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Repaired components are warranted for a period of 90 days from the billing

ALCO-SENSOR IV

date of the repair. The warranty on repaired components are subject to the same limitations as this warranty. Components not repaired or replaced do not receive an extended 90-day warranty.

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SECTION I INTRODUCTION

About This Manual

This manual covers the operating information and procedures for the Alco-Sensor IV. The Alco-Sensor IV is available with a variety of software protocols. The internal program of the unit is noted by the color of the dot on the face-plate of the Alco-Sensor IV and the part number displayed on the back of most Alco-Sensor IVs. If the colored dot on the faceplate and/or the software version (encoded in the part number located on the back-plate of the Alco-Sensor IV) does not match the information printed on the cover of this manual contact Intoximeters to receive the appropriate manual.

General Information

The Alco-Sensor IV is a hand-held breath alcohol testing device designed to read blood/breath alcohol concentrations. A disposable mouthpiece, a 9-volt alkaline battery, and a calibration standard are the only items necessary to keep the Alco-Sensor IV operational. The plug-in 9-volt alkaline battery should run at least 500 tests. Other types of batteries may not provide as many tests as an alkaline battery.

Under normal operating conditions, the Alco-Sensor IV should provide thousands of accurate tests with little more than routine maintenance checks.

Unpacking and Inspection

- Carefully open the packing carton and remove contents.
- Refer to the packing list in the box to ensure all items are accounted for.
- Inspect for any sign of shipping damage.

DO NOT DISCARD CARTON OR PACKING MATERIALS UNTIL YOU ARE SURE THAT ALL PARTS OF SHIPMENT ARE DAMAGE-FREE AND IN WORKING ORDER. IN THE EVENT OF DAMAGE CONTACT THE CARRIER AND INTOXIMETERS IMMEDIATELY.

Safety Tips and Warnings

Familiarize yourself with the operating instructions for the Alco-Sensor IV by reviewing this manual. Be sure you understand how to perform all procedures properly before operating the Alco-Sensor IV.

Demonstration of a Non-Zero Reading

When simulating a non-zero reading on the Alco-Sensor IV **DO NOT USE** mouthwash or breath sprays. These substances contain chemicals/ substances which may shorten the life of the fuel cell. Use any commercial spirit, beer or wine to simulate a non-zero result. To avoid introducing exceedingly heavy concentrations of alcohol into the instrument wait at least one minute after rinsing your mouth with an alcoholic solution before submitting a sample.

Smoke

Under no circumstances should raw cigarette smoke be blown directly into the Alco-Sensor IV; it may shorten the life of the fuel cell.

Proper Environmental Conditions

When operating or storing the Alco-Sensor IV avoid environments with heavy alcohol vapor, cigarette smoke, high levels of radio interference, or magnetic fields. The Alco-Sensor IV is designed so that none of these environmental conditions will affect the results of a test, however, prolonged exposure of the Alco-Sensor IV to these types of environmental factors may shorten the life of various components. The Alco-Sensor IV is designed for all-weather operation, however the instrument itself must be within the proper temperature range to initiate a test sequence.

Storage

It is advantageous if the Alco-Sensor IV is stored with the SET button depressed. This will help protect the fuel cell from environmental contaminants. Storage in cold or moderately hot environments will not harm the Alco-Sensor IV. For prolonged storage avoid extremely humid or arid environments. Storing an instrument in extreme environments may result in increased time for the instrument to adjust to proper operating conditions.

Recommended Storage Conditions

Temperature: -15°C to 40°C (3° F to 104° F)
Humidity: 10% to 95% relative humidity – non-condensing
Pressure: 600 to 1300 hPa

SECTION II OPERATING PRINCIPLES

Alcohol and the Human Body

Alcohol's Properties

Alcohol is a general term denoting a family of organic compounds with common properties. Members of this family include ethanol, methanol, isopropanol. This introduction discusses the physical, chemical and physiological aspects of these alcohols.

Alcohol is a clear, volatile liquid that burns (oxidizes) easily. It has very little characteristic odor and is soluble in water. Alcohol is an organic chemical composed of carbon, oxygen, and hydrogen; its chemical formula is C_2H_5OH . When ingested, alcohol passes from the stomach into the small intestine, where it is absorbed into the blood. Alcohol is a depressant and deadens nerve endings. In small concentrations, alcohol can impair the brain's delicate systems. As blood alcohol concentrations increase, a person's response to stimuli becomes less precise, speech becomes slurred, and motor skills are adversely effected. Very high concentrations (greater than 0.4 grams/210 liters of breath or 0.4 grams/100 milliliters of blood) can result in a coma or death.

Rate of Consumption

Blood alcohol concentration depends on the amount of alcohol consumed, the rate at which it was consumed, body size, and the rate at which the user's body metabolizes alcohol. Although the *average* person metabolizes alcohol at the rate of approximately one and a half ounces per hour, metabolic rates vary from person to person. Body size is also variable; an individual who weighs 300 pounds likely has possibly twice the body fluid as compared to a person who weighs 100 pounds. If the same amount of alcohol is consumed by two people of very different size, the person with more body fluid will have a lower alcohol concentration. It is worth noting that the smaller person's blood alcohol concentration will drop more quickly than a larger person as both the smaller and larger person will metabolize approximately one and a half ounces of alcohol per hour.

Absorption

Once the alcohol reaches the upper intestine it passes into the bloodstream rapidly. Alcohol is then absorbed into all body tissues. Because of its affinity to water, alcohol can be found in blood, urine, saliva and any other body tissue that contains water.

Accumulation

The liver oxidizes alcohol: this oxidation creates body energy. The body metabolizes (converts to energy) alcohol at a rate of approximately one and a half ounces per hour. Because the body metabolizes alcohol at a fixed rate, ingesting alcohol at a rate higher than one and a half ounces per hour results in a cumulative effect - increasing blood alcohol concentration.

