).

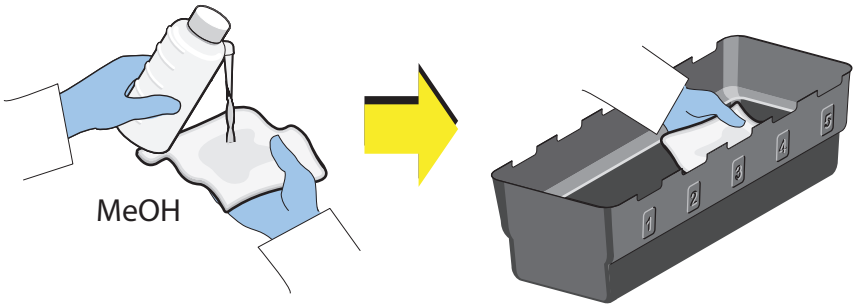
IMPORTANT All baths must be thoroughly dry before returning them to the Stainer tray. Water in the stain system may interfere with stain quality.



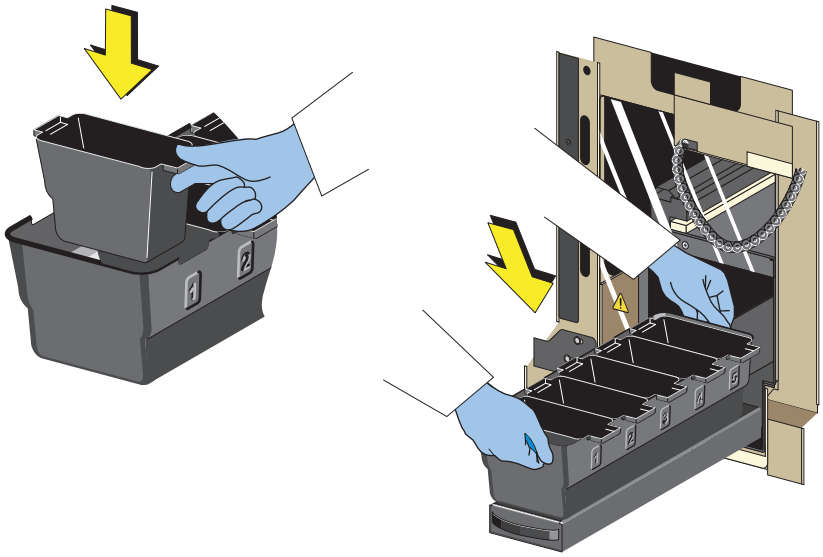
⚠ CAUTION

Dispose of methanol in accordance with your local regulations and acceptable laboratory procedures.

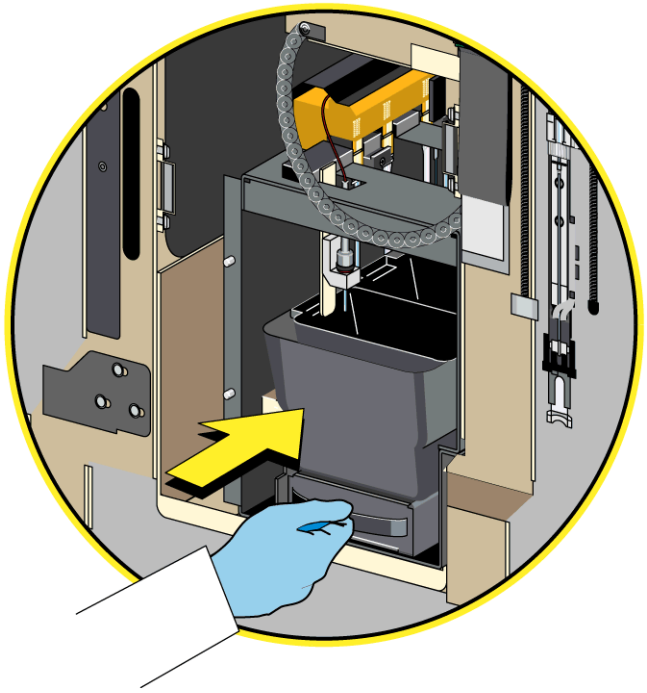
14 Clean the tray with a lint-free cloth moistened with methanol.



15 Return all the baths to the tray and place the bath tray back in the stainer drawer.



16 Push the drawer back into the Stainer until it clicks into position.



17 Install the Stainer Shield.

18 Lower the Front Cover and Install the Transport Shield. The system is ready to use.

19 Place the DxH Slidemaker Stainer II online.

Clean Stainer Fill Probes, Drain Probes, and Level Sense Probes

Follow this procedure when:

- Slide stain quality has degraded.
- Stain has built up in the baths.
- Stainer has been idle for an extended period with stain in the baths.
- Preparing to fill the stainer with fresh stain to allow for optimal performance.

1 Verify that you have the new software.

2 Select **Menu** > **Diagnostics** > **Dx Tools**.

3 Select the **Slidestainer** tab.

4 Select **Fluidics**.

5 Select **Drain All Baths** from the pull-down list and select **Start**. Wait for the prompt to go to the next step.

6 Drain the baths:

- If the software is v1.2.0 and prior, select **Drain All Baths**.
- If the software is v2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
- If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

7 Remove the Stainer Shield.

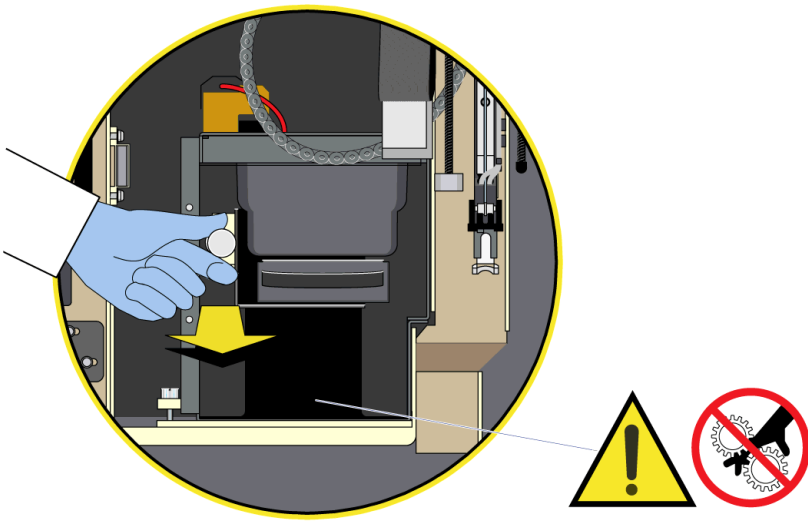
⚠ WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath tray.

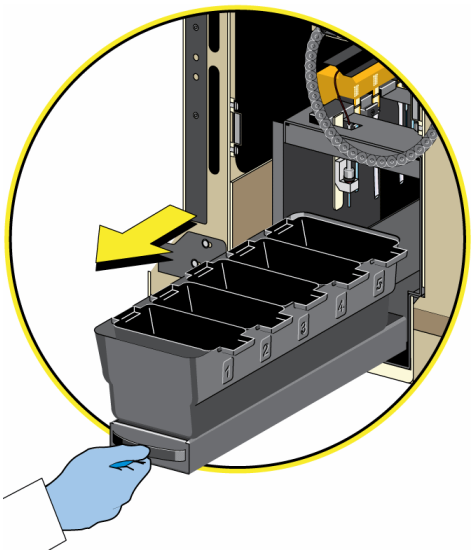
⚠ CAUTION

Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

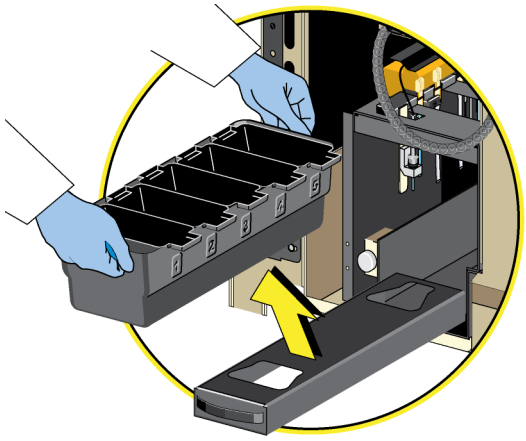
8 Pull the bath tray release knob to lower the stainer bath tray.



9 Grasp the handle on the stainer drawer and pull the tray out to the maintenance position.



10 Lift up the bath tray and remove it from the instrument.



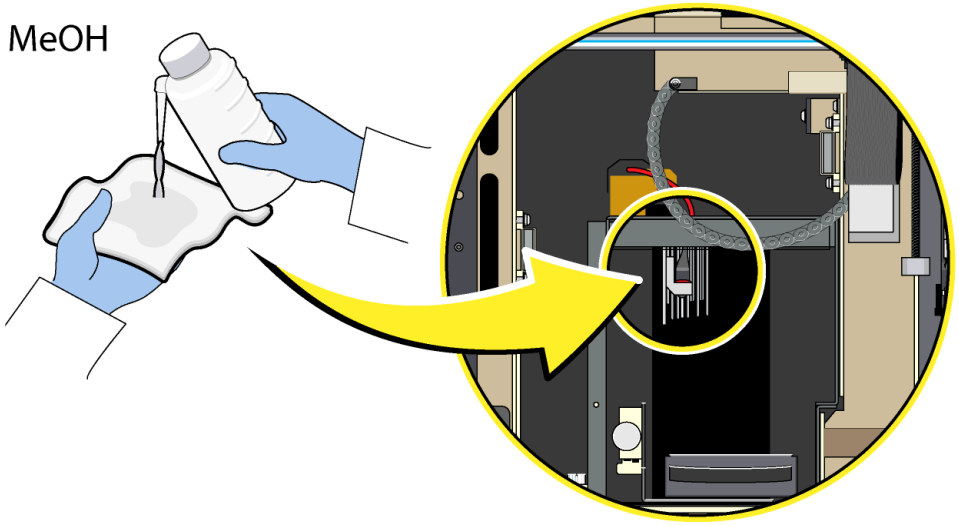
11 Perform the Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED) procedure, if necessary.

NOTE You have already drained all of the baths.

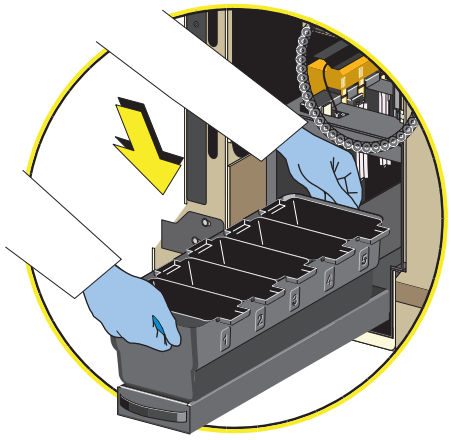
⚠ CAUTION

Dispose of methanol in accordance with your local regulations and acceptable laboratory procedures.

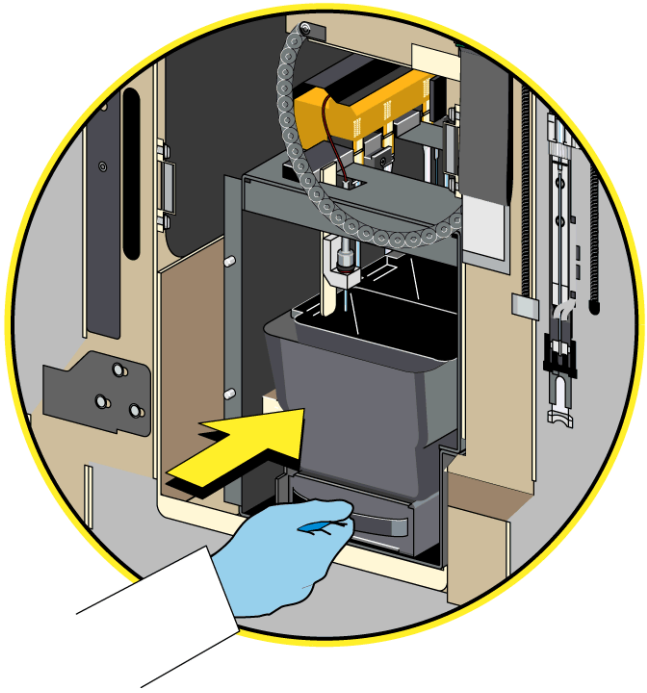
12 Moisten a lint-free cloth with methanol and wipe clean the fill probes, drain probes, the level sense probes, and the surfaces soiled with stain.



13 Place the bath tray back in the stainer drawer.



14 Push the tray drawer back up into the stainer until it clicks into position.



15 Install the Stainer Shield.

16 Lower the Front Cover and Install the Transport Shield. The system is ready to use.

17 Place the DxH Slidemaker Stainer II online.

Extensive Cleaning of Fill Probes and Drain Probes - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES

NOTE this procedure does not apply to these new fill and drain probes:

Follow this procedure to remove stain buildup and to unclog fill probes and drain probes.

⚠ WARNING

Risk of personal injury or contamination. Failure to properly shield yourself while using or servicing the instrument may result in injury or contamination. To prevent possible injury or biological contamination, you must wear proper laboratory attire including gloves, a laboratory coat, and eye protection.

1 Remove the applicable fill and drain probes as described in Replacing Fill Probes and Drain Probes - DxH Slidemaker Stainer II - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES in CHAPTER 13, Replacement/Adjustment Procedures.

2 Soak the probes in a container with methanol for 15 minutes. Repeat, as needed.

NOTE For a more thorough cleaning of the inside of each probe:

- Attach a piece of tubing to a 10 ml syringe and to the probe.
- Use the syringe to flush methanol through the probe.

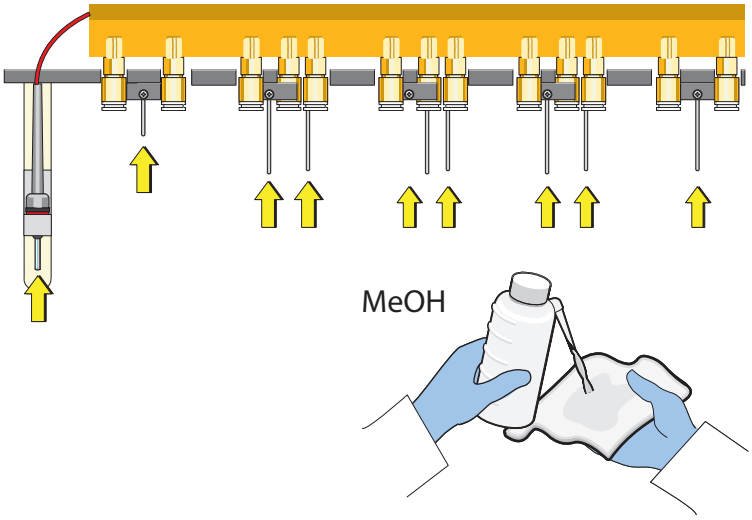
3 Remove the probes from the container of methanol and rinse with fresh methanol.

4 Remove the probes from the methanol rinse:

- Attach a piece of tubing to a 10 ml syringe and to the probe.
- Use the syringe to flush air through the probe to remove excess methanol.
- Place the probe on a clean dry paper towel and allow it to air dry.

NOTE Removing the fill probes and drain probes provides greater access to the bath fluid level sensors for cleaning.

5 Moisten a lint-free cloth with methanol and wipe clean the bath fluid level sensors and the surfaces soiled with stain.



6 Install the probes. See Replacing Fill Probes and Drain Probes - DxH Slidemaker Stainer II - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES in CHAPTER 13, Replacement/Adjustment Procedures for more information.

Cleaning the Baskets - DxH Slidemaker Stainer II

Follow these steps to clean baskets.

1 Obtain a clean tray that can hold the baskets to be cleaned.

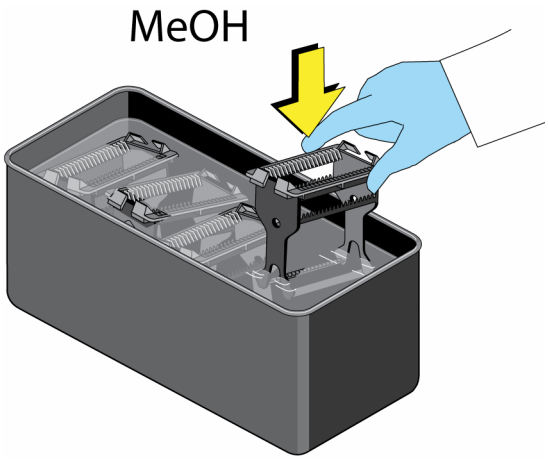
⚠ WARNING

Risk of personal injury and contamination. The instrument could continue to move or could have delayed movement. Wait a few seconds to ensure that all movement has ended before pulling the I/O drawer. Do not place your hands inside the I/O drawer.

2 If the baskets are still in the instrument, open the I/O drawer, remove the baskets, and replace them with a spare set.

3 Locate the baskets and remove any slides present.

4 Soak the empty baskets in methanol for 5 to 15 minutes.



5 Thoroughly dry the baskets before storing them or returning them to the instrument.

Cleaning the Slide Chute - DxH Slidemaker Stainer II

Follow this procedure to remove any broken slides and related debris.

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **Slidemaker** tab.

3 Select **Release SAM** from the local navigation bar.

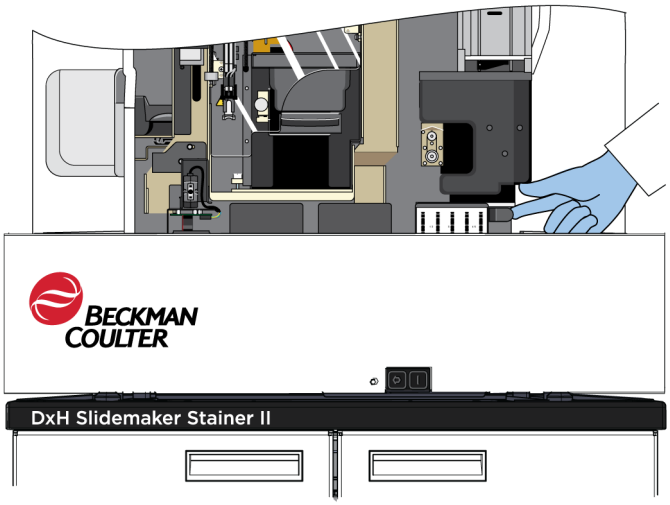
4 Remove the Transport Shield and Lift the Front Cover.

⚠ CAUTION

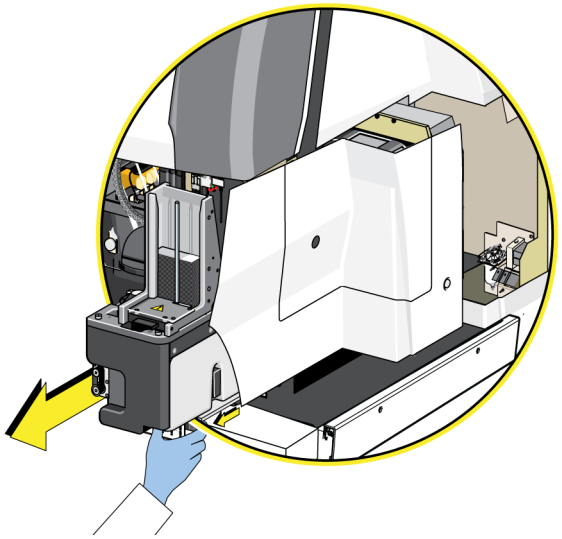
Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

5 Ensure the SAM is moved all the way to the left.

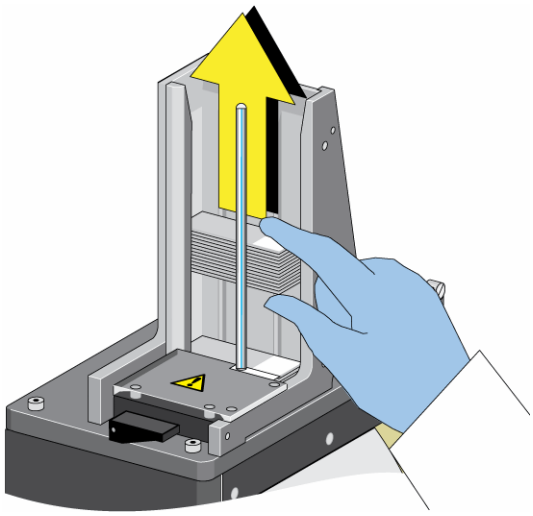
6 Locate the release handle behind the bar code reading station and release the Slidemaker.



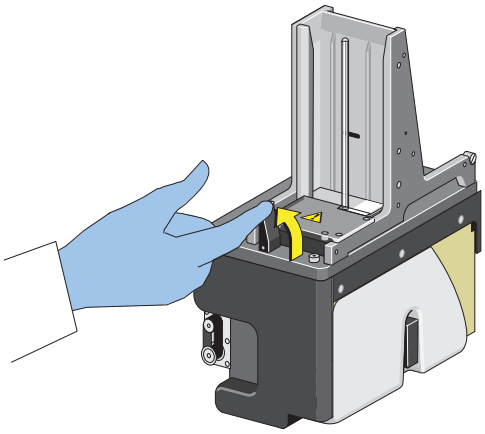
7 Pull the Slidemaker forward until it locks into the maintenance position.



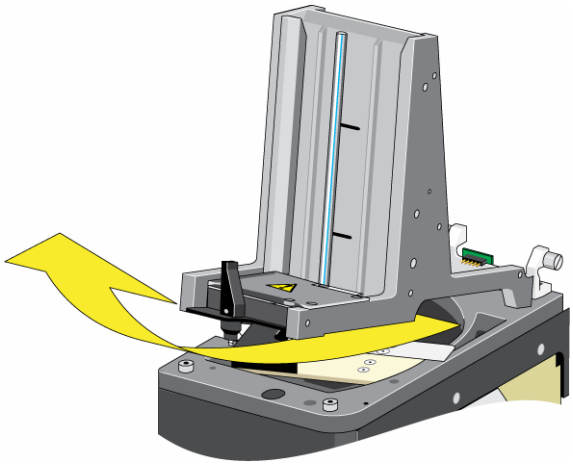
8 Remove as many slides as possible from the slide stack.



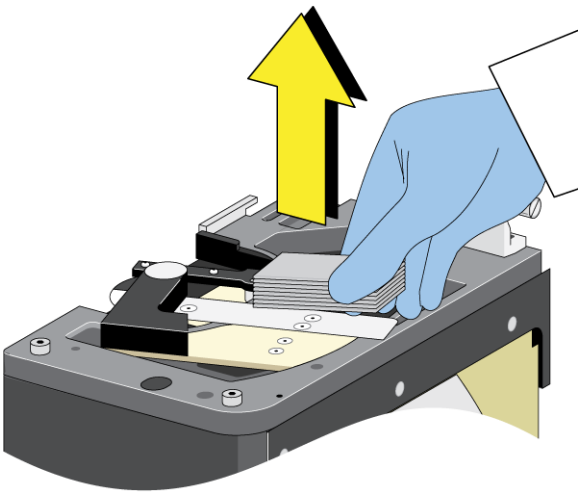
9 Snap open the lock on the chute.



10 Tilt the front of the chute up about 25 degrees, pull it straight out, and set it on a secure surface.



11 Remove the rest of the slide stack.



⚠ WARNING

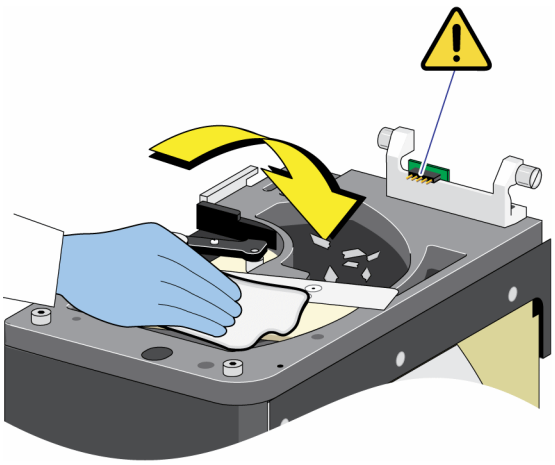
Risk of personal injury. Use caution when removing broken slides.

⚠ CAUTION

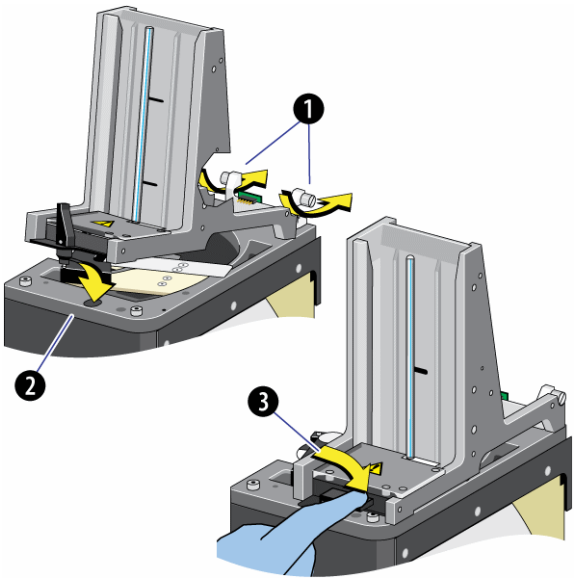
Risk of equipment damage. Be careful with the connections when removing broken slides.

12 Remove any large pieces of broken slides by picking them up or use gauze or a brush to move the glass particles into the platen hole for removal.

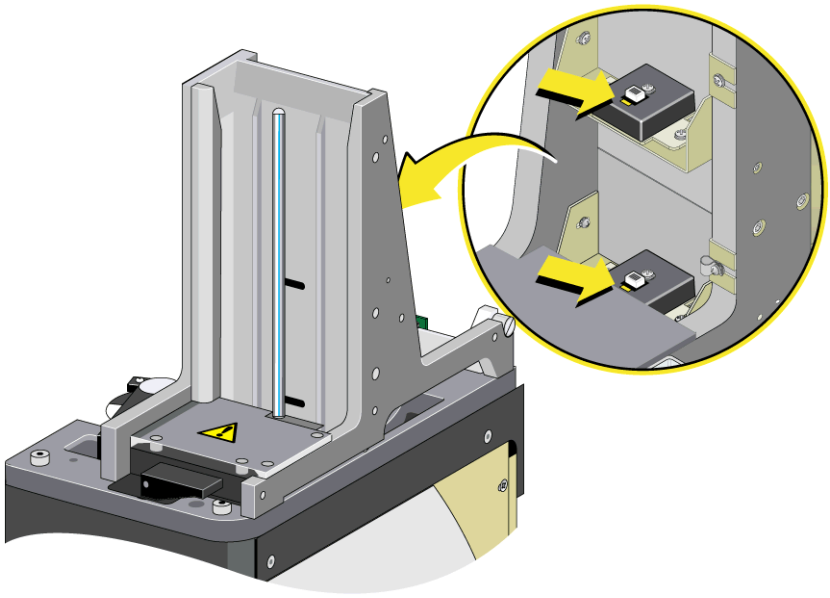
NOTE Use alcohol pads for cleaning, if necessary.



13 Replace the chute and lock it into place.

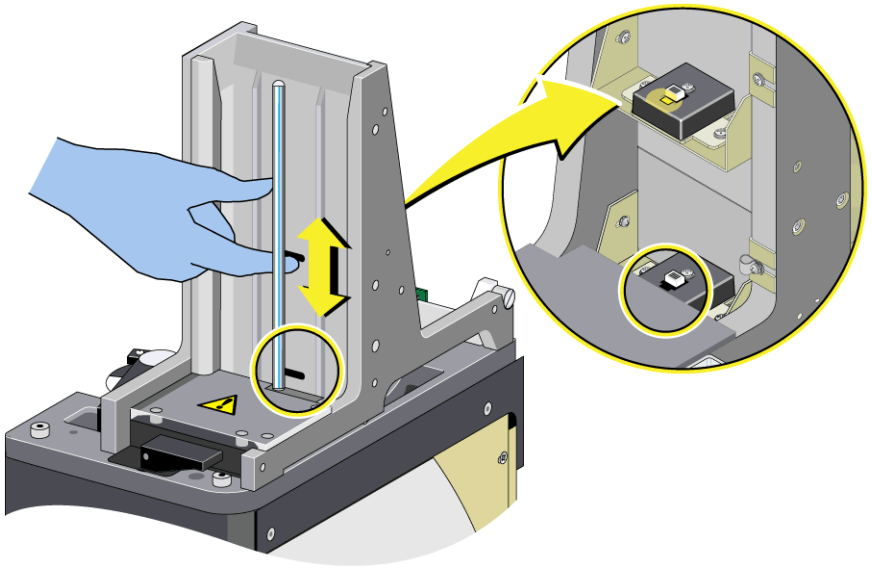


14 Locate the two LED yellow sensors behind the chute.



15 Run your fingers through the low sensor and the out sensor slots in the front where the slides are stacked while observing the two LEDs in back of the chute.

If each LED is lit, go to step 17
OR
If the system displays a *slide out* message (this indicates the chute is not installed correctly), remove and reinstall the chute.

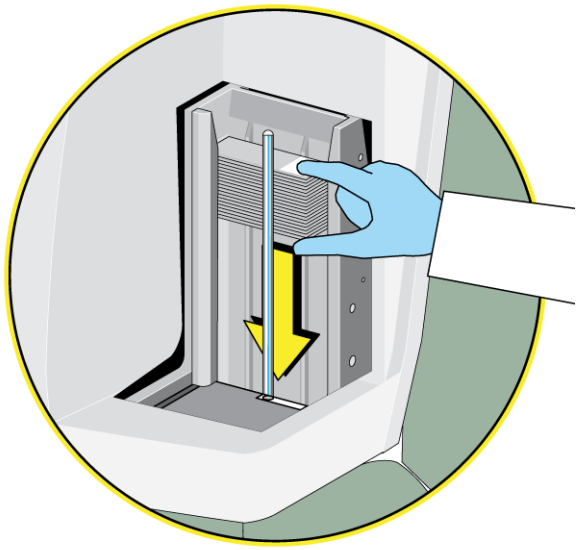


16 Repeat steps 14 to 15, as needed, to ensure that the chute is installed correctly.

⚠ WARNING

Risk of injury. Handle the slides with care to avoid skin puncture. Load the slides flat against the pins to avoid breaking the slides. Clean up any broken glass as quickly as possible.

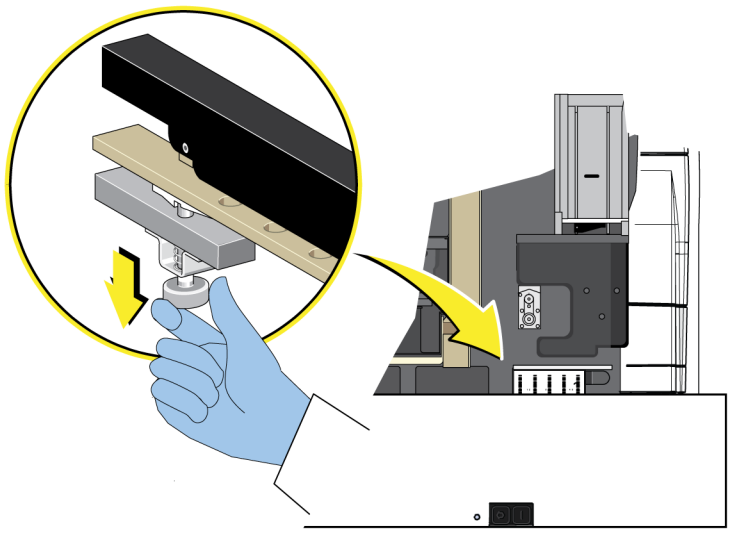
17 Load the slides into the slide chute with the painted side up.



⚠ WARNING

Risk of hand injury. Use caution when pushing the Slidemaker back into position.

18 Return the Slidemaker to the operating position by pulling the locking pin and pushing the Slidemaker back into position.



19 Lower the Front Cover and Install the Transport Shield.

20 Select **Finish** and **Yes** to exit from Diagnostics mode. Place the instrument online to continue.

21 Empty the broken slide bin, if necessary. See Emptying the Broken Slides Bin - DxH Slidemaker Stainer II.

Cleaning the STM Bar Code Scanner, SAM Bar Code Scanner, and the Single-Tube Station Bar Code Scanner - DxH Slidemaker Stainer II

1 Power OFF the instrument.

2 Remove the Transport Shield and Lift the Front Cover.

3 Pull out the STM.

4 Locate the STM bar code scanner, the SAM bar code scanner, and the single-tube station bar code scanner.

5 Use a lint-free tissue moistened with lens cleaner or alcohol to wipe the scanners and remove any buildup.

6 Dry the bar code scanners by wiping them with a dry lint-free tissue.

7 Return the STM to the operating position.

8 Lower the Front Cover and Install the Transport Shield.

9 Power ON the instrument.

CHAPTER 13

Replacement/Adjustment Procedures

IMPORTANT Maintenance and replacement/adjustment procedures are performed on a module basis. Ensure the appropriate instrument is selected before initiating a procedure.

When, Why, and How to Perform Each Procedure - DxH 900/DxH 690T

⚠ WARNING

Use caution as ac voltages may be present. Diagnostics procedures (run from Menu > Diagnostics > Dx Tools) automatically place the SPM in safe mode; however, for all other replacement procedures, you must turn off the power switch in front of the SPM.

⚠ CAUTION

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, call your Beckman Coulter Representative.

Table 13.1 Matrix of Frequency for Replacement Procedures - DxH 900/DxH 690T

Procedure	Purpose	Tools/Supplies	Frequency
Replacing the Aspiration Probe - DxH 900/DxH 690T	To replace a defective aspiration probe	New aspiration probe	As needed
Replacing the Count Vacuum Regulator - DxH 900/DxH 690T	To replace a defective count vacuum regulator	• New Count Vacuum Regulator • Flathead screwdriver	As needed
Replacing the Pneumatic Supply Module (PSM) - DxH 900/DxH 690T	To replace a defective Pneumatic Supply Module	• New Pneumatic Supply Module • Phillips-head screwdriver • 1/2-nut driver (in tool box in Accessory kit)	As needed
Replacing Reagent Containers - DxH 900/DxH 690T To replace quad diluent containers, see Replace Quad Diluent Containers - DxH 900.	To replace empty reagent container	New reagent containers	As needed to replace empty reagent containers. The Supplies alert status icon (see Alert Status Icons in CHAPTER 1, System Overview) displays the status of the supplies.

Table 13.1 Matrix of Frequency for Replacement Procedures - DxH 900/DxH 690T *(Continued)*

Procedure	Purpose	Tools/Supplies	Frequency
Replacing the Waste Container - DxH 900/DxH 690T	To replace a full waste container	New waste container	As needed to replace full waste containers
Replacing the Handheld Bar Code Scanner - DxH 900/DxH 690T	To replace a defective handheld bar code scanner	None	As needed

Why, When, and How to Perform Each Procedure - DxH Slidemaker Stainer II

⚠ WARNING

Use caution as AC Voltages may be present. Diagnostics procedures (run from Menu> Diagnostics> Dx Tools) automatically place the instrument in safe mode; however, for all other replacement procedures, you must turn off the power switch in front of the instrument.

⚠ CAUTION

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, call your Beckman Coulter Representative.

