

Title: <b>Laboratory Calibration of DataMaster DMT</b>		Page 1 of 9
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

## **1.0 Purpose and Scope**

- 1.1 The purpose of this procedure is to describe the process used by Vermont Forensic Laboratory staff for the calibration of the DataMaster DMT infrared breath alcohol analysis instruments designated for use as evidentiary breath testing devices.
- 1.2 The scope of this procedure includes new and repaired instruments. Any instrument which is new or has had repairs affecting the analytical portion of the instrument will be calibrated by trained laboratory staff before being installed in any location for evidentiary testing.

## **2.0 Responsibility**

- 2.1 It is the responsibility of staff performing this task to follow the procedure as written, to note any omissions, errors or unclear instructions in the procedure and bring them to the attention of the Alcohol Program Supervisor.
- 2.2 This procedure will be reviewed periodically by appropriate staff. Revisions of the procedure will be made when a need is identified.

## **3.0 Precautions**

- 3.1 Appropriate caution must be taken to avoid electrical shock when working with or using any electrically charged equipment.
- 3.2 Each instrument must complete a power-up prior to calibration. See P-ALC 201, DataMaster DMT Power-Up Procedure.
- 3.3 Any changes made to the bias, lamp or cooler voltages of an instrument necessitate a recalibration.

## **4.0 Procedure Steps**

### **4.1 Materials and Supplies are all located in Room 164**

- 4.1.1 DataMaster DMT Instrument.
  - 4.1.2 Thermometer, Calibrated traceable to NIST Standards.
  - 4.1.3 Four Wet Bath Simulators.
  - 4.1.4 Simulator containing volatile organic free, lab-pure water.
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Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 2 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

- 4.1.5 0.100 EtOH DataMaster Calibration Solution prepared following the procedure noted in P-ALC 207, Ethanol Simulator Solution Preparation.
- 4.1.6 0.100 EtOH DataMaster Calibration Check Solution prepared following the procedure noted in P-ALC 207, Ethanol Simulator Solution Preparation.
- 4.1.7 0.100 EtOH Secondary external source, certified standard, obtained from GUTH laboratories or another vendor.

## **4.2 Preparation**

- 4.2.1 Allow the instrument to warm up for at least one hour.
- 4.2.2 Activate Technician Mode using your password.
- 4.2.3 Purge the simulator ports for approximately one minute or until the detector voltage has stabilized. The detector voltage must not drift by more than +/- 0.003V over a one minute period. To do this, while in Technician Mode, activate the "Pump" and "Sim. Valve" options.
- 4.2.4 The detector voltage should be +/-0.100V of zero. The voltage is set during the Power-Up Procedure (P-ALC 201). It is prudent to double check the voltage prior to calibration to ensure it is within tolerance. If the detector voltage is out of specification, refer to DataMaster DMT Power-Up Procedure (P-ALC 201) for instructions.
- 4.2.5 Prepare the Calibration Simulator containing ~0.100 EtOH Calibration Solution.
  - 4.2.5.1 Open a new bottle of Calibration Solution (~0.100 EtOH). Do not use solutions which have passed their expiration date. Pour solution into a calibration simulator and allow it to come to temperature and equilibrate for at least 30 minutes.
  - 4.2.5.2 A previously used Calibration Solution may be used under the following conditions:
    - 4.2.5.2.1 If the solution has been open for no more than one calendar week.
    - 4.2.5.2.2 If the solution has been analyzed no more than twenty (20) times.

Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 3 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

4.2.5.3 Using a NIST traceable thermometer, check the temperature of the Calibration Solution. The temperature must read 34°C +/- 0.2°C, adjust as necessary.

4.2.6 Prepare a simulator containing volatile organic free, lab-pure water.

4.2.6.1 Using a NIST traceable thermometer, check the temperature of the water. The temperature must read 34°C +/- 0.2°C, adjust as necessary.

4.2.7 Prepare a simulator containing ~0.100 EtOH Calibration Check Solution.

4.2.7.1 Using a NIST traceable thermometer, check the temperature of the solution. The temperature must read 34°C +/- 0.2°C, adjust as necessary.

4.2.7.2 If a new bottle of Calibration Check Solution is opened, allow at least thirty minutes for the solution to come to temperature and equilibrate.

4.2.8 Prepare a simulator containing a secondary source externally certified 0.100 EtOH solution.

4.2.8.1 Using a NIST traceable thermometer, check the temperature of the solution. The temperature must read 34°C +/- 0.2°C, adjust as necessary.

