



PAS Flashlight

Passive Alcohol Sensor



PAS Systems International, Inc.

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Thank you for purchasing this PAS Flashlight and supporting passive alcohol sensor technology. Before use, please read this manual carefully to avoid unnecessary damage to the fuel cell and to ensure that you get the best possible results when screening for alcohol. For questions regarding the use and maintenance of this device, contact PAS Technical Service at 855-754-4433.

For more information on how to use a flashlight scan the QR code below:



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SECTION I OVERVIEW

1.0 Introduction

The PAS Flashlight Alcohol Screening System combines a high-intensity 3-Mode LED flashlight, with a dynamic sampling system and miniature alcohol sensor. It "sniffs" ambient air, the breath, open containers, or enclosed spaces for the presence of alcohol, functioning as a non-intrusive "*extension of the operator's nose*".

The device is used to check the presence/absence of alcohol with or without a subject's direct participation. When used ***without the subject's direct participation*** it's known as **passive** sampling, as opposed to active testing where the subject blows directly into a mouthpiece or the intake port.

The passive alcohol sensor was developed from prototype sensing devices that had been produced to specifications proposed by the Insurance Institute for Highway Safety.

The PAS Flashlight can be operated with one hand, leaving the other completely free. The instrument is easy to use and has been designed to withstand the physical conditions experienced in operational situations. It is resistant to adverse weather conditions and mechanical shocks. Despite its rugged construction and appearance, the unit is no heavier than an equivalent flashlight. It is well-balanced and comfortable to use for several hours at a time.

Law Enforcement

The device has been extensively tested by police in the United States under field conditions. During trials carried out by traffic patrols at random checkpoints, use of the instrument led to an increased number of arrests for Driving While Intoxicated, with the added advantage of reducing the number of false arrests over conventional sobriety tests.

Schools

The use of the flashlight alcohol sensor not only detects the presence of alcohol but its' use serves as a strong deterrent and provides student's a reason to "say No" to peer pressure. Screening for alcohol use at schools allows for the earliest possible intervention when a problem is detected.

Further information regarding this precision instrument or its use in screening subjects for the presence of alcohol can be obtained by calling 1-855-754-4433.

1.1 Principles of Operation

When the operator presses the Sensor Control Button, a small, silent pump draws an air sample through a **fuel cell (electrochemical)**, which generates a small electrical current in the presence of alcohol vapor. This current is amplified electronically and used to drive a multicolored **bar-graph display**. The number of bars lit in the display indicates the presence of alcohol in the air sample. The more alcohol detected, the more bars that will illuminate.

We want you to get the best possible results from your units so please take the time to study this manual and to practice using the instrument before depending on it under real-life conditions.

SECTION II FEATURES

2.0 Physical Characteristics



2.1 At-A-Glance Display

To provide you the confidence that the system is working correctly, the PAS Flashlight has five indicator lights above and below the bar-graph display. These lights provide useful feedback when using the flashlight or sensor.

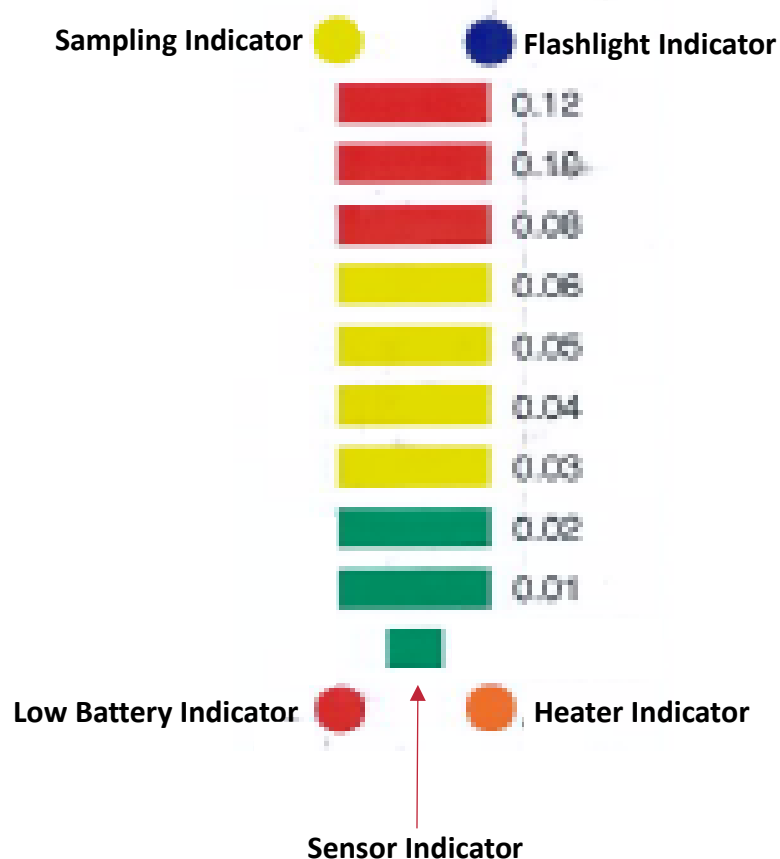
Sampling Indicator: The **PMP** light indicates when the PAS is taking an air sample. It comes on for a few seconds at the beginning of each alcohol measurement cycle. While the pump is running...hold still.

