



**Tennessee Bureau of Investigation
Forensic Services Division**

**INTOXIMETER
ALCO-SENSOR V XL
OPERATOR'S MANUAL**

Effective December 1, 2012

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TENNESSEE BUREAU OF INVESTIGATION
FORENSIC SERVICES DIVISION
BREATH ALCOHOL PROGRAM

Tennessee Code Annotated (TCA), Section 38-6-103 (g) requires the Tennessee Bureau of Investigation (TBI) through its Forensic Services Division to “...establish, authorize, approve, and certify techniques, methods, procedures, and instruments for the scientific examination and analysis of evidence...and to teach and certify qualifying personnel in the operation of such instruments to meet the requirements of the law for the admissibility of evidence.”

The TBI Breath Alcohol section is comprised of 3 Special Agent Forensic Scientists and 1 Special Agent Forensic Scientist Supervisor that maintain this requirement statewide. They are responsible for of the certification of evidentiary breath testing instruments and operator training for law enforcement personnel in the State of Tennessee.

All breath tests are performed in accordance with the standards and operating procedures promulgated by the forensic services division of the Tennessee Bureau of Investigation. Only personnel from a law enforcement agency shall be trained and certified as breath test operators.

To contact TBI Breath Alcohol Personnel:

Tennessee Bureau of Investigation
Forensic Services Division
901 R.S. Gass Blvd.
Nashville, TN 37216

Phone: (615) 744-4000
Fax: (615) 744-4421
Website: www.tbi.tn.gov

- | | |
|-----------|--|
| F1 | Allows you to select the bottom left screen option on the instrument. |
| F2 | Allows you to select the bottom right screen option on the instrument. |
| F6 | An abort key while the instrument is in the docking station. |
| T | Restart the 20 minute observation countdown timer. |
| R | Indicate the subject as having refused the test, i.e. refusal. |
-
- | | |
|-------------------------|--|
| C. Mouthpiece Reservoir | A storage container for extra mouthpieces. |
| D. 2D Barcode Reader | Scans the operator's card and driver's licenses. An operator card must be used to perform a test. |
| E. Alco Sensor V XL | The cordless, hand held instrument takes 4 "AA" batteries. |
| F. Cradle | Used to store and connect the ASVXL. When the instrument is in place the operator will be allowed to print and type on the keyboard. |

Alco- Sensor V XL Views

Left View

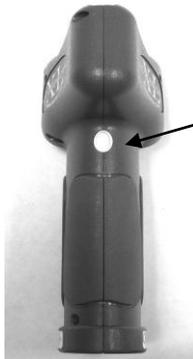


Right View



Indicator lights

Front View



Trigger Button

Rear View

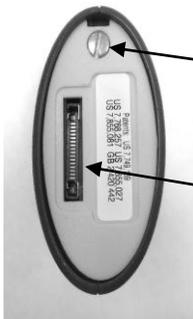


Display

Left scroll button

Right scroll button

Underneath View



Access screw

Communication Port

Top View



Indicator Light

Flow inlet

OPERATION OF AN EVIDENTIAL TEST

The subject will be required to provide 2 breath samples in one test sequence in order for the test to be completed. The following is an outline of steps taken by an operator to achieve a successful evidential test. For the purpose of this section, the bold print will represent the instrument display.

You must press the RETURN key or the trigger button on the ASV XL to power it on. Once the instrument is on, the display will come on, you will hear and audible beep. The green light on the printer will also illuminate. The information on the display will include: date, time, instrument temperature, instrument name, and serial number.

Press F1 or the left scroll button to Start Evidential Test.

You must have an Operator's Card to perform a test.

Operator Card, Init, Place in Cradle Operator Card Swipe, Please Swipe Card...

You will hear multiple audible tones. The 2D barcode reader has 2 lights, a ready light (green) and a scan light (red). When the green light is on, the barcode reader is ready to scan an operator card.

