

Alco-Sensor FST Operators Manual



Intoximeters, Inc.
St. Louis MO

ASFST version

PRINT DATE: September 2004

WARRANTY

Unless otherwise determined by the purchase agreement Intoximeters, Inc. warrants to the original user-purchaser that all new *Intoximeter Breath Alcohol Analyzers* are free from defects in material and workmanship, under normal use and service, for a period of twelve (12) months from original invoice date. The following are not covered under this warranty: consumables or supplies (i.e. mouthpieces, calibration gas, ink ribbons, printer paper) nor any damage which has, in Intoximeters Authorized Sales/Service Outlet opinion, been the result of misuse, alteration, accident or abnormal conditions of operation or handling. Also excluded from coverage under this agreement are printers and other hardware that are not manufactured by or for Intoximeters Inc. and do not carry the Intoximeters trademark, trade name, or logo affixed to them.

Software is warranted to perform substantially in accordance with the accompanying written materials. Software is warranted to be free from defects in materials and workmanship under normal use and service for a period of twelve months from original invoice date.

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CAUTION: THE INTOXIMETER BREATH ALCOHOL ANALYZER CONTAINS STATIC-SENSITIVE MEMORY DEVICES. THE UNIT'S CASING SHOULD ONLY BE OPENED BY A FACTORY AUTHORIZED TECHNICIAN.

This warranty does not apply if: the product has been repaired or modified by someone other than a factory authorized technician without written permission from Intoximeters; if parts other than Intoximeters approved parts are used in replacement or repair; or if any Intoximeters serial number has been removed or defaced.

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Repaired components are warranted for a period of 90 days from the billing date of the repair. The warranty on repaired components is 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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Note. Some countries or states do not allow the foregoing limitations. Other rights may also vary.

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SECTION I INTRODUCTION

About This Manual

This manual covers the operating information and procedures for the Alco-Sensor FST.

General Information

The Alco-Sensor FST is a hand-held breath alcohol-testing device designed to read blood/breath alcohol concentrations. A disposable mouthpiece, two AA batteries, and a calibration standard are the only items necessary to keep the Alco-Sensor FST operational. Two AA batteries should run at least 1000 tests.

Under normal operating conditions, little more than routine maintenance checks are all that is required to keep your Alco-Sensor FST operational.

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 FST by reviewing this manual. Be sure you understand how to perform all procedures properly before operating the Alco-Sensor FST.

Demonstration of a Non-Zero Reading

When simulating a non-zero reading on the Alco-Sensor FST **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 FST; it may shorten the life of the fuel cell sensor.

Proper Environmental Conditions

When operating or storing the Alco-Sensor FST avoid environments with heavy alcohol vapor, cigarette smoke, and high levels of radio interference or magnetic fields. The Alco-Sensor FST is designed so these environmental conditions should not affect the results of a test, however, these are not ideal testing environments and prolonged exposure of the Alco-Sensor FST to some of these types of environmental factors may shorten the life of various components. The Alco-Sensor FST is designed for all-weather operation, however the instrument itself must be within the proper temperature range to initiate a test sequence.

Storage

Storage in cold or moderately hot environments will not harm the Alco-Sensor FST. For prolonged storage avoid extremely humid or arid environments.

Recommended Storage Conditions

Temperature: -15°C to 50°C (3° F to 122° F)
Humidity: 10% to 95% relative humidity
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, and 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 affected. 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, 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 are variable. Body size is also variable; an individual who weighs 300 pounds 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 larger person may have half the blood alcohol level attained by the smaller person. The effect of the higher blood alcohol level on the smaller individual probably will be observable. It is worth noting that the smaller person's blood alcohol concentration will drop more quickly than a larger person as he or she burns off 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, and saliva.

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

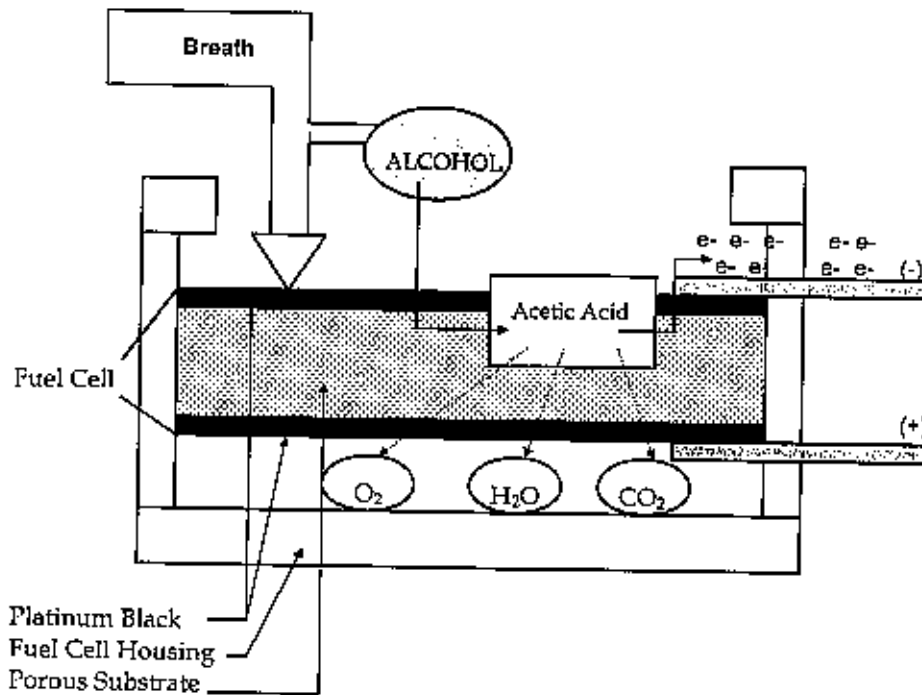
Acquired Tolerance is a person's ability to mask the impairing effects of alcohol; it can be learned experientially. Body Tolerance is related to physical factors, (i.e. body size, food in the stomach). Both types of tolerance affect how an individual will respond to a given amount of alcohol.