Table 13.2 Matrix of Frequency for Replacement Procedures - DxH Slidemaker Stainer II

Procedure	Purpose	Tools/Supplies	Frequency
Replacing a Bath - DxH Slidemaker Stainer II	To replace the bath	• New bath • Unstained smear	As needed
Replacing the Aspiration Probe - DxH Slidemaker Stainer II	To replace a defective aspiration probe	• New aspiration probe • Phillips-head screwdriver	As needed
Replacing the Dispense Probe - DxH Slidemaker Stainer II	To replace a defective dispense probe	• New dispense probe • Phillips-head screwdriver	As needed
Replacing Fill Probes and Drain Probes - DxH Slidemaker Stainer II - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES	To remove fill and drain probes for replacement or extended cleaning	• Hemostat • Long flathead screwdriver	As needed
Replacing or Refilling the Reagent Containers - DxH Slidemaker Stainer II	To replace or refill an empty reagent container	New reagent container if replacing	As needed
Replacing the Biohazard Waste Container - DxH Slidemaker Stainer II	To replace a full biohazard container	New, empty biohazard waste container	As needed

Table 13.2 Matrix of Frequency for Replacement Procedures - DxH Slidemaker Stainer II *(Continued)*

Procedure	Purpose	Tools/Supplies	Frequency
Replacing the Stain Waste Container - DxH Slidemaker Stainer II	To replace a full stain waste container	New, empty stain waste container.	As needed
Replacing the Printer Cartridge - DxH Slidemaker Stainer II	To replace a used printer ribbon or cartridge	New ribbon or printer cartridge	As needed
Replacing the Stainer Reagent Line Filters - DxH Slidemaker Stainer II	To replace a reagent line filter	New reagent line filter	As needed
Loading Slides - DxH Slidemaker Stainer II	To refill the slide chute	New unopened box of slides	As needed

Managing Supplies - DxH 900/DxH 690T

The system monitors the supplies status and provides you with a visual indication of their states through the Supplies alert indicator icon ():

- A beige or neutral background indicates valid reagent usage remaining for all supplies.
- An amber background indicates a warning condition.
- A red background indicates an error condition.

You can return the color to neutral by replacing the supplies that are low, depleted, or expired.

One or more testing locations may require attention. Select **Menu > Supplies** to find the locations that require attention. The location requiring attention may or may not display a beacon light associated with the Supplies error or warning.

Replacing the Aspiration Probe - DxH 900/DxH 690T

⚠ WARNING

Risk of injury and false hardware errors. To avoid injury and false hardware errors, do not remove the transport shield or lift the front cover until otherwise instructed.

⚠ WARNING

Risk of personal contamination. The aspiration probe and the associated tubing contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

Remove the Aspiration Probe

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **Maintenance** tab.

3 Select **Change Aspiration Probe** from the *Maintenance* drop-down list.

4 Select **Start**. A pop-up window displays the following message:

System placing aspiration probe in safe mode. Please wait.

5 When the aspiration probe is in safe mode, Remove the Transport Shield and Lift the Front Cover.

6 Locate the aspiration probe.

7 Remove the shield.

8 Disconnect the tubing at the top of the probe.

NOTE Use your fingers to push the tubing up. Do not crimp the tubing.

9 Completely unscrew the knurled nut securing the probe.

10 Lift the aspiration probe up and out.

NOTE The probe must be clear of the probe wipe collar before lifting out. Use caution so that you don't bend the probe during replacement.

Install the New Aspiration Probe

1 Pick up the new aspiration probe.

2 Orient the probe so that the tab on the top corresponds to the notch in the probe holder.

3 Insert the probe tip into the probe wipe then fit the top section into the holder.

4 Tighten the knurled nut.

5 Reattach tubing to the top of the probe.

NOTE Use care so that you don't crimp the tubing with your fingers.

6 Replace the SAM shield.

NOTE The tip of the SAM shield where the screws go in should just touch the metal screw caps where the screws are screwed in. Overtightening will cause the tips of the SAM shield to break and loosen the SAM shield.

7 Lower the Front Cover, Install the Transport Shield, and select **OK**.

8 Select **Finish** and **Yes** to exit from diagnostics mode.

9 Perform the Dispensing Diluent procedure in CHAPTER 10, Troubleshooting. If you observe any leaks or the diluent tube does not fill, call your Beckman Coulter Representative.

10 Select **OK**.

11 Run Daily Checks.

12 Verify the calibration by running three levels of controls.

Replacing the Count Vacuum Regulator - DxH 900/DxH 690T

Remove the Old Count Vacuum Regulator

1 Power OFF the SPM.

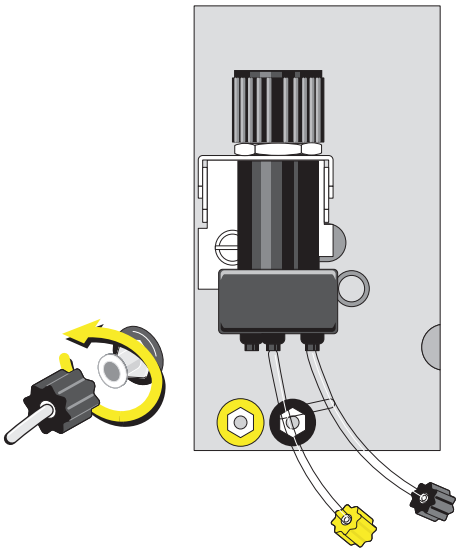
2 Remove the Transport Shield and Lift the Front Cover

⚠ CAUTION

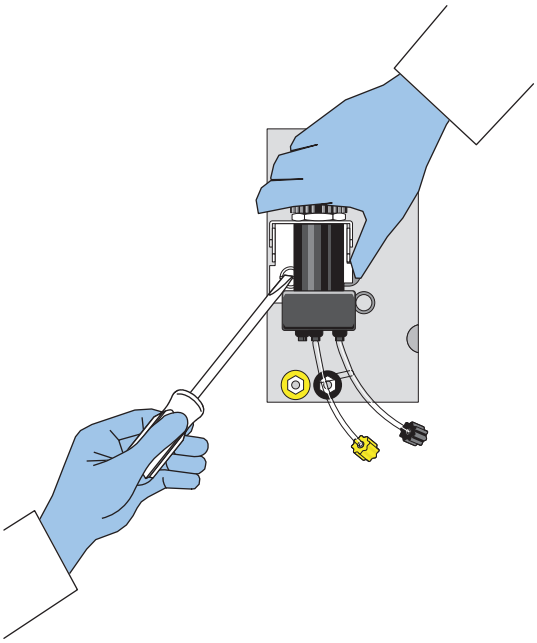
Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module.

3 Move the SAM to the right to reveal the Count Vacuum Regulator.

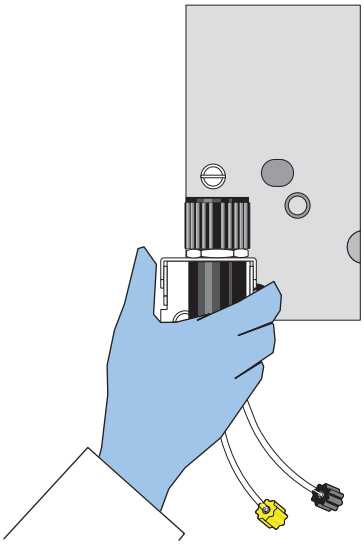
4 Disconnect the yellow quick disconnect and the black quick disconnect.



5 Using a flathead screwdriver, loosen the screw.

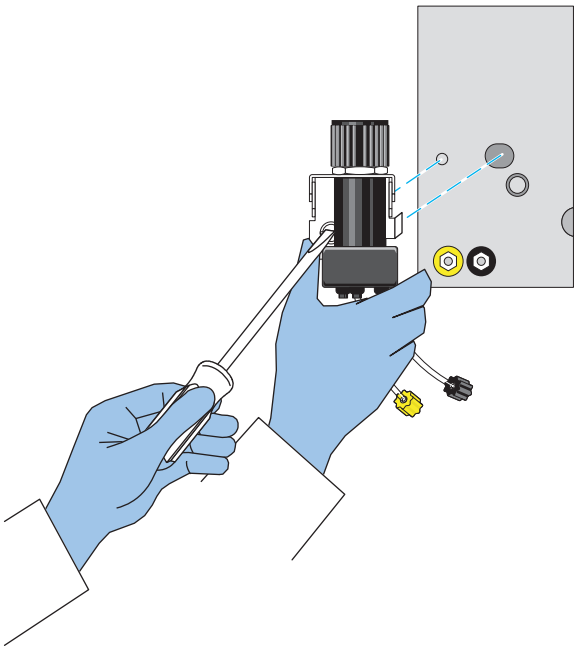


6 Remove the old Count Vacuum Regulator and discard it.

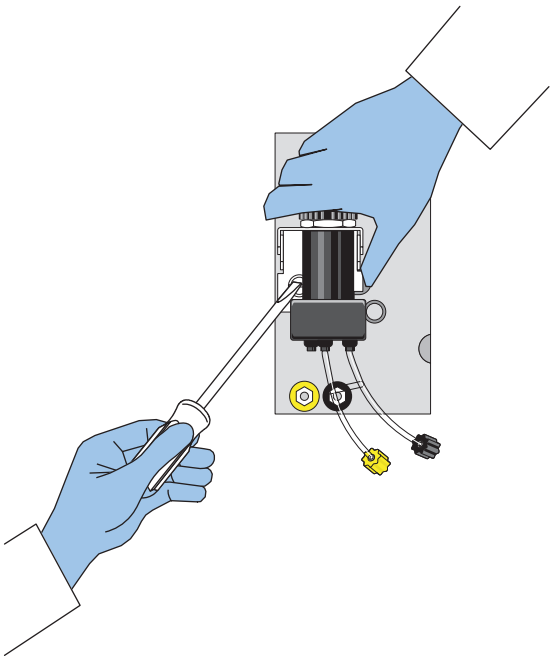


Install the New Count Vacuum Regulator

1 Place the regulator on the instrument by lining up the thumbscrew and tab on the bracket with the corresponding holes on the instrument.

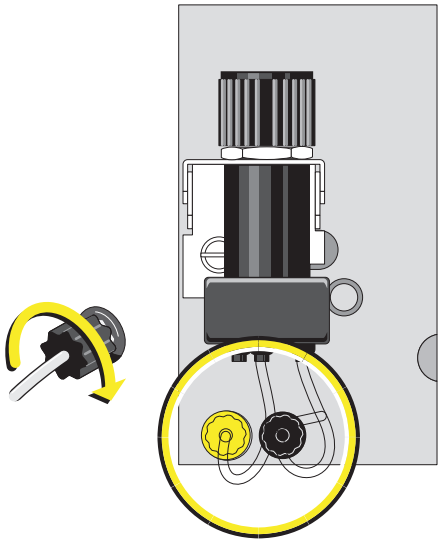


2 Using the flathead screwdriver, tighten the thumbscrew.



3 Connect the yellow and black quick disconnects. You should hear one click with each connection.

NOTE Be careful not to leave tubing twisted or crimped.



4 Lower the Front Cover and Install the Transport Shield.

5 Power ON the SPM.

6 Perform the Check Count Vacuum Procedure. See Checking Count Vacuum in CHAPTER 10, Troubleshooting.

7 Press F10 **Access System Monitor** and select **Volt/Temp**. In the **CBC** panel of the System Monitor screen, verify that **Count Vac** reads 6.0 ±0.1.

a. If the vacuum needs to be adjusted, turn the Count Regulator knob clockwise to increase the vacuum or counter-clockwise to decrease the vacuum.

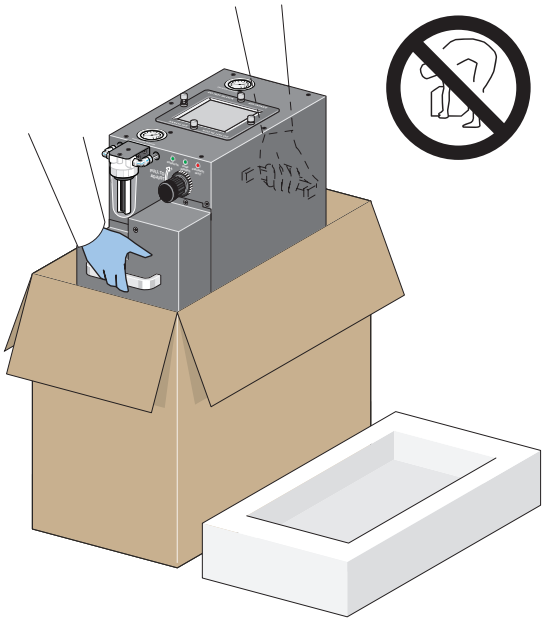
b. After you have verified that the vacuum is 6, select **Stop** on the Diagnostic Procedures - Maintenance screen to stop the Check Pneumatic Supply procedure.

Replacing the Pneumatic Supply Module (PSM) - DxH 900/DxH 690T

Unpack the New PSM

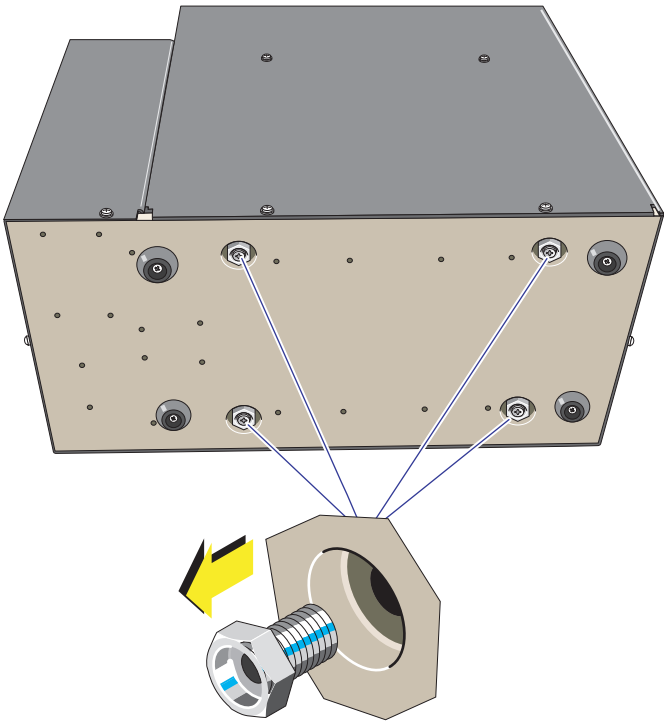
1 Unpack the PSM and remove the plastic sheeting,

2 Using the handles on the PSM, lift it out of the box.



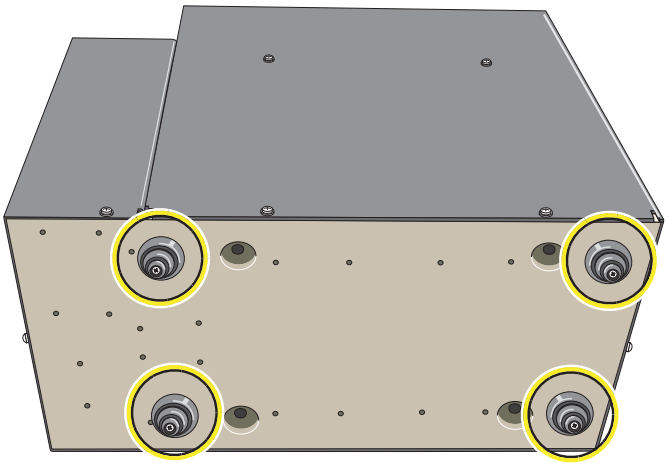
3 Lay the PSM on its side.

4 On the bottom of the PSM, use the nut driver from your accessory kit to remove the four socket-head screws.



5 Note that the PSM has feet that are intended for the DxH 900 floor stand only.

If you are installing the DxH 690T and the PSM will be placed on the floor or on a shelf, remove the feet and replace them with the enclosed set of feet which will support the full weight of the PSM.



6 Set the PSM upright and place it in the desired location.

NOTE If you are using a floor stand, you must connect the new PSM before you place it in the floor stand. Refer to Remove and Replace the PSM for additional instructions.

Remove and Replace the PSM

⚠ WARNING

Risk of personal contamination. The PSM and the associated tubing can contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

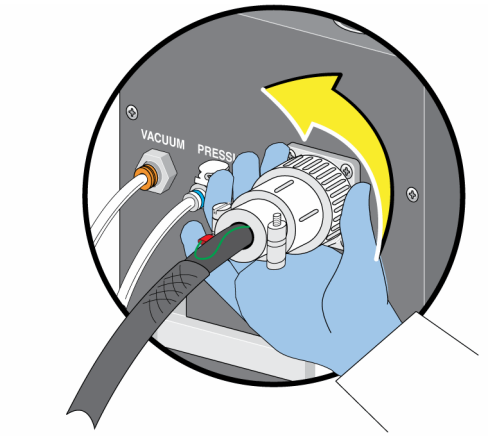
1 Power OFF the SPM.

2 Locate the Pneumatic Supply Module.

NOTE If your Pneumatic Supply Module is in a floor stand, see DxH 900 Floor Stand in CHAPTER 1, System Overview for information on locating the Pneumatic Supply Module.

3 Unscrew the power/communications cable from the compressor.

NOTE If you are using a floor stand, remove the PSM from the drawer before disconnecting.

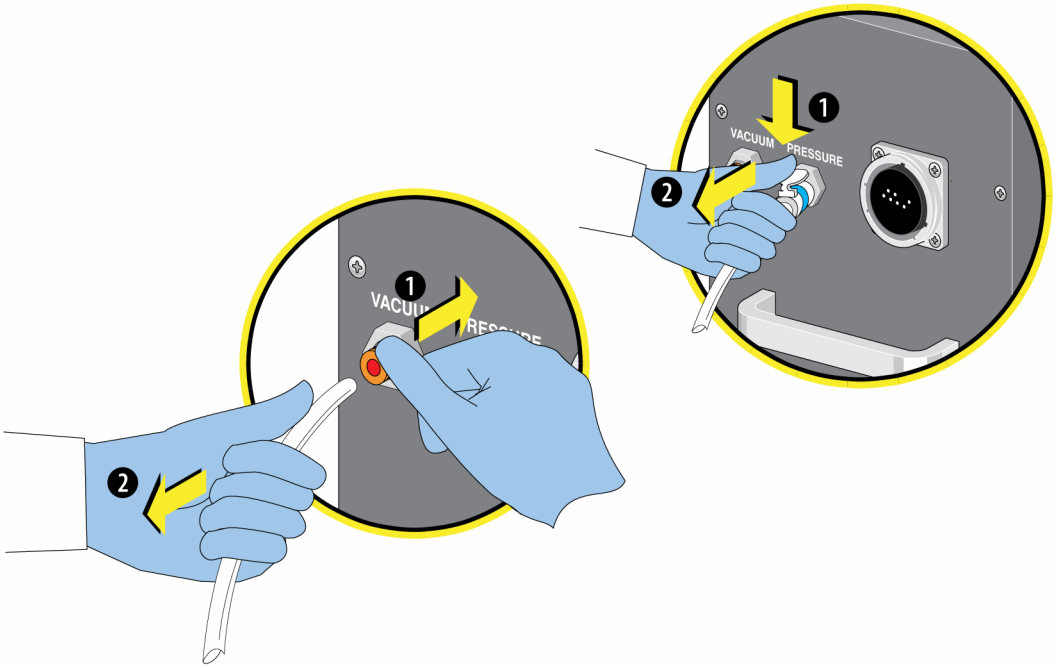


4 Disconnect the vacuum and pressure lines.

a. Push the vacuum connector rubber sleeve and pull vacuum tube from the connector.

b. Press down on the pressure connector to remove the connector and pressure line.

NOTE if you are returning a defective PSM, replace the four socket head screws. Include the unused feet and the nut driver with your return of the PSM.

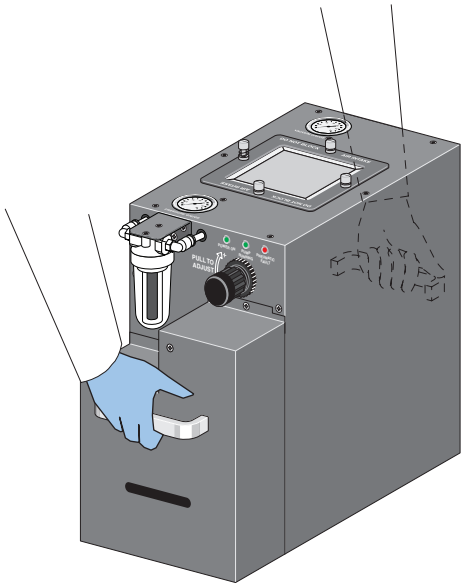


5 Replace the old compressor with the new compressor.

a. Lift the compressor by using the handles on the front and rear of the PSM.

⚠ WARNING

Risk of injury due to lifting. Follow your laboratory's guidelines for lifting to avoid injury.



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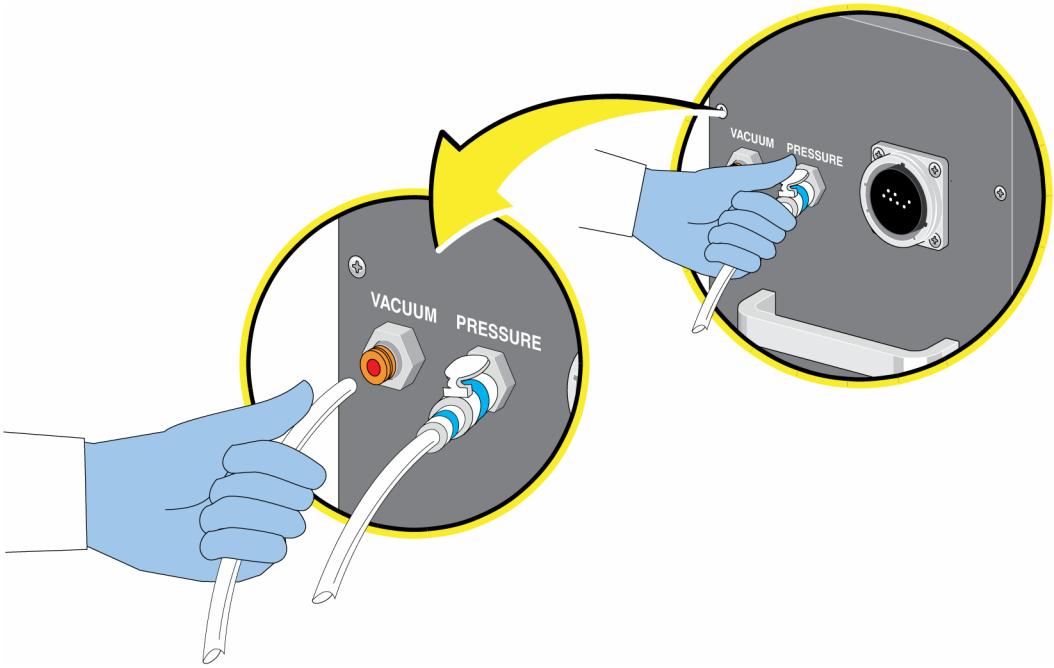
6 Connect the vacuum and pressure lines.

NOTE If you are using a floor stand, connect everything before placing the new PSM in the floor stand drawer.

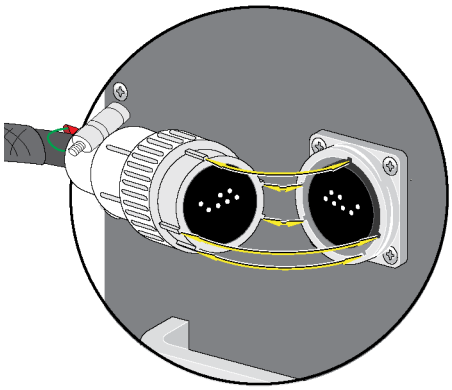
a. Insert the vacuum tube into the vacuum connector.

b. Push the pressure connector into the connecting port until it snaps into place.



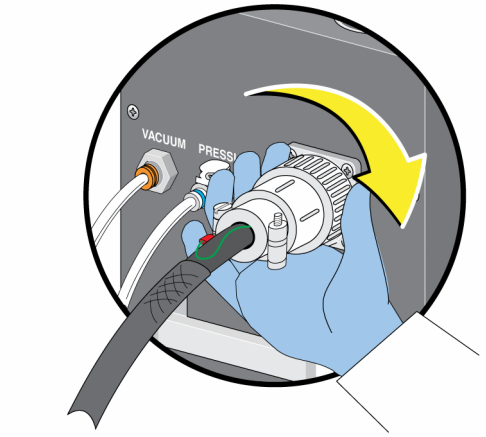
7 Connect the power/communications cable connector with the power/communications port on the PSM.

a. Line up the holes of the connector with the pins in the port.



b. Push the connector into the port so that the pins in the port are inserted into the connector.

c. Fasten the connector by turning the connector clockwise.



NOTE On a floor stand, after the connection is complete, the PSM must be centered in the drawer ensuring that the rubber mounts on the PSM align with the holes on the metal plate. Avoid touching the inner sides of the drawer (to avoid vibration transfer through the floor stand to the SPM).

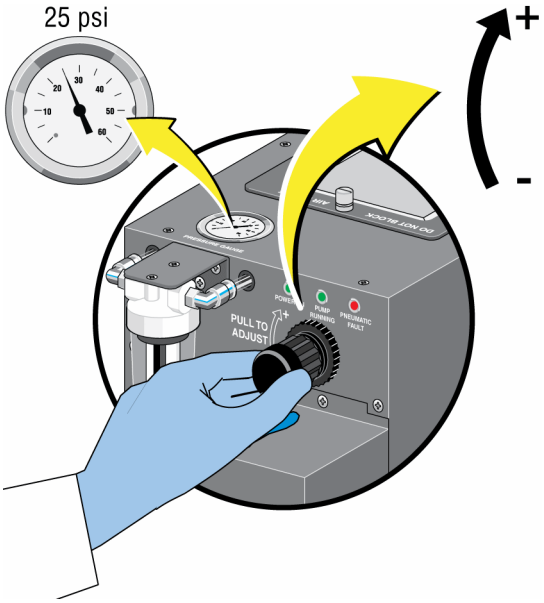
8 Power ON the SPM.

9 Go to Adjusting the Pneumatic Supply Regulator.

NOTE Wait until the system is completely powered ON before performing the adjustment.

Adjusting the Pneumatic Supply Regulator

1 Turn the knob on the Pneumatic Supply Module to adjust the Pneumatic Supply Regulator to 25 psi.



2 Press (F10) **Access System Monitor** and select **Volt/Temp** to display the Raw Pressure reading.

Replacing Reagent Containers - DxH 900/DxH 690T

NOTE To replace quad diluent containers, see Replace Quad Diluent Containers - DxH 900.

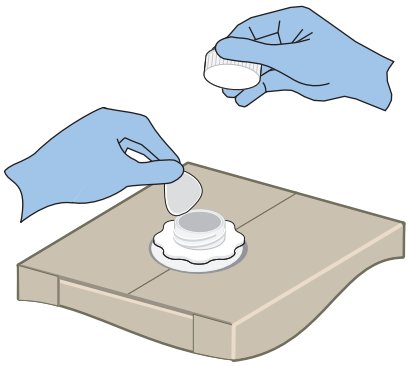
1 Locate the old reagent container. See DxH 900 Floor Stand in CHAPTER 1, System Overview for instructions on locating reagents in the floor stand.

2 Place the new reagent box near the old container. All systems have a one-piece weighted-end pickup tube for 10 L diluent and cleaner containers.

NOTE On a floor stand, lift out the old container and place the new container in the drawer. Ensure that you position the containers correctly in the floor stand so that you do not crimp the tubing.

3 Remove any cardboard cutouts from the new container.

4 Remove the cap and seal from the new reagent container. Be sure to completely remove the foil seal and lift the neck of the container.



5 Unscrew the pickup tube assembly from the old container as follows:

- Cleaner and diluent (single and dual) - Detach the quick disconnect, hold the line to prevent contamination, move the pickup tubing from the old container to the new container, and reconnect the quick disconnect.
- Other reagents without quick disconnect - Lift the entire pickup tube assembly out of the old container and insert it in the new container.

6 Inspect the pickup tube for damage and replace it, if necessary.

7 Reconnect the quick disconnect (cleaner and diluent) or insert the pickup tube assembly (other reagents without quick disconnect) straight into the new container, and tighten the cap.

IMPORTANT Check the tube for visual leaks or places where the tube is crimped or pinched. If there are leaks you will need to replace the tube. If there are crimped or pinched areas, the container may need to be repositioned.

8 Scan the new DxH container's information on the Setup DxH Supplies dialog box or manually enter information on the Setup Supply dialog box. See Suppliesin CHAPTER 9, Setup.

9 If you are using a floor stand, ensure that you do not tangle the tubing for the various reagents in the upper left drawer of the floor stand. This may make it difficult for reagent replacement in the future.

Replace Quad Diluent Containers - DxH 900

⚠ CAUTION

Risk of erroneous results. Do not mix different lot numbers within a diluent pair.

1. Remove the quick disconnect from each container for each of the diluent cubes.
2. Attach the dual line magnet to the metal frame.
3. Remove the old containers from the drawer.
4. Place the new containers in the drawer.

   NOTE Ensure that the direction of the containers aligns with the graphic sticker in the drawer.

   Both diluents in each drawer must have the same lot number. The system does not accept different lot numbers in the same drawer.
5. Scan the new DxH Diluent container's information on the Setup DxH Supplies dialog box. See Setting Up DxH 900 Supplies in CHAPTER 9, Setup.
6. Transfer the pickup tubes from the old containers to the new containers.
7. Securely connect the quick disconnects to each diluent container. You should hear one click with each connection.
8. Close the drawer and close the floor stand.
9. Select **OK** on the screen to accept the new reagents and update your reagent volumes.

Replacing the Waste Container - DxH 900/DxH 690T

⚠ WARNING

Risk of 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.

Waste containers (if used) must be located in a safe place and tubing connection integrity must be verified periodically. Do not replace the waste container while the SPM is cycling.

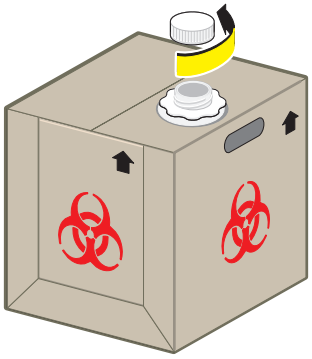
If the waste line is connected to a drain instead of a waste container, the waste line must be secured into the drain so that the tube cannot accidentally come out of the drain. If you are using this method of waste removal, Beckman Coulter recommends that you schedule routine maintenance of the laboratory drain pipes.

1 Locate the waste containers.

NOTE If your waste containers are located in a floor stand, see DxH 900 Floor Stand in CHAPTER 1, System Overview for instructions on locating the waste containers. A quad diluent configuration does not include waste containers.

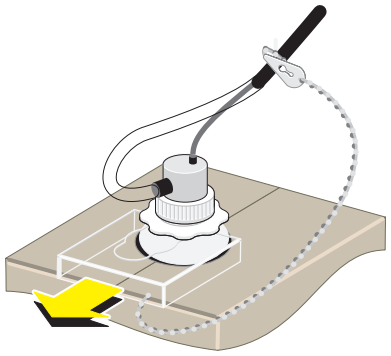
2 Label and uncap an empty waste container and place it near the full one. Save the cap to put onto the full waste container.

NOTE If you are using a floor stand, place the empty waste container in the drawer first, and the full container on the floor; then, remove the tubing from the full waste container. The empty waste container should be placed with the container handle opening on the right side.

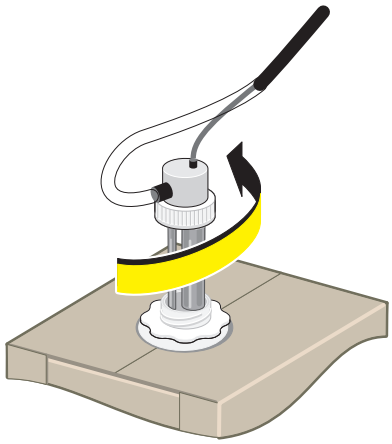


3 Ensure that the SPM is not cycling.

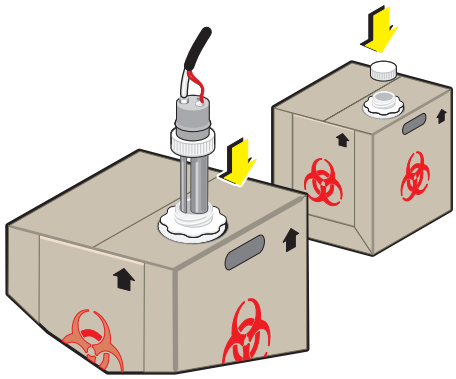
4 Slide the collar off the full waste container.



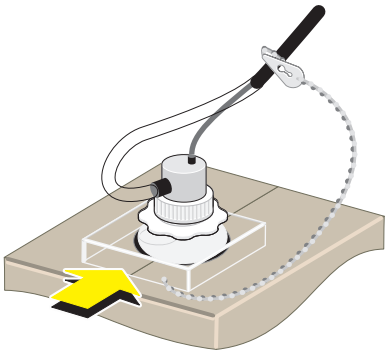
5 Unscrew the waste tube/level sense assembly cap and lift the assembly straight up and out.



6 Insert the assembly into the empty waste container and screw the cap tightly in place. Cap the full waste container before moving it.



7 Slide the collar into place.



8 Verify that the old container is clearly labeled, add 250 mL of 5% bleach to the old 10 L container; then discard it according to your laboratory's standards for biohazardous material.

Replacing the Handheld Bar Code Scanner - DxH 900/DxH 690T

1 Disconnect the handheld bar code scanner from the USB port at the front of the System Manager CPU.

2 Install the new scanner by connecting the cable to the USB port at the front of the System Manager CPU.

Managing Supplies - DxH Slidemaker Stainer II

The system monitors the supplies status and provides you with a visual indication of their states through the Supplies alert indicator icon (). While there is valid reagent usage remaining for all the supplies, the Supplies icon background is beige or neutral. An amber background indicates a warning condition and a red background indicates an error condition. You can return the color to neutral by replacing the supplies that are low, depleted, or expired.

Replacing a Bath - DxH Slidemaker Stainer II

Follow this procedure when a bath is leaking or as needed.

⚠ WARNING

Risk of personal injury and false hardware errors. To avoid injury and false hardware errors, do not remove the transport shield or lift the front cover until otherwise instructed.

⚠ CAUTION

Risk of chemical hazard. The baths must be empty when lowering the stainer.

1 Ensure that the stainer is inactive:

   a. Select **Menu** > **Diagnostics** > **Dx Tools**.

   b. Select the **Slidestainer** tab.

2 Drain the baths:

   - If the software is v1.2.0 and prior, select **Drain All Baths**.
   - If the software is v.2.0.0 and *Flush Stainer* is ENABLED, select **Drain All Baths and Flush**.
   - If the software is v2.0.0 and *Flush Stainer* is DISABLED, select **Drain All Baths**.

