



Alco-Sensor FST® Operator's Manual (BRITISH COLUMBIA)

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NOTICE

This manual has been prepared by the British Columbia Association of Chiefs of Police (BCACP), Impaired Driving Advisory Committee (IDAC) with representation from RCMP National Forensic Laboratory Services. The manual has been created from materials provided by Intoximeters Inc., the manufacturer of the **Alco-Sensor FST®**. This manual conforms to British Columbia provincial standards and legislation and is provided to police officers undertaking **Alco-Sensor FST®** operator training in British Columbia.

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1.0 Introduction

Impaired driving is the leading cause of criminal death in Canada.¹ This is a preventable tragedy and the key to success is ensuring our response to impaired driving is swift, certain and significant.

The nature of alcohol impairment presents serious challenges. The first is that individuals have a wide range of tolerance to alcohol and detecting a person whose ability to operate a motor vehicle is impaired is easier said than done. Since police often have a brief observation period and limited interaction with the subject, discovering impaired drivers can be very challenging.

A study conducted in Florida demonstrated even senior and motivated officers missed 2/3 of all impaired drivers at a check stop because of the wide range of tolerance to alcohol and because officers have only a brief observation and limited interaction with the stopped drivers.

This is why the Approved Screening Device (ASD) was created. The ASD gives police a scientific and reliable method for quickly determining, with certainty, whether a person's blood alcohol concentration (BAC) meets-or-exceeds 80 milligrams of alcohol in 100 millilitres of blood (mg%).

The use of ASDs in Canada is governed by the *Criminal Code*. Although this manual deals with the Alco-Sensor FST®, the law and policy are the same for all ASDs.

The *Criminal Code* sets the legal parameters for blood alcohol concentration as well as making it illegal to drive while impaired by alcohol or a drug. Section 320.14 of the *Criminal Code* describes the "who", "what", "where" and "how" of the offense in these terms:

320.14 (1) Everyone commits an offence who

(a) operates a conveyance while the person's ability to operate it is impaired to any degree by alcohol or a drug or by a combination of alcohol and a drug;

(b) subject to subsection (5), has, within two hours after ceasing to operate a conveyance, a blood alcohol concentration that is equal to or exceeds 80 mg of alcohol in 100 mL of blood;

Before any screening device can be used, it must be approved by the Attorney General of Canada for use and appear in the Approved Screening Devices Order. The Alco-Sensor FST® is included in this order and is, therefore, approved for use. For court purposes, the operator must know exactly which device and model was used and should always state that it was an "Approved Screening Device".

The Alco-Sensor FST® was approved for use as a screening device in 2012. It is distributed in Canada by DAVTECH Analytical Services and is manufactured by Intoximeters Inc. of St. Louis, Missouri. Upon successful completion of this course, you will be qualified to use this ASD to investigate impaired driving offences.

¹ source: <http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11739-eng.pdf>

2.0 Identify Suspected Impaired Drivers

2.1 Initial Observation

The initial observation of vehicular operation begins when the officer first notices the vehicle and/or the driver. If the initial observation discloses vehicle maneuvers or human behaviors that may be associated with alcohol influence, the officer may develop an initial suspicion of impaired driving.

2.2 Stopping Drivers

Provincial and/or federal legislation provide police with the authority to stop a vehicle.

2.3 Recognizing Signs of Impairment

Once the traffic stop has been initiated, the officer must closely observe the driver's actions and vehicle maneuvers during the stopping sequence. Significant evidence of alcohol influence may become apparent during the vehicle stop. Drivers impaired by alcohol and/or other drugs may respond in unexpected and dangerous ways.

2.4 Assessing Signs of Impairment

Alcohol is a central nervous system depressant and as such, slows down the activity of the brain and spinal cord. Impairment refers to a deterioration of sensory and mental functions to such an extent as to make the operation of a motor vehicle unsafe. Impaired drivers have a deterioration of vision and fine motor co-ordination, decreased comprehension and judgment, lessened attentiveness and a decreased rate of information processing. Drivers who are impaired by alcohol may display the following driving behaviors: an inability to negotiate curves and turns successfully; an increase in reaction time; misjudge the distance between themselves and other vehicles; disregard for the rules of the road; increase in risk taking behavior; and difficulty in maintaining lane positions and appropriate speeds.

It is the consensus of the scientific community that all individuals are impaired in their ability to operate a motor vehicle with a blood alcohol concentration of 100 mg%.

Intoxication is an advanced state of impairment in which the outward physical signs of the deteriorating effects of alcohol are apparent. Intoxicated individuals may exhibit slurred speech, loss of balance, staggered gait, emotional disturbances and teary or overemotional behavior.

Tolerance refers to the body's ability to withstand or resist the effects of alcohol, due to prior exposure. The degree of intoxication exhibited by an individual at a given BAC will depend on their level of tolerance to alcohol. Drinkers that have greater tolerance will appear less intoxicated compared to inexperienced drinkers that have consumed the same amount of alcohol. An experienced drinker may show no outward signs of impairment with a BAC of 100 mg%. However, their ability to safely operate a motor vehicle will still be impaired.

2.5 Science of Breath Testing

When a person consumes an alcoholic beverage, it passes from the mouth and esophagus to the stomach and small intestine, where it is absorbed into the blood stream. The absorption of alcohol is quite rapid, generally taking 20 to 30 minutes after consumption to reach the maximum reading. Absorption time may be affected by the type and amount of food in the stomach, the rate of alcohol consumption, the type of beverage consumed as well as some drugs, disease and emotional states. Once in the blood stream, the alcohol is distributed to all parts of the body including the lungs, brain and liver. It is the depressant action of alcohol in the brain that causes impairment and intoxication.

Elimination of alcohol begins immediately after it has entered the blood. Most of the alcohol (approximately 95%) is eliminated by metabolism in the liver. The remainder (approximately 5%) is excreted unchanged through breath and other body fluids. Unlike absorption, the elimination process is slow. The elimination rate ranges between 10 - 20 mg% per hour for most of the population.

The basis for all breath test equipment is that alcohol is eliminated unchanged in the breath. There is a fixed and known relationship between the amount of alcohol in the breath and the amount of alcohol in the blood. This relationship (essentially the principle of breath testing) is:

At 34°C, 2100 parts of deep lung air contains the same amount of alcohol as one part of blood.

