

# ALT-621

# ASP-621

## Digital Indicators



## AIRSPEED

## ALTIMETER

# OPERATION AND MAINTENANCE MANUAL

[prestonpressure.com](http://prestonpressure.com)

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**PRESTON PRESSURE LLC**

**ALT-621/ASP-621**

**USER AND MAINTENANCE MANUAL**

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## **WARRANTY AND LIABILITY STATEMENT**

Preston Pressure warrants its products against defects in workmanship and material under normal, intended use for a period of two years from the date of purchase.

Preston Pressure's limit of liability shall be to repair or replace the product at their discretion. Transportation shall be pre-paid to the Preston Pressure factory or authorized service facility. Preston Pressure shall not be liable for any consequential damage expense.

This warranty shall be void if the product has been repaired or altered in any way that adversely affects its performance or reliability. This warranty shall be void if the product has been subject to abuse, misuse, contamination, negligence, accident, shipping damage, or improper operation.

Preston Pressure reserves the right, at its own discretion, to make changes in materials, designs, finish, or specifications, without obligation to install or incorporate such changes in products previously manufactured.

This warranty shall, at Preston Pressure's option, become void if the ownership is changed, unless the prior owner or proposed owner obtains written approval of continuation of coverage prior to the change of ownership.

Preston Pressure reserves the right to revise this manual and to make changes to content from time to time in the content thereof, without obligation to notify any person of such revision.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## **CHAPTER 1**

### **GENERAL INFORMATION**

The **ALT-621** is a digital display tester used to test aircraft altimeters. Altitude is displayed in feet and meters, with increments of 2, and 5 feet.

The **ASP-621** is a digital display tester used to test aircraft airspeed indicators. Airspeed is displayed miles per hour, kilometers per hour, and knots.

**This manual is valid for the following models:**

**ALT-621-35** (altimeter with 35,000 feet capability)

**ALT-621-50** (altimeter with 50,000 feet capability)

**ASP-621-300** (airspeed with 300 knot capability)

**ASP-621-500** (airspeed with 500 knot capability)

## SPECIFICATIONS

**Digital Altimeter:**

**Range for ALT-621-35:** -1000 to 35,000 50,000 feet (-305 to 10,670 meters)

**Range for ALT-621-50:** -1000 to 50,000 feet (-305 to 15,240 meters)

**Resolution:** from -1500 to 30,000 feet resolution is in 2-foot increments  
from 30,005 to 50,000 feet resolution is in 5-foot increments  
all metric resolution is in 1-meter increments

**Units Displayed:** Feet, Meters , mBar, inHg

**Sensor Accuracy:** 0.03 %

**Digital Airspeed:**

**Range for ASP-621-300:** 20 – 350 Knots, 34 – 690 KPH, or 21 – 430 MPH

**Range for ASP-621-500:** 20 – 550 Knots, 34 – 975 KPH, or 21 – 575 MPH

**Resolution:** 1 MPH, 1 KPH, or 1 Knot

**Sensor Accuracy:** 0.03%

**Temperature range:** 30 degrees F to 125 degrees F (-1 C to 51 C) limited by LCD display

**Display Type:** LCD

**Display Size:** 2.53" X 0.53" (64.5mm X 13.5mm)

**Physical dimensions:** 3.3" (8.4cm) wide x 3.5" (8.9cm) tall x 0.7" (1.8cm) deep on face; rear can is 3.15" (7.7cm) diameter x 3.05" (7.75cm) deep

Mounting hole pattern: 2.5" x 2.5" (6.35x6.35cm)

Fitting threads are 1/8 inch NPT (national pipe thread)