3 Select **Start** from the local navigation bar.

4 Remove the Transport Shield and Lift the Front Cover.

5 Remove the Stainer Shield.

6 Select **Menu > Diagnostics > Dx Tools > Release SAM.**

⚠ CAUTION

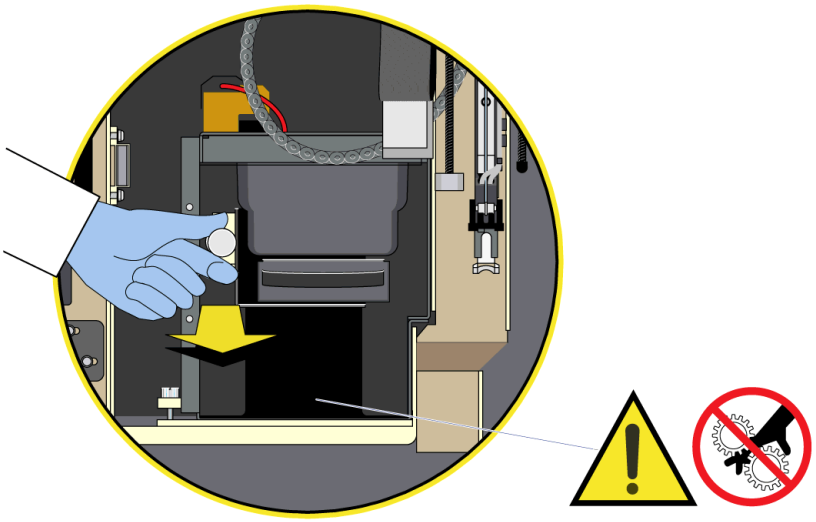
Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

7 Move the SAM to the right to prevent breaking the aspiration probe.

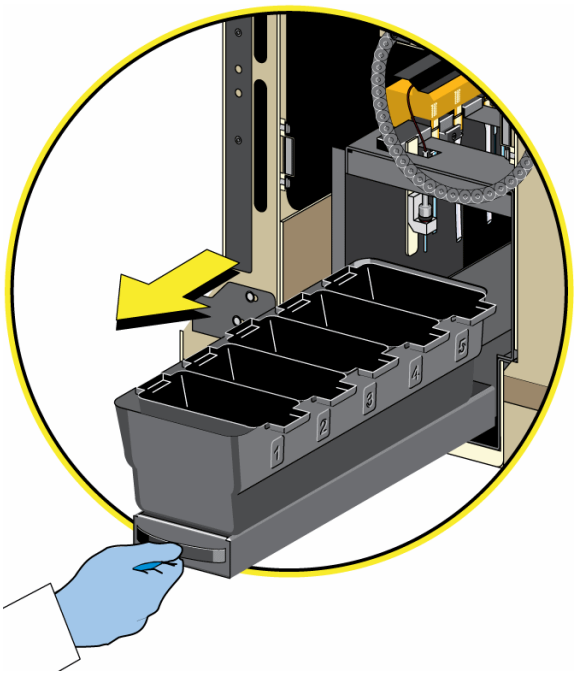
⚠ WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath tray.

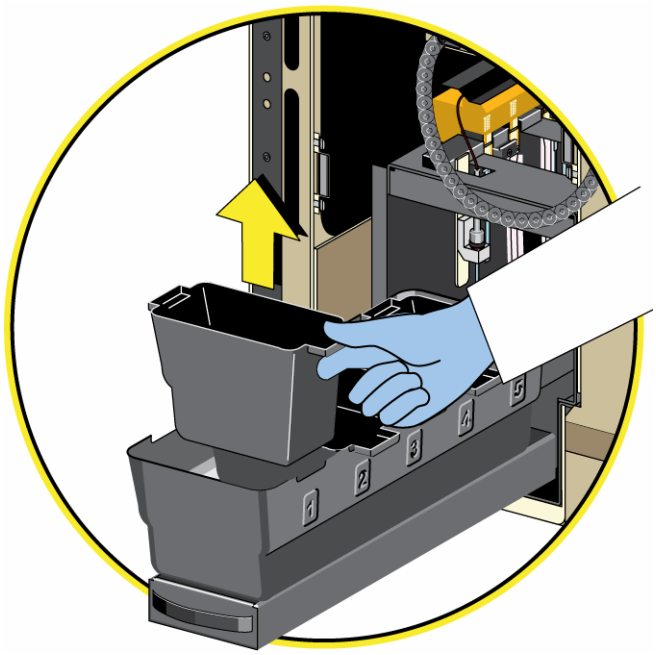
8 Pull the bath tray release knob to lower the stainer bath tray.



9 Grasp the handle on the stainer drawer and pull the tray out to the maintenance position.

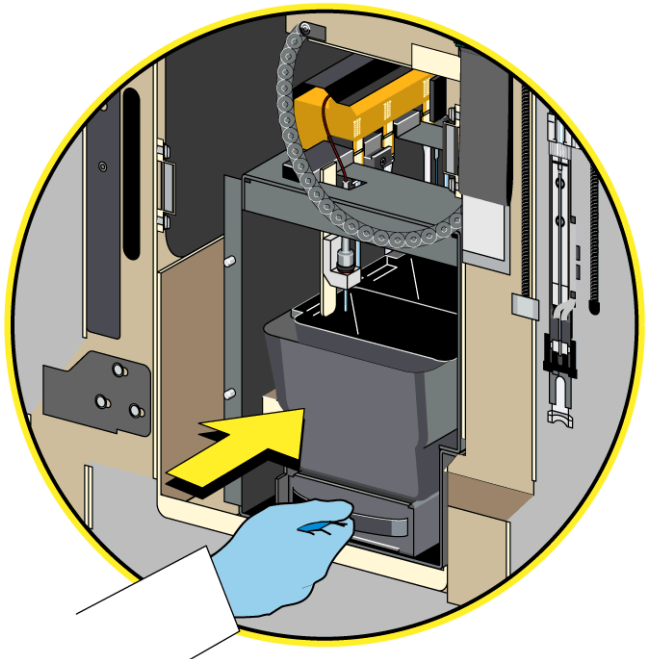


10 Remove the bath from the tray.



11 Place the new bath into the bath tray.

12 Push the drawer back into the Stainer until it clicks into position.



13 Install the Stainer Shield.

14 Lower the Front Cover and Install the Transport Shield.

15 Select **Finish** to end the diagnostic cycle.

16 On the SMS Detail Status screen, select **Start** to activate the stainer. The stainer status will change from inactive to active.

17 Place the instrument back online to resume operation.

18 Run a **Stain Only** cycle to test the smear stain quality.

Replacing the Aspiration Probe - DxH Slidemaker Stainer II

NOTE Beckman Coulter recommends that you perform the procedures for Dispensing Diluent - DxH Slidemaker Stainer II, and for Verifying the Aspiration Probe Alignment - DxH Slidemaker Stainer II before processing slides, to verify that the new probe is installed correctly.

⚠ WARNING

Risk of injury and false hardware errors. To avoid injury and false hardware errors, do not remove the transport shield or lift the front cover until otherwise instructed.

⚠ WARNING

Risk of personal contamination. The aspiration probe and the associated tubing contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

Remove the Aspiration Probe

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **Maintenance** tab.

3 Select **Change Aspiration Probe** from the drop-down list.

4 Select **Start** from the local navigation bar. The system:

- Places the aspiration probe in the safe mode to ensure operator safety.
- Provides assistance in replacing a damaged or blocked aspiration probe.

A pop-up window displays the following message:

System placing aspiration probe in safe mode. Please wait.

5 When the aspiration probe is in safe mode, Remove the Transport Shield and Lift the Front Cover.

6 Locate the aspiration probe.

7 Disconnect the tubing at the top of the probe.

NOTE Use your fingers to push the tubing up. Do not crimp the tubing.

8 Completely unscrew the knurled nut securing the probe.

9 Lift the aspiration probe up and out.

NOTE The probe must be clear of the probe wipe collar before lifting out. Use caution so that you don't bend the probe during replacement.

10 Install the New Aspiration Probe.

Install the New Aspiration Probe

1 Insert a new aspiration probe by orienting it so that the tab on the top corresponds to the notch in the probe holder.

2 Insert the probe tip into the probe wipe. Then, fit the top section into the holder.

3 Tighten the knurled nut.

4 Reattach the tubing to the top of the probe.

NOTE Use care so that you do not crimp the tubing with your fingers.

5 Lower the Front Cover and Install the Transport Shield when the system displays:
Remove transport shield and lift front cover. Change the aspiration probe, Lower front cover and install transport. Select **OK to continue.**

6 Select **OK**.

7 See Dispensing Diluent - DxH Slidemaker Stainer II and follow the steps.

Replacing the Dispense Probe - DxH Slidemaker Stainer II

⚠ WARNING

Risk of injury and false hardware errors. To avoid injury and false hardware errors, do not remove the transport shield or lift the front cover until otherwise instructed.

⚠ WARNING

Risk of personal contamination. The dispense probe and the associated tubing contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

Remove the Dispense Probe

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **Maintenance** tab.

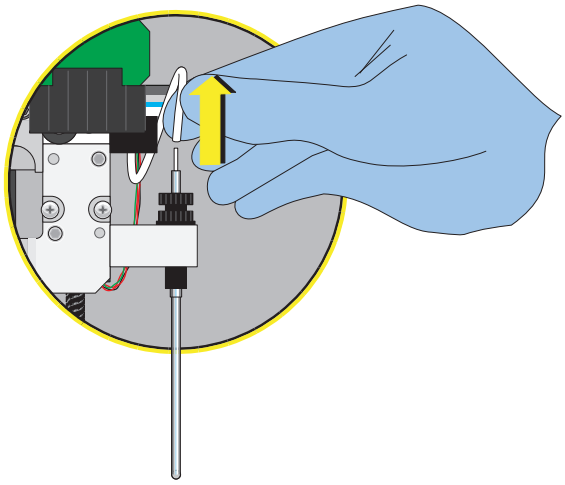
3 Select **Change Dispense Probe** from the drop-down list.

4 Select **Start**.

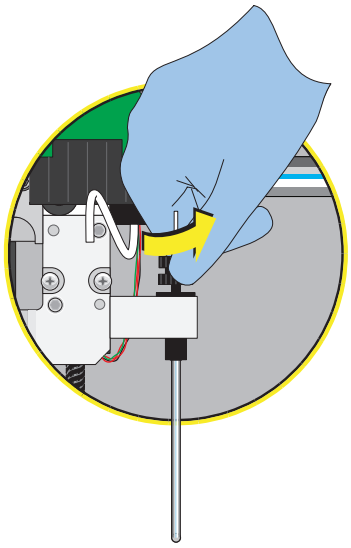
5 Remove the Transport Shield and Lift the Front Cover.

6 Locate the dispense probe.

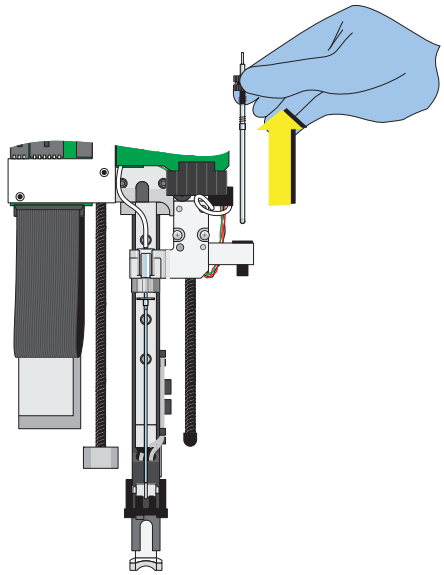
7 Disconnect the tubing at the top of the probe.



8 Completely unscrew the knurled nut securing the dispense probe.



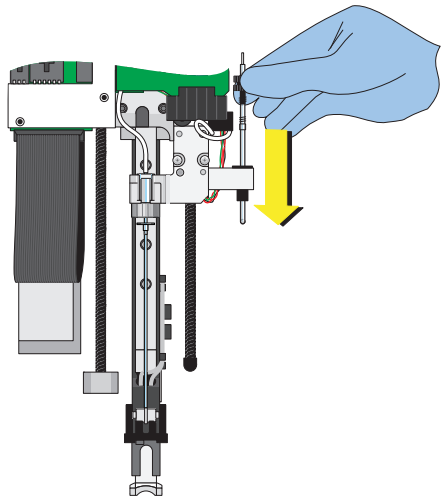
9 Lift the dispense probe up and out.



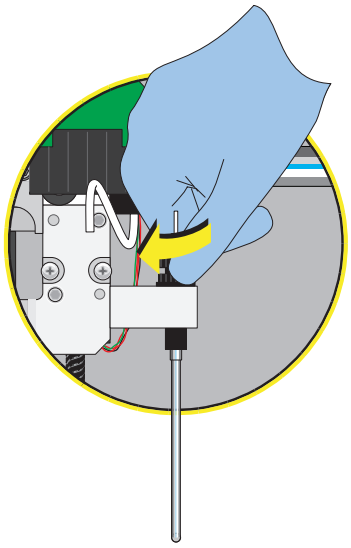
10 Install the New Dispense Probe.

Install the New Dispense Probe

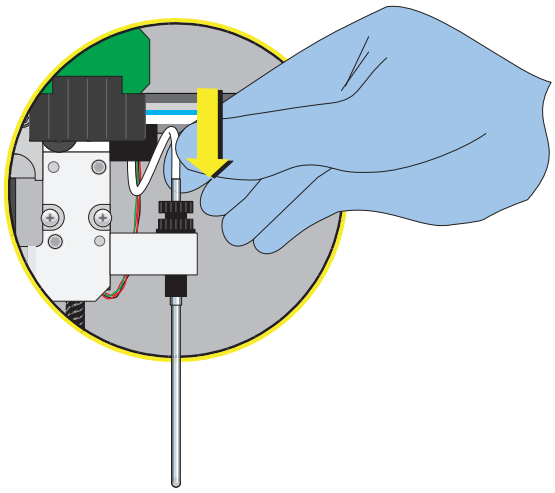
1 Insert the new dispense probe into the holder.



2 Tighten the knurled nut.



3 Reattach the tubing to the top of the probe.



4 Lower the Front Cover and Install the Transport Shield.

5 Select **OK** to continue.

6 See Dispensing Diluent - DxH Slidemaker Stainer II and follow the steps.

Dispensing Diluent - DxH Slidemaker Stainer II

Follow these steps to dispense diluent when installing a new dispense probe or a new aspiration probe.

1 Select **Menu > Diagnostics > Dx Tools** to verify that the new probe is functional.

2 Select the **SAM** tab.

3 In the *Fluidics* option box, select one of the following from the drop-down list:

- **Dispense Diluent from Aspiration Pump** if you are installing a new aspiration probe.
- **Prime SAM** if you are installing a new dispense probe.

4 Select **Start** from the local navigation bar.

If you are installing a new aspiration probe, the system:

- Extends the single-tube station.
- Prompts you to insert an empty capped tube into the left position.
- Retracts the single-tube station.
- Dispenses diluent from the aspiration pump through the aspiration probe and into the tube.
- Extends the single-tube station.
- Prompts you to remove the tube and select **OK** on the System Manager screen.

If you are installing a new dispense probe:

- The system displays *Prime SAM is in progress. Please wait...*
- The dispense probe advances into the wash cup and is cleaned with diluent.

5 If you are installing a new aspiration probe, verify the aspiration probe alignment OR
If you are installing a new dispense probe, select **Stop**.

Replacing Fill Probes and Drain Probes - DxH Slidemaker Stainer II - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES

NOTE This procedure does not apply to these new fill and drain probes:

Follow this procedure when replacing or cleaning fill probes and drain probes.

1 Select **Menu** > **Diagnostics** > **Dx Tools**.

2 Select the **Slidestainer** tab.

3 Select **Fluidics**.

4 Select **Drain All Baths** from the pull-down list.

5 Remove the Transport Shield and Lift the Front Cover.

6 Select  .

7 Select **Detailed Status** from the local navigation bar.

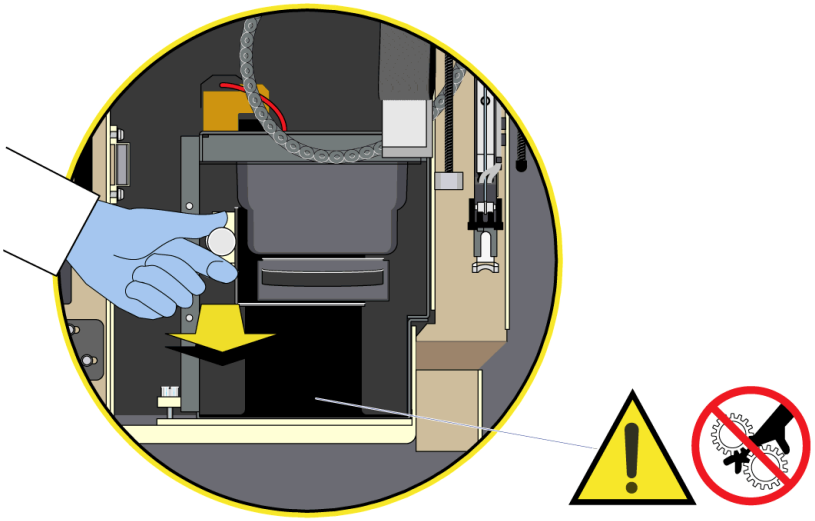
8 Select **Power Down** from the local navigation bar.

9 Remove the Stainer Shield.

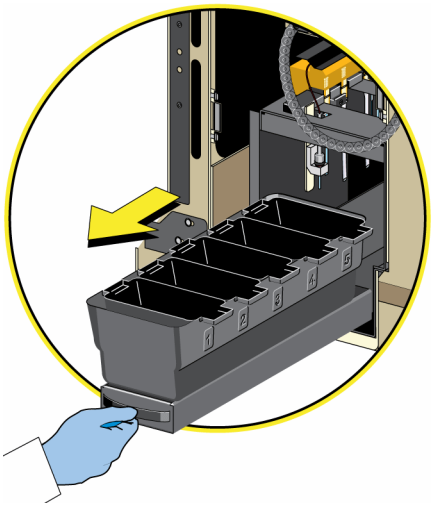
⚠ WARNING

Risk of injury. The bath tray descends to the bottom of the Stainer module when you pull the bath tray release knob. To avoid being pinched, do not place your hand on the frame of the Stainer module below the bath try.

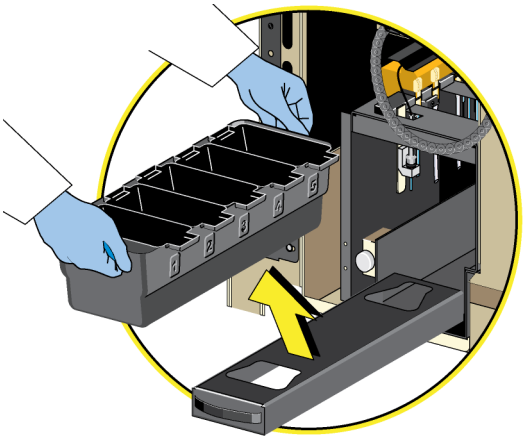
10 Pull the bath tray release knob to lower the stainer bath tray.



11 Grasp the handle on the stainer drawer and pull the stainer bath tray out to the maintenance position.

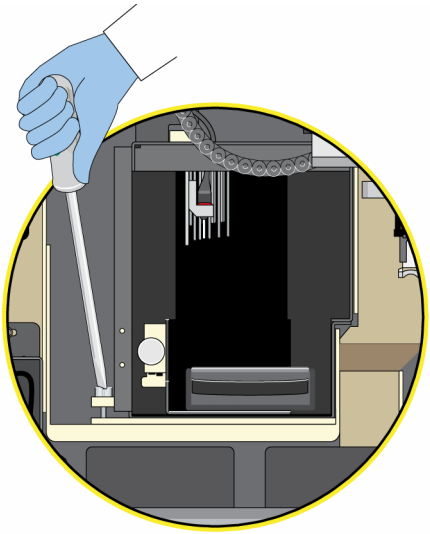


12 Remove the bath tray from the instrument.



13 Access the probes for removal and installation:

a. Remove the Stainer locking screw using both hands.



⚠ CAUTION

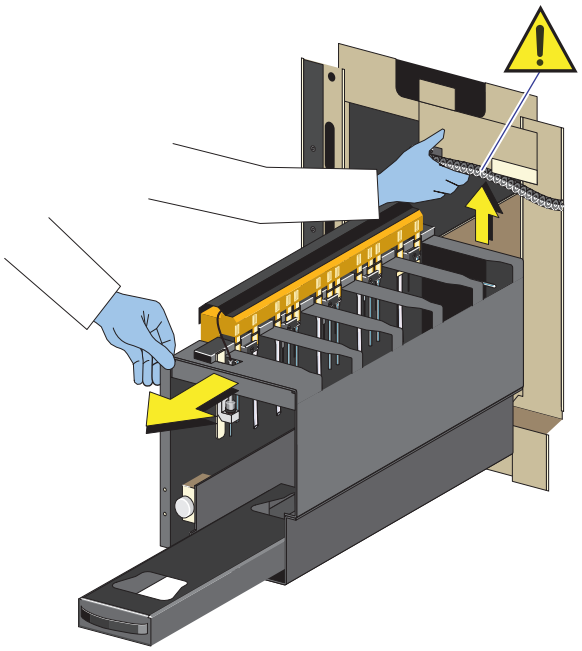
Risk of damage to the dispense probe and/or the aspiration probe. Ensure that the SAM is powered OFF and is moved completely out of the way before pulling out any module. (For access to the Slidemaker, the SAM must be on the left side to avoid bending the dispense probe. For access to the Slidestainer, the SAM must be on the right side to avoid bending the aspiration probe.)

b. Verify that the SAM is on the far right.

⚠ WARNING

Risk of injury and contamination. Use caution when handling the probe and moving the tubing chain.

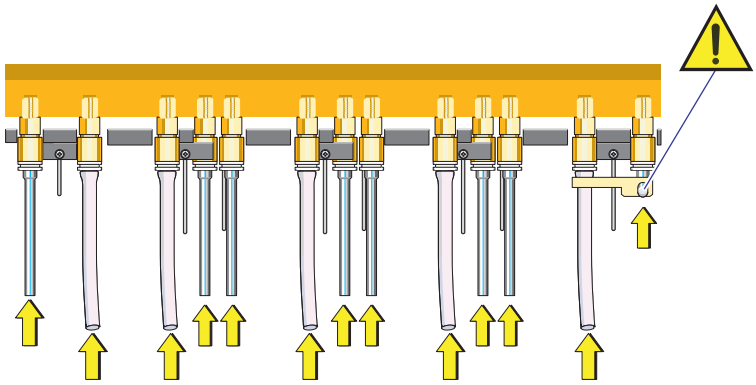
c. Lift the SAM tubing chain and pull the stainer out to the service position.



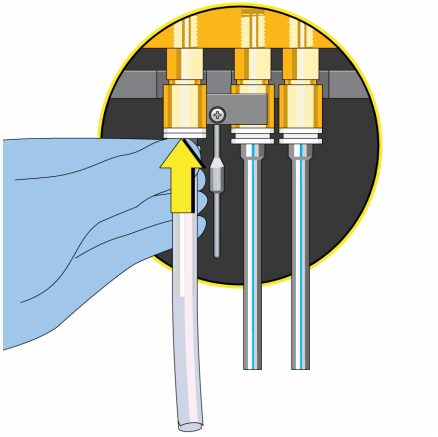
14 Place some absorbent material such as paper towels in the areas where liquid may leak.

15 Locate the applicable probe.

NOTE Pay particular attention to the orientation of the probe when removing the probes for Bath 5.

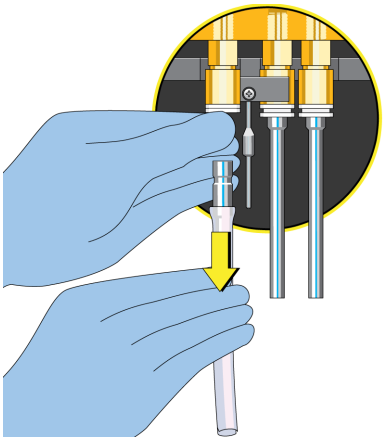


16 Push up and hold the lower ring of the white probe quick disconnect.



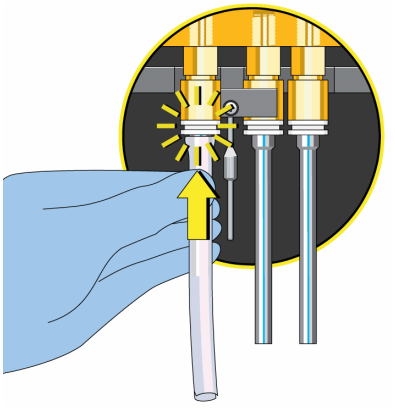
17 With the lower ring of the white probe quick disconnect in the up position, pull straight down on the probe to remove the probe.

NOTE Remove the probes one at a time and keep them in order due to their different lengths. When you replace the probes, replace them in the same order.



18 Follow the procedure in Extensive Cleaning of Fill Probes and Drain Probes - DOES NOT APPLY TO NEW FILL AND DRAIN PROBES in CHAPTER 12, Cleaning Procedures, if necessary.

19 Install the probe in its corresponding location by positioning the probe into the locking ring and pushing straight up until you hear a click.

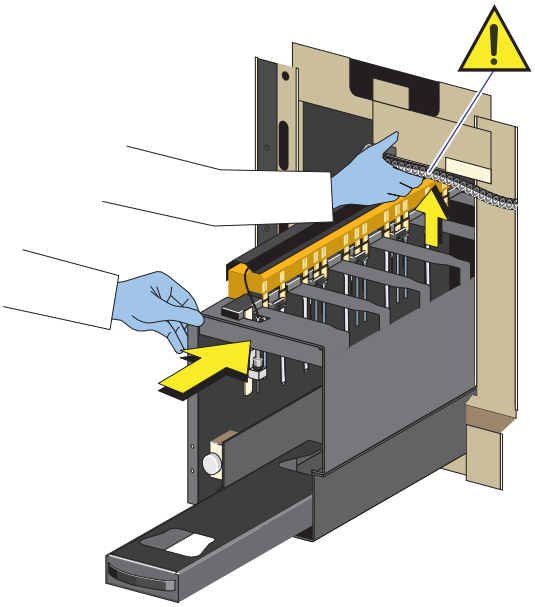


20 Verify the probe is seated properly by pulling straight down on the probe to ensure that it will not come out.

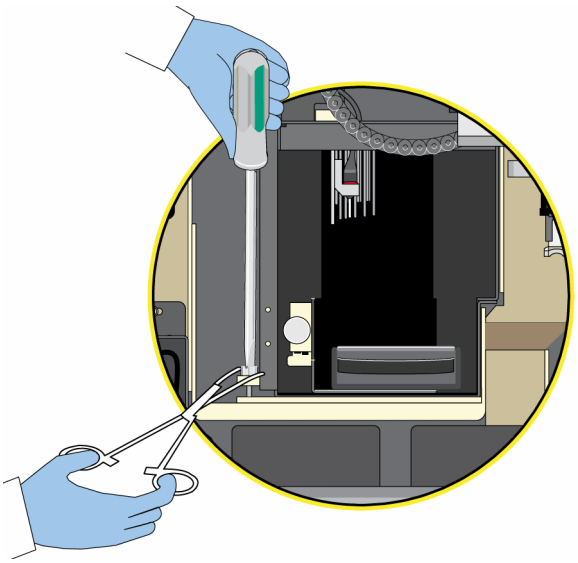
⚠ WARNING

Risk of injury and contamination. Use caution when moving the tubing chain.

21 Lift the SAM tubing chain out of the way and push the stainer back into the operating position.

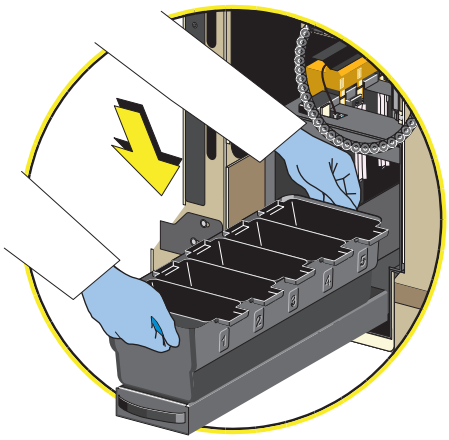


22 Using a large hemostat, insert the Stainer locking screw and tighten it.

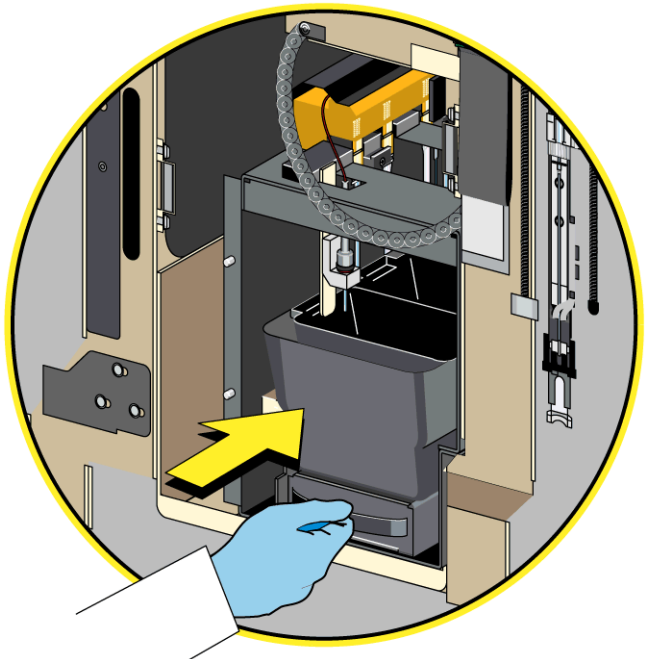


23 Remove the Stainer Shield.

24 Place the bath tray back in the stainer drawer.



25 Push the tray drawer back up into the stainer until it clicks into position.



26 Install the Stainer Shield.

27 Lower the Front Cover and Install the Transport Shield.

28 Select **Power Up** from the local navigation bar.

Replacing or Refilling the Reagent Containers - DxH Slidemaker Stainer II

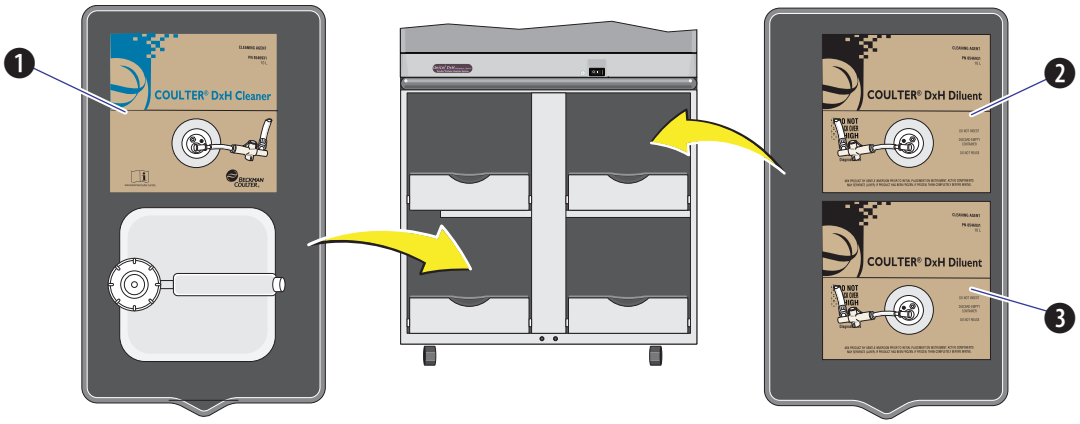
Follow the applicable procedure to:

- Replace Beckman Coulter Manufactured Reagent Containers
- Refill Supply and Deionized Water Containers

Replace Beckman Coulter Manufactured Reagent Containers

1 Locate the old reagent container.

NOTE The DxH 690T and the DxH Slidemaker Stainer II do not have a quad diluent container configuration.



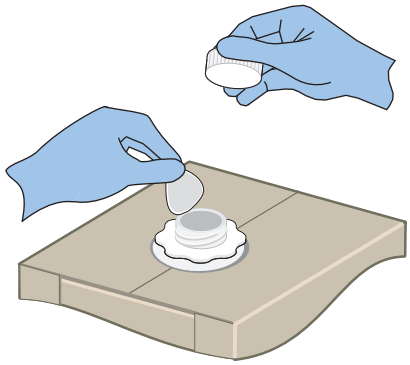
Number	Description
1	Cleaner Reagent
2	Diluent 1 Container
3	Diluent 2 Container

2 Place the new reagent box near the old container.

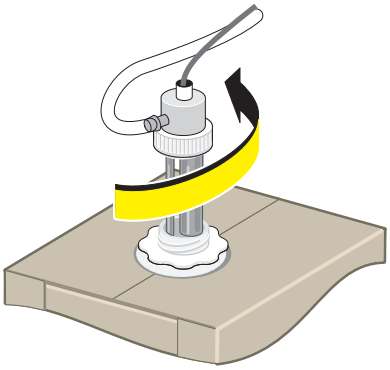
NOTE On a floor stand, lift out the old container and place the new container on the drawer. Ensure that you position the containers correctly in the floor stand so that you do not crimp the tubes when they are inserted.

3 Remove any cardboard cutouts from the new container.

4 Remove the cap and seal from the new reagent container. Be sure to completely remove the foil seal and lift the neck of the container.



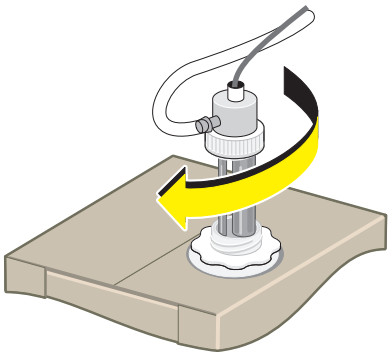
5 Unscrew the pickup tube assembly from the old container and lift it straight up and out.



6 Inspect the pickup tube for damage and replace it, if necessary.

IMPORTANT Check the tube for visual leaks or places where the tube is crimped or pinched. If there are leaks you will need to replace the tube. If there are crimped or pinched areas, the container may need to be repositioned.

7 Carefully insert the pickup tube assembly straight into the new container and tighten the cap.



8 Cap the old container securely.

9 Replace the old container in the floor stand with the new container.

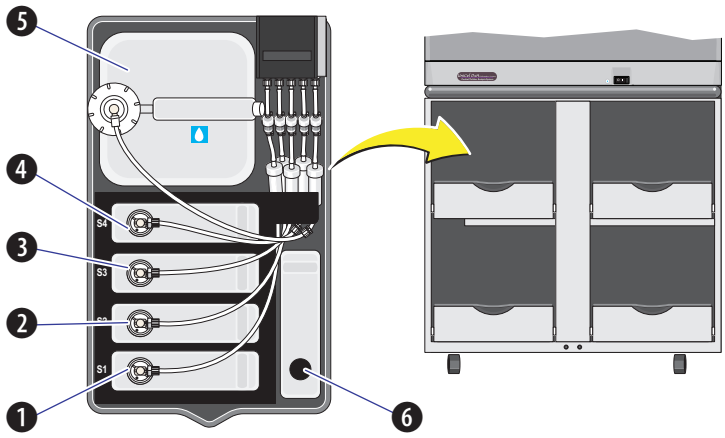
10 Scan a new container's information on the Setup DxH Supplies dialog box or manually enter information on the Setup Other Supply dialog box. See Setting Up DxH Slidemaker Stainer II Reagents in CHAPTER 9, Setup.

11 Dispose of the old container in accordance with your laboratory standards and local regulations.

Refill Supply and Deionized Water Containers

1 Locate the old supply container.

NOTE If you are using a floor stand, locate the deionized water and the stain reagents in the top left drawer shown.



Number	Description	Number	Description
1	Supply 1 (S1)	4	Supply 4 (S4)
2	Supply 2 (S2)	5	Deionized Water
3	Supply 3 (S3)	6	Extra Cleaning Bottle

⚠ WARNING

Risk of biohazardous contamination. Place the pickup tube away from any source of contamination. To avoid spills, use a funnel to refill the supply containers.

2 Quick disconnect the pickup tube assembly from the old container.

NOTE For deionized water and methanol containers, take the containers aside and refill them.

The deionized water container can be removed from the input tubing and refilled at the deionized water source.