Theory And Design Of The Alco-Sensor FST

The Alco-Sensor FST 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 sampling pump is activated. A small, fixed volume of deep lung breath is drawn onto the surface of the cell, any alcohol is subsequently converted to acetic acid, electrons are released and a current is generated in proportion to the amount of alcohol oxidized. The resulting electric current is translated into a Breath or Blood alcohol concentration and the result is displayed on the Alco-Sensor FST.

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.

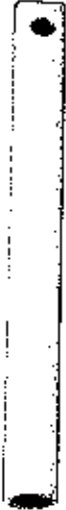
Fuel Cell Diagram



The Alco-Sensor FST 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 is a critical portion of the sample assembly and specifically designed to be used with the Alco Sensor FST.

The cross section is a "D" shape which helps orient the mouthpiece when placing it on the instrument. By inserting the closed end of the mouthpiece into the mouthpiece channel, and then rotating the shaft of the mouthpiece downward, the flat side of the mouthpiece and the two holes on the underside of the mouthpiece will naturally align and attach to the appropriate ports on the Alco-Sensor FST.

Use only mouthpieces manufactured or approved by Intoximeters. The design of the mouthpiece can affect both the analytical process and/or damage the instrument. Using unapproved mouthpieces can void the instrument warranty and make it impossible for Intoximeters to support test results generated while using these unapproved parts.

**Passive Sampling Cup**

The Passive Sampling Cup is designed to help automatically collect an air sample while a subject is blowing in the direction of the instrument. For best passive results have the subject's mouth about two inches from the top of the cup, while the subject is blowing into the cup.

**Display**

The display turns on when the instrument is powered ON. If it is necessary to backlight the display, pressing and holding the ON button down for an additional second will illuminate the backlighting.

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 Status Message, page 22).

ON Button

The ON button (labeled with a "I" symbol) 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 instrument. The primary function of the button is to turn the instrument ON, and this is accomplished by pressing the button down for one second, a beep and/or the display powering ON will indicate that power up has been successful. (Note: If you want to have the backlit display illuminated, hold the ON button down for an extra second on power up or press the ON button at any point where the temperature is being displayed and the backlight will illuminate).

The ON button also allows an operator to capture a manual sample.



Additionally, the ON button is used to toggle through menu items to access certain features of the instrument. The steps are described later in this manual. (see also: Manual Sampling, page 10).

OFF Button



The 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 Instrument off. Manually turning the instrument off will always reset the instrument to the standard subject test sequence. Note: The instrument does have an auto power down feature, which powers the instrument down when it has not been used for a period of time.

The OFF button is also used to select several other features of the Instrument. The steps are described throughout this manual (see also: Features and Maintenance Menu, page 10).



Batteries

The battery cover is located on the base of the Alco-Sensor FST. Two AA batteries should run in excess of 1000 tests. *When changing batteries, always replace both batteries.*

SECTION IV CONDUCTING A SUBJECT TEST

Initial Preparation

Operator Training

The results from a properly calibrated Alco-Sensor FST are no better than the quality of the sample collected. A deep lung sample is essential to produce a breath alcohol reading that will correlate with the alcohol concentration of the blood. The Alco-Sensor FST sampling system is designed to ensure that a deep lung sample is collected for analysis.

Even though the Alco-Sensor FST has a very simple sample collection process, training on the use of the instrument is recommended. Training is available through a variety of mediums. Both Classroom or Computer based training provided on a CD, are available from Intoximeters. For further information on training sessions and the availability of training tools contact Intoximeters Training Department.

Preconditions for Conducting a Test

Temperature Requirements

The Alco-Sensor FST is generally set up to operate at instrument temperatures of 0°C to 50°C (32°F to 122°F). Customized software is available from Intoximeters that will allow the Alco-Sensor FST 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 50°C (3°F to 122°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 should be performed periodically. An accuracy check is performed by introducing, to the Alco-Sensor FST, a sample containing a known concentration of alcohol (what is referred to in this manual as a Standard Sample). The reading provided by the instrument must be within the established tolerances of the target value of the standard sample for the instrument 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. If you don't have an established program, checking the instrument at no more than 31-day intervals is a frequency that would be acceptable for most routinely used tolerance levels.