Using this ratio, it is possible to collect a measured volume of breath, analyze it for alcohol and convert the result to a blood alcohol concentration. This principle is used in all breath test instruments and screening devices operated in North America, including the Alco-Sensor FST®. It should be noted that this ratio is lower than the actual ratio (2300:1) and so the results obtained through breath testing tend to underestimate the actual blood alcohol concentration.

2.6 Theory of Fuel Cells

The Alco-Sensor FST® analyzes the amount of alcohol in a sample of breath by means of a fuel cell. A fuel cell is similar to a battery except that it requires a fuel (like alcohol) to make it produce a current. The current is produced by a chemical reaction that occurs when alcohol comes in contact with the fuel cell:

Alcohol -----> Acetic Acid + Electrons -----> CO₂ + O₂ + H₂O

The current is produced when electrons are generated in the above reaction. The more alcohol there is in a breath sample, the more electrons are produced causing a stronger current and subsequently, a higher reading.

3.0 Lawfully Administer the Alco-Sensor FST®

3.1 Stopping the Subject

Police may stop a driver to check the license, registration, insurance, mechanical condition of the vehicle, or to check the sobriety of the driver. An ASD is an important tool police can use to help evaluate driver sobriety.

In order to use an ASD lawfully an officer must comply with section 320.27 of the *Criminal Code*. An ASD demand may be made when the officer has reasonable grounds to suspect that the person has alcohol in their body and the person has been operating a conveyance within the preceding three hours.

320.27 (1) If a peace officer has reasonable grounds to suspect that a person has alcohol or a drug in their body and that the person has, within the preceding three hours, operated a conveyance, the peace officer may, by demand, require the person to comply with the requirements of either or both of paragraphs (a) and (b) in the case of alcohol or with the requirements of either or both of paragraphs (a) and (c) in the case of a drug:

(a) to immediately perform the physical coordination tests prescribed by regulation and to accompany the peace officer for that purpose;

(b) to immediately provide the samples of breath that, in the peace officer's opinion, are necessary to enable a proper analysis to be made by means of an approved screening device and to accompany the peace officer for that purpose;

(c) to immediately provide the samples of a bodily substance that, in the peace officer's opinion, are necessary to enable a proper analysis to be made by means of approved drug screening equipment and to accompany the peace officer for that purpose.

Reasonable suspicion may be formed when: an officer smells alcohol coming from the subject's breath, the subject admits to recent alcohol consumption, a witness observes the subject consuming alcohol, an officer observes subject consuming alcohol, or any other combination of factors which reasonably support the suspicion.

An ASD should not be used if the officer already has formed the opinion that the subject's ability to drive is impaired by alcohol.

Do not confuse the grounds for the ASD demand with the grounds for an evidentiary breath demand.

320.28 (1) If a peace officer has reasonable grounds to believe that a person has operated a conveyance while the person's ability to operate it was impaired to any degree by alcohol or has committed an offence under paragraph 320.14(1)(b), the peace officer may, by demand made as soon as practicable,

(a) require the person to provide, as soon as practicable,

(i) the samples of breath that, in a qualified technician's opinion, are necessary to enable a proper analysis to be made by means of an approved instrument,

or

(ii) if the peace officer has reasonable grounds to believe that, because of their physical condition, the person may be incapable of providing a sample of breath or it would be impracticable to take one, the samples of blood that, in the opinion of the qualified medical practitioner or qualified technician taking the samples, are necessary to enable a proper analysis to be made to determine the person's blood alcohol concentration; and

(b) require the person to accompany the peace officer for the purpose of taking samples of that person's breath or blood.

Reasonable grounds for impairment are a much higher standard than a suspicion of alcohol in the body, and are generally formed with observations of intoxication (slurred speech, poor balance, staggering gait, confusion, disorientation, etc.) or of poor driving (excessively slow, fast or variable speeds, wide or narrow turns, weaving within and outside of the lane of travel, driving errors, etc.).

3.2 Dealing with the Subject

Section 320.27(1)(b) of the *Criminal Code* gives the peace officer the authority to demand a breath sample for analysis by an ASD on reasonable grounds to suspect that a person has alcohol in their body and that the person has, within the preceding three hours, operated a conveyance.

Section 320.27 also grants the officer the power to detain and ask the subject to accompany him/her for the purposes of administering the test. This authorizes the officer to remove the accused from the vehicle or move a short distance, if required for testing or safety reasons.

Timing is critical and the officer must make the demand promptly and administer the test without any avoidable delay. Failure to expedite the tests or explain delays will often lead to a *Charter* breach. Any delay in performing the ASD test must be explained to the subject. If a demand is made but the arrival of the ASD is delayed a right to counsel may arise and the driver should be informed of this right and given a reasonable opportunity to exercise this right. A general threshold for this time frame is fifteen minutes, but situational factors may further impact it.

ASD demands must be made "immediately" and without any delay. As soon as an officer has reasonable grounds to suspect alcohol being present in the subject's body, the officer must read the ASD demand verbatim as soon as practicable.

Approved Screening Device (ASD) DEMAND (Suspicion of Alcohol in Body) 320.27 (1) (b)

I have reasonable grounds to suspect that you have, within the preceding three hours, operated a conveyance (namely (pick one) a motor vehicle, a vessel, an aircraft or railway equipment) with alcohol in your body. In accordance with the provisions of the Criminal Code, I hereby demand that you provide a sample of your breath, immediately, suitable for analysis using an approved screening device and to accompany me for the purpose of enabling such samples to be taken. Do you understand?

There is no right to counsel prior to providing a breath sample into an ASD. Compliance with an ASD demand is considered a detention. However, it has been deemed a reasonable detention in the interest of public safety. The test is to be conducted as soon as practicable and any delays must be explained to the subject.

The full and proper name of the ASD you are using (Alco-Sensor FST®) as well as the serial number of the device should be recorded in your notes.

3.3 Failure or Refusal to Comply

Section 320.15 of the *Criminal Code* applies to the failure or refusal to comply with a demand for an ASD test, approved instrument test or blood sample. Each refusal case is unique. The offence is complete and the subject may be charged with refusal when:

- The officer has properly and fully explained the demand, and

- The subject has been given a reasonable opportunity to comply, and
- The officer has received an unequivocal refusal (by statement or conduct), or
- The subject fails to provide a suitable sample and the officer is of the opinion they are capable of doing so.

