

**IFR Certification Procedure
FAR Part 91.411 & 91.413**

A. PRELIMINARY STEPS

1. Determine test equipment to be used is within calibration period, and the correction chart on the pitot/static instruments is current.
2. Relocate aircraft inside metal hanger with doors closed while static system is under test to avoid traffic avoidance systems interference. If this is not possible, coordinate with the tower for times the test can be done outside. An alternate method would be to use the antenna shields supplied in the ATC-601 test set accessories, or go direct to the transponder antenna connection thru a 34 db attenuator and complete the encoder check then reconnect the antenna to complete the radiated check.
3. Check for any AD's or bulletins that may apply to the altimeter under test. Check aircraft maintenance manual for special test conditions, such as author Q's, limits, special tolerances, ect. Verify the maximum operating altitude of the altimeter meets or exceeds the operating ceiling of the aircraft under test. Before connecting pitot/static test set to aircraft or instruments, complete barometric scale error test in accordance with FAR Part 43 App. E, table IV. Record the results on Form #KA-2 (Altimeter Test/Inspection).
 - a. Set barometric scale to 29.92 and record altitude reading of altimeter under test.
 - b. Reset scale to values listed in table IV.
 - c. Compute difference between actual reading and the 29.92 value.
 - d. If altimeter does not exceed tolerance, proceed to next step. If altimeter does exceed tolerance, it must be removed for repair.
4. Inspect Static system to be checked for entrapped moisture, restrictions, or damage.
 - a. Cycle pitot/static drains.
 - b. If moisture is present, drain and purge system in accordance with manufacturers recommended procedures.
 - c. If damage is noted on pitot or static ports, repair as required.
5. Connect aircraft to auxiliary power since the system will be powered up for the duration of the test.

6. Connect pitot/static test set to aircraft static port. Seal off opposite port if applicable, with metal tape. Flag tapped port with flagging material. If test is being completed on a FAR part 121 aircraft, complete log entry stating static ports have been sealed for static tests.
7. Connect pitot adaptor to airspeed pitot and tape off drain holes, if applicable, with electrical tape.
8. Close crossfeed on pitot/static test set and apply airspeed, check the aircraft airspeed indicator at approx 150kts for accuracy (for reference later), and note pitot leak rate.

NOTE: The pitot system leak rate may be found in the aircraft maintenance manual. If a leak rate is not in the manual, 10 kts. per/min.(or less) @ 150 Kts. is acceptable. (AC43.13-1A Chap 12 Sect 4)

9. Open crossfeed and perform leak check of static system.
 - a. If un-pressurized aircraft, leak test altitude is 1000 ft above field elevation. Leak rate not to exceed 100 fpm (FAR 23/25.1325 par. 2 i).
 - b. If pressurized aircraft, leak test altitude is at maximum cabin differential pressure. Leak rate not to exceed 2% of test altitude or 100 fpm, whichever is greater (FAR 23/25.1325 par. 2 ii).

NOTE: A simple way to determine test altitude on pressurized aircraft is to read the altitude's on the cabin pressure controller dial. Find the field elevation on the inner ring of numbers and read the test altitude directly across on the outer ring of numbers. Always refer to the aircraft maintenance manual to confirm the max differential altitude.

10. Set up transponder tester per manufacturers instructions. Check for any AD's or bulletins applicable to the transponder under test.

B. TEST PROCEDURES

1. Set all barometric scales to 29.92 in. hg.
2. Record part numbers and serial numbers of altimeters, blind encoders, air data computers, and transponders in the appropriate spaces on the Altimeter Test/ Inspection form #KA-2, the ATC Transponder Inspection form #KA-4, and the Logbook Sticker card #KA-12.

3. Determine if altimeters are airdata driven or pneumatic.
 - a. Obtain pitot/static schematics from aircraft maintenance manual if static system is complex.
 - b. If working on a pressurized aircraft disconnect cabin pressure altimeter instrument and plug static line for the duration of the test. Remember to reconnect cabin pressure altimeter instrument and leak check to proper test altitude when tests are completed.
Note: If cabin pressure altitude instrument is forced below field elevation, it could be damaged.
 - c. If airdata driven, connect direct to airdata static and pitot inputs to test and certify.
 - d. If pneumatic, connect to aircraft static systems and certify as a system.