Tolerance

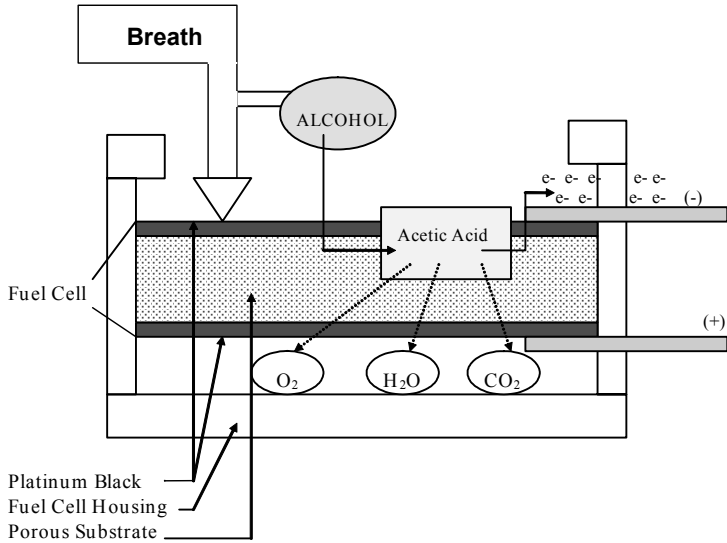
Acquired Tolerance is a person's ability to mask the impairing affects of alcohol; it can be learned experientially. Body Tolerance is related to physical factors, (i.e. body size, food in the stomach). Both types of tolerance affect how an individual will respond to a given amount of alcohol.

Theory And Design Of The Alco-Sensor IV

The Alco-Sensor IV contains a fuel cell sensor and an electrically operated piston sampling pump. The fuel cell is a porous disk coated with a thin layer of platinum black on both faces and saturated with an electrolyte. The cell is supported at its outer edge in the fuel cell case. While a subject is blowing and when deep lung breath is reached the piston sampling pump is activated. A small, fixed volume of deep lung breath is drawn onto the upper surface of the cell, any alcohol is subsequently converted to acetic acid and electrons are released. A signal is generated on the fuel cell as a result of the oxidation of any alcohol from the breath sample. The resulting electric current is translated into a Breath or Blood concentration of alcohol and digitally displayed on the Alco-Sensor IV.

If there is no alcohol present in the breath sample, no oxidation will occur. Because no electrons will be released, no current will be generated and the result displayed will be a zero reading.

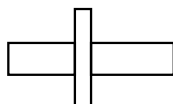
Fuel Cell Diagram



The Alco-Sensor IV fuel cell responds to alcohol in the human breath. It will not respond to acetone which may be found in the breath of a diabetic, dieter or highly exercised individual. In fact, it has no significant cross sensitivity to any known substance that might be found in a living human subject after a 15-minute deprivation period.

SECTION III COMPONENTS AND FUNCTIONS

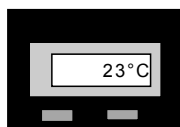
Instrument Operating Components



Mouthpiece

The mouthpiece contains a plastic check valve which permits only one way air flow.

Note: Use only mouthpieces manufactured or approved by Intoximeters. The design of the mouthpiece can affect the readings which the Alco-Sensor IV provides. Using other mouthpieces may cause damage to the instrument and/or influence the accuracy of test results.



RECALL MANUAL

Display

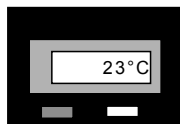
The display turns on when a mouthpiece is inserted properly. Various commands and symbols appear on the display to direct the operator through the testing protocol and to alert the operator of improper testing conditions detected by the system. (see also: Appendix A Display Messages, page 33)



SET

Set Button

The set button cocks the sampling pump when depressed. It is best that the internal pump be cocked when the Alco-Sensor IV is not in use. In this position the chance of contaminants entering the fuel cell chamber is eliminated.



RECALL MANUAL

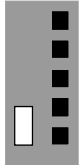
Manual Button

The MANUAL button is located below the display on the front panel of the Alco-Sensor IV; its primary function is to allow an operator to take a sample manually. (see also: Manual Sampling, page 16)



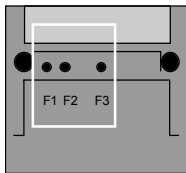
Recall Button

The RECALL button is located below the display on the front panel to the left of the MANUAL button. Its primary function is to re-display the current test result. Once the mouthpiece is removed the result of the previous test cannot be recalled. (see also: Test Recall, page 16)



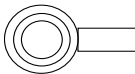
Mouthpiece Release Button

When depressed, the red mouthpiece release (release) button on the right hand side of the instrument releases the mouthpiece from the mount and ejects it from the chamber. The mouthpiece should never be pulled from the mount without depressing the RELEASE button.



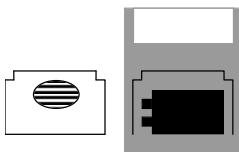
Function Switches (F1, F2, F3)

The function switches (F1, F2, F3) are located under the battery cover on the panel at the top of the battery compartment.



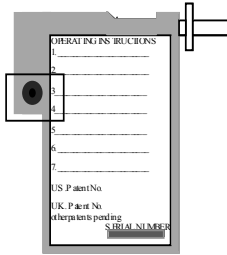
Function Switch Key

The Function Switch Key is located in the case under the Alco-Sensor IV. It is used to press the function switches.



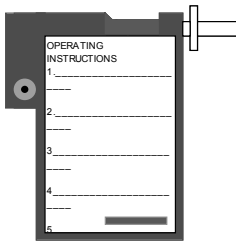
Battery

The battery cover opens when the serrated area, located on the front of the Alco-Sensor IV, is depressed and the door is pushed towards the bottom of the case. A heavy duty 9-volt alkaline battery should run in excess of 500 tests. Only 9 volt alkaline batteries should be used in the Alco-Sensor IV.