To scan the operator card, take the card (with the barcode facing forward) and insert it into the barcode reader. After the scan is completed, you will hear an audible tone. If the scan is successful, you will be prompted to enter the four digit PIN found on the card. Press the "RETURN" key.

All data pertaining to that operator will appear on the screen.

Driver's License, Initialize, Place in Cradle Driver's License, Swipe, Please Swipe Card...

F1 or left scroll button will "SKIP" the Driver's License swipe and require you to type the information listed on the Driver's License.

F2 or right scroll button will "QUIT" the Evidential Test.

Subject First Name: Up to 20 characters can be typed. This is a required field.
If using the barcode reader, this data will be entered for you.

Subject Middle Initial:	1 character <i>If using the barcode reader, this data will be entered for you.</i>
Subject Last Name:	Up to 20 characters can be typed. This is a required field. <i>If using the barcode reader, this data will be entered for you.</i>
Subject Sex:	The instrument defaults to MALE. You can use the function keys or scroll buttons to select FEMALE. <i>If using the barcode reader, this data will be entered for you.</i>
Subject D.O.B.:	Has to be entered in this format, MM/DD/YYYY. The instrument will calculate the date of birth. If a D.O.B is not known, you must enter 00/00/0000 . <i>If using the barcode reader, this data will be entered for you.</i>
Subject D.L.N:	Type up to 20 characters/ numerals. <i>If using the barcode reader, this data will be entered for you.</i>
D/L State of Issue:	Abbreviation code for the state. <i>If using the barcode reader, this data will be entered for you.</i>
Subject race:	The instrument defaults to Caucasian. You can use the function or scroll keys to select the option of: Caucasian, African American, Hispanic, Asian, and Other. <i>If using the barcode reader, this data will be entered for you.</i>
County of Arrest:	Full name of county where the test is being performed.
Time of Arrest:	24 hour time
Accident?:	The instruments defaults to “No”. You can use the function or scroll keys to select “Yes”.

Fatality?: The instruments defaults to “No”. You can use the function or scroll keys to select “Yes”.

Verify Data Entry?: The instruments defaults to “No”. You can use the function or scroll keys to select “Yes”.

This concludes the data entry portion of the test. Once you press the return key, the observation time will begin.

**Observation Period...
20:00**

The observation time starts from 20:00 and counts down to zero. There is an audible beep at 3 minutes, 2 minutes, 1 minute, and zero. During this time, the operator is to observe the subject and ensure that the subject has no foreign matter in his/ her mouth and/ or has not regurgitated. The operator will have the option, by using the scroll or function keys, to select a “Refusal” or “Reset” the timer.

Remove Cradle From Unit!

Install New Mouthpiece! The operator is to put a NEW mouthpiece on the ASV XL

Blank Check Ambient air will be drawn into the sample chamber and tested to insure that the instrument is clean and free of contamination.

Analyzing Sample...

.000 g/210L The results of the blank check will be displayed.

Please Blow The subject will have 3 minutes to provide a sample. When the subject is blowing, red lights on both sides of the instrument and on top will flash.

Analyzing Sample... Remove Used Mouthpiece

Subject X.XXX g/210 L The result of the first sample will be displayed. It takes 2 samples within 0.020 g/210 L of each other to complete the test.

**Please Wait
2:00** Countdown between 1st and 2nd sample is a maximum of 2 minutes.

Install New Mouthpiece! Place a new mouthpiece on the instrument for the 2nd sample.

Blank Check Ambient air will be drawn into the sample chamber and tested to insure that the instrument is clean and free of contamination.

Please Blow The subject will have 3 minutes to provide a sample. When the subject is blowing, red lights on both sides of the instrument and on top will flash.

Analyzing Sample... **Remove Used Mouthpiece**

Subject X.XXX g/210L The result of the second sample will be displayed. It takes 2 samples that agree within 0.020 g/210L.