**ALT-621 Weight:** 0.6 lb (270 grams)

**ASP-621 Weight:** 0.7 lb (320 grams)

**Voltage:** 12VDC, positive center

**Current draw:** 150 mA

**Other Features:**

Leak test feature: 2 minutes, selectable down to 30 seconds

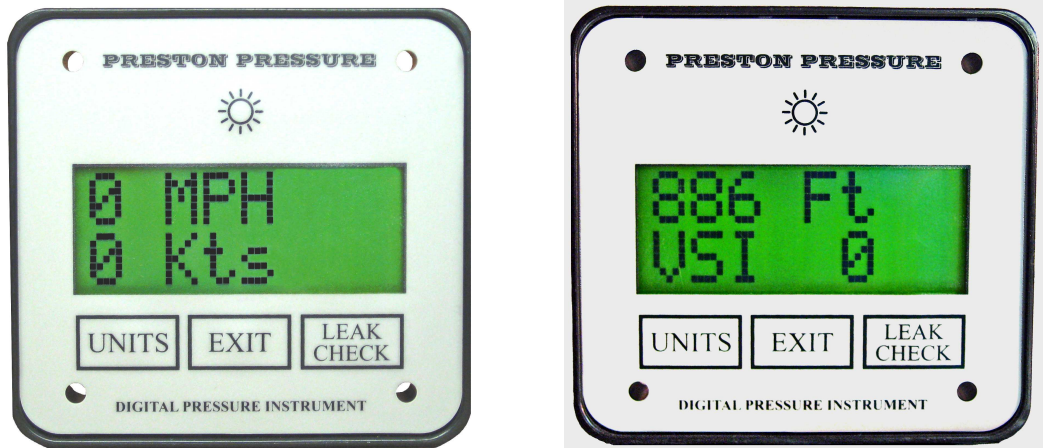
VSI (vertical speed indicator) in increments of +/- 2 feet at < 100, and +/- 10 feet if > 100

**The ALT-621 and ASP-621 indicators can be mounted in any position, at any angle.**

**Note: The ALT-621 and ASP-621 indicators do NOT have the precision required to test RVSM altimeter systems.**

**The ALT-621 and ASP-621 indicators are NOT intended for flight or use in aircraft.**

## Front Panel Description



Note: current production indicators have a grey display background

The **UNITS** button is used to toggle between the various units of measurement.

The UNITS button on the ALT-621 will toggle between a display of feet, meters, mbars, and inHg.

The UNITS button on the ASP-621 will toggle between a display of MPH, KPH, or Knots.

The **EXIT** button is used to exit out of the leak check mode.

The **LEAK CHECK** will begin a 120 second timer, and the display will also show the gain or loss of altitude or airspeed experienced during the displayed time period. If the operator wishes to select a different length of time, the Leak Check button may be pressed repeatedly, which will cause a reduction in the timer counter in 30-second increments. The timer will not toggle above 120 seconds nor under 30 seconds. Once the time is selected, press the Units button to start the timer.

The **LIGHT** button will toggle the display backlight ON or OFF.

Note: there is no method provided to turn the power on or off. If this function is necessary, an external switch will have to be added.

## CHAPTER 2

# OPERATION

Prior to using the ALT-621 or ASP-621 indicator, the user should read this manual in its entirety.

Select the desired units of pressure measurement by pressing the UNITS button as needed.

A leak check may be initiated by pressing the **LEAK CHECK** button. This will display a 120 second timer, and the display will also show the gain or loss of altitude or airspeed experienced during the displayed time period. If the operator wishes to select a different length of time, the Leak Check button may be pressed repeatedly, which will cause a reduction in the timer counter in 30-second increments. The timer will not toggle above 120 seconds nor under 30 seconds. Press the Units button to start the timer.

At the end of a leak check cycle, or to abort the cycle, the **EXIT** button may be pressed, which will return the display to the normal operating mode.

## CHAPTER 3

# CALIBRATION PROCEDURES

**The recommended calibration interval for the ALT-621 and ASP-621 indicators is one year.** If at any time during regular use the unit becomes unreliable or out of correct operating calibration, it must be repaired and/or re-calibrated before continuing its use.

The ALT-621 is easy to calibrate. There are 4 set points used in the calibration of the altimeter (the ALT-621-50 has 7 set points). This enables the altimeter to have a greater degree of accuracy, allowing it to self-correct to the nearest calibrated set point.

Note: the calibration factors are stored in the microcontroller's EEPROM memory. This memory does not need battery back-up. The calibration will not be lost when power is removed.

### Altimeter Calibration Procedures

1. Apply power to the ALT-621. Go to the mBar display, and allow the unit to warm up for a *minimum* of 15 minutes.
2. Connect a known altitude pressure standard to the Vacuum Port.
3. Press the Exit and Leak Check buttons simultaneously. The display will change to:

**Cal? No Yes**

4. Press the Leak Check button to proceed with calibration, or select the Exit button to exit out of the calibration mode without any changes being made.
5. At this point the display will read:

**Goto  
0 Feet**

This is to notify the technician that the current calibration point is 0 feet. To select a different calibration point, press the backlight button (the button will not activate the light while in Cal mode).

There are 4 calibration points: 0, 10,000, 20,000, 30,000 (the ALT-621-50 has 3 additional set points at 40,000, 45,000, 50,000) feet. When the desired calibration point is displayed, press the Units button.

