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## **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 certification 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 optical bench of the instrument will be certified after having first been powered up and 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 Alcohol Program 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. All reports generated during this procedure must be retained; this includes those displaying error messages or failures.
- 3.3. Instruments must have a power up procedure performed and be calibrated prior to certification. See Power Up procedure (P-ALC 201) and Calibration procedure (P-ALC 202).

## **4.0 Procedure Steps**

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

- 4.1.1. DataMaster DMT Instrument.
  - 4.1.2. NIST traceable thermometer.
  - 4.1.3. DataMaster Mouthpieces.
  - 4.1.4. Mouth alcohol test solution.
  - 4.1.5. A radio frequency transmitter.
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4.1.6. Wet bath simulators.

**Figure 1: Certification Solutions**

Use	Component	Nominal Concentration	Acceptance Criteria
Linearity 1	Ethanol	0.02 EtOH	± 0.002 (10%)
Linearity 2	Ethanol	0.08 EtOH	± 0.004 (5%)
Linearity 3	Ethanol	0.16 EtOH	± 0.008 (5%)
Linearity 4	Ethanol	0.40 EtOH	± 0.020 (5%)
Interference	Acetone in Ethanol	0.01% Acetone (% by vol) in 0.080 EtOH	INTERFERENCE

## 4.2. Preparation

- 4.2.1. Ensure that solutions are replaced on a quarterly basis or when the solution falls out of acceptable range. Do not use solutions which have passed their expiration date.
- 4.2.2. Ensure that the solutions needed for certification are at temperature using a thermometer calibrated to NIST standards. Simulators must indicate solution temperature of 34°C ± 0.2°C. Each fresh solution requires a minimum 30 minute equilibration time.
- 4.2.3. Make an entry in the DataMaster DMT Certification Solution Information Log. Each entry shall include the technician's name, date, DataMaster serial number, solution lot number, target concentration, date opened, expiration date and simulator solution NIST (traceable thermometer) temperature of each concentration.

## 4.3. Protocol

- 4.3.1. On the touch screen, press the NPAS logo to open the drop down menu. Select: Protocols → Certification. Enter your password. Enter the name of the technician performing the certification.
- 4.3.2. Follow the instructions as prompted by the DataMaster DMT.
  - 4.3.2.1. The certification process works like a check-list. To begin each step in the certification process, press the button for that step.

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- 4.3.2.2. When each step is successfully completed, the box to the left of the step will be checked. Each step must pass in order to go on to the next test.
- 4.3.2.3. The first step in the certification process is a diagnostic test. Press the button labeled “diagnostic” to begin the test.
- 4.3.2.4. The next four steps are the linearity tests (“Linearity 1”, “Linearity 2”, etc). Seven replicates of each of the four concentrations of ethanol will be analyzed. Run the solutions from lowest to highest concentration to avoid carryover. Enter the solution lot number, concentration and acceptance range (see figure 1) before pressing the “Linearity #” button to begin each step.
- 4.3.2.5. Once all four linearity solutions have passed, press the button labeled “R<sup>2</sup>” to perform an R<sup>2</sup> statistical analysis.
- 4.3.2.6. The next step is the acetone interference test. Enter the lot number of the solution then press the “Acetone” button. The interference solution is blown through the simulator into the breath tube when prompted “Please Blow”.
- 4.3.2.7. The next step is the invalid sample detection test, also known as the mouth alcohol test.
- 4.3.2.7.1. To complete the mouth alcohol test, a mouthpiece is loaded with ethanol by sucking air into the mouth piece from the bottle of mouth alcohol test solution.
- 4.3.2.7.2. Press the “Mouth Alc” button to begin the test. When prompted “Please Blow”, the technician will then blow out through the ethanol-laden mouthpiece into the breath tube.
- 4.3.2.7.3. An “Invalid Sample” error must be generated in order to pass the mouth alcohol test.
- 4.3.2.8. To complete the RF detection test press the “RF” button. When the detector voltage box pops up, key a handheld radio near the breath tube. The instrument should beep indicating that a radio frequency is detected.
- 4.3.2.9. To begin the sample acceptance test press the “Sample Acc” button. Open a new mouth piece and press “OK” when you are ready to start the test.
- 4.3.2.9.1. The DMT will run through a series of quality control checks.
- 4.3.2.9.2. When prompted “Please Blow” and an intermittent tone is heard, insert the mouthpiece into the breath tube.
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4.3.2.9.3. Provide breath samples. The bottom left corner of the screen will display the type of breath to deliver.

