PITOT/STATIC SYSTEM - INSPECTION/CHECK

1. General

A. This section has the inspections and checks necessary to keep the pitot/static system in a serviceable condition.

TASK 34-11-00-720

2. Pitot/Static System Functional Check

A. General

(1) This task provides procedures to perform a functional check of the pitot/static system. Airplanes equipped with Garmin G1000 proceed to Paragraph F. For an alternate method of compliance, (without air data test set) proceed to Paragraph G.

B. Special Tools

NOTE: Equivalent tools and equipment can be used.

(1) Air Data Test Set - (LAVERSAB Model 6500); (Barfield 101-00184)

(2) Pitot/Static Test Adaptor - (Nav-Aids Ltd. PS4769)

(3) External Electrical Power Unit, 28 VDC

(4) Air Bulb (Optional)

C. Safety Precautions and Preparations

CAUTION: Do not disconnect pitot-static tubes, hoses, or test equipment while test pressures are applied. Connections that are not correct can cause damage to the instruments. Make sure that all of the plumbing connections have been installed correctly.

CAUTION: Make sure that the static system pressure is not more than pitot system pressure, or instrument damage can occur. Do not apply pitot pressure to the static system or a vacuum to the pitot system. Do not do a leak test of the pitot and static system with soap and water or other liquids.

CAUTION: Do not apply anti-ice power to pitot probes or static ports when adapters are installed.

NOTE: The aircraft is In-Air mode when a valid GPS groundspeed is greater than 30 knots, or a valid true airspeed is greater than 50 knots.

D. Access

(1) None

E. Do a Functional Check of the Pitot/Static System.

(1) Examine the pitot tube(s) and the static port(s) for condition, corrosion, and obstructions.

(2) Examine the mast(s) for condition, bends, and damage.

(a) Make sure that the sealant at the mast-to-wing joint is in good condition.

(3) Examine all pitot/static system plumbing for condition and security.

(a) Make sure that there are no low spots in the tubing that would cause water to collect.

(4) Make sure that there is no moisture and/or restrictions caught in the static system.

(5) Make sure that there are no alterations or deformations of the airframe surface that would affect the relationship between the air pressure in the static pressure system and the true ambient static air pressure for any flight configuration.

(6) Examine the drain valve(s) for condition, water in static system, and security of installation.

CAUTION: Do not open the autopilot drain plugs unless moisture is found in the left static system drain valve. If the autopilot static drain plug is removed to drain moisture, you must do a static system check after you install the plug.

(7) Examine the drain valve(s) tubing connections for condition and security.

(8) Connect external electrical power to the airplane.

(9) Set the External Power Switch to BUS.

(10) Set the Battery Switch to ON.

(11) Set the Avionics Switches 1 and 2 to ON.

(12) Do a self-test on the air data test set and record the leak rate for future use.

(13) Connect the air data test set to the left pilot's pitot/static probe in accordance with the manufacturer's instructions.

(14) Make sure that the altimeter(s) pressure display reads 29.92 IN (1013 HPA).

(15) Use the air data test set, to increase the pressure to the left pitot systems to generate airspeeds of 100, 125, 150, and 175 knots.

(a) Make sure that the airspeed displayed is the same as the input +/-5 knots.

(16) Slowly increase the pressure and make sure that the airspeed warning horn gives an audible sound at 178 KIAS, +3 or -3 KIAS.

(17) Slowly decrease the pressure and make sure that the airspeed warning horn sound stops at 178 KIAS, +3 or -3 KIAS.

(18) With the test set input set at 175 knots, do the leak check on the system.

(a) After 1 minute the maximum allowable loss must not be more than 5 knots.

NOTE: The airplane's leak rate is determined by subtracting the recorded test set's internal leakage.

(19) Set the altitude on the air data test set to 1,500, 10,000, 25,000 feet.

(a) Make sure that the altitude displayed on the altimeter(s) as specified in Table 602.

(20) Slowly apply suction until the altimeter shows a 1000- foot (304.800 m) increase in altitude.

(a) Close the suction source to keep the system closed for one minute.

(b) Make sure that the decrease in altitude is not more than 100 feet as shown on the altimeter.

(c) If the leakage rate is within tolerance, slowly release the suction source.

(d) If the leakage rate is more than the maximum permitted rate, tighten all the connections and do a leakage test.

(e) If the leakage rate is still more than the maximum permitted rate, do the steps that follow:

1 Disconnect the static pressure lines from the airspeed indicator and the vertical speed indicator.

2 Use the correct fittings and connect the pressure lines together so the altimeter is the only instrument connected to the static pressure system.

