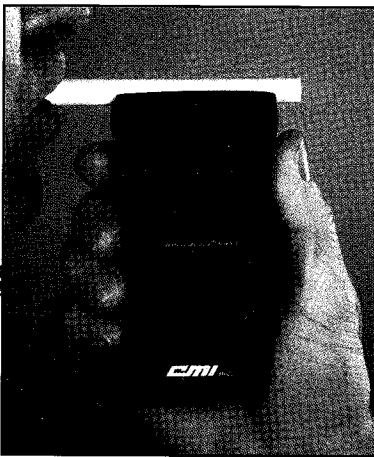


# ***Intoxilyzer***<sup>®</sup> **S-D5**

---

OPERATOR'S MANUAL



Part No. 650264

**EMI** INC.



316 E. 9th St.  
Owensboro, KY 42303  
800-835-0690  
Fax: 270-685-6268  
www.alcoholtest.com

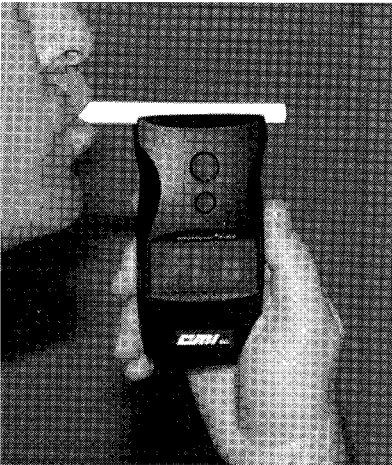
---

*Operator's  
Manual*

# ***Intoxilyzer<sup>®</sup>*** **S-D5**

© 2000 by CMI, Inc.

*No part of this work covered by the copyrights hereon may be reproduced or copied in any form or by any means—graphical, electronic, mechanical, including photocopying, taping or information storage and retrieval systems—without written permission of CMI, Inc.*

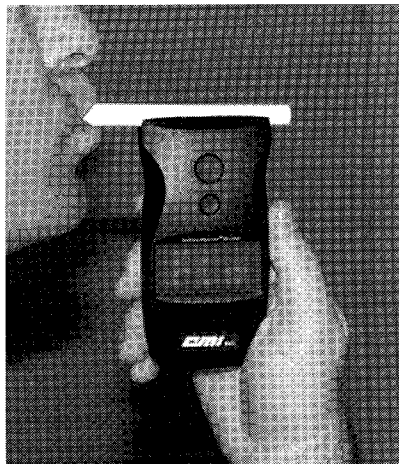


## TABLE OF CONTENTS

<b>INTRODUCTION</b> . . . . .	<b>1</b>
<b>PRINCIPLES OF OPERATION</b> . . . . .	<b>2</b>
• Instrument Features . . . . .	<b>3</b>
<b>SUBJECT BREATH TEST</b> . . . . .	<b>5</b>
• Preliminary Donor Questioning . . . . .	<b>5</b>
• Detailed Procedure . . . . .	<b>6</b>
• Donor Refusals and Failures . . . . .	<b>8</b>
• Manual Breath Sampling . . . . .	<b>8</b>
• Last Test Recall . . . . .	<b>9</b>
<b>CALIBRATION REQUIREMENTS: USE OF THE DRY GAS STANDARD</b> . . . . .	<b>10</b>
• The Alcohol Standard . . . . .	<b>10</b>
• The Gas Standard . . . . .	<b>11</b>
• Using a Dry Gas Standard at High Altitude . . . . .	<b>11</b>
• Altitude Correction Chart . . . . .	<b>12</b>
• Use of a Wet-Bath Simulator . . . . .	<b>13</b>

<b>CALIBRATION CHECK PROCEDURE . .</b>	<b>14</b>
<b>CALIBRATION ADJUSTMENT . . . . .</b>	<b>16</b>
<b>POINTS TO REMEMBER . . . . .</b>	<b>19</b>
• "Mouth Alcohol" . . . . .	19
• Mouthpiece . . . . .	19
• Smoking . . . . .	19
• Manual Breath Sampling . . . . .	20
• Storage Between Tests. . . . .	20
• Battery Replacement . . . . .	20
<b>SOME DOs AND DONTs . . . . .</b>	<b>21</b>
<b>SPECIFICATIONS . . . . .</b>	<b>23</b>
<b>ERROR AND WARNING MESSAGES . .</b>	<b>25</b>





