Simple Step-by-Step Test & Evaluation Guide for the LeakAlertor #5000

STOP

Please Read This First!

The LeakAlertor has been designed and patented to detect all kinds of actual toilet leaks, including stuck flush valves and flappers. This Guide has been developed to help product evaluators and water professionals through the steps that will allow for the simulation of actual leaks (*because holding the handle down for a few seconds is **not** an actual toilet leak*) and evaluating the response of the LeakAlertor to the same. Although most home owners, business owners, property managers, and hospitality managers will install the LeakAlertor in 30 seconds or less (without tools!) and simply observe the **GREEN LAMP** (No Problems - Everything is OK!) or **RED LAMP** and **BEEPS** (There's a Problem!), evaluators generally want to know how the product actually works and what to expect…and that's the purpose of this Guide.

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INTRODUCTION – Facts, Notes, & Additional Resources

<u>FACT:</u> Of the thousands of LeakAlertors sold directly to consumers, *MOST* of them installed the product, walked away, and simply waited for the alert to sound. This is because the meaning of **RED LIGHT**/**GREEN LIGHT** is simple and universally understood by everyone. *99% of the time if the* **RED LIGHT** *flashes and the unit beeps, there is a leak.*

<u>DESIGN:</u> The LeakAlertor has been specifically designed to detect the repeatable vibration patterns produced by the fill valve ("Phantom Flushes") that indicate significant water loss. It is not "listening" for what is sometimes described as "trickling water", although this usually produces the "Phantom Flushes" which the LeakAlertor detects. This Guide explains how the LeakAlertor detects those repeatable vibration patterns and how to reliably test the product.

<u>NOTE:</u> Although it is not necessary to read through this entire Guide before testing begins, Evaluators are encouraged to read each individual STEP in its entirety *BEFORE* the step is begun.

This Guide is color-coded:

> This color box indicates what Evaluators will **OBSERVE** during testing.

> This color box explains what the LeakAlertor is **DOING** during testing.

> This color box helps **ANSWER** questions that often come up about the LeakAlertor.

Text highlighted in GREEN can often be skipped.

<u>ADDITIONAL RESOURCES WHICH CAN BE REQUESTED FROM</u> *n^{th} Solutions*:

LeakAlertor Evaluation Pack: Includes everything necessary for non-technical personnel to easily facilitate the testing of the LeakAlertor using this Guide. Pack includes LeakAlertors, dye tablets, leak simulators, and additional battery pull-tabs.

LeakAlertor Engineer's Evaluation Pack: Includes all the engineering technical documentation, including the "*Technical Reference Guide*" and the "*Data Display Unit (DDU) Specification*" (Note: The DDU is a production LeakAlertor with a telemetry port. It performs identically to production units, outputs all measurements, data, and calculations, and does so in real time. The DDU's can be requested for evaluation by water professionals and engineers).
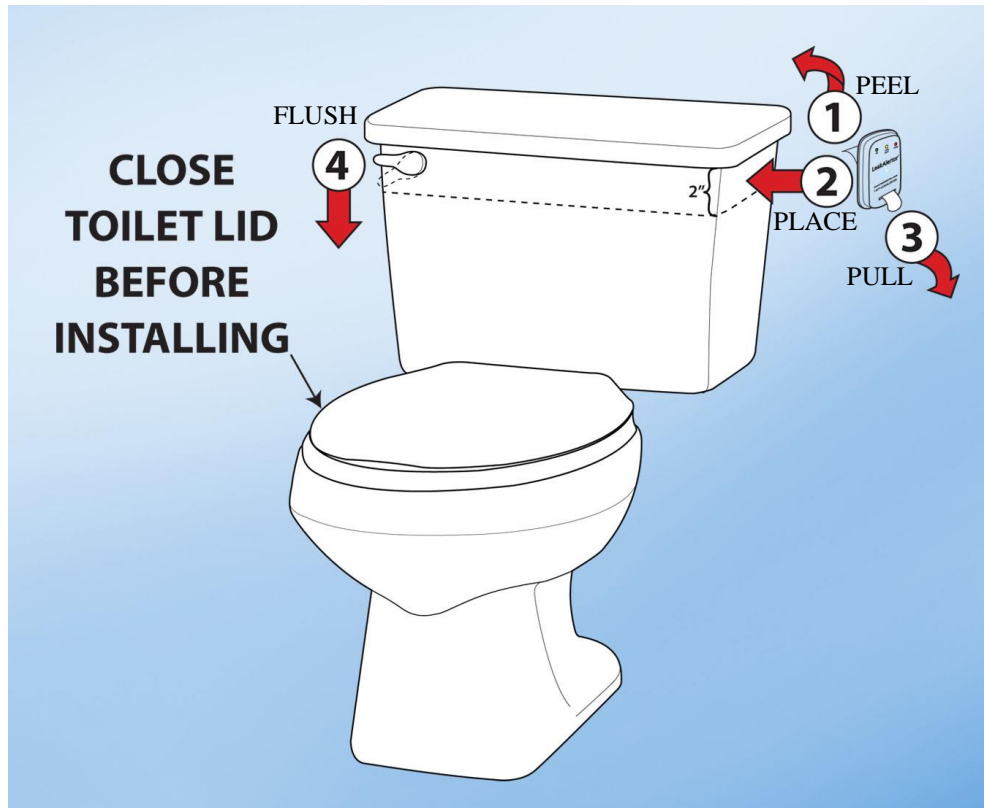
STEP #1
Installing the LeakAlertor