3 Do a leak test to find whether the static pressure system or the bypassed instruments are the cause of the leakage.

(21) Slowly return the pitot/static system to the field elevation.

(22) If installed, do the test again for the right copilot's pitot/static system.

(23) Remove the air data test set in accordance with the manufacturer's instructions.

(24) Set the PITOT-STATIC HEAT switch to ON for 30 seconds, then OFF.

NOTE: The pitot tubes have two heating elements, one in the front of and one behind the static port compensating ring. Make sure that both elements are operating.

WARNING: Use extreme caution when you touch the pitot tube surface with you bare hands. The pitot tube will cause severe burns to skin if it is left on too long.

(25) Carefully make sure that the pitot tube becomes warm when the PITOT-STATIC HEAT switch is at the ON position.

(26) Set the Avionics Switches 1 and 2 to OFF.

(27) Set the Battery Switch to OFF.

(28) Set the External Power Switch to OFF.

(29) Remove the external electrical power from the airplane.

(30) Do the Restore Access.

F. Do a Functional Check of the Pitot/Static Systems (Garmin G1000 Equipped).

(1) Examine the pitot tube(s) and the static port(s) for condition, corrosion, and obstructions.

(2) Examine the mast(s) for condition, bends, and damage.

(a) Make sure that the sealant at the mast-to-wing joint is in good condition.

(3) Examine all pitot/static system plumbing for condition and security.

(a) Make sure there are no low spots in the tubing that would cause water to collect.

(4) Make sure that there is no moisture and/or restrictions caught in the static system.

(5) Make sure that there are no alterations or deformations of the airframe surface that would affect the relationship between the air pressure in the static pressure system and the true ambient static air pressure for any flight configuration.

(6) Examine the drain valve(s) for condition, water in static system, and security of installation.

CAUTION: Do not open the autopilot drain plugs unless moisture is found in the left static system drain valve. If the autopilot static drain plug is removed to drain moisture, you must do a static system check after you install the plug.

(7) Examine the drain valve(s) tubing connections for condition and security.

(8) Connect external electrical power to the airplane.

(9) Set the External Power Switch to BUS.

(10) Set the Battery Switch to ON.

(11) Set the Avionics Switches 1 and 2 to ON.

(12) Do a self-test on the air data test set and record the leak rate for future use.

(13) Connect the air data test set to the left pilot's pitot/static probe in accordance with the manufacturer's instructions.

CAUTION: Make sure that the static system pressure is not more than pitot system pressure, or instrument damage can occur. Do not apply pitot pressure to the static system or a vacuum to the pitot system. Do not do a leak test of the pitot and static system with soap and water or other liquids.

CAUTION: Do not apply power to pitot probes when the test adapters are installed.

NOTE: The pressure sensors inside of the GDC 74 are internally heated and must stabilize before the test. The G1000 / Air Data System must be powered on for a minimum of 15 minutes before you take calibration readings.

(14) Push in on the BARO correction knob on PFD1 and make sure that the pressure display reads 29.92 IN (1013 HPA).

(a) Set the barometric setting on the standby altimeter to 29.92 IN.

(15) Use the air data test set to increase the pressure to the left pitot systems to generate the airspeeds (A/S) shown in Table 601. Record the airspeed displayed on the PFD and the standby airspeed indicator.

Table 601. Airspeed Display Check

Input Airspeed	Airspeed Indication Limit on PFD1	Airspeed Indication on PFD1	Airspeed Indication on PFD2	Airspeed Indication Limit on Standby Airspeed Indicator	Airspeed Displayed on Standby Airspeed Indicator
100	100 ± 2 kts			100 ± 4 kts	
125	125 ± 2 kts			125 ± 4 kts	
150	150 ± 2 kts			150 ± 4 kts	
175	175 ± 2 kts			175 ± 4 kts	

NOTE: Airspeed tape changes to RED above 175 KIAS.

(16) Slowly increase the pressure and make sure that the airspeed warning horn gives an audible sound at 178 KIAS, +3 or -3 KIAS.

(17) Slowly decrease the pressure and make sure that the airspeed warning horn sound stops at 178 KIAS, +3 or -3 KIAS.

(18) With the test set input set at 175 knots do the leak check on the system.

(a) After 1 minute the maximum allowable loss must not be more than 5 knots.

NOTE: The aircraft's leak rate is determined by subtracting the recorded test set's internal leakage.

(19) Set the altitude on the test set to the values shown in Table 602.

