INFRARED BREATH TESTING DEVICE

STUDENT MANUAL

Vermont Criminal Justice Training Council/Vermont Department of Health
December 2007

CONTENTS

TABLE OF FIGURES

TRAINING GOALS AND OBJECTIVES

Training Goal:

To certify Vermont law enforcement officers in the operation of the BAC DataMaster and enable them to obtain a valid evidential breath sample from a DUI subject to determine the breath alcohol concentration.

Objectives:

As a result of this training, students will be able to:

A) Ensure that an adequate observation period is properly administered prior to obtaining a subject test.

B) Determine that the BAC DataMaster breath testing instrument is prepared to analyze a breath sample.

C) Operate the BAC DataMaster breath testing instrument in accordance with the specified procedure incorporated in this training.

D) Verify that the BAC DataMaster completes and passes all quality control checks prior to obtaining a subject test.

E) Inspect the test record (evidence ticket) to ensure that all case specific information is recorded accurately.

F) Make a log entry of the subject test at the time the test is completed.

G) Ensure that the subject has a copy of the evidence ticket.

H) Be prepared to testify in court about the procedure followed in operating the BAC DataMaster.

SECTION I

SCIENTIFIC PRINCIPLES

The information provided in this section is for reference purposes only. An understanding of this material is not necessary for the effective operation of the DataMaster breath testing device.

SCIENTIFIC PRINCIPLES REGARDING BREATH TESTING

INTRODUCTION:

Breath alcohol testing devices are designed to identify and evaluate the amount of ethyl alcohol (ethanol) in breath specimens. These devices can be used for clinical, diagnostic or forensic purposes. The concept of testing breath to evaluate the amount of alcohol present in a person's body has been put into practice for over fifty years. The equipment designed to perform this testing has undergone nearly constant development and refinement through out that time. These devices often incorporate optical, mechanical and electronic components to provide the user with a device that provides consistent and reliable testing for alcohol vapor in both simulated and authentic breath samples.

There are two major aspects of the testing that is done that must be addressed by such equipment. These include qualitative and quantitative analysis.

QUALITATIVE ANALYSIS:

Qualitative analysis in breath alcohol testing is simply the identification of ethanol in the breath sample. The DataMaster does this by considering the unique interaction of infrared energy with the alcohol molecule. Infrared energy is sensed by us as heat. It is a relatively narrow range of energies or wavelengths in the broadly defined electromagnetic spectrum, which includes gamma and x-rays at the high energy end and radio waves at the lower energy end. Infrared energies fall in the slightly lower energy region just beyond visible light. Due to this proximity it is not unusual to sense heat from sources of visible light that are seen as red by our eye and *vice versa.* Just as visible light can be separated into individual bands of color using a glass prism or grating, infrared energies can also be separated with similar devices.

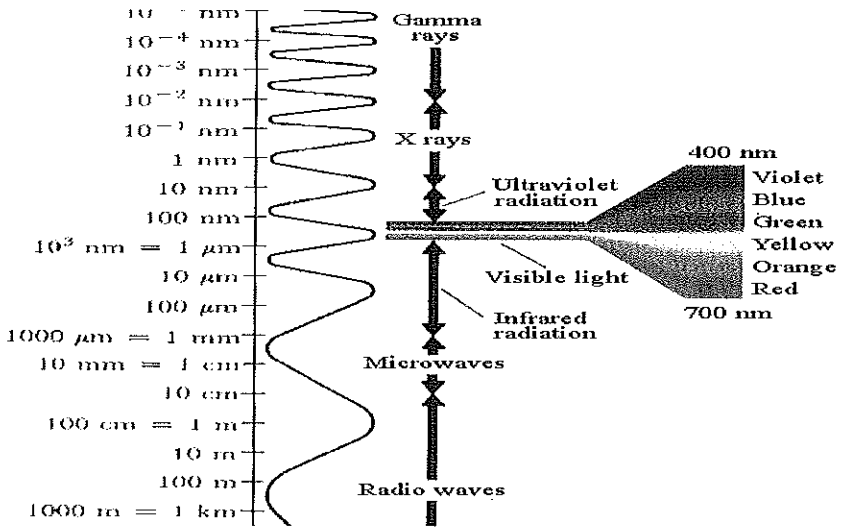


Figure 1: The Electromagnetic Spectrum

A widely used scientific test technology, infrared spectroscopy, uses the phenomenon of the unique pattern of absorption of infrared energy by chemical substances to identify when they are present in a sample. This pattern is referred to as the infrared spectrum or the infrared "fingerprint" of a substance. The DataMaster is designed to measure the absorbance of infrared energies at relatively specific areas of the ethanol spectrum. Energy filters are used which eliminate most of the energies in the beam emitted from the source. These filters are designed to allow only infrared energy with wavelengths in the 3 to 4 micrometer range to reach the detector. Specifically, in the BAC DataMaster, filters allow monitoring of energy absorption at 3.37 and 3.44 micrometers because those wavelengths are characteristic for ethyl alcohol. More than one energy or wavelength is measured to be as specific as is needed to identify the presence of ethyl alcohol and to minimize the measurement of other chemical substances that may be present in a breath specimen that could interfere with the accurate identification and quantitation of ethyl alcohol.

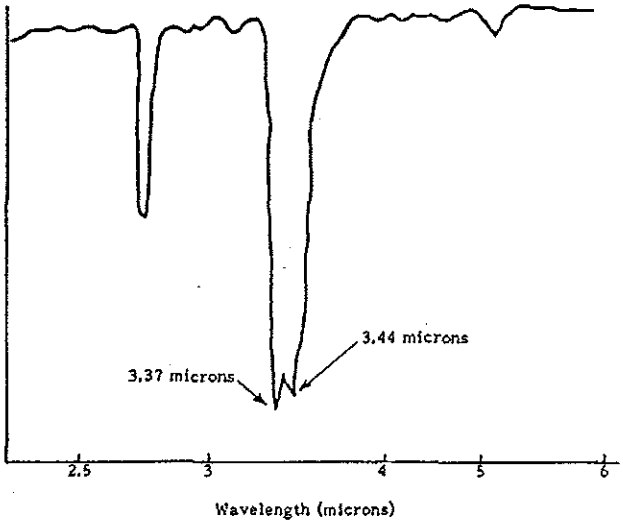


Figure 2: A Partial Infrared Spectrum of Ethanol

QUANTITATIVE ANALYSIS:

The Beer Lambert Law:

The second aspect of testing for alcohol in a breath specimen is the determination of how much ethyl alcohol is present. This is important when the amount present is related to one or more *per se* levels relating to legal sanctions. The ability of infrared breath testing devices, such as the DataMaster, to accomplish this is based on the well-defined scientific Beer-Lambert Law.

This phenomenon was first described by Lambert in the mid-1700's. It simply acknowledges that the absorption of light by substances is directly proportional to the amount of the substance present. An analogy to this as a fairly common experience is the

continuing loss of intensity of light from a source, such as a tail light on a vehicle, as fog forms and gets thicker. The more fog present between the source of light and the eye, the less light that reaches the eye. When using breath testing devices, within the range of normal breath alcohol vapor amounts, this relationship can be defined mathematically and is seen as a constant proportion.