Air Flow Exit Port

This port is located on the back of the Alco-Sensor IV. It is surrounded by a ring of plastic ridges. The function of this opening is to allow the expired breath to pass unimpeded, out of the instrument. During operation, position the instrument so that the expired breath is directed away from the operator, also avoid blocking this passage with your hand at any time during operation.



Back Plate

On the back plate of the Alco-Sensor IV are step-by-step directions providing a general explanation of how to run a test. These steps only refer to the operating procedures of the instrument. The operator should be thoroughly familiar with the protocols under which s/he is performing the test.



bottom view

Cable Connector Port

Located at the bottom of the Alco-Sensor IV; it is used when connecting the instrument to a printer or a computer with a compatible cable.

SECTION IV CONDUCTING A SUBJECT TEST

Initial Preparation

Operator Training

The results from a properly calibrated Alco-Sensor IV are no better than the quality of the sample collected. A deep lung sample is essential to produce an accurate breath/blood alcohol reading. The Alco-Sensor IV sampling system is designed to ensure that a deep lung sample is collected for analysis. Even though the Alco-Sensor IV is highly automated it cannot control all of the parameters surrounding the testing process. For this reason, operator training is recommended on instrument operation, maintenance, and testing procedure.

Video training media for certain software versions of the Alco-Sensor IV are available for self taught training or if required or desired training programs are available through Intoximeters.

Often there are locally available classes through state organizations which train personnel to use the Alco-Sensor IV. Suggested organizations to contact are: Health Departments, State Police, Municipal Police Academies, Junior Colleges, or your local Intoximeters Representative. For further information on training sessions and the availability of video tapes contact the Intoximeters Training Department.

Preconditions for Conducting a Test

Temperature Requirements

The Alco-Sensor IV is generally set up to operate at instrument temperatures of 10°C to 40°C (50°F to 104°F). Customized software is available from Intoximeters that will allow the Alco-Sensor IV to operate in a broader or narrower temperature range. When the unit is in its operating temperature range it will function properly in climates where ambient temperatures are in the range of -15°C to 40°C (3°F to 104°F).

Calibration Requirements

The accuracy of a subject test result is dependent upon a properly calibrated instrument. To determine the accuracy of an instrument an accuracy check is run periodically. An accuracy check is performed by introducing, to the Alco-Sensor IV, a sample which contains a known quantity of alcohol (what is referred to in this manual as a Standard). The reading provided by the instrument must be within

ALCO-SENSOR IV

the established tolerances if the instrument is to be considered properly calibrated or accurate. Because different testing programs have different requirements for the instrument, the definition of accuracy is dictated by the tolerances established in the protocols of a specific testing program. Know the established tolerances of your program before conducting an accuracy check.

Your unit was calibrated at the factory before shipment. However, before using your instrument for subject testing you should perform an accuracy check to ensure that the unit is calibrated. Be sure to record the accuracy check test results in a calibration logbook. (see *also*: Inspection and Routine Maintenance, *page 22*)

Preparing the Instrument for a Subject Test

Mouthpiece and Powering Up the Alco-Sensor IV

To avoid damaging the Alco-Sensor IV, the operator should be familiar with the correct procedure for inserting and removing the mouthpiece.

The mouthpiece has a long end, which fits snugly and easily into the unit. When properly inserted, the mouthpiece turns the display on.

To initiate a test sequence always use a new mouthpiece. Insert the long end of the mouthpiece into the mouthpiece port. As it is slipped into place, some resistance is felt, as the end of the mouthpiece enters a resilient seal additional resistance will be felt. Be sure that the mouthpiece is solidly "home".

To remove the mouthpiece, press the red mouthpiece RELEASE button on the right front side of the unit. If the mouthpiece does not eject, keep the release button depressed and gently push it out by placing pressure on the back side of the mouthpiece flange. **Under no conditions** should the mouthpiece be pulled out without the RELEASE button depressed. The cam or mouthpiece mount is designed to resist accidental pull-out. Pulling the mouthpiece out without disengaging it can break the eject mechanism.

Practice proper technique for insertion and removal of the mouthpiece several times before attempting to operate the unit.

Note: *Do not eject the mouthpiece while the instrument is analyzing a sample (i.e. while the unit display shows >/<). The unit will show this display while it is analyzing a Blank Test Sample, an Accuracy Check Sample or a Calibration Sample. After the instrument completes the analysis of a sample and the result is displayed the mouthpiece may be ejected.*

Preparing the Subject for a Test

Before initiating a test, explain to the subject what you want him or her to do. *Example:* "When I tell you I want you to take a deep breath hold it for a moment then blow through this mouthpiece until I tell you to stop." Clear and simple instruction will help the subject give you a good sample.

Screening Test Procedure

Observing a fifteen-minute deprivation period prior to testing, where no substance is introduced into the mouth, will ensure the elimination of mouth alcohol.

Evidential Test Procedure

When using the Alco-Sensor IV to administer an evidential test without a preliminary test, the subject must be kept under observation for a period of time dictated by the agency's testing protocol, usually 15 to 20 minutes prior to testing. This ensures complete dissipation of any residual alcohol that may have been in the subject's oral or nasal cavity. Evidential test protocols that utilize multiple tests will usually require a deprivation period between tests and also require that the test results be within a certain tolerance of one another.

Performing a Test - Step by Step

INSERT
MOUTHPIECE.

THIS WILL TURN THE UNIT ON.