Table 602. Altitude Display Check

Test Set Altitude Input	Altitude Indication Limit	Altitude Indication PFD 1	Altitude Indication PFD 2	Standby Altimeter Reading Indication Limit	Standby Altimeter Reading Indication
1,500 ft	1,500 ± 25 ft			1,500 ± 25 ft	
10,000 ft	10,000 ± 80 ft			10,000 ± 80 ft	
25,000 ft	25,000 ± 155 ft			25,000 ± 155 ft	

(20) Slowly apply suction until the altimeter shows a 1000- foot (304.800 m) increase in altitude.
  (a) Close the suction source to keep the system closed for one minute.
  (b) Make sure that the decrease in altitude is not more than 100 feet as shown on the altimeter.
  (c) If the leakage rate is within tolerance, slowly release the suction source.
  (d) If the leakage rate is more than the maximum permitted rate, tighten all the connections and do a leakage test.
  (e) If the leakage rate is still more than the maximum permitted rate, do the steps that follow:
    1 Disconnect the static pressure lines from the airspeed indicator and the vertical speed indicator.
    2 Use the correct fittings and connect the pressure lines together so the altimeter is the only instrument connected to the static pressure system.
    3 Do a leak test to find whether the static pressure system or the bypassed instruments are the cause of the leakage.

(21) Do the test again for the right pitot/static system using PFD2. Record the data in Table 601 and Table 602.

NOTE: The standby altimeter and airspeed indicators are not connected to the right system.

(22) Slowly return the pitot/static system to the field elevation.

(23) Remove the air data test set in accordance with the manufacturer's instructions.

(24) Set the PITOT-STATIC HEAT switch to ON for 30 seconds, then OFF.

NOTE: The pitot tubes have two heating elements, one in the front of and one behind the static port compensating ring. Make sure that both elements are operating.

WARNING: Use extreme caution when you touch the pitot tube surface with you bare hands. The pitot tube will cause severe burns to skin if it is left on too long.

(25) Carefully make sure that the pitot tube becomes warm when the PITOT-STATIC HEAT switch is at the ON position.

(26) Set the Avionics Switches 1 and 2 to OFF.

(27) Set the Battery Switch to OFF.

(28) Set the External Power Switch to OFF.

(29) Remove the external electrical power from the airplane.

(30) Do the Restore Access.

G. Do a Functional Check of the Pitot/Static Systems (Alternate Method). Refer to Figure 601.

(1) Examine the pitot tube(s) and the static port(s) for condition, corrosion, and obstructions.

(2) Examine the mast(s) for condition, bends, and damage.
  (a) Make sure that the sealant at the mast-to-wing joint is in good condition.

(3) Examine all pitot/static system plumbing for condition and security.
  (a) Make sure there are no low spots in the tubing that would cause water to collect.

(4) Make sure that there is no moisture and/or restrictions caught in the static system.

(5) Make sure that there are no alterations or deformations of the airframe surface that would affect the relationship between the air pressure in the static pressure system and the true ambient static air pressure for any flight configuration.

(6) Examine the drain valve(s) for condition, water in static system, and security of installation.

CAUTION: Do not open the autopilot drain plugs unless moisture is found in the left static system drain valve. If the autopilot static drain plug is removed to drain moisture, you must do a static system check after you install the plug.

(7) Examine the drain valve(s) tubing connections for condition and security.

(8) Connect external electrical power to the airplane.

(9) Set the External Power Switch to BUS.

(10) Set the Battery Switch to ON.

(11) Set the Avionics Switches 1 and 2 to ON.

(12) Connect a piece of rubber or plastic tubing over the left pilot's pitot/static probe.

(13) Close the opposite end of the rubber or plastic tubing and slowly roll the tubing up to generate airspeeds of 100, 125, 150, and 175 knots.

(a) Make sure that the airspeed displayed is the same as the input +/-5 knots.

(14) Slowly increase the pressure and make sure that the airspeed warning horn gives an audible sound at 178 KIAS, +3 or -3 KIAS.

(15) Slowly decrease the pressure and make sure that the airspeed warning horn sound stops at 178 KIAS, +3 or -3 KIAS.

(16) With the airspeed set at 175 knots do the leak check on the system.

(a) After 1 minute the maximum allowable loss must not be more than 5 knots.

(17) Slowly unroll the tubing and gradually decrease the pressure.

CAUTION: Make sure that the pressure is gradually decreased to prevent damage to the instrument.

(18) Remove the tubing from the pitot tube.

(19) Close the static pressure alternate source valve.

(20) Set the altimeter to 29.92.

(21) Apply a source of suction to the remaining static pressure source opening. Refer to Figure 601 for one method.