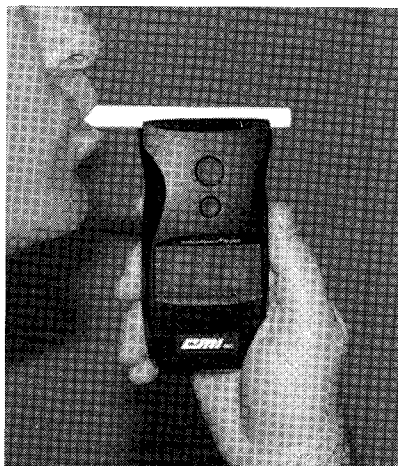
## INTRODUCTION

The Intoxilyzer® S-D5 is the latest in the CMI, Inc. line of handheld quantitative breath alcohol testing instruments. It can be used for law enforcement, workplace safety and medical purposes and is the successor to the popular S-D2 model, thousands of which have been used worldwide for several years. Unlike the S-D2, which requires manual operation, the S-D5 features an easy-to-use automatic sampling system. The S-D5 is just one of the range of instruments manufactured by CMI, Inc. for breath alcohol testing purposes.

The Intoxilyzer® S-D5 is accurate and reliable, allowing a complete breath test procedure to be conducted in about 30 seconds.

This manual describes the operation, maintenance, calibration check, and calibration adjustment of the S-D5. This manual should be read completely and fully understood by each operator prior to testing a subject. It is further recommended that operators practice the breath testing process before giving an actual "in the field" test.

## PRINCIPLES OF OPERATION



The Intoxilyzer® S-D5 uses an electrochemical fuel cell, containing two platinum electrodes, to detect and measure the concentration of alcohol vapor in expired breath. When breath is drawn into this fuel cell, by means of the sampling system, a small voltage is generated in proportion to its breath alcohol concentration. This fuel cell is fed to an electronic amplifier and displayed on a digital meter (light emitting diode).

The instrument is simple to operate and may be used as often as required, provided that a suitable delay is allowed between successive tests. This time delay allows the fuel cell to clear itself of alcohol and prevents the possibility of additive readings. If no alcohol is present in a test, a second test may be analyzed immediately, since the fuel cell voltage is already at zero. Unless the breath alcohol level of the subject is very high, the instrument will generally be clear enough to receive and analyze the second sample in less than two minutes.

## INSTRUMENT FEATURES

### 1) Disposable Mouthpiece

This is attached to the sampling port. For hygienic reasons, mouthpieces are supplied separately packed and are disposable. A new mouthpiece must be used for each breath test. This minimizes health concerns and prevents cross-sample alcohol contamination. The mouthpiece used on the Intoxilyzer® S-D5 is the same as used on the Intoxilyzer® S-D2.

### 2) Function Button "A"

The uppermost button is used for various functions described in this manual

### 3) Function Button "B" (On/Off switch)

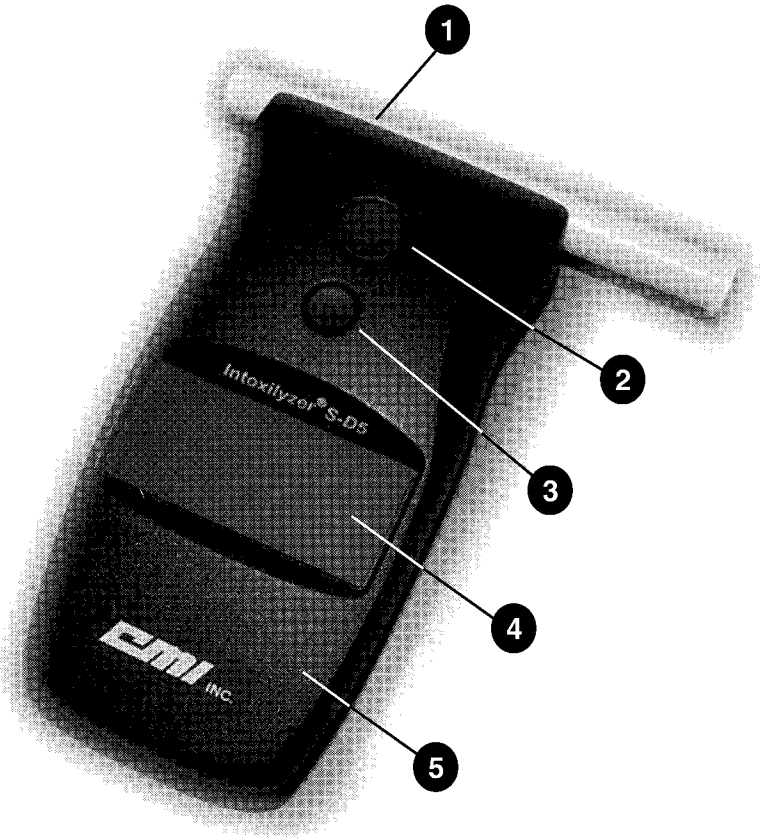
Depress once to activate the unit. The lower button is used for functions described in this manual. Function button "**B**" is also used to turn off the unit by holding it down for three seconds until the display shows "**Off**".