Flashlight Indicator: The **LGT** light indicates when the flashlight is on. If this light is on but there is no beam emitting from the flashlight, you have a defective lamp module.

Low Battery Indicator: The **BAT** light flashes when the battery is almost discharged and needs recharging. When flashing, charge *IMMEDIATELY* to avoid battery failure.

Heater Indicator: The **HTR** light comes on whenever the fuel cell heater is on. When the flashlight is on, the heater cycles on and off to maintain a constant fuel cell temperature.

Sensor Indicator: The lowest **GREEN BAR** indicates the PAS alcohol sensor is on.



SECTION III POWER SUPPLY

3.0 Battery Life & Maintenance

A NiMH rechargeable battery (no memory) powers the PAS Flashlight. Battery life per charge depends on the mode of light beam being used. Operating on High power will provide 65 minutes of continuous use per charge, while operation on Low will provide 190 minutes.

Once the low battery signal is displayed, the battery will retain a charge for approximately 10 minutes before it is completely dead. It is important to avoid a dead battery condition; otherwise the battery may need to be replaced.

It is recommended that the unit be left in the charger/cradle when not in use.



CAUTION! Do not allow the metal case of the flashlight to come into contact with metal when charging. Such contact may create an electrical short causing serious damage to the charging system although a “slo-blo” fuse is integrated into the system to prevent such damage. If the fuse blows, replacements are available from the manufacturer. Only a 1.5 amp slo-blo fuse should be used.

CAUTION! Occasionally inspect the battery cover wrapping for tears or punctures as they may cause serious electrical damage to the product.

3.1 Charging System

An integrated fast charger is provided so that the unit can be ready for use at all times. The charger can be plugged into either 12-volt automotive power or 110 volt @60 Hz power source. The AC/DC charging system has been introduced to make in-vehicle charging more convenient, while securing the device in a vehicle.

3.2 Initial Charging

When you receive your flashlight, the battery may already be fully charged. This can be determined by observing the low battery indicator. If it is not flashing, the initializing has already been performed at the factory and you may proceed to use the PAS unit. If the low battery indicator is flashing, it is important to follow these steps for getting an **initial** full charge into the battery.

[1] Apply Power

Insert the battery, button-end first. Plug the AC power adapter into a 110-volt AC electrical outlet. Connect the adapter to the hole in the base of the charger cradle. Or, to use the auto adapter, follow the same steps except you will plug the cigar plug into the vehicle outlet. When connected to power, the YELLOW LED on the charger cradle

should come *ON* to indicate that power is reaching the cradle input connector. The GREEN LED will be *OFF*.

[2] Apply Charge

Snap the flashlight into the charger cradle. Make sure it is seated correctly. Now the GREEN LED should come *ON* and remain on throughout the charge cycle. **IF** the YELLOW LED begins blinking, there is something wrong with the power source. See section on Fault Conditions.

[3] Full Charge

A fully charged condition may take up to 3.5 hours. When the battery charge cycle is complete, the GREEN LED will begin *BLINKING/FLASHING*. This indicates a trickle charge level has been achieved. It is recommended by the manufacturer that the unit now be "Reset". To reset the charger and gain up to 20-35 minutes MORE charge, simply remove the flashlight off of the charging cradle for a few seconds and then replace. When the GREEN LED begins to blink again, an additional 20-35 minutes of charge should be gained.

NOTE: If the GREEN LED starts to flash prior to 3.5 hours (in about 15 minutes), you may only have a partial charge. This condition will result in a shorter than expected discharge period and the low battery indicator on the display will begin to flash. In this event, restart (reset) the charging procedure and wait until the green light begins to flash. A fully charged condition should result.

3.3 Fault Condition

If the Flashlight Switch is left in the ON position when placed into the charger/cradle, the YELLOW LED on the charger will begin to blink after a short period. You may not be aware the Flashlight Switch has been left in the ON position because the battery may be drained to a level that cannot power the flashlight lamp. If this condition is observed, press the Flashlight Switch to turn it off and after a short time (depending on battery condition) the YELLOW LED should stop blinking and begin charging.

Also, when the Flashlight Switch is turned OFF, the RED Low Battery indicator on the sensor display will begin to blink, indicating the Flashlight Switch is in the correct position for charging. This RED Low Battery light will go off after some battery charging has occurred.