If a subject refuses the Alco-Sensor FST® by failure to provide a sample, they should be charged with refusal. In such a case, it is critical that the officer document why they felt the subject was refusing. For example, if they start blowing and then stop, if they continually take their lips off the mouthpiece, if they start blowing out the side of their mouth, or if they put their mouth on the mouthpiece but don't blow any breath out of their mouth. All of these observations are to be documented in the officer's notes as the subject's actions constitute the refusal. It may be necessary to demonstrate to the subject how to provide a proper sample into the ASD and ask the subject if they understand. The officer may have to explain to the subject several times and in different ways on how to provide a proper sample. If a subject is charged with refusal by failure to comply, the mouthpiece is to be checked to ensure there are no blockages or obstructions preventing breath from flowing through it. The mouthpiece is to be retained as evidence. The officer should also provide a sample into the device to demonstrate that the device is capable of accepting a sample.

3.4 Mandatory Alcohol Screening

Section 320.27(2) of the *Criminal Code* provides peace officers the authority to demand samples of breath for analysis by an ASD without first requiring them to have reasonable grounds to suspect the subject has consumed alcohol. The peace officer needs to be in possession of an ASD, and must be dealing with the driver of a motor vehicle in "the course of the lawful exercise of powers under an Act of Parliament or an Act of a provincial legislature or arising at common law." This Section also requires the subject to accompany the peace officer for this purpose.

Mandatory alcohol screening

(2) If a peace officer has in his or her possession an approved screening device, the peace officer may, in the course of the lawful exercise of powers under an Act of Parliament or an Act of a provincial legislature or arising at common law, by demand, require the person who is **operating** a motor vehicle to immediately provide the samples of breath that, in the peace officer's opinion, are necessary to enable a proper analysis to be made by means of that device and to accompany the peace officer for that purpose.

While this Section does provide sweeping authority to demand a sample for analysis by an ASD, if the peace officer is able to demonstrate reasonable grounds to suspect the driver has consumed alcohol, it remains more appropriate to rely on 320.27(1)(b) than this authority, and

for the peace officer to make notes of their observations accordingly. In the event a peace officer does rely upon the Mandatory Alcohol Screening authority to demand a breath sample, comprehensive notes are to be made, including the reason for the original detention, and any other potential indicia the officer observes that, while not rising to the point of “reasonable grounds to suspect”, may suggest the consumption of alcohol or other intoxicants.

**Approved Screening Device (ASD) DEMAND
(Mandatory Alcohol Screening) 320.27 (2)**

In accordance with the provisions of the Criminal Code and in the lawful execution of my duty, you are required to provide a sample of your breath into an approved screening device when operating a motor vehicle. I hereby demand that you provide a sample of your breath, immediately, suitable for analysis using an approved screening device and to accompany me for the purpose of enabling such samples to be taken. Do you understand?

4.0 Operate the Alco-Sensor FST®

4.1 Operational Overview of the ALCO-SENSOR FST®

It is imperative all ASD operators are able to adequately articulate how the device functions and to describe the correct sequence of messages displayed by the device, if called upon to give testimony in court. Although some messages are displayed only very briefly, failure to identify and articulate these messages can raise concerns about the proper operation of the device.

Commence a test by attaching a clean mouthpiece to the device. Insert the closed end of the mouthpiece into the mouthpiece channel, with the flat side of the mouthpiece downward and press the mouthpiece into position. The two holes on the underside of the mouthpiece will naturally align and attach to the appropriate ports of the Alco-Sensor FST®.

Press the ON button (labeled with an “I” symbol within a diamond shape) located opposite the display for about one second so the display illuminates and an audible beep sounds. The backlight of the display is normally green for all functions but turns an amber color when displaying a **WARN** result, or a red color when displaying a **FAiL** result.

The test sequence starts by briefly indicating the device temperature and battery strength. The acceptable operating temperature of the device is -5°C to 55°C. The test sequence will automatically end if the temperature is not in the acceptable range programmed for the

particular device or if the batteries are too weak to complete the test. There is no need to record this temperature.

Following the temperature and battery check, the display will show **BINK** and perform a blank test to demonstrate the alcohol free status of the device. A blank result other than 0 mg% will generate a status message **NULL FAiL** and end the test sequence automatically, so there is no need to record the blank reading. A 0 mg% blank will allow the sequence to continue with **WAIT** appearing on the display while the sequence progresses automatically.

A double beep will sound when the device is ready to accept a sample of breath and there will be a small flashing icon of a person's head in the upper left corner of the display and the message **Blow**. The ASD operator should instruct the subject to **“take a normal breath in, seal your lips around the mouthpiece, and blow continuously through the mouthpiece until I tell you to stop”**.

The Alco-Sensor FST® has an automatic sampling system designed to ensure that a sample of deep lung air is obtained and analyzed. In order to trigger automatic sampling the subject must blow with a minimum flow rate, must produce a minimum breath volume and blow for a minimum duration. When the minimum flow rate is met a continuous tone will sound, the head icon will stop flashing, the message **Blow** will disappear, and one of three progressive dashes will appear to the right of the icon. If the subject continues to blow while exceeding the minimum flow rate two more dashes will appear to the right of the head icon.

If the subject stops blowing before the sampling requirements have been met, one of the four flow messages will appear and the device will re-cycle to allow a second attempt to provide a sample. After a very short wait the flashing head icon will reappear and the subject should be directed to blow again. The device will allow up to three attempts to provide a breath sample for each test sequence.

When all the sampling requirements are met there will be an audible click and the sample will be accepted and analyzed. The analysis of the breath sample usually takes less than 10 seconds to complete and there are three possible results:

Result displayed on screen	BAC Level
Digital Numerical Reading	0 to 59 mg%*
WARN	60 to 99 mg%
FAiL	100 mg% or higher

The test result will be displayed for about fifteen seconds and then the device will power off automatically. Show the reading to the subject. You can recall the test result using the menu function, LAST (see Alco-Sensor FST® Menu Functions on page 17).