### 4) Digital Display

Provides on-screen directions to the instrument operator and indications of the subject's breath alcohol concentration. Illuminates in bright red LED and at night for use in dark conditions.

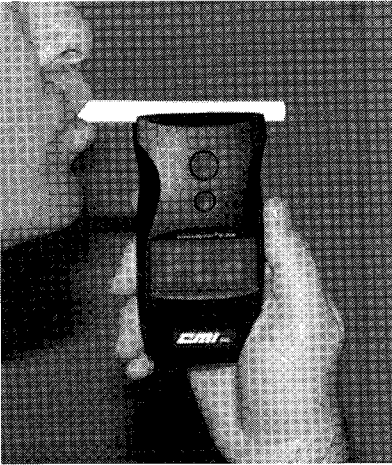
### 5) Beeper

Provides audible warning messages to the operator.



- 1 Disposable Mouthpiece
- 2 Function Button "A"
- 3 Function Button "B" (On/Off)
- 4 Digital Display
- 5 Beeper





## SUBJECT BREATH TEST

Although the Intoxilyzer® S-D5 is extremely simple to operate, it is important that the following procedure is used each time a breath test is given. Deviation from the proper procedure will not generally affect the result of a test. However, the integrity and capability of an operator, and even the legality of any resulting action, could be questioned and brought into doubt if it is found later that the operator did not follow the proper testing procedure. This is true even if the test subject was not analytically prejudiced by it.

### PRELIMINARY DONOR QUESTIONING

Ask the subject when he/she last took anything by mouth. Some foods and even “non-alcoholic” drinks may contain traces of alcohol, which the subject may later claim affected the result of the test through a “mouth alcohol” effect. To prevent this, wherever possible, insure that a delay of about 20 minutes has elapsed since the subject took anything by mouth—even medicines which may contain alcohol.

Do not even allow the subject a glass of water prior to the test since this will cool the mouth and dilute the saliva, temporarily reducing the amount of alcohol in the breath, and, consequently, the instrument reading. A

delay of at least two minutes should take place between the time the donor last smoked and the test.

## DETAILED PROCEDURE

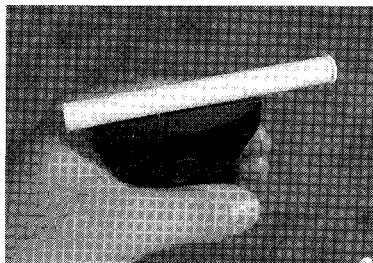
This section describes how the Intoxilyzer® S-D5 is used in a breath test.

### 1) TURN INSTRUMENT "ON"

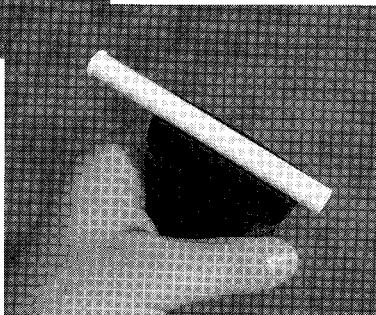
Switch the instrument on by pressing Function Button "B" and wait for "blo" to be displayed which is shown for only a brief time to conserve battery power. The decimal point will then flash.

### 2) ATTACH MOUTHPIECE

You can then attach a new disposable mouthpiece to the sampling port. The mouthpiece can be attached to blow from either side of the unit. The hole in the mouthpiece will fit snugly around the sampling port on the top of the S-D5 and snap into place.



The mouthpiece can be attached to blow from either side of the unit. Do whatever is most comfortable.



### 3) INSTRUCT THE SUBJECT

Instruct the subject to take a deep breath and to blow into the lipped end of the mouthpiece at a steady pace until you say "stop." During the time when the subject is blowing, the S-D5 will display "Flo".

### 4) SUBJECT PROVIDES SUFFICIENT SAMPLE

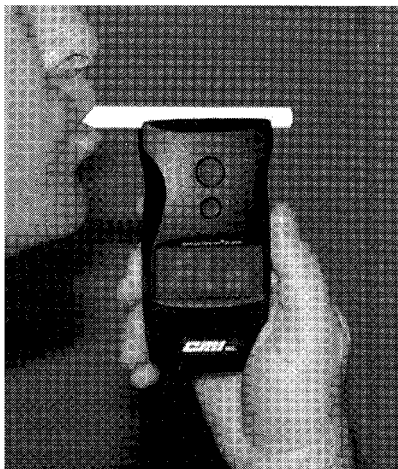
You can instruct the subject to stop blowing when you hear a *click* and the unit begins to analyze the sample (4-6 seconds).

