

U. S. COAST GUARD
MARITIME LAW ENFORCEMENT ACADEMY



INSTRUCTOR GUIDE

BUI: ALCO-SENSOR III and IV

1.3-2-1-2-07.1

JULY/07



INSTRUCTOR GUIDE

INSTRUCTOR GUIDE: BUI: ALCO-SENSOR III and IV

LESSON NUMBER: 1.3-2-1-2-07.1

LESSON DATE: July 2007

LENGTH OF PRESENTATION: 4.0 hours

PROGRAM	CLASSROOM	PRACTICE	EVALUATION	TOTAL
BO	2.0	2.0	0.0	4.0
BOPC	2.0	2.0	0.0	4.0

DESCRIPTION: The purpose of lesson is to instruct Boarding Officers in the proper procedure for:

- the operation of the ALCO-SENSOR III chemical testing device.
- the operation of the ALCO-SENSOR IV chemical testing device.
- the calibration of the ALCO-SENSOR III chemical testing device.
- the calibration of the ALCO SENSOR IV chemical testing device.

STATING THE OBJECTIVES:

General Procedures

1. **STATE** the procedures to be followed if an individual refuses a chemical test.
2. **STATE** the importance of obtaining a Deep Lung Sample.

ALCO-SENSOR III Operation:

1. **IDENTIFY** the external components of the ALCO-SENSOR III.
2. **STATE** how the fuel cell of the ALCO-SENSOR III converts a breath sample into a Blood Alcohol Concentration (BAC) reading.
3. **LIST** the factors that may affect the optimum performance of the ALCO-SENSOR III to include temperature, battery, fuel cell, Radio Frequency Interference (RFI) and the rule of .500.
4. **STATE** the procedure for obtaining a breath sample with an ALCO-SENSOR III.



ALCO-SENSOR IV Operation:

1. **IDENTIFY** the external components of the ALCO-SENSOR IV.
2. **EXPLAIN** how the fuel cell of the ALCO-SENSOR IV converts a breath sample into a Blood Alcohol Concentration (BAC) reading.
3. **LIST** the factors that may affect the optimum performance of the ALCO-SENSOR IV to include temperature, battery and fuel cell.
4. **STATE** the procedure for obtaining a breath sample with an ALCO-SENSOR IV.

ALCO-SENSOR III Calibration:

1. **EXPLAIN** why the calibration of the ALCO-SENSOR III is important.
2. **IDENTIFY** when you must calibrate the ALCO-SENSOR III.
3. **IDENTIFY** when you must perform calibration checks on the ALCO-SENSOR III.
4. **IDENTIFY** when you must perform calibration verifications on the ALCO-SENSOR III.
5. **EXPLAIN** the process for returning a defective ALCO-SENSOR III.
6. **EXPLAIN** the importance of a Calibration Log.
7. **CALIBRATE** the ALCO-SENSOR III, in accordance with the manufacturer's instructions.

ALCO-SENSOR IV Calibration:

1. **EXPLAIN** why the calibration of the ALCO-SENSOR IV is important.
2. **IDENTIFY** when you must calibrate the ALCO-SENSOR IV.
3. **IDENTIFY** when you must perform calibration checks on the ALCO-SENSOR IV.
4. **IDENTIFY** when you must perform calibration verifications on the ALCO-SENSOR IV.



5. **EXPLAIN** the process for returning a defective ALCO-SENSOR IV.
6. **EXPLAIN** the importance of a Calibration Log.
7. **CALIBRATE** the ALCO-SENSOR IV, in accordance with the manufacturer's instructions.

METHOD OF PRESENTATION: Participative Lecture, Demonstration, Classroom Exercises, and Practical Exercises/Evaluations

PQS REQUIREMENT: 3-05

REFERENCES: ALCO-SENSOR III Operator's Manual
ALCO-SENSOR IV Operator's Manual

EQUIPMENT AND RESOURCES Magna-Slick Board, Markers, Student Workbook, Quizzes, Classroom Exercises, ELMO

SAFETY NOTICE: See Training Platforms SOP

EQUIPMENT AND RESOURCES

1. Instructor Guide
2. ALCO-SENSOR III – 1 per student
3. ALCO-SENSOR IV – 1 per student
4. Calibration bottles
5. Extra batteries
6. Alcoholic beverage/mouthwash of choice (with alcohol) for swishing

INSTRUCTOR SPECIAL REQUIREMENTS One instructor is needed for the lecture, discussion and demonstration portions of this training session.

