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| **Document Title:** Operation of the Midas III Slide Stainer |

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REVISION HISTORY

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| **Procedure #** | **Revision Date** | **Reason for Revision** |
| SH.CP.AU.Hem.0017.0002 | 11/12/2015 | Update format; remove fecal leukocytes, update procedure |
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# TITLE: Operation of the Midas III Slide Stainer

1. Purpose
   1. The purpose of this document is to provide use and functions of Midas III stainer used to stains blood smears and fluid slides for microscopic analysis
2. SCOPE
   * + 1. To be used by URMC Automated Lab staff for hematology slide staining.
3. **RESPONSIBILITIES**
   1. Department and functional responsibilities are defined in the table below:

| **Group/Person** | **Responsibility** |
| --- | --- |
| Quality Assurance | * Supports the development of this document. * Review and approval of this document. |
| Medical Director | * Ensures that the procedure is followed. * Review and approval of this document. |
| Supervisor | * Ensures that the procedure is followed. * Review and approval of this document. |
| End User | * Follows the procedure. |

1. SPECIMENS N/A
2. QUALITY CONTROL N/A
3. SPECIAL SAFETY PRECAUTIONS
   1. Rinse water is disposed of into a dirty sink. Any methanol based products (the methanol in staining vessel 1 and the Wrights stain in staining vessels 2 and 3) will be poured into an empty gallon jug for disposal by Environmental Health. The contents for staining vessel 4 can be rinsed down a dirty sink.
   2. All patient specimens should be considered potentially infectious and must be handled with precautions used for human blood, as described in CDC (Center for Disease Control) recommendations and in compliance with the Federal OSHA (Occupational Safety and Health Administration) Blood-borne Pathogen Standard, 29 CFR (Code of Federal Regulations) part 1910.1030. Follow specimen handling as outlined by Laboratory Safety Policy, (SH.CP.AU.gen.0005).

C. Electric shock hazard is always a danger, especially considering the proximity of the water bath. Always disconnect the line cord when servicing equipment.

1. MATERIALS
   1. Equipment
2. Midas III Slide Stainer
   1. Supplies
      1. Slide carrier
      2. Stains/Fixative vessels
      3. Drying vessel
      4. Vessel covers
      5. Slides
      6. Graduated cylinders
   2. Reagents 
      1. Giemsa
      2. Wright Stain
      3. Phosphate Buffer pH 6.8
      4. Deionized water
      5. Methanol
3. Reagent Preparation

Routine blood smear

1. Wright’s plus buffer: **Staining vessel 3**

a. Measure 50 ml of Wright’s stain into a graduated cylinder then pour into the staining vessel.

b. Fill the remaining volume of the staining vessel with 6.8 pH Phosphate buffer.

1. Giemsa plus deionized water: **Staining vessel 4**
   * + 1. Measure 20 ml of Giemsa stain into a graduated cylinder then pour into the staining vessel.
       2. Fill the remaining volume of the staining vessel with deionized water.

1. control and indicators

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| **KEY** | **FUNCTION** |
| PROGRAM | Enter processing steps for a program |
| REVIEW | View each successive programmed processing step  Push ENTER to view each processing step  Push PROGRAM to write over incorrect steps  Push ENTER to the end of the program |
| RUN | Starts execution of a program |
| STOP | Pauses the stainer and raises the tower  (Press RUN to continue or 1X, 2X, 3X, Program will stop and the  arm will go to the Home Position) |
| ENTER | Enters selected processing steps into system memory |
| CLEAR | Push PROGRAM button and Program No., then ENTER  Press CLEAR to start programming the new sequence  To clear an incorrect entry, use “0” or write over the entry |
| UP and DOWN arrow | Used to navigate through menus |
| Number pad | Used to select program numbers and processing steps |

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| **DISPLAY** | **FUNCTION** |
| PROGRAM NUMBER | Indicates program currently being run or reviewed |
| STATION NUMBER | Indicates station currently being run or reviewed |
| STATION TIME REMAINING | Indicates time remaining in program at station being used  (STA is displayed on keyboard)  Also time in station in review |
| DIPPING STATION/AGITATION | Displays DIP for dipping, no dipping (---) (By temp area) |
| STEP NUMBER | Indicates step currently being run or reviewed |
| TEMP C degrees | Indicates temperature currently being run or reviewed  (Displayed to the right in review area) |
| TOTAL TIME REMAINING | Indicates total time remaining in the program |