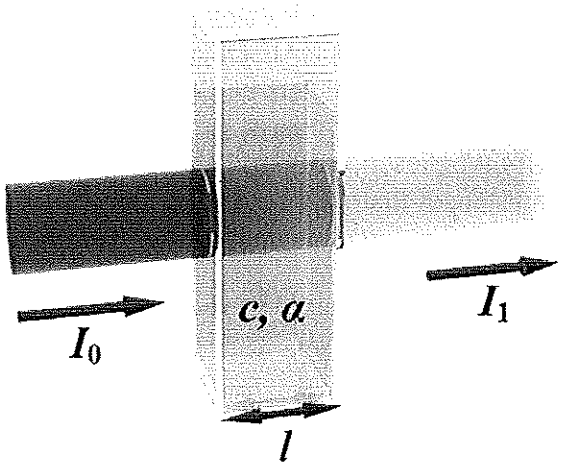


Figure 3: A graphical representation of the Beer-Lambert Law where I_0 is the infrared beam prior to absorption by a substance and I_1 is the infrared beam after absorption.

In the DataMaster there is a source of infrared energy at one end of a chamber and a detector of infrared energy at the other end. When there is no alcohol vapor present in the chamber there is no absorption of the energy by alcohol. As the amount of alcohol vapor increases, the more infrared energy is absorbed by the molecules; therefore, the amount of energy reaching the detector is less. If simultaneous measurements of the amount of alcohol in the chamber and the amount of light being absorbed by the alcohol are made, a graph of that data will demonstrate that a straight line is defined.

This is performed each time a DataMaster is calibrated for use in the field by presenting the DataMaster with a vapor sample of a known alcohol concentration. While we can apply this information graphically, the DataMaster determines the mathematical expression of this relationship and uses it each time a sample of unknown concentration is evaluated.

We can now use the information about the amount of light reaching the detector when there is no alcohol present and the amount of light reaching the detector when a single known amount of alcohol is present to determine the amount of alcohol present in an unknown sample, such as a subject's breath test, based on how much light is absorbed.

Henry's Law:

One further principle in effect in breath alcohol testing involves the distribution of volatile (easily evaporated) substances between a liquid and a gas. In this setting, we are specifically concerned with the distribution of ethyl alcohol between blood and air. This phenomenon was described as a scientific law when it is observed in a closed system under controlled conditions by William Henry in 1803. His law simply states that, in a

closed, fixed system kept at a constant temperature, a volatile substance will come to a constant ratio of amounts between a liquid and in the air space above that liquid. For example, if a jar is half-filled with water and three drops of alcohol are added to the water, then the jar is closed with a lid. The alcohol will eventually appear in both the water and the air above the water. Under the same conditions, and after equilibrium has been reached, the measured amounts of alcohol in the air and in the water will always be the same This can be defined numerically as a partition ratio.

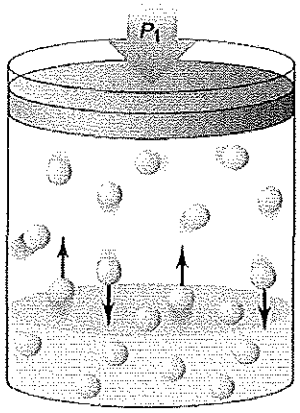


Figure 4: A graphical representation of Henry's Law. In a closed system, the alcohol in the water is in equilibrium with the alcohol in the air.

Although this law applies to closed systems with unchanging conditions, the basic process of a volatile substance being distributed between a liquid and a gas can be seen in humans. These substances pass to and from our blood very efficiently in our lungs. This occurs in a fairly uniform way when a substance such as ethanol is present in a person's blood stream. As the blood circulates through the tissues in the lung, a portion of that alcohol will pass through the membranes of the alveolar sacs and enter the air in the lower part of the lung. As someone exhales, that alcohol will be carried out of the body in the breath. This allows us to identify when there is alcohol in a person's blood.

When a breath from someone with alcohol in their blood is introduced into a DataMaster the instrument can detect the presence of that alcohol and calculate how much alcohol is present. The ratio of the amount of alcohol in the breath to the amount in the blood is roughly 2100:1. That means that it takes 2100 times as much breath as blood to have the same amount of alcohol in it. Said another way, there is about 2100 times less alcohol in a volume of breath as there is in the same volume of blood if they are measured at about the same time.

The DataMaster is specifically designed to measure the amount of alcohol in the breath and reports a test value as grams of alcohol in 210 liters of exhaled air. This provides alcohol concentration values that are in a similar range to those that would be reported for a blood alcohol test that is reported in grams of alcohol per 100 milliliters of blood. However, the DataMaster result is the result for the breath sample delivered to the instrument and is not converted to a blood alcohol concentration.

The Simulator:

One additional association to Henry's Law in the use of a DataMaster for breath alcohol testing is seen when we use a breath simulator device to provide a reference sample during the breath testing sequence. The simulator is designed to contain a solution of water with a small amount of ethanol in it. The simulators in use with the DataMaster are not a part of the DataMaster but a separate device which is used to provide a simulated breath sample containing ethanol vapor to the DataMaster. This is tested and reported by the DataMaster before each subject breath sample is measured as a control check on the system. The instrument is not calibrated by this process.

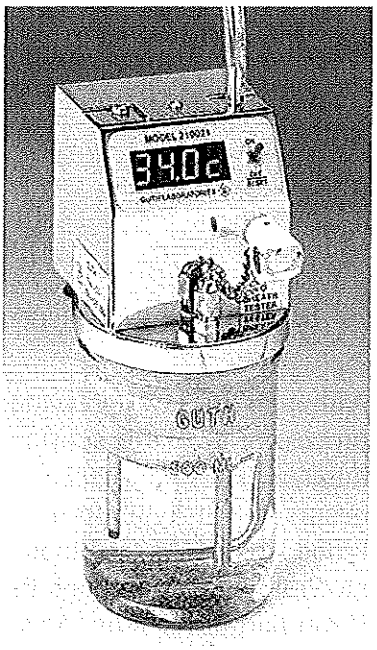


Figure 5: A simulator used for breath alcohol testing devices, such as the DataMaster.

When the solution in the jar is held at a uniform temperature, the air above the liquid contains a portion of the alcohol as a vapor. When we consider Henry's Law, we can see that the amount of alcohol in the air will be proportional to the amount of alcohol in the water in a uniform way. When we remove a portion of that air for testing in a DataMaster and replace it with room air, it will re-establish the same liquid to air ratio of alcohol content as it previously had. By carefully preparing a solution of a specific amount of alcohol in water and controlling the temperature of the system we can repeatedly produce an air sample that has an amount of alcohol in the same range as what could be expected in a sample of breath from someone with alcohol in their blood. For the simulators attached to the DataMasters we provide simulator solutions that will provide reference vapor samples that contain about the same amount of alcohol as someone's breath that contains 0.10 grams of alcohol per 210 liters of breath.

SECTION II

OPERATIONAL PRINCIPLES

The information provided in this section is for reference purposes only. An understanding of this material is not necessary for the effective operation of the DataMaster breath testing device.

BASIC COMPONENTS OF THE BAC DATAMASTER

1) **IR Source**: A lamp which emits infrared energy.