Do not overfill the container. Leave about 2.54 cm (1 in.) of air at the top of the container.

3 Remove the old container from the supply tray.

4 Place a new container for the same supply into the supply tray.

5 Unscrew and inspect the pickup tube for damage and replace it, if necessary, when transferring the pickup tube to the new container.

6 Carefully insert the pickup tube assembly straight into the container and tighten the cap.

NOTE Changing staining reagents that are out, places the stainer in an inactive state and triggers a message in the log. To continue staining, reactivate the stainer by double-clicking the Instrument Status screen and selecting the **Start** button pertaining to the stainer.

Replacing the Biohazard Waste Container - DxH Slidemaker Stainer II

⚠ WARNING

Risk of 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.

⚠ CAUTION

Risk of faulty tubing connection. Waste containers (if used) must be located in a safe place and the tubing connection integrity must be verified periodically. DO NOT replace the waste container while the instrument is cycling.

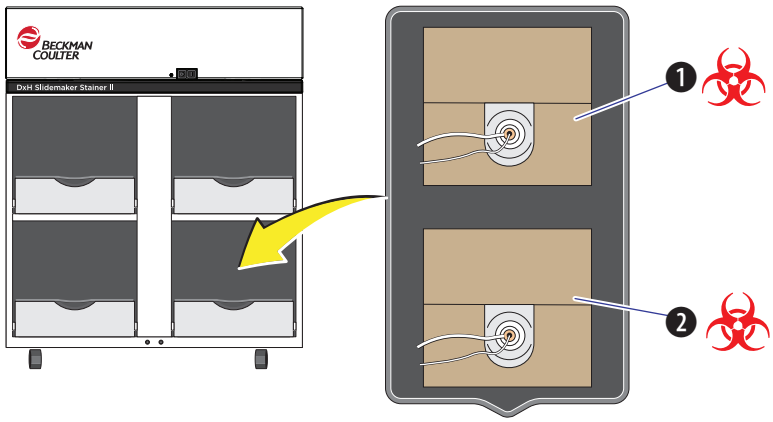
⚠ CAUTION

Risk of faulty waste line. If the waste line is connected to a drain instead of a waste container, the waste line must be secured into the drain so that the tube cannot accidentally come out of the drain. If you are using this method of waste removal, Beckman Coulter recommends that you schedule routine maintenance of the laboratory drain pipes.

1 Ensure that the instrument is not cycling.

2 Locate the waste containers.

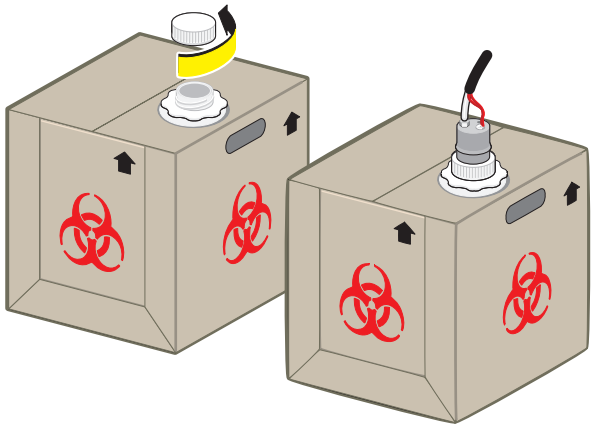
NOTE If you are using a floor stand, locate the waste containers in the bottom right drawer.



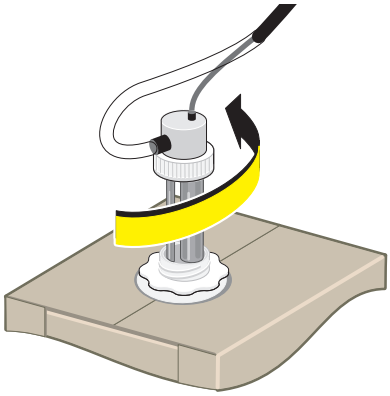
Number	Description
1	Waste 1 Container
2	Waste 2 Container

3 Label and uncap an empty waste container and place it near the full one. Save the cap to put onto the full waste container.

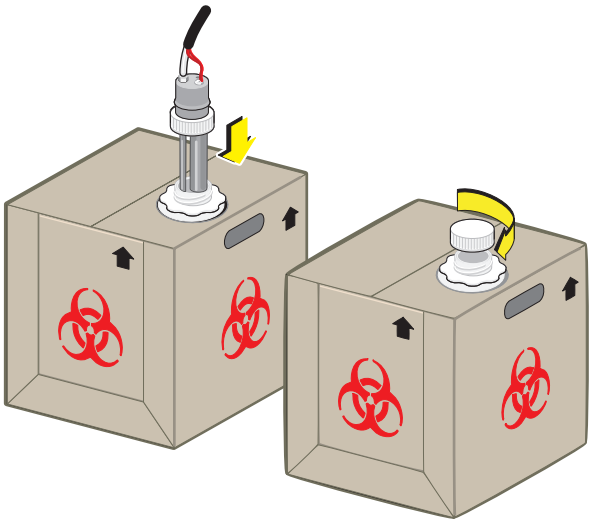
NOTE If you are using a floor stand, remove the full waste container from the drawer and replace it with an empty container. Remove the tubing from the full waste container and insert it into the empty container.



4 Unscrew the waste tube/level sense assembly cap and lift the assembly straight up and out.



5 Insert the assembly into the empty waste container and screw the cap tightly in place. Cap the full waste container before moving it.



⚠ CAUTION

Risk of damage to slides and stains. Keep undiluted bleach away from the DxH Slidemaker Stainer II to prevent fumes from reaching the slides or stains and damaging them.

6 Verify that the old full waste container is clearly labeled and remove it away from the DxH Slidemaker Stainer II.

7 Add 250 mL of 5% bleach to the 10 L old waste container, then discard according to your laboratory's standards for biohazardous material.

Replacing the Stain Waste Container - DxH Slidemaker Stainer II

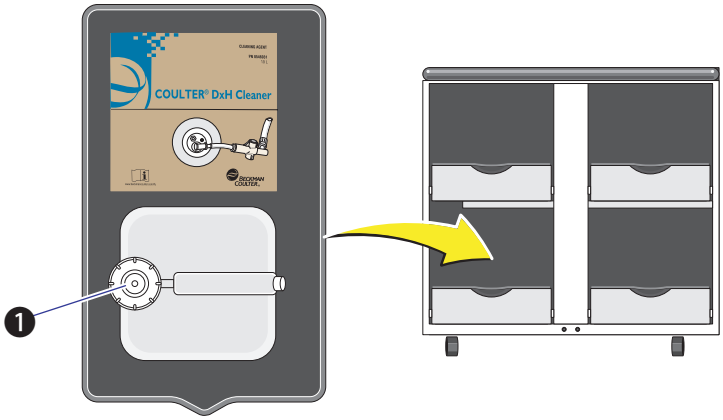
⚠ WARNING

Risk of injury. Methanol is dangerous, poisonous, flammable, and requires special handling. Refer to the Safety Data Sheets (SDS) for details. Ensure that the STAIN WASTE container is clearly labeled and that it is not exposed to sparks or flame. Dispose of STAIN WASTE in accordance with federal, state, and local regulations. NEVER connect the STAIN WASTE tubing directly to a drain.

1 Ensure that the instrument is not cycling.

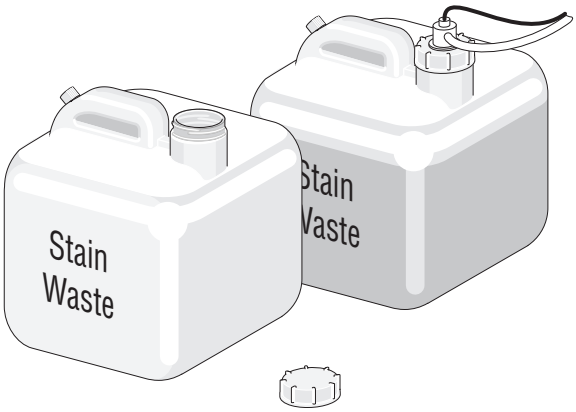
2 Locate the stain waste container.

NOTE If you are using a floor stand, locate the stain waste container (**1**) in the bottom left drawer.



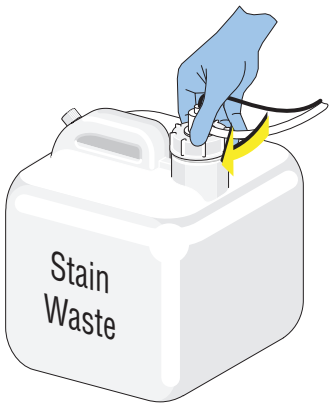
3 Place a properly labeled, uncapped, empty stain waste container near the full one. Save the cap to put onto the full stain waste container.

NOTE If you are using a floor stand, place the empty stain waste container into the drawer first, and the full container on the floor; then, remove the tubing from the full stain waste container.



4 Unscrew the waste tube/level sense assembly cap and lift the assembly straight up and out.

5 Insert the assembly into the empty stain waste container and screw the cap tightly in place. Cap the full stain waste container before moving it.



6 Verify that the old container is clearly labeled, then dispose of the contents of the methanol waste container in a non-flammable container in accordance with your local regulations and acceptable laboratory procedures.

Replacing the Printer Cartridge - DxH Slidemaker Stainer II

You may need a step stool to access the slide printer area on your DxH Slidemaker Stainer II. Otherwise, place the Slidemaker in the maintenance position. See Slide Printer Cover - Removing and Installing - DxH Slidemaker Stainer II in CHAPTER 10, Troubleshooting.

Remove the Printer Cartridge

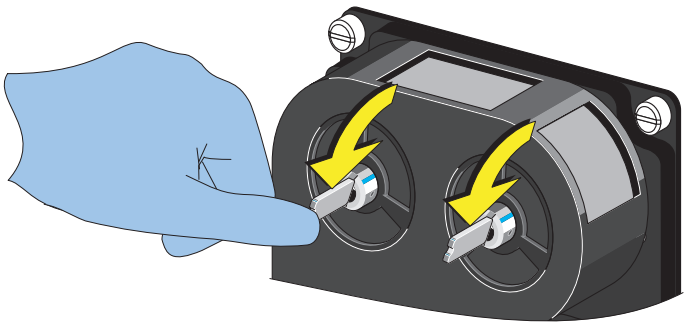
1 Select 
OR
Select **Menu > Supplies > Slidemaker**.

2 Select **Replace Ribbon** from the local navigation bar. The system will display a message instructing you to load the new printer cartridge.

3 Remove the cartridge cover (see Figure 1.8, Right-Side View of the DxH Slidemaker Stainer II in CHAPTER 1, System Overview) and ensure the Slidemaker is back into the operating position.

NOTE The Printer Ribbon contains Protected Health Information (PHI), dispose accordingly.

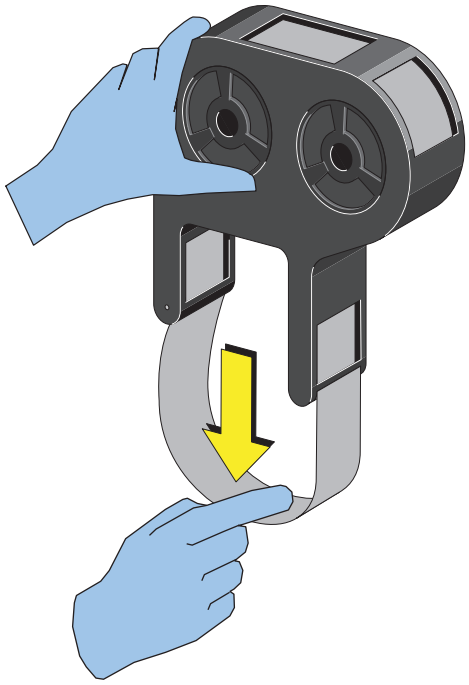
4 Unlock the printer cartridge locking pins.



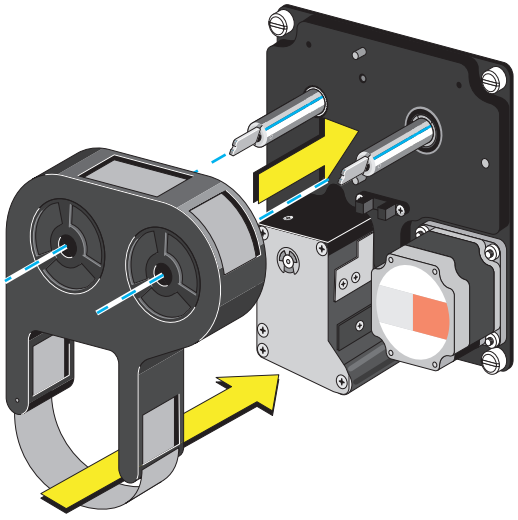
5 Pull the printer cartridge forward and out.

Install the New Printer Cartridge

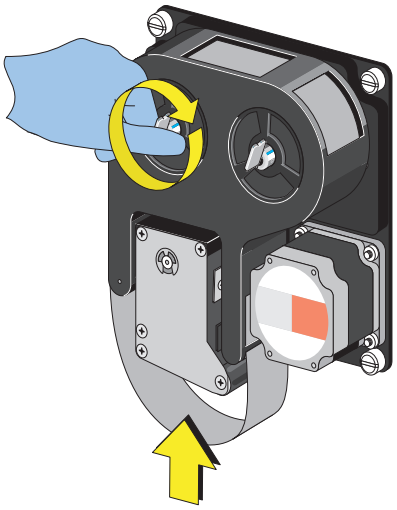
1 Hold the new printer cartridge and create slack in the ribbon.



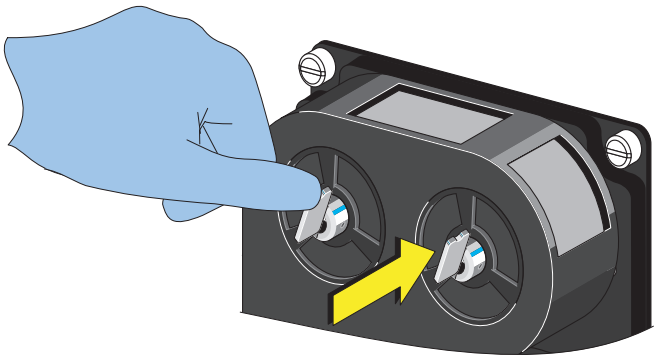
2 Insert the new cartridge by ensuring that the ribbon loop is under the print head and the pins are properly aligned with the holes.



3 If necessary, take the slack out of the ribbon by turning the left pin clockwise.



4 Secure both metal pins to the printer cartridge by pushing them in.



5 Replace the cartridge cover and ensure that the Slidemaker is back in the operating position.

6 Select **Load** on the screen when finished.

Replacing the Stainer Reagent Line Filters - DxH Slidemaker Stainer II

Follow these steps to replace the stainer reagent line filters when you replace a reagent type.

NOTE In order to minimize spillage, perform this procedure when the reagent supply has been depleted.

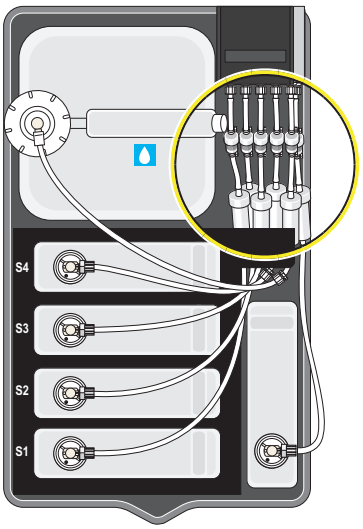
1 Open the left cabinet door and pull the drawer all the way out.

NOTE This step applies only if you have a floor stand with your instrument.

2 Locate the supply lines support plate and the lines to be replaced.

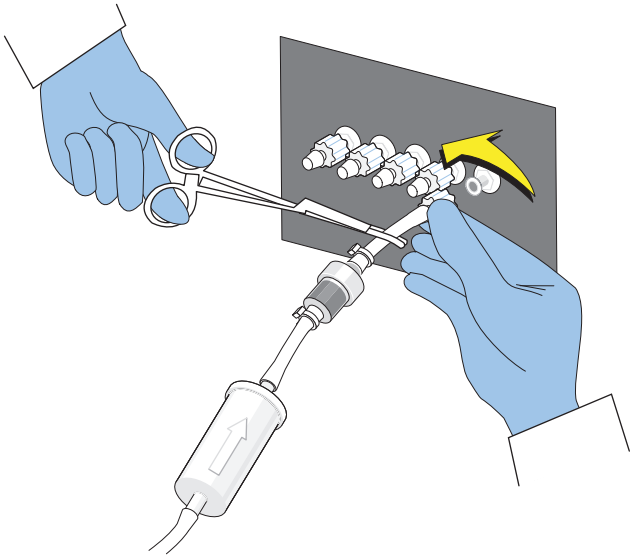
NOTE The figure below applies to an instrument with a floor stand. For a DxH Slidemaker Stainer II on a bench top, the filters will be on the right side of the supply drawer on the back.

Alternatively, you may have multiple 1 L cleaning bottles.

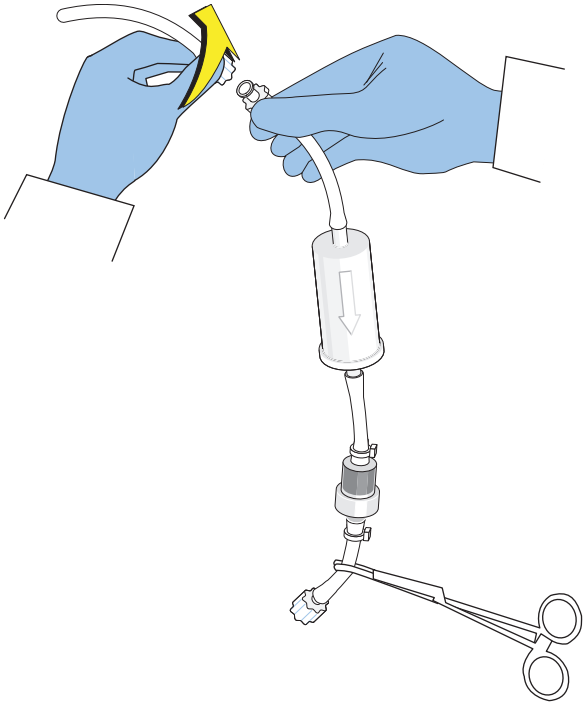


3 Place absorbent material, such as paper towels, under the supply lines and support plate to catch any reagent drips.

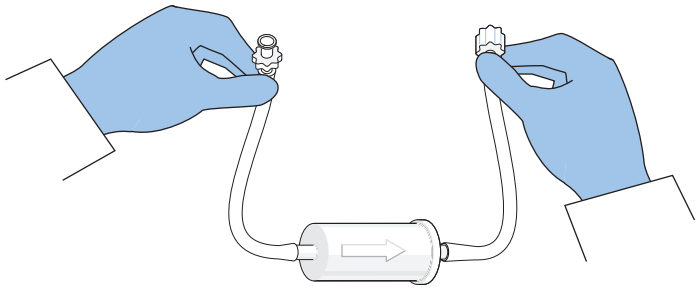
4 Pinch the reagent line filter with a hemostat on each end and unscrew it from the supply lines support plate to disconnect it.



5 Unscrew the other end of the reagent line filter.

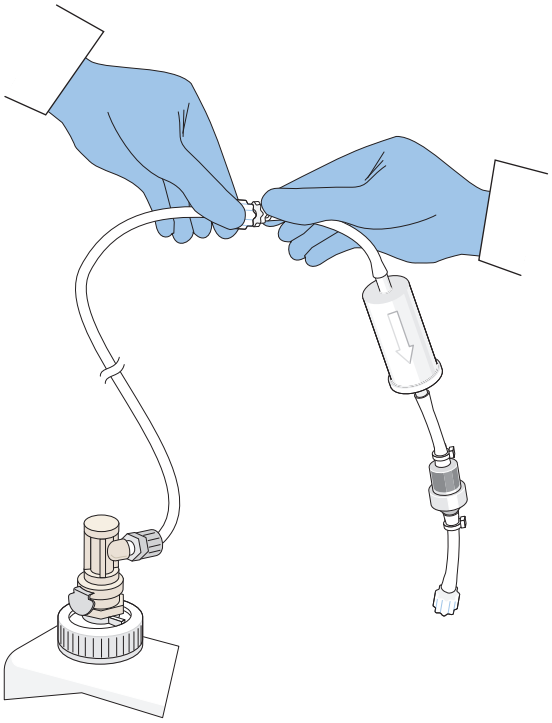


6 Carefully hold both ends of the reagent line filter to avoid dripping and remove the hemostat.

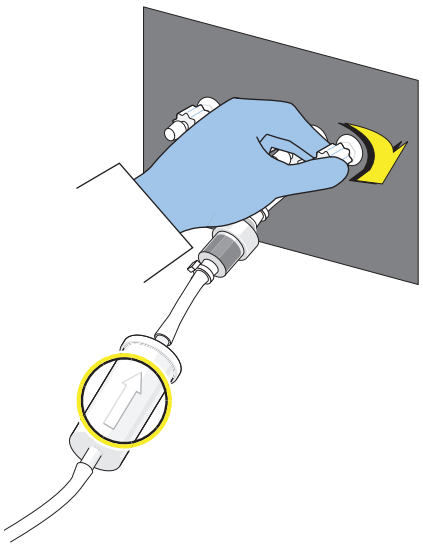


7 Discard the used reagent line filter in accordance with your local regulations and laboratory standards.

8 Connect the new reagent line filter into the quick disconnect supply line and ensure that the arrow on the filter is pointing away from the quick disconnect. You should hear one click with the connection.



9 Connect and screw the other end of a new reagent line filter to the supply line on the support plate, pointing the arrow on the line upward.



10 Push in the reagent drawer and close the cabinet door.

NOTE This step applies only if your instrument has a floor stand.

Loading Slides - DxH Slidemaker Stainer II

The software supply icon turns amber when the slide level is low.

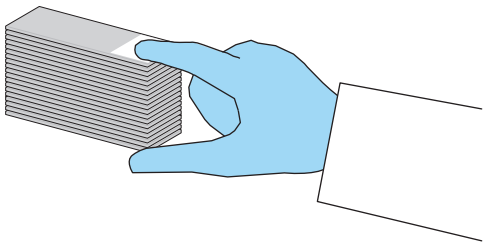
The software supply icon will turn red when the slides are completely out. The system will go offline until more slides are loaded. Go back online to continue processing the slides.

⚠ WARNING

Risk of injury and biohazardous contamination. Handle slides with care to avoid skin puncture. Clean up any broken glass or blood spill as quickly as possible. Dispose of all contaminated disposable cleaning materials and broken slides in accordance with your local regulations and acceptable laboratory practices.

1 Open the ejector door (see Figure 1.6, Front View of the DxH Slidemaker Stainer II in CHAPTER 1, System Overview).

2 Remove slides from the box handling them by the painted end.

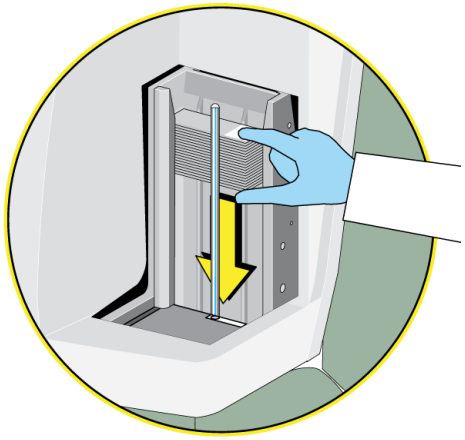


⚠ WARNING

Risk of injury. Handle slides with care to avoid skin punctures. Load the slides flat against the pins to avoid breaking the slides. Clean up any broken glass as quickly as possible.

3 Load the slides into the slide chute in the same direction with the painted side up and flush against the right side of the slide chute.

NOTE You can load up to 172 slides. Be aware that slides exposed to high humidity may stick together.



4 Close the ejector door.

APPENDIX A

Special Equipment

Bar Code Label Specifications

The supported specimen bar code symbologies are Code 128, Codabar, NW7, Code 39, and Interleave 2 of 5. The number of characters that can be read by the bar code reader is limited to 22 characters or to that which can be printed in the viewable height, whichever is less.

Approximately the bottom 10 mm and the top 10 mm of all tubes is not viewable by the bar code reader. This is due to the curvature at the bottom of a rounded tube as well as to the cassette barcode window. The top 10mm dimension is measured from the bottom edge of the cap.

Table A.1 Printing Parameter Specifications

10 µM 3:1 Ratio Recommended				
	Number of Characters by Code Type			
Minimum Tube Length Required	Code 128 *	Code 39	Interleave 2 of 5	Codabar
55 mm	9	4	12	8
60 mm	11	5	14	9
65 mm	12	6	16	11
70 mm	14	8	18	12
75 mm	16	9	20	14
80 mm	19	10	22	16
85 mm	21	11	—	18
90 mm	22	12	—	19
95 mm	—	13	—	20
100 mm	—	14	—	22

* The DxH Systems support Codabar with AIM-16 using A as the leading and trailing character.

Bar Code Label Specifications - DxH Slidemaker Stainer II

The supported specimen bar code symbologies are Code 128, Codabar, NW7, Code 39, and Interleaved 2 of 5. The number of characters that can be read by the bar code scanner is limited to 22 characters or whatever can be printed in the viewable height, whichever is less.

The bottom 10 mm and the top 10 mm of all tubes are not viewable by the bar code scanner. This is due to the curvature at the bottom of the rounded tube as well as to the cassette bar code window. The top 10 mm dimension is measured from the bottom edge of the cap.

The system can print linear or data matrix (2D) bar code labels. Slide bar code labels default to 2D when the number of characters with certain symbologies exceeds the printable area of the slides.

NOTE The DxH Slidemaker Stainer II does not support Codabar with AIM-16 checksum technology with leading or trailing characters other than **A**.

Table A.2 Printing Parameter Specifications

10 µM 3:1 Ratio Recommended				
Minimum Tube Length Required	**Number of Characters by Code Type**			
	Code 128	**Code 39**	**I 2 of 5**	**Codabar**
55 mm	9	4	12	8
60 mm	11	5	14	9
65 mm	12	6	16	11
70 mm	14	8	18	12
75 mm	16	9	20	14
80 mm	19	10	22	16
85 mm	21	11	—	18
90 mm	22	12	—	19
95 mm	—	13	—	20
100 mm	—	14	—	22

Recommended Tubes

Tube acceptance criteria was established on the comparator model DxH 800 (see www.beckmancoulter.com for a list of test tubes) for physical compatibility. Tubes are not recommended based on analytical performance. You should establish analytical acceptance for tube types in your laboratory that meet the physical dimensions and cap materials for testing at the single-tube station (see Single-Tube Presentation in CHAPTER 5, Sample Analysis and/or the corresponding cassettes (see Cassette Presentation in CHAPTER 5, Sample Analysis).

Tubes vary in cap types and materials which may produce results with system messages, events, or flags related to aspiration. Follow the instructions for use from the tube manufacturer. Some tube types have limitations for the number of pierces, and requirements for fill volume and mixing. Verification of the collection tube is required by your laboratory.

⚠ CAUTION

Risk of erroneous results. Narrow tubes with small internal diameters will require manual premixing prior to analysis to ensure proper cell and plasma distribution and to avoid possible erroneous results. Premix these tubes before placing them in the cassette and then analyze the cassette by placing it in the Stat position of the Input Buffer. Refer to the tube list at www.beckmancoulter.com for additional information.

⚠ CAUTION

Risk of specimen leakage or clogging. Possible specimen leakage or clopping of the system can occur. Excessive piercing of sample tubes may cause coring of the stopper. The number of pierces without problems can vary among sample tube types and manufacturers. Do not pierce a blood collection tube more than five times.

Verify the instructions for use in the Hematology Tube List. Some tube types have more restrictive instructions for use and limitations on the number of pierces.

Slide Specifications

Use only Beckman Coulter slides or approved Beckman Coulter slides with:

- White or painted frosted ends (not etched, sandblasted, or blank)
- Chamfered corners

Slides require a second painted area for separation.

IMPORTANT Microscope slides and cover glasses should be rotated. Rotation is the first line of defense against temperature and humidity changes resulting in moisture contamination. They should also be kept off of concrete floors on a pallet. Slides should be kept as far away as possible from doors and heating and air conditioning ducts to minimize temperature and humidity changes.

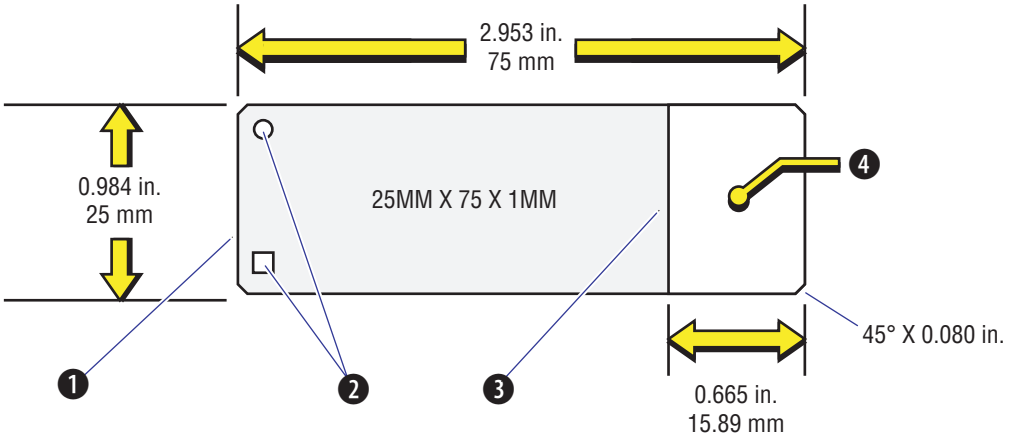
Slide and cover glass cases should be allowed to come to room temperature in the lab before they are opened.

These precautions will minimize the chances of slides and cover glasses developing problems related to moisture contamination such as sticking and corrosion of the glass surface. Remember that slides do not necessarily have to be old to have been affected by moisture, just that the chance of a moisture contamination increases with the age of the product.

Slide Dimensions

Use only Beckman Coulter slides with the following specifications:

Figure A.1 Slide Specifications



Number	Description
1	Smear edge
2	Separators
3	No overspray allowed on the clear area of the slide from painting (frosting) process
4	White painted (frosted) slide end/side

Other Slide Parameters

Dimensions	25mm X 75 mm X 1 mm: 1 mm (0.040 in.) + 0.08/- 0.13 mm (+ 0.003/-.005 in.)
Material	Soda Lime Glass
Surface Wettability	Per ISO 8037-2, Section 6.8 or similar
Beveled Edges	Not Allowed

Painting

The painted end must be an opaque white applied by a coating application (deposition), not by sandblasting or acid etching, compatible with thermal transfer printing.

Smear Edges

The finish on the slide edges shall be ground and polished to minimize blood margination and accumulation. The edges shall be free of rough and sharp cutting surfaces. Beveled edges are not allowed.

Slide Material

The material composing the slide shall be clear transparent glass, free from imbedded foreign material, bubbles, blisters, striae, and internal cloudiness. The glass type chosen for the slide construction shall have strength, hardness, and brittleness characteristics which will minimize slide cracking and breakage as well as the formation of ground glass residue and chips.

Color and Optical Properties

The faces of the slide shall be colorless when judged by the unaided eye. Any coloration on the slide edgewise, shall not materially affect the light transmitted through the slide faces.

Precleaning

Slides are precleaned and will demonstrate uniform dispersion of liquid and an absence of smears on both surfaces. The precleaned slides will be free of all traces of moisture, cloudiness, detergent, and oily, waxy, or syrupy film (suggested protocols include NNN-S-450B*, sections 4.4.1.1 and 4.4.1.2).

Boiling and Solubility

The slides shall show no evidence of fogging, chipping, cracking, or formation of pink color when tested according to NNN-S-450B, sections 4.4.2 and 4.4.3.

Storage

Precleaned blank slides should not be stored one year from the manufacturing date.

* International Standards ISO 8037/1, Optics and Optical Instrument - Microscope Slides - Part 1: Dimensions, Optical Properties and Markings.

APPENDIX B

Operator Access

Operator Access

Operators can be assigned Level I, II, or III (Lab Administrator) access.

The following table lists the operator access by level. If an item is not listed, assume that Level III access is required.

All configuration items not listed must be set up at the System Manager.

Table B.1 Operator Access Levels

Function	Level I	Level II	Level III	*
Manually Modify Patient Demographics	X	X	X	
Review Patient Demographics	X	X	X	
Delete, Rectify, or Replace Patient Demographics		X	X	
PATIENT RESULTS				
Review Patient Results	X	X	X	
Clear Exceptions for Worklist	X	X	X	
Add or Modify Comment	X	X	X	
Edit, Delete, Release, or Export Patient Results		X	X	
Manually Request Rerun/Reflex Tests		X	X	
Delete Comment		X	X	
Manually Generate Patient Reports	X	X	X	
Monitor Slide Carrier Positions	X	X	X	
Specimen Information		X	X	
CONFIGURE PATIENT PROCESSING				
Batching	X	X	X	
Auto-Report Criteria		X	X	
Studies	X	X	X	
Advanced Sort/Filter Criteria	X	X	X	
User-Defined Comments	X	X	X	
TEST ORDER MANAGEMENT				
Manually Create and Modify Test Orders	X	X	X	
Delete Pending Test Orders with NO Results in Progress or Completed	X	X	X	
Manually Delete Pending Completed Test Orders Not in Progress		X	X	

Table B.1 Operator Access Levels *(Continued)*

Function	Level I	Level II	Level III	*
Configure Default Test Orders	X	X	X	
All Test Order Configuration Except Default Test order			X	
QUALITY CONTROL				
Configure Controls	Only **QC Only** Feature	X	X	*
Configure XB and XM	Turn ON/OFF Only	Turn ON/OFF Only	X	*
Configure Extended QC			X	*
Delete Control Results and Files, XB, XM			X	
Export Control, XB, and XM Results		X	X	
Add, Modify, and Delete the Control, XB, and XM Comments	X	X	X	
Manually Generate the Control, XB, and XM Reports	X	X	X	
Set Up Automatic QC Run Notification			X	
Set Up Automatic Notification to Calibrate		X	X	
QUALITY ASSURANCE				
CBC Calibration		X	X	
Reproducibility		X	X	
Carryover		X	X	
Export Calibration-Related Results		X	X	
Generate Quality Assurance Reports		X	X	
Configure QA Auto-Report Criteria	X	X	X	*
MONITOR MODULES AND WORKCELL				
Manual Backup and Recover		X	X	*
Change Module/Workcell State (For Example: Online, Offline, Stop Transport)	X	X	X	
View Module and Workcell Status	X	X	X	
Handle Errors	X	X	X	
LOGS				
View, Print, Sort, Filter, Export ANY Log	X	X	X	
Access Detailed Data in ANY Log Except Service	X	X	X	
Add Comments to ANY Log Except Service	X	X	X	
Delete Logs	Not Consumable, Maintenance, Event, or Audit Logs	X	X	
Add Entries to Maintenance Log	X	X	X	
Manage Host Log	X	X	X	

Table B.1 Operator Access Levels *(Continued)*

Function	Level I	Level II	Level III	*
DX TOOLS/MAINTENANCE				
Service Test/Adjust		X	X	
View Monitoring Functions	X	X	X	
Perform Maintenance Functions	X	X	X	
Configure and Allow RMS Deskstop Sharing			X	*
Upload Information to RMS		X	X	*
Automatic Maintenance Cycles		X	X	*
REPORTS				
Generate Other Reports (Not Patients or Controls)	X	X	X	
Configure Reports (Not Patient or Controls)			X	*
Export and Reset Workload Data			X	**
Generate Workload Report	X	X	X	
SYSTEM CONFIGURATIONS				
Configure System Settings	Turn ON/OFF, Adjust Volume of Audible Alarm Only	Turn ON/OFF, Adjust Volume of Audible Alarm Only	X	*
Configure and Edit Operators and Roles			X	*
Reset Password			X	*
Change Password	X	X	X	*
Bar Code Configurations		Bar Code Discovery Only	X	
Configure Tests			X	*
Configure Printing within the Application			X	*
Configure Slidemaking and Staining		X	X	*
Configure LAS Connection			X	
Configure LIS Communications			Turn ON/OFF Transmission Only	*
Temporarily Disable an Analysis		X	X	*
Configure Error Notification and Conditions at System Manager			X	
Configure Automatic Database Backup		X	X	*
Modify Complex Topology			X	*
Configure Diluent Option 1 (1 or 2 Diluents)			X	*

Table B.1 Operator Access Levels *(Continued)*

Function	Level I	Level II	Level III	*
All Consumable Configurations Except Configure Diluent	X	X	X	*
HELP				

* These items can only be configured at the System Manager.