1. MIDAS III STAINING PROCEDURE
   1. Turn on the Midas III Slide stainer with the ON/OFF toggle on the back of the instrument. Wait for the instrument to initialize.
   2. Perform Daily Maintenance.
   3. The black vessel with the opening on the side is for Station 6. Make sure the opening is on the left toward the fan. The dryer at Station 6 takes about 2 minutes to reach 45°C.
   4. Replace methanol/stain per shift assignment. Remove the covers from the staining vessels.
   5. Load slides into carrier.
      1. Lay carrier on its side. Slide up the metal retaining plate on the slide carrier.
      2. Load the slides into the carrier with the smear end away from the retaining plate. The slides may face left or right.
      3. Slide down the retaining plate to hold the slides in the carrier.
      4. Mount the slide carrier onto the two rods of the tower arm. Gently and firmly slide the carrier back until the magnetic catch engages.

**Note:** Do not move arm left or right or up or down.

* 1. Running a program
     1. The staining program is created at the time of installation.
     2. Run Program 1 by pressing RUN, 1, ENTER. The run will start, the arm will initialize, and the tower will move to the first station of the sequence. As the slide carrier runs in each Station, the unit will display run information.
     3. An audible beep sounds six times at the completion of the program and the Standby mode is entered.
  2. To interrupt a stain cycle
     1. To pause a run in progress, press STOP. Press RUN to continue the run where it left off.
     2. To stop and reset the system, press STOP and then press STOP 3 more times. The tower will return to Home position. A scrolling marquee will indicate the stainer is at the Home position on standby.

1. STAINING PROTOCOL FOR WHITE CELL DIFFERENTIAL and fluid
   1. Program **1** is programmed with the following parameters:
      1. Station 1: Methanol

Time: 20 seconds

Agitation: no

* + 1. Station 2: Wright stain

Time: 3 minutes 30 seconds

Agitation: yes

* + 1. Station 3: Wright stain and 6.8 pH buffer

Time: 5 minutes 30 seconds

Agitation: yes

* + 1. Station 4: Giemsa stain and deionized water

Time: 4 minutes

Agitation: yes

* + 1. Station 5: Water rinse

Time: 1 minute

Pressure: 1500 mL

Agitation: yes

* + 1. Station 6: drying @ 45°C

Time: 2 minutes

Agitation: no

1. STAIN STAINING VESSEL MAINTENANCE PER SHIFT

See SH.CP.AU.jad.0111 Midas Stainer Maintenance diagram for initial set up of staining vessels.

* 1. Night shift – replace Methanol, and top off Wright’s stain
  2. Day shift – replace ALL staining vessels
  3. Evening shift – replace Methanol, and top off Wright’s stain

1. PROGRAMMING THE MIDAS III STAINER
   1. Entering a Program
   2. Turn power on by using the ON/OFF switch on back of unit by the power cord and wait for the unit to initialize.
   3. Press PROG to enter the programming mode.
   4. The stainer has 9 available programs numbered 1 through 9. Select a program number and press that number on the keypad.
   5. Selected program number is displayed. Press ENTER
   6. If the Midas III stainer already has a protocol stored under the selected program number, it will display.
   7. Press Clear for New Program. Press Clear to start the new programming sequence.
   8. Enter the station number corresponding to the vessel location desired. Stations 1 through 6 are available. Press that number on the keypad. Press ENTER.
2. In the far left home position the tower arm is at Station 6.
3. Station 1 is the far right station.
4. Rinse vessel is stationary at station 5 and the
5. Drying station is stationary at station 6.
   1. Enter the required time for the selected station in minutes and seconds. Press ENTER.
   2. Using the up and down arrows select agitation if desired.
   3. If station 5 is selected, the Midas III stainer will ask for the flow rate selection after programming the agitation mode. Use the up and down arrows and select 1500. Press ENTER.
   4. Press ENTER.

The first station is now programmed and the display is cleared for the next station.