CAUTION: When you apply or release the suction, you must stay less than the range of the vertical speed or airspeed indicator.

(22) Slowly apply suction until the altimeter shows a 1000-foot increase in altitude.

(a) Air Bulb Method

1 Squeeze the air bulb to remove as much air as possible.

2 Hold the suction hose firmly against the static pressure source opening.

3 Slowly release the air bulb to get the necessary suction.

4 Tightly close the hose to trap the suction in the system.

(b) Close the suction source to keep the system closed for one minute.

(c) Make sure that the decrease in altitude is not more than 100 feet as shown on the altimeter.

(d) If the leakage rate is within tolerance, slowly release the suction source.

(e) If the leakage rate is more than the maximum permitted rate, tighten all the connections and do a leakage test.

(f) If the leakage rate is still more than the maximum permitted rate, do the steps that follow:

1 Disconnect the static pressure lines from the airspeed indicator and the vertical speed indicator.

2 Use the correct fittings and connect the pressure lines together so the altimeter is the only instrument connected to the static pressure system.

3 Do a leak test to find whether the static pressure system or the bypassed instruments are the cause of the leakage.

a If the leakage is the result of an instrument failure, the instrument must be repaired by an approved repair station, or it must be replaced.

b If the leakage is the result of the static pressure system, find the leakage as follows.

c Apply a source of positive pressure to the static source opening. Refer to Figure 601 for one method to get a positive pressure.

CAUTION: Make sure that you do not apply a positive pressure when the airspeed indicator or the vertical speed indicator is connected to the static pressure system.

d Slowly apply a positive pressure until the altimeter shows a 500-foot decrease in altitude.

NOTE: For the air bulb method you must hold the pressure hose firmly against the static pressure source opening. To apply the desired pressure to the static system you slowly squeeze the air bulb. This will replace any air that is released through the leaks.

e Put leak detector solution or a mixture of mild soap and water on the line connections and the static source flange.

f Apply a positive pressure to keep the altimeter indication and look for bubbles which show the leaks.

g Slowly release the pressure.

NOTE: For the air bulb method you must slowly open the pressure bleed-off screw.

h Remove the test equipment.

i Tighten all the connections that leak.

j Repair or replace the defective parts.

k Do the leak test again.

(g) After the leak test, release the suction slowly. Intermittently let a small amount of air to go into the static system.

1 Air Bulb Method

a Tilt the end of the suction hose away from the opening, then immediately tilt it back against the opening.

b Continue to release a small amount of air intermittently until all of the suction is released.

(23) If installed, do the test again for the right copilot's pitot/static system.

(24) Remove the test equipment.

(25) Set the PITOT-STATIC HEAT switch to ON for 30 seconds, then OFF.

NOTE: The pitot tubes have two heating elements, one in the front of and one behind the static port compensating ring. Make sure that both elements are operating.

WARNING: Use extreme caution when you touch the pitot tube surface with you bare hands. The pitot tube will cause severe burns to skin if it is left on too long.

(26) Carefully, make sure that the pitot/static tube(s) became warm when the PITOT-STATIC HEAT switch was placed in the ON position.

(27) Set the Avionics Switches 1 and 2 to OFF.

(28) Set the Battery Switch to OFF.

(29) Set the External Power Switch to OFF.

(30) Remove the external electrical power from the airplane.

H. Restore Access

(1) None

END OF TASK

TASK 34-11-00-710

3. Pitot Tube Heaters Operational Check

A. General

(1) This task gives the information needed to operational check of the pitot tube heaters.

B. Special Tools

(1) External Electrical Power Unit

C. Access

(1) None

D. Do the Pitot Tube Heater Operational Check.

NOTE: The pitot tubes have two heating elements, one in the front and one behind the static port compensating ring. Make sure that both elements operate.

(1) Make sure that the covers are not installed on the pitot tubes.

(2) Connect the external electrical power unit to the airplane.

(3) Set the BATT switch to the ON position.

(4) Set the PITOT-STATIC HEAT switch to the ON position for 30 seconds, then to the OFF position.

WARNING: Use extreme caution when you touch the pitot tube surface with you bare hands. The pitot tube will cause severe burns to skin if it is left on too long.

(5) Carefully make sure that the pitot tube becomes warm when the PITOT-STATIC HEAT switch is at the ON position.

(6) Set the BATT switch to the OFF position.

(7) Remove the electrical power from the airplane.

E. Restore Access

(1) None

END OF TASK

Figure 601 : Sheet 1 : Static System Test Equipment Fabrication