### 5) OBSERVE READING

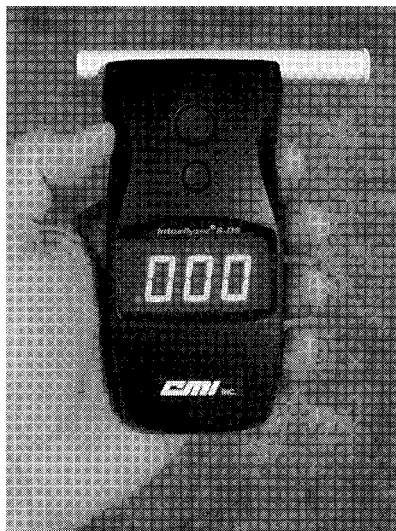
If alcohol is detected, the reading will rise incrementally on the display until it reaches its peak value. If the result is negative, the display will quickly read ".000".

### 6) DISCARD MOUTHPIECE

After the final reading is made, remove the mouthpiece and discard. Never use the same mouthpiece for subsequent tests on different subjects.



While the subject blows, "Flo" will appear on the display. This tells you the subject is providing a sufficient sample of air for analysis.



If alcohol is not detected in the subject's breath, the display will quickly read ".000".

S-D5 will automatically reset itself to allow more breath tests to proceed. “**Blo**” will appear in the display when the unit is ready for more tests. If a test result is positive, it may take a few minutes before the unit is ready for another test. This time will vary depending on the concentration of the positive test.

### **A WORD ABOUT MOUTHPIECES...**

The Intoxilyzer® S-D5's sampling port is designed specifically for the particular Intoxilyzer® S-D5 mouthpieces sold by CMI, Inc. It is strongly recommended that mouthpieces for the Intoxilyzer® S-D5 be ordered from CMI at 1-800-835-0690 or an authorized CMI distributor.

## **DONOR REFUSALS AND FAILURES**

If the subject is not able to provide a sufficient sample, one of the following two messages will be displayed:

- “**Vol**” indicates that the subject provided a sample that did not satisfy the breath sampling requirement
- “**Suc**” indicates the subject attempted to foul the test by withdrawing his/her sample

In both cases, the S-D5 will be unable to analyze a sufficient sample of breath for a quantitative result. The operator should wait for “**Blo**” to be displayed before proceeding with another try.

## **MANUAL SAMPLE**

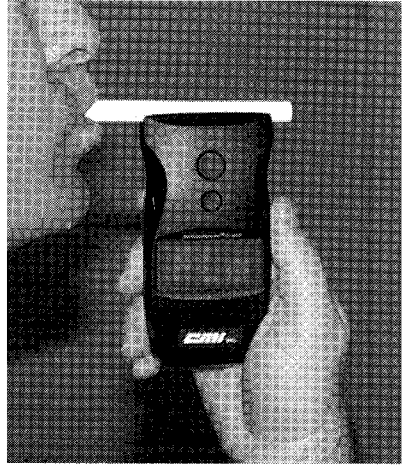
If the subject cannot provide a sufficient sample, the S-D5's manual override feature makes it possible to still acquire and analyze a breath sample. While the subject is blowing,

simply press and release Function Button “**A**”. The S-D5 will then sample the breath as provided. Note: Since the manual sample feature is controlled by the operator, the breath sample might not be of the deep lung air equivalent that the automatic sampling mode requires. Because of this, the manual sample result might not reflect the true BAC of the subject.

### **LAST TEST RECALL**

The S-D5 can recall from its memory the last breath test record. Simply press and release Function Button “**B**” to show the last test result value. If the value shown is “**no**”, this indicates that the previous test was aborted because of the “**Vol**” or “**Suc**” conditions described above.

## **CALIBRATION REQUIREMENTS: USE OF THE DRY GAS STANDARD**



The Intoxilyzer® S-D5 uses an electrochemical fuel cell to detect and measure the concentration of alcohol in expired breath. The sensitivity of the instrument changes slowly with time, due to aging of the platinum electrode within the fuel cell. This change in sensitivity is very slight and calibration will not normally change significantly over a six-month or longer period.

Monthly calibration checks are recommended to determine when calibration adjustment is needed.

Either a dry gas standard or wet-bath simulator may be used to generate the standard alcohol vapor required.

### **THE ALCOHOL STANDARD**

Calibration checks and adjustments can be conveniently done using a dry gas standard. This consists of a mixture of alcohol in air or nitrogen.