2) **Sample Chamber**: The sample chamber consists of a 50 cc folded light path measuring 1.1 meters through which the IR energy passes.

3) **Filters**: Infrared filters specific for wavelengths at 3.37 and 3.44 microns.

4) **Internal Standard**: A quartz plate with known infrared absorption for verification of calibration.

5) **Chopper:** A device which breaks up the light into pulses before they reach the detector in order to provide a reference point on which to measure.

6) **Microprocessor:** The microprocessor controls the test sequence and all measurements.

7) **Simulator:** An external attachment used to simulate a breath alcohol sample containing a known amount of alcohol to act as a quality control check.

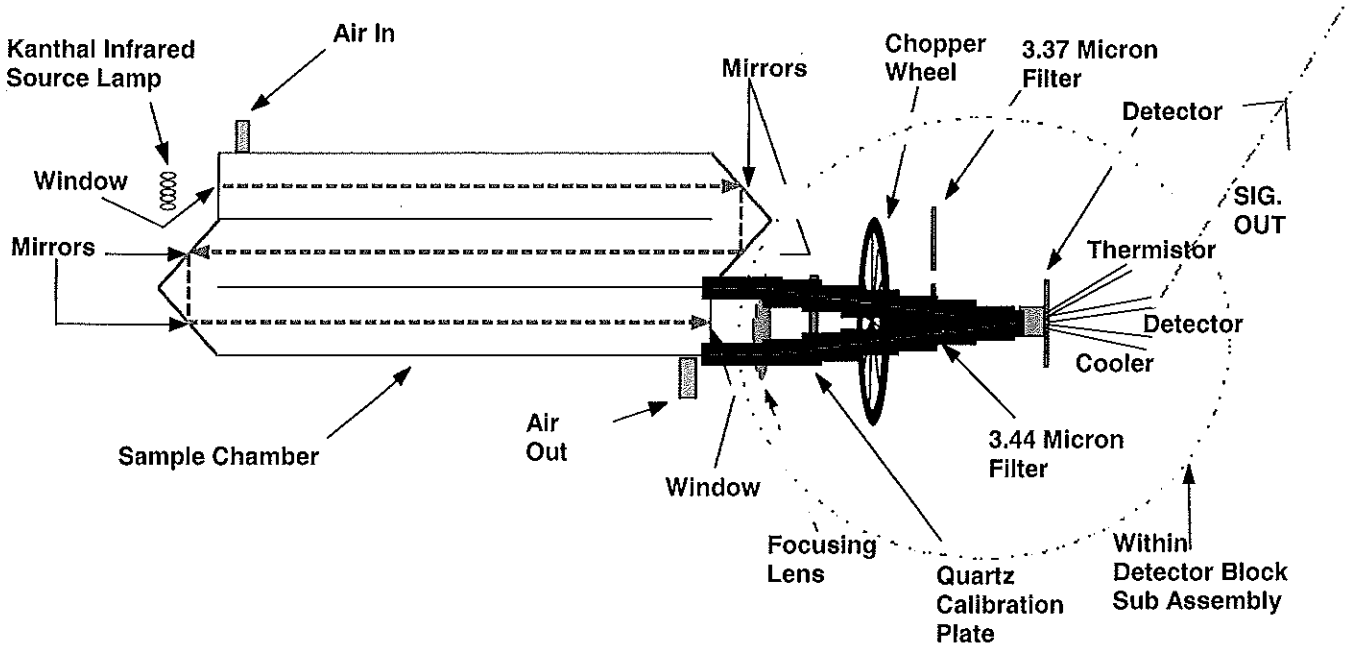


Figure 6: BAC DataMaster Optical Bench

EXTERNAL FEATURES OF THE BAC DATAMASTER

1) **LCD:** The liquid crystal display identifies each part of the test procedure as it occurs and provides information to the instrument operator to complete the test.

2) **Supervisor Panel/Keys**: A separate keypad on the 88 models or the top row of keys on the 95 and newer models which contain special functions.

3) **Evidence Ticket Slots**: The evidence ticket is inserted into the lower slot on the front cover. Upon completion of the test sequence the ticket is ejected from the upper slot.

4) **RFI Antenna**: An antenna on the back of the instrument used to detect radio frequency in the instrument's environment during testing.

5) **Power ON/OFF Switch**: Located on the back of the instrument and only to be used under special circumstances as the normal mode for the instrument is to have the power on.

6) **Heated Breath Tube:** The breath tube is electrically heated and provides a path for the breath sample from the mouth piece to the sample chamber.

7) **CPY Button**: The copy button is used to re-print the most recent test run on the instrument assuming that the power has not been turned off in the interim.

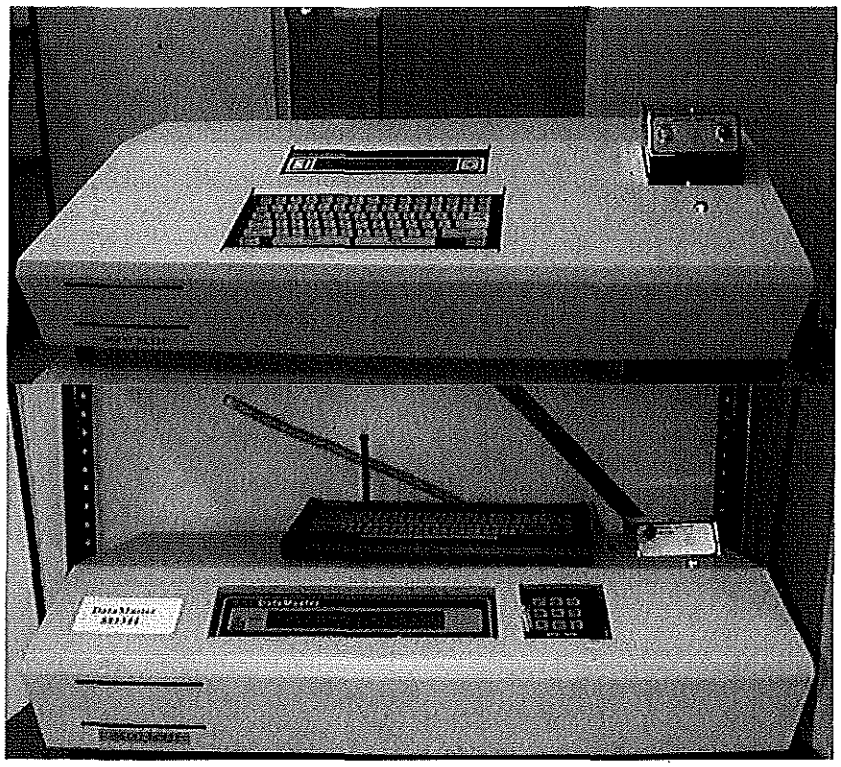


Figure 7:
95 and newer models with built-in keyboard

Figure 8:
88 model with external keyboard

BAC DATAMASTER OVERVIEW

The BAC DataMaster breath testing instrument is designed to undergo a number of processing steps to ensure a fair and accurate analysis of a breath sample introduced to it. These steps include checking components for function, checking detector response, adjusting a measurement baseline to ambient air, introducing an external standard of simulated breath containing alcohol vapor, measuring the quality of breath and monitoring heated zones within the system.