Your unit was calibrated at the factory before shipment. However, before using the instrument for subject testing you should perform an accuracy check to ensure that the unit has maintained its calibration. To build a history of instrument performance, record accuracy check and calibration results in a logbook along with the date of the test and the expected or target value of the standard sample. (see also: Inspection and Routine Maintenance, page 15).

Preparing the Instrument for a Subject Test

Mouthpiece and Powering up the Alco-Sensor FST

For a subject test, an accuracy check or a calibration, always use a clean mouthpiece.

To avoid damaging the Alco-Sensor FST, the operator should be familiar with the correct procedure for attaching the mouthpiece to the instrument.

The mouthpiece has both an open and a closed end. The open end should be made available for the subject to blow into. The sealed, rounded end should be inserted into the mouthpiece channel on the top of the Alco Sensor FST.

In addition to the breath inlet hole, there are three additional holes in the mouthpiece. One larger hole, on the top of the mouthpiece, toward the sealed end of the mouthpiece is the exit port for the subject's breath flow. There are also two smaller holes on the bottom, or flat portion of the mouthpiece. When the mouthpiece is mounted properly these holes will be seated on both the fuel cell inlet port and the flow sensor port.

To initiate a test sequence, use a clean mouthpiece. Insert the long, closed end of the mouthpiece into the mouthpiece channel. The mouthpiece is "D" shaped and when properly inserted, the flat side should be making contact with the instrument.

The mouthpiece connection process is simplified if the end of the mouthpiece is first pressed into the mouthpiece channel. Once the mouthpiece abuts the end of the guide, rotating the mouthpiece downwards attaches the mouthpiece to the two ports and the instrument will be ready for testing.

Preparing the Subject for a Test

Before initiating a test, explain to the subject how you want the subject to provide a sample.

Example: "When I tell you to, I want you to take a deep breath, hold it for a moment and then blow steadily into this mouthpiece until I tell you to stop. Are you ready? Okay, take a deep breath, hold it, now blow steadily for as long as possible".

Clear and simple instruction will help the subject give you a good sample.

Screening Test Procedure

Observing a fifteen-minute deprivation period (no foreign substance is introduced into the mouth during this period) prior to sample collection will ensure the elimination of "mouth alcohol".

Performing a Subject Test - Step by Step

ATTACH A MOUTHPIECE.

Use a clean, unused mouthpiece from a sealed bag

DEPRESS THE POWER ON BUTTON AND HOLD FOR 1 SECOND.

This will turn the unit on.

If you wish to have the displays back lighting illuminate, hold the button down for an extra second or two.

NOTE PRE-TEST INFORMATION.



A digital display showing the number 28 followed by a small 'c' for Celsius. Above the number, there are several small horizontal bars, likely representing a battery level indicator.

The Battery Strength Indicator and Temperature in °C (i.e., 26C) will be displayed momentarily after the instrument is powered ON. As well, a battery indicator will be displayed indicating the current condition of the battery. If the instrument does not have sufficient battery power to perform a test either the instrument display will not power on or BAT will be displayed and testing will be disabled. The standard Alco-Sensor FST is designed to operate when the unit temperature (not the ambient temperature) is between 0°C and 50°C. If the temperature is outside of the proper operating range, the standard instrument will indicate a temperature out of range condition before powering off. If you must perform a test with the instrument, place the instrument in an environment that will bring it to a proper operating temperature.

BLN flashes on display.



A digital display showing the letters 'BLn'.

If your unit displays BLN, it is an indication that the instrument is performing a blank test automatically. Your unit will then display the result of the blank test. If the blank check is successful, a zero result appears on the display. If the blank check is not successful, a status message E 11 (Air Blank Out of Range Message) is displayed and the test sequence is aborted.



A digital display showing the number .000.

%BrAC

Depending upon the version of the Alco-Sensor FST, the blank test may or may not be displayed. However, a failed blank test will always be indicated with an error message (E 11) followed by the test sequence being discontinued.

COLLECT A BREATH SAMPLE



When the display shows the icon of a persons head flashing and/or BLO displayed, 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. The icon of the head will stop flashing and a dash appears to the right of the head indicating that the instrument senses sufficient breath flow. Additional dashes will appear as the subject continues to provide a sample. Once three dashes appear an automatic sample will be taken. It is not necessary for the subject to blow hard but rather a steady or continuous sample is best for sample collection.

OBSERVE AND RECORD THE RESULT



As soon as a successful breath sample has been captured, the analyzing signal "___", "-_-", "___" is scrolled across the display. At the end of the analysis a result will be displayed.

REMOVE THE MOUTHPIECE.

The result will be displayed for fifteen seconds before the instrument will power itself off.

It is also possible to turn the instrument off manually by pressing the OFF button for two seconds. To view the last test result after the instrument is powered off see the section below on Test Recall. If you are interested in starting another test, after the instrument has been powered down, pressing the ON button will initiate the next test sequence.

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 the attached mouthpiece to 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 upon the version of instrument, the blank test may or may not be displayed. However a failed blank test will always be indicated with an error message (E 11) followed by the test sequence being discontinued.

Note: Although the instrument cleans up quickly, 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 pressure sensor monitors breath flow and volume to determine when to capture a breath sample for analysis.