SECTION IV LED FLASHLIGHT OPERATION

There are 3 modes in which the LED flashlight can be operated: Low, High, or Strobe

4.0 Flashlight Control Switch (LED)

[1] Press and release the Flashlight Switch (you will hear a “click”) at the top of the front of the tube. The LED light turns on in LOW mode. The battery will last up to 190 minutes in this mode.

[2] Gently tap the same switch to put the flashlight in HIGH mode. The battery will last up to 65 minutes in this mode.

[3] Gently tap the switch again to put the flashlight in STROBE mode.

[4] Press and release the Flashlight Switch fully (you will hear a “click”) while in any mode to turn off the LED light. If the LED light is off for more than 3 seconds, the next time the LED light is turned ON – it will default to LOW mode.

SECTION V SCREENING FOR ALCOHOL

It is important to practice sampling procedures so that they are second nature when you use the PAS Flashlight under field conditions.

5.0 Alcohol On the Breath

The PAS Flashlight is intended for use as a screening device to detect alcohol in or around a person without the person’s direct or active participation. Because of the passive nature of the device, it is not possible to obtain precise readings or breath alcohol levels (deep lung BrAC).

Accurate measurements can only be obtained with an evidential quality instrument, where the subject blows into a mouthpiece. The purpose of the PAS Flashlight is to **alert** you that alcohol is present.

5.0.1 Sampling Procedure

[1] Flashlight ON

For best performance, turn the flashlight on for 1-2 minutes prior to using the alcohol sensor. This activates the fuel cell heater and ensures that the unit responds quickly to alcohol. The orange HTR lamp will cycle on and off as the thermostat regulates the fuel cell temperature. Turning on the flashlight, prior to sampling, is important when using the sensor at low temperatures.

[2] Battery Check

Check that the low-battery (BAT) lamp is not flashing. If it is, the batteries should be recharged before using the PAS Flashlight sensor.

[3] Zero Check

If you are unsure whether the fuel cell has recovered from the previous sample, check a sample of alcohol-free air (air blank) and verify that no bars light up in the display; observe for about 5 to 10 seconds. If bars do light up, wait a minute, then try again. In severe cases, refer to the section on Overload Recovery (page 13) of this manual.

[4] Positioning

For optimum results, the inlet port on the right side of the PAS Flashlight should be **5–7 inches from the subject's mouth**, and directly in front of it. Readings may be lower if it is held too far away or off to one side.

[5] Sampling

To take a sample, press the PAS Sensor Control Button and **release it immediately**. The GREEN sensor indicator will come on to show that the sensor is on. The yellow PMP indicator will also turn on for the 5 seconds that the pump is running and taking the sample. While the pump is running, it is important to keep the subject talking for the 5 seconds. Therefore, ask questions that require lengthier answers than yes or no.

Once the pump has stopped running, it is no longer necessary to hold the flashlight in position.

[6] Peak Reading

The air pump draws air through the fuel cell for about 5 seconds. If there is alcohol present, the bars in the main display will start lighting up, with a peak reading in about 2–10 seconds.

After detecting alcohol, the fuel cell may need a minute or so to recover before conducting the next screening. The recovery time increases with high concentrations of alcohol and with low operating temperatures. If no alcohol is detected, the unit is immediately ready for the next sample.

[7] Alcohol Sensor OFF

After noting the peak reading, press the Sensor Control Button again and release it immediately. The sensor and main display will turn off, and the fuel cell will recover. The microcontroller will automatically turn off the sensor after about 45 seconds and reset for the next sample.

[8] Flashlight OFF

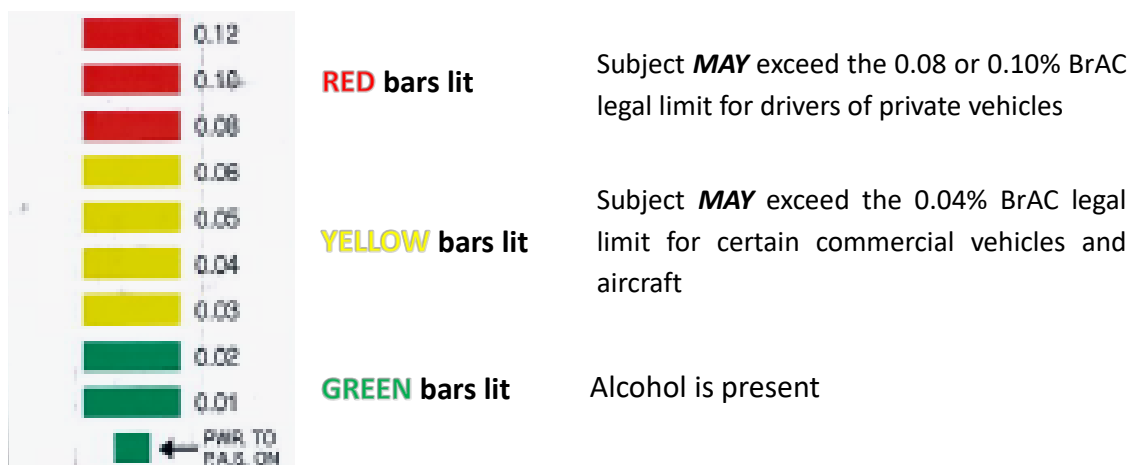
Turn the flashlight off whenever you are ready to do so. Leaving the flashlight LED light on will drain the battery.

