

ERRORS OF ALTIMETER

If an altimeter indicates a 50' error when set to the current altimeter pressure setting, the instrument is unserviceable (U/S). During flight the pilot sets the altimeter to the nearest setting source (tower, metar etc.).

BLIP PBT

B	lockage	P	ressure error
L	ag	B	arometric error
I	nstrument	T	emperature error.
P	osition		

- 1) **Blockage Error** – Indicates a constant altitude in climb or descent. It will cause altimeter pointer to freeze. If the static is blocked at 9,000' and a/c is at 10,000, Altimeter will read 9,000'.
- 2) **Lag Error** – The error is caused due to hysteresis and mechanical friction. Lag error is virtually removed in servo altimeter by electro mechanical pick off device.
- 3) **Instrument Error** – It is inherent or manufacture error of the instrument.
- 4) **Position** – Position error is caused due to interference of dynamic pressure at static source. This error is caused due to following reasons:
 - (a) Incorrect positioning of static source.
 - (b) Induced (Slip / Skid, Low speed and High or low angle of attack, use of standby or alternate source).
 - (c) Ground effect. It is the disturbance of the wing tip vortices and the air flow around the A/C which eventually causes interference.

Position error causes altimeter to always under read.

- 5) **Pressure Error** - When flying from a high-pressure area to a low-pressure area, the altimeter will read higher than actual altitude. From low-pressure area to a high-pressure area, the altimeter will read lower than actual altitude.
- 6) **Barometric error:** When the subscale of altimeter differs from actual pressure prevailing at a point the indication will not be correct. The error is called barometric error.
- 7) **Temperature Error:** When flying from area of high temp to low temp. Altimeter will over read. $H \rightarrow L \rightarrow H$. Altimeter is calibrated based on ISA temperature and Pressure lapse rate. There is no altimeter settings which will compensate for temperature deviation from ISA. An aircraft flying at a constant altitude

from high temperature area to low temperature would descend and will be actually at a lower true altitude than indicated. Hence the altimeter over reads. So, remember Hot to cold, do not be Bold or Cold kills. Opposite happens from Cold to hot temperatures.



Questions

- Q1. A servo altimeter has a quoted accuracy of 1 hPa at mean sea level. The accuracy in the standard atmosphere is:
 - a) ± 50 ft at 10 000 ft and ± 100 ft at 40 000 ft
 - b) ± 50 ft at 20 000 ft and ± 90 ft at the tropopause
 - c) ± 27 ft at MSL and ± 50 ft at 10 000 ft
- Q2. Position error is caused due to
 - a) Ground effect
 - b) Configuration of A/C
 - c) All of the above
- Q3. Pressure error is maximum at:
 - a) High speed and high altitude
 - b) Low level and high speed
 - c) As in and under ground effect
- Q4. A servo altimeter is _____ than a conventional one because of _____.
 - a) More accurate, electrical servos
 - b) More accurate, electrical pick off coils.
 - c) Less accurate, electrical servos

Q5. What will happen if an a/c has 2 altimeters, one of which is compensated for position error, whilst the other is not:

- a) One will over read at high air speed
- b) One will under read at high air speed
- c) One will under read close to the ground.

Q6. The purpose of stand by static source is:

- a) To reduce position error
- b) To be used in emergency
- c) Both a and b

Q7. If static source of a/c is blocked in un pressurized a/c the correct action for pilot will be:

- a) Break glass of altimeter
- b) Break glass of VSI
- c) Use stand by static source.

Note: The glass of altimeter is never broken, the glass of VSI is broken in case of emergency because it is less important. In cases where static source is available, that is to be used.

Q8. White zebra crossing on altimeter appears when:

- a) a/c is below MSA (minimum safe altitude)
- b) a/c is above, 10,000'
- c) a/c is below 10,000

Q9. When flying from a sector of warm air into one of colder air, the altimeter will?

- a) Under read.
- b) Over read.
- c) Show the actual height above ground.

Q10. Temp. error in altimeter is caused due to:

- a) Non standard MSL temp
- b) Non standard temp lapse rate
- c) Non standard temp at a/c altitude

Q11. Bimetallic strip in altimeter is provided

- a) To compensate for temp. error
- b) To compensate for thermal expansion of mechanical linkages.
- c) To compensate for adiabatic rise in temperature of temp error.