When breath flow is sensed by the instrument, the icon of the human head will stop flashing, **bl_o** will disappear and a **"."** is displayed next to the icon of the head. This **"."** indicates that the instrument has determined that the minimum breath flow rate has been detected and that breath volume can start to be calculated.

"..." is displayed when the minimal breath volume has been reached. After a minimum volume requirement has been met the sampling system will capture a sample for analysis when either the subject's breath flow begins to decrease or a second, greater volume threshold is met.

When the sampling system is activated, a small sample of deep lung breath is drawn into the fuel cell chamber for analysis.

If an improper breath sample condition is detected by the instrument, the sample will be rejected and the instrument will flash **"FLO"** along with one of the following descriptors: **"Lo"**, **"Hi"**, **"InS"** or **"Cut"**. (see also: Status Messages, page 20 for an explanation of the meaning for each of these displayed descriptors.) After this message is displayed the instrument will return to the ready mode. If the subject is unable to provide a proper sample after the preset number of attempts the instrument will power itself off. For this reason, it is important for the operator to provide the subject with clear instruction on how to properly provide a breath sample. (Note: The standard Alco-Sensor FST will allow the subject three attempts to provide a proper sample before it will display the status message **E06** and power off.)

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. This can occur in both direct and passive testing modes.

When direct sampling (sampling when a subject blows into a mouthpiece) Manual sampling can produce results that are as accurate as automatic samples but for best sampling technique, before using this method of testing, the operator should be trained to collect a manual breath sample. Samples taken too early or after the breath flow has ceased will result in readings that are lower than the actual deep lung BrACs or BACs.

In the rare occasion when a subject is unable to provide an adequate breath flow to trigger the automatic sample capture feature, a Manual Sample Capture is possible. This process requires that the operator follow the normal test procedure up to the point that **bl_o** is displayed. At this point the operator should instruct the subject on how to provide a sample.

As close to the end of the exhalation as possible (but while the subject is still blowing) the operator can collect a Manual sample by pressing the ON button.

Errors in Manual Testing that must be avoided include capturing a sample before the subject begins blowing; capturing a sample in the early part of the exhalation or capturing a sample after the exhalation has ceased. In all of these cases a dilute sample will be drawn into the instrument for analysis and a corresponding low or zero result will occur.

Features / Maintenance Menu

While the instrument is powered down, by depressing and holding the OFF button down and then also depressing the ON button, one can access a List of Optional Features included in the instrument software. This list includes, but is not limited to the following features:

- rcL** – Allows the operator to Recall the last test result
- PAS** – Allows the operator to access the Passive Testing Mode
- ACC** – Allows the operator to access the Accuracy Check Mode
- CAL** – Allows the operator to access the Calibration Adjustment Mode
- dSr** – Allows the operator to view the Displayed Software Revision

After gaining access to this menu (which is indicated by **rcL** being displayed), pressing the ON button will allow you to scroll through the list of options, pressing the OFF button will execute the option displayed at the time the OFF button is depressed.

Test Recall

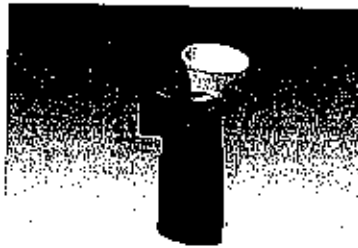
After the test result has been calculated the Instrument will display the result for several seconds after which the Instrument will power OFF. If the operator wants to review the result, while the instrument is OFF, momentarily press the OFF button and then simultaneously press the ON button. The display will show the first menu item off a list of optional functions that the instrument can perform. The first item on the list is rcl (Recall Last Test). To execute this function, pressing the OFF button will prompt the instrument to alternately display the result from the last test performed along with an Intermittent displayed rcl.

rcl 079
%BAC

Passive Sampling

Two common uses for this mode are to sample and determine if alcohol exists in the ambient air around a subject or in the headspace over an unknown liquid substance. If alcohol is detected, a positive indication is displayed.

When performing a passive test of a subject, for best results, attach the Passive Sample Cup as shown in the diagram below. If you are sampling the headspace of unknown liquid, the Passive Sampling Cup can be used, but is not required.



Performing a Passive Test

DURING POWER UP,
DEPRESS AND HOLD THE
POWER OFF BUTTON WHILE
AT THE SAME TIME,
PRESSING THE ON BUTTON.
RELEASE THE BUTTONS
ONCE rcl IS DISPLAYED
DEPRESS THE POWER ON
BUTTON TO SCROLL TO
THE PAS OPTION

PAS

DEPRESS THE OFF BUTTON
TO SELECT THE PASSIVE
MODE

28c

PAS

This will turn the unit on and display the first option from a menu listing. The first option will be rcl.

When the ON button is pushed it will cycle to the next menu item. If you continue to push the ON button, the instrument will cycle through the whole list of menu items and will eventually scroll back to the rcl option. For the purpose of performing a passive test, cycle the message to the PAS option.

Selecting the Passive Testing Mode by pressing the OFF button will initiate a Passive Test. This will be indicated by the display first indicating the instrument's current temperature (for passive testing the operating range is from 0°C to 50° C) and then flashing the PAS display. Once you see this flashing PAS display the Alco Sensor FST is prepared to capture a Passive Sample.