NOTE: When testing as a system, and the leak rate exceeds 100 FPM at 18,000 Feet, the determination needs to be made as to whether the altimeter meets the CASE LEAK specifications.

4. Determine if Static Defect Correction unit is installed (in most jets). This unit will have a bearing on how the tests are to be performed. A correction curve will need to be obtained from the pilots operating handbook or from the equipment manufacturer, and referred to during the scale error test.
5. Complete altimeter and encoder tests in accordance with the limits called out in FAR Part 43, App E & FAR Part 91.217, and record readings on the form #KA-2.

NOTE: Scale error tests are accomplished by reading the test altitude on the pitot/static test set altimeter and adjusting the static altitude as read on the test set altimeter plus or minus to match the correction chart. With correction applied, the test altitude will be accurate. Then record the error as read on the aircraft altimeter under test on form #KA-2.

NOTE: Record field pressure altitude in the test set reference box in the AFTER EFFECT TEST section as read on the test set altimeter as well as the altimeter under test prior to testing. Use this test set altitude reading as a reference when recording the after effect test readings. This practice will eliminate errors associated with atmospheric pressure changes during the test, and compensates for "0" hysteresis if using a digital test altimeter.

- a. Set test unit to each test altitude and record readings
- b. Verify unit under test does not exceed tolerance.

- c. Record mode C readings. The difference between altitude as read on the aircraft altimeter being tested and the mode C reported on the transponder test set will not exceed ± 125 feet on a 95% probability as called out in FAR 91-217.

NOTE: If the encoder maximum altitude is less than the altitude ceiling of aircraft under test, a logbook entry and a panel placard will be completed stating "Mode C altitude encoding limited to xxx feet."

6. Hysteresis Test

NOTE-This test must be completed within 15 minutes of reaching maximum test altitude.

- a. The Hysteresis test is checked at a test altitude equivalent to 50% and 40% of the maximum altitude of the altimeter under test.
- b. Reduce altitude at a rate not to exceed 5,000 fpm, or the maximum rate of VSI, whichever is less. Reduce rate to 3000 fpm when within 3000 ft of the first test point. Hold at 50% point for five (5) minutes and record reading. Reduce altitude to 40% point, hold for five (5) minutes and record reading.
- c. The difference between the up and down readings should not exceed ± 75 feet.

7. After Effect Test

NOTE: This test must be completed within five (5) minutes after Hysteresis test is completed.

- a. Reduce altitude to field elevation (test set reference).
- b. Compare altimeter reading to original reading before the test was started. Difference should not exceed ± 30 feet.

- 8. Close crossfeed on pitot/static test set and apply airspeed. Compare aircraft airspeed indicator reading to the value recorded in preliminary step 8. This check verifies no damage was done to the airspeed indicator during the test.
- 9. Complete operational check of all pitot/static heaters after hoses, tape, caps, or plugs have been removed. Always remove hoses from pitot/static tester first. This will prevent any possible instrument damage.
- 10. Complete transponder test and record results on form #KA-4. It is advisable, and good practice, to go beyond the requirements of FAR Part

43, App E, and check other parameters of the transponder to insure the unit being tested is in healthy condition.

- 11.** After all checks are completed and found to meet specs, install sticker #KA-27 on altimeters, airdata computer, or blind encoder verifying these units have been tested in accordance with FAR Part 91.217 or FAR Part 91.411 as required. Complete all forms including logbook sticker #KA-12. Make a copy of the form #KA-12 to be placed in the work order folder, the original to be placed in the aircraft logbook or given to maintenance control of the aircraft. Make of copy of Form #KA-2 and include with the aircraft records or staple or clip to logbook.
- 12.** Record the ID numbers for the test equipment used on Form #KA-2 and #KA-4.