

Model
H-340-CalKit

Tipping Bucket Rain Gauge Calibration Kit



Instruction Manual
Version 1.0



1.0 Introduction

The H-340-CalKit includes the apparatus to verify and adjust the calibration of a H-340 Tipping Bucket Rain Gauge.

Tipping bucket rain gauges have a reputation for being inaccurate. Inaccuracies can be caused by algae in the bucket, evaporation and poor calibration. The greatest source of inaccuracy however, is the volume at which the tipping bucket mechanism tips is sensitive to rainfall rate. This occurs because the water droplets cause small waves in the bucket and high rainfall rates cause superposition or “pile up” of extra water in the bucket before it actually tips over. Design Analysis Associates makes two different rain gauge models. The model H-340 is a standard tipping bucket rain gauge with a switch closure output. The model H340-SDI has a SDI-12 output and an internal microprocessor which compensates for the flow rate sensitivity by measuring the time between bucket tips.

The H-340-CalKit is used to field calibrate a standard H-340 rain gauge. The H-340-SDI requires a more complex apparatus which delivers a constant flow rate and the calibration must be performed at the factory.

The H-340-CalKit provides for a calibration of one tip per 0.01 inches of rainfall at a mean rate of 4.00 inches of rainfall per hour, the rate starts at a rate greater than 4.0 in/hr and diminishes as the bottle drains.

The H-340-CalKit includes:

- 1 ea Water bottle with valve attached
- 1 ea Water bottle mount with built-in orifice
- 2 ea 250ml graduated cylinders
- 2 ea 24-inch plastic drain hoses
- 1 ea Orifice brush



Using the Rain Gauge Calibration Kit

The H-340-CalKit is designed to be used either with or without the H-340's funnel cover installed. To allow for visibility of the bucket mechanism during calibration we recommend calibrating with the funnel cover removed. Use the special brush included with the CalKit to clean the water bottle orifice. Do not attempt to clean the orifice with a wire or needle, as the orifice is easily damaged. Use fresh clean water for the test.

Begin by cleaning any algae, debris or hard water deposits from the bucket mechanism. Push a 24-inch hose over each drain port. Place the rain gauge where the exiting water can be collected into the two 250ml graduated cylinders. Adjust the leveling feet until the bubble in the bulls-eye level is exactly centered.

Fill one of the 250ml graduated cylinders with 198.0ml of water. Unscrew the orifice cap from the water bottle. With the valve on the bottle closed pour the measured water into the bottle. Screw the orifice cap onto the bottle making sure it is securely tightened. With the valve still closed invert the bottle and place it on top of the rain gauge as shown. The vacuum formed by the closed valve keeps the water from running out of the bottle. Place the graduated cylinders under each drain hose to capture all water as it exits the rain gauge. Open the valve on top of the water bottle to start the flow of water through the rain gauge. Carefully count the number of bucket tips until the water is completely drained from the bottle. The bucket should tip 24 times, leaving the 25th bucket less than 1/3 full. Manually dump the little remaining water in the 25th bucket. The water in the two graduated cylinders should be equal. If either the number of tips is not 24 or the water volume in the two cylinders are not equal, make the proper adjustments as described below and re-verify the calibration. This procedure may need to be repeated several times before proper calibration is obtained.



Adjusting the Tipping Bucket Mechanism

Warning: DO NOT ADJUST THE BUCKET STOPS. Do not adjust the bucket stops in an attempt to balance the bucket mechanism. Instead, the H-340 has an adjusting screw above the buckets by which the two buckets can be balanced. This eliminates the need to adjust the stops to compensate for any inequality of weight due to manufacture and assembly. The bucket stops are set at the factory to give equal travel to each bucket as the knife edge divider passes under the water flow. Changing or adjusting the stop post height causes a false reading of equal amounts of water in each bucket. This is due to the unequal distance the bucket center must travel from side

to side after passing the bottom of the funnel.

The counter weight underneath the bucket mechanism can be adjusted (up or down), to adjust the bucket volume (# tips/unit rainfall). The counter weight adjust instructions in Steps 1 and 2 below may seem to be intuitively backwards however, realize the center of gravity of the bucket and counterweight is above the pivot.

- To adjust for more tips (more rainfall volume), release nut #1 and turn weight counter clockwise (down). Re-lock nut #1.
- To adjust for less tips (less rainfall volume) release nut #1 and turn weight clockwise (up). Re-lock nut #1.
- To adjust for equal amounts of water in each bucket, loosen set screw #2, turn adjusting screw toward the bucket with the most amount of water, then re-lock the setscrew.

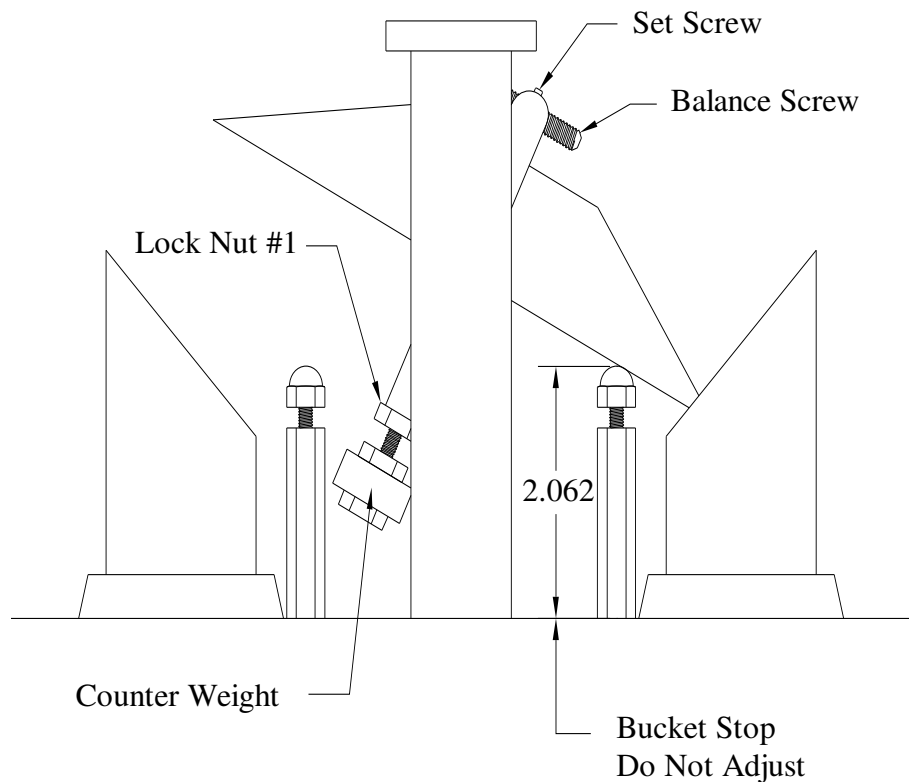


Figure 2

Maintenance

After use, clean and dry the graduated cylinders to prevent buildup of hard water deposits. Empty and dry the water bottle and orifice assembly. The CalKit includes a special orifice brush for cleaning the water bottle orifice.