NOTE PRE-
TEST
INFORMATION

Temperature in °C will be displayed after the mouthpiece as been properly inserted. The standard Alco-Sensor IV is designed to operate when the unit temperature is between 10°C and 40°C. The Alco-Sensor IV will display **TEMP<** or **TEMP>** and will not allow a test if the unit is out of the proper operating temperature range. If the temperature is outside of the proper operating range, take appropriate corrective action by removing the mouthpiece and placing the instrument in an environment that will bring it to proper operating temperature.

If unit displays
SET depress set
button.

At any time during a test sequence when **SET** appears depress the **SET** button to re-cock the sampling valve. (Depending upon whether the **SET** button was pressed at the end of the last test sequence or not will determine whether **SET** will display at this time). The test will not proceed until this is accomplished.

If the **SET** button has been depressed the processor will monitor the system is stable and free of alcohol. If this function takes more than a few seconds, a **WAIT** message followed by a “analyzing” display consisting of alternating **</>** characters appears until the fuel cell output has completely returned to baseline. If **WAIT** persists for more than 1 minute, remove the mouthpiece, wait a few moments and start the test again from Step 1.

BLNK flashes on
display.

When unit displays **BLNK**, the unit runs a blank test automatically and then displays the result of the test. The **</>** displays while the check is being run. If the fuel cell is alcohol free, a zero result appears on the display, if not the test sequence will **VOID**.

zero result
shows on
display.

If display shows
SET

Depress the **SET** button to cock the sampling pump; the unit is ready for a breath sample.

CONDUCTING A SUBJECT TEST

Display shows
**TEST -
COLLECT A
BREATH
SAMPLE.**

At the beginning of this step, </> is displayed while the instrument's processor monitors the breath flow sensor for stability. When the display shows **TEST**, instruct the subject to take a deep breath, hold it and then blow steadily through the mouthpiece for as long as he or she can. A + appears to indicate that the instrument senses breath flow. If ++ does not appear, stop the subject and instruct him or her to blow with more force. When the subject has blown a minimum volume of breath, a ++ appears. The sample will be taken **only** if this condition has been met **and** when the flow diminishes, indicating that the end of the exhalation is approaching. It is not necessary for the subject to blow hard but rather steadily or continuously.

**OBSERVE
AND RECORD
3 DIGIT
READING.**

As soon as a successful breath sample has been taken, the busy signal </> is displayed to indicate the Alco-Sensor IV is analyzing the breath sample. A sample with no alcohol will result in a zero reading almost instantaneously. In a breath sample containing alcohol, a three-digit display appears in 10 - 40 seconds depending upon the amount of alcohol in the sample and the temperature of the fuel cell. The final result is displayed in three digits and is accompanied by a three-second beep.

(Note: Some units are programmed to initially display a 2-digit reading; this is an approximation of the final reading. The final result is displayed in three digits and is accompanied by a three second beep).

**DEPRESS SET
BUTTON.**

Unless you need to recall the test result, depress the SET button and eject the mouthpiece. To recall the test result after the SET button has been pressed, depress the RECALL button. Depressing the RECALL button will display the 3 digit result of the test just completed. The result may be retrieved anytime after the SET button has been depressed and **before the mouthpiece is ejected.**

**REMOVE THE
MOUTHPIECE.**

Depress the RELEASE button to eject the mouthpiece.

NOTE: *The Alco-Sensor IV should remain idle for at least one minute following a positive test. When initiating a test sequence always use a new mouthpiece.*

Instrument Operating Features

Automatic Blank Test

A blank test is a test that is run automatically by the instrument to check the sample chamber and ensure that there is no alcohol present from a previous test. The automatic blank test must result in a zero reading before the instrument will advance to the next step in the testing protocol.

Depending on the version of the Alco-Sensor IV, the blank test may or may not be displayed. However, in all instruments the sensor is tested for zero prior to a subsequent sample collection. A failed blank test will always be indicated with a **VOID** message followed by the test sequence being discontinued.

Note: *Keeping the unit warm will shorten the time it takes for the cell to clear and give a zero reading on the blank test.*

Automatic Sampling

A thermistor in the manifold monitors breath flow and allows sampling of deep lung breath. **+** is displayed when the thermistor senses an adequate breath flow. **++** is displayed when the minimal breath volume has been reached. Automatic sampling requires that at least **++** is displayed before the sample will be taken, but the sampling system will not be activated until the subject's breath flow meets this requirement and the breath flow begins to decrease. When the sampling system is activated, a small sample of deep lung breath is drawn into the fuel cell chamber from the manifold.

Manual Sampling

Manual Sampling is a feature that allows the operator to collect a sample either when the automatic sampling function has been disabled or the subject is unable to provide the minimum volume of breath. Manual sampling can produce equally accurate results but before using this method of testing the operator should be trained in the proper technique to collect a manual sample. Samples taken too early or after the breath flow has ceased will result in readings that are lower than the actual BrAC/BAC.

Test Recall

After the test result has been displayed the instrument will display **SET**. If the operator needs to review the test result the Alco-Sensor IV has a Recall function. To access this function, press the SET button when display shows **SET**. At anytime after the SET button has been depressed and **before the mouthpiece is ejected** the operator may retrieve the previous result by pressing the RECALL button. Once the release button has been pushed and the mouthpiece has been ejected the test result can no longer be recalled on the Alco-Sensor IV display.

SECTION V ADMINISTRATIVE / MAINTENANCE FUNCTIONS

Overview

The accuracy of an instrument is verified by running a known alcohol concentration (standard) through the Alco-Sensor IV's sampling system, and verifying that the result is within an acceptable tolerance of the expected value of the standard. This is called an accuracy check. It is also sometimes called a calibration check because it is a test of proper calibration. The two terms are used interchangeably. We will use accuracy check in this manual. An accuracy check should be performed at a minimum of once every thirty-one days. If the accuracy check reading is within an acceptable range the Alco-Sensor IV is considered calibrated. If the reading is not within the acceptable tolerance the Alco-Sensor IV must be calibrated. Only approved standards (dry or wet) gas samples with a known expected ethanol concentration should be used to perform this procedure. To obtain accurate subject test results, the unit must be in calibration.