4.2 Theory and Design of the Alco-Sensor FST®

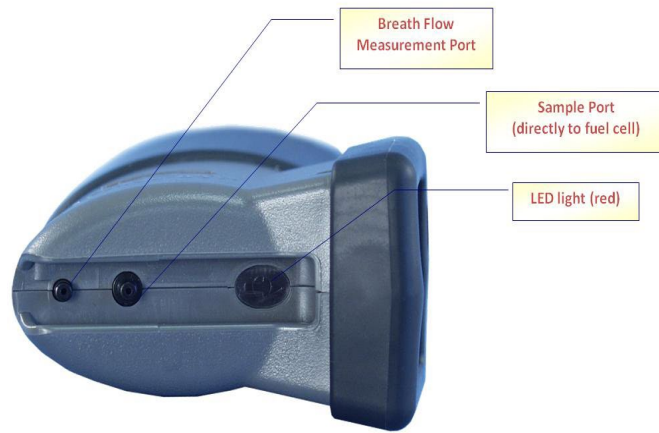
The Alco-Sensor FST® contains a fuel cell sensor and an electrically operated sampling system. A pressure sensor in the device monitors breath flow and volume to determine when to capture a breath for analysis. While a subject is blowing and when deep lung breath is reached the sampling system is activated. A small, fixed volume of deep lung breath is drawn onto the surface of the fuel cell, any alcohol present in the sample is oxidized, generating a current. The resulting electric current is translated into a blood alcohol concentration and the result is displayed on the Alco-Sensor FST® in blood alcohol concentration units of milligrams of alcohol in 100 milliliters of blood (mg%).

Display - The display and the back light turn on when the device is powered ON. Various commands and symbols appear on the display to direct the operator through the testing procedure and alert the operator of improper testing conditions detected by the system.

ON Button - The ON button (labeled with an "I" symbol within a diamond shape) is the larger of the two buttons on the Alco-Sensor FST® case. This button is located opposite the display and will naturally rest under the operator's forefinger when holding the device. The primary function of the button is to turn the device ON, and this is accomplished by pressing the button down for one second. A beep and the display powering on will indicate that power up has been successful. (NOTE: If you want to illuminate the display, hold the ON button down for an extra second on power up or press the ON button at any point when the temperature is being displayed and the display will illuminate.)

MENU/OFF Button - The MENU/OFF button (labeled with an "O" symbol) is located on the Alco-Sensor FST® case beneath the display. Depressing it and holding it down for two seconds, during normal operation, will manually turn the device off. **NOTE:** The device does have an auto power down feature which powers the device down when it has not been used for a period of time.

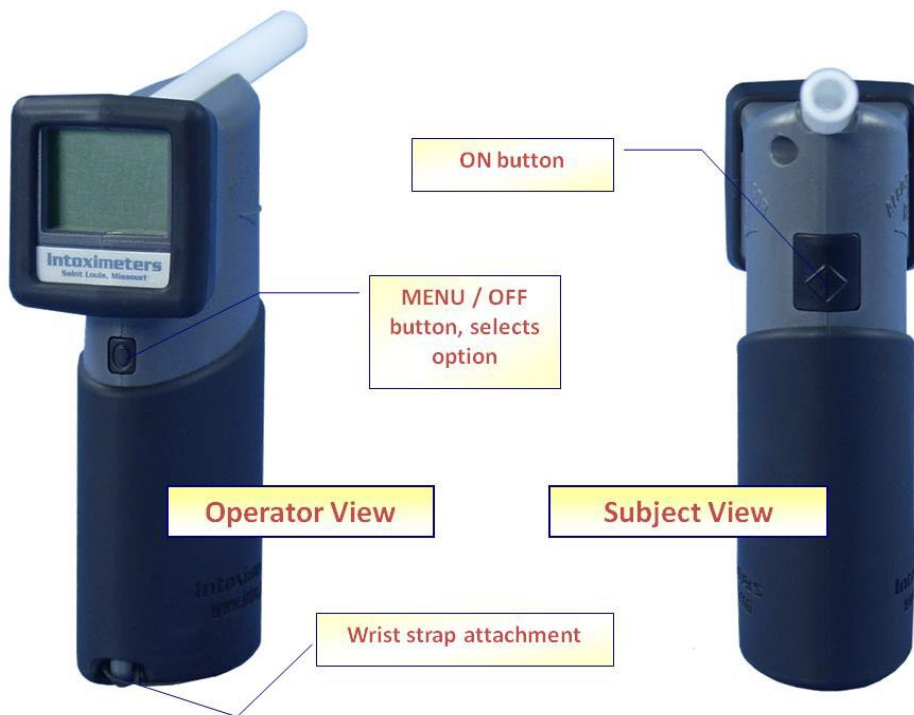
Alco-Sensor FST® - Structure



Alco-Sensor FST® - Nomenclature

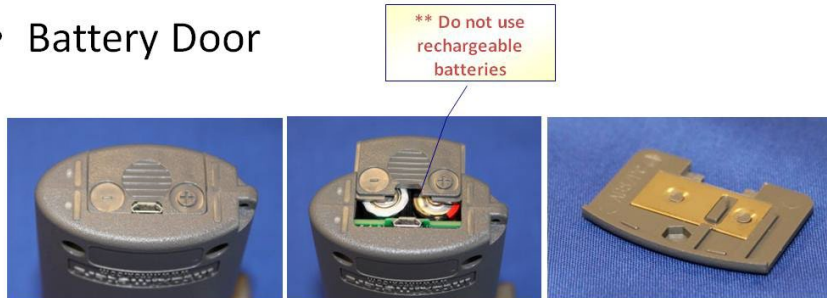


Alco-Sensor FST® - Structure



Alco-Sensor FST® - Structure

- Battery Door



Batteries - The battery cover is located on the base of the Alco-Sensor FST®. Two AA alkaline batteries should run well in excess of 1000 tests at room temperature. The device is reverse-polarity protected. Rechargeable batteries are not to be used.

If the Alco-Sensor FST® does not have sufficient battery power to perform a test, either the display will not power on or **BAT** will be displayed and testing will be disabled.

In order to replace the batteries:

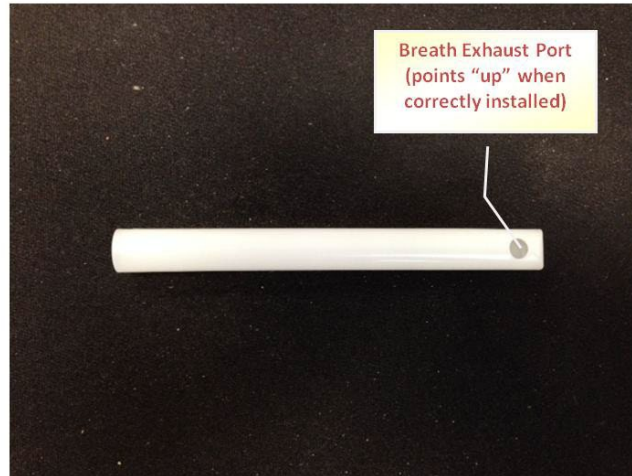
1. Remove rubberized grip.
2. Slide battery door open. It is located at the bottom of the Alco-Sensor FST®.
3. Remove both batteries.
4. Insert two new AA size alkaline batteries, ensuring polarity is correct.
5. Close battery door.
6. Replace rubberized grip.
7. Turn Alco-Sensor FST® ON to verify proper installation.