THIS MANUAL WILL DESCRIBE THREE WAYS TO CAPTURE A PASSIVE SAMPLE. FIRST WE WILL DESCRIBE HOW TO COLLECT A PASSIVE SAMPLE OVER AN OPEN CONTAINER. SECOND, WE WILL DESCRIBE HOW THE INSTRUMENT IS DESIGNED TO AUTOMATICALLY COLLECT A SAMPLE OF AIR FROM A SUSPECT WHO IS BLOWING IN THE DIRECTION OF THE INSTRUMENT; AND FINALLY WE WILL DESCRIBE HOW TO COLLECT A PASSIVE AMBIENT AIR SAMPLE FROM THE VICINITY OF A SUSPECTED ALCOHOL USER.

Test an Open Container

To test a beverage for the presence of alcohol, the instrument should be in the Passive Mode with "PAS" flashing. Next place the Alco-Sensor FST directly over the beverage. The instrument does not need to have the Passive Sampling Cup attached. The mouthpiece channel (or Passive Sampling Cup) should be positioned within one or two inches of the surface of the liquid. After several seconds press the ON button and a sample will be captured for analysis. A "PoS" result indicates the presence of alcohol in the beverage. A "nEG" result indicates that the alcohol content in the sample was negligible.

Test a Subject Passively

The best method to passively test a subject with the Alco Sensor FST is to automatically capture a sample from a subject who blows at the Passive Sampling Cup. To accomplish this, the instrument must have a Passive Sampling Cup attached and be in the Passive Mode with "PAS" flashing. (Note: the subject must have his/her lips approximately 2" from the Passive Sampling Cup and the subject must blow at the cup – see picture at left). In this mode, when the instrument detects a consistent flow of breath reaching the sample inlet port, an automatic sample will be collected for analysis. A "PoS" result indicates the presence of alcohol in the collected sample. A "nEG" result indicates that the alcohol content in the sample was negligible. Have the subject blow in the direction of the sample cup for as long as possible. Once you hear the instrument click the sample has been taken, it will be analyzed and a result reported.

Test the Environment Around a Subject

Finally, to merely test the air in the vicinity of a subject for alcohol, the instrument should be in the Passive Mode with "PAS" flashing. In order to capture a sample, place the Alco Sensor FST without the Passive Sampling Cup attached as near to the subject as possible (preferably near his nose or mouth) and press the ON button to capture a sample for analysis. A "PoS" result indicates the presence of alcohol in the air near the subject. A "nEG" result indicates that the alcohol content in the air was negligible.

It is important to understand that the further the Operator is from the subject's mouth and nose, the more dilute the sample will become and the less likely you will be able to identify a meaningful concentration of alcohol. Also, Passive Sampling on a subject only indicates the likely presence of alcohol, further direct sampling will validate a positive or negative passive result.

Repeat Passive Testing

The FST is designed to perform repeat Passive Tests while in the Passive Mode. After the displayed result, the instrument will go into a low power mode for two minutes. This mode is indicated by a dash slowly moving across the top of the display. Once in the low power mode there are three possible events that can change the instrument's mode of operation:

First, no buttons are pressed during the two-minute low power mode and the instrument automatically powers OFF. Auto power down will return the instrument to a standard testing sequence and if the operator wants to perform another Passive Test they must go through the menu selection process again.

A second option is that the operator presses the OFF button, powering the instrument OFF prior to the end of the two-minute low power timer. Again, the instrument will be in the standard direct sample mode if powered ON after this occurs.

Finally, if the ON button is pressed while the instrument is in the low power mode, the instrument will return to the Passive Mode (PAS flashing) after momentarily displaying the instrument temperature and battery strength indicator. With PAS flashing the instrument is ready to perform another Passive Test. Using this feature allows an operator to perform repeat Passive Samples with minimal delay between tests.

SECTION V ADMINISTRATIVE / MAINTENANCE FUNCTIONS

Overview

To obtain accurate subject test results, the unit must be properly calibrated.

The accuracy of an Instrument is verified by running a known alcohol concentration (standard) through the Alco-Sensor FST sampling system, and verifying that the result is within an acceptable tolerance of the expected or target value of the standard. This is called an accuracy check. It is also sometimes called quality assurance or a calibration check. The terms are used interchangeably; however, we will use the term accuracy check in this manual.

When performing an accuracy check, if the result of the accuracy check is within an acceptable tolerance of the stated value of the standard, the Alco-Sensor FST is considered calibrated. If the reading is not within the acceptable tolerance the Alco-Sensor FST must have its calibration adjusted. Only Intoximeters approved standards (dry or wet) gas samples with a known expected ethanol concentration should be used to perform the accuracy check or calibration procedure.

Alco-Sensor FSTs hold calibration for months. However, some users choose to perform an accuracy check once a week during the first month the unit is in use. This process helps establish that the new instrument is stable and increases the operator's confidence in its accuracy.

Intoximeters recommends you follow your own policy when performing accuracy checks. If you do not have a quality assurance policy, if an accuracy check has not occurred within the past 31 days, it is recommended that an accuracy check be run in conjunction with a subject test to ensure the instrument has maintained proper calibration.