** A Level III operator cannot perform Reset Workload. To reset workload data, call your Beckman Coulter Representative.

APPENDIX C

Logs

History Logs

Select the icon displaying **!** or select **Menu > Logs** at the top of any screen to display the History Logs screen. The icon background may be either yellow or red for an unreviewed event, or neutral if all events have been reviewed.

The *Log Type* drop-down list on the History Logs screen lets you view logs by type.

Log entries may be tagged to the user as *SYSTEM* as opposed to the logged-on operator.

Some dates in logs may be shown in US1 format as opposed to the selected local format.

Event Logs

The History Logs - Event Logs (**Menu > Logs > Event Logs**) screen displays seven unique tabbed views; however, the options available from the local navigation bar are the same for each tabbed view.

Select a tab to view its information:

- System Status
- Supplies
- QC
- QA
- XB/XM
- Patients
- General

For systems with DxH Slidemaker Stainer II, *Slide Not Made* exceptions are not logged in the Patient filter for the History log. The Worklist Slide tab - *Unreviewed Slide Not Made Exceptions* - shows that the slide was not successfully made. The Worklist icon is red.

DxH event logs are trimmed automatically per instrument when the number of entries in the log is greater than 5,000 and are not associated with a calendar date.

See Guided Help Icons in CHAPTER 1, System Overview for information on the icons used in Guided Help.

Finding Events in the Log

1 Select **Find** on the Event Logs screen to display the Find Event dialog box.

2 Enter the event or a keyword to search and select **Find Next**. You can also select **Up** or **Down** for the direction of the search.

Displaying/Printing Log Details

1 Select **Details** on the History Logs - Event Logs screen to display the Event Details dialog box.

2 Select **Print** to print the details or **Troubleshoot** to troubleshoot the event.

Adding Comments to Logs

1 Select **Comments** on the Event Logs screen to add comments to an event.

2 Enter comments in the **Enter Comment** text box.

3 To **Log Comment/Event in Maintenance Log,** select the check box.

4 Select **OK**.

Filtering Event Log

Filtering events in the Event Log are limited to those events matching the filter criteria that you select. The **Filtered By** fields reflect the selected filter criteria which include the following:

- **Operator ID** filters the events based on the **Operator ID** selected or **All Operators**.
- **Instrument** filters the events based on the **Instrument** selected or **All Instruments**.
- **Date Range** filters the events based on the selected **Date Range**.
- **Severity Setting** filters the events based on the selected **Severity Setting(s)**.

1. Select **Filter** on the History Logs - Event Logs screen to filter events.
2. Select an **Operator ID**.
3. Select a **Date Range**.
4. Select **Security Settings**.
5. If a workcell is available, select **Instrument**.
6. Select **OK**.

Deleting Events from the Event Log

1. Ensure that the filter is set to **All Operators** and **All Entries**.
2. Select **Delete** on the History Logs - Event Logs screen to display the Delete dialog box.
3. Select entries to delete.
4. Select **OK**.

Exporting Events from the Event Log

1. Select **Export** on the History Logs- Event Logs screen to display the History Logs Export screen.
2. Select **Event Logs** to export or **Select All**.
3. Select **Data Summary Logs** to export or **Select All**.
4. Select **Maintenance Logs** to export or **Select All**.

5 Select **Audit Logs** to export or **Select All**.

6 Select **All Dates** or **Specify Date Range**.

7 Select a **Destination**.

8 Select **OK**.

Reviewing Events in the General Event Log

1 From the *General* tab, select the event that you want to review.

NOTE You can also do the following:

- To see a list of the unreviewed events only, select **Unreviewed**. To review the Unreviewed events using the touchscreen, select and hold the first event, go down to the last event you want to review, and lift your finger. Then, select **Review** to review the selected events.
- To select all of the unreviewed events, select **Unreviewed**. To review the Unreviewed events using the keyboard, hold down the **Shift** key, go down the list of events, and select the last event.
- To see events that have Guided Help, select **Guided Help Available**. The events that have Guided Help in the *Fix* or *Resume* state will be displayed. See Guided Help Icons in CHAPTER 1, System Overview for information on the icons used in Guided Help.
- To see both unreviewed events and events that have Guided Help, select **Unreviewed** and **Guided Help Available**. The events that have Guided Help in the *Fix* state will be displayed. See Guided Help Icons in CHAPTER 1, System Overview for information on the icons used in Guided Help.
- To see all of the events matching the **Filter** criteria selected, do not select **Unreviewed** or **Guided Help Available**. Ensure that they are not selected. If **Unreviewed** or **Guided Help Available** are selected, the **Filtered By** fields are updated to reflect the selections.

2 Select **Review**.

Auto Print

See Auto Print History Log Configuration in CHAPTER 9, Setup for instructions on setting up auto print for History Logs.

Printing History Logs

1 Select  at the top of the History Logs screen to print History Logs.

2 Select a **Print Range**.

3 Select the **Print Details** check box to print details.

4 Select **OK**.

Data Summary Logs

1 Select **Data Summary Logs** from the *Log Type* drop-down list. The Data Summary Log screen displays two tabs of History Logs: Supplies and Daily Checks.

The Data Summary Log for Supplies requires a manual printing of the actual data. Auto Print does not contain the actual data.

2 Select a tab to see its history log.

Audit Logs

1 Select **Audit Logs** from the *Log Type* drop-down list to display the audit logs.

2 Use the scroll bars, as needed, to select and review the audit logs.

Edits to *Physician Name* and *Suffix* and changes to bar code alignment adjustments are not entered in the audit log.

Cancellations of pending slide orders or requests for manually made slides requested at the System Manager are not entered in the audit log. Cancellations and requests from the LIS are recorded in the audit logs.

No audit log entry occurs to indicate that a physician or location that already exists in the workstation is received from the LIS. Subsequent attempts to modify that physician or location via the workstation will be prevented since it is managed by the LIS.

Audit Log Setup

- The Audit Log can only be enabled or disabled by a Level III Operator from the System Manager.
- Anytime Audit Log Setup is enabled, disabled, or modified, the DxH system will record an entry in the Audit Log.
- When you export, transmit, or view Protected Health Information (PHI) information in the Workstation screen, Patient Results screen, Patient Demographics screen, or Edit Patient Demographics screen, the system will record an entry in the audit log.
- The detail of the Audit Log entry may be viewed by selecting the entry and selecting details.
- This option is configurable and may be enabled or disabled at anytime.

Enable Audit Log Setup

1 Select **Menu** > **Setup** > **System** > **More** > **Audit Log Setup**.

2 Select the **Enable View PHI Audit Log** checkbox (disabled by default).

3 Select **OK**.

Disable Audit Log Setup

1 Select **Menu** > **Setup** > **System** > **More** > **Audit Log Setup**.

2 Deselect the **Enable View PHI Audit Log** checkbox.

3 Select **OK**.

Maintenance Log

1 Select **Maintenance Logs** from the *Log Type* drop-down list to display the Maintenance log.

2 Go to Add a New Entry to the Maintenance Log to add a new entry to the Maintenance log.

Add a New Entry to the Maintenance Log

1 Select **New Entry** to display the New Log Entry dialog box.

2 Enter a **Message** in the text box.

3 Enter a **Comment** in the text box. (Optional)

4 Select **OK** to save the new entry in the Maintenance Log.

APPENDIX D

Reports

Report Examples

See the appropriate figure for an example of each of the following reports:

- Figure D.1, DxH 900/DxH 690T Patient Lab Report - Example
- Figure D.2, DxH 900/DxH 690T Patient Chartable Report - Example
- Figure D.3, DxH 900/DxH 690T Patient Cumulative Report - Example
- Figure D.4, DxH 900/DxH 690T QC Run Detail Report - Page 1 of 2 - Example and Figure D.5, DxH 900/DxH 690T QC Run Detail Report - Page 2 of 2 - Example
- Figure D.6, DxH 900/DxH 690T QC Summary Report - Page 1 of 2 - Example and Figure D.7, DxH 900/DxH 690T QC Summary Report - Page 2 of 2 - Example
- Figure D.8, DxH 900/DxH 690T QC Summary Graphical Report - Example
- Figure D.9, DxH 900/DxH 690T Extended QC Summary Report - HCT - Example
- Figure D.10, DxH 900/DxH 690T Extended QC Summary Report RBC - Example
- Figure D.11, DxH 900/DxH 690T Extended QC Summary Report HGB - Example
- Figure D.12, DxH 900/DxH 690T Extended QC Summary Report - WBC - Example
- Figure D.13, DxH 900/DxH 690T XB Batch Details Report - Page 1 of 2 - Example and Figure D.14, DxH 900/DxH 690T XB Batch Details Report - Page 2 of 2 - Example
- Figure D.15, DxH 900/DxH 690T XB Batch Means - Example
- Figure D.16, DxH 900/DxH 690T XM Batch Details Report - Example
- Figure D.17, DxH 900/DxH 690T XM Batch Means-RETIC CALC Report - Example
- Figure D.18, DxH 900/DxH 690T Levey Jennings on a Report - Example

The first example, Figure D.1, DxH 900/DxH 690T Patient Lab Report - Example, displays footer details that reflect variable flagging sensitivity. The second line of the footer, left hand side, represents the algorithm revision and, in brackets, the variable flagging sensitivity. Here, [333] indicates that all the sensitivities are set to High [3]. Other possible values are shown below.

Disabled = 0, Low = 1, Medium = 2, High = 3

Only Left Shift can be disabled.

(X _ _)Variant LY, 1, 2, 3

(_ X _)Left Shift, 0, 1, 2, 3

(_ _ X)Immature Granulocytes, 1, 2, 3

NOTE If the algorithm version is not printed on the Patient Lab report, select **Patient Results** > **Additional Information** and refer to the version number in *Algorithm Version*.

Figure D.1 DxH 900/DxH 690T Patient Lab Report - Example

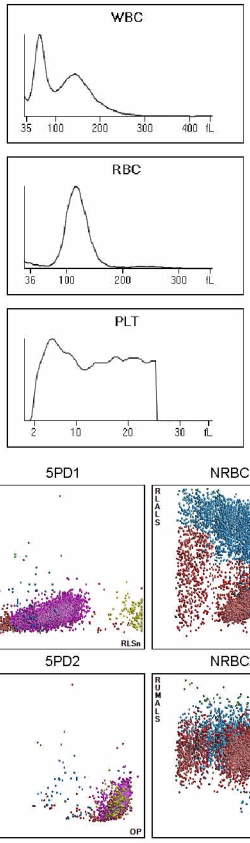
Patient Lab Report

Specimen ID: 89338837543 Panels: CD
Specimen Type: Whole blood Flag Set: Adult Priority: Routine
Physician: Diagnosis:

Name: Patient ID:
Gender: Unknown Age:
Location:
Comment:

Panels		Date	Time	Tube Pos	Instrument	Opr ID	Exceptions
CD	(C)	09/02/2017	02:12:03 PM	00021	DxH9001	SYSTEM	

Test	Result	Flags	Units
WBC	4.2	L	10^3/uL
UWBC	4.2	L	10^3/uL
RBC	4.09	L	10^6/uL
HGB	13.6		g/dL
HCT	45.8		%
MCV	111.9	a H	fL
MCH	33.2		pg
MCHC	29.7	a L	g/dL
RDW	15.8	H	%
RDW-SD	65.6		fL
PLT	117	R L	10^3/uL
MPV	9.9	R	fL
NE	95.2	R H	%
LY	1.2	R L	%
MO	0.1	R L	%
EO	3.5	R	%
BA	0.0	R L	%
NE#	4.0	R	10^3/uL
LY#	0.1	R L	10^3/uL
MO#	0.0	R L	10^3/uL
EO#	0.1	R	10^3/uL
BA#	0.0	R	10^3/uL
NRBC	55.3	Rc H	/100WBC
NRBC#	2.3	Rc H	10^3/uL



Suspect

System
RBC-PLT Overlap
Abn NRBC Pattern
Aged Sample
Low AL2 Events
High RF Events
NE-EO Overlap
NRBC Interference

Definitive
H & H Check Failed

Seg	
Band	
Lymph	
Mono	
Eos	
Baso	
Meta	
Myelo	
Pro	
Blast	
ATL	
Other	
NRBC	
Aniso	
Poik	
Polychr	
Hypo	
Micro	
Macro	
Other	
Reviewed by	
Comment	

INF/DAT Filename: 2017-09-02T14-12-03_89338837543_00021_329

Actions: [1]Rerun

Comment: [S]:call dr

Final Report Actions Required: Rerun
Rev: 0.45.1.3 1.0.3133.5290 [333]
DevOp Printed 09/02/2017 02:19 PM Page 1 of 1

Figure D.2 DxH 900/DxH 690T Patient Chartable Report - Example

Patient Chartable Report

Specimen ID: 89299430487 Panels: CBC
Specimen Type: Whole blood Flag Set: Adult Priority: Routine
Physician: Diagnosis:

Name: Patient ID:
Gender: Unknown Age:
Location:
Comment:

Panels		Date	Time	Tube Pos	Instrument	Operator ID
C	(C)	08/11/2017	09:52:10 AM	00220	DxH9001	SYSTEM

Test	Result	Flags	Units	Low	High
WBC	5.3		10^3/uL	4.3	10.3
UWBC	5.3		10^3/uL	4.3	10.3
RBC	4.99		10^6/uL	4.38	5.77
HGB	14.9		g/dL	13.6	17.2
HCT	42.9		%	39.5	50.3
MCV	86.1		fL	80.7	95.5
MCH	30.0		pg	27.2	33.5
MCHC	34.8		g/dL	32.7	35.6
RDW	13.1		%	11.8	14.3
RDW-SD	38.1		fL		
PLT	211		10^3/uL	156	373
MPV	8.8		fL	6.9	10.8

Comment:

Final Report
DevOp Printed 08/11/2017 09:55 AM Page 1 of 1

Figure D.3 DxH 900/DxH 690T Patient Cumulative Report - Example

Patient Cumulative Report

Name: Patient ID:
Gender: Unknown Age:
Location:
Comment:

Most Recent Whole blood Specimen

Specimen ID: 89299430487 Panels: CBC
Specimen Type: Whole blood Flag Set: Adult Priority: Routine
Physician: Diagnosis:

	08/11/2017 09:52 AM	Units	Most Recent Reference Range Low	High
WBC	5.3	10^3/uL	4.3	10.3
UWBC	5.3	10^3/uL	4.3	10.3
RBC	4.99	10^6/uL	4.38	5.77
HGB	14.9	g/dL	13.6	17.2
HCT	42.9	%	39.5	50.3
MCV	86.1	fL	80.7	95.5
MCH	30.0	pg	27.2	33.5
MCHC	34.8	g/dL	32.7	35.6
RDW	13.1	%	11.8	14.3
RDW-SD	38.1	fL		
PLT	211	10^3/uL	156	373
MPV	8.8	fL	6.9	10.8
NE		%	41.4	73.0
LY		%	19.4	44.9
MO		%	5.1	10.9
EO		%	0.9	6.0
BA		%	0.3	1.5
NE#		10^3/uL	2.1	6.1
LY#		10^3/uL	1.3	3.5
MO#		10^3/uL	0.3	0.9
EO#		10^3/uL	0.0	0.5
BA#		10^3/uL		0.2
NRBC		/100WBC		1.0
NRBC#		10^3/uL		0.1
RET		%	0.52	3.53
RET#		10^6/uL	0.0200	0.1600
MRV		fL		
IRF				

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Figure D.4 DxH 900/DxH 690T QC Run Detail Report - Page 1 of 2 - Example

QC Run Detail Report

Lot Number:	149021948	Exp. Date:	09/25/2017	LIS Status:	Not Sent
Source:	BCI	Instrument:	DxH9001	Shift:	1
Control Type:	COULTER®6C Cell	Tube Pos ID:	00018	System Messages:	
Level:	Level 3	Run Date/Time:	08/11/2017 07:23:13 AM		
Excluded:	No	Presented By:	SYSTEM		
Presentation:	Automatic	Reviewed By:	DevOp		
		Review Date/Time:	08/11/2017 07:29 AM		

Test	Result	Flags	Units	Upper Limit	Lower Limit	SM Error Limit (%)	SM Error Diff%
WBC	8.9		10^3/uL	9.6	8.2	6.50	0.00
RBC	5.12		10^6/uL	5.39	4.93	4.00	-0.78
HGB	16.2		g/dL	16.6	15.2	4.00	1.89
HCT	46.0		%	49.9	42.9	5.00	-0.86
MCV	89.8		fL	94.5	85.5		
MCH	31.7		pg	32.6	29.0		
MCHC	35.3		g/dL	37.0	31.2		
RDW	14.2		%	16.6	11.6		
RDW-SD	45.9		fL	58.6	36.6		
PLT	227		10^3/uL	266	216	8.50	-5.81
MPV	9.6		fL	11.3	7.3		
NE	67.6	H	%	64.0	54.0		
LY	15.0	L	%	29.5	19.5		
MO	7.6		%	11.7	5.7		
EO	9.8		%	11.7	3.7		
BA	0.0		%	0.5	0.0		
NE#	6.0		10^3/uL	7.2	3.2		
LY#	1.3		10^3/uL	3.8	0.6		
MO#	0.7		10^3/uL	1.6	0.0		
EO#	0.9		10^3/uL	2.1	0.0		
BA#	0.0		10^3/uL	0.1	0.0		
NRBC	19.9		/100WBC	21.6	15.6		
NRBC#	1.8		10^3/uL	1.9	1.3		

Comments: INF/DAT Filename: 2017-08-11T07-23-13_149021948_00018_121

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Figure D.5 DxH 900/DxH 690T QC Run Detail Report - Page 2 of 2 - Example

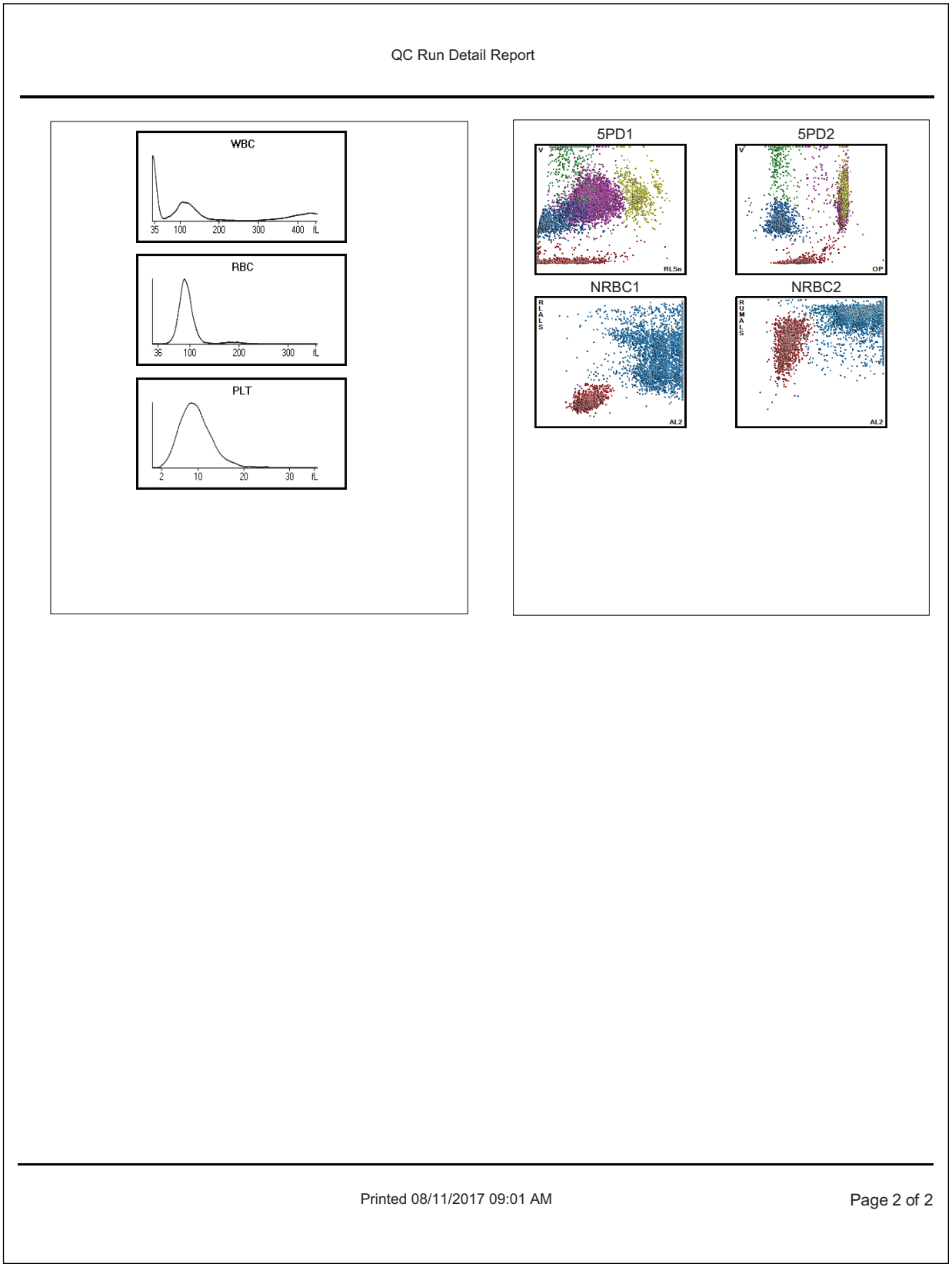

Figure D.6 DxH 900/DxH 690T QC Summary Report - Page 1 of 2 - Example

QC Summary Report

Control Type:	COULTER® 6C Cell	Lot Number:	143191880	Source:	BCI
Level:	Level 3	Expiration Date:	12/24/2017	Instrument:	MP00003
Report Filter:	None	First Run:	10/26/2017 03:22 PM	Last Run:	11/15/2017 10:07 AM
Control File Comments:					

Review Date	Operator	Analysis Date	Md.Ex.	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW	RDW-SD	PLT
				MPV									
10/26/2017 03:31:52 PM	DevOp	10/26/2017 03:22:13 PM	C N	8.846 10.29	5.135	15.26	45.04	87.72	29.72	33.88	15.26	49.88	217.9
No Review		11/02/2017 09:18:05 AM	C N	8.941 10.22	5.200	15.49	45.76	88.01	29.79	33.85	15.21	49.44	226.9
No Review		11/03/2017 09:05:12 AM	C N	8.641 10.30	5.212	15.29	45.89	88.05	29.34	33.32	15.23	49.88	226.1
No Review		11/06/2017 08:56:30 AM	C N	8.796 10.22	5.210	15.49	46.17	88.63	29.73	33.55	15.21	49.88	221.3
No Review		11/07/2017 08:43:04 AM	C N	8.591 10.26	5.119	15.32	45.19	88.27	29.93	33.90	14.95	49.00	221.1
No Review		11/08/2017 09:03:21 AM	C N	8.937 10.34	5.164	15.38	45.70	88.49	29.78	33.66	15.11	49.88	226.9
No Review		11/09/2017 08:29:30 AM	C N	8.965 10.33	5.176	15.45	45.86	88.59	29.84	33.69	14.99	49.00	229.1
No Review		11/13/2017 08:49:47 AM	C N	8.839 10.23	5.182	15.41	45.79	88.37	29.74	33.65	15.20	49.88	225.1
No Review		11/14/2017 08:35:08 AM	C N	8.948 10.20	5.167	15.36	45.81	88.65	29.73	33.54	15.40	50.31	224.2
No Review		11/15/2017 10:07:00 AM	C N	8.850 10.48	5.177	15.37	46.15	89.14	29.69	33.31	15.25	49.88	225.2

Summary Statistics:	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW	RDW-SD	PLT
N	10	10	10	10	10	10	10	10	10	10
Diff	0.035	-0.016	-0.02	-0.16	-0.01	0.03	0.03	-0.02	0.20	2.4
Mean	8.835	5.174	15.38	45.74	88.39	29.73	33.63	15.18	49.70	224.4
2SD	0.258	0.060	0.16	0.73	0.81	0.31	0.42	0.26	0.85	6.7
%CV	1.46	0.58	0.51	0.80	0.46	0.52	0.63	0.87	0.85	1.49
Target	8.800	5.190	15.40	45.90	88.40	29.70	33.60	15.20	49.50	222.0
Limit	0.700	0.230	0.70	3.50	4.50	1.80	2.90	2.50	11.00	25.0

	MPV
N	10
Diff	-0.11
Mean	10.29
2SD	0.17
%CV	0.80
Target	10.40
Limit	2.00

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Figure D.7 DxH 900/DxH 690T QC Summary Report - Page 2 of 2 - Example

QC Summary Report

Control Type:	COULTER® 6C Cell	Lot Number:	143191880	Source:	BCI
Level:	Level 3	Expiration Date:	12/24/2017	Instrument:	MP00003
Report Filter:	None	First Run:	10/26/2017 03:22 PM	Last Run:	11/15/2017 10:07 AM
Control File Comments:					

Review Date	Operator	Analysis Date	Md.Ex.	NE	LY	MO	EO	BA	NE#	LY#	MO#	EO#	BA#
				NRBC	NRBC#								
10/26/2017 03:31:52 PM	DevOp	10/26/2017 03:22:13 PM	C N	54.74 19.26	29.57 1.704	8.15	7.51	0.03	4.843	2.616	0.721	0.665	0.002
No Review		11/02/2017 09:18:05 AM	C N	55.79 19.80	29.42 1.771	7.68	7.07	0.04	4.989	2.630	0.687	0.632	0.003
No Review		11/03/2017 09:05:12 AM	C N	55.13 21.10	29.01 1.823	8.84	6.99	0.03	4.764	2.507	0.764	0.604	0.002
No Review		11/06/2017 08:56:30 AM	C N	55.76 21.36	28.77 1.879	8.28	7.18	0.01	4.904	2.531	0.729	0.632	0.001
No Review		11/07/2017 08:43:04 AM	C N	54.51 21.64	29.35 1.859	8.57	7.57	0.00	4.683	2.521	0.736	0.650	0.000
No Review		11/08/2017 09:03:21 AM	C N	55.33 19.41	29.37 1.735	8.10	7.17	0.03	4.944	2.625	0.724	0.641	0.003
No Review		11/09/2017 08:29:30 AM	C N	54.83 19.99	29.32 1.792	8.63	7.19	0.03	4.916	2.628	0.774	0.644	0.002
No Review		11/13/2017 08:49:47 AM	C N	54.51 20.73	29.94 1.832	7.75	7.80	0.00	4.817	2.647	0.685	0.690	0.000
No Review		11/14/2017 08:35:08 AM	C N	53.98 19.75	30.13 1.767	8.26	7.59	0.04	4.831	2.696	0.739	0.679	0.003
No Review		11/15/2017 10:07:00 AM	C N	55.40 20.82	29.37 1.842	8.74	6.48	0.01	4.904	2.599	0.774	0.573	0.001

Summary Statistics:	NE	LY	MO	EO	BA	NE#	LY#	MO#	EO#	BA#
N	10	10	10	10	10	10	10	10	10	10
Diff	-0.00	-0.08	-0.20	0.26	0.02	-0.040	-0.000	0.033	0.041	0.002
Mean	55.00	29.42	8.30	7.26	0.02	4.860	2.600	0.733	0.641	0.002
2SD	1.17	0.79	0.79	0.76	0.03	0.181	0.122	0.063	0.069	0.003
%CV	1.06	1.34	4.78	5.24	67.09	1.86	2.35	4.31	5.35	67.48
Target	55.00	29.50	8.50	7.00	0.00	4.900	2.600	0.700	0.600	0.000
Limit	5.00	5.00	3.00	4.00	0.50	2.000	1.600	0.800	1.400	0.100

	NRBC	NRBC#
N	10	10
Diff	-0.31	0.000
Mean	20.39	1.800
2SD	1.69	0.113
%CV	4.15	3.13
Target	20.70	1.800
Limit	3.00	0.300

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Figure D.8 DxH 900/DxH 690T QC Summary Graphical Report - Example

QC Summary Graphical Report

Type:	COULTER® 6C Cell	Lot Number:	149021948	Source:	BCI
Level:	Level 3	Expires:	09/25/2017	Instrument:	DxH9001
Filter:	None	First Run:	08/07/2017 02:31 PM	Last Run:	08/07/2017 07:23 AM
Comments:					

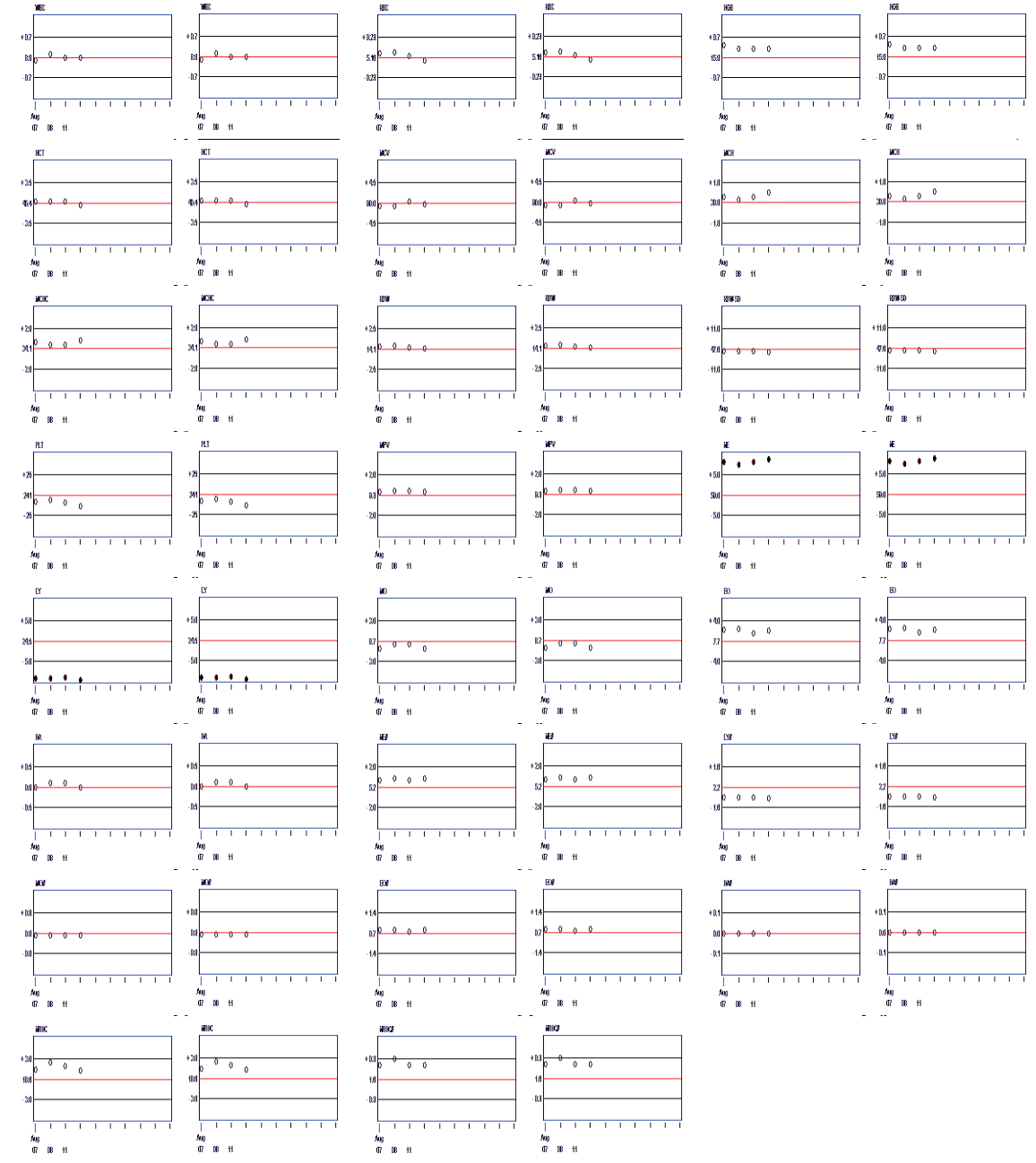

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Figure D.9 DxH 900/DxH 690T Extended QC Summary Report - HCT - Example

Extended QC Summary Report - HCT

Parameter		**Control**	
Parameter ID:		Lot Number:	149021948
Parameter Name:	Hematocrit	Control Name:	COULTER® 6C Cell
		Manufacturer:	BCI
Units:	%	Measurement Principle:	Calculated
Specimen Type:	Whole Blood	Level:	Level 3
Instrument ID:	IMP032_DxH900	Expiration Date:	09/25/2017
Basic Data		**Limits(%)**	
Lab Information:		Random Error:	3.00
Target:	46.4	Systematic Error:	3.00
SM Low Limit:	44.1	SM Error:	5.00
SM High Limit:	48.7		
Statistics			
First Run Date:	08/07/2017	Mean:	46.5
Last Run Date:	08/11/2017	SD:	0.34
Number of Runs:	4	CV:	0.72
Minimum:	46.0	Delta Diff%:	0.2
Maximum:	46.7	RMSE:	0.31

Additional Information:

Date	Comment	Ex	Operator	Result	Diff%
08/07/2017 02:31:31 PM			SYSTEM	46.6	0.43
08/08/2017 10:07:10 AM			SYSTEM	46.7	0.65
08/11/2017 07:17:27 AM			SYSTEM	46.7	0.65
08/11/2017 07:23:13 AM			SYSTEM	46.0	-0.86

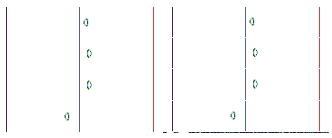

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Figure D.10 DxH 900/DxH 690T Extended QC Summary Report RBC - Example

Extended QC Summary Report - RBC

Parameter		**Control**	
Parameter ID:		Lot Number:	149021948
Parameter Name:	Red Blood Count	Control Name:	COULTER®6C Cell
		Manufacturer:	BCI
Units:	10^6/uL	Measurement Principle:	Impedance
Specimen Type:	Whole Blood	Level:	Level 3
Instrument ID:	IMP032_DxH900	Expiration Date:	09/25/2017
Basic Data		**Limits(%)**	
Lab Information:		Random Error:	2.50
Target:	5.16	Systematic Error:	3.00
SM Low Limit:	4.95	SM Error:	4.00
SM High Limit:	5.37		
Statistics			
First Run Date:	08/07/2017	Mean:	5.18
Last Run Date:	08/11/2017	SD:	0.045
Number of Runs:	4	CV:	0.87
Minimum:	5.12	Delta Diff%:	0.44
Maximum:	5.22	RMSE:	0.05