DEMONSTRATION SET-UP The Instructor should also ensure the availability and operability of all equipment on the ALCO-SENSOR III and IV carts.



**LESSON
INTRODUCTION**

Note: How many of you have ever been pulled over for speeding? When the policeman says he clocked you on radar going 10 mph over the posted limit, does the calibration and accuracy of the radar matter to you? Does evidence that the radar was maintained and validated according to manufacturer's recommendations make a difference if you decide to challenge the ticket in court? For the same reasons, the calibration of your ALCO-SENSOR is vital.

After completing the field sobriety testing, your opinion is that the individual is intoxicated. It is now time to offer the chemical test. The results will provide a Blood Alcohol Concentration (BAC) comparison to the standard in the regulations.

1. DOES THE INDIVIDUAL HAVE TO SUBMIT TO YOUR CHEMICAL TEST?

No

2. WHAT DO YOU DO IF THE INDIVIDUAL REFUSES THE TEST?

Advise him/her "If an individual refuses to submit to or cooperate in the administration of a timely chemical test when directed by a law enforcement officer based on reasonable cause, the evidence of the refusal is admissible as evidence in any administrative proceeding and THE INDIVIDUAL WILL BE PRESUMED TO BE INTOXICATED." This is in accordance with 33 CFR 95.035, Reasonable Cause.

3. A BAC reading is only as reliable as the sample that is given.

4. COULD SOMEONE GIVE A DEFINITION OF A DEEP LUNG SAMPLE?

Air found near the bottom of the lung where the oxygen and carbon dioxide exchange takes place. The alveoli are the little sacs which control this exchange.

5. HOW LONG DOES IT TAKE TO GET ONE OF THESE SAMPLES?

It takes four seconds of steady exhalation to get this deep lung air; the result will be the truest sample of the individual's BAC.



6. WHY SHOULD YOU OBSERVE THE SUBJECT FOR AT LEAST 15 MINUTES?

To ensure that nothing has entered the mouth, such as food, drink, or tobacco.

Not coincidentally, it just so happens that the Afloat/Ashore test battery takes about 15 minutes to complete.

7. CAN ANYONE DESCRIBE FOR ME HOW BOTH UNITS WORK INTERNALLY?

Both the ALCO-SENSOR III and IV contain a fuel cell. A fuel cell is a porous disc coated with a thin layer of gold and platinum with black on both faces and saturated with an electrolyte. When the breath sample is drawn across the top surface of the cell, all of the alcohol is quickly absorbed and is then converted to acetic acid and electrons. At this time, the resulting electric current is converted to a BAC reading and is digitally displayed. The fuel cell has an average shelf life of two - five years.



**PERFORMANCE
DEMONSTRATION**

ALCO-SENSOR III Operation

Introduction

Present the following to the students:

1. This is the ALCO-SENSOR III. (Hold up the unit.)
2. It is manufactured by Intoximeters Inc. and is easy to operate.
3. This unit is used by various law enforcement agencies throughout the country.
4. Remove the battery from the bottom of your unit and you will see the serial number. It should match the serial number on the outside of the unit.
5. Use only alkaline 9-volt batteries. Discuss the difference between a regular 9-volt battery and an alkaline 9-volt battery.
6. The back of the unit has the operating instructions and a temperature sensitive liquid crystal, which reads in degrees centigrade.
7. The top of the unit has a small nipple extending out, which is the sampling port. The mouthpiece attaches here.
8. The front of the unit has two buttons, a SET button, and a READ button.
9. The SET button purges the machine and turns the battery off. The SET button must remain depressed until you press the READ button.
10. Repeat Step 9 again to emphasize the point.
11. CAN ANYONE DESCRIBE FOR ME WHAT HAPPENS WHEN THE READ BUTTON IS DEPRESSED?

