



U.S. Patent No. D-226,847

### **Barometer Test Kit, Model 3613 (King Nutronics Corporation, Part No. 3613-1-1)**

The Model 3613 by King Nutronics Corporation is an easy to use barometer test kit that simulates the environment necessary for testing and calibrating aneroid barometers within a range of 20 to 37 in-Hg. The following barometers are among those that can be tested and calibrated using the test kit: ML-448/UM, MIL-B-17896A, FA112 (Wallace and Tiernan), PMB-1 (American Paulin), and SK12509 (Taylor).

The Model 3613 Barometer Test Kit can also be used to test surveying altimeters and other handheld mechanical or electronic aneroid-type pressure/vacuum measurement instruments within the specified operating range.

During use, the test chamber is evacuated or pressurized through a flexible hose connected to a diaphragm-type pressure/vacuum pump. The pump ports are equipped with restricted orifice couplings to prevent a rapid rise of pressure or vacuum inside the test chamber from damaging the unit under test. Pressure/vacuum inside the test chamber is metered by means of a precision soft seat control valve. A hose fitting upstream of the control valve permits the operator to monitor the pressure/vacuum inside the chamber using an external reference standard, while a relief valve prevents damage to the unit under test due to inadvertent overpressurization.

The test chamber is fitted with adjustable feet, which permit the leveling of the unit under test for maximum accuracy. An adjustment tool inside the chamber, coupled to a top-mounted knob outside, enables the operator to conveniently adjust the pointer on barometers equipped with null indicators, such as surveying barometers.

### **Chamber Specifications**

<b>Characteristics</b>	<b>Specifications</b>
<b>Operating range</b>	10 in-Hg vacuum to 5 psig
<b>Burst pressure</b>	In excess of 25 psig
<b>Inside diameter</b>	8.25 inches
<b>Inside height</b>	5 inches
<b>Wall thickness</b>	3/8 inch
<b>Cap thickness</b>	3/4 inch
<b>Material:</b>	
<b>Chamber</b>	Clear acrylic
<b>Base</b>	Black anodized aluminum
<b>Seals</b>	Standard O-ring design, Buna-N
<b>Relief valve operating pressure</b>	3.4 to 3.8 psig
<b>Control valve</b>	Soft seat precision metering valve
<b>Hose</b>	1/4 inch OD Polyflow with quick connect coupling

## Pump Specifications

Characteristics	Specifications
Type	Diaphragm pressure/vacuum
Range	10 in-Hg vacuum to 10 psig
Fittings	Quick-disconnect with flow restrictor
Motor	110 VAC, 60 Hz, with in-line switch
Weight	19 lbs

## Operation

**General.** The Model 3613 Barometer Test Kit should be set-up near a 110 VAC, 60 Hz power source. Place the chamber and pressure/vacuum pump on a flat, level surface.

**Operating Instructions.** Operate the Model 3613 Barometer Test Kit in accordance with the instructions that follow:

- 1) Connect the power cable for the pressure/vacuum pump to a 110 VAC, 60 Hz power source.
- 2) Pull out the three chamber retaining pins and remove the chamber by pulling it upward. The chamber retaining pins are tethered to the base to prevent loss.
- 3) Place the unit under test on the base.
- 4) Replace the chamber by aligning the index pin in the base with the corresponding slot in the chamber wall. Slowly press down on the chamber until it is securely seated on the base.
- 5) Fully open the control valve.
- 6) Insert the three retaining pins to secure the chamber to the base.

### CAUTION

Make certain that all three retaining pins are used, and that they are securely seated. Failure to do so may result in a rapid loss of pressure, or the chamber being blown off the base.

- 7) If necessary, adjust the feet on the base to level the unit under test. For instruments requiring null adjustments, engage the adjustment tool on top of the chamber with the pointer knob on the unit under test. Rotate the knob on top of the chamber as required to set the barometer to the null position.
- 8) Connect the threaded receptacle on the hose assembly to the corresponding nipple on the control valve. Connect the "quick-connect" end of the hose assembly to the PRESSURE or VACUUM port of the pump, depending on the test to be performed.
- 9) Connect an external reference standard to the barbed fitting on the chamber manifold. The external reference standard is required to compare the actual pressure/vacuum inside the chamber with the readings on the unit under test.
- 10) To perform vacuum tests, first make sure that the hose assembly is connected to the VACUUM port of the pump and that the control valve is open, then do the following:
  - a) Switch ON the pump to evacuate the chamber.
  - b) Observe the reading on the external reference standard. When the desired vacuum is reached, close the control valve and switch OFF the pump.
  - c) Note the reading on the external reference standard and the reading on the unit under test. If there is a discrepancy between the reading on the external reference standard and the unit under test, subtract the two numbers to determine the deviation.
  - d) To move on to the next test point, open the control valve slightly to meter-in ambient pressure. Observe the reading on the external reference standard and close the control valve when the desired test point is reached.
  - e) Repeat Steps C and D for all test points.

- 11) To perform pressure tests, first make sure that the hose assembly is connected to the PRESSURE port of the pump and that the control valve is open, then do the following:
  - a) Switch ON the pump to pressurize the chamber.
  - b) Observe the reading on the external reference standard. When the desired pressure is reached, close the control valve and switch OFF the pump.
  - c) Note the reading on the external reference standard and the reading on the unit under test. If there is a discrepancy between the reading on the external reference standard and the unit under test, subtract the two numbers to determine the deviation.
  - d) To move on to the next test point, switch ON the pump and open the control valve to meter the pressure. Observe the reading on the external reference standard. Close the control valve and switch OFF the pump when the desired test point is reached.
  - e) Repeat Steps C and D for all test points.
- 12) After all tests have been completed, disconnect the hose from the pump and open the control valve slightly to vent the chamber. Avoid venting the chamber too rapidly, or the unit under test may be damaged.

## Maintenance

**Parts Replacement.** Spare parts are available for the repair of the Model 3613 Barometer Test Kit. These parts are illustrated and listed in the Illustrated Parts Breakdown, below.

**Lubrication.** When replacing packing or O-rings, indicated by callouts 4, 6, and 17 in the Illustrated Parts Breakdown, apply a light coat of Grease, Halocarbon 25-5S (Halocarbon Products Corporation, Hackensack, N.J.), or equivalent, to facilitate installation.

**Cleaning.** Periodically remove the coupling-restrictor assembly, consisting of parts 17 through 19 in the Illustrated Parts Breakdown, and clean the orifice by washing it with Freon 113 solvent (DuPont), or equivalent. Dry the part using compressed air at a maximum pressure of 20 psig.

**Leak Testing.** To test for air leakage, first connect the hose assembly to the PRESSURE port of the pump and open the control valve, then do the following:

- 1) Connect an external reference standard to the barbed fitting on the chamber manifold.
- 2) Switch ON the pump to pressurize the chamber. When the chamber is pressurized to 3 psig, close the control valve and switch the pump OFF.
- 3) Apply a leak detector solution to the relief valve, control valve, fittings, manifold, around the shaft of the adjustment tool, and around the seam between the chamber cap and wall.

### NOTE

King Nutronics Corporation recommends the use of Swagelok "Snoop" liquid leak detector (P/N MS-SNOOP) for tracing leakage in the pneumatic system. A solution of liquid dish detergent and water may also be used.

- 4) When the liquid leak detector solution is applied, bubbles will form in areas where leakage is present. The size of the bubbles will give some indication as to the size of the leakage. Replace the leaking parts.
- 5) Test the integrity of the pneumatic system in accordance with the performance verification procedures in Section 5.4.