Choices, Choices, You Have Choices! To install the LeakAlertor you can either:
- ➢ Follow the Instructions that are included with the LeakAlertor, or…
- ➢ Watch the 30 second installation video on our website (or by clicking on this link) or…
- ➢ By following the simple directions below:

First make sure that the toilet lid is DOWN to avoid accidentally dropping the LeakAlertor in the bowl during installation.

NOTE: Please read *ALL* of the installation instructions *AND* the "**What You Should Observe AFTER the Toilet is Flushed**" box on the next page *BEFORE* you proceed.

1) **PEEL** off the protective backing (this exposes the adhesive).
2) **PRESS** the LeakAlertor onto the outside surface of the toilet tank. The ideal location is just below the tank lid on either side of the toilet.
3) **PULL** the battery tab.
4) The **GREEN LAMP** will flash. **AFTER** the **RED LAMP** flashes and the LeakAlertor beeps, **FLUSH** the toilet – *You're Done!*

What You *Should* Observe AFTER the Toilet is Flushed:

- ❖ The **RED LAMP** should illuminate and remain illuminated during the *COMPLETE* flush cycle (The "*COMPLETE* flush cycle" is the total amount of time that water continues to flow into the tank from the fill valve).
- ❖ At the end of the *COMPLETE* flush cycle, the **RED LAMP** will extinguish and the LeakAlertor is now ready to continuously monitor the toilet.
- ❖ After this initial installation, the **RED LAMP** will **ONLY** illuminate (and the LeakAlertor will **ONLY** beep) if there is a problem with the toilet.

What is the LeakAlertor *doing* during *this* Flush Cycle?

- ✓ *When the battery tab is pulled, the first thing the LeakAlertor does is analyze all of the background noise (fans, talking, etc.)*
- ✓ *After the toilet is flushed and during the complete flush cycle, the LeakAlertor is collecting and analyzing all of the different kinds of vibration produced by the toilet, which it then uses to create a digital "signature". This signature becomes a future point of reference for detecting leaks and stuck flappers or flush valves.*
- ✓ *Even though there are thousands of different types of toilets, fill valves, flush valves, etc., the LeakAlertor is smart enough to figure out everything about the toilet without any user input.*

What if the LeakAlertor RED LAMP did *NOT* Remain Illuminated during the *COMPLETE* Flush Cycle?

- ✦ You can leave it alone – it will "Learn" the toilet's characteristics all by itself over the course of several days, OR…
- ✦ …You can go to STEP #12 and follow the instructions to **RESET** the LeakAlertor.

STEP #2
Confirming that the LeakAlertor "Recognized" the Flush during Installation

1) *After the toilet has completed the installation flush cycle*, wait at least 30 seconds and then **FLUSH** the toilet again.
2) **WATCH** the LeakAlertor.

What You *Should* Observe:

❖ You should *not* see the LeakAlertor illuminate or flash any lamps *until* the very end of the *COMPLETE* flush cycle.
❖ If the LeakAlertor "Recognized" the flush during installation (also referred to as "Qualifying the Flush", as defined in our technical bulletins), then the **GREEN LAMP** should **DOUBLE-FLASH** once at the conclusion of the *COMPLETE* flush cycle.

What is the LeakAlertor *doing* during *normal* Flush Cycles?

✓ If the LeakAlertor "Recognized" the flush during installation, it will use that digital "signature" to accurately identify subsequent flushes.
✓ When a subsequent flush *has* been identified, the LeakAlertor will first check its internal memory to see if there is a leak to which the user must be alerted.
✓ If there is no leak, the LeakAlertor will **DOUBLE-FLASH** the **GREEN LAMP** to let the user know that the toilet is not leaking *AND* that the LeakAlertor is functioning properly.

What if You *Don't* see a *single* Double-Flash After *COMPLETE* Flush Cycles?