NOTE: If the batteries are replaced incorrectly, the device will not power ON. Immediately remove the batteries. An Alco-Sensor FST® calibrator will be required to put the device back into service.

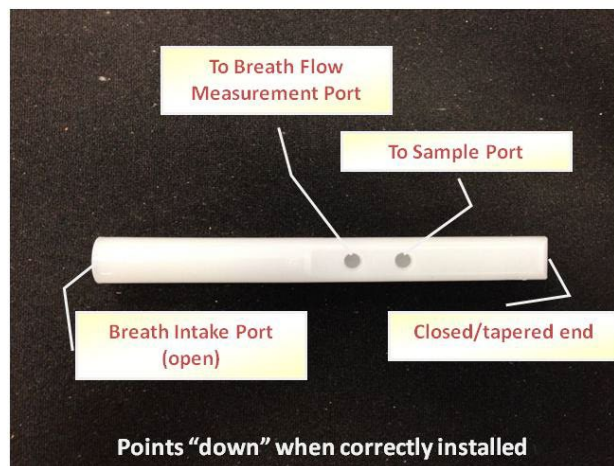
Mouthpiece - The mouthpiece is a critical portion of the sample assembly and specifically designed to be used with the Alco-Sensor FST®. Inserting the closed end of the mouthpiece into the mouthpiece channel, with the flat side of the mouthpiece downward, and pressing down will

place the mouthpiece into position. The two holes on the underside of the mouthpiece will naturally align and attach to the appropriate ports of the Alco-Sensor FST®.

Alco-Sensor FST® - Mouthpiece



Alco-Sensor FST® - Mouthpiece



4.3 Storage, Handling and Transport

The Alco-Sensor FST® has been designed to be carried and used by police officers under operational conditions. Normal physical shocks encountered in the policing environment will not generally be a problem.

In order to extend the life of the Alco-Sensor FST®, the following basic principles should be observed:

- Employ reasonable precautions against excessive shocks. For example, use the supplied wrist strap to ensure the Alco-Sensor FST® is not dropped during its use.
- When not in use, the Alco-Sensor FST® should be kept in its carrying case.
- At end of your shift, return the Alco-Sensor FST® to the office.
- Do not leave the Alco-Sensor FST® in the trunk of your vehicle.
- Ensure there are an adequate number of mouthpieces in the carrying case.
- Alco-Sensor FST® is to be sent for annual maintenance.

4.4 Operator Menu Functions

1. Power the device on by first pressing and holding the MENU button, and simultaneously pressing the ON button.
2. Press the ON button to scroll through the entire menu. Press the MENU button to select an option.

Operators will see the entire menu; however, only the following functions can be accessed:

LAST: Displays result of last test



The display will show the **LAST** message, which is the first option in the function Menu.

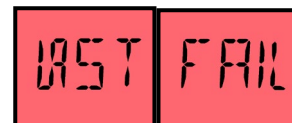
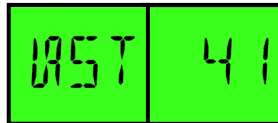
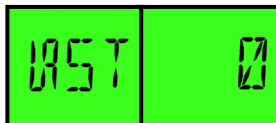
The result of the last test will be displayed briefly (15 seconds) and then device will automatically turn off.

FOR EXAMPLE:

OR

OR

OR



PAS: Initiates passive mode test

(Not to be used for impaired driving investigations)



RBL: Initiates roadblock mode test

(Outside scope of this course)



Allows operation in a special mode used for rapid sampling of subjects, as in a roadblock/check stop scenario

CodE: Displays software version



Allows the operator to view the software and firmware versions of the device

4.5 Confirming subject suitability

A test on a subject shall not be conducted until:

1. **15 minutes** after the time the officer believes alcohol has last been consumed
2. **5 minutes** after the time the officer believes anything has been taken by mouth
3. **5 minutes** after the time the officer believes anything has been smoked.

Mouth alcohol

Mouth alcohol is residual alcohol remaining in the mouth from the recent consumption of an alcoholic drink, regurgitation of stomach contents containing alcohol, from a burp, belch or vomit, or recent use of mouthwash or breath fresheners containing alcohol. The concentration of alcohol in beverage alcohol or breath fresheners is much higher than in the breath of a person who has consumed alcohol. All deep lung breath samples originate in a lower part of the lungs and pass through the mouth before entering the Alco-Sensor FST®.

When mouth alcohol is present, the raw alcohol, because of its high concentration, adds more alcohol to the breath sample and produces a false high result. Mouth alcohol disappears rapidly, usually in 15 minutes or less. Prior to administering the breath test, ensure 15 minutes has passed from the time of the last drink. This will minimize the possibility of a falsely high Alco-Sensor FST® result.

Objects in mouth

It is important that neither cold nor hot beverages are placed in the mouth immediately prior to the breath test. A breath test subject may place objects in the mouth (e.g. *candy, coins, matches, gum*) in an attempt to avoid the test or alter the test results. If the subject has placed anything in their mouth have the subject remove the object from their mouth and/or stop drinking. Wait at least five (5) minutes for the mouth temperature to stabilize before taking a breath sample. A person can also choke on these objects making them unsafe.

Tobacco

Under no circumstances should raw cigarette smoke be blown directly into the Alco-Sensor FST®, as it may shorten the life of the fuel cell sensor. Tobacco smoke will damage the sensor.

Vapes

Wait five (5) minutes, should be treated the same as anything else used by mouth.

“The recommended standard operating procedure for ASDs used by the Royal Canadian Mounted Police (R.C.M.P.) requires a 5-min wait time following the end of smoking prior to provision of a sample by a subject. This wait period is more than sufficient for any effects from the Ecigarette vapour containing alcohol to be eliminated, thus refuting any concerns of E-cigarette vapour falsely elevating an individual's existing BAC.”

Amy Eng Minh (2021) Effects of vaping E-juices with and without alcohol on the accuracy of the Alco-Sensor FST® approved screening device, Canadian Society of Forensic Science Journal, 54:2, 77-85, DOI: 10.1080/00085030.2021.1898774

To link to this article: <https://doi.org/10.1080/00085030.2021.1898774>

4.6 Operating the Alco-Sensor FST®

REMINDER: Be aware of officer and subject safety at all times.