Remember: 5 Easy Steps for Successful Testing

1. Distance: Position 5–7 inches
2. Direction: Aim intake port at mouth
3. Talking: Subject speaks
4. Tap: Sample Pump Light ON/ Light OFF
5. Read: 5–20 seconds for peak reading

5.0.2 Interpreting the Display

If the PAS Flashlight is used in still air at the optimum distance of 5–7 inches from the subject's mouth, the chart below will give you an approximate indication of the breath alcohol concentration (BrAC). Roughly, the readings can be interpreted as follows:



In some situations it is not practical to get the PAS sensor as close as 5–7 inches from the subject's mouth. The device can be used at greater distances, but readings will be lower. As a rule of thumb, one less bar will light up for every 2 inches beyond the optimum 5–7 inches. Using the PAS Flashlight at distances greater than 10 inches is not recommended for breath-alcohol sampling, because of the effect of drafts.

5.0.3 Low Temperature Operation

At low temperatures, fuel cells take longer to reach their peak readings of alcohol levels. They also take longer to recover from each positive sample before you can take another. To overcome this problem, your PAS Flashlight includes a thermostatically controlled heater that maintains a fuel cell temperature of 104°F.

Since the unit is normally used at night, the heater comes on automatically whenever you turn on the flashlight. The fuel cell reaches its' operating temp within a few minutes, although the exact time depends on how cold it was originally. The orange HTR indicator cycles on and off as the thermostat regulates the fuel cell temperature.

The **sensitivity** of the fuel cell is NOT affected much by temperature. A cold unit will work just fine, it's simply slower to respond and recover. You don't *have* to wait for the fuel cell to warm up.

5.1 Additional Screening Applications

5.1.1 Alcohol in Enclosed Spaces

The PAS Flashlight is sensitive enough to detect background levels of alcohol in enclosed spaces such as vehicles and rooms. This is useful for detecting drinking by minors in cars or at social gatherings, without sampling each individual's breath.

To detect alcohol in an enclosed space, run the PAS Sensor to sample air drawn from anywhere in the space. Just make sure you don't sample fresh air from an open door or window.

5.1.2 Crash Victims

If a crash victim is unconscious, it can be important to know whether he or she has been drinking. Any crash victim who is breathing can be checked with the PAS. An unconscious subject might be exhaling from the nose instead of the mouth, but the procedure is the same.

5.1.3 Open Beverage Containers/Spiked

The PAS Flashlight is invaluable in determining whether an open beverage container has alcohol in it. This is easily done by sampling the air above the container.

The air over an alcoholic drink has much more alcohol in it than a drinker's breath. Therefore, an effort should be made to avoid overloading the fuel cell which will take the fuel cell longer to recover and will cause its' performance to gradually deteriorate. To check a container for alcohol, angle the intake port away from the container opening to dilute the sample. If your first reading is inconclusive, you can always take another one with less dilution.



CAUTION! Be aware that certain citrus-based beverages, flavored waters, and some Starbucks coffees have been reported to give a positive reading. It is not clear if these beverages are in fact fermenting and producing low levels of alcohol, or if certain ingredients are reacting chemically with the fuel cell in some way. Retest individuals 10–15 minutes after an initial positive reading to verify true alcohol presence and not the result of residual mouth alcohol from these types of beverages.

5.1.4 Secondary Investigative Light

To use the Secondary Investigative Light, located on the back of the flashlight tube, turn on the main Flashlight Control Switch. Depending on which model of PAS Flashlight you have, you will have one of the following options:

[Option 1] Horizontal Gaze Nystagmus (HGN) Test Light - Green

The HGN test is one of the three field sobriety tests developed by the National Highway Traffic Safety Administration (NHTSA). Additional information on administering the HGN test can be found at nhtsa.dot.gov

[Option 2] Ultraviolet (UV) Light - Blue

Hold the UV light several inches above any item or surface to illuminate any UV-sensitive object or residue.



CAUTION! Do NOT shine the Ultraviolet (UV) light directly into anyone's eyes

SECTION VI PRACTICAL TIPS

6.0 Clearing Overloads

If your fuel cell is overloaded, it will take a few minutes to recover.