❖ If you see the **GREEN LAMP** **DOUBLE-FLASH** *and then quickly* **DOUBLE-FLASH** again, it means that the LeakAlertor did NOT "Recognize" the flush during installation and is now in the "Learn" mode (Go to Step #11 for more information about the "Learn" mode).
❖ **NOTE:** At the conclusion of *MOST* flush cycles, the LeakAlertor will usually flash the **GREEN LAMP** (**Everything is OKAY!**) or flash the **RED LAMP** and beep (**There is a PROBLEM!**). *There are some occasions, however, when there is no indication* – refer to "Miscellaneous Facts about the LeakAlertor" section at the end of this Guide for more information.

STEP #3
Simulating a Leak

READ THIS FIRST: Please use the *n^(th) Solutions* "Leak Simulation Kit" when evaluating the LeakAlertor. How the LeakAlertor actually identifies leaks will be explained a bit later in this Guide.
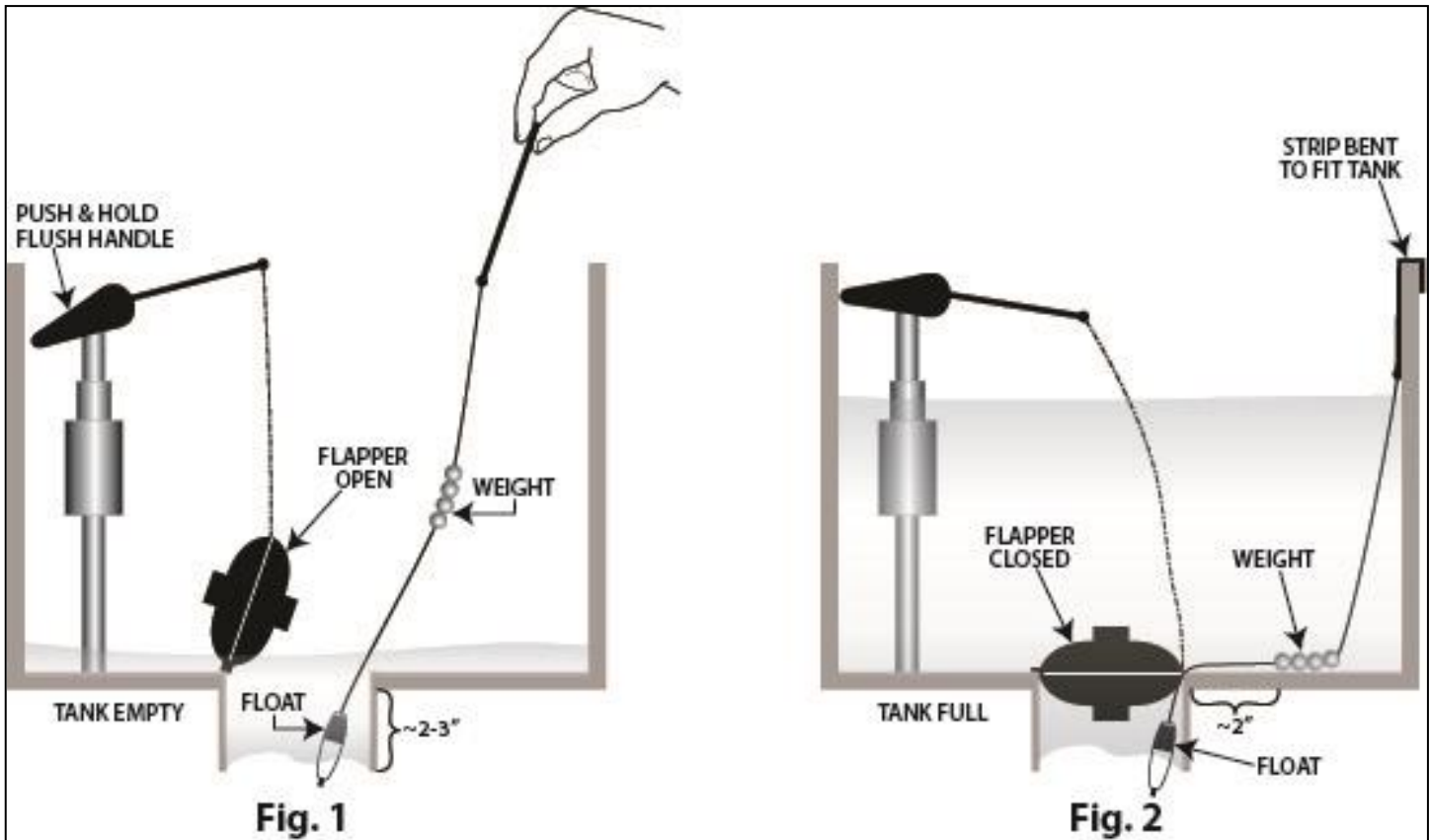
LEAK SIMULATOR INSTALLATION

1) **REMOVE** the tank lid.
2) **UNWIND** the float and weight from the flexible metal strip.
3) **FLUSH** the toilet and continue to hold the handle down, allowing the water to drain from the tank.
4) **PLACE** the float into the drain area below the flapper. The shape of the float will prevent it from becoming lodged between the flush valve and the bowl.
5) **RELEASE** the handle so that the float is now underneath the flapper.
6) **POSITION** the weight about 2 inches away from the flapper.