4.2.8.2 If new bottle of a secondary source externally certified 0.100 EtOH solution is opened, allow at least thirty minutes for the solution to come to temperature and equilibrate

### **4.3 Protocol Procedure**

4.3.1 On the touch screen, press the NPAS logo to open the drop down menu. Select: Protocols → Calibration. Enter the name of the technician performing the calibration, the solution concentration and lot number in the required fields.

4.3.2 Follow the instructions prompted by the DataMaster DMT.

4.3.2.1 Connect Simulator containing the Calibration Solution to the DataMaster DMT.

4.3.2.2 Once the instrument has analyzed the water vapor, it will prompt the technician to “Disconnect Water.” Disconnect the

Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 4 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

simulator from the breath tube and remove the tygon tubing from the CAL port. Press OK when ready.

- 4.3.2.3 The instrument will now ask for a technician signature. Sign on the line provided and press “finished” when complete. The calibration report will print in duplicate.
- 4.3.3 Inspect the calibration report and ensure that all values are within acceptable ranges. See Appendix A for an example of a calibration report with acceptance ranges and Sections 6.1 and 6.2 for what to do if a value is not within range.
- 4.3.4 Perform a check of the calibration by analyzing a ~0.100 solution.
  - 4.3.4.1 Attach a simulator containing ~0.100 Calibration Check Solution at 34°C +/- 0.2°C to the simulator tower.
  - 4.3.4.2 On the touch screen, press the NPAS logo to open the drop down menu. Select: ACCURACY AND PRECISION.
  - 4.3.4.3 In the first name field, enter the initials of the technician performing the test. In the last name field enter “Cal Check”. Enter the solution concentration and lot number in the required fields. Review the data entered for accuracy, then press “OK”.
  - 4.3.4.4 The instrument will analyze the solution ten times and calculate the average and standard deviation. The average result must be within  $\pm 3\%$  of the certified value of the solution with a standard deviation  $\leq 0.002$ . The instrument shall be recalibrated if the results do not meet these criteria.
  - 4.3.4.5 Print two copies of the Accuracy and Precision report to document the calibration check.
- 4.3.5 Perform a check of the calibration by analyzing a second source externally certified 0.100 solution.
  - 4.3.5.1 Attach a simulator containing the certified 0.100 Secondary Source Standard Solution at 34°C +/- 0.2°C to the simulator tower.
  - 4.3.5.2 On the touch screen, press the NPAS logo to open the drop down menu. Select: ACCURACY AND PRECISION.
  - 4.3.5.3 In the first name field, enter the initials of the technician performing the test. In the last name field enter “2<sup>ND</sup> Source

Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 5 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

Cal Check”. Enter the solution concentration and lot number in the required fields. Review the data entered for accuracy, then press “OK”.

- 4.3.5.4 The instrument will analyze the solution ten times and calculate the average and standard deviation. The average result must be within  $\pm 3\%$  of the certified value of the solution with a standard deviation  $\leq 0.002$ . The instrument shall be recalibrated if the results do not meet these criteria.
- 4.3.5.5 Print two copies of the Accuracy and Precision report to document the calibration check.
- 4.3.6 The calibration and calibration check reports are kept with the instrument until certification is complete. The reports are then submitted along with the certification report, for review.
  - 4.3.6.1 After review, the reports are filed as follows:
  - 4.3.6.2 If the instrument is undergoing preliminary testing, file one copy of the calibration report and calibration check report in the instrument’s paper testing binder; discard the other copies. Then place an electronic copy of all reports into the instrument electronic folder on the VFL intranet.
  - 4.3.6.3 If the instrument is beyond preliminary testing, one copy of the reports will be given to the Alcohol Program Supervisor. The second copy will be kept with the instrument until it is deployed, then they will be put with the instrument’s on-site maintenance records. Then place an electronic copy of all reports into the instrument electronic folder on the VFL intranet.
- 4.3.7 Make an entry in the DataMaster Calibration Logbook (F-ALC 201) which documents the Technician’s name and date, the DataMaster DMT serial number, calibration solution lot number, certified concentration, Second Source Lot number, and solution temperature. Also document the CAL factor, room temperature and whether or not a new bottle or a previously used solution was employed.