Most Alco-Sensor IVs hold calibration for months. However, performing an accuracy check once a week during the first month the unit is in use will establish the new instrument's stability and increase the operator's confidence in its accuracy.

SHOULD WEEKLY ACCURACY CHECKS NOT GIVE SATISFACTORY RESULTS CALL INTOXIMETERS SERVICE DEPARTMENT.

Accuracy Check Methods

Intoximeters recommends that external accuracy checks and calibrations be performed using a dry gas standard approved for use by both NHTSA and Intoximeters. Alternatively, wet bath simulators which have been approved for use by NHTSA and Intoximeters can be utilized with properly certified and maintained ethanol solutions.

In all cases the compressed gas tanks, simulators and simulator solutions should be used and maintained only in accordance with the quality assurance plans provided by their respective manufacturers to insure that they produce consistent and reliable samples.

Although some jurisdictions require using certified standards with specific values to perform accuracy checks and calibrations, these values are imposed only by the specific jurisdiction. The analytical design of the instrument allows it to be checked for accuracy and calibrated using any positive standard value. However, the integrity of the standards themselves are most reliable in the range of .015 - .200, for this reason most Intoximeters instruments are programmed so that calibration standards in this range must be used.

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Mini-Alco Cans* may also be used with the Alco-Sensor IV. The Mini-Alco Can is approved for use with the Alco-Sensor IV in non-evidentiary testing environments. Although the Mini-Alco Can provides a reference for screening devices it has not been approved for use in evidential maintenance protocols.

Approved Dry Gas Standard

ELEMENTS:

- A. Pressurized approved dry gas tank.
- B. Small single staged approved regulator.
- C. True-Cal device. (*Optional*)

MAKEUP: NIST traceable tank contains a single-phased mixture of Nitrogen and Ethanol. (The concentrations available are .038% at sea level, and .082% at sea level).

CHARACTERISTICS:

- A. Flow rate of the regulator is 1.5 liters per minute.
- B. Used properly, a 105 liter tank should supply at least 300 tests.
- C. New tanks show approximately 1025 psi on the gauge. Follow instructions on the tanks to mount the regulator. When the regulator is initially mounted, depress the regulator control button and allow the gas to purge the valve for 10 seconds.
- D. Expiration date is stamped on the label of the dry gas standard.
- E. The True-Cal device used in the vicinity of the dry gas standard will display the true value of the standard at the time of the test.
- F. Tanks should only be used when they are between 10° - 40° C.
- G. If the tank has been maintained at temperatures below 0°C (32°F), see tank manufacturer's QAP for proper handling of the dry gas standard.

Approved Wet Bath Simulator (Standard)

ELEMENTS:

- A. Glass jar which holds 500cc of solution.
- B. Jar head contains heater thermostat, stirrer, thermometer, inlet and outlet ports for sampling headspace gas standing above the solution.

MAKEUP: Solution is a water/alcohol mixture of a certified BrAC/BAC concentration.

CHARACTERISTICS:

- A. Seven month shelf-life for refrigerated, unopened bottles of solution. Or as determined by the manufacturer.
- B. 30 tests per bottle of solution.
- C. Liquid should be clear with no visible particles suspended in the solution.
- D. A simulator containing a solution of known BrAC/BAC value must be at the operating temperature of 34°C. The simulator top must be on securely so the system is airtight. To check, cover the outlet port and blow into the intake port. Air bubbles will not rise rapidly through the solution if the top is secure.

Mini Alco Can*

ELEMENTS:

- A. Pressurized gas can. Discard plastic collar from stem before use
- B. Valve - Button activated flow control.

MAKEUP: Argon - Alcohol single phase gas mixture

CHARACTERISTICS:

- A. Ten test capacity.
- B. Six month shelf-life.
- C. Expiration date is stamped on the label of the gas can.
- D. Gas value is effected by elevation variations. The gas value can be determined by consulting the chart that is included with the Mini-Alco Can instructions.

*This Standard is not approved by the NHTSA for evidential testing but is approved by Intoximeters for use with the Alco-Sensor IV units provided that the protocols of the program under which the instrument is being operated does not specify the use of a NHTSA approved Calibration Standard, and the results from tests run with this instrument **are not** used in an evidentiary manner.

Accuracy Check Intervals

If an accuracy check has not occurred within the past 31 days, an accuracy check should be run prior to running a subject test to ensure the instrument has maintained proper calibration.

Accuracy Check Tolerances

The result of an accuracy check should not differ from the expected value by more than the tolerances prescribed by the program guidelines under which the test is being administered. Usually these tolerances range from $\pm .005$ or 5% whichever is greater, to $\pm .010$ or $\pm 10\%$ whichever is greater. Examples of accuracy requirements are:

Accuracy checks must be within 5% of the expected reading, if not, re-calibration is necessary,

OR

Accuracy checks must read $\pm .010$ of the expected reading, if not, re-calibration is necessary,

OR

Accuracy checks must read $\pm .005$ of the expected reading, if not, re-calibration is necessary.

Intoximeters has set a factory standard for accuracy checks run directly following a calibration. The factory standard states: the tolerance range for the expected value of the required accuracy check run ***directly*** following a calibration should be no greater than $\pm .003$ of the expected value if the calibration is to be considered successful.

Refer to your policy to determine the guidelines for your testing program.

Inspection and Routine Maintenance

The instrument should be calibrated when the displayed result of an accuracy check differs from the expected result of the standard gas sample by more than the accepted tolerances established by the protocols of the specific program under which the instrument is being utilized.