The quantity of alcohol in the gas is accurately known and is shown on the label. Therefore, when

the instrument is calibrated using a dry gas standard, subsequent breath tests will indicate the subject's blood alcohol concentration (BAC).

Dry gas standards are supplied in one of four ranges, each range based around a legal limit which is in wide use: .040% BAC, .045% BAC, .085% BAC and .105% BAC. For calibration above 3,000 feet, use a gas value of .085 or greater.

## **THE GAS STANDARD**

The gas canister is a high-pressure, disposable cylinder fitted with a regulator. Cylinders are available in two sizes, containing enough gas for approximately 100 or 300 calibration checks or adjustments.

The label on each cylinder is marked with an expiration date. The gas should not be used after that time due to deviation of alcohol concentration of the gas outside the analytical specifications of the instrument.

When the cylinder is empty or time-expired, the regulator can be safely unscrewed from the cylinder and retained for use with a new cylinder. After venting all pressure, the old cylinder can then be disposed or recycled.

## **USING A DRY GAS STANDARD AT HIGH ALTITUDE**

The concentration of alcohol in the dry gas standard is calculated and carefully controlled to give the correct vapor concentration when the cylinder is used at sea level at normal atmospheric pressure. At lower atmospheric pressures, the concentration of alcohol in the vapor leaving the cylinder will be less. The change in alcohol concentration due to normal atmospheric pressure changes at sea level is so small as to be negligible, but if the dry gas standard was used at a high altitude, significant errors would result if suitable corrections were not made.

## ALTITUDE CORRECTION CHART

Elevation from Sea Level	Correction Factor
0	1.000
500	.981
1000	.962
1500	.943
2000	.925
2500	.907
3000	.889
3500	.872
4000	.854
4500	.837
5000	.820
5500	.804
6000	.787
6500	.771
7000	.755
7500	.740
8000	.724



Intoxilyzer® S-D5 itself to alcohol is **not** affected by changes in atmospheric pressure; it is only the concentration of the alcohol in the vapor from the dry gas standard that is affected.

The Altitude Correction Chart on the preceding page gives the correction factors which should be applied to the stated dry gas value when calibration checks or adjustments are made at various altitudes above sea level.

*Correction factor sample:*

*Suppose the dry gas standard you are using has a value of .045% BAC at sea level, but it is being used at an altitude of 500 feet. Using the chart on page 16, the correction factor would be (0.981). Therefore, the corrected value of the dry gas standard would now be (.045 x .981 = .044% BAC).*

## **USE OF A WET BATH SIMULATOR**

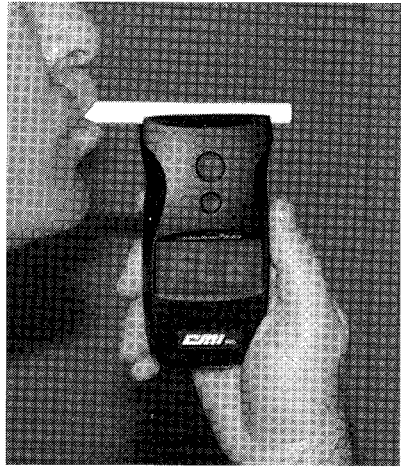
If required, a wet bath simulator can be used instead of a dry gas standard to perform calibration checks and adjustments on the Intoxilyzer® S-D5.

A wet bath simulator should be used according to its own instructions. Pay particular attention to the alcoholic strength and temperature of the solution used.

A mouthpiece should be attached to the simulator outlet for direct attachment to the sampling port on the instrument. A flow rate of air of about 1.5-2 liters per second should be used. Any higher rate may result in the formation of an aerosol and lead to excessive cooling of the solution itself.

The simulator vapor must be allowed to pass through the mouthpiece for at least ten seconds before the sample is "taken" for analysis.

## CALIBRATION CHECK PROCEDURE

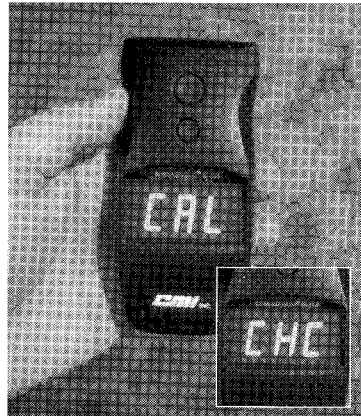


The calibration check procedure insures that the Intoxilyzer® S-D5 is reading alcohol levels correctly and alerts the operator that a calibration adjustment is needed. It is recommended that the instrument's calibration be checked once per month.