7) **BEND** the flexible metal strip over the edge of the tank. It doesn't matter where on the tank it is located, as long as there is a slight amount of tension on the line.

8) **DO NOT REPLACE THE TANK LID JUST YET.** In STEP #4 ("*Verify that the toilet is CURRENTLY Leaking*") you will verify that the toilet is leaking, and in STEP #5 you will verify that the fill valve is working properly. After STEP #4 and STEP #5 ("*Verify that the Fill Valve is Working PROPERLY*") you will replace the tank lid.

(When it is time to remove the Leak Simulator, follow the instructions below)

LEAK SIMULATOR REMOVAL

1) **REMOVE** the tank lid.
2) **GRASP** the flexible metal strip.
3) **FLUSH** the toilet and continue to hold the handle down.
4) **CAREFULLY** lift the float out of the drain.
5) **RELEASE** the flush handle.
6) **REPLACE** the tank lid.

NOTE: The line between the float and the weight does not permit the flapper to create a perfect seal with the flush valve base, and therefore simulates a leak. The amount of water that will leak depends upon the type of flapper, flush valve, and the volume of water in the tank.

STEP #4
Verify that the Toilet is *CURRENTLY* Leaking

*You might be thinking, "Isn't the LeakAlertor supposed to verify that the toilet is leaking???" The obvious answer is yes. However, if a leak isn't actually occurring, but the evaluator assumes that it **should be** leaking because of the Leak Simulator, the LeakAlertor may be seen as not working. So let's first verify that the toilet is actually leaking:*

NOTE: If you have already determined that the toilet tank *is definitely leaking* into the bowl, you can skip this step and proceed to STEP #5 ("*Verify that the Fill Valve is Working PROPERLY*").

If You <u>DO</u> Have the LeakAlertor Evaluation Kit:

1) The kit contains several packs of Dye Tablets.
2) **REMOVE** the tank lid.
3) **DROP** 1 tablet into the tank.
4) **REPLACE** the tank lid.
5) **WAIT** about 15 minutes – do **NOT** flush the toilet!
6) **GO TO** "What You Should Observe" below.

If You <u>DON'T</u> have the LeakAlertor Evaluation Kit:

1) You will need some **RED** or **BLUE** food coloring.
2) **REMOVE** the tank lid.
3) **DISPENSE** at least 10 drops of food coloring into the tank.
4) **REPLACE** the tank lid.
5) **WAIT** about 15 minutes – do **NOT** flush the toilet!
6) **GO TO** "What You Should Observe" below.

What You *Should* Observe:
❖ If the toilet is leaking, you should see colored water in the bowl within 15 minutes.

What if You *Don't* See any Colored Water in the Bowl?
❖ If no colored water is in the bowl, **RETURN** to STEP #3 ("*Simulating a Leak*") to **REMOVE** the Leak Simulator and **RELOCATE** the line in a different spot underneath the flapper.
❖ Repeat STEP #4 ("*Verify that the Toilet is CURRENTLY Leaking*") and verify that the toilet is leaking.

STEP #5
Verify that the Fill Valve is Working PROPERLY

Consumers, customers, and tenants generally don't concern themselves with the fill valve. But if you are testing the LeakAlertor, understanding how a properly functioning fill valve works is important.

A properly functioning fill valve will produce a "phantom flush" when the toilet is leaking. A "phantom flush" occurs when the water level in the tank drops due to the leak, prompting the fill valve to refill the tank. It often sounds like a "whooooosh" that can last 5 seconds or longer. About 5% to 10% of all fill valves are not functioning properly. The repeating pattern of the "phantom flush" – the "whooooosh" and then a period of silence – is how the LeakAlertor detects a leak.

NOTE: If you have already determined that the toilet leak *is* producing audible and periodic "Phantom Flushes", you can skip this step and proceed to STEP #6.

Normal Water Height
Water Height
Drops due to Leak
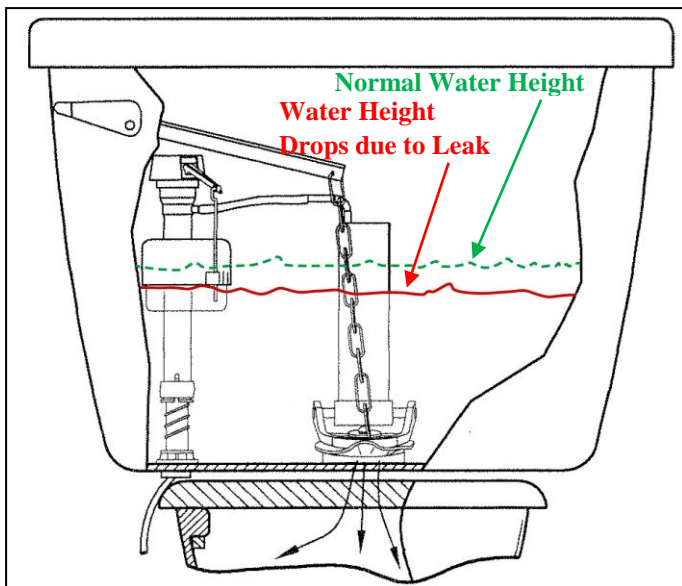
1) **The Leak Simulator** should be installed and be producing a verified leak.
2) **REMOVE** the tank lid.
3) **FLUSH** the toilet.
4) When the flush cycle is complete, **MARK** the waterline on the inside of the tank with a pencil.