* 1. Repeat steps 4 through 7 for each step in the staining sequence. The programmed sequence can contain up to 29 steps, in any order.
  2. After the final step is programmed and the unit is displaying a blank step, press STOP to save the program.
  3. Running a program
     1. Load the staining vessels into the appropriate station for the program being run.
     2. Load the slides into the slide carrier and very carefully slide carrier onto the tower arm.
     3. Press RUN and the number of the desired program. The run will start, the arm will initialize, and the tower will move to the first station in the sequence. As the slide carrier runs in each station, the unit will display run information.
     4. To pause the run, press STOP

To continue the run, press RUN

To cancel the run, press STOP. Wait for tower to go to vertical home position and then press STOP 3 additional times in succession to reset the system or anytime the arm is up.

* + 1. An audible beep sounds six times at the completion of the program and Standby mode is entered
  1. Reviewing a program
     1. Press REVIEW
     2. Press the number of the program to be reviewed. The program number is displayed
     3. Press ENTER

The first step in the program sequence is displayed, including the program number, station number, DIP if agitation is selected or --- if agitation is deselected. Station time in minutes and seconds, the flow-rate of station 5 and the temperature in degrees C if at station 6 are also displayed.

* + 1. Continue to press ENTER to look at all steps in programming sequence. Once all steps in the current sequence are displayed, the Midas III will display:

END OF PROGRAM

* + 1. Press the STOP key at any time to exit the Review mode.
    2. Press PROG key any time when the information about a step is displayed and you want to change the selection for that step (i.e. station number, time, agitation or flow rate) to enter the program EDIT mode.
  1. Changing an existing program
     1. Press REVIEW
     2. Press the number of the program to be changed.
     3. Press ENTER to view the first step of the program. Continue to press ENTER until the desired step is located.
     4. Press PROG. The Midas III will display the station number for the selected step. Change the station number by pressing the desired station number and ENTER. If you do not want to change the station number just press ENTER.
     5. Enter new time by pressing 0000 and then new time using number keys followed by ENTER.
     6. Change agitation if desired by pressing the up or down arrow followed by ENTER. Just press ENTER for no change.
     7. If station 5 is being edited, to change the flow rate press the up or down arrows to the desired rate. Press ENTER if no change is needed.
     8. If no other changes are necessary press STOP. Press ENTER to view the remainder of the program. Press REVIEW to continue with the review mode. If changes to any other step(s) or if additional steps are desired continue the EDIT process.

1. MAINTENANCE
2. Daily – Wipe off the cabinet and bench area with damp cloth to prevent build-up of residue and subsequent corrosion.
3. Cover stain vessels when not in use to minimize evaporation.
4. Weekly – Clean the cabinet with mild detergent solution. To remove stain residue from the stainless top panel, use methanol.
5. TROUBLESHOOTING AND SERVICE MODe
   1. Self test program – to run the self test program press RUN 0, ENTER

The sequence for PROGRAM 0 is:

|  |  |
| --- | --- |
| **STATION** | **TIME** |
| 5 | 10 sec |
| 4 | 10 sec |
| 3 | 10 sec |
| 2 | 10 sec |
| 1 | 10 sec |
| 2 | 10 sec |
| 3 | 10 sec |
| 4 | 10 sec |
| 5 | 10 sec |
| 6 | 3 min |

The display will indicate the number of cycles completed.

* 1. Service mode programs

1. The Midas III software provides 11 service modes to test the performance of various functions as well as to set working parameters.
2. To select the service mode, press SVC key. The software displays the name of the first service mode.
3. The operator can scroll through the entire list of the service modes by pressing the up or down keys.
4. To select a specific service mode press the ENTER key.
5. Once the mode is selected, the user can activate the service mode function or scroll through the available options for the selected parameter value.
6. To select the desired value of a parameter, press the ENTER key to select the displayed options.
7. The STOP key terminates the selected service mode and returns to Standby mode. Prior to exiting the service mode, the mechanism may reinitialize to the home position.