Q12. Pressure error in an altimeter arises because:

- a) The true external dynamic pressure is not accurately transmitted to the instrument
- b) The true external static pressure is not accurately transmitted to the instrument
- c) The true external kinetic pressure is not accurately transmitted to the instrument

Q13. In a non-pressurized aircraft, if one or several static pressure ports are damaged, there is an ultimate emergency means for restoring a practically correct static pressure intake:

- a) breaking the rate-of-climb indicator glass window
- b) Slightly opening a window to restore the ambient pressure in the cabin
- c) calculating the ambient static pressure, allowing for the altitude and QNH adjusting the instruments

Q14. The pressure altitude is the altitude corresponding:

- a) in ambient atmosphere, to the reference pressure Ps
- b) in standard atmosphere, to the reference pressure Ps
- c) in standard atmosphere, to the pressure Ps prevailing at this point

Q15. The altimeter consists of several aneroid capsules located in a sealed casing. The pressure in the aneroid capsule (i) and casing (ii) are respectively:

- a) (i) static pressure at time t (ii) static pressure at time t - t
- b) (i) vacuum (or a very low pressure) (ii) static pressure
- c) (i) static pressure (ii) total pressure

Q16. Altimeter gives height of aircraft with Respect To :

- a) M.S.L.
- b) A.G.L.
- c) Set Datum

Q17. We are maintaining a constant flight level. That means:

- a) the outside air pressure is constant if the temperature remains constant.
- b) the outside air pressure is constant.
- c) the altitude is constant when the sea-level pressure is constant.

Q18. The altitude indicated on board an aircraft flying in an atmosphere where all atmosphere layers below the aircraft are warm is:

- a) the same as the real altitude
- b) Higher than the real altitude
- c) equal to the standard altitude

- Q19. In case of accidental closing of an aircraft's left static pressure port (rain, birds), the altimeter:**
- Over reads the altitude in case of a sideslip to the left and displays the correct information during symmetric flight
 - keeps on providing reliable reading in all situations
 - Under reads the altitude
- Q20. The altimeter is fed by:**
- differential pressure
 - dynamic pressure
 - static pressure
- Q21. The advantage of sensitive altimeter over service altimeter is.**
- It does not form lag error.
 - Instrument error is really eliminated.
 - It can be used up to higher altitude
- Q22. The error in altimeter readings caused by the variation of the static pressure near the source is known as:**
- position pressure error
 - barometric error
 - hysteresis effect
- Q23. If the static source of an altimeter becomes blocked during a descent the instrument will:**
- under-read
 - gradually indicate zero
 - continue to display the reading at which the blockage occurred
- Q24. The primary factor which makes the servo-assisted altimeter more accurate than the simple pressure altimeter is the use of:**
- an induction pick-off device
 - more effective temperature compensating leaf springs
 - combination of counters/pointers
- Q25. At sea level, on a typical servo altimeter, the tolerance in feet from indicated must not exceed:**
- +/- 30ft
 - +/- 75ft
 - +/- 60ft

- Q26. An aircraft is flying straight and level, over a warm air mass. The altimeter reading will be:**
- Greater than the real height
 - less than the real height
 - correct
- Q27. When flying from a sector of warm air into one of colder air, the altimeter will:**
- be just as correct as before
 - Under read
 - Over read
- Q28. The hysteresis error of an altimeter varies substantially with the:**
- Aircraft altitude
 - time passed at a given altitude
 - mach number of the aircraft
- Q29. A pilot is given a QNH of 1003 hPa while coming in to land. He forgets to reset his altimeter. The error experienced will be.**
- Pilot Error
 - Pressure Error
 - Barometric error
- Q30. For an altimeter, pressure fluctuations at the static vent cause:**
- Barometric error
 - Position error
 - Hysteresis error
- Q31. An aircraft is passing 6,500 ft in a descent when the static line becomes blocked. The altimeter then reads:**
- less than 6,500 ft
 - zero
 - 6,500 ft
- Q32. The purpose of the vibrating device of an altimeter is to?**
- Allow damping of the measurement in the unit.
 - Reduce the hysteresis effect.
 - Reduce the effect of friction in the linkages.
- Q33. Lag error in servo assisted altimeter is virtually removed by:**
- Electromechanical pick off device.
 - Rocking mechanism.
 - Using more than one capsule in series.