**A) Shallow Breath:** Very lightly blow a small amount of air into the mouth piece, allowing some air to escape out the sides of your mouth. The air flow should be very slight, but strong enough to just register air flow (blue line) on the screen. Blow for a few seconds then stop. The instrument should **not** report an alcohol response (black line) and should **not** accept the sample.

**B) Intermittent Breath:** Strongly blow into the mouth piece for 1-2 seconds and stop a couple of times. Be careful not to suck back on the mouth piece between puffs of air. The instrument should **not** report an alcohol response (black line) and should **not** accept the sample.

**C) Suck Back Test:** **VERY GENTLY** suck back on the mouth piece just enough so you feel a one-way valve stop the air flow (less than one second of pressure). If you suck too hard, you may damage the one-way valve. Once you feel this one way valve hit, you are finished. **Do not continue to suck back on the breath tube. Once is enough.** The instrument should **not** report an alcohol response (black line) and should **not** accept the sample.

**D) 1.5L Alcohol Free Sample:** While watching the total volume box in the bottom right corner of the screen, provide a sample of ~1.5L of air to the instrument. The instrument should accept a sample of 1.5L of air. The instrument should **not** report an alcohol response.

**E)** If any elevation of the alcohol line above 0 is visible, rerun the Sample Acceptance Test.

4.3.2.10. Once the sample acceptance test is complete, the instrument will prompt “Did Instrument Pass All Sample Acceptance Checks? Yes/No”. If all checks passed, select “Yes”. If any of the checks failed, select “No”. When prompted, type in which check failed and why.

4.3.3. Once all tests have been successfully completed, the instrument will ask for a technician signature. Sign on the line provided and press “finished” when complete. The certification report will now print in duplicate.

4.3.4. Inspect the certification report and ensure that all tests are acceptable. See Appendix A for an example of a passing Certification Report.

4.3.5. Assign a simulator to the DataMaster DMT Instrument, see Appendix B: How to Assign a Simulator to a DMT.

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- 4.3.6. Once the simulator has been assigned to the DMT, perform a diagnostic check to demonstrate that the temperature of the simulator is being monitored and is within range.
- 4.3.7. Give all documents (calibration report, calibration check report and certification report) and the Certification Log to the Alcohol Program Supervisor or their designee for review. All documents must be tech and admin reviewed.
- 4.3.8. Once the review is complete, the certification paperwork is filed as follows.
  - 4.3.8.1. The reports are attached to the Technical Support Inquiry (TSI) associated with the maintenance/repair.
  - 4.3.8.2. An electronic copy of the certification will be placed in the instrument's folder on the VFL intranet.

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

- 5.1. The Laboratory Director or Alcohol Program Supervisor may designate any DataMaster DMT certification to be a high priority and request certification is completed as soon as possible.

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

- 6.1. If any of the certification factors are outside the manufacture or VFL recommended specifications, the certification will be failed and corrective action must be taken. The action taken will vary depending on the specific problem.
- 6.2. The standard approach to correct a problem would be to first repeat the test to confirm the problem. Consult the Technical Notes Binder or ask for technical support from the Alcohol Program Supervisor.
- 6.3. All work performed must be documented on a Technical Support Inquiry (F-ALC 202). TSI's are filed in each instrument's file.