The instrument should be taken out of service if:

- the instrument repeatedly fails to maintain its calibration, (i.e. if after two successive attempts to calibrate the device a successful accuracy check was not obtained);
- the instrument fails to maintain its calibration on three consecutive monthly accuracy checks;
- the instrument consistently takes more than two minutes to perform a breath analysis on a sample with a concentration less than .100 grams per 210 liters of breath.

IF THE INSTRUMENT DISPLAYS ANY OF THE ABOVE CHARACTERISTICS CALL INTOXIMETERS SERVICE DEPARTMENT.

Accuracy Check

Unit Temperature

Accuracy checks must be performed when the Alco-Sensor IV's temperature is between 10° - 40°C.

Accuracy Check Procedure Step by Step

Before beginning have these items available: Calibration Standard (dry gas or wet bath simulator) • Calibration Logbook • New Mouthpiece

1. If the accuracy check is being done with a Wet Bath skip this step and go to step #2. If the accuracy check is being performed with a Dry Gas, purge the regulator for at least 3 or 4 seconds before running your first accuracy check of the day. (Continue with step #3)
2. Prepare Wet Bath simulator for use and be sure it has reached a stable 34°C temperature, the stirrer is operating properly and the top is securely mounted.
3. Insert a new mouthpiece into the Alco-Sensor IV. When the display shows **TEST** then make an airtight connection between the delivery tube of the regulator OR the outlet port of the simulator and the open end of the mouthpiece.
4. Depress the regulator control button OR blow into the inlet port of the simulator for 7 seconds. On the 5th second depress the MANUAL button to take a sample. (The goal is to have gas still flowing through the Alco-Sensor IV when the sample is taken). Release the regulator control button OR stop blowing into the inlet port of the simulator on the 7th second.
5. Carefully detach the mouthpiece from the regulator OR the simulator ensuring that the mouthpiece is not disengaged from the unit.
6. Observe the 3-digit reading.
7. Record the 3-digit reading. If it does not meet the specified tolerances, the unit requires a calibration adjustment.

Calibration

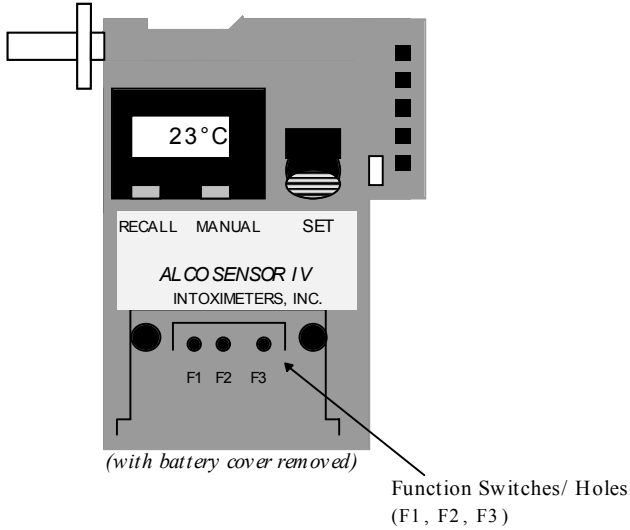
When to Perform a Calibration

A calibration procedure should be performed when the result of an accuracy check indicates the unit does not read a standard within your testing program's specified acceptable tolerances.

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Unit Temperature

To calibrate an instrument its temperature must be between 23°C - 27°C. If the temperature is not within this range, the unit will display **TEMP >** or **TEMP <** and block the calibration procedure.



Calibration Procedure - Step by Step

Before beginning this procedure have these items available: • New mouthpiece • Approved calibration standard • Function switch key • Calibration logbook • Security tape (optional)

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Ready your calibration standard according to the instructions that came with the device.

1. Remove battery cover to expose the function switches (F1- F3). Carefully and completely remove any security tape covering the holes.
2. Depress and hold F1 with the function switch key while inserting a new mouthpiece. **FOUR SOLID BLOCKS** appear on the display indicating that the instrument is in the calibration mode. The instrument will follow standard operation of test start up.
3. When the zero result from the blank is still displayed, use the function switch key depress and hold down F3. At this point the instrument will check its temperature. If the temperature is out of range **TEMP<** or **TEMP>** will display. If the temperature is within range a number (**.XXX**) appears on the display. This number is the value of the last standard used for calibration. When this number appears on the display, release F3.
4. **SET** displays indicating the SET button needs to be depressed. The last calibration value will display again. Use the calibration tool to adjust the number, up (F1) and down (F2), until the value of the standard being used for this procedure equals the value on the display.
5. When the standard value equals the value on the display push F3 again. The display must flash **CAL** before the standard gas sample is delivered.
6. Make an airtight connection between the delivery tube of the regulator OR the outlet port of the simulator, and the open end of the mouthpiece. Depress the regulator control button OR blow into the inlet port of the simulator for 7 seconds. On the 5th second depress the MANUAL button to take a sample. The goal is to have gas still flowing through the Alco-Sensor IV when the sample is taken. Release the regulator control button OR stop blowing into the inlet port of the simulator on the 7th second.
7. Carefully detach the mouthpiece from the regulator OR the simulator ensuring that the mouthpiece is not disengaged from the unit.
8. The microprocessor will analyze the output from the fuel cell and will automatically make the necessary calibration adjustments. The resulting calibration value will reflect the programmed value and that number will be displayed. Observe the displayed result.
9. When **SET** appears press the SET button. When you hear the intermittent **BEEP** remove the mouthpiece by depressing the red mouthpiece release button. Wait 3 minutes before checking the accuracy of the calibration.
10. It is essential to verify the calibration. After the 3-minute wait, run an accuracy check using a new mouthpiece and an approved gas standard. **THE RESULT SHOULD BE WITHIN $\pm .003$ OF THE EXPECTED VALUE OF THE STANDARD GAS READING.** If it is not repeat the calibration procedure after waiting another three minutes.