The instant the READ button is depressed, the unit will suck in one cubic centimeter of breath, which is in the mouthpiece. The READ button will not remain depressed; it must be held down to ensure that you see the peak reading.

12. ARE THERE ANY QUESTIONS UP TO THIS POINT?
13. Let's discuss some considerations before we use the unit.



14. WHAT IS THE OPERATING TEMPERATURE RANGE OF THE UNIT?

If any of the numbers are lit, the machine is within its operating temperature (68-104 degrees Fahrenheit/20-40 degrees Centigrade).

Instructor's Note: This information is found in the *ALCO-SENSOR III Operator's Manual*, Page 4, paragraph 1, "Operating Conditions".

15. WHAT DO YOU DO IF IT IS TOO COLD?

You must take precautions to keep the device warm so that it is ready for use when you need it. You can place it in your pocket or under your arm to warm it up. The unit will operate if it is cold; however, the reading may take as long as two minutes to reach its peak and the BAC will be understated (in favor of the subject).

16. WHAT IF IT IS OVER 100 DEGREES F?

Again, place the unit in your pocket to cool it.

17. WHAT IS THE UNIT'S HOURLY TESTING LIMIT?

The hourly testing limit is a cumulative total of .500% per hour. If this is exceeded, either take the unit out of service for 24 hours, or recalibrate it due to the loss of sensitivity for continued use.

18. Due to the risk of Radio Frequency (RF) Interference, you should not transmit on your VHF-FM radio during the chemical test.

19. An indicator of RF interference is a spiked reading; it will be very high then will return back to normal. RF interference does not affect the reading but it could cloud the issue in court.



Instructor Demonstration

1. Set up for instructor demonstration in the following manner:
 - Ensure that each student has an ALCO-SENSOR III unit.
 - Ensure that each table has several calibration bottles.
2. Demonstrate the ALCO-SENSOR III Operation. Criticalities follow. (The operating instructions are on the back of the unit.)

1	Check the temperature.
2	Remove one end of the mouthpiece from its wrapper, and attach it to the Alco Sensor III. Do not touch the end to be offered to the subject. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: After removing the wrapper from the mouthpiece, save it to remove the mouthpiece after the test.</p> </div>
3	Ensure that the unit is “zeroed out”.
4	Depress the READ button for 10 seconds, the unit should read .000. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Instructor’s Note: This information is found in the <i>ALCO-SENSOR III Operator’s Manual</i>, Page 4, paragraph 1, “Operating Conditions.”</p> </div>
5	You need to get a deep lung sample; therefore, wait at least four seconds before depressing the READ button. You must hold the READ button continuously. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: Once the READ button is pressed, the ALCO-SENSOR III will sample only the breath that enters at that time.</p> </div>
6	Continue holding the READ button and record the highest reading attained that held steady for approximately five seconds.
7	Show your witness the reading and record the reading on the FST sheet and the unit’s log.
8	Press the SET button, remove the mouthpiece, and put the ALCO-SENSOR III back into its case.

STUDENT WALKTHROUGH

Students will follow along with each step of the instructor demonstration, without actually performing the procedures on their own unit.



INSTRUCTOR GUIDE

STUDENT PRACTICE

Students will take a BAC reading, using their own ALCO-SENSOR III unit on an instructor. The instructor has swished, but not swallowed, an alcoholic beverage or Listerine.

EVALUATION

Students will be given feedback during the Operation Exercise; however, no evaluation is given.



**PERFORMANCE
DEMONSTRATION**

ALCO-SENSOR IV Operation

Introduction

Present the following to the students:

1. This is the ALCO-SENSOR IV (hold up the unit).
2. It is manufactured by Intoximeters Inc. and is easy to operate.
3. This unit is used by various law enforcement agencies throughout the country.
4. Slide the battery cover down and you will see a 9-volt alkaline battery and three calibration switch holes. The battery is good for 300+ tests. The calibration switches are used during calibration procedures.
5. A Radio Frequency Interference (RFI) sensor is built into the ALCO-SENSOR IV's circuitry. If an interference signal is received which could influence the test result, the test will be voided and "RFI" will display.
6. Let's discuss the external parts of the unit. Follow along with your unit.
7. The SET button cocks the pump when depressed and released. When the ALCO-SENSOR IV is not in use, the SET button should be used to cock the pump. In this position, the chance of contaminants entering the fuel cell during storage is reduced.
8. The MANUAL button must be used to take a sample during the calibration process or when the operator wants to test someone who cannot blow long enough to activate the automatic sampling system.
9. The RECALL button permits the operator to recover the final test reading of the current test until the mouthpiece is ejected.
10. The display turns on when a mouthpiece is mounted in place. It directs the operator as to when to take a sample from the subject, i.e. "TEST", and enunciates any malfunctions of the system and what actions to take.
11. Discuss temperature and possible results of test reading.
12. The Breath Manifold monitors breath-flow and assures a sampling of just deep lung breath samples.



13. The Mouthpiece Release button releases and ejects the mouthpiece when depressed.

Note: Under no circumstances should the mouthpiece be pulled out without actuating the Mouthpiece Release button.

Instructor Demonstration

1. Set up for an instructor demonstration in the following manner:
 - Ensure that each student has an ALCO-SENSOR IV unit.
 - Ensure that each student has a mouthpiece.
2. Demonstrate that ALCO-SENSOR IV Operation. Criticalities follow. (The ALCO-SENSOR IV Operator’s Manual provides instructions on operation.)

1	Insert the mouthpiece. This turns the unit on.
2	Watch the display for information.
3	Note the temperature; it is displayed for three seconds and should be between 10-40 degrees Centigrade (50-104° F).
4	If “Bat” is displayed, conduct the test and replace the battery.
5.	If unit displays “Set”, depress the SET button. This will re-cock the device.
6.	When the unit displays “Test”, collect a breath sample. Instruct the subject to blow into the mouthpiece until told to stop. The microprocessor will sense a ten percent reduction in the flow rate, at which point, the ALCO-SENSOR IV will automatically take a sample.
7	Show your witness the reading. The test result is displayed for several seconds. Record the test result on your FST sheet and the ALCO-SENSOR log.
8	Depress the SET button and remove the mouthpiece.
9	The “Recall” function is not available until the SET button is depressed and released. Depress the SET button and then depress the RECALL button. The final reading will be displayed at this time.

Note: After the mouthpiece has been ejected, the test results can no longer be recalled.



INSTRUCTOR GUIDE

**STUDENT
WALKTHROUGH**

Students will follow along with each step of the instructor demonstration without actually performing the procedures on their own unit.

**STUDENT
PRACTICE**

Students will take a BAC reading, using their own ALCO-SENSOR IV unit on an instructor (instructor has swished, but not swallowed, an alcoholic beverage or Listerine).

EVALUATION

Students will be given feedback during the Operation Exercise; however, no evaluation is given.



PERFORMANCE
DEMONSTRATION

ALCO-SENSOR III Calibration

Introduction

1. WHY IS THE CALIBRATION OF THE ALCO-SENSOR III IMPORTANT?

We can use the ALCO-SENSOR III for admissible evidence only if the unit is calibrated in accordance with the manufacturer's instructions and the results of the calibration and testing are appropriately logged.

2. WHEN DO WE NEED TO CALIBRATE THE ALCO-SENSOR III?

- When it is first put into use
- When you exceed the 500 Rule
- When it fails a monthly calibration/accuracy check

3. WHEN DO WE NEED TO CONDUCT A CALIBRATION/ ACCURACY CHECK?

- Weekly check for the first month
- Every 30 days after the first month
- After battery replacement

Note: When conducting a calibration/accuracy check, the ALCO-SENSOR III must be within ± 0.010 of the standard (i.e. if the standard is .082, the ALCO-SENSOR III needs to fall between .072 and .092). If the device fails to meet this criterion, it must be re-calibrated.

4. WHEN DO WE CONDUCT CALIBRATION VERIFICATION?

Wait three minutes after the calibration and then run a calibration/accuracy check using a new mouthpiece.

Note: When conducting a calibration verification check, the ALCO-SENSOR III must be within ± 0.003 of the standard (i.e. if the standard is .082, the ALCO-SENSOR III needs to fall between .079 and .085). If the device fails to meet this criterion, it must be re-calibrated. If it holds its calibration in your environment, you can change the calibration schedule to once a month, as the policy states.