The display will read:

Altitude number (in feet)  
In ^ xxx v



(Where Altitude is the sensed altitude in feet, and xxx is the current calibration value.)

**Write down the calibration value so it can be re-set if needed!**

The In is above the Units button. Press this button when ready to input the selected correction value, as described in the next step.

**6.** Go to a pressure that corresponds to the selected calibration point (referenced from 29.92 inHg/ 0 feet), as read from a pressure standard. When the altitude is stable for approximately 15 seconds, note the altitude displayed on the ALT-621 display in calibration mode.

If the displayed altitude is lower than the standard, press the Exit button as needed to incrementally raise the altitude to be equivalent to the standard.

If the displayed altitude is higher than the standard, press the Leak Check button as needed to incrementally lower the altitude to be equivalent to the standard.

As the altitude is adjusted, note that the displayed correction factor also changes, and the change is in increments smaller than the altitude. Use this to fine-tune the altitude as close as you can to the standard.

When the ALT-621 altitude matches the standard as close as possible, wait another 15 seconds to ensure that the internal mathematical filtering corrections have been done. If satisfied with the results, press the Units button to save the selected correction, and the display will automatically proceed to the next calibration level.

**7.** Repeat the procedure in step 6 at each requested altitude: 10000, 20000, 30000, 40000, 45000, and 50000 feet as needed

**8.** After entering the calibration value of the highest altitude, pressing the Units button will change the calibration to the VSI calibration mode. Select a vertical descent speed (5,000 feet is suggested) on the calibration test equipment and activate it. The ALT-621 will indicate the calculated VSI value. Adjust if needed by pressing the Exit or Leak Check buttons. When finished, press the Units button. The VSI calibration value will be saved.

**9.** After the VSI calibration has been entered, the display will briefly read “**Finished Cal**” and then re-start. There is no need to re-cycle power.

**Helpful Notes:** By pressing the Light button the calibration can be cycled through the various calibration points of 0, 10,000, 20,000 feet, etc. This is handy for use in those cases when only one range is in need of calibration. Note, however, that the unit must be within less than 5,000 feet of the selected range in order to save the new value. This eliminates accidentally saving a value when in the incorrect pressure range.

Note: Allowable error tolerances are as follows:

| Altitude | +/-Error | Altitude | +/-Error |
|----------|----------|----------|----------|
| -1000    | 5        | 14000    | 25       |
| 0        | 5        | 16000    | 27       |
| 500      | 5        | 18000    | 30       |
| 1000     | 5        | 20000    | 32       |
| 1500     | 6        | 22000    | 35       |
| 2000     | 7        | 25000    | 38       |
| 3000     | 7        | 30000    | 45       |
| 4000     | 8        | 35000    | 51       |
| 6000     | 10       | 40000    | 57       |
| 8000     | 15       | 45000    | 63       |
| 10000    | 20       | 50000    | 70       |
| 12000    | 22       |          |          |

ALT-621 S/N

| FOR TEST ALTITUDE | DISPLAY ALTITUDE | FOR TEST ALTITUDE | DISPLAY ALTITUDE |
|-------------------|------------------|-------------------|------------------|
| - 1000            |                  | 14000             |                  |
| 0                 |                  | 16000             |                  |
| 500               |                  | 18000             |                  |
| 1000              |                  | 20000             |                  |
| 1500              |                  | 22000             |                  |
| 2000              |                  | 25000             |                  |
| 3000              |                  | 30000             |                  |
| 4000              |                  | 35000             |                  |
| 6000              |                  | 40000             |                  |
| 8000              |                  | 45000             |                  |
| 10000             |                  | 50000             |                  |
| 12000             |                  | n/a               | n/a              |

Calibrated by: \_\_\_\_\_ Date: \_\_\_\_\_  
 Next Calibration Due Date: \_\_\_\_\_

## Airspeed Calibration Procedures

1. Apply power to the ASP-621 display and allow unit to warm up for a minimum of 15 minutes.
2. Connect a known pressure standard to the Pressure and Static ports. Both ports should be sensing the same pressure. The calibration steps 6 and 7 will be repeated once for each sensor. The first time is for the Pressure port sensor, and the second time for the Static port sensor.
3. Press the Exit and Leak Check buttons. The display will change to:

**Cal? No Yes**

4. Press the Leak Check button to proceed with calibration, or select the Exit button to exit out of the calibration mode without any changes being made.
5. At this point the display will read:

**Goto 0  
Feet**

Press the Units button to continue.