**Final Result:
X.XXX g/210L** This final result is the lower of the 2 samples.

If the difference between the first sample and second sample is greater than 0.020 g/210L, the instrument will prompt the operator to obtain a 3rd and final sample.

A new mouthpiece will be placed on the breath tube.

Two of the 3 samples must agree within 0.020 g/210L and the lowest of the 2 samples will be displayed as the final result.

**Print?
Place in Cradle...** If you select yes, the printer will turn on and print 3 test copies. If you select no, the instrument will power down.

OPERATOR INSTRUMENT MESSAGES & BASIC TROUBLESHOOTING

High Blank - Test Aborted

The instrument is unable to detect 0.000 g/210 L during its blank check. The instrument will attempt 3 times before it will display this message.

To Avoid a **High Blank**:

Keep subject's mouth away from breath tube during purge/ blank sequence.

Make sure there is no alcohol odor in the air or near the instrument. i.e. Lysol had just been sprayed or open containers of alcohol are present.

The ventilation in the room is not good. Open the door. Allow fresh air into the room.

Insufficient Sample - Test Aborted

The subject was unable to meet the minimum requirements for a proper breath sample. The subject will be allowed 3 attempts before the test aborts.

*The operator should change the mouthpiece after every **Insufficient Sample** message.*

To Avoid an **Insufficient Sample**:

Ensure the subject is capable of providing a sample by asking health related questions.

Ensure the subject's posture is upright when providing a sample.

High Flow

The subject was blowing too hard into the mouthpiece.

Suck Back

Subject sucked back while providing a sample.

Insufficient Flow

Subject did not meet minimum volume requirement.

Low Flow

Subject did not meet minimum flow rate requirement.

Breath Timeout - No Sample Provided

When the display reads "Please Blow", the subject has 3 minutes to provide a sample.

NO .02 AGREEMENT

Two test samples failed to agree within .020 g/210L. The operator must retest the subject.

Accuracy Check Required - Subject Test Disabled

The instrument is equipped with a warn/disable system to ensure that subject testing will be disabled if a successful accuracy check is not performed within 90 days.

After 85 days, a warning will be displayed to notify the operator an accuracy check will be required soon.

Subject Test Disabled - Test Database Full

The instrument can hold up to 700 tests inside its database. When this database is full, this message will appear on the display.

When this message is displayed, you must contact TBI.

CHANGING THE INSTRUMENT BATTERY

The Alco- Sensor V XL is equipped with 4 AA batteries that can be changed when they have expired. Access the batteries by turning the screw at the base of the instrument as shown in figure 3.

Once the compartment is open, the battery compartment will slide out. Replace the batteries. The battery compartment will slide back in with the yellow plastic piece should entering the instrument first. The high part of the yellow piece should face the trigger button side of the AS V XL.



Figure 3. Base photo of the AS V XL.



Figure 4. A photo of the AS V XL and battery compartment.

PRINTER TROUBLESHOOTING



Figure 5. A photo of the thermal printer of the Alco-Sensor V XL.

Paper Advance	Advances the paper
On/ Off Button	Will turn the printer on when needed.
Paper Door Release Button	The button will open the door to access the paper.
Battery Light	Orange light. When the battery charger is connected, the light will be on.
Error Light	Red light. If on, printer is not ready.
Power Light	Green light. Will be on if the printer has established connection when called upon.

The printer paper is supplied by TBI.

CHANGING THE PAPER

Once the paper reaches the end of the roll, a blue line in the paper will be visible.

The operator will open the paper door by pressing the paper door release button.



**GRASP HERE
TO REMOVE
SPOOL**

Figure 6. An open printer of Alco- Sensor V XL.

Once opened, grasp the paper, and remove it from the printer.



**CHARGING
PORT FOR
PRINTER**

Figure 7. A side photo of the AS V XL.

Replace the old spool of paper with a new spool.