## **5.0 Emergency or High Priority Situations**

- 5.1** The Laboratory Director or Alcohol Program Supervisor may designate any DataMaster DMT calibration to be a high priority and request calibration as soon as possible.
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Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 6 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

## **6.0 Quality Criteria and Corrective Action**

- 6.1** If any of the calibration factors are outside the manufacturer's recommended specification, the calibration will be failed by the software. Corrective action must be taken. The action taken will vary depending on the specific problem.
- 6.2** If the average result from the Accuracy and Precision test used as a calibration check is not within  $\pm 3\%$  of the certified value of the simulator solution, or the standard deviation is  $>0.002$ , the instrument shall be recalibrated.
- 6.3** If the average result from the Accuracy and Precision test used as a Second Source calibration check is not within  $\pm 3\%$  of the certified value of the calibration solution, or the standard deviation is  $>0.002$ , the instrument shall be recalibrated.
- 6.4** The standard approach to correct a problem would be to first repeat the test to confirm the problem. Consult the service manual or ask for technical support from the Alcohol Program Supervisor. Correct the problem and document the event on a Technical Support Inquiry (TSI) (F-ALC 202).
- 6.5** If the problem is not correctable without some repair or technical evaluation, the problem and resolution will be documented.
- 6.5.1 If the instrument is still in the initial testing process, a TSI will be written and placed in the testing binder for that instrument. An electronic copy will also be filed in the instrument electronic folder.
- 6.5.2 If the instrument has completed its initial testing and results are no longer being stored in the initial testing binder and testing notebook, then a TSI (F-ALC 202) must be completed and placed in the instrument's file.
- 6.5.3 This procedure will be performed again when the problem is resolved.

## **7.0 Preventative Maintenance and Backup Procedures**

- 7.1** If the problem is not correctable without some repair or technical evaluation, the problem and resolution will be documented on a TSI (F-ALC 202).
- 7.2** If a problem is encountered that cannot be resolved by Alcohol Program staff, the instrument manufacturer, National Patent Analytical Systems, Inc. will be contacted for technical support.
- 7.3** If an agency's instrument cannot be made field ready within two weeks of removal from the agency, a replacement instrument may be installed at that site.
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Title: <b>Laboratory Calibration of DataMaster DMT</b>		<b>Page 7 of 9</b>
Doc. No. P-ALC 202 Version 1	Approved By: Margaret Schwartz, Lab Director	Date Effective: 3/1/2012

**7.4** No back-up procedure available.

## **8.0 References**

- 8.1** DataMaster DMT In-house Service Manual.
  - 8.2** DataMaster DMT Power-Up Procedure (P-ALC 201).
  - 8.3** Ethanol Simulator Solution Preparation (P-ALC 207).
  - 8.4** DataMaster Calibration Logbook (F-ALC 201).
  - 8.5** Technical Support Inquiry (F-ALC 202).
  - 8.6** Appendix A: Acceptable Calibration Report with ranges.
  - 8.7** Appendix B: Acceptable Calibration Check Report.
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Appendix A  
Acceptable Calibration Report

CALIBRATION REPORT

DataMaster DMT: 122306  
Calibration Date: 08/21/2009  
Calibrated by: STEVEN E HARNOIS  
Lot: 10-02-100



Ca =	0.101000	
CAL =	1.022435	0.800 <= CAL < 1.200
b1 =	0.000010	0.000 <= b1 < 0.004
b2 =	0.004077	0.001 <= b2 < 0.012
b3 =	0.000000	0.000 <= b3 < 0.004
Xq =	0.088161	0.050 <= Xq < 0.200
a21 =	1.193076	1.050 <= a21 < 1.300
a31 =	0.459486	0.300 <= a31 < 0.800

Performed by *St D*

Date 08/21/2009

## Appendix B Acceptable Calibration Check Report



ACCURACY AND PRECISION TEST		
STATE OF VERMONT		
DataMaster DMT: 101708		
-----		
Date: 03/16/2010		
Time: 07:08:56		
SUPERVISOR NAME: ALB CAL CHECK		
SOLUTION LOT #: 10-23-100		
SOLUTION CONCENTRATION: 0.100		
-----		
BLANK TEST	0.000	07:09
CALIBRATION CHECK	PASSED	07:09
SIMULATOR VAPOR (34.3°C)	0.099	07:10
SIMULATOR VAPOR (34.3°C)	0.100	07:11
SIMULATOR VAPOR (34.3°C)	0.099	07:12
SIMULATOR VAPOR (34.3°C)	0.100	07:13
SIMULATOR VAPOR (34.3°C)	0.099	07:14
SIMULATOR VAPOR (34.3°C)	0.100	07:15
SIMULATOR VAPOR (34.2°C)	0.101	07:16
SIMULATOR VAPOR (34.3°C)	0.100	07:17
SIMULATOR VAPOR (34.3°C)	0.100	07:18
SIMULATOR VAPOR (34.3°C)	0.100	07:19
BLANK TEST	0.000	07:20
Average = 0.099		
Std Dev = 0.0006		