What You *Should* Observe:
 ❖ After a flush, the water line should be at a **normal water height** (see the figure at left).
 ❖ The simulated leak will slowly cause the **water height to drop**.
 ❖ As the water height drops, the fill valve float also drops, causing the fill valve to open and refill the tank, producing the "Phantom Flush".
 ❖ The total time between "Phantom Flushes" can range from seconds to hours, depending upon the volume of the leak.
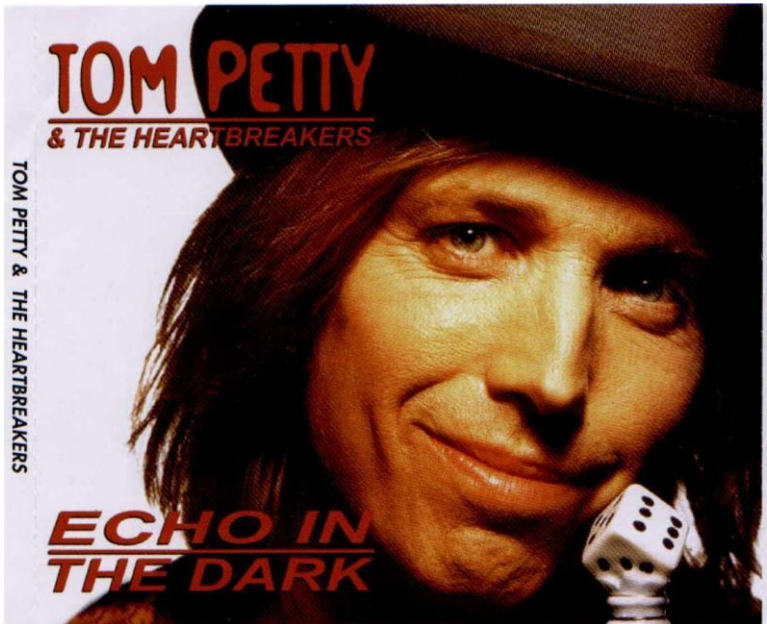
What if the water height drops but does not rise back up to the pencil mark?
 ❖ *The toilet is leaking, but the fill valve is defective and should be replaced.* The faulty fill valve is partially open, allowing water to continue to leak into the bowl and down the drain.

STEP #6
The Waaaaaiting is the Hardest Part

Very slow leaks can take time to detect. Allow the LeakAlertor to monitor the toilet overnight before proceeding to STEP #7.

Is there anything to Observe?
- ❖ Nope...there is nothing to "see" in this Step. Head to STEP #7 in the morning…
- ❖ …*UNLESS* you know the "Phantom Flushes" are occurring frequently (such as less than 10 minutes apart), in which case you can wait just a few hours and then proceed to STEP #7.

In simplest terms, how is the LeakAlertor detecting a leak while I'm waiting?

- ✓ The LeakAlertor constantly monitors the vibrations produced by your toilet. It is specifically looking for "Phantom Flushes" and statistically analyzing how long they last and how often they occur, in order to determine if there is a leak.
- ✓ Why the statistics? Why the boring math? The math and statistics are used to isolate the vibrations from your toilet from other nearby noise sources…like the shower…and your off-key singing (yeah, that's right…we know you sing off-key…even in the shower…).
- ✓ The LeakAlertor doesn't identify a single "Phantom Flush" and then determine, "Ah ha! A leaking toilet!!!" The LeakAlertor is looking for an uninterrupted consecutive number of "Phantom Flushes" with silent periods in between. If only 1 or 2 "Phantom Flushes" were detected, it would be possible for different types of background vibrations and noise to randomly simulate a similar pattern, which would result in false positives.

STEP #7
Was the Leak Detected?

At this point:
1) The Leak Simulator has been producing a leak for at least several hours or overnight.
2) The fill valve has been verified as (or is known to be) functioning properly.
3) **FLUSH** the toilet.

What You *Should* Observe:
❖ At the conclusion of the complete flush cycle, the LeakAlertor should flash the **RED LAMP** and beep two or more times (a complete explanation of the flashes and beeps and what they mean is detailed in STEP #8).