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 or a wet bath simulator with properly certified and maintained ethanol solutions. The wet bath simulator should be approved for use by NHTSA and Intoximeters.

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.

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 positive standard values between .015 and .200 g/210L.

Approved Dry Gas Standard

ELEMENTS:

- A. Pressurized NHTSA and Intoximeters approved dry gas tank.
- B. Small single staged approved regulator
6 lpm regulator required for automatic sampling
- C. True-Cal device. *(Optional)*

MAKEUP:

NIST traceable tank contains a single-phased mixture of Nitrogen and Ethanol.

CHARACTERISTICS:

- A. Flow rate of the regulator must be 6 liters per minute for automatic sampling on Accuracy Checks and Calibrations. 1.5 liter per minute regulators can be used, but manual sampling on Accuracy Checks and Calibrations will be required. (1.5 lpm regulators purchased from Intoximeters can be modified in the field to become 6 lpm regulators – contact Intoximeters Customer Support for more information (314) 429-4000).
- B. 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.
- C. Expiration date is stamped on the label of the dry gas standard.

- D. The optional True-Cal device (programmed for your tanks alcohol concentration) used in the vicinity of the dry gas standard will display the expected value of the standard based on current barometric pressure at the time of the test.
- E. If you are not using a True-Cal device, the altitude chart on the side of the tank will give you the stated value of your tank adjusted for the pressure changes due to the elevation at which you are using the dry gas standard.
- 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 when bringing it back to operating temperature.

For True-Cal Device information see Accessory below.

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.

Accessory

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 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.

Accuracy Check Intervals

Unless stated otherwise by your programs protocol, if an accuracy check has not occurred within the past 31 days, it is recommended that an accuracy check be run in conjunction with 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 $\pm .005$ g/210L or 5% whichever is greater, to $\pm .010$ g/210L or $\pm 10\%$ whichever is greater.

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 $\pm .003$ g/210L 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, properly performed, 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 EXHIBITS ANY OF THE ABOVE CHARACTERISTICS CALL INTOXIMETERS SERVICE DEPARTMENT AT (314) 429-4000 OR (800) 451-8839.

Performing an Accuracy Check

Unit Temperature

The FST will only allow Accuracy Checks to be performed when the Alco-Sensor FST's temperature is between 0°-50°C.

Note: While wet bath Standard accuracy checks can be performed throughout the full 0°- 50°C temperature range, if you are using Dry Gas as your Standard for accuracy checks, then the unit and gas should be at or between 10°C and 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. Attach a new mouthpiece and power the instrument ON by first pressing and holding the OFF button and then simultaneously pressing ON button.
2. The display should show the rL message, which is the first option in the function Menu. Momentarily depress the ON button, the displayed message should change to PAS, press the ON button again, the displayed message should change to ACC. If it is not ACC repeat this step until ACC appears on the display.
3. With ACC on the display, press the OFF button to select the Accuracy Check option. The temperature will be displayed before a flashing ACC message will appear.
4. If the accuracy check is being done with a Wet Bath Standard skip this step and go to step 5. 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 6)
5. Prepare Wet Bath simulator for use. Be sure the stirrer is operating properly and the top is securely mounted. Also be certain that the bath temperature has reached 34°C and stabilized at this temperature for 15 to 30 minutes.
6. Attach a new mouthpiece to the Alco-Sensor FST. While the display shows a *flashing* ACC, 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.
7. Depress the regulator control button OR blow into the inlet port of the simulator. If there is 6 lpm or more of airflow, after several seconds, the instrument should capture a sample automatically. Make certain that you continue to provide a sample for at least one or two seconds following the point in time where the sample has been captured. (sample collection is identified by a *clicking* sound).
8. If for some reason you cannot provide an adequate flow rate for the instrument to collect an automatic sample, it is possible to perform an Accuracy Check by taking a manual sample. To perform a test in this manner, present a sample to the instrument for seven seconds. On the 5th second depress the ON button to take a manual sample. (The goal is to have gas still flowing through the Alco-Sensor FST mouthpiece when the sample is taken). Release the regulator control button OR stop blowing into the inlet port of the simulator on the 7th second.
9. Detach the mouthpiece from the regulator OR the simulator.
10. Observe the result and compare it to the known value of the standard gas.
11. Record the result in your calibration log. If it does not meet your programs specified tolerances, the unit will require a calibration adjustment. If the result is within the required tolerances, the procedure is completed.

Performing a 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 known standard within your testing program's specified acceptable tolerances. A calibration procedure or calibration adjustment should not be confused with the term "calibration check". A calibration check is synonymous

with an Accuracy Check. A calibration procedure or calibration adjustment is a procedure where the instrument's calibration setting is adjusted.

Unit Temperature

To calibrate an instrument its temperature must be between 15°C - 35°C. If the temperature is not within this range, the unit will display **E09** OR **E10** and block the calibration procedure.