Additional Information:

Date	Comment	Ex	Operator	Result	Diff%
08/07/2017 02:31:31 PM			SYSTEM	5.21	0.97
08/08/2017 10:07:10 AM			SYSTEM	5.22	1.16
08/11/2017 07:17:27 AM			SYSTEM	5.18	0.39
08/11/2017 07:23:13 AM			SYSTEM	5.12	-0.78

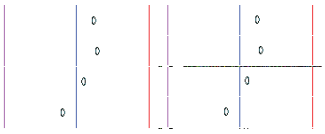

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Figure D.11 DxH 900/DxH 690T Extended QC Summary Report HGB - Example

Extended QC Summary Report - HGB

Parameter		**Control**	
Parameter ID:		Lot Number:	149021948
Parameter Name:	Hemoglobin Concentration	Control Name:	COULTER®6C Cell
		Manufacturer:	BCI
Units:	g/dL	Measurement Principle:	Photometric
Specimen Type:	Whole Blood	Level:	Level 3
Instrument ID:	IMP032_DxH900	Expiration Date:	09/25/2017
Basic Data		**Limits(%)**	
Lab Information:		Random Error:	2.00
Target:	15.9	Systematic Error:	2.00
SM Low Limit:	15.3	SM Error:	4.00
SM High Limit:	16.5		
Statistics			
First Run Date:	08/07/2017	Mean:	16.2
Last Run Date:	08/11/2017	SD:	0.05
Number of Runs:	4	CV:	0.31
Minimum:	16.2	Delta Diff%:	2.0
Maximum:	16.3	RMSE:	0.33

Additional Information:

Date	Comment	Ex	Operator	Result	Diff%	15.3 15.9 16.5
08/07/2017 02:31:31 PM			SYSTEM	16.3	2.52	
08/08/2017 10:07:10 AM			SYSTEM	16.2	1.89	
08/11/2017 07:17:27 AM			SYSTEM	16.2	1.89	
08/11/2017 07:23:13 AM			SYSTEM	16.2	1.89	

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Figure D.12 DxH 900/DxH 690T Extended QC Summary Report - WBC - Example

Extended QC Summary Report - WBC

Parameter		**Control**	
Parameter ID:		Lot Number:	149021948
Parameter Name:	White Blood Count	Control Name:	COULTER®6C Cell
		Manufacturer:	BCI
Units:	10^3/uL	Measurement Principle:	Impedance
Specimen Type:	Whole Blood	Level:	Level 3
Instrument ID:	IMP032_DxH900	Expiration Date:	09/25/2017
Basic Data		**Limits(%)**	
Lab Information:		Random Error:	4.00
Target:	8.9	Systematic Error:	5.00
SM Low Limit:	8.3	SM Error:	6.50
SM High Limit:	9.5		
Statistics			
First Run Date:	08/07/2017	Mean:	8.9
Last Run Date:	08/11/2017	SD:	0.08
Number of Runs:	4	CV:	0.92
Minimum:	8.8	Delta Diff%:	0.0
Maximum:	9.0	RMSE:	0.07

Additional Information:

Date	Comment	Ex	Operator	Result	Diff%	8.3	8.9	9.5
08/07/2017 02:31:31 PM			SYSTEM	8.8	-1.12			
08/08/2017 10:07:10 AM			SYSTEM	9.0	1.12			
08/11/2017 07:17:27 AM			SYSTEM	8.9	0.00			
08/11/2017 07:23:13 AM			SYSTEM	8.9	0.00			

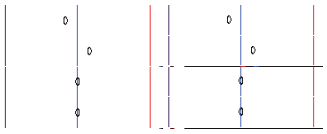

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Figure D.13 DxH 900/DxH 690T XB Batch Details Report - Page 1 of 2 - Example

Design Validation Lab
DxH 690T

XB Batch Details

SWv 2.0.0.211
C56182 Rev. AA

Batch Date/Time: 05/12/2021 11:38:18 AM
Reviewer: DevOp
Review Date/Time: 05/14/2021 11:42:14 AM
Instrument: BC06303

Specimen	Exclude	Analysis Date/Time	MCV	MCH	MCHC	RBC	HGB	HCT	RDW
89351136177	N	05/12/2021 11:38:08A	90.29	29.57	32.75	4.262	12.60	38.48	14.29
89352337633	N	05/12/2021 11:35:35A	97.12	32.24	33.19	4.636	14.95	45.02	12.17
89352337632	N	05/11/2021 11:56:37A	86.59	30.06	34.71	4.977	14.96	43.10	13.19
89352337631	N	05/11/2021 11:54:59A	83.27	27.22	32.69	4.177	11.37	34.78	16.08
89352337630	N	05/11/2021 11:53:44A	93.50	31.22	33.40	4.716	14.73	44.09	12.99
89352337629	N	05/11/2021 11:52:26A	89.26	30.08	33.70	5.211	15.68	46.51	14.18
89352337627	N	05/10/2021 10:32:32A	88.59	29.40	33.19	4.464	13.13	39.55	13.39
89352337625	N	05/10/2021 10:30:58A	86.65	28.55	32.95	4.552	13.00	39.44	13.44
89352337628	N	05/10/2021 10:23:44A	91.80	31.10	33.88	4.610	14.34	42.32	13.04
89352337627	N	05/10/2021 10:22:08A	88.44	29.83	33.72	4.445	13.26	39.31	13.60
89352337625	N	05/10/2021 10:20:50A	86.53	28.59	33.04	4.562	13.04	39.47	13.50
89352337626	N	05/10/2021 10:19:36A	84.63	28.90	34.15	4.738	13.69	40.10	12.94
89352064179	N	03/24/2021 10:59:06A	86.25	28.15	32.63	6.201	17.45	53.48	14.82
89352064178	N	03/24/2021 10:57:26A	95.14	31.99	33.63	5.062	16.19	48.16	14.31
89352064177	N	03/24/2021 10:56:12A	73.98	23.98	32.41	2.827	6.78	20.92	20.99
89352064176	N	03/24/2021 10:54:48A	85.64	28.20	32.93	3.319	9.36	28.42	15.65
89352064175	N	03/24/2021 10:53:32A	84.43	27.63	32.73	4.190	11.58	35.37	17.65
89352064179	N	03/24/2021 10:41:41A	86.32	28.00	32.44	6.263	17.54	54.06	15.03
89352064178	N	03/24/2021 10:40:01A	95.74	32.28	33.71	5.024	16.22	48.10	13.96
89352064177	N	03/24/2021 10:38:48A	74.40	23.67	31.82	2.860	6.77	21.28	19.31

N:	20		
Mean:	86.56	28.77	33.16
%Diff:	-3.29L	-5.68L	-2.46
Target Mean:	89.50	30.50	34.00
Limit(%):	3.00	3.00	3.00

Printed 05/18/2021 11:41 AM

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Figure D.14 DxH 900/DxH 690T XB Batch Details Report - Page 2 of 2 - Example

XB Batch Details
Design Validation Lab

Batch Date/Time: 05/12/2021 11:38:18 AM
Reviewer: DevOp
Review Date/Time: 05/14/2021 11:42:14 AM
Instrument: BC06303

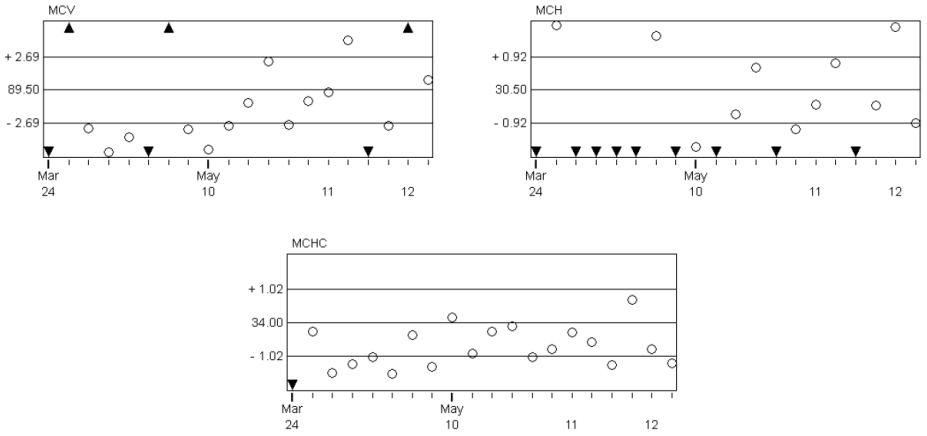

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Figure D.15 DxH 900/DxH 690T XB Batch Means - Example

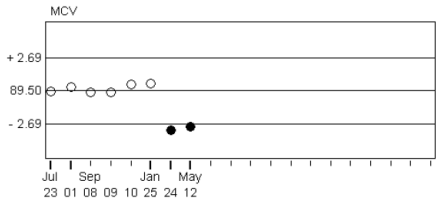
Design Validation Lab
DxH 690T

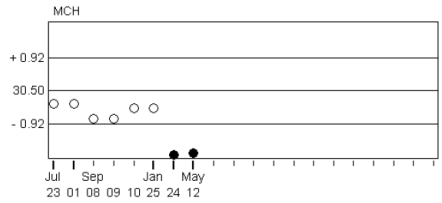
XB Batch Means

SWv 2.0.0.211
C56182 Rev. AA

Instrument BC06303

Batch Date/Time	N	Reviewed By	MCV		MCH		MCHC	
			Mean	%Diff	Mean	%Diff	Mean	%Diff
Current Batch		In Progress						
05/12/2021 11:38 AM	20	DevOp 05/14/2021 11:42 AM	86.56	-3.29L	28.77	-5.68L	33.16	-2.46
03/24/2021 10:37 AM	20	DevOp 03/24/2021 10:40 AM	86.26	-3.63L	28.72	-5.85L	33.16	-2.46
01/25/2021 11:40 AM	20	DevOp 05/18/2021 11:47 AM	90.04	0.60	30.02	-1.59	33.22	-2.29
09/10/2020 02:04 PM	20	DevOp 05/18/2021 11:47 AM	89.97	0.53	30.02	-1.59	33.22	-2.29
09/09/2020 12:17 PM	20	DevOp 05/18/2021 11:47 AM	89.39	-0.12	29.73	-2.53	33.21	-2.33
09/08/2020 12:52 PM	20	DevOp 05/18/2021 11:47 AM	89.37	-0.15	29.73	-2.53	33.20	-2.35
09/01/2020 01:14 PM	20	DevOp 05/18/2021 11:47 AM	89.78	0.31	30.14	-1.19	33.32	-2.00
07/23/2020 12:01 PM	20	DevOp 05/18/2021 11:47 AM	89.40	-0.11	30.14	-1.19	33.46	-1.59
Total Batches 8								
		Target Mean	89.50		30.50		34.00	
		Limit(%)	3.00		3.00		3.00	





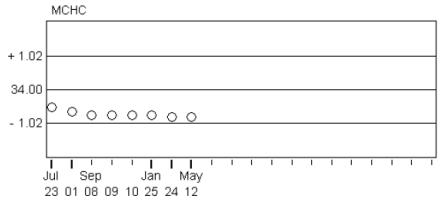


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Figure D.16 DxH 900/DxH 690T XM Batch Details Report - Example

Design Validation Lab
DxH 690T

XM Batch Details-CBC

SWv 2.0.0.211
C56182 Rev. AA

Instrument ID: BC06303
Batch Date/Time: 07/23/2020 12:11 PM
Batch Size: 20
Reviewer: DevOp 05/18/2021 11:49:51 AM

Specimen ID	Exclude	Date/Time	WBC	UWBC	RBC	HGB	HCT	MCV	MCH	MCHC	@LHD	RDW	RDW-SD	@MAF	PLT	MPV	@PCT	@PDW
89351902751	N	07/23/2020 12:11 PM	6.351	6.351	3.488	10.79	32.65	93.62	30.95	33.06	6.36	14.83	49.00	10.11	412.0	7.75	0.3191	16.71
89347284674	N	07/23/2020 12:00 PM	7.499	7.499	3.865	12.04	35.11	90.83	31.14	34.28	2.11	13.44	42.44	10.93	340.2	7.21	0.2453	15.89
89347284673	N	07/23/2020 11:59 AM	10.145	10.145	2.410	7.54	22.23	92.23	31.30	33.93	2.90	15.67	51.63	6.96	450.2	7.55	0.3398	16.04
89347284672	N	07/23/2020 11:58 AM	11.262	11.262	3.257	8.05	25.39	77.95	24.71	31.70	21.21	16.31	44.63	6.27	433.1	8.67	0.3753	16.20
89347284671	N	07/23/2020 11:56 AM	4.475	4.475	3.270	8.67	27.30	83.49	26.51	31.75	20.27	20.77	59.94	7.24	60.3	9.66	0.0582	18.39
89347284670	N	07/23/2020 11:55 AM	8.193	8.193	3.351	9.04	26.47	79.01	26.97	34.13	2.43	19.68	54.25	7.14	141.7	8.02	0.1137	16.61
89347284669	N	07/21/2020 11:56 AM	27.123	27.123	1.871	5.97	19.35	103.43	31.90	30.84	42.54	20.76	74.81	6.17	89.7	10.41	0.0934	17.52
TH616005	N	06/17/2020 02:43 PM	7.283	7.283	5.190	15.29	45.14	86.97	29.46	33.87	3.07	13.24	39.81	13.30	225.4	10.84	0.2443	17.01
TH616001	N	06/17/2020 02:42 PM	5.696	5.696	4.220	13.86	40.61	96.22	32.85	34.13	2.42	13.02	43.31	13.34	261.6	9.69	0.2535	16.62
TH616002	N	06/17/2020 02:41 PM	5.609	5.609	4.727	14.23	43.03	91.02	30.09	33.06	6.34	14.27	45.06	12.95	249.3	9.14	0.2279	16.61
TH616004	N	06/17/2020 02:39 PM	4.175	4.175	4.318	13.95	40.60	94.03	32.30	34.35	1.99	12.89	42.44	13.11	206.7	9.24	0.1909	16.62
TH616008	N	06/17/2020 02:38 PM	6.838	6.838	5.148	13.98	42.90	83.34	27.15	32.58	9.74	14.88	43.75	11.65	251.6	8.59	0.2160	16.44
TH616003	N	06/17/2020 02:37 PM	4.051	4.051	4.116	13.26	39.18	95.18	32.21	33.84	3.14	12.59	41.56	12.62	182.4	9.55	0.1742	16.37
TH616007	N	06/17/2020 02:36 PM	4.921	4.921	4.329	12.66	38.28	88.43	29.24	33.06	6.36	13.77	42.88	11.19	169.5	12.26	0.2078	17.47
TH616006	N	06/17/2020 02:34 PM	4.056	4.056	3.843	12.45	37.31	97.08	32.39	33.36	4.84	13.04	44.19	12.09	183.4	10.64	0.1951	16.49
89347285557	N	06/15/2020 02:06 PM	8.214	8.214	4.814	12.86	40.07	83.24	26.72	32.10	14.90	17.14	50.31	10.71	290.3	8.71	0.2529	17.07
89347285556	N	06/15/2020 02:05 PM	7.638	7.638	3.488	9.83	31.24	89.56	28.20	31.48	25.45	17.15	53.81	8.81	301.9	8.83	0.2667	16.68
89347285555	N	06/15/2020 02:03 PM	5.452	5.452	4.752	13.37	41.41	87.14	28.14	32.29	12.60	17.96	55.56	11.65	237.2	8.85	0.2098	16.60
89347285554	N	06/15/2020 02:02 PM	8.720	8.720	4.477	12.24	37.78	84.38	27.34	32.40	11.43	22.31	65.19	10.33	294.4	9.19	0.2707	16.53
89347285553	N	06/15/2020 02:01 PM	7.365	7.365	3.941	11.37	34.83	88.37	28.85	32.64	9.23	17.05	52.50	10.05	278.3	8.28	0.2305	16.29
		Mean:	7.753	7.753	3.944	11.57	35.04	89.28	29.42	32.94	10.47	16.04	49.85	10.33	253.0	9.15	0.2242	16.71
		2SD:	9.956	9.956	1.721	5.16	14.89	12.77	4.79	2.09	20.58	5.99	17.94	4.87	208.5	2.44	0.1547	1.14
		3SD:	14.935	14.935	2.581	7.74	22.33	19.15	7.19	3.13	30.87	8.98	26.91	7.31	312.8	3.66	0.2320	1.70
		Target:	7.753	7.753	3.944	11.57	35.04	89.28	29.42	32.94	10.47	16.04	49.85	10.33	253.0	9.15	0.2242	16.71
		High Limit:	17.710	17.710	5.664	16.73	49.93	102.04	34.21	35.03	31.04	22.02	67.80	15.20	461.5	11.59	0.3789	17.84
		Low Limit:	0.000	0.000	2.223	6.41	20.16	76.51	24.63	30.86	0.00	10.05	31.91	5.46	44.4	6.71	0.0696	15.57
		N:	20															

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Figure D.17 DxH 900/DxH 690T XM Batch Means-RETIC CALC Report - Example

DxH 690T
Design Validation Lab

XM Batch Means-RETIC CALC
DXH Solution Version 2

SWv 2.0.0.211
C56182 Rev. AA

Instrument ID: DxH1
Batch Size: 20

Date/Time	Reviewed By	RET#
05/24/2021 04:22:04 PM	SvcAdmin 05/24/2021 04:22:42 PM	0.0643
05/24/2021 03:28:02 PM	SvcAdmin 05/24/2021 03:39:15 PM	0.0651

Target: 0.0643
High Limit: 0.0757
Low Limit: 0.0529
N: 2

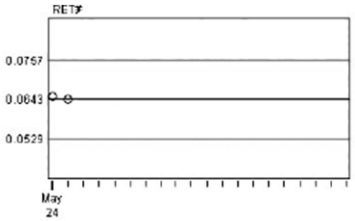

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Figure D.18 DxH 900/DxH 690T Levey Jennings on a Report - Example

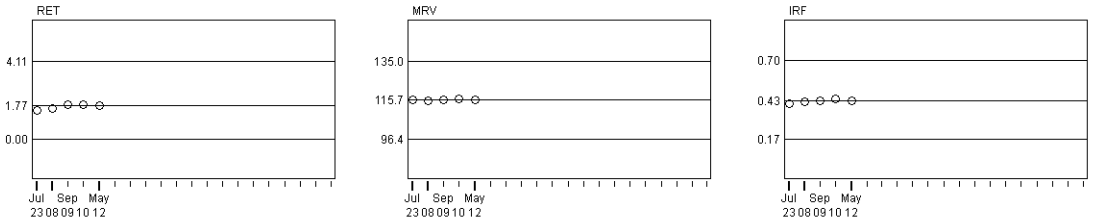
Design Validation Lab
DxH 690T

XM Batch Means-RETIC

SWv 2.0.0.211
C56182 Rev. AA

Instrument ID: BC06303
Batch Size: 20

Date/Time	Reviewed By	RET	MRV	IRF
05/12/2021 11:35:46 AM	DevOp 05/18/2021 11:52:39 AM	1.77	115.7	0.43
09/10/2020 02:42:18 PM	DevOp 05/18/2021 11:52:39 AM	1.81	116.0	0.44
09/09/2020 12:23:10 PM	DevOp 05/18/2021 11:52:39 AM	1.78	115.6	0.43
09/08/2020 12:44:36 PM	DevOp 05/18/2021 11:52:39 AM	1.61	115.4	0.42
07/23/2020 12:22:01 PM	DevOp 05/18/2021 11:52:39 AM	1.52	115.5	0.41
	Target:	1.77	115.7	0.43
	High Limit:	4.11	135.0	0.70
	Low Limit:	0.00	96.4	0.17
	N:	5		



APPENDIX E

Stain Protocol Optimization

Considerations for Optimum Stain Quality

Overall Stain Quality

Beckman Coulter has developed COULTER TruColor reagents and default protocols to be used on the DxH Slidemaker Stainer II. The Beckman Coulter default protocols have been optimized to a predefined coloration specification. (See Table E.2, Human Blood Cell Inclusions and Table E.3, Coloring of Romanowsky Stains.) Since coloration is subjective, optimization of the protocols and/or reagents may be necessary to meet your individual coloration criteria. Ensure that both the methanol and water you use meet the specifications detailed in your system's online Help.

Typical Time Adjustment Increments

Typical time adjustment increments are:

- Stain — 30 seconds
- Buffer — 1 minute

Coloration (Red/Blue)

Coloration (red/blue) is primarily controlled by the pH of the buffer.

Stain Intensity and Differential Staining Characteristics

Stain intensity and differential staining characteristics are controlled by:

- The length of staining times (longer = more intense)
- Decreasing the buffer strength
- Concentration of stain in buffer (more stain = darker, more intense)

NOTE See Table E.1, Optimum Stain Quality Troubleshooting for more information. See Adding/Editing a Staining Protocol in CHAPTER 9, Setup for any time or frequency changes mentioned in the table.

Table E.1 Optimum Stain Quality Troubleshooting

Symptom	Probable Cause	Recommended Action
Too red	Buffer too acidic	**1.** Adjust with alkaline solution until the desired color is achieved. **2.** Try a buffer with a higher pH.
	Excessive washing	**1.** Shorten rinse time (Bath 5) until the desired color is achieved. **2.** Adjust frequency of Bath 5 drain and fill until the desired color is achieved.
	All reagents too old	Drain and fill all baths.
	Stain time too short	Prolong staining time until the desired color is achieved.
	Buffer time too long	Shorten buffer time until the desired color is achieved.
Too blue	Buffer too alkaline	**1.** Adjust with acid solution until the desired color is achieved. **2.** Try a buffer with a lower pH.
	Insufficient washing	Lengthen rinse time until the desired color is achieved.
	Stain time too long	Decrease stain time until the desired color is achieved.
	Buffer time too short	Lengthen buffer time until the desired color is achieved.
	Slide fixed two hours after prep	Fix smears within two hours of slide preparation.
Too dark	Stain time too long	Shorten stain time until the desired color is achieved.
	Buffer time too long	Shorten buffer time until the desired color is achieved.
Too light	Rinse time too long	Decrease rinse time until the desired color is achieved.
	Poor quality rinse water	**1.** Verify that water meets the specifications of Type II CLSI water. **2.** Change water.
	Stain time too short	Increase stain time until the desired color is achieved.
	Buffer time too short	Increase buffer time until the desired color is achieved.
	Buffer too concentrated	Dilute buffer solution with deionized water until the desired color is achieved.
RBC centers appear punched out (cookie cutter effect in center of cells)	Water has contaminated the methanol	**1.** Drain and fill the methanol bath. **2.** Dip empty basket in methanol prior to re-entry into system.

Table E.1 Optimum Stain Quality Troubleshooting *(Continued)*

Symptom	Probable Cause	Recommended Action
Background staining (overall slide shows color)	Stain too old	Drain and fill the stain and stain/buffer baths.
	Excess stain left on slide	Increase the frequency of the replacement for the Quick Rinse Bath 4 (25:75 methanol + deionized water) primarily for Wright-Giemsa stain (WG). See Setting Up a Quick Rinse in CHAPTER 9, Setup.
RBC artifacts	Insufficient smear drying	Increase smear drying time.
Precipitate (clumps or fine particles on whole slide)	Stain or stain/buffer too old	Drain and fill all baths.
	Rinse (Bath 5) dirty	1. Drain and fill Bath 5. 2. Increase frequency of Bath 5 drain and fill. 3. Increase the frequency of the replacement for the Quick Rinse Bath 4 (25:75 methanol + deionized water) primarily for WG. See Setting Up a Quick Rinse in CHAPTER 9, Setup. 4. Consider adding recirculation in Bath 5 to reduce circulation. See Configuring Baths (Mapping) to the Bath Location in CHAPTER 9, Setup.
	Stain baths dirty (stain and stain/buffer)	Perform the Clean Stainer Baths and Tray (Software v1.2.0 and Prior, and v2.0.0, if Drain All Baths and Flush Stainer is DISABLED) procedure in CHAPTER 12, Cleaning Procedures.
Overall pale blue staining	Blood smear more than 2 hours old prior to fixing	Make new blood smear.

Stain Characteristics

Table E.2, Human Blood Cell Inclusions and Table E.3, Coloring of Romanowsky Stains contain the stain characteristics against which the TruColor reagents and Beckman Coulter default protocols were evaluated.[2, 6]

Table E.2 Human Blood Cell Inclusions

Inclusion	Description	Cell	Color
Auer rods	Spicule-like formation	Myeloblast	Pink[a]
Pappenheimer bodies	Small spots	RBCs	Purple
Malaria parasites	Inclusions	RBCs	Blue[b]
Howell-Jolly bodies	Medium-sized spot	RBCs	Purple
Cabot rings	Threadlike filaments	RBCs	Purple
Basophilic stippling	Small granules	RBCs	Purple
Toxic granulation	Coarse granules	WBCs	Dark purple
Dohle bodies	Spots	WBCs	Sky blue

a. These azurophilic granules may appear more blue-purple with some stains.

b. Generally, a blue ring (or rings, which are cytoplasmic) with a red dot (chromatin).

Table E.3 Coloring of Romanowsky Stains

Structure	Cell	Color
Nuclei	All	Purple
Cytoplasm	Erythrocyte	Pink
	Lymphocyte	Blue
	Monocyte	Grey blue
	Neutrophil	Pink
	Metamyelocyte	Pink
	Myelocyte	Pink
	Promyelocyte	Pale blue
Granules	Basophil	Purple, black
	Eosinophil	Orange
	Neutrophil	Purple
	Platelet	Purple

Default Stain Protocols

Table E.4 Wright Stain

Bath	Supply	%	Duration
1	Methanol	100	1 minute
2	Wright Stain	100	5 minutes
	None	N/A	
3	Wright Stain	5	6 minutes
	Wright Buffer	95	
4	None	N/A	N/A
5	Water	100	2 minutes

NOTE Drying duration is set to 5 minutes. The default for Auto Drain and Refill for bath 5 is after 5 baskets.

Table E.5 Wright Giemsa with Quick Rinse

Bath	Supply	%	Duration
1	Methanol	100	1 minute
2	Wright Giemsa Stain	100	2 minutes
	None	N/A	
3	Wright Giemsa Stain	10	6 minutes
	Wright Giemsa Buffer	90	
4	25% Methanol/75% Water	100	10 seconds
5	Water	100	2 minutes

NOTE Drying duration is set to 5 minutes. The default for Auto Drain and Refill for bath 5 is after 5 baskets.

APPENDIX F

System and Module Connections

System and Module Connections

The inter-unit connections consist of:

- Power and Signal Cables
- SPM and Consumable Connections

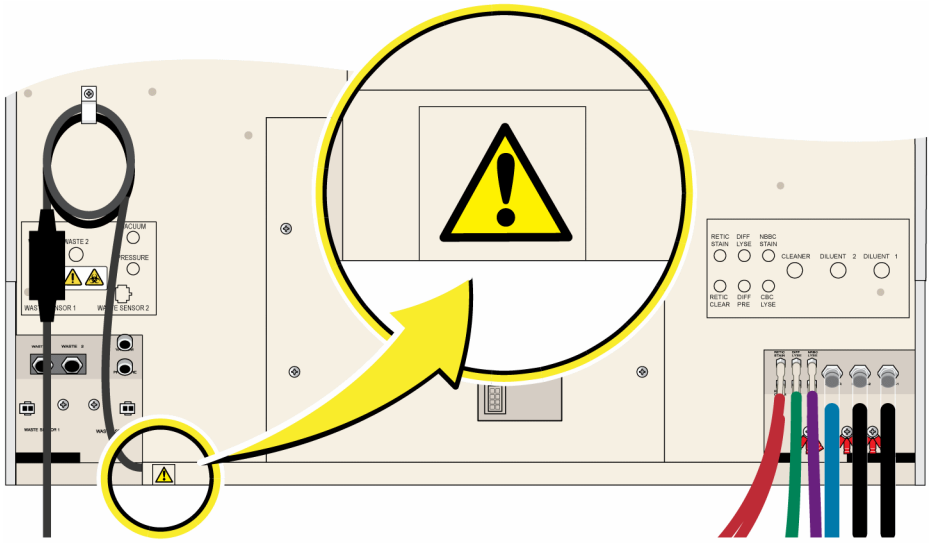
Power and Signal Cables

Figure F.1, Power Connection shows the warning label at the back of the SPM that alerts you to the possible presence of ac voltages.

⚠ WARNING

Risk of injury. To avoid electric shock, use caution as ac voltages may be present.

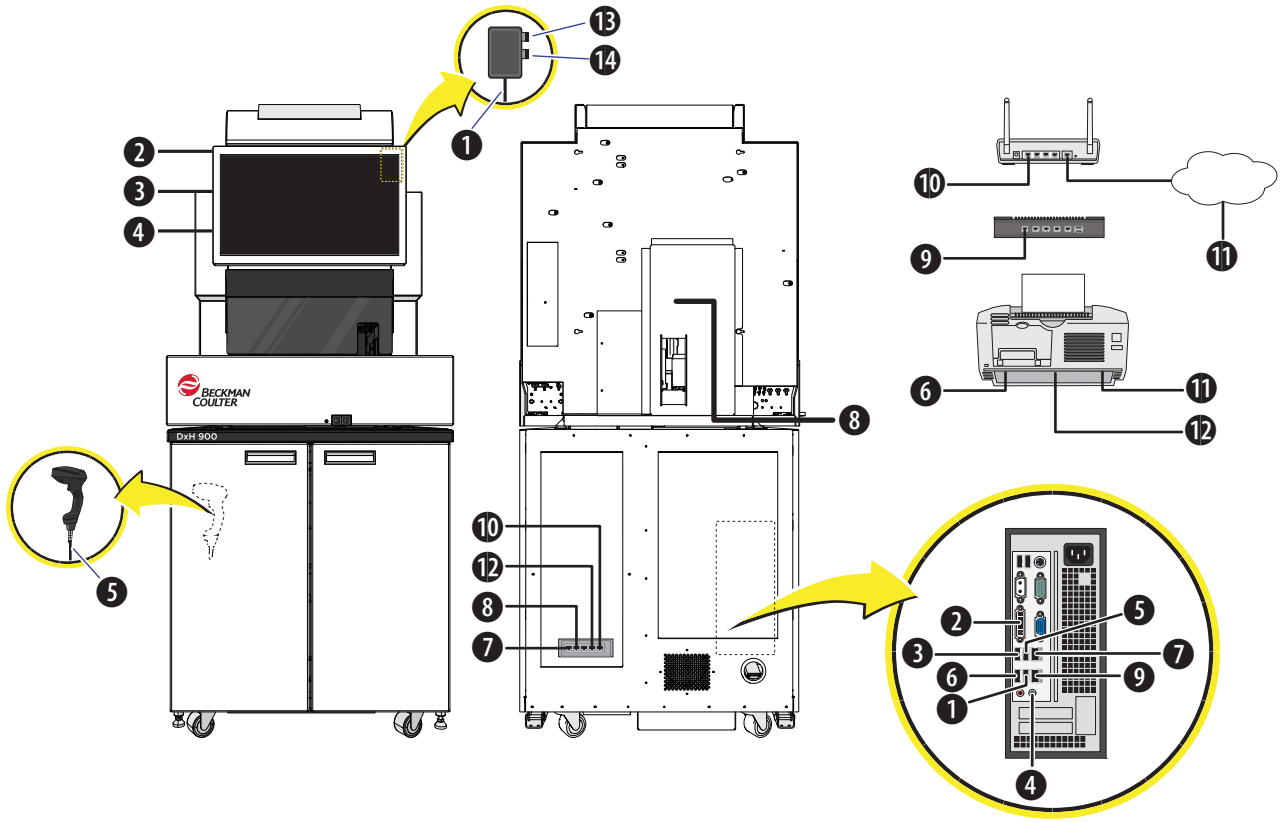
Figure F.1 Power Connection



NOTE The colors used in Figure F.1, Power Connection are for illustration only and represent the colors of the actual connections.

Figure F.2, Inter-Unit Power and Signal Cable Connections shows the inter-unit connections of the power and signal cables that are supplied with the instrument. Your Beckman Coulter Representative makes these connections when installing the instrument.

Figure F.2 Inter-Unit Power and Signal Cable Connections



NOTE The matching numbers above signify the beginning and ending of a connection.

Number	Description	Number	Description
1	USB Hub Cable	9	Ethernet Cable (RMS NIC to PROService Box)
2	Digital Video Interface (DVI) Cable	10	Ethernet Cable (Network Switch to Network Router)
3	USB Touchscreen Cable	11	Global Network Printer (Hospital Network Printer)
4	Audio Cable	12	Ethernet Cable Local Network Printer
5	USB Handheld Scanner	13	USB Mouse Dongle
6	USB Printer Cable	14	USB Keyboard Dongle
7	Ethernet Cable (Instrument NIC to Network Switch)		
8	Ethernet Cable (Network Switch to DxH 900/DxH 690T)		

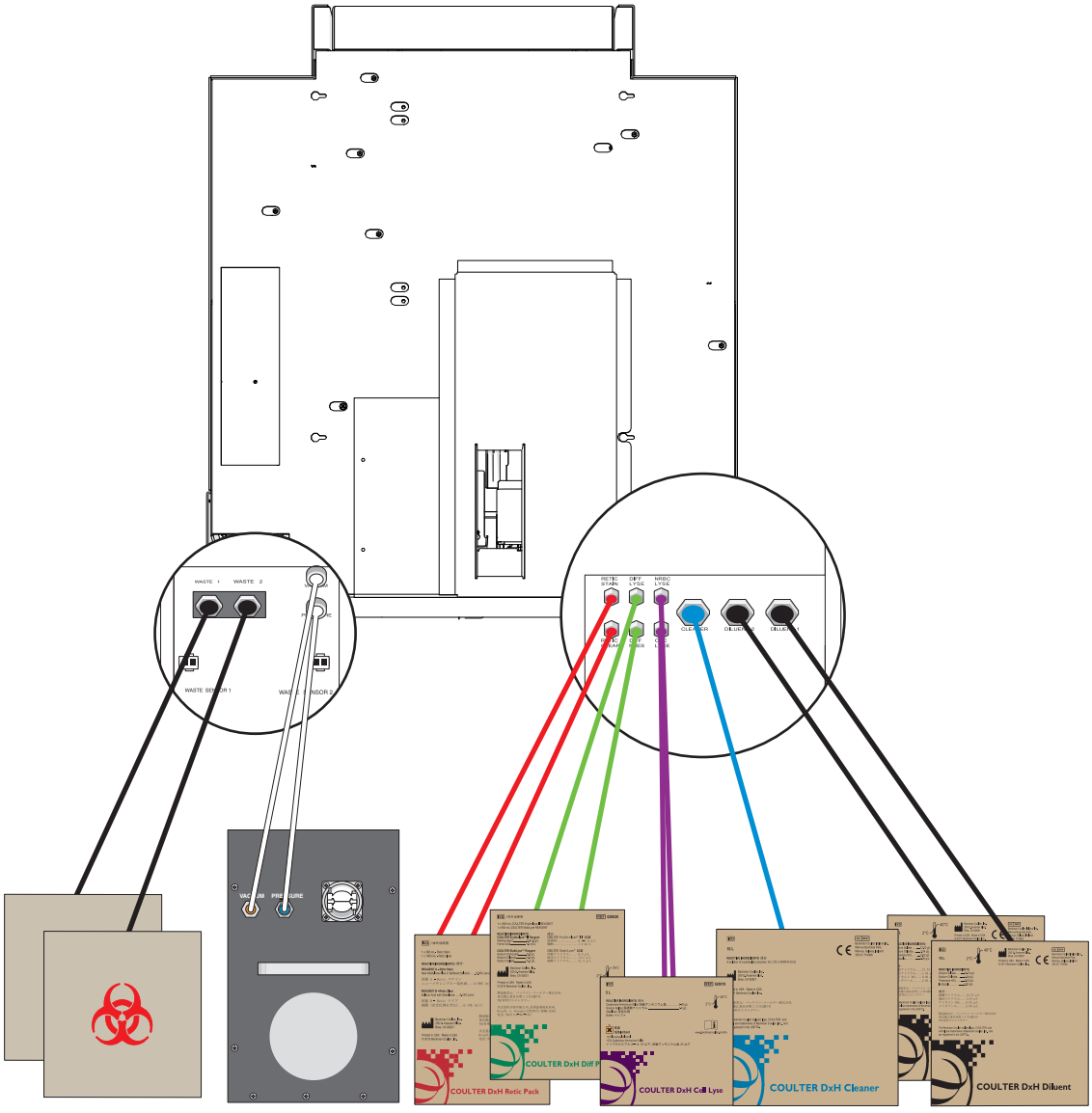
SPM and Consumable Connections

The figure below shows the connections between the SPM and the consumable reagents and waste containers.