The figure below is a general graphic example of the monitoring of a breath sample to ensure that what is measured meets the minimum criteria. As a sample is introduced into the instrument the flow rate is continually monitored. When the minimum flow rate is achieved it must remain at or above that rate for enough time to account for delivery of at least 1.5 liters of breath. Simultaneously the alcohol concentration in the sample is monitored four times per second. A valid breath sample is expected to show a fairly constant amount of alcohol as breath continues to flow. If these criteria are met the instrument will report a breath alcohol concentration.

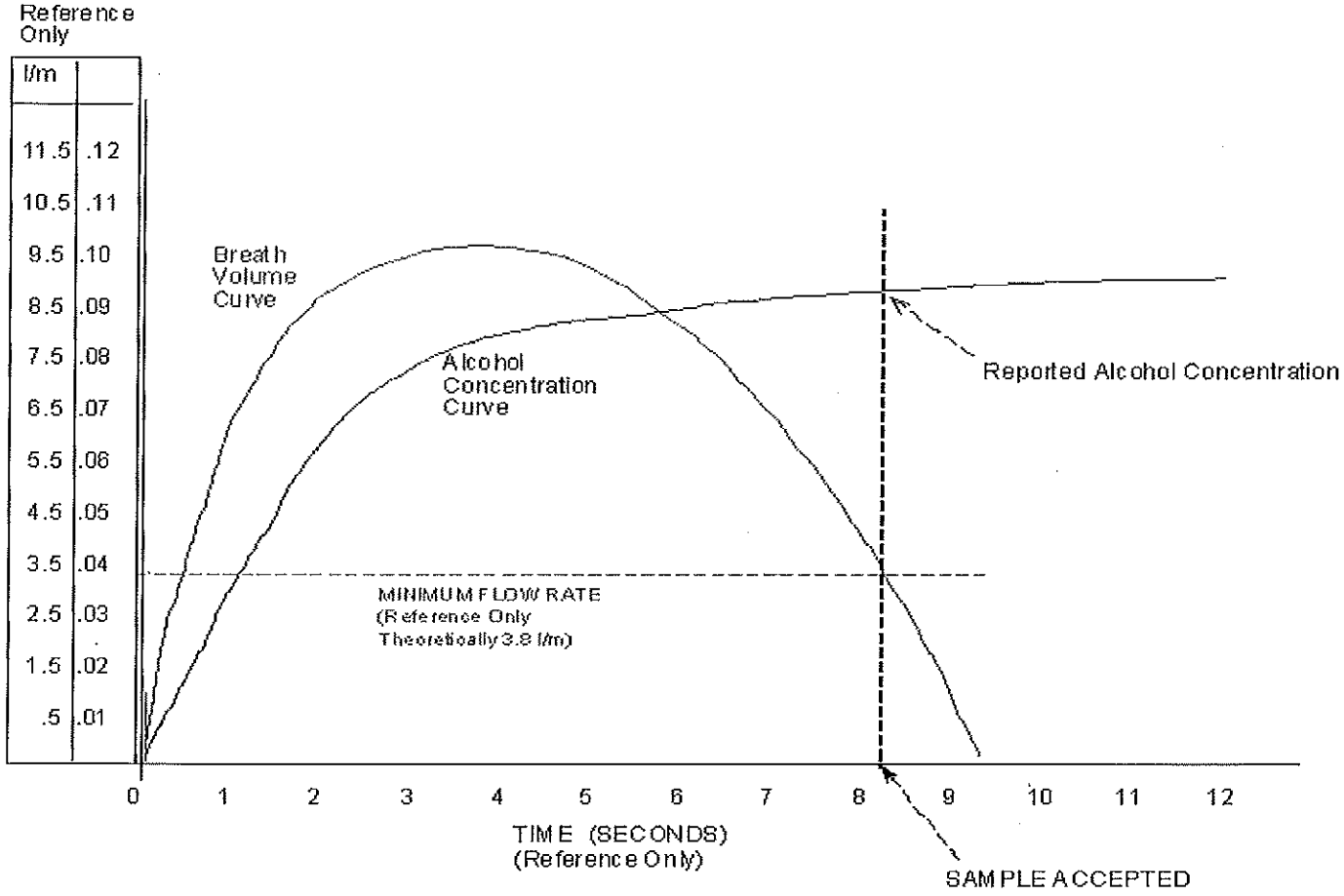


Figure 9: Typical Breath Profile

SECTION III

PROCESS FOR OBTAINING AN EVIDENTIAL SAMPLE

PROCESS FOR OBTAINING AN EVIDENTIAL DATAMASTER TEST

PREPARATION:

STEP 1: Confirm that the power to the BAC DataMaster is on and that the instrument displays "READY, PUSH RUN." If the instrument is turned off or if it displays "OUT OF SERVICE," proceed to a different DataMaster site.

STEP 2: Visually observe the subject for any evidence of food, gum, tobacco or any other foreign matter in the mouth. Ask the subject if he/she has anything in their mouth. Have anything in their mouth removed prior to starting the next step. Tongue piercings and dentures may remain in the mouth.

STEP 3: Observe the subject for 15 uninterrupted minutes. The subject must be within visual and audio proximity for the entire 15 minutes preceding the test. If at any time the subject burps, belches or vomits, the observation period must be restarted. If at any time the subject puts something into their mouth, the item must be removed and the observation period started again.

STEP 4: The DataMaster clock may be used to time the observation period. If another time piece is used, record which one is used and any discrepancy from the time displayed on the DataMaster. The DataMaster will document the time the test is taken on the ticket.

OPERATING THE INSTRUMENT:

STEP 1: Push "Run" to begin the test process.

STEP 2: The instrument will then display "INSERT TICKET." Follow the instructions on the ticket and insert the ticket into the lower slot on the instrument.

STEP 3: The DataMaster will then sequentially prompt the operator to enter the information for twelve programmed questions which pertain to the subject and circumstances of the incident. The questions are addressed in Section IV of this manual, *Data Entry and Review*.

STEP 4: Review the information entered into the DataMaster. Correct any errors if necessary and answer "N" when the Review Data question prompts for a second time. The test sequence will automatically begin.

STEP 5: The instrument will sequentially display the following.

"PURGING" .###	Room air is being pumped into the sample chamber through the breath tube.
"AMBIENT ZEROING"	Establishing zero reference based on room air in the sample chamber.
"BLANK TEST" .###	Confirms that the air in the sample chamber is alcohol free.
"INTERNAL STANDARD" .###	The quartz plate is analyzed to verify that the calibration performed in the laboratory is still valid.
"EXTERNAL STANDARD" .###	A simulated breath sample is analyzed as a quality control check standard.

The results of the external standard test should be between 0.090 and 0.110. After the external standard is analyzed, the instrument will then display as before:

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

STEP 6: After the instrument completes its quality control checks it will display "SUBJECT TAKE TEST (Y/N)."

A) If the subject consents to provide a breath test, type "Y."

B) If the subject refuses to provide a breath sample, type "N" for the refusal. The evidence ticket will document the refusal and the breath testing sequence will automatically end. All refusals should be documented with an evidence ticket.