Calibration Procedure - Step by Step

Before beginning this procedure have these items available:

- New mouthpiece
- Approved calibration standard
- Calibration logbook

Ready your calibration standard according to its instructions

- A. Attach a new mouthpiece and power the instrument **ON** by first pressing and holding the **OFF** button and then simultaneously pressing **ON** button.
- B. The display should show the **nl** message, which is the first option in the function Menu. Momentarily depress the **ON** button, the displayed message should change to **PAS**, press the **ON** button again, the displayed message should change to **ACC**, press the **ON** button one more time and the next message should be **CAL**. If it is not **CAL** repeat this step until **CAL** appears on the display.
- C. Once **CAL** is displayed, depress the **OFF** Button; this will initiate the Calibration sequence.
- D. The temperature will be displayed and if within range then **CAL** (*flashing*) will be displayed on the Instrument.
- E. 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. If there is adequate and consistent flow, after several seconds the instrument should capture a sample automatically. Make certain that you continue to provide a sample for at least one or two seconds following the point at which the sample has been captured. (identified by a clicking sound)

If for some reason you cannot provide an adequate flow rate for the instrument to collect an automatic sample, it is possible to perform a Calibration by taking a manual sample. To perform a test in this manner:

- F. Present a sample to the instrument for seven seconds. On the 5th second depress the **OFF** button to take a sample. The goal is to have gas still flowing through the Alcoa-Sensor FST mouthpiece when the sample is taken. Release the regulator control button OR stop blowing into the Inlet port of the simulator on the 7th second.
- G. Detach the mouthpiece from the regulator OR the simulator.
- H. The microprocessor will analyze the output from the fuel cell and will report a result.
- I. **If this value equals the current expected value** of the standard then depress the **OFF** Button. You will see that each time you depress the **OFF** Button, the *flashing digit* moves from the left most digit of the number to the right. After depressing the button (three times, the value displayed will be accepted as the Calibration Value and will flash three times before the Instrument will power down.
- J. If the result **does not** match the expected value or current target value of the standard gas, you will need to adjust the displayed result to the proper value. The result displayed will have the digit furthest to the left flashing. If the flashing digit is incorrect, press and release the **ON** button as many times as it is necessary to cycle the displayed digit to the correct number. When the digit is correct, press the **OFF** button to move the flashing highlight to a digit to the right. After you have adjusted the furthest to the right digit and the **OFF** Button is depressed, the new calibration value will be flashed on the display three times. If you need to adjust this number further, pressing the **OFF** Button again, while the entire calibration number is flashing, will provide you this option by displaying the most recently entered number with the digit furthest to the left flashing. If the calibration value is correct and you have not pressed the **OFF** button a second time, after the third flash the new Calibration value will be accepted.
- K. Cycle the power on the instrument **OFF** and **ON** and perform an Accuracy Check to verify the calibration adjustment.
- L. It is essential to verify the calibration. Use a new mouthpiece and an approved gas standard. **THE RESULT SHOULD BE WITHIN ± .003 OF THE EXPECTED VALUE OF THE STANDARD GAS READING.**
- M. If this Accuracy Check does not produce a result within ± .003 of the standard's target value repeat the calibration procedure after waiting several minutes.

Battery Replacement Procedure

The batteries will need to be replaced when the displayed battery icon indicates the battery is out of power. The display shows BAT or there is not enough power to power the instrument ON.

BAT

To replace the batteries follow these instructions.

- Remove the optional rubberized grip (if the ASFST is equipped with this option)
- Slide BATTERY DOOR open.
- Remove both BATTERIES.
- Insert two new BATTERIES.
(Note the + and - labels within the battery compartment to insert the batteries properly)
- Close BATTERY DOOR.
- Replace rubberized grip

SECTION VI TROUBLE SHOOTING & TECHNICAL SUPPORT

Trouble Shooting

Aborting a Test

To abort a test depress the OFF button to turn the Instrument OFF.

E11 - Blank Test is not Successful

Before the subject provides a sample the instrument automatically performs a blank test to ensure that the unit is free of alcohol. If this test does not result in a zero reading the test will display E11. Remove and replace the mouthpiece. Make certain that you are using a new, clean mouthpiece. Wait a few moments before inflating another test. If repeated attempts do not result in a zero reading contact Intoximeters' Service Department.

E06 - Insufficient Breath Sample

The standard instrument will allow the subject a preset number of attempts to provide a sample before it will display the status message E06 and power off. (The majority of Alco-Sensor FST software versions are preset to allow the subject three attempts to provide a proper sample).

If the subject has impaired breathing it is possible to take the sample manually with the standard version Alco-Sensor FST. (see also: Manual Sampling, page 10)

Improper Breath Sample

An Improper Breath Sample was detected by the instrument and is indicated by the FLO message flashing several times along with one of the following descriptors: Lo, HI, InS or Cut. FLO Lo - indicates subject breath flow fell below the instrument's minimum flow requirements; FLO HI - indicates subject breath flow exceeded maximum allowable flow rate; FLO InS - indicates subject breath flow was not consistent; FLO Cut - indicates subject provided enough sample to capture a sample, but breath flow stopped too abruptly

Low Battery

The battery level indicator is displayed on power up and will give the user an indication of current battery strength. If the battery strength is lower than the instrument's requirement for performing a test BAT will flash on the display and the instrument will power off. Battery replacement is required. (see also: Battery Replacement Procedure, page 18)

Radio Frequency Interference (RFI) Sensor

An RFI sensor is built into some versions of the Alco-Sensor FST. In all versions, the Alco-Sensor FSTs casing is designed to provide RFI shielding for the 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 FST. 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.