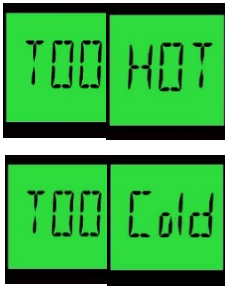
ASDs require a service check every year and a calibration check every 4 weeks (28 days). Operators should check both the service and calibration tags on the device before any intended use. If the current date is beyond the Service Expiry Date or the Calibration Expiry Date, you must not use the screening device. **Record the device serial number and expiry dates in your notebook.**

1. Install a clean, unused Alco-Sensor FST® mouthpiece from a sealed bag. This mouthpiece is specifically designed to be used with the Alco-Sensor FST®. Handle the mouthpiece (before and after breath test) in a sanitary manner.
2. Depress the Power ON button. A single beep will be heard and the display will show temperature and battery strength.



The Battery Strength Indicator and Temperature in °C (e.g. 27c) will be displayed momentarily after the device is powered ON. As well, a battery indicator will be displayed indicating the current condition of

the battery. If the device does not have sufficient battery power to perform a test either the device display will not power ON or **BAT** will be displayed and testing will be disabled.



The Alco-Sensor FST® is designed to operate when the device temperature (not the ambient temperature) is within a certain temperature range programmed into each device at the time of its annual servicing. The programmed acceptable temperature range is -5°C to 55°C. If the temperature is outside of the proper operating range programmed for the particular device, the device will indicate **TOO HOT** or **TOO Cold** before powering OFF. If you must perform a test with the device, place it in an environment that will bring it to within the operating temperature range.

3. Perform an air blank test



An air blank test (**BLINK**) is run automatically by the device to ensure that there is not alcohol present from a previous test.



The automatic blank test must result in a zero (**0**) reading before the device will advance to the next step in the testing protocol. After the zero (**0**) is displayed, the device will prompt the operator to **WAIT** for the next prompt.

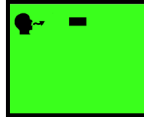


If the result of the blank test is not zero, a status message of **NULL/FAIL** will be generated. The test sequence will be aborted. Ensure that a new mouthpiece is used and that there is no ambient alcohol contamination. The result of the Blank Check must be "0" "WAIT" before the device will continue with the test sequence.

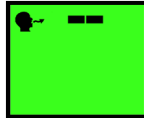
4. Breath Sampling:



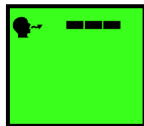
When ready for a sample of breath, the display shows the icon of a person's head flashing and **Blow**. A double beep will be heard when this appears on the display. Instruct the subject to take a normal breath in and then blow steadily through the mouthpiece until you tell them to stop.



“take a normal breath in, seal your lips around the mouthpiece, and blow continuously through the mouthpiece until I tell you to stop”.



Once the subject starts to blow with sufficient flow, the icon of the head will stop flashing and a dash will appear to the right of the head. Additional dashes will appear as the subject continues to provide a sample. A continuous tone will be heard as the subject is blowing.



Once three dashes appear a sample will be taken. It is not necessary for the subject to blow hard, but rather a steady and continuous sample is best for successful sample collection. The subject has up to three (3) minutes and/or three (3) attempts in which to provide a suitable sample once the **Blow** message is displayed.

In order for the device to accept a sample, the breath test subject must blow with a minimum flow rate, produce a minimum volume of breath, and blow over a minimum period of time. Once these criteria have been met by the breath test subject, the sample will be accepted and analyzed by the device.

If the subject stops blowing before the minimum sampling requirements are met, then no sample will be taken for analysis. This will be indicated by beep warnings and alternating messages on the display. In such a case, depending on the circumstances, the subject may be offered another attempt to provide an adequate sample. When **Blow** comes back on the display, you may proceed by telling the subject to blow again.

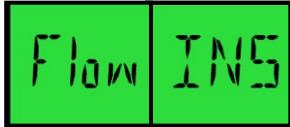
The following status messages may be displayed with inadequate samples of breath:



Flow LOW means the subject did not provide a constant breath flow above the minimum flow rate required.

The subject is given three attempts to provide an adequate sample before the test is aborted.

Solution: Instruct the subject to provide a continuous sample with a moderate rate of breath flow.



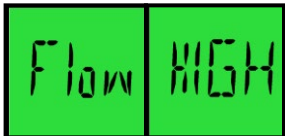
Flow INS indicates that the subject's breath flow rate is inconsistent.

Solution: Instruct the subject to provide a continuous sample with a moderate rate of breath flow.



Flow CUT tells the operator that the subject provided enough breath flow to capture a sample, but their breath flow was stopped too abruptly or there has been an attempt to suck back the breath as the sample is being taken for analysis.

Solution: Instruct the subject to provide a continuous sample with a moderate rate of breath flow.



Flow HIGH indicates that the subject's breath flow exceeded the maximum allowable flow rate.

Solution: Instruct the subject to provide a continuous sample with a moderate rate of breath flow.

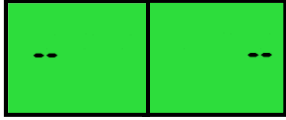
In each of these examples, the subject is allowed three (3) attempts to provide an adequate sample before the test is aborted with a **Blow Void** message on the display and the Alco-Sensor FST® turns itself off. This message will appear after the third failed attempts error message is shown. Instruct the subject to provide a continuous sample with a moderate rate of breath flow. If the subject is to be given the option to attempt another breath sample (after the three unsuccessful attempts), you should replace the mouthpiece with a new one. You will have to initiate a new testing sequence by turning on the Alco-Sensor FST®. Consider retaining the used mouthpiece for evidence.



Blow Void – Indicates that the subject has not met the minimum breath flow requirements after 3 attempts.

Refusals: If the officer forms the opinion that the subject is refusing to provide a suitable breath sample, retain the mouthpiece for evidence. The officer should make a visual inspection of the mouthpiece used by the subject. The officer should also provide a sample into the device to demonstrate that the device is capable of accepting a sample. The officer should make note that the mouthpieces used were free of obstruction and the device was working properly.

5. Analysis



As soon as a successful breath sample has been captured, the analyzing signal will appear. This signal is a display segment (--) scrolling horizontally across the center of the display. At the end of the analysis a result will be displayed for 15 seconds before the device auto-powers OFF. The backlight turns off after 5 seconds, but results display for 10 seconds after that.