[1] Turn ON the flashlight to activate the fuel cell heater. This speeds up recovery.

[2] Turn OFF the PAS Sensor. This too will shorten the recovery time.

[3] After 5 minutes, check the unit with an alcohol-free air sample. If within approximately 20 seconds, bars still light up on the display, repeat steps [2] and [3] as necessary until the overload has been completely cleared.

[4] Your unit is now ready for use.

6.1 FAQs

[Q] ***What if the PAS Flashlight detects alcohol but seems to be giving low readings?***

[A] This problem is usually caused by using the sensor too far from the subject's mouth, or with the inlet port off to one side (incorrect positioning). It can also be caused by a blocked inlet or outlet port, perhaps by your own fingers. It is possible that your unit might need to be recalibrated.

[Q] ***Why does the display light up several bars with no alcohol present?***

[A] This can be due to background levels of alcohol vapor in the air, but it is more likely that the fuel cell has not recovered from the previous positive reading. If the problem persists when you check a sample of fresh air, follow the procedure for clearing overloads. Also, frequently switching the sensor on, without a brief waiting period, may result in bars lighting up.

[Q] *Why does my PAS Flashlight appear to be too sensitive?*

[A] You might be using the instrument too close to the subject's mouth, or it might need to be recalibrated. Certain mouth washes or freshly applied perfume or cologne may give high readings temporarily. Alcohol from these sources dissipates rapidly. Always allow the sensor fuel cell to rest a few seconds between samplings to clear itself of any residual electrical activity.

[Q] *Why won't the main flashlight LED light come on?*

[A] If the blue LGT indicator comes on, but the flashlight does not, you might have a drained battery.

[Q] *Why is the red LED lamp flashing?*

[A] The battery is discharged and could give a false reading. Charge the battery before using the unit.

[Q] *Why is my battery draining so quickly?*

[A] Be sure to follow the Reset procedure when charging the battery. To reset the charge, and gain up to 20–35 minutes more charge, simply remove the PAS Flashlight from the charging cradle for a few seconds and then replace. When the Green LED begins to blink, an additional 20–35 minutes of charge should be gained.










[Q] *What if the Orange HTR indicator is ALWAYS on when the flashlight is on?*









[A] If the HTR indicator fails to cycle on and off as the thermostat regulates the fuel cell temperature, you may have a defective thermostat. Please send in your unit for service.

[Q] *What if I dropped my unit on the ground?*

[A] The instrument is likely just fine. If it doesn't work, the battery might have been crushed by its own weight. Check this before assuming that the PAS Flashlight needs repair.

6.2 Dos and Dont's

-  In cold weather, turn on the flashlight before using the alcohol sensor.
-  Hold the unit with the inlet port 5–7 inches from the subject's mouth.
-  Keep the subject speaking while sampling.
-  Keep your fingers away from the inlet and outlet ports.
-  Turn off the device when not in use.
-  Protect the unit from temperature extremes.
-  Remove the battery if the unit will not be used for more than a month.
-  Use only the rechargeable battery obtained from PAS Systems International
-  Have your unit calibrated yearly, or when it seems to be losing sensitivity.

-  Take strong samples right over an alcohol beverage.
-  Sample raw cigarette smoke. This rapidly damages the fuel cell.
-  Allow liquids to enter the inlet or outlet ports.
-  Use the sensor where it is exposed to high winds that can affect the sampling.
-  Subject the unit to abuse such as excessive shocks.
-  Attempt to dismantle the unit. This will void the warranty.
-  Clean the unit with chemical solvents. You may permanently damage the fuel cell.
-  Allow the metal flashlight tube to come into contact with metal parts of the vehicle when charging.

SECTION VII SENSITIVITY CHECKING & CALIBRATION

7.0 Wet Bath Simulator

PAS Systems International recommends having the calibration checked once a year, or whenever the unit seems to be losing sensitivity. Instructions for checking sensitivity and performing calibration using a wet bath simulator are provided below. You may also choose to send your PAS Flashlight in to the manufacturer (PAS Systems) to be calibrated.

7.0.1 Equipment Checklist

<input checked="" type="checkbox"/>	Your PAS Flashlight unit
<input checked="" type="checkbox"/>	The Calibration Assembly Adapter to connect the outlet of the wet bath simulator to the intake port of the unit. Available from PAS Systems.
<input checked="" type="checkbox"/>	A NHTSA approved Wet Bath Simulator
<input checked="" type="checkbox"/>	500 mL of 0.005% ethanol solution. To set lower sensitivity, a 0.01% solution may be used. Premixed solutions are available from PAS Systems.
<input checked="" type="checkbox"/>	Plastic tubing to connect the simulator's inlet to a mouthpiece into which the operator blows (or can be used to connect the simulator's inlet to a wet bath simulator pump).
<input checked="" type="checkbox"/>	A jeweler's screwdriver to adjust the fuel cell sensitivity if calibration should be necessary.
<input checked="" type="checkbox"/>	A Cal-Pump wet bath simulator air pump (recommended)

7.0.2 Preparing the Wet Bath Solution (optional) and Simulator

Certified calibration solution (500 ml) is available from PAS Systems but making your own calibration solution by diluting a stronger stock solution with distilled water is a simple process using the following steps.