NOTE The colors in Figure F.3, SPM Consumable Connections show interrelated tubing and packing connections.

See Replacing Reagent Containers - DxH 900/DxH 690T in CHAPTER 13, Replacement/Adjustment Procedures for information on replacing the reagents.

Figure F.3 SPM Consumable Connections



Peripheral Distribution Box - DxH 690T

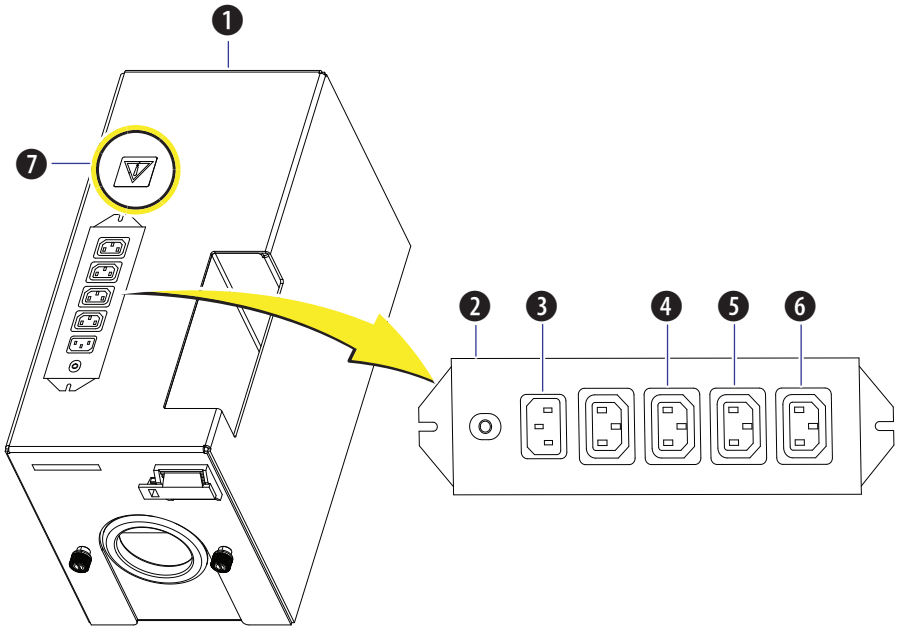
⚠ WARNING

Risk of injury. Use caution when handling the peripheral distribution box for the DxH 690T. The warning label on top of the box alerts you to the possible presence of ac voltages.

IMPORTANT The instrument's power cord cannot be connected to the power strip.

The Peripheral Distribution box holds the network switch, and the power strip that is connected to the monitor, computer, network switch power adapter, and feeder power. The network switch's LED lights are visible from the top of the box for troubleshooting.

Figure F.4 Peripheral Distribution Box - DxH 690T



Number	Description
1	Peripheral Distribution Box
2	Power Strip
3	Power In
4	Computer Power Adapter
5	Monitor Power Adapter
6	Network Switch Adapter with Converter

You can remove the network switch through the top by sliding it out. To access the power strip, manually unscrew the three thumb screws located on the front and back of the box. This also allows for access to items, 3, 4, 5, and 6. If you do not need access to the power strip, keep the box closed and secured with thumb screws.

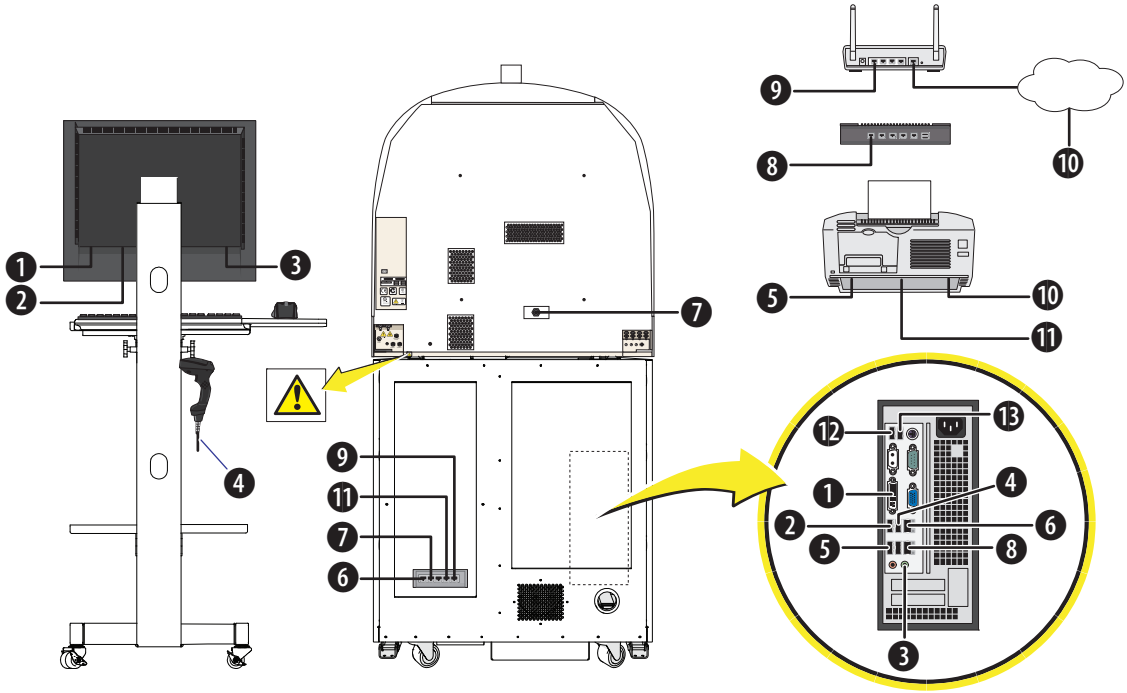
System Cable and Tubing Connections - DxH Slidemaker Stainer II

Figure F.5, Cable Connections for a DxH Slidemaker Stainer II shows the cable and tubing connections on the back of the DxH Slidemaker Stainer II, and the warning label that alerts you to the possible presence of ac voltages. Your Beckman Coulter Service Representative will connect all of the electrical cables at installation.

⚠ WARNING

AC voltages could be present in the area on the back of the DxH Slidemaker Stainer II indicated with the hazard label in Figure F.5, Cable Connections for a DxH Slidemaker Stainer II. To avoid electric shock, use caution when working in that area.

Figure F.5 Cable Connections for a DxH Slidemaker Stainer II



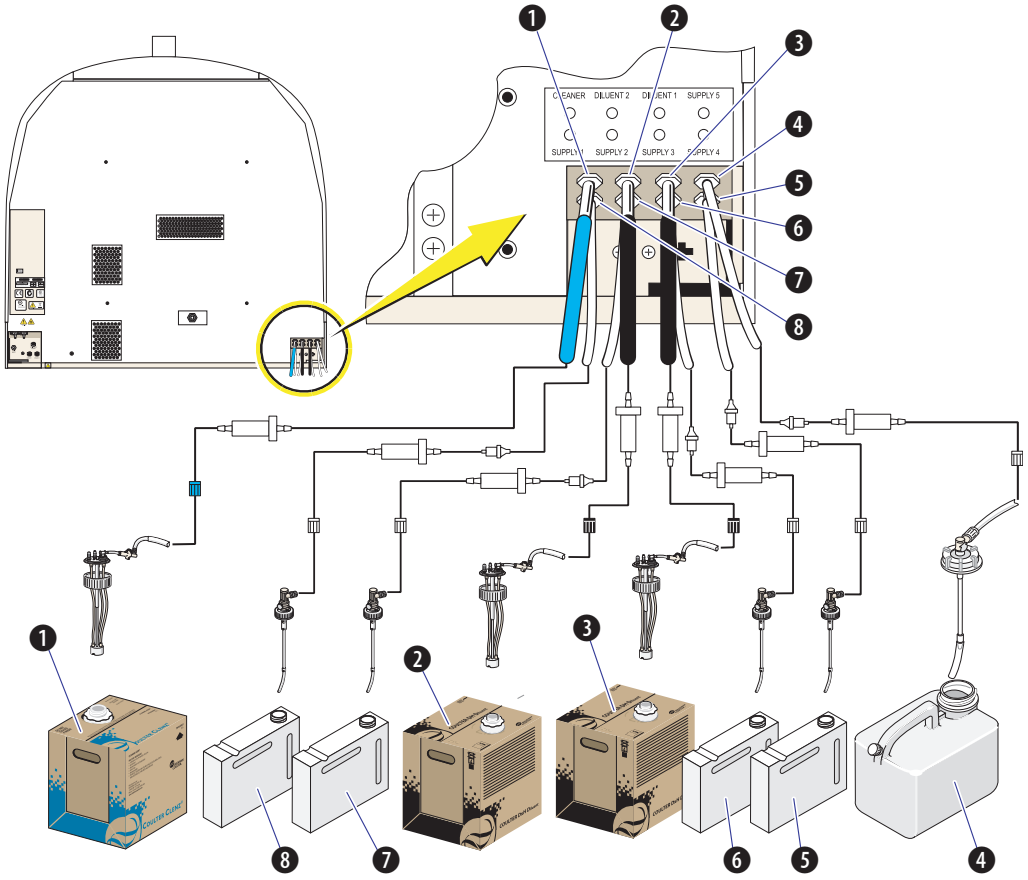
NOTE The matching numbers above signify the beginning and ending of a connection.

Number	Description	Number	Description
1	Digital Video Interface (DVI) Cable	8	Ethernet Cable (RMS NIC to PROService Box)
2	USB Touchscreen Cable	9	Ethernet Cable (Network Switch to Network Router)
3	Audio Cable	10	Global Network Printer (Hospital Network Printer)
4	USB Handheld Scanner	11	Ethernet Cable Local Network Printer
5	USB Printer Cable	12	USB Mouse Dongle

Number	Description	Number	Description
6	Ethernet Cable (Instrument NIC to Network Switch)	13	USB Keyboard Dongle
7	Ethernet Cable (Network Switch to DxH Slidemaker Stainer II)		

See Figure F.6, DxH Slidemaker Stainer II Reagent Connections for reagent connections.

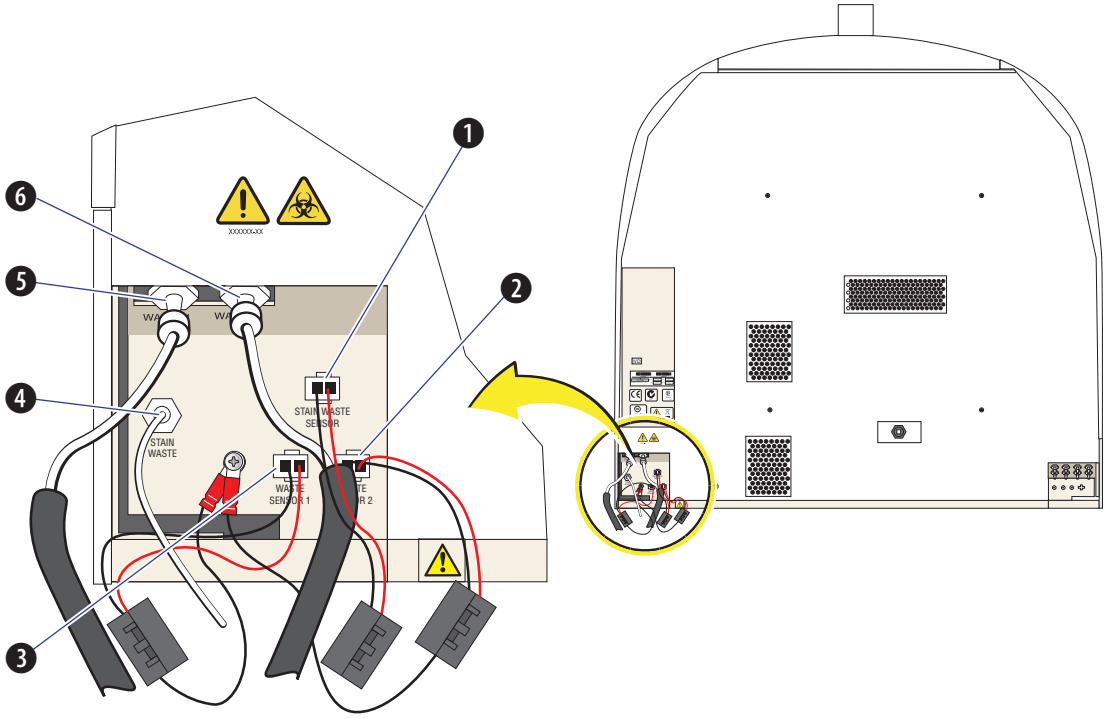
Figure F.6 DxH Slidemaker Stainer II Reagent Connections



Number	Description	Number	Description
1	Cleaner	5	Supply 4
2	Diluent 2	6	Supply 3
3	Diluent 1	7	Supply 2
4	Supply 5	8	Supply 1

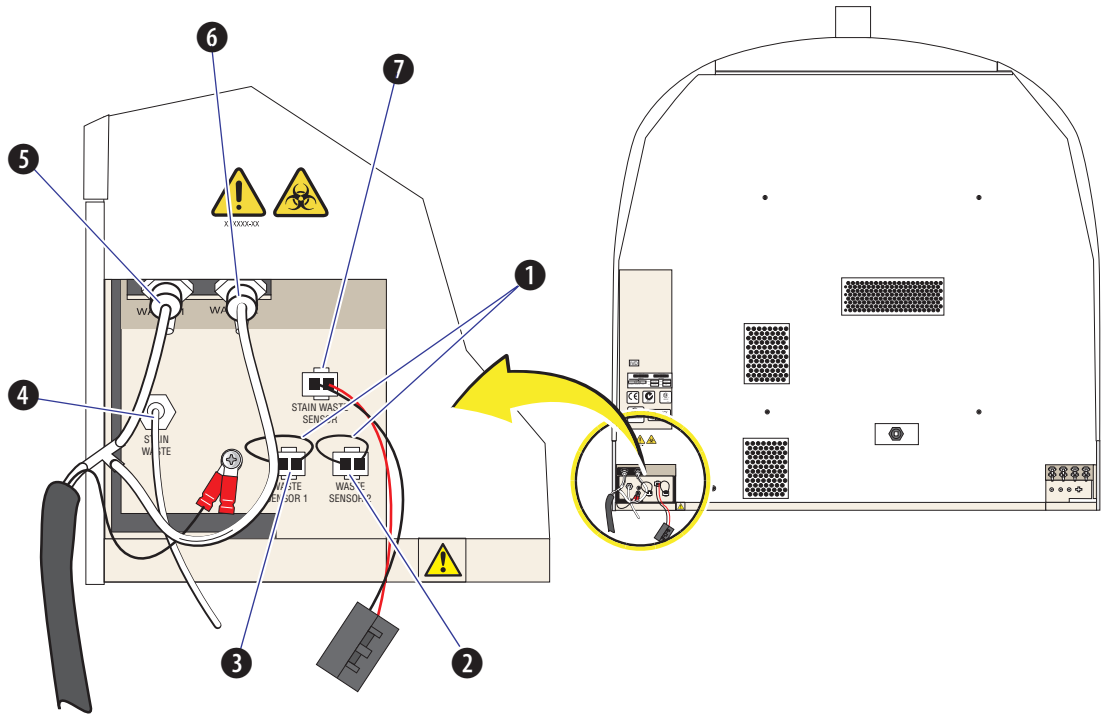
See Figure F.7, Waste Connections Configured to Drain into Waste Containers and Figure F.8, Waste Connections Configured to Drain Directly into the Laboratory Drain for proper waste drainage configuration.

Figure F.7 Waste Connections Configured to Drain into Waste Containers



Number	Description	Number	Description
1	Stain Waste Sensor	4	Stain Waste
2	Waste Sensor 2	5	Waste 1
3	Waste Sensor 1	6	Waste 2

Figure F.8 Waste Connections Configured to Drain Directly into the Laboratory Drain



Number	Description	Number	Description
1	Pneumatic Waste Level Interconnect Jumper	5	Waste 1
2	Waste Sensor 2	6	Waste 2
3	Waste Sensor 1	7	Stain Waste Sensor
4	Stain Waste		

Biohazardous Waste

⚠ WARNING

Risk of biohazardous contamination. The waste lines contain residual biohazardous material. Avoid skin contact. Clean up spills immediately in accordance with your local regulations and acceptable laboratory procedures.

You can connect the biohazardous waste lines to two waste containers or you can connect the waste lines directly to the laboratory drain.

If you choose to drain the biohazardous waste directly into a drain, you must:

- Ensure that the drain is:
  - Chemically resistant and is appropriate for biohazardous waste.

  - Less than 76 cm (30 in.) above the floor and within 3.7 m (12 ft) of the area designated for the DxH Slidemaker Stainer II.

- Mechanically secure the waste tube in the drain so that the tube cannot accidentally come out of the drain. This prevents spillage.

APPENDIX G
Job Aids

DxH Slidemaker Stainer - Flushing Reagent Lines with Methanol, Wright Giemsa Stain, or Wright Stain (Manual Procedure)

1. Drain all of the baths. See Flushing Reagent Lines and Stainer with Methanol - DxH Slidemaker Stainer II - Manual Procedure (Software v1.2.0 and Prior, and v2.0.0) in CHAPTER 12, Cleaning Procedures.
2. Ensure your cleaning bottle is full of methanol.
3. Remove the pickup tubes from supplies 2 and 4 and turn them upside-down.
4. Wrap the pickup tube assemblies in clean gauze to prevent dripping.
5. Hold the pickup individually and fill baths 2 and 3 to remove the reagents from the lines. Wait two minutes and select **Cancel** to stop the filling process.
6. Transfer the pickup tubes to the methanol cleaning bottle(s).
7. Drain baths 2 and 3 individually OR select **Drain All Baths**.
8. Fill baths 2 and 3 individually with methanol.
9. Let the methanol sit in the baths for at least 15 minutes.
10. Drain baths 2 and 3 individually OR select **Drain All Baths**.
11. Remove the pickup tube assemblies from the methanol cleaning bottles and turn them upside-down.
12. Wrap the pickup tube assemblies in clean gauze to prevent dripping.

13 Hold the pickup individually and fill baths 2 and 3 with air. Let the air flow through the pickup tubes for less than two minutes (to prevent a low supply warning) and select **Cancel**.

14 Transfer the pickup tube assemblies back into supplies 2 and 4.

15 Select **Finish** from the local navigation bar.

16 Clean or replace the baths, especially baths 2 and 3.

17 Clean the probes by wiping them with methanol.

18 Place the DxH Slidemaker Stainer II online to continue working.

Total Voteout ----- (WBC, RBC, Plt)..... (Calculated Parameters)

Definition

----- Total Voteout occurred. No average histogram appears for the affected parameter.

..... Incomplete computation. This may occur in place of the calculated parameters because a voteout occurred for a primary parameter used in the calculation.

Affected Parameters

WBC, RBC, and Plt

Action for WBC Voteout

Required only when a consecutive number of occurrences (determined by the laboratory) triggers Auto Stop.

If an Auto Stop is triggered due to a Total Voteout, follow these steps:

1 Perform the Zap Apertures diagnostic procedure (**Menu** > **Diagnostics** > **Dx Tools** > **Maintenance** tab **> Zap Apertures**). The Zap Apertures procedure applies voltage to the WBC and RBC apertures.

2 Perform the **Clear WBC Aperture** procedure. See Clearing a WBC Aperture in CHAPTER 10, Troubleshooting.

3 Select **Finish** to complete the procedure OR if the cycle failed, clear the aperture, perform a shutdown, and cancel the shutdown after five minutes. For difficult plugs, a full shutdown may be necessary.

4 If voteouts persist, perform the clean apertures procedure. See Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures.

Action for RBC Voteout

Required only when a consecutive number of occurrences (determined by the laboratory) triggers Auto Stop.

If an Auto Stop is triggered due to a Total Voteout, follow these steps:

1 Perform the Zap Apertures diagnostic procedure (**Menu > Diagnostics > Dx Tools > Maintenance** tab **> Zap Apertures**). The Zap Apertures procedure applies voltage to the RBC apertures.

2 If voteouts persist, perform the clean apertures procedure. See Cleaning (Bleaching) the Apertures - DxH 900/DxH 690T in CHAPTER 12, Cleaning Procedures.

3 If the problem persists, call your Beckman Coulter Representative

Flow Cell Clog::::: (NRBC/Diff, Retic)

Definition

::::: Flow Cell Clog was detected

Affected Parameters

NRBC, Diff, and Retic

Action

Required Only with a consecutive number of occurrences (determined by the laboratory)

If a consecutive number of samples (determined by the laboratory) displays :::::, follow these steps:

1. Perform the clear flow cell aperture procedure. See Clearing a Flow Cell Aperture in CHAPTER 10, Troubleshooting.

   If the cycle fails to be completed as displayed by either one of these messages: *DC flow cell voltage exceeded operating limits* OR *UMALS, LMALS, or ALL offset voltage exceeded operating limits*, run the **Clear Flow Cell Aperture** procedure again. If the cycle fails after a third attempt, call your Beckman Coulter Representative.

2. Select **Finish**. If flow cell clogs persist, go to the next step.

3. Perform the flush flow cell procedure. See Performing the Flush Flow Cell Procedure in CHAPTER 10, Troubleshooting.

4. Select **Finish**.

5. Perform a Daily Checks.

UniCel DxH Series Cleaning Checklist

UniCel DxH Series Cleaning Checklist

Month _____ Year _____

Serial # _____

System ID _____

DAILY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Perform Shutdown Procedure																															
Perform Daily Checks																															
Monthly																															
Clean BSV Externally or when crystallization is observed on the outside of the BSV, whichever comes first																															
Every Six Months (As a Minimun)																															
Clean the STM																															
As Needed																															
Clean (Bleaching the Apertures)																															
Clean Pneumatic Supply Module Fan Filter																															
Clean (AMTC) Module																															
Clean Aspiration Probe																															
Clean Optical Sensors																															
Clean Vacuum Trap																															
Clean the Handheld Bar Code Scanner																															
Tech Initials																															

UniCel DxH Slidemaker Stainer II Cleaning Checklist

UniCel DxH Slidemaker Stainer II Cleaning Checklist

Month _____ Year _____

Serial # _____

System ID _____

DAILY (As a Minimun)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Perform Shutdown Procedure																															
Perform a Daily Checks																															
Clean Stainer Baths and Tray (Applies to Software v1.2.0 and prior and v2.0.0 If Drain All Baths and Flush Stainer is Disabled)																															
Flush Stainer and Clean Baths and Tray (Applies to Software v2.0.0 If Drain All Baths and Flush stainer is Enabled)																															
Weekly (As a Minimun)																															
Clean the Baskets																															
Clean Stainer Fill Probes, Drain Probes and Level Sense Probes																															
Performing the Flush Stainer Module Procedure - Manual (Applies to Software v1.2.0 and prior)																															
Extensive Cleaning of Fill and Drain Probes Does NOT apply to New Fill and Drain Probes																															
Every Six Months (As a Minimun)																															
Clean the STM																															
As Needed																															
Flushing Reagent Lines and Stainer Manual (Applies to Software v1.2.0 and prior and v2.0.0)																															
Clean the Slide Chute																															
Clean Aspiration Probe																															
Clean Dispense Probe																															
Clean STM Optical Sensors																															
Clean Vacuum Trap																															
Empty Broken Slides Bin																															
Clean STM and Single-Tube Station Bar Code Scanner																															
Tech Initials																															

APPENDIX H

Adding, Copying, and Exporting Files

Saving and Exporting Quality Control, Patient Information, Event Log Files, Maintenance Log Files, and IQAP Information

You can save Quality Control, Patient Information, Event Log files, Maintenance Log files, and IQAP information to a USB flash drive or to removable media.

If you use a USB flash drive to archive your files, save the files in a folder on the hard drive (E: drive). Then, copy the files to the USB flash drive or removable media.

Save the Files to a Folder on the E: Drive

1 Select one or more of the following files to export them to the E: drive:

- Quality Control files (**QC Setup > More Options > Export**)
- Patient Information files from the **Worklist Released** tab
- Event Log files

2 Select **Export**.

3 Select **Local Drive** on the Export screen that is displayed.

4 Select **Select Folder**.

5 Select **Create Folder** and enter a name for the folder OR select a folder from the list.

6 Select **OK**.

7 Highlight the folder you want to use and select **OK**.

The Export screen reappears with a path to the selected folder and a file name.

Example: *Patient_current date_DxH serial #_date & time.CVS*

8 Select **Start**. The files are moved to your selected folder on E: drive.

Move the Files to Your USB Drive

1. Insert your removable media into the USB flash drive on the System Manager.
2. Select **Menu > Advanced > Windows Explorer > Expand User (E:)**.
3. Select your folder.
4. Select the file(s) within the folder. For several files, select **Organize > Select All**.
5. When the folders are highlighted, select **Organize > Copy**.
6. Double-click the USB flash drive to open it.
7. Select **Organize > Paste**. The files should appear in the USB flash drive.
8. Close the USB folder.
9. To eject the USB flash drive, select **Computer > Eject**. The USB flash drive should disappear from the screen.

Setting File Encryption for PHI Data

- File Encryption can only be enabled or disabled by a Level III Operator from the System Manager.
- Anytime File Encryption for PHI Data is enabled, disabled, or modified, the DxH system will record an entry in the Audit Log.
- The user can export Protected Health Information (PHI) data to the Local Drive E:\ or CD Recorder.
- The exported file(s) are encrypted and configured with a password and can only be opened by the user of a password.
- Unauthorized users cannot access the exported Protected Health Information (PHI) data as it is encrypted and password-protected.
- If the exported file(s) password is forgotten, the user must export the file(s) again from the DxH application to the Local Drive E:\ or CD Recorder and create a new password as passwords cannot be reset.
- If the exported file(s) have been deleted from the DxH Application, the data is lost.

1 Select **Menu** > **Setup** > **System** > **More** > **File Encryption Setup**.

2 Select the **Enable File Encryption** checkbox (disabled by default).

3 There are two encryption password options available:

- Default Encryption Password - A unique password is needed for extracting the exported Protected Health Information (PHI) files.
- Dynamic Encryption Password - A unique password is needed during the export and extraction of the Protected Health Information (PHI) files.

1. If you select **Default Encryption Password**:
   a. Enter a password meeting the complexity password rules in the New Encryption Password and Confirm Encryption Password Field. Note the password. Passwords are case-sensitive. This password will be needed for opening the exported files.
   b. Select the **Show Password** checkbox, if you want the password to be visible.
   c. Select **OK**.
2. If you select **Dynamic Encryption Password:**
   a. Select **OK**.

Exporting a PHI Data File with Default Encryption Password

1 Select the **Worklist icon** > **Released** tab.

2 Select the files you want to export to the E:\ drive or CD Recorder.

3 Select **Export**.

4 Under Format, select Type: **CSV** or **INF/DAT** from the drop-down list.

NOTE Patient files are CSV.

Raw Data Files are INF/DAT.

5 Under Data Selection, select **Selected Result(s)** or **All Results in Current Filter**.

6 Under Destination, select **Local Drive E:** or **CD Recorder**.

NOTE You may copy the file(s) directly to E:\ drive or CD Recorder.

You may also Select Folder within E:\ and copy the files to a specific folder. The system will give your file(s) a File Name(s).

7 Select **Start**. The files are moved to your selected folder on the E:\ or CD Recorder. The exported files will be in the 7-Zip format.

Exporting a PHI Date File with Dynamic Encryption Password

1 Select **Menu** > **Worklist** > **Released** tab or select the **Worklist icon** > **Released** tab.

2 Select the files you want to export to the E:\ drive or CD Recorder.

3 Select **Export**.

4 Under Format, select Type: **CSV** or **INF/DAT** from the drop-down list.

NOTE Patient files are CSV.

Raw Data Files are INF/DAT.

5 Under Data Selection, select **Selected Result(s)**.

6 Under Destination, select **Local Drive E:** or **CD Recorder**.

NOTE You may copy the file(s) directly to E:\ drive or CD Recorder.

You may also Select Folder within E:\ and copy the files to a specific folder. The system will give your file(s) a File Name(s).

7 Select **Start**.

8 Enter a password to encrypt the exported file, and select **OK**.

NOTE Enter a password to encrypt the exported file. It must meet the complexity password rules. Note the password. Passwords are case-sensitive. This password will be needed for opening the exported files. The files are moved to your selected folder on E:\ or CD Recorder. The exported files will be in the 7-Zip format.

Moving the Files with Default/Dynamic Encryption Password and 7-Zip Software Folder to Your USB

1 Insert your removable media into the USB port on the System Manager.

2 Select **Menu > Advanced > Windows Explorer > Expand User (E:)**.

3 Select the files you exported to E:\ and the 7-Zip Software folder.

4 On the keyboard, press Ctrl + C to copy the file(s).

5 Double-click on the USB flash drive to open it.

6 On the keyboard, press Ctrl +V to paste. The files should appear in the USB flash drive.

7 To eject the USB flash drive, select **My Computer > USB Drive > Drive Tools > Eject**. The USB flash drive should disappear from the screen.

Opening/Copying the Exported Folder/Files and 7-Zip Software Folder to Your Computer From Your USB

1 Insert your USB in another computer.

2 Copy the folder/file(s) from the USB to your computer.

3 Install the 7-Zip software to your computer if it is the first time you are extracting Protected Health Information (PHI) Encrypted Data files.

7-Zip Software Installation Instructions:

a. Double-click the 7-Zip folder.

b. Double-click **Installer**.

c. Double-click **7z1900.exe**.

d. Select **Yes** if prompted by: *Do you want to allow this app from an unknown publisher to make changes to your device?*

e. Select **Install**. The destination folder of the 7-Zip Software is *C:\Program Files (x86)\7-Zip*.

f. Select **Close** when prompted by: *7-Zip 19.00 is installed.*

4 Select the Windows key on your keyboard.

5 Expand the **7-Zip** folder.

6 Select **7-Zip File Manager**.

7 Locate where you saved your files (ie: C:\), double-click on the file.

8 Select one of the file extraction options:

a. Select the **exported file(s)** > **right-click** > **7-Zip** > **Extract files** > **Enter password** (Passwords are case sensitive.) > select **OK**. The system creates a folder(s) of the data exported with files in a CSV, INF, or DAT format.

NOTE Patient files are CSV.

Raw Data Files are INF\DAT.

b. Select the **data file(s)** > **right-click** > **7-Zip** > **Extract Here** > **Enter password** (Passwords are case sensitive.) > select **OK**. The system extracts the data and creates a file(s) in a CSV format.

9 You may open the exported files created in the CSV, INF, or DAT format.

NOTE Patient files are CSV.

Raw Data Files are INF\DAT.

Export to IQAP

Using the Beckman Coulter IQAP program provides your laboratory with a peer review of other laboratories using the UniCel DxH Systems and Beckman Coulter Controls.

1 From QC Setup, select **Menu > Setup > Quality Control**, select the instrument (one at a time if more than one) from the drop-down list, and highlight the Quality Control files you want to export.

2 Under *More Options*, select **IQAP Export**.

NOTE These files are only usable by the Beckman Coulter IQAP program. A .csv format will not work when submitting a file to IQAP.

3 Select one of these destinations for the files you are exporting:

- **Transfer to BCI** - This is used when the laboratory has PROService available.
- **CD Recorder (G:\) This process may take several minutes.**
- **Local Drive E:** - After exporting the files, follow the steps in Move the Files to Your USB Drive.

4 Select **Start** to export the files.

Adding Documents to the Reader from the E: Drive

The E: drive provides a repository for adding documents that you can view in the reader or for removing documents from the reader.

Add the Document to the E: Drive and View it in the Reader

1 Copy the document you want to view in the reader to a USB flash drive.

2 Select **Menu > Advanced > Windows Explorer**.

3 Select the **E:** drive.

4 Insert the USB flash drive into the USB port.

5 Follow the prompts to copy the document from the USB flash drive to the E: drive.

6 Follow the prompts to remove the USB flash drive from the USB port.

7 On the right side of the DxH 900 screen, select **Reader** tab **> Open** and double-click the file to open it in the reader.