5. If the unit does not hold its calibration, send it back to the company for a replacement unit.



6. If you call the manufacturer and let them know you are sending a unit back, they have a one-day turnaround on the repair or they will give you a replacement unit until yours is fixed.
7. When the unit exceeds the .500 Rule, it loses 3-5% of its accuracy or sensitivity. It must be recalibrated to meet this new level of sensitivity. If you need to continue testing at this rate, recalibrate each time the total of the tests conducted reach .500 in one hour.
8. Remember, the unit does not remember the calibration standard. You are adjusting the unit to read a different level of sensitivity of the fuel cell.
9. When this testing load is over, let the unit rest 10 hours to regain its original sensitivity and then conduct a calibration/accuracy test and recalibrate, if necessary.
10. Display an approved dry gas cylinder.
11. This is an approved dry gas cylinder, containing 105 liters, 99 plus percent of this is Nitrogen and a small amount of it is alcohol vapor.

Example: Refer to the dry gas cylinder and state the percentage. Notice on the back of the standard is an elevation chart. The BAC percentage of the bottle is based on being at sea level. This percentage will change, based on elevation. For most units, this is not an issue. For example, Lake Tahoe is 6,255 feet above sea level. Referring to the chart will change the value from .082% to .065%.

Note: The dry gas cylinder does have a shelf life. Look on the label for the unit expiration date.

12. You can even pretend that this is a subject that you are testing. You will be discharging gas for four-five seconds, then pressing the READ button. In this case, though, you will already know the subject's BAC level.
13. This reference is what should appear on the ALCO-SENSOR III when calibrating the unit.
14. There are two other tools you can use to calibrate the unit:
 - The Mini-ALCO, shown in the manual, is not recommended for everyday use because of its short life (contains about 10 tests); however, its size makes it perfect for placement in a boarding kit for occasional use.
 - The simulator is an expensive set-up that requires additional training, maintenance and operating criticality in itself.



15. (Hold up a Calibration Log.)
16. This is a calibration log. It can come in many different forms. MLEA uses a simple 3x5 index card that will fit in the box with the unit. Another log should be kept at the station, in the event you should lose the index card.
17. Take a minute and look at the log in the box in front of you. Notice the information listed. A copy of this information will be required when your case goes to a hearing.

**Instructor
Demonstration**

2. Set up for an instructor demonstration in the following manner:
 - Ensure that each student has an ALCO-SENSOR III unit.
 - Ensure that each table has several calibration bottles.
2. Demonstrate ALCO-SENSOR III Calibration/Accuracy Check, Calibration, and Calibration Verification. Criticalities follow. (The *ALCO-SENSOR III Operator's Manual* provides instructions on calibration.)

Calibration/Accuracy Check

1	Run a blank check. To do this, hold the READ button down to ensure there is no residual alcohol and the zeroing function inside "zeros out" the display.
2	Ensure you have a pressure reading on the gauge.
3	Press the RELEASE button on the regulator for 10 seconds. This discharges the stale residual gas that has been sitting inside the regulator for the last month since your last check.
4	Attach the mouthpiece to the ALCO-SENSOR and take a sample by discharging gas for 5-6 seconds and taking a sample on the fourth second.
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Note: Write on the board +/- .010. </div>	
5	Record the reading. The reading you get should be at the ALCO standard or +/- 0.010. If it does not meet the specified tolerances, the unit requires a calibration.
6	Record the calibration/accuracy check in the Calibration Log.



Calibration

1	Locate the calibration screw on the side of the unit. This is the adjusting mechanism.
2	Take out your screwdriver. Turn the screw two full turns clockwise.
3	What you have just done is increased the unit's sensitivity significantly. So, if your standard read .082, it may now read .150 or so.
4	As you take a sample, you will see the reading go up. As it goes over the ALCO standard reading, turn the screw counterclockwise, slowly, to keep the reading at the standard. After it settles out and retains a steady reading for five seconds without moving, it is calibrated.
5	Record the calibration in the Calibration Log.