Stock Solution

[1] Pour 77 ml of 100 proof vodka into the 100 ml graduated cylinder

[2] Pour the 77 ml of vodka into a 500 ml volumetric flask and fill the flask up with distilled water.

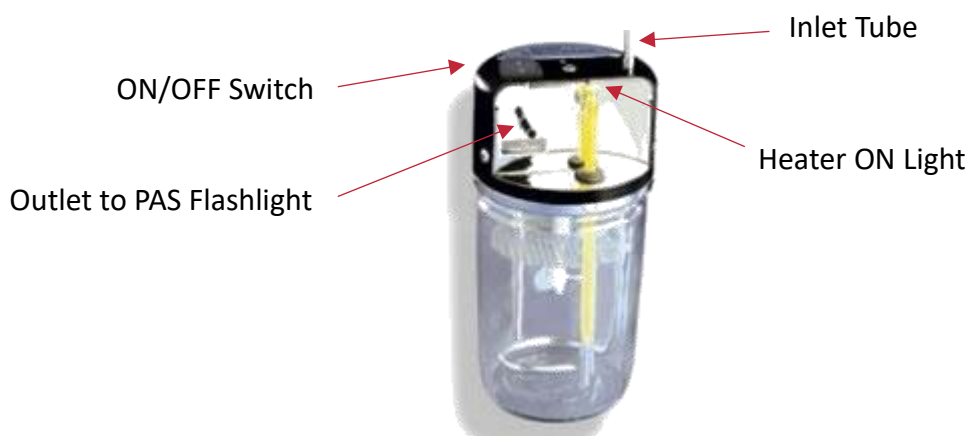
This completes your mixture of stock solution. You may keep your stock solution in a refrigerator for mixing calibration solution as necessary. We do not recommend keeping stock solution for longer than 45 days.

0.005% Ethanol Calibration Solution

[1] Using a 0.5 ml volumetric pipette, draw in 0.5 ml of the premixed stock solution into a 500 ml volumetric flask.

[2] Fill the 500 ml volumetric flask up with distilled water.

This result gives you a 0.005% calibration solution for use in the wet bath simulator. For accuracy, if you have access to a quality evidential unit, run your calibration fluid in the evidential unit to verify.



The lower (jar) portion is filled with a heated solution of water and alcohol, which simulates the blood running through the arteries in the lungs. The upper portion (the head space) is filled with a mixture of air and alcohol that simulates the air in the lungs that is in contact with the blood across the cell membranes. Air flowing out of the outlet pipe simulates the expired air of a person who has been drinking.

In order to work properly, the temperature of the water/alcohol solution must be 34°C and the mixture of alcohol and water must be accurate for the BrAC to be used in the test (0.01 or 0.005 BrAC).

[1] Remove the glass jar from the simulator by unscrewing it from the top assembly.

CAUTION! Do NOT remove the top assembly and expose the heating element to open air with the power turned ON. This will damage the heating element.

[2] Place 500 ml of the 0.005% calibration solution into the simulator.

[3] Reassemble the simulator by tightly turning the jar back into the top assembly.

[4] Add tubing to the inlet and outlet of the simulator.

[5] Check the seal of the lid on the jar by blowing into the inlet while holding the outlet closed. There should be resistance to the airflow.

[6] Plug in the simulator and turn the power ON and allow the solution to heat to 34°C (approx. 15 min). The heater lamp is lit when the heating element is heating and will go off when the fluid has reached the optimum temperature. However, it will come back on from time to time to keep the fluid at the correct temperature. When 34°C is reached, the simulator is ready to be used.

7.1 Readyng the PAS Flashlight

Be sure the room air is free from alcohol and that the ambient temperature is above 50°F. Do not have jars of stock solution or other alcohol open in the room during testing.

[1] Be sure the battery is installed and fully charged. The RED battery light should not be blinking.

[2] Inspect the inlet/outlet ports of the flashlight to make sure they are not clogged.

[3] Conduct an air blank.

[a] Turn on the flashlight and take an air sample by pressing the Sensor Control Button. The green indicator light will come on.

[b] Observe the light bar for 15–20 seconds. If only the small green sampling indicator light comes on, the air blank check is OK.