E09 & E10 Temperature of Instrument too high or too low

The Instrument temperature is displayed after the mouthpiece has been inserted. If this temperature is below 0°C or above 50°C (the standard Alco-Sensor FST range), the test cannot be inflated. 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. (Versions of this instrument can be set up so that they operate outside of the standard temperature range. In these instruments, temperature outside the standard range will flash on the display, but the test will be allowed to proceed.)

Time Outs

If no breath sample is blown into the instrument, bLo will be displayed for 30 seconds before the test is aborted and the instrument powers down.

If the Alco-Sensor FST is being used in the passive mode, and no test is performed for 120 seconds the instrument will power off.

Status Messages

bIn	Indicates that a blank test is in process
OFF	Indicates that the instrument has been turned OFF
bLo	Indicates that the instrument is ready to accept a sample
PAS	In the Maintenance Menu this menu item indicates the Passive Testing Option
nEg	Indicates, during a PASSIVE TEST, that the prior test result was negative
PoS	Indicates, during a PASSIVE TEST, that the prior test was positive
CAL	Menu item indicating the Calibration Mode Option
Bat	Battery power low – Change the battery
FLO Lo	Subject's breath flow fell below the instrument's minimum flow requirements before the minimum volume requirement was met. Subject is given a preset number of attempts to provide an adequate sample before the test is aborted. Instruct the subject to provide a continuous sample with a moderate rate of breath flow.
FLO HI	Subject's breath flow exceeded maximum allowable flow rate. Subject is given a preset number of attempts to provide an adequate sample before the test is aborted. Instruct the subject to provide a continuous sample with a moderate rate of breath flow.
FLO InS	Subject's breath flow was not consistent. Subject is given a preset number of attempts to provide an adequate sample before the test is aborted. Instruct the subject to provide a continuous sample with a moderate rate of breath flow.
FLO Cut	Subject provided enough breath flow to capture a sample but their breath flow stopped too abruptly. Subject is given a preset number of attempts to provide an adequate sample before the test is aborted. Instruct the subject to provide a continuous sample with a moderate rate of breath flow.
RFI	Instrument detected possible radio frequency interference at the time of the test and aborted the test process.
reL	Indicates that the result that is being viewed is a recalled test result from the previous sample.
E03	Blank Timeout (> 60 seconds)
E06	Exceeded Sample Attempt Allotment
E07	Bad Calibration (Invalid Sample)
E09	Temp too Cold for Test Type Being Performed
E10	Temp too Hot for Test Type Being Performed
E11	Failed Air Blank – Replace mouthpiece with new mouthpiece and begin test again
E12	RFI Detection Error

E21	Invalid Sample
E22	Invalid Calibration Target (<.015, >.200)
E23	Recall Memory Failure
E25	Insufficient drive voltage to reset solenoid
E26	Excess drive voltage after solenoid reset
E27	Insufficient drive voltage to sample
E28	Excess drive voltage after sample
E29	Fuel Cell Out of Range
E30	Pressure Sensor Baseline Out of Range
E31	Result Over Range
E32	Internal Error

Frequently Asked Questions

Q: After a fifteen-minute deprivation period does the Alco-Sensor FST respond to anything other than alcohol found in the human breath?

A: *The Alco-Sensor FST responds only to alcohol. It does not respond to acetone or hydrocarbons, which also might be present in the breath.*

Q: What is the life of a fuel cell?

A: *Field use indicates that fuel cells have an average life of 3 - 6 years.*

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 or our Totnes UK office. You will be provided with a local name and number. Likewise, for product replacement parts and pricing for mouthpieces, protector set, passive sample cup, carrying case, in-service training, etc., a list of technical service locations or general information, the St. Louis office, UK 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

Intox UK
Alpha Center Unit 6 A-D
Babbage Road
Totnes, Devon UK
TQ9 5JA
44 (0) 1803 868602

Information is also available 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 and U.K; this may include motor freight or United Parcel Service. Airfreight 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. or U.K. (for instruments repaired in the UK) 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 RMA sheet, which you can obtain from our website (www.intox.com/forms_apps.asp) or request by calling customer service (314/429/4000). Additionally, we will accept units for repair that arrive with a letter describing in detail the difficulty being experienced with the product. The letter must also include a name and phone number of the contact person and proper billing and shipping instructions.

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.

Intoximeters, Inc.
8110 Lackland Road
St. Louis, Missouri 63114
(314) 429-4000
800-451-8638 T
FAX: (314) 429-4170

Intox UK
Alpha Center Unit 6 A-D
Babbage Road
Totnes, Devon UK
Q9 5JA
44 (0) 1803 868602

Information is also available at:

www.intox.com

Intoximeters, Inc.

8110 Lackland Road

St. Louis, MO 63114

(800) 451-8639

(314) 429-4000

(314) 429-4170 (fax)