What if the LeakAlertor flashes the GREEN LAMP instead of the RED LAMP?
❖ If there is definitely a leak *AND* the fill valve is operating properly, there are several possible reasons the LeakAlertor did not flash the **RED LAMP** and beep:
  o Not enough time elapsed to allow enough "Phantom Flush" sequences to be detected.
  o The "Phantom Flushes" were more than 1 hour apart (See "Misc. Facts" section)
  o The toilet was in constant use – not enough consecutive uninterrupted "Phantom Flush" sequences were tracked (which is why the overnight period is often the best operational time for the LeakAlertor to identify leaks).
  o There is a significant noise source nearby and the LeakAlertor needs more time to adjust to the noise in order to lock onto the "Phantom Flush" vibrations.

Okay, but what if the LeakAlertor doesn't flash *ANY* lamp after a flush?
❖ The LeakAlertor will give a visual indication after the complete toilet flush cycle most of the time. There are several reasons why a visual indication might not occur:
  o The LeakAlertor may be in the "Learn" mode and may be taking some time to create the profile which represents the vibrational signature against which the flush cycles are compared (as was explained in Step #1 and further explained in Step #11).
  o During installation, the LeakAlertor modeled the toilet's vibrational signature and created a profile. But if the water pressure temporarily changes substantially, this will affect the toilet's flush cycle and might not be recognized by the LeakAlertor (for instance, if substantial additional water is being used elsewhere in the home at the same time).

Is the LeakAlertor still detecting leaks and will it give an indication if it does?
✓ Yes. The temporary absence of a visual indication at the conclusion of a complete flush cycle does not mean that the LeakAlertor is not functioning correctly.

STEP #8
Explaining the RED LAMP Flashes and BEEPS

The longer a detected leak goes uncorrected, the more urgent the visual and audible alerts become. At some point, the LeakAlertor will no longer wait for a complete flush cycle to occur, and instead, it will begin to flash the **RED LAMP** and beep after every "Phantom Flush". Below is a brief explanation of how the alerts increase over time *when a leak has been detected, but not corrected* (all water volumes are cumulative rough estimates, but are generally pretty accurate):

RED LAMP Flashes & Beeps	WHEN?	Total Water Loss
2 to 4 times	After the flush cycle	1 to 10 Gallons
5 to 10 times	After the flush cycle	10 to 25 Gallons
11 to 20 times	After the flush cycle	25 to 50 Gallons
21 to 40 times	After the flush cycle	50 to 100 Gallons

More than 125 Gallons: At this point – which can be as short as a day or two (bad leak) or as long as several weeks (slow leak) – the LeakAlertor assumes that it is not getting anyone's attention. At this point in time, the LeakAlertor will flash the **RED LAMP** and beep 50 times after every complete flush cycle *AND* after every detected "Phantom Flush". Additionally, a further assumption is made: the user may not be near the bathroom, but may "hear" the alert. So after the 50 flashes and beeps, the LeakAlertor will continue to flash the **RED LAMP** (without beeps) for the next 30 seconds. This allows someone nearby who heard the beeps to get to the bathroom and "see" the flashing LeakAlertor.

You mentioned water volumes above…are you saying the LeakAlertor can actually estimate the approximate water loss due to leaks?
  ✓ Yes, that's exactly what we're saying. From extensive field testing with hundreds of different types of toilets, fill valves, tank and flush capacities, etc., the LeakAlertor can actually correlate "Phantom Flushes" to water loss with a surprisingly high level of accuracy.
  ✓ And yes, in anticipation of your next question: there is a version of the LeakAlertor which can be used for water surveys that can track flushes, approximate water-volumes-per-flush, and also water loss volumes due to leaks. Contact *n^{th} Solutions* for more information.

STEP #9
Fixing the Leak – Automatic Reset

1) **REMOVE** the Leak Simulator (See STEP #3 "*Simulating a Leak*").
2) **ENSURE** that the toilet is no longer leaking (Follow the instructions in STEP #4 "*Verify that the toilet is CURRENTLY Leaking*", if necessary).
3) **WAIT** 24 hours for the Leak Alertor to automatically detect that the leak has been fixed and to then automatically reset itself. **NOTE:** In general, the LeakAlertor will reset in a 6 hour time frame provided that the toilet is *NOT* used during that time. Waiting 24 hours virtually guarantees that it will reset itself during the overnight hours.
4) **FLUSH** the toilet.

What You *Should* Observe:

❖ At the conclusion of the COMPLETE flush cycle, the **GREEN LAMP** should **DOUBLE-FLASH.**

In VERY Simple Terms, how does the LeakAlertor reset itself?