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

- 7.1. 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. This may include return or replacement of the instrument for warranty service.
    - 7.1.1. Contact NPAS at 1-800-800-8143 or [service@npas.com](mailto:service@npas.com).
  - 7.2. If an agency's instrument cannot be made field ready in a timely manner, a replacement instrument may be installed at that site.
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## 8.0 References

- 8.1. VFL DataMaster DMT Technical Notes Binder.
  - 8.2. Technical Support Inquiry (F-ALC 202).
  - 8.3. DataMaster Certification Solution Information Log
  - 8.4. Appendix A: Acceptable Certification Report.
  - 8.5. Appendix B: How to Assign a Simulator
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## Appendix A Acceptable Certification Report

### CERTIFICATION REPORT

DataMaster DMT: 100147  
 Calibration Date: 03/16/2012  
 Certification Date: 03/16/2012  
 Certified by: AMANDA BOLDOC



#### Diagnostic Results

VERSIONS  
 DMT: 1.01  
 PIC: 2.06  
 Modem: 2.2  
 Questions: 2.1

TEMPERATURES  
 Sample Chamber = 48.7°C  
 Breath Tube = 44.5°C  
 Digital Sim = 0.0°C

SETTINGS  
 Lamp Voltage = 1.53 V  
 Cooler Voltage = 1.50 V  
 Bias Voltage = 81 V  
 Chopper Freq = 526 Hz

PUMP INFO  
 Flow Rate = 6.180 L/M

DETECTOR INFO  

PUMP	ON	OFF
MAX (V)	0.0030	0.0073
MIN (V)	-0.0004	0.0061

FILTER INFO  

Filter	Value	Zero
Filter 1	0.007	Zero = true
Filter 2	0.509	Zero = true
Filter 3	1.254	Zero = true

CALIBRATION CHECK  
 Xq = 0.116 1.73%

#### Options

OPTIONS

Units  
 Alcohol..... g/210L

Simulator  
 Tolerance Check..... yes  
 Standard Type..... wet  
 Nominal..... 0.100  
 Digital Simulator..... Guth34CNP

Subject  
 Ask Questions..... yes  
 Number of Tests..... 2  
 Alcohol Display..... yes  
 Volume Display..... yes  
 Query Refusal..... yes  
 Copies..... 3  
 Simulator Before..... yes  
 Simulator Between..... yes  
 Simulator After..... no  
 Observation Time..... 0

Supervisor  
 Number of Tests..... 10

Calibration  
 Standard Type..... wet  
 Nominal..... 0.100  
 Nominal (Dry Gas)..... 0.100  
 Number of Tests..... 1

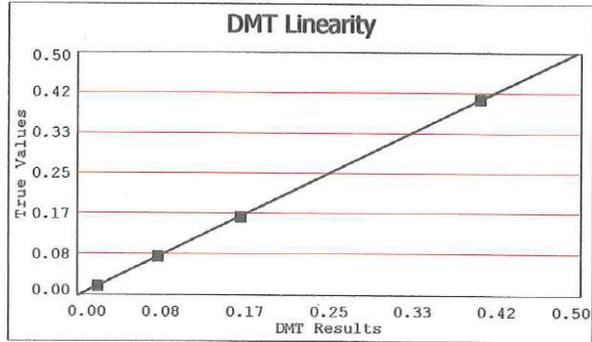
Printer  
 Printer On..... yes

Software Configuration  
 Data Collection..... yes

**Linearity Check Results**

True Value	Reported Average	Std Dev
0.020 g/210L	0.020 g/210L	0.0000
Lot # 12-52-020		
0.081 g/210L	0.080 g/210L	0.0000
Lot # 12-63-080		
0.162 g/210L	0.162 g/210L	0.0000
Lot # 12-60-162		
0.404 g/210L	0.400 g/210L	0.0000
Lot # 12-62-400		