Make sure that the edge of the new paper roll is closest to the front of the printer. If it is in backwards, or the edge of the paper is not out of the printer, the printer will not print.

Slide the paper back in the instrument and close the lid making sure that part of the paper is out of the printer (see Figure 7)

CHARGING THE PRINTER

The AS V XL is equipped with a rechargeable battery inside its printer. The connection is located as seen in Figure 7.

SCIENTIFIC PRINCIPLES
THE USE OF BREATH AS A SAMPLE

Law enforcement personnel that have been trained by individuals in the TBI Breath Alcohol section are certified to operate specific evidentiary breath alcohol instrumentation. They are not expected to master the scientific material of this manual. This manual contains more in-depth material for those who wish to gain more knowledge than required for operation of the instrument.

Measuring blood alcohol concentration by means of breath sampling has been around since the 1940's. In fact, studies were done as early as 1910 with the discovery of using breath as means to determine alcohol in the blood. The use of breath as a sample has been proven through years and many studies to be accurate and reliable.

Breath alcohol analysis follows the scientific principle of Henry's Law which states that "The weight of any gas that dissolves in a definite volume of liquid is directly proportional to the vapor pressure that the gas exerts above the liquid." This law governs the interaction between a gas and a liquid. Alcohol is a liquid in the blood stream, and a vapor in the lungs. When exhaled, alcohol will be exhaled in a small but measurable amount. The amount of alcohol exhaled will be approximately 1/2100th of the amount of alcohol in the blood stream. This breath to blood ratio is achievable due to Henry's Law.

This 2100 to 1 ratio means that there is the same amount of alcohol for 1 part blood as there is to 2100 parts deep lung air. This ratio is currently used by every breath alcohol instrument in the United States.

OPERATING PRINCIPLES OF THE ALCO- SENSOR V XL

The Alco- Sensor V XL uses an electrochemical cell to achieve an alcohol concentration. The electrochemical cell (EC), or fuel cell, is responsible for measuring the alcohol.

Electrochemical Cell (EC)

This is more commonly known as a fuel cell. The fuel cell is responsible for measuring the amount of alcohol in a sample. The fuel cell consists of a porous, chemically inert disk that is coated on both sides with finely divided platinum. An acidic solution is applied to the disk and electrical connections applied to the surface. The fuel cell is encased in a sampling system that allows about 1 cubic centimeter (CC) of air inside the chamber.

When alcohol is introduced into the sample chamber via breath, an electrochemical reaction occurs. When this reaction takes place, an electrical charge is produced. This charge is directly related to the amount of alcohol that is produced on the fuel cell. When the two surfaces of the fuel cell are connected electrically, a current flows through this circuit to neutralize the charge. This current can be measured, and with signal processing, a breath alcohol concentration can be determined.

One advantage of the fuel cell is that it is specific for alcohol. Interfering substances are not triggered by the fuel cell.

LEGAL PRINCIPLES
State v. Sensing

The case of State v. Sensing began as a traffic stop which occurred in Dickson County, TN in 1988.

As a result of this case, preset requirements must be met in order for breath test results to be admitted into court without expert witness testimony. The requirements are as follows:

- 1) That the tests were performed in accordance with the standards and operating procedures promulgated by the forensic services division of the Tennessee Bureau of Investigation.
- 2) That the operator was certified in accordance with those standards.
- 3) That the evidentiary breath-testing instrument used was certified by the forensic services division was tested regularly for accuracy and was working properly when the breath test was performed.
- 4) That the motorist was observed for the requisite twenty (20) minutes prior to the test, and during this period, he did not have any foreign matter in his mouth, consume any alcoholic beverage, smoke, or regurgitate.
- 5) Evidence that the operator followed the prescribed operational procedure.
- 6) Identify the printout record offered in evidence as the result of the test given to the person tested.

Certified operators are just that, operators. Certified operators are not required to know the theory of breath alcohol testing or principles of breath alcohol analysis.