✓ The LeakAlertor is able to determine that the problem which originally caused the leak is no longer present and has likely been corrected. But because some leaks are intermittent and can start and stop over a given period of time, the LeakAlertor waits at least 6 hours before concluding that the leak has been fixed, and at that time it will automatically reset itself.

And while you're explaining stuff, why does it take at least 6 hours to reset?

✓ Extensive testing has determined that 6 hours is the optimum amount of time necessary to perform a reset. Any less time and an intermittent leak might be overlooked.

Just curious: why not just have a "Reset" button instead of an automatic reset?

✓ Human beings can be VERY predictable when it comes to solving annoying problems – like a beep. A manual "Reset" button was not desired by most water utilities and property managers because it doesn't encourage repairs and notifications. Many folks would simply press the "Reset" to shut up the product, walk away, and forget about it.

IMPORTANT POINT: Often times a user will "think" that they have repaired a leak, only to have the LeakAlertor continue to flash **RED** and beep. **THIS IS OFTEN BECAUSE THE TOILET IS STILL LEAKING!** Many repairs are facilitated with so-called "Universal Flappers" that actually will *NOT* universally seal all flush valves! Replacement flappers should be selected on the basis of the type of flush valve. *A high percentage of "Universal Flappers" begin leaking the moment they are installed because they are not ideally suited for properly sealing all types of flush valves.*

STEP #10
Simulating a Stuck Flapper or Flush Valve

There are 2 ways to simulate a stuck flapper or flush valve (pick one!):

1) **Make the Toilet Actually Leak Water for an Extended Period of Time**
    a. **FORCE** the flush handle down and lock it into that position using a small block of wood or partially used roll of toilet paper (compress it between the tank lid and the flush handle), *or better yet…*
    b. *…use a short piece of wire or string.* Here's how:
        i. **REMOVE** the tank lid and locate the flush handle arm.
        ii. **ATTACH** the wire or string to the flush handle arm.
        iii. **PULL** up on the wire or string until the flapper has been completely lifted off of the flush valve seat, and tie off or secure the line.
        iv. **REPLACE** the tank lid during the test.
    c. **WAIT** 15 minutes or until the LeakAlertor begins to sound a nearly continuous beep and flash the **RED LAMP.**
    d. **REMOVE** the wood block, wire, or string.
    e. **AUTOMATIC RESET** will occur AFTER the complete flush cycle has ended.
2) **Use a Common Noise Producing Household Item**
    a. **GET** a hair dryer (most hair dryers, if close enough to the LeakAlertor, will produce enough vibration to get its attention).
    b. *WARNING!!! DO NOT TURN IT ON THE HEAT SETTING!!!*
    c. **TURN** the fan on **HIGH.**
    d. **PLACE** the hair dryer within a few feet of the LeakAlertor.
    e. **WAIT** 15 minutes or until the LeakAlertor begins to sound a nearly continuous beep and flash the **RED LAMP.**
    f. **TURN OFF** the hair dryer.
    g. **AUTOMATIC RESET** will occur AFTER the complete flush cycle has ended.

NOTE: Do **NOT** interrupt the water flow (#1 above) or turn off or move the hair dryer during testing because an *ACTUAL* stuck flapper **PRODUCES A CONSISTENT AND CONSTANT VIBRATION**, which is what the LeakAlertor is looking to detect.

Why does it take 15 minutes before it begins to flash and beep???
✓ Because some hair dryers – *even at a distance of 10 feet or more* – can actually create a vibration component in the "sweet spot" of the LeakAlertor's detection threshold, a false positive is possible. Therefore, despite the 30 or more gallons of possible wasted water due to an actual stuck flapper over 15 minutes, market surveys have indicated *there would be a more favorable consumer/customer/tenant perception if there were no false positives*.

STEP #11

Simulating an Incorrect User-Performed Installation OR a Situation Where the LeakAlertor did not "Recognize" the *ENTIRE* Flush Cycle (Placing the LeakAlertor in the "Learn" Mode")

It doesn't get any easier than **PEEL**, **PLACE**, **PULL**, **FLUSH**, yet many consumers will not bother to read the instructions, which can result in the LeakAlertor being incorrectly installed. For instance, the customer might **PULL** the battery tab *BEFORE* placing the product on the toilet; the toilet might not get flushed; etc. This was anticipated during the design of the product, which is why the LeakAlertor has a "Learn" mode to compensate for incorrect installations. Additionally, some toilets exhibit unusual flush cycles. When this occurs, the LeakAlertor will automatically enter the "Learn" mode.

1) Follow the instruction in STEP #1 ("*Installing the LeakAlertor*"), **BUT DO NOT FLUSH THE TOILET.**
2) **WAIT** 2 minutes.
3) **FLUSH** the toilet.