### DETAILED PROCEDURE

#### 1) ENTER THE CALIBRATION CHECK MODE

Switch the instrument on by pressing Function Button “**B**”. As the S-D5 is performing its startup self test—upon the third digit displaying an “**8**”, press and release Function Button “**A**”. The instrument will then enter its “calibration modes” cycle. Use Function Button “**B**” to cycle between showing “**CAL**” and “**CHC**”. When the display is showing “**CHC**”, select this option by pressing and releasing Function Button “**A**”.



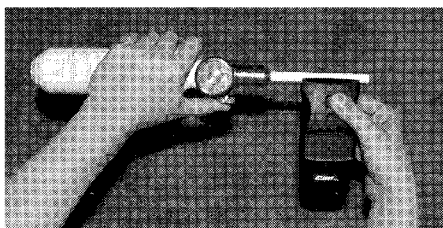
After entering the calibration modes, the unit will cycle between showing “**CAL**” and “**CHC**”. When “**CHC**” is displayed, enter the calibration check mode by pressing Function Button “**A**”.

## 2) CHOOSE BETWEEN DRY GAS STANDARD OR WET BATH SOLUTION

You now have a choice of using either dry gas standard or wet bath solution to perform the calibration check. To cycle between these modes, “**Gas**” and “**Sol**”, press Function Button “**B**”. Once your chosen calibration source is displayed, press and release Function Button “**A**” to confirm.

## 3) DISPENSE THE CALIBRATION STANDARD

The instrument will then ready its sampling mechanism for calibration which will take a few seconds. When ready, the decimal point on the bottom left of the display will flash at a steady rate. Dispense the calibration standard through a new mouthpiece attached to the sampling port for a period of at least five seconds. While the calibration standard is still flowing, press and release Function Button “**A**” to sample the standard and perform the check. The result will be displayed.



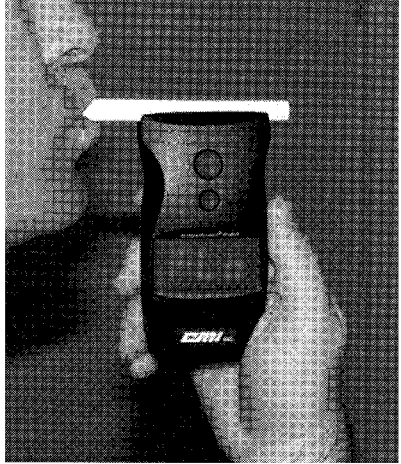
**Dispense the calibration standard (dry gas standard shown) into the unit through a mouthpiece for at least five seconds. Press Function Button “A” to sample the standard.**

Once the calibration check process is completed, the S-D5 will return to the “calibration check mode” and should be switched off by pressing Function Button “**B**”.

If the calibration check shows the instrument is outside the acceptable range of the calibration standard, a calibration adjustment should be done using the procedure described in the next section.

## CALIBRATION ADJUSTMENT

Calibration adjustment is required when a calibration check indicates the Intoxilyzer® S-D5 has deviated more than  $\pm .005$  BAC from a known standard of alcohol vapor. During the calibration adjustment procedure, the Intoxilyzer® S-D5 will automatically adjust its fuel cell to compensate for any change in sensitivity of the fuel cell detector over a period of time. Adjustment should not normally be required more than two or three times per year.



### THE DRY GAS CALIBRATION VALUE

Since the fuel cell detector responds linearly to the concentration of alcohol vapor in the standard, the actual value of the dry gas standard used for calibration is not important, provided that the instrument is actually calibrated to this value.

### DETAILED PROCEDURE

The calibration adjustment process assumes three conditions:

- The instrument has not analyzed a sample of alcohol within the past hour,
- The instrument is in its normal operating temperature range, and
- The battery does not need replacement.

## 1) ENTER THE CALIBRATION CHECK MODE

Switch the instrument on by pressing Function Button “**A**”. As the S-D5 is performing its startup self test—upon the third digit displaying an “**8**”, press and release Function Button “**A**”. The instrument will then enter its “calibration mode” cycle. During this time, use Function Button “**B**” to cycle between showing “**CAL**” and “**CHC**”. When the display is showing “**CAL**”, select this option by pressing and releasing Function Button “**A**”.

## 2) CONFIGURE UNIT TO CALIBRATION STANDARD

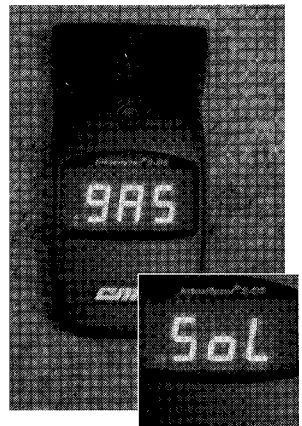
The S-D5 will now show a value for the calibration standard. To change this value to correspond to your calibration standard, press Function Button “**B**” to increment the figure to your desired value. The calibration value range is from 0.050% BAC to 0.125% BAC. Upon reaching 0.125% BAC, the calibration value will revert back to 0.040% BAC. Once your desired calibration value is displayed, press and release Function Button “**A**” to confirm.