Remove the Document from the Reader

1 Select **Menu > Advanced > Windows Explorer**.

2 Go to the E: drive and search for the document.

3 Ensure that the document is not open and select it.

4 From the toolbar, select the drop-down arrow next to **Organize**.

5 Select **Delete** to delete the document.

6 Close the E: drive.

Abbreviations and Acronyms

A — ampere

ALL — axial light loss

AMTC — Air Mix and Temperature Control module

ANSI — American National Standards Institute

ASCII — American Standard Code for Information Interchange

ASTM — American Society for Testing and Materials

AWG — American wire gauge

BFC — body fluid count

bmp — bitmap (file format)

bps — bits per second

BSV — Blood sampling valve

CBC — complete blood count

CD — CBC/Diff

CDC — Centers for Disease Control and Prevention

CDR — CBC/Diff/Retic

CEE — Commission for Electrical Equipment

CHD — Coulter histogram differential

CLRW — Clinical Laboratory Reagent Water (formerly CLSI Type I, II, and III)

CLSI — Clinical and Laboratory Standards Institute

cm — centimeter

CR — CBC/Retic

CSA — Canadian Standards Association

CSF — Cerebrospinal Fluid

CS — Common Services

csv — Comma-separated values

CV — coefficient of variation

dB — decibel

DV — distribution valve

EDMA — European Diagnostic Manufacturers Association

EDTA — ethylenediaminetetraacetic acid

FC — flow cell

FDA — Food and Drug Administration

ft — foot or feet

gal — gallon

HCT — hematocrit

HGB — hemoglobin

H&H — HGB/HCT

Hz — hertz

IEC — International Electrical Commission

IQAP — Inter-Laboratory Quality Assurance Program

IQM — Intelligent Quality Monitoring

IVD — in vitro diagnostics

L — liter

LALS — low angle light scatter

LAS — Laboratory Automation System

LIS — Laboratory Information System

LMALS — lower median angle light scatter

m — meter

MALS — median angle light scatter

MCH — mean corpuscular hemoglobin

MCHC — mean corpuscular hemoglobin concentration

MCV — mean cell volume

MGG — May-Grunwald-Giemsa stain

mL — milliliter

mm — millimeter

MTM — Multi-Transducer module

mW — milliwatt

n — number

NEMA — National Electrical Manufacturers Association

nm — nanometer

pg — picogram

psi — pounds per square inch

QA — quality assurance

QC — quality control

SAM — sample aspiration module

SDS — safety data sheets

SPM — specimen processing module

STAT — superior turn-around time (urgent or rush, immediately)

STM — specimen transport module

TNC — total nucleated cells

TTM — Triple Transducer module

µ — micron

µL — microliter

µm — micrometer

UL — Underwriters Laboratory

UMALS — upper median angle light scatter

VAC — volts of alternating current

VCSn — values for volume, conductivity, and light scatter for multiple angles

VCS 360 — values for volume, conductivity, and light scatter for multiple angles

Vdc — volts of direct current

VIC — vacuum isolator chamber

WBC — white blood cell

WG — Wright-Giemsa stain

WHP — WBC/HGB/Plt

XB — Bull's moving average

XM — moving average

Glossary

This glossary is a collection of specialized terms and their meanings that are either used in this manual or related to the information in it. If a term has more than one meaning, all meanings relevant to this manual are included.

absolute count
Concentration of a cell type expressed as a number per volume of whole blood.

accuracy
The ability of the instrument to agree with a predetermined reference (true) value.

accurate
The reported measurement is in agreement, within acceptable limits, of the preferred reference standard. Sometimes specified as the difference of the means of a sample to the assay or expected value (mean difference) or the percent difference of the means of a sample to the assay or expected value (percent mean difference).

action limits
The limits for a test value, such that if the value is outside of the limits, some future action or review is suggested (for example, repeat test, review blood smear, etc.)

active result
A result associated with an active test order.

active test order
Test order for which one or more results for one or more specimens have not been released or released and not yet reported.

administrator
Somebody whose job is to administer the affairs of a business or organization.

advanced operator
An operator who has been given authority beyond that of a basic operator.

alert
A fault condition classification for events occurring on the DxH System. An alert occurs when a condition exists on the system for which corrective actions must be taken in order for specimen results to be reported. This condition has no immediate effect on the system operation as the system does not stop. The system alerts the operator by triggering visual alarms, and if applicable, audible alarms. Alerts are not logged to the Event Log. All alerts require operator review; however, the method of review is specific to the individual event.

algorithm
A particular procedure for performing an analysis.

amended report
A patient report that is modified subsequent to release.

analytical measuring range
Analytical measuring range is the manufacturer-determined upper and lower limits of the amount, activity, or potency of a specific analyte between which measurement is possible on the measuring system within specified limits. The analytical measuring range includes results from diluted samples.

analyze
To process a sample to determine the results for a test or tests.

analyzer
An analytical or preparation unit composed of one or more modules.

anticoagulant
A substance added to blood to prevent clotting.

aperture
An opening of a specific size and length through which cells pass for counting and sizing.

application software
SPM or System Manager software that controls and implements the DxH System.

aspiration probe
Device which pierces the cap and through which the sample is aspirated.

assay values
Values established for a control or calibrator by repeat testing of that material.

assembly
A replaceable part that comprises more than one component.

audit log
A general record showing any changes that the operators have made on the system, including configuration, patient, and QC. Data in the Audit log is kept up to a period of 2 years after which the system will "roll over" the log data.

audit trail
A record of a sequence of events, as actions performed by the operator, from which a history can be reconstructed for a specific area of the system. For example, a patient audit trail will have changes related to patient data. Audit trails are maintained for as long as the data is maintained on the system.

auto collation
A System Manager feature that automatically combines results of different test modes (CBC/Diff and Retic) analyzed from a sample with an identical patient or sample ID. The different test modes must be performed within a predetermined time.

auto stop
Automatic (for example, without a specific user request) stopping of specimen analysis on the SPM because of some condition that was detected by the system. Several conditions can result in an autostop. For the DxH System, the autostop conditions are configurable.

available tests
All the tests which an instrument is capable of performing.

background count
Measure of the amount of electrical or particle interference.

backup
To store data separately from the active data, while leaving the active data in place. Backups can be done completely, meaning that all of the selected data is backed up, or incrementally, meaning that only the changes are backed up.

base test
A test that is determined for a method, directly measured by an instrument (for example, WBC, for a CBC analysis), or a test that is derived from the RBC or PLT histogram.

basic operator
An operator with only limited authority to operate the system.

basophil
A mature granulocyte WBC with granules that contain heparin and vasoactive compounds. The granules stain purple-blue with Wright's stain.

batch
A group or set of results.

batch mean
The mean or average of a set of examples.

bi-directional
The capability to send test results to (upload) and receive test results from (download) the LIS system.

board
Circuit board not directly connected to a host board or backplane using a card edge connector; typically has a moderate to high density of components.

body fluid count
The DxH 900/DxH 690T CBC module generates a simple panel for body fluid specimens composed of RBC and TNC.

body fluids
Fluids that are excreted, secreted, or derived form the human body. Some examples are: cerebrospinal fluid (brain and spinal cord), pericardial fluid (heart), peritoneal dialysis fluid (abdomen), peritoneal lavage fluid (abdomen), peritoneal tap fluid (abdomen), pleural fluid (lungs), and synovial fluid (joints).

calibration
The procedure used to set an instrument at a specific value or values using a reference method.

calibration factor
A numerical factor applied to a result determined by an instrument, in order to establish an agreement between the instrument's measurement and a reference value.

calibrator
A substance with values obtained by reference instruments and used to calibrate instruments.

card
Circuit board with a card edge connector that plugs into a host board or a backplane; typically has a moderate to high density of components.

carryover
The amount, in percent, of sample remaining in the system and picked up by the next sample cycled. Low-to-high carryover is the amount of sample with low cell concentrations carried over to samples with high cell concentration, such as diluent to blood. High-to-low carryover is the amount of samples with high cell concentrations carried over to samples with low cell concentrations, such as blood to diluent.

cassette
A type of specimen carrier.

cassette presentation
The SPM accepts specimens presented at the automatic entry point, delivered by cassette.

CBC analytical module
A partition of the Specimen Processing module (SPM) that produces CBC raw data.

characters
All letters A-Z and numbers 0-9.

cleaning agent
A detergent used to flush sample from tubing and eliminate protein buildup.

cleared
When a specimen has been seen by the system, but it could not be processed, a notification for the specimen is placed on the *Not Processed Filter* of the Worklist. *Cleared* means that one of these notifications has been removed.

closed vial
The sampling of a specimen by piercing the cap of the container.

coefficient of variation (CV or CV%)
An expression, in percent (%), of the data spread (variation) as related to the mean value. CV, CV%, and coefficient of variation may be used interchangeably. The standard formula for calculation:

$$CV\% = \frac{SD}{Mean} \times 100$$

coincidence correction
Mathematical adjustment of cell count and size for coincidence error.

coincidence error
Errors produced in counting and sizing by the presence of more than one cell within the aperture sensing area at the same time. The system senses these as one large cell rather than as two distinct cells.

common services
A functional module that consolidates a set of services and becomes a common source of those services for several other modules. It comprises the Reagent Services, Pneumatic Services, Pneumatic Supply and Electronic Supply.

complete blood count (CBC)
In the DxH 900/DxH 690T, whole blood parameters RBC, WBC, UWBC, HGB, HCT, MCV, MCH, MCHC, PLT, RDW, RDW-SD, and MPV.

component
A subassembly or other constituent part of a module.

computed test
A test that is calculated based on the results of one or more other tests.

configured tests
The tests for the SPM that have not been disabled by the operator via the configuration options described in this manual.

conforming vial
A cap-pierceable vial that can be placed directly into a tube holder or cassette.

consensus rules
Generally accepted guidelines (rules), developed by the International Consensus Group for Hematology's (ISLH) Review. The rules can be applied to criteria for review of CBC and differential results from automated hematology analyzers.

consumable
A component that is required by the physical system during operation and is typically disposed of after a single use or a finite number of usages. This includes such items as calibrators, controls, liquid reagents, etc.

control
A substance with predetermined values used as a standard to verify accuracy of instrument results.

control file
A set of retrieved control results and the expected results associated with them. Each control file contains results from a single instrument and a single control lot or specimen.

Control ID
A specimen ID that cannot be used for patient specimens because a control has been configured with a lot number that matches the Specimen ID.

critical limits
The limits for a test value, such that if the value is outside of the limits, the patient's life may be threatened and immediate action and notification is required.

critical result
A result considered sufficiently abnormal as to warrant immediate notification of the physician.

cyclic redundancy check (CRC)
A common technique for detecting data transmission errors.

dataplot
A graphic representation of results. Dataplots present a combined view of population density and membership. Colors represent different types of cells. Shades of colors represent the number of cells--bright colors are the most dense.

dead volume
The volume of fluid in its container (for example, reagent bottle or specimen tube) that the SPM cannot access.

deciliter (dL)
A unit of volumetric measurement equal to 0.1 liter.

decision rules
Typically, user-defined *if, then* statements specifying an action to be taken dependent on the outcome (for example, test values, flags) of a test. These are programmed at the System Manager to allow automatic responses.

default
Original setting in the SPM or System Manager.

default test order
A test order that is generated when a specimen is presented to the system and a previously submitted test order cannot be found for it. The tests on the order will depend on the method of presentation (Cassette or Single-Tube).

default tests
The tests that may be assigned to a test order for a specimen that cannot be positively identified, or for which a test order cannot be located.

deionized water
Water freed of salt and some organisms by an ion-exchange process. This water can be used interchangeably with distilled water in procedures. Also referred to as DI H_2O or DI water.

deleted
A test order, with or without associated results, that has been completely removed from the system. That is, the Test Order is no longer available on either the active or inactive Test Order lists. Furthermore, if there were any results associated with the test order, they are no longer available.

delta check
A check on sample results that is made by clinical laboratories to determine if the current result on a particular patient is within certain limits of the last result obtained on that same patient.

density
The number of cells in a particular region, regardless of the type of cell. On dataplots, as more cells appear in a particular region, the color of the region gets brighter.

Diff %
Used to represent the individual differential % tests, which includes: NE%, LY%, MO%, EO% and BA%.

Diff #
Used to represent the individual count tests, which includes: NE#, LY#, MO#, EO# and BA#.

differential (Diff)
Leukocyte or white blood cell differential.

discrete test
Refers to either a single base test or a single computed test (for example, WBC which is a base test or HCT which is a computed test).

distilled water
Water freed of solids and organisms by distillation. This water can be used interchangeably with deionized water in procedures.

distribution valve (DV)
An electrically driven ceramic face sealing valve in the VCSn functional module that routes sample/reagents between the mixing chambers, the flow cell, and the VCS diluent pump.

download
Data transmitted from an LIS system to a clinical System Manager.

DxH System
An interacting group of components (SPM, System Manager, and Pneumatic Supply Module).

entry point
The physical place where the specimen first becomes known to the system, for example, at the Single-Tube Station or at the Input Buffer for Cassette presentation.

eosinophil
A mature granulocyte WBC that responds to parasitic infections and allergic conditions. Granules stain a bright reddish orange with Wright's stain.

error
A fault condition classification for events occurring on the DxH 900/DxH 690T System. An error occurs when a condition exists on the system for which the operator must take corrective action. Operation of the system or a component was affected or may have been halted, and action is required in order to recover the situation. Action may be unrecoverable and may consist of contacting your Beckman Coulter Representative. The system alerts you of an error by displaying messages and triggering visual and audible alarms. If an error has an impact on the SPM's operation, the Operational Status Indicator for the SPM will be triggered. Messages related to the event will be posted to the Event Log by filter category. All errors require acknowledgement or review; however, how each error is acknowledged or reviewed is specific to the event.

error message
A classification of messages that are put into the Event Log. Indicates that messages posted to the Event Log are intended to alert the operator of an error. The Event Log visual indicator is triggered consistent with an error. Audible alarms are also triggered. Error messages post to the Event Log for the General category filter only. The operator is required to review or acknowledge the message in order to clear the Event Log visual indicator.

erythrocyte (red blood cell)
A biconcave disc, 6.2 to 8.2 µm, that carries oxygen to the tissues in the body and carries carbon dioxide away from the tissues.[53]

ethylenediaminetetraacetic acid (EDTA)
A common anticoagulant used for hematological testing.

event
A noteworthy occurrence; something that needs to be logged.

exception
A message that indicates why a specimen was not processed or skipped, or a default test order or no match occurred.

expiration date
A manufacturer's recommended last day of use for a reagent, control, or calibrator.

exit
To leave the current displayed screen.

In reference to a specimen, a specimen designed to be moved to an exit point (for example, output buffer) for unloading. An exited specimen must be presented at an entry point before another request can be processed.

export
To format and store data so that it can be used by external programs (for example, Microsoft Excel or Word).

extended QC
Additional QC rules for verification of the following:

- Random error or Imprecision
- Systematic error or Bias
- Total error or Inaccuracy

femtoliter (fL)
Femtoliter, a unit of volumetric measurement equal to 10^{-15} liter.

field replaceable assembly
A functional, testable assembly that replaces a portion of a module. This can include such parts as a circuit board, flow cell, laser, etc.

flags
A flag is a single letter or symbol and will always appear to the right of a result. A flag can be instrument generated (R, P), or laboratory-defined (H, L, c, a). On screens and printouts, the letters, such as H, L, and R appear next to parameter results to indicate specific conditions.

final report
Any patient report dispatched subsequent to the entire set of patient's results being final released.

five-part differential
Classifying leukocyte cells into five sub-populations (neutrophils, lymphocytes, monocytes, eosinophils and basophils).

flagging
The ability of a system to identify and alert the operator to the presence of possible anomalies that may affect the accuracy of a test result or require additional work to be performed.

flow cell
A device used to guide particles as they pass through a laser beam one at a time in a stream of fluid called sheath. This sheath fluid aligns the sample with the center of the flow cell.

flow cytometry
A process for measuring the characteristics of cells or other biological particles as they pass through a measuring apparatus in a fluid stream.

Gaussian distribution
A normal or symmetrical distribution; for example, a bell-shaped curve.

giant platelets
Platelets above 20 fL in size.

gram (g)
A unit of weight.

ground state
The energy level having the least energy of all its possible states and greatest stability. For example, the resting state of an atom is referred to as its ground state.

hardware modules
Replaceable, testable units that comprise multiple components and/or assemblies.

hematocrit (HCT)
Red cell packed volume. The percentage of packed red cells compared to the entire blood sample.

hemoglobin (HGB)
A protein component of red cells that carries oxygen and carbon dioxide.

hemoglobinometry
Measurement of hemoglobin in the blood.

hertz (Hz)
A unit of frequency.

histogram
A graphical display of the cell size distribution of a blood sample, where size is on the X-axis and frequency is on the Y-axis.

hold
When an individual test value, panel or set of test results is identified as requiring further review and verification prior to release.

host
A device with customized drivers that receives the SPM patient or control information electronically and formats the data so the LIS can interpret it.

host query
When a clinical instrument requests test information for a particular specimen from the LIS system.

immature reticulocyte fraction (IRF)
The ratio of immature reticulocytes to the total number of reticulocytes.

imprecision
The degree to which a result will vary due to random error when measured several times on the same instrument.

in vitro
Outside of a living organism, such as in a laboratory or in an artificial container.

in vivo
Inside a living organism, associated with the physiological system.

indices
In hematology, refers to the following calculated values for red cell properties: MCV, MCH, and MCHC.

information
An information event occurs when a message is logged to the Event Log for tracking and/or troubleshooting purposed. This event has no effect on the system operation and the operator is not alerted. An information event is logged to the Event Log by filter category and does not require operator acknowledgement or review. An action may eventually be needed in order to prevent problems in the future.

input buffer
Place for loading cassettes.

instrument
An analytical or preparation unit composed of one or more modules.

Intelligent Quality Monitoring (IQM)
Intelligent Quality monitoring (IQM) monitors event notification and recovery within the system on an on-going basis. IQM monitors sensor and hardware status in real-time, and also provides tracking and trending of event notifications via the Alert Status icons, alarms and the History Event Log. Events can be addressed as they occur. The availability of IQM optimizes system availability and minimizes possible repeat patient testing for failed QC.

interfering substances
Components within a blood sample that complicate or obstruct the measurement of the desired parameters.

Inter-laboratory Quality Assurance Program (IQAP)
A program administered by Beckman Coulter, Inc. for users of its hematology instruments and controls. It allows a laboratory to compare its performance to all other laboratories in the program that use the same or similar instrument category and control products.

lab administrator
An individual who has responsibility for running a laboratory.

laser
Light amplification by stimulated emission of radiation.

leukocyte (white blood cell)
Cells that defend the body against disease.

linearity
The ability of an instrument to accurately produce a test result over the range of possible values for a specific parameter.

liter (L)
A unit of volumetric measurement.

LIS query
When a clinical instrument requests test information for a particular specimen from the LIS system.

log
A record of certain system occurrence or events.

lot number
An identifier assigned by a manufacturer to identify a control, reagent or calibrator.

lymphocyte
WBC originating in the lymph system. The key to the body's immune system, the lymphocyte recognizes and eliminates foreign pathogens in the body.

lyse
To break apart or dissolve.

mean
Arithmetic average of a group of data.

mean cell volume (MCV)
Average volume of red blood cells expressed in fL.

mean corpuscular hemoglobin (MCH)
The weight of hemoglobin in the average red blood cell expressed in picograms.

mean corpuscular hemoglobin concentration (MCHC)
The weight of hemoglobin in the packed red cell volume expressed in g/dL or g/L.

mean platelet volume (MPV)
Average volume of platelets expressed in fL.

mean reticulocyte volume (MRV)
Average volume of reticulocytes expressed in fL.

membership
The different types of cells in a particular region, regardless of the number of cells. On dataplots, membership is represented showing different types of cells in different colors.

message
A classification of messages that are posted to the Event Log that are for informational purposes only. The Event Log visual indicator is not triggered. Audible alarms can be triggered depending on the specific event. Messages can be posted to any of the Event log filter categories.

meter (m)
A unit of linear measurement.

micron (µ)
One millionth of a meter.

microprocessor
The integrated circuitry for electronically controlled devices.

milliliter (mL)
A unit of volumetric measurement equal to 10^{-3} liter.

millimeter (mm)
A unit of linear measurement, equal to one-thousandth of a meter.

module
A standardized assembly with well-defined interfaces and functionality, that provides a major service to a larger system and can be used together with other modules to form a complete system

A piece of a workcell or a system.

monocyte (MO)
A large, mononuclear, phagocytic WBC found in the peripheral blood and in the lymphoid system.

mononuclear
Having only one nucleus.

morphology
Various conditions that can be seen by examining a blood smear, along with a semi-quantitative estimate of the condition's severity. The morphology can be related to red cells, white cells or platelets.

multi-transducer module (MTM)
A set of components that produce the DC, Rf, MALS, UMALS, ALL, LALS. and LMALS-Offset signals. It consists of the optical bench, an LALS pre-amp board and the diff pre-amp board. Electrical signals and laser light are passed through the flow cell such that particles flowing through the flow cell will perturb the signals listed above and cause a variety of transducers (antennas, light sensors) to produce other electrical signals which are then measured to produce raw data.

nanometer (nm)
A unit of linear measurement equal to 10^{-9} meter.

neutrophil
A mature granulocytic WBC characterized by a segmented nucleus. The cytoplasm of this phagocyte stains pinkish to beige with faint granules in Wright's stain.

nucleated red blood cell (NRBC)
Immature form of the red blood cell characterized by the presence of a nucleus.

offline
SPM or DxH Slidemaker Stainer II is not conducting specimen scheduling, specimen delivery, or specimen processing for slidemaking. The stainer may still be processing specimens to completion.

online
SPM or DxH Slidemaker Stainer II is conducting specimen scheduling, specimen delivery, and specimen processing.

opacity
A transformation of the data derived from the ratio of the RF and DC components obtained during data acquisition. It is calculated for every individual cell measurement or event. Opacity has the effect of removing the size component, yielding a measurement that is more closely related to the internal contents of the cell.

$$OP \approx \frac{RF}{DC}$$

open vial
The sampling of a specimen (blood, body fluid, etc.) by removing the cap from the container.

operating range
The range over which the instrument displays, prints and transmits results. This includes results from prediluted samples. Operating range limits usually exceed analytical measuring ranges.

operating system (OS)
Operating system files, libraries, drivers, and so forth, required for running the application.

operator
An individual with authority to operate the system.

operator ID
The unique identifier of the person who operates the analyzer.

Operator (Level I)
Normal operator - has low level privileges to the system software.

Operator (Level II)
Advanced operator - has medium level privileges to the system software.

Operator (Level III)
Lab administrator operator - has full level privileges to the system software.

Operator (System)
Default operator - the system uses this operator when no one is logged in to the system software, but the system is processing specimens. Limited to processing specimens only.

Operator (Temp Admin)
Temporary administrator operator - has full level privileges to the system software, to all system service tools and the full operating system for one day only.

outlier
Control results that fall outside the expected or established range.

output buffer
Where cassettes are unloaded.

panel
A grouping of two or more simple panels and/or discrete tests that can be ordered on a specimen (for example, CD, CDR, CR, H&H, WHP, etc.).

parameter
Component of blood that the instrument measures and reports.

partial voteout
An individual aperture count that is not used in the average parameter value.

patient ID
The System Manager considers this field an optional sample identifier.

Your laboratory may use it as a specific identifier for the patient, such as the medical record or Social Security Number. It is intended for laboratories that want to track results of several different samples or tests for the same patient.

pericardial fluid
The serous fluid that fills the pericardial cavity (the cavity around the heart) and protects the heart from friction.

peritoneal dialysis fluid
Used in peritoneal dialysis, it is a special solution that is run through a tube into the peritoneum, a thin tissue that lines the cavity of the abdomen, to remove the body's waste products.

peritoneal lavage fluid
Fluid instilled into the peritoneal cavity and subsequently withdrawn, for the removal of elements not being excreted by the kidneys.

peritoneal tap fluid
Fluid obtained from an abdominal tap, which is a procedure in which a needle is inserted through the abdominal wall into the peritoneal cavity to obtain a sample of any fluid that is present.

photometric measurement
A process where a beam of light with certain wavelength goes through a sample and is read by a photocell. This generates a current that can be measured.

platelet (thrombocyte)
The cytoplasmic fragments of megakaryocytes, circulating as small discs in the peripheral blood, and an essential component for blood clotting.

pleural fluid
The fluid that encompasses the lungs. The name comes from pleura, the serous membrane that enfolds the lungs and is folded back upon the walls of the thorax and upon the diaphragm.

Plt Histogram
The portion of the Plt distribution curve between 0 fL and 36 fL.

polynuclear
Having many nuclei.

positively identified
The bar code for the selected primary identifier (Specimen ID) was successfully read.

power DOWN
A predefined sequence of events performed at the System Manager to power DOWN the System Manager and the SPM.

power OFF
To remove power from an instrument.

power ON
To provide power to an instrument.

power UP
A predefined sequence of events performed at the System Manager to power UP the instrument.

precision
A measure of the ability of the instrument to reproduce similar results when a sample is run repeatedly. May also be referred to as repeatability.

precision test
The precision test is performed as part of Daily Checks. If any test value exceeds the reference value by 1% or more, the test value appears in red on the Daily Checks screen and is flagged with an H (high) or L (low).

predilute
Dilution of a sample prior to analysis on the analyzer.

preliminary report
Any patient report dispatched prior to the entire set of patient's results being final released.

presentation method
The method by which the specimen is presented to the SPM. The available methods are Cassette Presentation and Single-tube Presentation.

primary identifier
The unique identifier that will be used by the system to positively identify a patient specimen.

privilege
Permission to perform some particular function, for example, enter a test order or review patient results.

probe
See *aspiration probe*.

pounds per square inch (psi)
A unit of pressure measurement.

QA/QC Operator
An operator who has authority to perform all QA (calibration) and/or QC (control) related activities.

quality control (QC)
A set of procedures a laboratory sets up to ensure that an instrument is working accurately and precisely.

Ramp Test
The ramp test is performed as part of Daily Checks. If any test value exceeds the reference value, the test value appears in red on the System Manager screen and is flagged with an H (high) and L (low).

random access
The ability to perform different tests on different specimens in random order. The opposite of batch processing, where specimens must be grouped according to tests ordered.

random error
Imprecision or variance.

range
The difference between the highest and lowest measurement in a series.

raw data
Unanalyzed data; data not yet subjected to analysis.

RBC histogram
An RBC distribution curve. The normal curve ranges from 36 to 360 fL. The display starts at 24 fL.

RDW (Red Distribution Width)
The size distribution spread of the erythrocyte population derived from the RBC histogram. Expressed as coefficient of variation (%).

RDW-SD
The size distribution spread of the erythrocyte population derived from the RBC histogram. Expressed as a standard deviation in fL.

reagent
A substance used (as in detecting or measuring a component, or in preparing a product) because of its chemical or biological activity. (Webster)

rectify
The operator can correct the patient ID if the patient ID was entered incorrectly.

red blood cell (RBC)
See *erythrocyte (red blood cell)*.

red cell indices
In hematology, refers to the following calculated values for red cell properties: MCV, MCH, and MCHC.

reference range
A range of test values determined by statistical analysis of specimens collected from a normal (non-diseased) population.

reflex test
A different test, panel or specimen preparation performed as a result of the outcome of an earlier test. Usually performed for confirmation of initial results or to gain a better understanding of a patient's condition.

rejected
A test value, panel or set of results has been reviewed and identified as non-reportable, either automatically because another panel in another run has been selected for release, or manually because the operator has determined that these tests cannot be reported.

released
The test results have been automatically or manually validated and identified as reportable outside the system's domain, as defined by your laboratory.

remote management
An application that allows a Beckman Coulter remote user to control a System Manager with prior authorization of lab management, allowing pro-active diagnostic support.

removed
A pending test order (no associated test results) that has been manually taken away from the active Test Orders list and has become inactive.

repeatability
The closeness of agreement between the results of successive measurements of the same substance carried out under the same conditions of measurement. Also known as reproducibility, precision, within-run precision, within-assay, within-run, intra-assay, and intra-run precision.

report
A formatted printed and/or electronic record of compiled specimen or system data.

reportable range
The range over which the instrument is accurate.

reported
The test results have been automatically or manually dispatched to a user specified destination. The test results may or may not have been released.

rerun
The ability to repeat an analysis on a specimen using the same test.

restore backup
To bring backed up data back into the system so that it replaces the active data in the system and becomes the active data itself.

result
A numerical value or values obtained by performing the analysis for a particular test.

reticulocyte (Retic)
An immature form of red cell that, in the maturation process, falls between a nucleated RBC and a mature RBC. As the nucleated RBC matures, the nucleus shrinks and eventually is shed, and the RNA in the cytoplasm breaks down. The red cell without a nucleus, but still containing remnants of the RNA, is a reticulocyte. Mature RBCs contain no RNA. Stains, such as new methylene blue, precipitate the RNA, differentiating the reticulocytes from mature RBCs and other cells.

Review Station
A personal computer with limited functional capability intended for the routine monitoring of a workflow.

root mean squared error (RMSE)
Measured within a control file Extended QC is enabled, and N is greater than or equal to 15 runs. RMSE is a statistical result that is compared to the limits for Single Measurement Error.

$$\Delta = \sqrt{\frac{n-1}{n} \cdot s^2 + \delta^2}$$

run
One analysis of a specimen which generates test results.

sample
A portion of a specimen taken for analysis on an instrument.

sample preparation
Requires two services, acquire sample and condition sample. It consists of extracting a sample from a specimen container, segmenting the required sample volume, then combining it with conditioning reagents to enhance specific discrimination characteristics for measuring and analysis. These responsibilities are delegated to an SPM.

sample volume
The volume of a specimen removed from a specimen container.

Also, the volume of a specimen that is conditioned for a specific measuring function. When the volume removed from a specimen container exceeds the conditioning requirement and a portion is discarded, or when portions of the sample are allocated to several conditioning processes, the sample may be called an intermediate sample volume.

schistocytes
A type of red blood cell fragments.

secondary identifier
An identifier not configured to be the primary identifier, that can be used by the system to identify a patient specimen in cases where the primary identifier cannot be read. A tube position ID is a secondary identifier.

sheath
A liquid which surrounds and aligns another liquid.

shift
Consecutive values that abruptly move from one level (mean) to another and then maintain a constant level.

Also, a work schedule within a day.

single measurement error
The possible deviation for a single measurement of a result. Single measurement error is flagged when Extended QC is enabled, and the result exceeded the upper or lower limit for Single Measurement Error limits entered by the operator. The Single Measurement Error is measured within the control file as the Root Mean Squared Error (RMSE).

Single-Tube Station
The entry point for Single-Tube Presentation.

specifications
An exact statement of particulars, especially a statement prescribing materials, and dimensions for something to be installed.

specimen
The discrete portion of a body fluid or whole blood taken for examination, study, or analysis.

Specimen ID
The primary identifier for sample analysis.

specimen processing module (SPM)
Processes specimens and transmits raw data to the System Manager.

specimen transport module
The specimen delivery module.

standard deviation (SD)
A measure of deviation from the mean. For example, a measure of the range of channel deviation within a measurement.

$$\mathrm{SD} = \sqrt{\frac{\sum \langle \bar{x} - x \rangle^2}{N - 1}}$$

status bar
A horizontal bar that appears toward the bottom of the screen. It displays the last event message, operator ID, and date and time.

suspect messages
Suspect messages appear in a separate area of the screen display, printout, and host transmission. Suspect messages, such as Imm Grans or Giant Platelets, etc., are system-generated. Suspect messages appear for sample results based on an abnormal cell distribution or population. The system generates these messages according to an internal algorithm.

synovial fluid
The viscid, transparent, albuminous fluid secreted by the synovial membranes at points where lubrication is necessary, as in joints.

system administrator
An individual who has responsibility for administering a DxH System and may perform activities such as configuring the modules and system and performing the more non-routine maintenance activities.

system identifier (SID)
An identifier entered at installation time and used to identify the system when calling your Beckman Coulter Representative.

System Manager
A personal computer (PC) that:

- Provides a graphical user interface and input devices (touchscreen, keyboard, and mouse) to the operator to interact with the system. This interaction can include, but is not limited to: ordering tests, reviewing test results, reviewing quality control results, making log entries, and responding to system errors.
- Is a repository for the database.
- Is intended for configuration and setup of all system features.

system message
A message that may be given when a system event occurs, to provide a reason for a review (R) flag generated by the system.

systematic error
The bias or deviation of the mean from the target value.

sweep flow
A steady stream of diluent that flows behind the RBC aperture during sensing periods to keep RBCs from swirling back into the sensing zone.

test
Individual parameter for which an instrument can determine a value, either directly measured or computed.

test order
A description of what tests are to be performed on each given specimen.

test panel
An aggregation of selected tests that, when combined, provide results of clinical diagnostic value, but do not necessarily share common analytical technologies.

thrombocyte (platelet)
the cytoplasmic fragments of megakaryocytes, circulating as small discs in the peripheral blood, and an essential component for blood clotting.

throughput
A measurement of rate at which an instrument can produce test results, conventionally measured as tests per hour.

total nucleated cells (TNC)
The total number of nucleated cells for a body fluid specimen.

total voteout
A code (-----) that replaces the average parameter result when there is disagreement between the three aperture counts. The aperture counts for the three apertures were too far apart to give a reliable average parameter value.

trend
Consecutive values that increase or decrease gradually.

Uncorrected WBC (UWBC)
Uncorrected WBC is measured directly using the Coulter Principle. UWBC cannot be edited. UWBC is an intermediate value in the calculation of WBC. It represents an estimation of the total white count before correction for interference(s). Potential interferences are listed in Table 1.35, Limitations in CHAPTER 1, System Overview. UWBC is provided so the laboratory can estimate the magnitude of correction on the final WBC result, and to guide follow-up workflow activities for validation of results (such as selecting suitable alternative methods).

uninterruptible power supply (UPS)
A device with a battery that allows limited continued operation of an instrument or other device during a power outage.

upload
Data transmitted from a clinical instrument to an LIS system or other host.

user interface
The display and mechanical devices (keyboard, mouse) used by an operator to interact with the instrument or instruments.

validated
The test results have been automatically or manually reviewed and confirmed according to laboratory protocols.

volume, conductivity, and light scatter for multiple angles (VCSn)
Measurements collected for a cell as it passes through the MTM. It consists of values for volume, conductivity, and light scatter for multiple angles.

warning
A fault condition classification for events occurring on the DxH System. A warning occurs when a condition exists on the system for which the operator needs to be alerted. This condition has no immediate effect on the system operation, however an action may be needed in order to avoid problems in the future. The system alerts the operator by displaying messages, triggering visible alarms and, if applicable, triggering audible alarms. If the warning could eventually impact the instrument's operation, then an operational status indicator for the instrument is triggered. Messages related to the event will be posted to the Event Log by filter category. All warning require acknowledgement/review; however, how each one is acknowledged or reviewed is specific to the individual event.

warning message
A classification of messages that are put into the Event Log. Indicates that messages posted to the Event Log are intended to alert the operator of a warning. Warning messages will be posted to the Event Log for the General category filter only. The operator must acknowledge/review the messages in order to clear the Event Log visual indicator.

WBC (White Blood Cell)
White Blood Cell count results from the CBC analysis. The WBC count is adjusted for interfering substances when appropriate. No further correction of WBC is required.

WBC differential
A determination of the types and numbers of leukocytes found in a blood specimen. This may be accomplished by the instrument or by examination of a stained blood smear.

white blood cell (leukocyte)
Blood cells that defend the body against disease.

worklist
A listing of specimen analysis status.

XB
Bull's Moving Average. A quality control mechanism used by hematology instruments that monitors the stability of the instrument by using the red cell indices MCV, MCH and MCHC.

XB batch
A set of XB results for up to 20 runs, and the associated XB statistics if there are any.

XB current batch
The batch of 20 XB results into which results are currently being placed. The batch will remain the current batch until the first specimen after this batch is run, at which time it will become the last XB batch.

XB last batch
The last XB batch for which results are available, immediately preceding the current XB batch.

XB previous batch
The XB batch immediately preceding the last XB batch.

XB results
The parameter results (for example, MCH, MCHC) that have been incorporated into an XB batch.

XB run
A single analysis of a specimen, the results for which are used as XB results. The run also has ID information associated with it in addition to the results.

XB statistics
Statistics resulting from the analysis of results in an XB batch, or in a set of XB batches.

XM
Moving Average. A quality control method that uses the Exponentially Weighted Moving Average (EWMA) to monitor the stability of the instrument using the CBC, Diff, and Retic parameters.

XM batch
A set of XM results, configured between two to 1,000 runs, and the associated XM statistics, if any.

XM batch mean
The average value calculated for the batch of XM results.

XM current batch
The batch of XM results, configured between two to 1000 runs, into which results are currently being placed. The batch remains the current batch until the first specimen after this batch is run, at which time it will become an XM completed batch.

XM completed batch
The XM batch for which the maximum number of runs for the batch are available.

XM group
The group (CBC, Diff, Retic and Retic Calc) into which results are placed for XM analysis.

XM results
The parameter results that have been incorporated into an XM batch.

XM run
A single analysis of a specimen, the results for which are used as XM results. The run also has ID information associated with it in addition to the results.

XM statistics
Statistics resulting from the analysis of results in an XM batch, or in a set of XM batches.

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Related Documents

Your DxH documentation can be found on our website at www.beckmancoulter.com/techdocs.

Instructions for Use

PN C06947

- System Overview
- Operation Principles
- Daily Checks
- Quality Control
- Sample Analysis
- Data Review
- Workload
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PN B26711

Symbols Glossary

PN C29230

Hematology Tube List

PN A70017

Summary of Safety and Performance

https://ec.europa.eu/tools/eudamed

RoHS Table of Hazardous Substances

PN C97430

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