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| --- | --- | --- |
| **NUMBER** | **SERVICE MODE HEADING** | **DESCRIPTION** |
| 1 | Up/Down Test  (SVC down arrow ENTER 1) | This mode moves the arm mechanism to the top if the up arrow is pressed and moves to the bottom position if the down arrow is pressed. This action only occurs at the station the arm is at, it does not move to any other stations.  Press STOP to exit. |
| 2 | Dipping Test  (SVC down arrow ENTER 2) | This test moves the arm up and down in its normal dipping motion, at the current station. Press STOP to exit. |
| 3 | L/R Station Test  (SVC down arrow ENTER 3) | The arm will move from station 3 to 4 to 2 and to station 4 to 2 continuously until function is stopped. Press STOP to exit. |
| 4 | Find Home Test  (SVC down arrow ENTER 4) | The arm mechanism moves to the home position (station 6) and in the UP position. Press STOP to exit. |
| 5 | L/R Motor Speed  (SVC down arrow ENTER 5) | Sets the speed of the left/right drive motor. The optimum speed for this motor is 200. The speed can be increased in increments of 5. Maximum speed is 255 and minimum is 50. Press and the up or down arrow and ENTER to change the speed. Press STOP to exit. |
| 6 | L/R Motor Test  (SVC down arrow ENTER 6) | This activates the left/right motor drive to move toward station5 from station 6.  **CAUTION!** Do not activate this function if the arm is already at the station 1 position  Press STOP to exit. |
| 7 | U/D Motor Speed  (SVC down arrow ENTER 7) | Sets the speed of the Up/Down drive motor. The optimum speed for this motor is 1100. The speed can be increased in increments of 50. Maximum speed is 1250 and minimum is 500. Press and the up or down arrow and ENTER to change the speed. Press STOP to exit. |
| **NOTE: If speed is too HIGH, the arm will fail to rise when the slide carrier is full** | | |
| 8 | Fan/Heater Test  (SVC down arrow ENTER 4) | During this service mode, the operator can turn ON (up arrow) or OFF (down arrow) the heater and fan/blower. When the heater and blower are ON, the stainer controls the temperature of the air to be within 5°C of the point set in service mode 10. It displays current temperature in the drying vessel in °F and °C, in the second line of the display. In the first line of the display, two numbers will be displayed, LOW and HI, to be used by the factory technician to evaluate the performance of the heating system.  Press STOP to exit. |
| 9 | Valve Test  (SVC up arrow ENTER 9) | Allows the user to set the flow rate of the rinse water. The flow rate is automatically controlled to be within 100 mL/min. The actual set point and flow rate is displayed. Press STOP to exit. |
| 10 | Set Temperature  (SVC up arrow ENTER 10) | Allows the operator to set the temperature in the drying station (station 6). The average temperature is 45°C. It has a range of 20 - 65°C and is changed in one degree increments. If the temperature is set at or below room temperature, the heater will not activate. Press ENTER to save and STOP to exit. |
| 11 | Set Drying Mode  (SVC up arrow ENTER 11) | The Midas III Stainer provides two drying modes at station 6. “Slides mostly up” mode is optimum for drying the slides at this station. “Normal agitation” allows the use of station 6 as another reagent station. Set the temperature to 20°C. Once the drying mode is selected, the Midas III will use that mode for all programs for station 6 agitation until changed by the operator.  Press STOP to exit. |

**Refer to Midas III Operators manual, section 5 for troubleshooting guide.**

For technical assistance and service call toll-free 1-800-222-0342 Monday through Friday 8:30 am to 5:00 pm EST

1. LIMITATIONS

The dryer at Station 6 needs about 2 minutes to warm up to 45°C.

1. CALCULATIONS N/A

xix. INTERPRETATION N/A

xx. RESULT REPORTING N/A

xxi. TRAINING

|  |  |
| --- | --- |
| **Personnel** | **Training Required** |
| Management | Read |
| End User | Read  Perform Skills Assessment |

xxii. REFERENCES

1. Midas III Slide Stainer Operators Manual
2. Midas Stainer Maintenance Log (SH.CP.AU.jad.0111)
3. Midas III Slide Stainer Problem Log (SH.CP.AU.jad.0113)
4. Clinical Diagnosis and Management, Henry
5. <http://www.facilities.rochester.edu/cu/hazmat1.htmv>