The display will read:

Pt XXX (Pitot sensor and Altitude)  
In ^ xxx v

### **Write down the calibration value so it can be re-set if needed!**

The In is above the Units button. Press this button when ready to input the selected correction value, as described in the next step.

6. Using the pneumatics of the test box or an attached pressure standard, go to a pressure of 1013.25 mBar (sea level pressure of 0 feet), as read from the pressure standard. When the pressure is stable for approximately 15 seconds, note the pressure displayed on the ASP-621 display in calibration mode.

If the displayed pressure is lower than the standard, press the Exit button as needed to incrementally raise the pressure to be equivalent to the standard.

If the displayed pressure is higher than the standard, press the Leak Check button as needed to incrementally lower the pressure to be equivalent to the standard.

As the pressure is adjusted, note that the displayed correction factor also changes, and the change is in increments smaller than the pressure. Use this to fine-tune the pressure as close as you can to the standard.

When the pressure matches the standard as close as possible, wait another 15 seconds to ensure that the internal mathematical filtering corrections have been done. If satisfied with the results, press the Units button to save the calibration.

**7.** If this is the first sensor calibration (the Pitot sensor), the display will indicate again the same display as in step 5. Repeat steps 5 and 6 for the Static sensor. After the second calibration point has been entered, the display will go blank and then re-start from the very beginning of the program as if the unit had just been turned on.

**8.** When a satisfactory calibration is obtained at this test point, go through each test point in the following chart, and enter the corrected value at each point. (The correction chart may be photocopied, cut out, and fixed to the test box for handy reference.)

| TEST AIRSPEED | DISPLAY AIRSPEED | TEST AIRSPEED | DISPLAY AIRSPEED |
|---------------|------------------|---------------|------------------|
| 40 Kts        |                  | 250 Kts       |                  |
| 60 Kts        |                  | 275 Kts       |                  |
| 80 Kts        |                  | 300 Kts       |                  |
| 100 Kts       |                  | 325 Kts       |                  |
| 120 Kts       |                  | 350 Kts       |                  |
| 140 Kts       |                  | 375 Kts       |                  |
| 160 Kts       |                  | 400 Kts       |                  |
| 180 Kts       |                  | 425 Kts       |                  |
| 200 Kts       |                  | 450 Kts       |                  |
| 225 Kts       |                  | 500 Kts       |                  |

Calibrated by: \_\_\_\_\_ Date: \_\_\_\_\_

Next Calibration Due Date: \_\_\_\_\_

## CHAPTER 4

### MAINTENANCE AND TROUBLESHOOTING

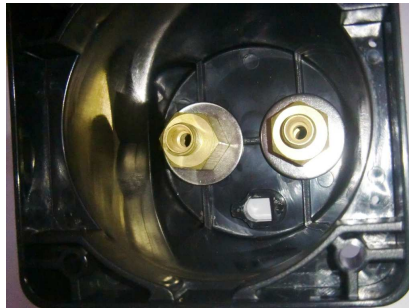
Normal maintenance is limited to performing calibration checks, and re-calibration if necessary. Refer to the following chart of symptoms, causes, and repair comments:

| SYMPTOMS                                       | POSSIBLE CAUSES   | COMMENTARY  |
|--|---|---|
| Display shows garbage                          | Microcontroller had a power brown-out   | Re-cycle power.   |
| Display never finishes initializing            | Bad solder joint or sensor  | Return unit to factory.   |
| Display restarts when a pump switch is toggled | Low Voltage condition, or electrical interference is affecting the instrument | A capacitor may need to be placed across power supply, or use higher amperage power supply. |
| Displays do not turn on                        | Low voltage   | Verify power to unit.   |

### Removal of rear fittings may damage the indicator!

If a rear fitting seems to be too tight, and there is danger of damaging the plastic case, follow these instructions to prevent irreversible damage to the indicator:

1. Disconnect power and external tubing, and remove indicator from test unit.
2. Remove front keypad panel. (Some older units have this panel glued in place. If this is the case, carefully cut around the top and bottom keypad edges, then insert a thin prying knife, and gently pry top panel until released.)
3. Remove small screws on display, then pull out electronic circuits.
4. Remove small screws used on power connector.
5. Disconnect internal tubing (mark tubes to match with fittings for reassembly).
6. Use deep socket wrench to hold internal fitting while removing rear fitting.
7. Reassemble indicator. (Note: the screws for the power connector are longer than the screws for the display.)



Internal view of indicator, showing fittings.