[4] Clear a fuel cell overload (if one or more of the bar-graph indicator lights comes on during the air blank)

[a] Turn the flashlight on to activate fuel cell heater (check that the HTR light is on). This speeds the cell's response, clearance, and recovery.

[b] Turn off the PAS Flashlight to aid in reducing the fuel cell recovery time.

[c] After 5 minutes, repeat the air blank making sure that the flashlight is on. If none of the bar-graph indicator lights come on (after observing for 15–20 seconds), the air blank check is OK.

[d] If however, one or more of the indicator lights comes on again, this clearance process should be repeated. If after two attempts to clear the unit, the indicator lights are still coming on when the air blank is performed, there are two possibilities:

1. The unit requires an internal zero adjustment. To have this adjustment made, the unit has to be returned to the manufacturer.
2. The air in the test room contains a significant amount of alcohol. To determine if this is the case, air blanks should be made away from the test room to see whether the unit gives a zero reading when removed from the test area.

[5] Once the air blank has been performed with a satisfactory result, the PAS Flashlight is ready for sensitivity checking.

7.2 Sensitivity Checking

If the low battery lamp starts flashing at any point in the procedure, recharge the battery before proceeding.

[1] Turn on the flashlight to activate the fuel cell heater. Leave it on for 5 minutes so the fuel cell comes up to design temperature before starting the test.

[2] Check that the inlet and outlet ports of the unit are free from obstruction.

[3] Hold the flashlight and insert the tip of the Calibration Assembly firmly into the PAS inlet port. Place the opposite end of the Calibration Assembly modified mouthpiece against the simulator outlet. The bar graph display will be facing upwards.

[4] Check that the simulator is running at 34°C and take a deep breath and blow slowly but steadily into the simulator. (If a Cal-Pump is used, follow Cal-Pump instructions). After 5 seconds, tap the Sensor Control Button on the flashlight to start a sampling cycle. Continue to blow for another 5 seconds.

[5] Look for the green sensor lamp and the yellow sampling lamp and listen for the sound of the air pump which should come on immediately after the Sensor Control Button is activated. Keep blowing until the PAS Flashlight's pump stops (pump light goes out) 5 seconds after sampling began.

[6] Disconnect the Calibration Assembly and observe the bar-graph display. All but one of the bars should light up - There should be two green, four yellow, and two of the three red bars lit 15-20 seconds from the time the pump stops.

[7] Record the number of red bars that light up (this should be two). Repeat the sensitivity test two more times noting each time how many red bars light up. If in two out of the three tests, two red bars are illuminated (a blinking red light counts), the sensitivity of the unit is satisfactory.

Note: A minimum of 5 minutes should pass between each sensitivity test and an air blank should precede each sensitivity test.

7.3 Calibration

This procedure follows the same steps as the sensitivity check procedure except that after the sample has been blown into the unit, the signal gain is adjusted to the point where two red bars light up.

If the low battery lamp starts flashing at any point in the procedure, recharge the battery before proceeding.

[1] Remove the plastic plug on the back of the flashlight tube by carefully prying it out with a small screwdriver. Inside you will see the PAS calibration adjustment pot (screw).

[2] Turn on the flashlight to activate the fuel cell heater. Leave it on for 5 minutes so that the fuel cell comes up to design temperature.

[3] Check that the inlet and outlet ports of the unit are free of obstruction.

[4] Connect the Calibration Assembly to the intake port of the PAS Flashlight. Place the opposite end of the Calibration Assembly against the outlet port of the wet bath simulator.

[5] Take a deep breath and blow slowly, but steadily, into the Simulator or use the Cal-Pump auto air pump. After 5 seconds activate the Sensor Control Button on the flashlight.

[6] Look for the green sensor light and the yellow pump (PMP) light and listen for the sound of the air pump that should come on immediately after the Sensor Control Button is pressed. Keep blowing for another 5 seconds until the flashlight pump stops (PMP light goes out). Disconnect the Calibration Assembly.

[7] Pass a small flat head jeweler's screwdriver through the opening and into the calibration adjustment pot (screw). Turn the calibration adjustment all the way up (counter clockwise). The adjustment is free to rotate approximately 270°. Take care not to use any force. With the calibration adjustment at maximum, all three red bars light up.

[8] When all the bars of the display light up (10–20 seconds after sampling), turn the calibration adjustment down (clockwise) until the top red bar just goes out. You may need to make several small, soft and easy adjustments as the fuel cell climbs to its' peak reading. If your adjustment is slightly too high, you should see the third red bar flash on and off. Turn counter clockwise just enough so that the flashing stops. Calibration is now complete.

[9] Replace the plastic plug by pressing firmly.

[10] Turn off the flashlight and sensor system. The unit is now ready for operational use once it has been fully charged.