6. Show the test result to the driver and record the result of the analysis as displayed on the Alco-Sensor FST® in addition to the time of the test in your notebook.



For results between 0 and 49, a digital result will be displayed for concentrations from 0 to 49 mg%. **In British Columbia, a digital result will be displayed for concentrations from 0 to 59 mg%.** In this example, the result is 41.



WARN will be displayed for concentrations from 50 to 99 mg%. **In British Columbia, a WARN result will be displayed for concentrations from 60 to 99 mg%.** The background colour will change to yellow.



FAIL will be displayed at 100 mg% or higher, and the background colour changes to red.

The result will be displayed for 15 seconds before the device will auto-power **OFF**.

7. Remove & Discard Mouthpiece

After taking the subject's alcohol reading you should remove and discard the mouthpiece. For your own hygiene, you may wish to place the wrapper over the blowing end before touching the used mouthpiece with your fingers. Discard the used mouthpiece properly.

8. Power OFF

Depress and release the **OFF** button. This is located below the display screen. The device will auto power down after 15 seconds after the result has been displayed. If a result is not obtained, the device will switch itself off automatically after displaying **Blow** for three (3) minutes.

5.0 Response to Subject Sample Results

Responses to subject sample results will depend on provincial legislation.

5.1 ASD Refusals

For unequivocal refusals, record in your notes the words of the subject indicating the refusal. If a driver is indecisive in a refusal and says something like; “yeah, I guess I won’t blow”, you should press for a clear refusal and a response like; “no, I will not blow”.

For equivocal refusals where a driver pretends to comply in providing a breath sample but does not blow long enough or hard enough to cause sample acceptance, you must document why you concluded the subject was refusing. You should record in your notes some of the details of the refusal such as how many times the driver attempted to blow, if the cheeks puffed out, if air blew around the mouthpiece, and the display messages for the device while the subject was blowing. It may be necessary to demonstrate to the subject how to provide a proper sample into the ASD and to ask if the instructions have been understood. You may have to explain to the subject several times and in different ways how to provide a proper sample.

If a driver demands to speak to a lawyer before blowing, do not declare a refusal until after you advise there is no right to a lawyer before the test, and non-compliance will result in a refusal charge. You should explain to the driver the jeopardy faced by failing or refusing to provide a suitable sample, such as “You may be charged with a criminal offence which carries the same penalties as an impaired driving conviction, and which may include losing your license for a year or more, and significant financial penalties and possible jail time”.

In refusal cases, it is a good practice to visually inspect the mouthpieces for obstructions after they have been used and to retain them as evidence.

After an equivocal refusal, insert a new mouthpiece into the ASD and provide a sample yourself to demonstrate the device is capable of accepting a breath sample. **Record this information in your notes and report it in the RCC or IRP.**

ASD refusals are to be handled via the IRP Refusal Process **or** the *Criminal Code* process, which will include issuing a 24hour prohibition (Section 215 BC *Motor Vehicle Act* (MVA)) and an Administrative Driving Prohibition (Section 94.1 MVA), and an Appearance Notice.

5.2 Fail Result

A **FAiL** result will give you reasonable grounds to make an evidentiary breath demand under section 320.28(1)(a)(i) of the *Criminal Code* and may be the primary grounds for the evidentiary demand. You should arrest or detain the driver, provide a Section 10 Charter notification, police caution and read the breath demand as soon as practicable,. **Record the times of the demand, charter, and police caution in your notes.**

In court, you will be asked what the **FAiL** result means and you should respond that it indicates the driver's blood alcohol concentration was 100 mg% or more and therefore the driver's ability to operate a motor vehicle was impaired by alcohol.

At this point you may decide to issue the driver an IRP under the BC *Motor Vehicle Act* (MVA) rather than proceed with the *Criminal Code* investigation. However, if you choose to issue an IRP you must inform the driver of the right to a second breath test on a different ASD and that the lower of the two results will prevail:

"I have reasonable grounds to believe: Based on the result of your approved screening device test that your ability to drive is affected by alcohol. I therefore direct you to surrender your driver's licence.

You are now prohibited from driving.

In accordance with the Motor Vehicle Act, I am informing you that you have the right to a second test by providing a second sample of breath into a different Approved Screening Device. You must request the second test forthwith and prior to the service of your Notice of Prohibition. By legislation the lower of the two test results will prevail.

Do you understand? Would you like to provide a second breath sample? "

If a second ASD is not available you will not be able to proceed with an IRP and should consider proceeding criminally, or issuing a 24 hour prohibition pursuant to Section 215 of the MVA.

Following the second ASD test (and provided it is a **WARN** or **FAiL**):

1. Seize the individual's driver's licence even if it is from another jurisdiction.
2. Complete the Notice of Prohibition (MV2723) and serve it on the driver.
3. Complete the Report to Superintendent (MV2724) and the IRP narrative together with other relevant information including civilian and police witness reports.
4. Ensure the Report to Superintendent is sworn.
5. Fax all forms including the Certificates of a Qualified ASD Calibrator (form ED6126) and Vehicle Impoundment documents (if applicable) to RoadSafetyBC before going off shift.

5.3 Warn Result

A **WARN** reading has no criminal consequence and does not contravene the *Criminal Code*. However, an officer must issue a 3, 7, or 30 day IRP under section 215.41 of the MVA if the driver is advised of the right to a second ASD test, and if a second ASD is available. If no second ASD is available an officer may issue a 24 hour driving prohibition under section 215 of the MVA.

5.4 ASD Readings of 51 – 59 mg%

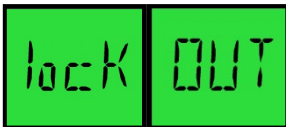
An IRP cannot be issued where the BAC is in the digital reading range of 59 mg% or less. However, a 24 hour prohibition pursuant to section 215 MVA may be issued where the BAC is in the range of 51 – 59 mg%. Complete MV2634 when issuing a 24 hour prohibition.

5.5 ASD Readings of 0 – 50 mg%

If a digital result in the range of 0 – 50 mg% is obtained and you have no other reason to believe the driver is affected by alcohol you should take no action. However, “L” or “N” drivers must have no alcohol in their bodies, and for readings of 5 - 50 mg% you may issue a 12 hour suspension under Section 90.3 MVA. Complete MV2906 when issuing a 12 hour suspension. A violation ticket for driving contrary to restrictions of licence may also be issued.

6.0 Troubleshoot Issues

The Alco-Sensor FST® has a number of other status messages that may be displayed.