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11. Fill in the Security Tape and place it over the access holes. **(optional)**

STEP 10 MUST BE ACCOMPLISHED AND THE RESULT MUST BE ACCURATE TO $\pm .003$ OF THE EXPECTED STANDARD VALUE FOR THE CALIBRATION PROCEDURE TO BE CONSIDERED SUCCESSFUL.

Note: The new calibration setting that was calculated by the Alco-Sensor IV will be stored in memory until another calibration is conducted.

Tamper Proof Tape for Securing Calibration Adjustment

Security tape is used to assure the operator that the Alco-Sensor IV has not been tampered with since the last calibration. The tape covers the 3 function switch holes inside of the battery chamber.

To use:

1. Calibrate the unit. (see calibration procedure)
2. Run an accuracy check - if calibrated satisfactorily
3. Sign and date security tape strip.
4. Peel the tape off the wax paper. Mount the tape and position it so the dots and switch access holes (F1 - F3) inside the battery chamber are covered and properly aligned.
5. Replace battery cover.

When the unit needs re-calibration, remove the security tape - it will fragment. Do not allow residue to accumulate as it will eventually impede closing the battery door. Proceed with calibration. Then follow above instructions for using security tape.

Battery Replacement Procedure

The battery will need to be replaced when the display shows **BAT**. To replace the battery follow these instructions.

Slide BATTERY DOOR open.
Remove old BATTERY.
Insert new BATTERY.
Close BATTERY DOOR.
Use only 9 VOLT ALKALINE BATTERIES

SECTION VI TROUBLE SHOOTING & TECHNICAL SUPPORT

Trouble Shooting

Aborting a Test

To abort a test anytime during the testing procedure simply depress the red mouthpiece release button to disengage the mouthpiece. The test sequence will end.

Blank Test is not Successful

Before the subject gives a sample the instrument automatically runs a blank test analyzing the system to ensure it is free of alcohol. If this test does not result in a zero reading the test will display **VOID**. Eject the mouthpiece. Wait a few moments before initiating another test with a new mouthpiece. Allowing additional time for the unit to purge itself of any residual alcohol from a previous test will better ensure a zero result on a blank test. If repeated attempts do not result in a zero reading contact Intoximeters Service Department.

Insufficient Breath Sample

Insufficient Breath Sample means that the subject did not provide enough breath to initiate the automatic sampling feature. If blowing is erratic, the unit will display **NOGO**. The instrument will allow the subject three tries, however, if the third try is unsuccessful the test will void and the test procedure will have to be started over. If the subject has impaired breathing, it is possible to take the sample manually.

Low Battery

BAT displayed for 2 seconds after the mouthpiece is mounted warns the operator that the battery is low. This message indicates the battery voltage has dropped below 7.0 volts; the current test can be completed but the battery should be replaced before any additional tests are run. When **BAT** is displayed for 2 seconds and followed by **VOID**, the battery power has fallen to 6.6v and must be replaced before the test sequence can be continued.

A fail-safe circuit incorporated into the software will not allow the test procedure to continue if degraded voltage caused by a weak battery or a high resistance to current is detected. If the battery temporarily drops below 6.2 volts during a test, the test will return to the beginning of the sequence and will not allow the completion of a test until power conditions have normalized.

This condition can occur without the (below 7.0 volts) **BAT** message appearing on the display. During the test process the display may inadvertently revert to displaying the temperature and/or date and time, depending on your instrument model. Battery replacement is required.

Radio Frequency

Interference (RFI) Sensor

An RFI sensor is built into the Alco-Sensor IV. As well, the Alco-Sensor IV's casing is designed to provide RFI shielding for electronics. If an interference signal is detected by the RF sensor, the test will be voided and ***RFI!*** will be displayed on the Alco-Sensor IV. No result will be available. The test will have to be re-started. The mouthpiece should be removed to turn the unit off, and the source of the ***RFI!*** located and removed from the testing site before the test is initiated again. Some common sources of ***RFI!*** include walkie-talkies, cell phones and other radio transmitting sources.

Temperature of Instrument too high or too low

The instrument temperature is displayed after the mouthpiece has been inserted. If this temperature is below 10°C or above 40°C (the standard Alco-Sensor IV range), the test cannot be initiated. Remove the mouthpiece and place the unit in an environment that will bring it to proper operating temperature. *(The instrument should come to an acceptable operating temperature within several minutes if placed in a pocket close to the body.)*

Time Outs

If no breath sample is blown into the instrument immediately, **TEST** will be displayed for 60-70 seconds before void appears and the test is aborted. This is a time-out and the test procedure must be re-started.

Factory Support and Repair

Intoximeters service has been organized around one premise: to offer customers convenient and speedy access to information and support for instruments manufactured by Intoximeters.

Intoximeters has representation throughout the United States and in many countries around the world. In order to find the representative most convenient for you, call the St. Louis, Missouri office. You will be provided with a local name and number. Likewise, for product replacement parts, a list of technical service locations or general information, the St. Louis office or your local representative can help you.

Intoximeters, Inc.
8110 Lackland Road
St. Louis, Missouri 63114
314-429-4000
800-451-8639
FAX 314-429-4170

Other Information is available on the internet
at: www.intox.com

Shipping Methods and Instructions

Shipping Product to the Customer

Unless specifically requested otherwise, surface transportation is used in the U.S.; this may include motor freight or United Parcel Service. Air freight or air express will be used only if the purchaser has specified it on their order. Unless the purchaser requests collect shipment, all shipping charges are prepaid and added to the invoice as a separate line item.

Shipments to destinations outside the U.S. are made by either surface or air, as directed by the purchaser. Please note that shipments by sea usually require commercial export packaging at an extra charge.