STEP 7: If the subject has consented to provide a breath test, the display will flash "PLEASE BLOW" and an intermittent tone will be heard.

A) Insert a new mouthpiece into the breath tube. For sanitary purposes, avoid directly touching the mouthpiece.

B) Instruct the subject to provide a slow, continuous breath sample through the mouthpiece attached to the breath tube of the instrument. This may take 6 seconds or longer depending on the individual. The internal electronics of the instrument determine when an adequate sample has been obtained. It is not necessary to instruct the subject to take a deep breath.

C) The test operator should hold the breath tube during delivery of the breath sample and confirm that the breath tube is warm to the touch.

D) As the subject provides an appropriate breath sample the words "PLEASE BLOW" will no longer flash, but remain steady on the screen and a steady tone will be heard. An individual should be allowed to deliver a sample until they are unable to do so.

E) After an adequate breath sample is obtained the message "TEST RESULTS ALCOHOL .###" will be displayed on the LCD. This number will only be displayed for a few seconds in the right hand corner of the display. The test operator must inform the subject of the results of the evidentiary test and ask the subject if they wish to have a second test.

F) The operator should immediately remove the mouthpiece and discard it.

STEP 8: The following displays will then appear on the LCD:

"PURGING"

"2nd TEST REQUESTED (Y/N)"

A) If the subject declines the second test, the operator should enter "N" and an evidence ticket will be printed. The evidence ticket will indicate the results of the evidentiary test and will also show "SECOND TEST NOT REQUESTED" and "SIMULATOR TEMPERATURE" with the specific temperature of the simulator at the time of the test sequence.

B) If the subject requests a second test, the operator should enter "Y." The instrument will then display:

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

"INTERNAL STANDARD"

"EXTERNAL STANDARD"

"TEST RESULTS ALCOHOL"

"PURGING"

"AMBIENT ZEROING"

"BLANK TEST"

Following completion of the blank test the instrument will display:

"PLEASE BLOW"

C) The operator should insert a new mouthpiece into the breath tube and instruct the subject to provide a breath sample as before. Once an adequate breath sample is provided the instrument will display "TEST RESULTS ALCOHOL .###."

D) The operator should immediately remove the mouthpiece and discard it.

STEP 9: The evidence ticket is printed in triplicate at completion of the test sequence and will include all information entered in Step 3, the test sequence(s) and "SIMULATOR TEMPERATURE" with the specific temperature of the simulator at the time of the test sequence.

A) The top white sheet should go with the rest of the case paperwork to the State's Attorney.

B) The middle, yellow sheet, is retained by the arresting officer.

C) The bottom, pink sheet, should be given to the subject.

STEP 10: Make entries regarding the test in the DataMaster Operator Use log as well as your own personal Infrared log, if one is maintained.

SECTION IV

DATA ENTRY AND REVIEW

INSTRUMENT QUESTION DISPLAYS AND FORMAT

QUESTION 1: CASE NUMBER

This is the agency case number. The field allows up to 20 characters.

Press the RETURN key to continue.

QUESTION 2: TOWN CODE

This is the assigned code for the county/town in which the incident took place, not where the processing is done. Four characters are required for this field. Refer to Appendix A for a list of county/town codes.

Press the RETURN key to continue.

QUESTION 3: SUBJECT'S NAME

Forty characters are allowed for the subject's name. The subject's name should be entered in the following format:

Last Name/First Name/Middle Initial.

Hyphens should only be used when they are a part of the subject's name. If there is no middle name leave it blank.

Examples: Allen/Douglas/M

St.John-Smythe/Carlynn/*A*

If the subject's name is unknown enter "Unknown."

Press the RETURN key to continue.

QUESTION 4: SUBJECT'S DOB

The subject's date of birth must be entered in the following format:

MM/DD/YY

All six digits must be entered. They must be numeric and provide a valid date. If the birth date is unknown, type in the date the sample is being collected. The slashes will appear automatically.

Press the RETURN key to continue.

QUESTION 5: SUBJECT'S SEX

One character is required and must be either "M" or "F."

Press the RETURN key to continue.

QUESTION 6: LOCATION OF STOP

This is the location where the vehicle was stopped or where the crash occurred. A maximum of 40 characters is allowed. Be as specific as possible.

Example: Corner of Church and Main St Burlington

Press the RETURN key to continue.

QUESTION 7: TIME OF STOP

Type in the time the vehicle was stopped or a reported time of operation. The time should be recorded in 24 hour time as HHMM.

Press the RETURN key to continue.

QUESTION 8: ACCIDENT?

If the incident involved a motor vehicle crash, enter "Y" otherwise enter "N."

Press the RETURN key to continue.

QUESTION 9: TEST OPERATOR'S NAME

Operator refers to the operator of the BAC DataMaster. Forty (40) characters are allowed and the name should be entered in the same format as the subject's name.

Last Name/First Name/Middle Initial.

Press the RETURN key to continue.

QUESTION 10: OFFICER ID NUMBER

This is the above test operator's Vermont Traffic Complaint (VTC) number used in traffic violation cases.

Press the RETURN key to continue.

QUESTION 11: DEPARTMENT

This refers to the officer's department, not the department where the DataMaster is located. Thirty (30) characters are allowed and the department should be entered as in the following examples.

Examples: PD/Colchester

VSP/Bethel

SD/ Orleans

FW/Chittenden

DMV/CVE (Commercial Vehicle Enforcement)

Constable/Essex

Press the RETURN key to continue.

QUESTION 12: REVIEW DATA (Y/N)

Type "Y" to review the data entered in the previous 11 questions. All data should be reviewed at least once. Enter "N" once you have reviewed your data and you wish to proceed to the test sequence.

DATA REVIEW PROCEDURES

When you answer the last question and press the RETURN key, the display will ask "REVIEW DATA (Y/N)." All data should be reviewed at least once.

Upon answering "Y" the first question will reappear with the information you have entered. Pressing the RETURN key advances the display to the next question. If you find that data has been entered incorrectly, the following methods are available to correct it.

Press Key(s)	Enter Mode	Review Mode
BACKSPACE	Erases one character at a time and moves cursor to the left.	Does not erase but moves cursor left, one space at a time.
CONTROL and X	Erases the entire line and puts the cursor at the start.	Does not function.
CONTROL and I	Does not function.	Does not erase but moves cursor right, one space at a time.
DELETE	Does not function	Deletes the character the cursor is on without leaving a space.

As you type each character you will hear a beep. If a disallowed character is typed, you will hear a louder beep and the character will not be displayed.

After editing the data the instrument will again display "REVIEW DATA (Y/N)." If you are satisfied that the information is correct, type "N" and the testing procedure will begin.

TIME RESTRICTIONS ON DATA ENTRY AND PROCESSING

When prompted to enter data approximately five minutes is allotted. If data entry is not finished within the five (5) minutes the instrument will return to "READY, PUSH RUN."

When prompted to make a decision such as "SUBJECT TAKE TEST (Y/N)" or "USE PREVIOUS DATA," one (1) minute is allotted.