Q34. Transducer in servo assisted altimeter is used to

- a) Increase sensitivity of altimeter
- b) To remove lag error.
- c) All the above

Q35. In an aircraft a static source is so placed that it is having subjected to dynamic pressure. The error caused of any will be known as:

- a) There will be no error
- b) Position Error
- c) Dynamic Pressure Error

Q36. The principle of operation of a servo-assisted pressure altimeter is that:

- a) static pressure is used in the same way as a simple altimeter except that several capsules are used
- b) static pressure changes are converted via an E- and I-bar transducer into electrical signal which is used, via a follow-up system, to move a digital counter and pointer system
- c) static pressure enters an aneroid capsule causing it to expand

Q37. When flying from low pressure to high pressure, the barometric error of an altimeter will cause the instrument to:

- a) indicate a higher altitude than the correct one.
- b) Under read the true altitude of the aircraft.
- c) indicate the true altitude.

Q38. What will happen to the altimeter reading in a right sideslip, if an aircraft has a static vent at each side of the fuselage, but the left one is blocked?

- a) Over read.
- b) Under read.
- c) No change.

Q39. A barometric altimeter comprises of?

- a) An aneroid capsule sensing static pressure.
- b) An aneroid capsule sensing pitot pressure.
- c) A differential capsule sensing pitot and static pressures.

Q40. What will happen to the altimeter reading in a right sideslip, if an aircraft has a static vent at each side of the fuselage, but the right one is blocked?

- a) Over read.
- b) Under read.
- c) No change.

Q41. The altimeter of an aircraft with a static pressure source on each side of the fuselage will if one becomes blocked ?

- a) Over read when side slipping.
- b) Over read when side slipping towards the blocked source.
- c) Over read when side slipping towards the clear source.

Q42. A servo altimeter is it employs an electrical pick-off?

- a) More accurate because.
- b) Less accurate because..
- c) Less reliable because...

Q43. What will happen to the altimeter reading if an aircraft flying at a fixed heading meets a colder air mass?

- a) Read less than true altitude.
- b) Read more than true altitude.
- c) Read zero.

Q44. From where does the ADC obtain altitude data?

- a) Radio Altimeter.
- b) OAT sources.
- c) Barometric altitude source.

Q45. If icing or debris cause pressure disturbances at the static source, the effect will be?

- a) Increased compressibility error.
- b) Increased instrument error.
- c) Increased position error.

Q46. In a barometric altimeter..... Is fed into the capsule and Is fed into the case?

- a) Static pressure dynamic pressure.
- b) Vacuum static pressure.
- c) Dynamic pressure vacuum.

Q47. If the static pressure source in an un-pressurized aircraft became blocked the altimeter would..... but might be rectified by.....?

- a) Read zero break the altimeter glass.
- b) Read zero open the windows.
- c) Freeze break the VSI glass.

Q48. If the pitot source becomes blocked the barometric altimeter will?

- a) Freeze. b) Read zero. c) Be unaffected.

Q49. If the static vent becomes partly blocked in a descent the indications will?

- a) Be too high when descending but correct when at constant altitude.
b) Be too high when descending but correct when at constant height.
c) Be too low when descending but correct when at constant altitude.

Q50. A vibrator is sometimes fitted in an altimeter to?

- a) Overcome gauge parallax error.
b) Reduce instrument errors.
c) Reduce sensing errors.

Answers

Q:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A:	c	c	c	b	c	b	c	c	b	c	b	b	a	c	b	c	b	b	a	c

Q:	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A:	c	a	c	a	c	b	c	b	c	b	c	c	a	b	b	b	b	b	a	a

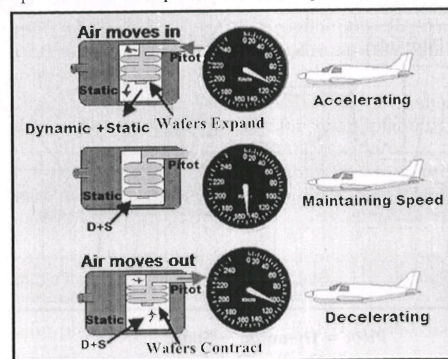
Q:	41	42	43	44	45	46	47	48	49	50
A:	b	a	b	c	c	b	c	c	a	b

Chapter

3

ASI - AIR SPEED INDICATOR

The ASI has pitot pressure, which is equal to static plus dynamic, and pipes that go to an aneroid capsule which is surrounded by static pressure. This results in the capsule being distorted by an amount equal to the dynamic pressure. This distortion is amplified and then presented to the pilot as IAS.



Purpose: To give Indicated Air Speed.

PRINCIPLE: It gives air speed indication by measuring difference between pitot and static pressure.