Shipping Product to Factory for Repair

When returning a product to Intoximeters for repair the product must be sent to the Intoximeters service center with an RA form (this form can be obtained by calling Intoximeters Repair Department at 1-800-451-8639 or the form can be printed from our web site at www.intox.com).

Alternately, the instrument can be returned with a letter which includes the following:

- type/model of unit (i.e. ASIV)
- serial number of unit
- customer shipping address
- customer billing address
- contact name and phone number
- detailed description of the difficulty being experienced with the unit

Intoximeters Authorized Sales/Service Outlet assumes no risk for damage in transit. The product should be sent to the service center postage and insurance prepaid.

SECTION VII ACCESSORIES

RBT IV Printer

The RBT IV is designed to connect to the Alco-Sensor IV. Together the Alco-Sensor IV and the RBT IV will lead the breath Alcohol Technician through the testing protocol. The keypad on the RBT IV enables the operator to enter numerical subject identification data which will be printed out and stored in memory with the specific test record. The RBT IV supplies a printed record of each test (multiple copies available if desired) and stores test data in memory. The memory has a capacity of 900 tests.

The RBT IV provides step by step instruction to prompt the operator through the entire test sequence. The microprocessor also guards against any improper test procedure by disallowing the test sequence to continue until the operator has properly completed the present step.

The RBT IV procedure is controlled by a pre-programmed microprocessor, which is installed at the factory. There are different software programs available for different protocols.

Cell Enhancement Module (CEM)

The Cell Enhancement Module (CEM) enhances operation and performance of the Alco-Sensor IV. By quickly and uniformly heating the fuel cell and the sampling system as well as purging residual alcohol from the manifold, the Alco-Sensor IV produces results more quickly and shortens cycling time between tests. This accessory is recommended in environments where tests are performed in extremely low temperatures.

True-Cal Device

Variations in barometric pressure can affect the expected value of a pressurized dry gas standard, according to standard gas laws. The True-Cal device is designed to sense changes in barometric pressure and report an adjusted value for the dry gas standard.

The True-Cal works only with Intoximeters approved dry gas standards. Due to strict accuracy and quality requirements for all tanks sold by Intoximeters, the True-Cal device should not be used with gas standards supplied by other vendors unless otherwise approved. The color of the label "% BAL" (which appears directly below the True-Cal name on the face of the device) must match the color of the label on the Intoximeters approved dry gas standard. A True-Cal device with a yellow "% BAL" can

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only be used with an Intoximeters approved .038% value dry gas standard, and a True-Cal device with a white "% BAL" can only be used with an Intoximeters approved .082% value dry gas standard. Values on the tanks are expressed in values at sea level under normal atmospheric conditions.

By depressing the button on the True-Cal device, the LED display will show the current expected value of the gas. The True-Cal is powered by a 9-volt alkaline battery which should be good for 800 assessments. "888" will appear on the True-Cal display when the battery needs to be replaced. *Only use 9 volt alkaline batteries for replacement.*

A CALIBRATION STATION consists of an Intoximeters approved dry gas standard, a regulator and a True-Cal device.

APPENDIX A DISPLAY MESSAGES

DISPLAY MEANING

BAT	The 9-volt alkaline battery should be replaced. If this display is followed by normal operation, the battery is capable of completing the current test. If BAT is followed by VOID , the test must be terminated and the battery must be replaced.
BLNK	Indicates the instrument is automatically initiating an analysis of the system's sample chamber to ensure it is free of alcohol. (see also: Automatic Blank Test, page 16)
CAL	Seen only during a calibration procedure. This display indicates that the standard gas sample should be delivered to calibrate.
MAN	The breath flow sensor is inoperative and ONLY a manual sample may be taken. Proceed with breath sample, but depress the MANUAL button near the end of exhalation. Service by an authorized service technician will be required to repair the automatic sampling feature. (see also: Manual Sampling, page 16)
NOGO	An insufficient sample has been given and rejected. When TEST appears again, start a new sample. The subject will be given <u>three</u> tries to deliver a proper sample before the test will VOID . (see also: Manual Sampling, page 16)
RFI!VOID	Indicates that RFI has been detected which is strong enough to possibly affect the results of the test. Test must be started over.
SET	Indicates SET Button should be depressed to cock sampling pump.
TMP>	Indicates the instrument's temperature is too high to perform any type of test.
TMP<	Indicates the instrument's temperature is too low to perform any type of test.
TEST	A breath sample should be collected from the subject or if running an accuracy check, a standard gas sample should be delivered.
VOID	Indicates an improper condition exists that requires the unit to be turned off and restarted from Step 1 of the testing procedure.

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WAIT	A waiting period is necessary to ready the system for another test. Generally, if WAIT persists more than 1 minute, the unit should be turned off for several moments before initiating another test
> / <	This indicates the instrument is performing a task - wait for the next message.
+	Indicates a sufficient minimum breath flow is being provided for automatic sampling.
++	Indicates a minimum sample volume of breath has been delivered

APPENDIX B VOID CODES

Void Codes will appear on the Alco-Sensor IV either as **VOID** and a number (**XX**) or just **VOID**. The output message depends upon which software version is in the Alco-Sensor IV. The following codes, however, are the same for all Alco-Sensor IVs. If your instrument does not display void code numbers refer to Appendix A for an explanation of the display messages.

VOID #	MEANING OF VOID MESSAGE
01	Battery too low for use
02	Set button not down at time of sample
03	N/A
04	Valve did not sample
05	180 second time-out on TEST
06	Third NOGO on a test
07	Too much or no alcohol introduced during a calibration
08	Set button pushed during Alco-Sensor IV analysis of a sample
09	Temperature of Alco-Sensor IV is too low to conduct any kind of test
10	Temperature of Alco-Sensor IV is too high to conduct any kind of test
11	N/A
12	RFI detected
14	Voided Analysis