The device has not had a successful accuracy check within the designated lock out number of days. No further testing can be performed until a successful accuracy check has been conducted by a Qualified Technician trained in the calibration of the Alco-Sensor FST®.

In accordance with the *Recommended Standards and Procedures* of the Alcohol Test Committee, the Alco-Sensor FST® must have an accuracy check performed every 31 days. If the ASD has not had an accuracy check performed within the past 28 days, it must not be used to conduct subject tests.



Device temperature **TOO Cold** for test type being performed.

Device temperature **TOO HOT** for test type being performed.



Insufficient power to conduct a subject test.

A two-part LCD display with a black background and green characters. The left part shows the word 'TIME' and the right part shows 'OUT'.

No sample has been provided within the 3-minute time interval.

A two-part LCD display with a black background and green characters. The left part shows 'Blow' and the right part shows 'Void'.

Indicates that the subject has not met the minimum breath flow requirements after 3 opportunities to provide a sample.

A two-part LCD display with a black background and green characters. The left part shows 'RFI' and the right part shows 'Void'.

The Alco-Sensor FST® has been designed to be immune to RFI. Device has detected possible Radio Frequency Interference (RFI) at the time of the test and aborted the test process. Transmission on portable radios, in-car radios and cellular telephones is not advisable while conducting a test. Solution: Do not transmit on radios while conducting a test on the ASD.

A two-part LCD display with a black background and green characters. The left part shows 'HIGH' and the right part shows 'BRAS'.

Fuel cell base line does not meet requirements.

A two-part LCD display with a black background and green characters. The left part shows 'Void' and the right part shows 'E31'.

The result of the sample analysis is higher than the device maximum reading.

A two-part LCD display with a black background and green characters. The left part shows 'Void' and the right part shows 'E29'.

VOID followed by E29 is displayed when the amount of alcohol sampled is too high for the device to process.

A two-part LCD display with a black background and green characters. The left part shows 'LOW' and the right part shows 'Volt'.

LOW Volt message indicates that there is a problem with the solenoid circuit voltage.

A two-part LCD display with a black background and green characters. The left part shows 'Void' and the right part shows 'E32'.

VOID followed by E32 is displayed when there is an internal malfunction.

7.0 ASD Policy and Precautions

Smoking: Do not allow the subject to blow smoke into the device. Wait 5 full minutes after smoking by the subject before taking a breath sample. The presence of smoke in a breath sample can damage the fuel cell.

Mouth Alcohol:

Alcohol present in the subject's mouth as a result of recent consumption of alcoholic beverages or belching/ burping/ vomiting can cause falsely high test results. If you have reason to believe alcohol has been consumed in the 15 minutes before you wish to perform an ASD test you must wait an appropriate time to ensure there are 15 full minutes before asking the subject to provide a sample of breath. You should explain to the driver the reason for the delay. If there is no reason to suspect mouth alcohol contamination you should take the breath sample forthwith.

Manual Button:

There is no Manual button for the Alco-Sensor FST®.

Radio Frequency Interference (RFI):

If radio frequency interference affects the device **RFI Void** will appear on the display and the test sequence will be aborted. If this happens, remove the source of the interference and start a new test sequence.

Alco-Sensor FST® Operating Temperature:

Each Alco-Sensor FST® is programmed with an acceptable operating temperature range of -5°C to 55°C. If the device temperature is not in the correct temperature range programmed for the device, it will provide a status message and abort the test sequence.

Materials in the Mouth:

It is important that neither cold nor hot beverages are placed in the mouth immediately prior to the breath test. A breath test subject may place objects in the mouth (e.g. candy, coins, matches, gum) in an attempt to avoid the test or alter the test results. If the subject has placed anything in their mouth have the subject remove the object from their mouth and/or stop drinking. Wait at least five (5) full minutes for the mouth temperature to stabilize before taking a breath sample. A person can also choke on these objects making them unsafe.

Alco-Sensor FST® Battery:

If the device battery voltage is too low to perform a test sequence, the display will show **BAT** and testing will be disabled, or the device will not turn on. Return the unit to a qualified ASD calibrator for battery replacement.

Service and Repair:

The Alco-Sensor FST® requires a yearly service check. For annual service and all repairs (other than battery replacement) ship the unit to the authorized service agency: DAVTECH Analytical Services Inc.

8.0 Additional Considerations

8.1 Alternative Reasons for Subject Impairment

When alcohol and various drugs are taken in combination, unexpected results may occur. Combination effects are often characterized by relatively low BAC and the presence of gross symptoms of impairment and intoxication. When alcohol-drug interaction impairment is suspected, medical assistance may be required. Alternatively, a Drug Recognition Evaluator (DRE) may be consulted. Further investigation may be required.

In addition, a medical crisis may mimic impairment due to alcohol and/or drugs.

8.2 Articulation

Be prepared to articulate discrepancies between the Alco-Sensor FST® and evidentiary test. There may be occasions when the Alco-Sensor FST® result does not correspond with the results from the subsequent evidentiary test. For example, a **FAIL** result was obtained on the Alco-Sensor FST® but the subsequent evidentiary result was less than 100mg%. These discrepancies may be due to:

1. Time delay between Alco-Sensor FST® test and evidentiary test

The result obtained on the ASD may differ from the result obtained on an Approved Instrument as a result of the time delay between the tests. As time passes, the breath test subject will be eliminating alcohol, resulting in a lower blood alcohol concentration at the time of the later breath tests.

2. Presence of mouth alcohol

If mouth alcohol is present, and a 15 minute time period is not implemented prior to testing on the ASD, a false high result may be obtained on the ASD, followed by a lower result on the approved instrument. This can be avoided by ensuring that a 15 minute wait period occurs when recent consumption of alcohol is suspected.

3. Margin of acceptability of breath test equipment.

All scientific instrumentation has what is referred to as 'a margin of acceptability', meaning that the instrument is not 100% accurate, 100% of the time. With respect to breath testing instrumentation, the margin of acceptability is +/-10 mg%. This means that a result may read 10 mg% higher – or 10 mg% lower – than the actual blood alcohol concentration. This applies to both the ASD and the Approved Instrument.

As always, take thorough notes.

8.3 Bias-Free Policing

When exercising the authorities granted by Section 320.27(2) of the *Criminal Code* as they pertain to Mandatory Alcohol Screening, it is expected that claims of bias will arise. It is important to ensure that this authority is being utilized responsibly. Thorough note-taking of what transpired before the breath demand is vital.