When prompting "PLEASE BLOW" the subject will have two (2) minutes to provide an adequate breath sample. If at the end of this time an adequate breath sample has not been provided the instrument will again prompt "SUBJECT TAKE TEST (Y/N)." After three failures to obtain an adequate breath sample the instrument will time out and print a ticket reflecting an incomplete test.

SECTION V

ERROR MESSAGES AND RESPONSES

ERROR MESSAGES AND RESPONSES

If at any time the instrument displays an error message and is unable to clear the problem to resume processing, place a notice on the instrument stating "OUT OF SERVICE" and leave a detailed message to your DataMaster Supervisor regarding the message and any steps taken to clear that message.

FATAL ERRORS:

Although a DataMaster supervisor or the Vermont Department of Health Laboratory may be able to remedy these error messages, for the purpose of processing, the officer should consider these "fatal errors" and proceed to a different DataMaster.

If another DataMaster is not reasonably available, blood may be drawn.

When encountering fatal error messages, post "OUT OF SERVICE" on the DataMaster and leave a message for your DataMaster supervisor.

1) A black bar appears in the upper half of the display.
2) Built in keyboard does not function on 95 models or higher.
3) Instrument does not accept a ticket.
4) "**NOT SET UP**" The default options cannot be located.
5) "**SIMULATOR OUT OF RANGE**" Simulator concentration is not within 0.090 and 0.110.
6) "**SIMULATOR TEMPERATURE ERROR**" Simulator temperature is not within 33.5 and 34.5°C.
7) "**NOT CALIBRATED**" The instrument has lost calibration.
8) "**TEMPERATURE LOW**" Sample chamber is below 45°C.
9) "**TEMPERATURE HIGH**" Sample chamber is above 55°C.
10) "**FILTER ERROR**" The filter solenoid is not activating properly.
11) "**DETECTOR OVERFLOW**" Dust or debris is located in the sample chamber or the subject's BrAC is greater than 0.600.

NON FATAL ERRORS:

The following errors may be remedied by the test operator. If after following these instructions the error remains, post "OUT OF SERVICE" and leave a detailed message to your DataMaster supervisor regarding when the error occurred and what steps where taken to try to remedy it.

Proceed to a different DataMaster, if one is not reasonably available you may have blood drawn. If the error has been cleared, begin the testing procedure again.

1) External Keyboard does not function on the 88 models.

   A) Disconnect keyboard from the back of the instrument.

   B) Reconnect the keyboard into the terminal marked "keyboard" at the back of the instrument.

2) "**SYSTEM WON'T ZERO**" The instrument is unable to reach zero apparent alcohol.

   A) Remove the mouthpiece from the breath tube.

   B) Remove possible contamination sources from the processing area.

   C) Open windows or use a fan to draw fresh air into the room if possible.

3) "**PLEASE BLOW**" flashes but instrument does not accept a sample.

   A) Remove the mouthpiece from the breath tube and replace with a new mouthpiece.

   B) Have the subject attempt to provide another breath sample.

   C) If error remains, turn instrument off for one minute and turn back on.

4) "**PRINTER ERROR**" The printer has malfunctioned.

   A) Turn the instrument off for one minute and turn back on.

5) "**PUMP ERROR**" The flow detector does not detect pump operation or the pump speed is incorrect.

   A) Place a fresh mouthpiece on the breath tube.

B) Alternately blow and suck back strongly and rapidly on the mouthpiece 5 or 6 times to free any sticking valve.

6) "**RADIO INTERFERENCE**" A radio frequency transmission has been detected in the testing environment.

A) Turn radio off and ensure that there are no active transmitters in the processing area.

B) Ensure that the radio antenna is free of any physical contact.

C) After beginning a new test, answer "Y" to "USE PREVIOUS DATA (Y/N)."

7) "**INVALID SAMPLE**" An abnormal breath profile has been obtained during sample delivery.

A) Start the fifteen minute observation period again.

B) Instruct the subject again on proper delivery of a breath sample.

8) "**INTERFERENCE DETECTED**" The ratio between the measurements at the two filters is not what is expected for ethanol.

A) Remove possible contamination sources from the processing area.

B) Open windows or use a fan to draw fresh air into the room if possible.

C) After beginning a new test, answer "Y" to "USE PREVIOUS DATA (Y/N)."

D) If "INTERFERENCE DETECTED" message appears again you may have subject's blood drawn.

OTHER ERROR CONDITIONS:

The following error conditions should be documented but may not necessitate moving to a different DataMaster. A detailed message should be left for the DataMaster Supervisor to remedy the situation for future use.

1) **The breath tube is cold to the touch.**

   A) The breath tube should be heated to slightly higher than body temperature which makes it feel warm to the touch.

   B) If it is cold, please make note on your processing form.

2) **Incorrect time appears on the DataMaster.**

   A) When the DataMaster ticket prints, place a single line through the time printed and hand write the correct time on the ticket prior to separating the three copies.

   B) Mark this line with your initials and date.

   C) Document on your processing form the time discrepancy.

3) **Incorrect date appears on the DataMaster.**

   A) When the DataMaster ticket prints, place a single line through the date printed and hand write the correct date on the ticket prior to separating the three copies.

   B) Mark this line with your initials and date.

   C) Document on your processing form the date discrepancy.

4) **Ticket is incomplete or unreadable.**

   A) If the ticket is jammed, gently remove the ticket. Insert a new ticket and press the copy button (CPY).

   B) As long as the instrument is not turned off, the copy button can be used repeatedly to obtain the last test run.

   C) If the printer ribbon is out of ink, remove the top layer from the ticket and photocopy the next layer to obtain your third copy.

D) If after several attempts you are unable to get a readable ticket you will have to proceed to a new DataMaster and obtain a new test. Post "OUT OF SERVICE" on the instrument and leave a detailed message to your DataMaster Supervisor.

5) "**INCOMPLETE**" prints on the evidentiary ticket across from "SUBJECT SAMPLE."

A) The instrument has timed out three times while waiting for the subject to provide an adequate breath sample.

B) Instruct the subject again on proper delivery of a breath sample.

C) If it is clear that the subject is unable to provide an adequate breath sample, have blood drawn.

SECTION VI

TESTIMONY PREPARATION

EXAMPLES OF DIRECT EXAMINATION QUESTIONS FOR A POLICE OFFICER TESTIFYING TO AN INFRARED BREATH TEST RESULT

Preliminary questions regarding the officer's training, experience, basis for the stop, investigation, field sobriety testing and other observations will precede testimony regarding the test.

TEST SEQUENCE QUESTIONS:

1) Where did you take the defendant to administer the breath test?

2) Were you the person who administered the breath test to the defendant?

3) What instrument did you use to obtain a breath test from the defendant?

4) Have you received training in the operation of the DataMaster?

5) Where did you receive this training?

(Questions 6-10 are leading but should be permitted as foundational only)

6) Did your training include the procedures for operating the DataMaster?

7) Did you receive any practical experience for operating the DataMaster during your training?

8) Did you pass a written examination as part of your training for operating the DataMaster?

9) Did you pass a proficiency test for operating the DataMaster during your training?

10) How many times have you administered a breath test utilizing the DataMaster?

OBSERVATIONS OF DEFENDANT:

1) Prior to administering the test, did you observe the defendant?

2) For how long did you observe the defendant?

3) During this observation, what were you looking for?