Calibration Verification

1	<p>Check the accuracy of your calibration by taking one more sample after waiting three minutes. The results of this final check must fall within +/- .003 of the stated standard.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Example: If the standard is .082, your reading may fall within .079 and .085.</p> </div>
2	Record the calibration verification in the Calibration Log.

STUDENT WALKTHROUGH

Students will follow along with each step of the instructor demonstration without actually performing the procedures on their own unit.

STUDENT PRACTICE

Students will conduct a Calibration/Accuracy Check, Calibration, and Calibration Verification on their own ALCO-SENSOR III unit.

EVALUATION

Students will be given feedback during the Calibration Exercise; however, no evaluation is given.



PERFORMANCE
DEMONSTRATION

ALCO-SENSOR IV Calibration

Introduction

Note: All information passed to the students in the ALCO-SENSOR III Calibration section about the dry gas cylinder, Mini-Alco cylinder, simulator, and the Calibration Logs are the exact same in this section, so it has not been repeated.

1. WHY IS THE CALIBRATION OF THE ALCO SENSOR IV IMPORTANT?

We can use the ALCO-SENSOR IV for admissible evidence only if the unit is calibrated in accordance with the manufacturer's instructions and the results of the calibration and testing are logged.

2. WHEN DO WE NEED TO CALIBRATE THE ALCO-SENSOR IV?

- When it is first put into use
- When it fails a monthly calibration/accuracy check

3. WHEN DO WE NEED TO CONDUCT A CALIBRATION / ACCURACY CHECK?

- Weekly check for the first month
- Every 30 days after the first month
- After battery replacement

Note: When conducting a calibration/accuracy check, the ALCO-SENSOR IV must be within +/- 0.010 of the standard (i.e. if the standard is .082, the ALCO-SENSOR IV needs to fall between .072 and .092). If the device fails to meet this criterion, it must be re-calibrated.

4. WHEN DO WE CONDUCT CALIBRATION VERIFICATION?

Wait three minutes after calibration and then run a calibration/accuracy check using a new mouthpiece.

Note: When conducting a calibration verification check, the ALCO-SENSOR IV must be within +/- 0.003 of the standard (i.e. if the standard is .082, the ALCO-SENSOR IV needs to fall between .079 and .085). If the device fails to meet this criterion, it must be re-calibrated. If it holds its calibration in your environment, you can change the calibration schedule to once a month, as the policy states.



5. If the unit does not hold its calibration, send it back to the company for a replacement unit.

Note: ALCO-SENSOR IVs will generally hold their calibration for months. However, there are some circumstances that will cause sensitivity to drop and low readings to occur.

6. The ALCO-SENSOR IV, unlike the ALCO-SENSOR III, does remember the last calibration standard; however, you will be adjusting the fuel cell to read the Dry Gas standard being used for calibration.
7. This reference is what should appear on the ALCO-SENSOR IV when calibrating the unit.



**Instructor
Demonstration**

1. Set up for an instructor demonstration in the following manner:
 - Ensure that each student has an ALCO-SENSOR IV unit.
 - Ensure that each student has the Calibration Standard.
 - Ensure that each student has a mouthpiece.
 - Ensure that each student has a calibration tool.

2. Demonstrate ALCO-SENSOR IV Calibration/Accuracy Check, Calibration, and Calibration Verification. Criticalities follow. (*The ALCO-SENSOR IV Operator's Guide* provides instructions on calibration.)

Calibration/Accuracy Check

1	Purge the regulator for at least three to four seconds before running your first accuracy check of the day.
2	Insert a new mouthpiece into the ALCO-SENSOR IV. The display shows "TEST".
3	Make an air-tight connection between the delivery tube of the regulator and the open end of the mouthpiece.
4	Depress the Regulator Control button for seven seconds. On the fourth or fifth of the six seconds, press the MANUAL button. (The goal is to have gas still flowing through the ALCO-SENSOR IV when the sample is taken.)
5	Carefully detach the mouthpiece from the regulator, ensuring that the mouthpiece is not disengaged from the unit.
6	Observe the three-digit reading.
7	Record the reading. The reading you get should be at the ALCO standard or +/- 0.010. If it does not meet the specified tolerances, the unit requires a calibration.