What You *Should* Observe:
- ❖ At the conclusion of the *COMPLETE* flush cycle, the **GREEN LAMP** will **DOUBLE-FLASH** *and then quickly* **DOUBLE-FLASH** again. This means that the LeakAlertor did *NOT* "Recognize" the flush during installation and is now in the "Learn" mode.
- ❖ As long as the LeakAlertor is in the "Learn" mode, the **GREEN LAMP** will **DOUBLE-FLASH** *and then quickly* **DOUBLE-FLASH** again at the conclusion of the flush cycles.

What does the LeakAlertor do in the "Learn" Mode?
- ✓ In the "Learn" mode, the LeakAlertor will first set default flush parameters because it needs a starting point from which to work. Over time the LeakAlertor will monitor *ALL* vibrational sequences, determine which of those sequences are actual toilet flushes, and eventually establish the correct flush profile for that toilet.
- ✓ When the flush profile has been correctly defined, the LeakAlertor will **DOUBLE-FLASH** the **GREEN LAMP once** (instead of two sets of **DOUBLE-FLASHES**).

Will the LeakAlertor still detect leaks in the "Learn" Mode?
- ✓ If a leak is detected in the "Learn" mode, the LeakAlertor will begin to flash the **RED LAMP** and beep after *EVERY* "Phantom Flush" and will continue to do so *UNTIL* the leak is corrected. This is because the LeakAlertor can *NOT* "Learn" the flush profile until *AFTER* the leak has been corrected, and to make *SURE* the customer is notified of the leak.

The **"Learn"** mode can be accelerated so that the LeakAlertor quickly models the flush profile by performing the following steps (but only if a leak has *NOT* been detected; if a leak *HAS* been detected, correct the leak *FIRST*, wait 6 hours, and then perform the following steps):

1) **FLUSH** the toilet and wait for the *COMPLETE* flush cycle to conclude.
2) **WAIT** about 15 to 20 seconds.
3) **FLUSH** the toilet and wait for the *COMPLETE* flush cycle to conclude.
4) **WAIT** about 45 to 60 seconds.
5) **FLUSH** the toilet and wait for the *COMPLETE* flush cycle to conclude.
6) **WAIT** about 2 minutes.
7) **FLUSH** the toilet.

What You *Should* Observe:
❖ The LeakAlertor should **DOUBLE-FLASH** the **GREEN LAMP** *only once* at the conclusion of the last *COMPLETE* flush cycle to indicate that it has now "Recognized" the flush and has created a proper flush profile.
❖ If you are still seeing the **GREEN LAMP** **DOUBLE-FLASH** *and then quickly* **DOUBLE-FLASH** again, repeat the steps above until the **GREEN LAMP** **DOUBLE-FLASHES** *only once*.

STEP #12
How to Test the Same LeakAlertor on Different Toilets
(Master Reset – This is *Easy*)

For Testing Purposes: The same LeakAlertor can be used on different toilets **IF** the battery is removed in order to fully reset the unit. Please consult the "*Battery Replacement*" bulletin in the LeakAlertor Evaluation Pack, or download the bulletin from the website. <u>You may need to provide your own additional strips of double-backed foam tape if you elect to test the same LeakAlertor on several different toilets.</u>

In actual consumer/customer/hospitality/property-management settings, one LeakAlertor should be used for each toilet. Rotating the LeakAlertor among several toilets decreases the likelihood of actually detecting a leak at the time the leak actually occurs, reducing the effectiveness of using the product for water loss prevention.

Miscellaneous Facts about the LeakAlertor

What you should know about "Phantom Flushes" and how the LeakAlertor identifies them in order to detect leaks:

- ✓ By technical definition, a "Phantom Flush" occurs when the water level in the toilet tank drops, causing the fill valve float to simultaneously drop, resulting in the fill valve "opening" to allow water to refill the tank. This usually occurs because the tank is leaking through the flapper or flush valve into the bowl.
- ✓ The water displacement of a "Phantom Flush" depends on the type of fill valve, the wear of the valve, the distance the float moves, and the cross-section of the tank. However, it should be pointed out that water loss is a specific function of the volume lost due to the leak, and that the "Phantom Flush" is simply indicative of the problem.
- ✓ Although most leaks begin intermittently, those leaks become more steady and predictable. Steady leaks exhibit several consistent time characteristics with respect to the fill valve: the amount of time it takes for the water level to drop (no vibration) and the amount of time it takes for the fill valve to refill the tank (vibration). The combination of the "no vibration" and "vibration" time frames is called the "period".
- ✓ When several very consistent and consecutive "periods" have been observed, the LeakAlertor determines that there is a leak. As the number of "periods" increase, the alert (**RED LAMP** plus beep) also increases.

The average battery life of the LeakAlertor?

- ✓ The battery life for most LeakAlertors is approximately 2 years.
- ✓ The battery life can be shortened by an uncorrected leak, which causes the unit to flash the lamps and beep frequently. For every month a leak goes uncorrected, an additional month of total battery life is lost due to the constant lamp flashes and beeps.