## 3) CHOOSE BETWEEN DRY GAS STANDARD OR WET BATH SOLUTION

You now have a choice of using either a dry gas standard or wet bath solution to perform the calibration. To cycle between these modes, “**Gas**” and “**Sol**”,

**You have a choice of using either a dry gas standard or wet bath solution to perform the calibration.**

To cycle between these modes, “**Gas**” and “**Sol**”, press Function Button “**B**”. Once your chosen calibration source is being displayed, press and release Function Button “**A**” to confirm.

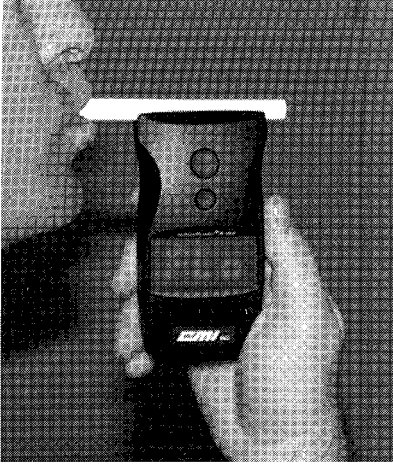


press Function Button “**B**”. Once your chosen calibration source is being displayed, press and release Function Button “**A**” to confirm.

#### 4) DISPENSE THE CALIBRATION STANDARD

The S-D5 will then ready its sampling mechanism for calibration which will take a few seconds. When ready, the decimal point on the bottom left of the display will flash at a steady rate. Dispense the calibration standard through a new mouthpiece attached to the sampling port for a period of at least five seconds. While the calibration standard is still flowing, press and release Function Button “**A**” to sample the standard and then stop the calibration standard flow.

Once the calibration process is complete, the instrument will return to the “calibration modes.” Your S-D5 is now calibrated and should be switched off manually using Function Button “**B**”.



## POINTS TO REMEMBER

The following information, if applied to the operation of your Intoxilyzer® S-D5, will help prevent any problems.

### “MOUTH ALCOHOL”

Twenty (20) minutes should pass between the consumption of alcohol and a breath test using the Intoxilyzer® S-D5. This period allows for any “mouth alcohol” to be dispersed. “Mouth alcohol” will give artificially high breath readings and is not indicative of actual impairment of the subject.

### MOUTHPIECE

Use a new mouthpiece for every subject breath test, calibration check and calibration adjustment. Insure that the subject blows (or the alcohol standard is introduced) through the lipped edge, wide-bored end. Only mouthpieces from CMI, Inc. should be used.

### SMOKING

Smoking just prior to a breath test will not influence the result, but tobacco smoke should not be blown through a mouthpiece attached to the instrument. Tobacco smoke could damage the fuel cell.

## MANUAL BREATH SAMPLING

When a sufficient volume of breath is blown into the mouthpiece, the Intoxilyzer® S-D5 automatically “takes” a sample for analysis. If, for any reason, the subject cannot or will not provide a sufficient sample, **Function Button A** can be pushed while the subject is blowing to manually obtain a sample for analysis.

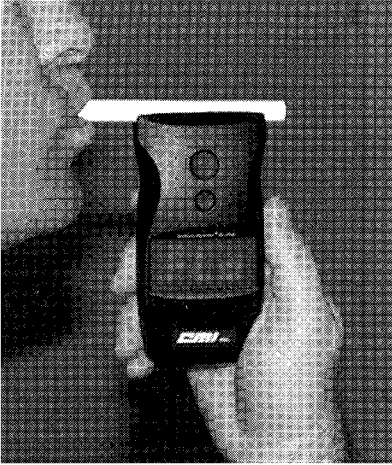
## STORAGE BETWEEN TESTS

Avoid storing the Intoxilyzer® S-D5 in temperature extremes.

## BATTERY REPLACEMENT

The Intoxilyzer® S-D5 is powered by two AAA batteries which are under the battery cover on the backside of the unit. A low battery warning appears on the display when battery power is low, and they should be replaced as soon as possible.