R<sup>2</sup> = 1



**Acetone Interference Test**

Lot # 12-63-080A1  
Interference Detected

**Mouth Alcohol Test**

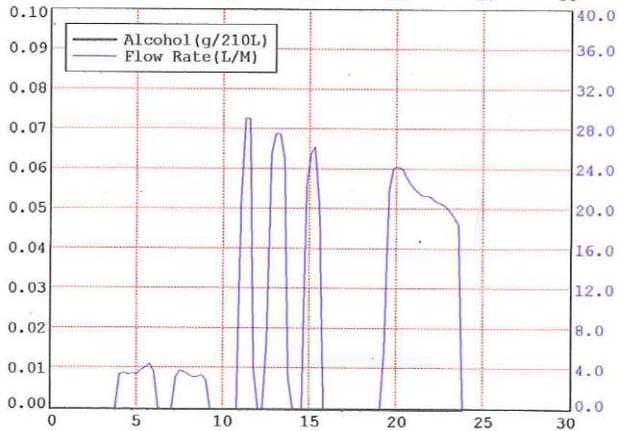
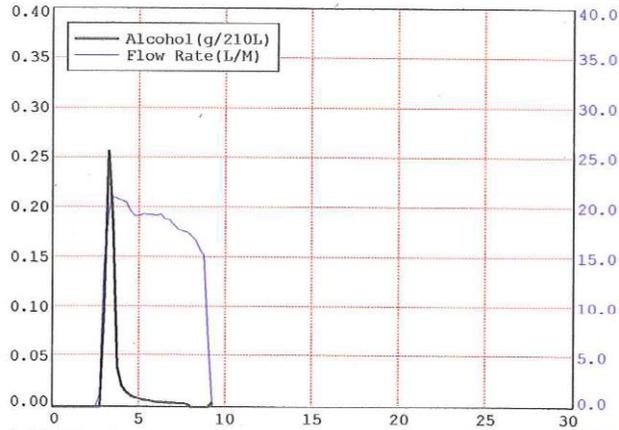
Mouth Alcohol Detected

**RF Detection Test**

Passed

**Sample Acceptance Test**

Passed



**CERTIFICATION PASSED**

Performed by Amanda B. B. B. B. Date 03/19/2012

Reviewed by \_\_\_\_\_ Date \_\_\_\_\_

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## **Appendix B**

### **How to Assign a Simulator to a DataMaster DMT**

1. Procure a simulator to be assigned to a DataMaster.
  2. Check the 2-wire temperature board in the simulator head. Replace any Rev-A boards.
  3. Preliminarily check the simulator to see if it will closely fit to the simulator tower of the DataMaster in question.
  4. Adjust the quick-connect on the simulator head so that the button to release the lock is pointed up. Take care not to twist or kink the tubing during adjustment.
  5. Adjust the distance between the quick-connects on the tower of the DataMaster so that when connected, the BNC cable will fit into its designated opening.
    - a. The BNC cable should not touch the sides of the opening to prevent damage to the rubber coating on the BNC cable and grounding of the simulator temperature reporting system.
    - b. The two quick connect ports attaching the simulator to the tower of the DataMaster should easily align. The height of the jar may be a factor in this alignment and can be adjusted by using a different simulator jar.
    - c. If the simulator cannot be made to easily attach to the tower of the DataMaster, it may be necessary to try a new simulator.
  6. Ensure that the release buttons to the quick connects on the DataMaster tower are pointed upwards to allow ease of use.
  7. Tighten the quick connects on the simulator tower so that they do not move from the ideal location. Take care not to twist or kink the tubing during adjustment.
  8. Check the jar for chips and/or cracks and replace as necessary.
  9. Check the O-ring on the head of the simulator to ensure it is present, appropriately seated and free from damage. Replace as necessary.
  10. Fill the simulator with 500mL of water or simulator solution.
  11. Perform a pressure check on the simulator to ensure an adequate seal. Repair and/or replace as necessary.
  12. Allow the simulator temperature to equilibrate (at least 30 minutes).
  13. Insert a NIST traceable thermometer into the simulator via the temperature testing port.
  14. Ensure that the simulator is maintaining the appropriate temperature ( $34^{\circ}\text{C} \pm 0.2^{\circ}$ ).
    - a. Adjust the heater on the simulator as necessary.
    - b. If the heater is adjusted, allow 30 minutes for the temperature to re-equilibrate.
  15. Attach the BNC cable from the DataMaster DMT to the simulator.
  16. Allow the thermometer and DMT to equilibrate (approximately 2 minutes).
  17. Ensure the DataMaster is registering the same temperature as reported by the NIST traceable thermometer.
    - a. Adjust the signal from the simulator to the DataMaster as necessary.
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- b. If the signal is adjusted, allow the signal to re-equilibrate and ensure correlation.
  - 18. Once complete, close the temperature testing port by snugly threading the bolt into the opening.
  - 19. Once all adjustments have been made, close the arms of the simulator tower around the simulator head and secure with a lock.
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