4) As you watched the defendant during the waiting period, did you observe any of the signs that you were trained to look for?

5) If you had observed any of these signs, what would you have done?

ADMINISTERING THE TEST:

1) After observing the defendant, were you prepared to run a test?

2) Was the DataMaster ready to perform a test?

3) How did you know?

4) After ensuring that the DataMaster was ready, what did you do?

5) Did you enter the defendant's name and date of birth into the DataMaster?

6) Did you provide all of the information as requested by the DataMaster?

7) What did the DataMaster do next?

8) Did you attach a new mouthpiece for the subject to give a breath sample through?

9) After the defendant gave a breath sample, did a BrAC value appear on the display?

10) Did a BrAC value print on the evidence ticket?

11) Was the number on the evidence ticket the same value that was displayed on the DataMaster?

12) Was the printed evidence ticket, which displays the defendant's results, attached to the case?

13) Do you recognize that printed evidence ticket?

14) How do you recognize the printed evidence ticket?

15) Did the instrument encounter any problems in completing the test?

ADDITIONAL INFORMATION:

The officer should be prepared to testify to how he/she knew that the instrument was operating properly when the test was given.

The best testimony here would be to state that the DataMaster went through its normal procedures of checking itself and that, based on the officer's training and experience, he/she determined the instrument was operating properly.

An officer may be asked to explain how the DataMaster functions. As this class is focused on instructing officers on the proper operation of the instrument and not in the technology behind it, officers should respond to those questions beyond the scope of this training in the following manner:

"I am not qualified to explain that but I do know based on my training and experience that the DataMaster was operating properly at the time of the test."

SECTION VII

APPENDICES

APPENDIX A

COUNTY/TOWN CODES

ADDISON		BENNINGTON		CALEDONIA		CHITTENDEN	
0101	Addison	0201	Arlington	0301	Barnet	0401	Bolton
0102	Bridport	0202	Bennington	0302	Burke	0402	Burlington
0103	Bristol	0203	Dorset	0303	Danville	0403	Charlotte
0104	Cornwall	0204	Landgrove	0304	Groton	0404	Colchester
0105	Ferrisburgh	0205	Manchester	0305	Hardwick	0405	Essex
0106	Goshen	0206	Peru	0306	Kirby	0406	Hinesburg
0107	Granville	0207	Pownal	0307	Lyndon	0407	Huntington
0108	Hancock	0208	Readsboro	0308	Newark	0408	Jericho
0109	Leicester	0209	Rupert	0309	Peacham	0409	Milton
0110	Lincoln	0210	Sandgate	0310	Ryegate	0410	Richmond
0111	Middlebury	0211	Searsburg	0311	Sheffield	0411	St. George
0112	Monkton	0212	Shaftsbury	0312	St. Johnsbury	0412	Shelburne
0113	New Haven	0213	Stamford	0313	Stannard	0413	So. Burlington
0114	Orwell	0214	Sunderland	0314	Sutton	0414	Underhill
0115	Panton	0215	Winhall	0315	Walden	0415	Westford
0116	Ripton	0216	Woodford	0316	Waterford	0416	Williston
0117	Salisbury	0217	Glastenbury	0317	Wheelock	0417	Winooski
0118	Shorham					0418	Ft. Ethan Allen
0119	Starksboro					0419	Buell's Gore
0120	Vergennes						
0121	Waltham						
0122	Weybridge						
0123	Whiting						

ESSEX		FRANKLIN		GRAND ISLE		LAMOILLE	
0501	Bloomfield	0601	Bakersfield	0701	Alburg	0801	Belvidere
0502	Brighton/Island Pond	0602	Berkshire	0702	Grand Isle	0802	Cambridge
0503	Brunswick	0603	Enosburg	0703	Isle LaMotte	0803	Eden
0504	Canaan	0604	Fairfax	0704	North Hero	0804	Elmore
0505	Concord	0605	Fairfield	0705	South Hero	0805	Hyde Park
0506	East Haven	0606	Fletcher			0806	Johnson
0507	Granby	0607	Franklin			0807	Morristown
0508	Guildhall	0608	Georgia			0808	Stowe
0509	Lemington	0609	Highgate			0809	Waterville
0510	Lunenburg	0610	Montgomery			0810	Wolcott
0511	Maidstone	0611	Richford				
0512	Norton	0612	Sheldon				
0513	Victory	0613	St. Albans City				
0514	Averill	0614	St. Albans Town				
0515	Avery's Gore	0615	Swanton				
0516	Ferdinand						
0517	Lewis						
0518	Warner's Grant						
0519	Warren's Gore						

ORANGE		ORLEANS		RUTLAND		WASHINGTON	
0901	Bradford	1001	Albany	1101	Bensen	1201	Barre City
0902	Braintree	1002	Barton	1102	Brandon	1202	Barre Town
0903	Brookfield	1003	Brownington	1103	Castleton	1203	Berlin
0904	Chelsea	1004	Charlestown	1104	Chittenden	1204	Cabot
0905	Corinth	1005	Coventry	1105	Clarendon	1205	Calais
0906	Fairlee	1006	Craftsbury	1106	Danby	1206	Duxbury
0907	Newbury	1007	Derby	1107	Fair Haven	1207	E. Montpelier
0908	Orange	1008	Glover	1108	Hubbardton	1208	Fayston
0909	Randolph	1009	Greensboro	1109	Ira	1209	Marshfield
0910	Strafford	1010	Holland	1110	Mendon	1210	Middlesex
0911	Thetford	1011	Irasburg	1111	Middleton Springs	1211	Montpelier
0912	Topsham	1012	Jay	1112	Mt. Holly	1212	Moretown
0913	Tunbridge	1013	Lowell	1113	Mt. Tabor	1213	Northfield
0914	Vershire	1014	Morgan	1114	Pawlet	1214	Plainfield
0915	Washington	1015	Newport City	1115	Pittsfield	1215	Roxbury
0916	West Fairlee	1016	Newport Town	1116	Pittsford	1216	Waitsfield
0917	Williamstown	1017	Troy	1117	Poultney	1217	Warren
		1018	Westfield	1118	Proctor	1218	Waterbury
		1019	Westmore	1119	Rutland City	1219	Woodbury
				1120	Rutland Town	1220	Worcester
				1121	Sherburne		
				1122	Shrewsbury		
				1123	Sudbury		
				1124	Tinmouth		
				1125	Wallingford		
				1126	Wells		
				1127	West Haven		
				1128	West Rutland		

WINDHAM

1301 Athens
1302 Brattleboro
1303 Brookline
1304 Dover
1305 Dummerston
1306 Grafton
1307 Guilford
1308 Halifax
1309 Jamaica
1310 Londonderry
1311 Marlboro
1312 Newfane
1313 Putney
1314 Rockingham
1315 Stratton
1316 Townshend
1317 Vernon
1318 Wardsboro
1319 Westminster
1320 Whitingham
1321 Wilmington
1322 Windham
1323 Somerset