## SOME “DOs” AND “DON'Ts”

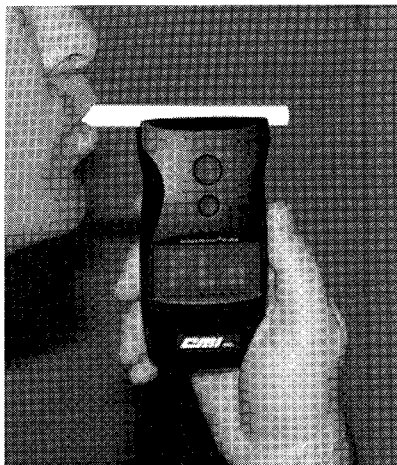
### WHAT TO DO...

- Do press the function buttons lightly. Excessive force is not required.
- Do store the unit with batteries to avoid discharging the internal lithium battery that backs up the computer circuitry.
- Do change the batteries as soon as the low battery warning is displayed.
- Do change both batteries at the same time.
- Do use the correct mouthpiece for the Intoxilyzer® S-D5. Intoxilyzer® S-D2 mouthpieces can also be used.
- Do use a clean, new mouthpiece for each subject test and calibration check and adjustment.
- Do insure the subject blows into the wide-bore, lipped end of the mouthpiece.

- Do check the instrument's calibration at least once per month.

### **WHAT NOT TO DO...**

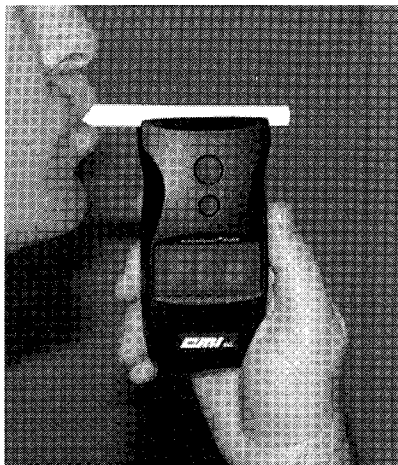
- Do not test the subject if you believe he/she may have been drinking within the last 20 minutes or smoking within the past two minutes.
- Do not permit the subject to hyperventilate immediately prior to supplying his/her breath sample.
- Do not store the unit in temperate extremes, either hot or cold.
- Do not subject the unit to unnecessary shock. Normal wear and usage will have no affect on the unit.
- Do not clean the unit with chemical or abrasive products because they could cause permanent damage.
- Do not allow the sampling port to become blocked.
- Do not block or restrict the end of the mouthpiece, such as with your finger, while the subject is blowing. This may seriously damage the unit.
- Do not open the unit or attempt any repairs.
- Do not deviate from the instructions in this manual.



## SPECIFICATIONS

MODEL:	Intoxilyzer® S-D5
DESIGNATION:	Portable, handheld, breath alcohol measuring instrument
DETECTOR:	Electrochemical fuel cell which generates a voltage or current in proportional response to breath alcohol vapor concentration.
SPECIFICITY:	The detector is unaffected by acetone, paint and glue fumes, foods, confectionery, methane and practically all other non-alcoholic substances at the levels found in human breath.
SAMPLING:	Automatic after the subject blows for 4-6 seconds. An override feature for manual sampling is provided.
MEMORY:	Result of the last test is stored and can be recalled until the next test is taken.

ACCURACY:	Meets DOT specifications of $\pm 0.005$ BrAC up to 0.100 BrAC and $\pm 5\%$ above 0.100 BrAC.
RESPONSE TIME:	Within five seconds of sampling, depending on alcohol concentration.
RF INTERFERENCE:	Case is impregnated with RFI shielding material for RFI protection.
DISPLAY:	Large, three digit LED (9/16" x 5/16")
AUDIBLE INDICATOR:	Beeper signals fault conditions and changes in instrument status.
VISUAL INDICATOR:	LEDs are used for alpha prompting of the operator.
INSTRUMENT CONTROL:	By microcontroller
RECOMMENDED OPERATING TEMPERATURE:	23° to 104°F (-5° to 40°C)
CALIBRATION:	Automated procedure by either dry gas or wet bath simulator.
DIMENSIONS:	2½" w x 4¾" h x 1¼" d
POWER SUPPLY:	Two "AAA" batteries
WARRANTY:	One year, parts and labor



## WARNING & ERROR MESSAGES

The following messages may appear in the unit's display indicating an error has occurred:

### ERROR MESSAGE

E1  
E2  
E3  
E4  
E5  
E6  
E7  
  
E8  
E9  
E10  
E11  
E12  
E13  
E14  
E15  
bat  
SuC

### MEANING

Calibration corrupt  
Cell over range  
Low calibration reading  
Low calibration flow  
Charge pump error  
Temperature out of range  
Calibration temperature  
out of range  
Flow over range  
Communications breakdown  
Last test corrupt  
PC settings corrupt  
Flow offset high  
Setup restored  
Temperature restored  
Calibration restored  
Low battery level  
Subject sucks back  
during the test