Calibration

1	<p>The unit must be calibrated when its temperature is near the mid-point of its operating range, (i.e., 23°-27° C). If the temperature is not within the required range, the unit will not accept the calibration.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: The unit will display Temp > if temperature of the cell is too high. It will display Temp < if the temperature is too low.</p> </div>
2	<p>Remove the battery cover to expose the Calibration Button access holes. Inside the battery compartment directly above the 9-volt alkaline battery, there are three small holes. Locate these holes</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: For the purpose of the training, we call them calibration switches. The hole to the left is Switch #1, the middle hole is Switch #2, the hole to the right is Switch #3.</p> </div>
3	<p>Using the Calibration tool, hold down Calibration Switch #1 while inserting a new mouthpiece, and continue holding down Switch #1 until you observe four red squares.</p>
4	<p>Once the four red squares are displayed, remove the Calibration Tool from Switch #1 and insert it into Switch #3 and hold it down.</p>
5	<p>The ALCO-SENSOR IV is now in its "Inspection mode". The full dot display is to assure the user that there are no missing elements in the displayed characters that might cause ambiguity in the reading.</p>
6	<p>Next, the temperature will be displayed and after a short period of time "Blnk" will be displayed, followed by .000.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: At this point, an air blank is taken automatically. If the sampling system is free of alcohol, ".000" will be displayed. Otherwise "Wait" will be displayed. "Wait" will continue to be displayed until the fuel cell reaches a zero baseline, at which time "blnk" will be followed by ".000".</p> </div>
7	<p>Keep the Calibration Tool gently pressed down in Switch #3 until the .000 is replaced with another number (i.e., .082). Observe the number displayed and remove the tool from switch #3. The reading displayed represents the last calibration setting.</p>



8	In order to properly calibrate the unit, you must know the BAC equivalent of the dry gas standard being utilized. Adjust the device by pressing the Calibration tool into Switch #1 (increments up) and Switch #2 (increments down), as needed. When the number on the display matches the current expected value of the standard, press Switch #3.
9	Once Switch #3 has been pressed "Cal" will flash on the display, indicating that the device is now ready to accept the standard sample.
10	When using a dry gas standard for calibration or accuracy checks on the ALCO-SENSOR IV, purge the gas tank's valve for 10 seconds prior to introducing the gas to the ALCO-SENSOR IV.
11	Attach the regulator to the mouthpiece of the ALCO-SENSOR IV, ensuring there is a good tight connection between the regulator and the mouthpiece.
12	<p>Deliver a sample of the standard to the device, on the fourth or fifth of the six seconds, press the MANUAL button on the ALCO-SENSOR IV to collect a gas sample for analysis.</p> <div data-bbox="613 1024 1421 1171" style="border: 1px solid black; padding: 5px;"> <p>Note: Do not stop the flow of the gas sample until after the MANUAL button has been pressed and flashing arrows "<>" "<" appear on the ALCO-SENSOR IV display. The display must flash CAL before the standard gas sample is delivered.</p> </div>
13	The flashing arrows on the display indicate the ALCO-SENSOR IV is analyzing the sample. DO NOT press any buttons on the ALCO-SENSOR IV.
14	Observe the three-digit calibration reading. This reading will match exactly the value you set into the ALCO-SENSOR IV.
15	When "SET" displays, depress the SET button on the ALCO-SENSOR IV.
16	Record the calibration in your Calibration Log.



Calibration Verification

1	<p>Check the accuracy of your calibration by taking one more sample after waiting three minutes. The results of this final check must fall within $\pm .003$ of the stated standard.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Example: If the standard is .082, your reading may fall within .079 and .085.</p> </div>
2	<p>Record the calibration verification in the Calibration Log.</p>

STUDENT WALKTHROUGH

Students will follow along with each step of the instructor demonstration without actually performing the procedures on their own unit.

STUDENT PRACTICE

Students will conduct a Calibration/Accuracy Check, Calibration, and Calibration Verification on their own ALCO-SENSOR IV unit.

EVALUATION

Students will be given feedback during the Calibration Exercise; however no evaluation is given.



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