SECTION VIII TECHNICAL SPECIFICATIONS

Product Name	PAS Flashlight Passive Alcohol Sensor
Flashlight	1000 Lumen, 3-mode LED with optimized light dispersion through an intense center beam.
Alcohol Sensor	Platinum electrochemical fuel cell generates an electrical current in response to alcohol vapor. The microcontroller will automatically turn off the sensor after about 45 seconds, should you forget to turn off the sensor.
Cell Heater	Built-in heater regulates fuel cell temperature at 104°F (40°C) whenever the flashlight is on.
Specificity	Fuel cell detects only alcohol. It is unaffected by acetone, paint or glue fumes, methane, and practically any other substance likely to be found in the breath.
Calibration	Performed at the factory. Additional field calibration procedure provided. Calibration checks are recommended once a year, or more frequently, if the unit appears to be losing sensitivity.
Air Sample	Pump runs for 5 seconds and draws in a 1 cu. In. (15ml) air sample.
Display	Color coded 9-element LED bar graph display.
Peak Reading	2–10 seconds at 104°F. Longer at lower temps if the fuel cell heater is not on.
Recovery Time	30 seconds – 2 minutes after a <i>positive</i> reading. Longer if the fuel cell is overloaded or the heater is off.
Power Supply	Nickel Metal Hydride (NiMH) rechargeable battery (no memory). Charger is operable from 12-volt DC or 110-volt AC power.
Battery Capacity	65 minutes of continuous use on High; 190 minutes on Low, if charged using the Reset procedure. Store unit on the charger to keep fully charged between uses (no memory).
Charging Time	Approx. 3.5 hours to recharge fully discharged battery using the AC/DC Fast Charger Cradle Unit and the Reset procedure.
Environmental Parameters	Operating temp range: 0 to 104°F (-18 to 40°C). Flashlight housing is weather resistant.
Dimensions	12" (300mm) long x 1.5" (38mm) diameter, increasing to 2.2" (56mm) at the head.
Weight	1.5lbs. (0.68kg) with battery

SECTION IX RETURN, SERVICE, and WARRANTY

9.0 Return Policy

If you receive an order that appears to be defective or damaged, please contact PAS Systems at 855-754-4433 within 10 days of receipt of the shipment. PAS Systems will replace the equipment, file any necessary claims, and correct any shipping errors.

To return an order for any other reason, contact PAS Systems within 10 days of receipt of the order and explain the reason for the return. A 20% restocking fee will be assessed and freight charges are non-refundable.

9.1 Service

Your PAS Flashlight is a self-contained unit. Other than the battery replacement, there are no user-serviceable parts inside. If you conclude that your unit is not functioning correctly, it must be returned to PAS Systems International for service.

Carefully package the device in a suitable shipping box and send to the address below. We suggest shipping UPS or FedEx etc., and insuring the package for the original purchase price. In the shipment, please include your contact information and a description of any known issues you are experiencing with the unit. If your unit is out of warranty, you will be contacted with a service quote for approval prior to the start of any repair work.

Ship units requiring service to:

PAS Systems International
Attn: Service Dept.
4920 S Alston Ave
Durham, NC 27713

9.2 Warranty

PAS Systems International warrants to the buyer that all new equipment purchased through PAS Systems, or one of our authorized distributors, will be free from defects in material and workmanship, under normal use and service, for a minimum period of twelve (12) months from original invoice date. Passive alcohol sensors carry a 2-year warranty on the fuel cell.

Products showing unusual wear, abuse, alteration, items dropped, or accidentally broken, will not be covered under warranty. In addition, the warranty does not cover the replacement of batteries. Warranties are non-transferable.

The company will provide one (1) free calibration during the warranty period should such recalibration be necessary.

SECTION X ADDITIONAL RESOURCES

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Foss, R. D., Voas, R. B. and Beirness, D. J. "Using a Passive Alcohol Sensor to Detect Legally Intoxicated Drivers", *American Journal of Public Health*, April 1993. 83(4).

Jones, I. S. and Lund, A. K. "Detection of Alcohol-Impaired Drivers Using a Passive Alcohol Sensor", *Journal of Police Science and Administration*, 14:153-60.

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Ross, H. L. "Deterring the Drinking Driver: Legal Policy and Social Control", Lexington, Mass. Lexington Books.

Voas, R. B. and Lacey, H. M. Drunk driving enforcement, adjudication, and sanctions in the United States. In: R. J.Wilson and R.E. Mann, (Eds). "Drinking and Driving Advances in Research and Prevention", New York: Guilford Press. 1990.

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Voas, Robert B., "PAS IV Procedure Manual for Sensitivity Checks and Instrument Calibration", Prevention Research Center, Berkeley, California, September 1994.

"Why Sobriety Checkpoints Matter and How To Make Them Work Even Better", *Status Report*, Insurance Institute for Highway Safety, Arlington: Virginia, 1993. 28: 1-5.