WINDSOR

1401 Andover
1402 Baltimore
1403 Barnard
1404 Bethel
1405 Bridgewater
1406 Cavendish
1407 Chester
1408 Hartford
1409 Hartland
1410 Ludlow
1411 Norwich
1412 Plymouth
1413 Pomfret
1414 Reading
1415 Rochester
1416 Royalton
1417 Sharon
1418 Springfield
1419 Stockbridge
1420 Weathersfield
1421 Weston
1422 West Windsor
1423 Windsor
1424 Woodstock
1425 Windsor Prison

APPENDIX B

BAC DATAMASTER OPERATOR USE LOG

Department/Agency

DataMaster Serial Number

Date	Operator's Name	Subject's Name	Ext. Std. 1	Ext. Std. 2

ALC 603 Rev 2 06/07

APPENDIX C

OFFICER'S INFRARED BREATH TESTING LOG

Officer's Name:_____ **Department** _____

DATE	INCIDENT #	SUBJECT	IR SERIAL #	IR LOCATION	BAC RESULTS

APPENDIX D

EXAMPLE TICKETS

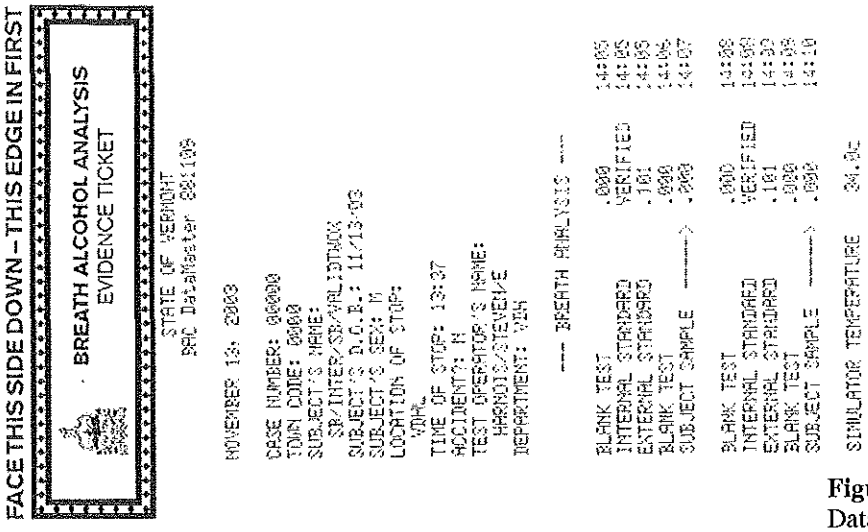


Figure 10:
DataMaster ticket reflecting two subject tests.

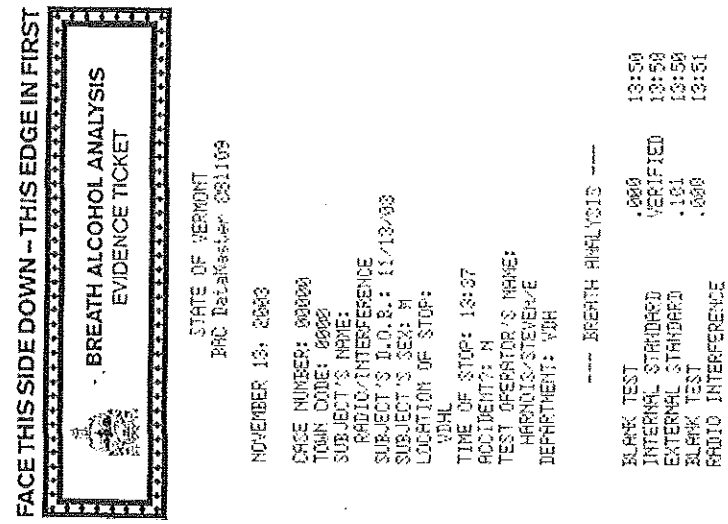


Figure 11:
DataMaster ticket reflecting radio interference.

Figure 12: DataMaster ticket reflecting an "Interference Detected" message.

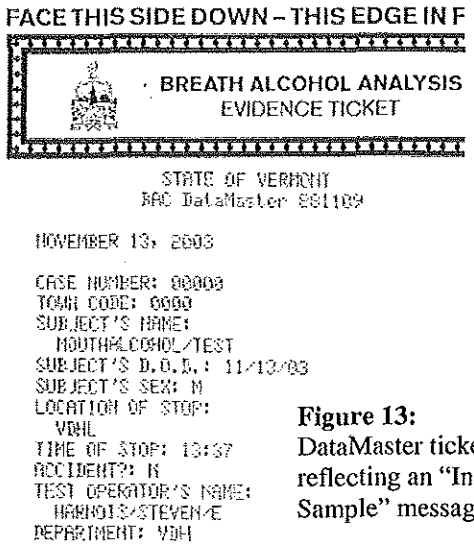
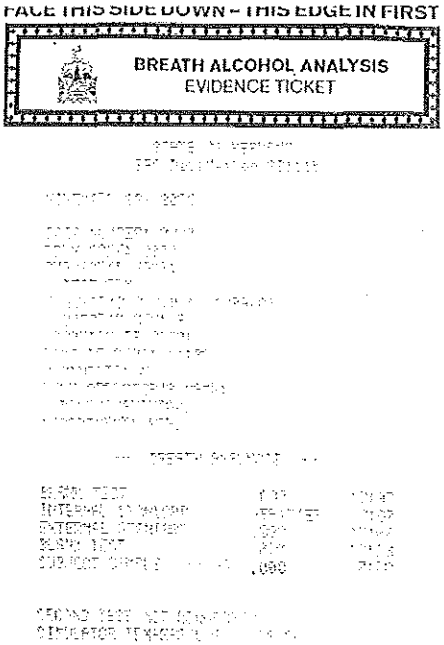


Figure 13: DataMaster ticket reflecting an "Invalid Sample" message.

Figure 14: DataMaster ticket reflecting a single test sequence.



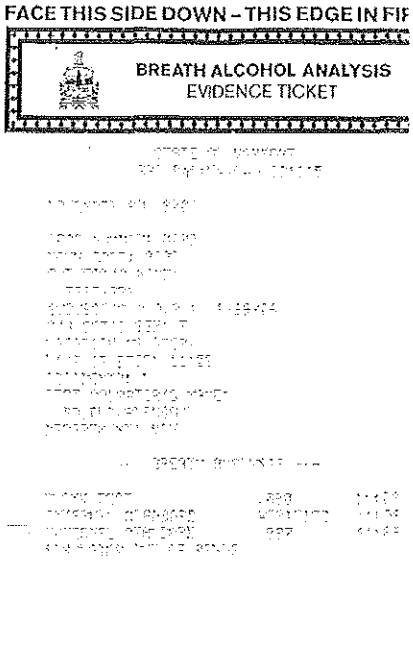


Figure 15: DataMaster ticket reflecting a "Simulator Out Of Range" error.

APPENDIX E

RESOURCES

VERMONT DEPARTMENT OF HEALTH LABORATORY

Phone: 1-802-863-7336

Fax: 1-802-863-7632

Email: lab_alc@vdh.state.vt.us

LEGAL ISSUES

DUI Resource Attorney

Phone: 1-802-828-2891

Fax: 1-802-828-2881

TRAINING AND CERTIFICATION

Vermont Criminal Justice Training Council

Phone: 1-802-483-6228

Fax: 1-802-483-2343