22. INSTRUMENTATION - AEROPLANES

22.01. FLIGHT INSTRUMENTS

22.01.01. Air data instruments

22.01.01.01. Pitot and static system

1 id 530 — The pressure measured at the forward facing orifice of a pitot tube is the :

- **a** static pressure.
- **b** **total pressure.**
- **c** total pressure plus static pressure.
- **d** dynamic pressure.

2 id 2677 — A pitot blockage of both the ram air input and the drain hole with the static port open causes the airspeed indicator to :

- **a** **react like an altimeter.**
- **b** read a little high.
- **c** read a little low.
- **d** freeze at zero.

3 id 2944 — A pitot tube covered by ice which blocks the ram air inlet will affect the following instrument (s) :

- **a** altimeter only.
- **b** **airspeed indicator only.**
- **c** vertical speed indicator only.
- **d** airspeed indicator, altimeter and vertical speed indicator.

4 id 4244 — 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** descending as much as possible in order to fly at a pressure as close to 1013.25 hPa as possible
- **d** calculating the ambient static pressure, allowing for the altitude and QNH and adjusting the instruments

5 id 4611 — The atmospheric pressure at FL 70 in a "standard + 10" atmosphere is:

- **a** **781.85 hPa.**
- **b** 942.13 hPa.
- **c** 1 013.25 hPa.
- **d** 644.41 hPa.

6 id 4616 — In a standard atmosphere and at the sea level, the calibrated airspeed (CAS) is :

- **a** higher than the true airspeed (TAS).
- **b** independent of the true airspeed (TAS).
- **c** **equal to the true airspeed (TAS).**
- **d** lower than the true airspeed (TAS).

7 id 5984 — Which instrument does not connect to the static system?

a Altimeter.

b **Vacuum gauge.**

c Airspeed Indicator.

d Vertical speed indicator.

8 id 5985 — What corrections must be applied to indicated airspeed to produce true airspeed?

a Correction for heading and altitude.

b Correction for wind and temperature.

c Correction for altitude and wind.

d **Correction for altitude and temperature.**

9 id 5989 — The pitot tube supplies:

a Alternate static pressure.

b **Impact pressure.**

c Dynamic pressure alone.

d Static pressure alone.

10 id 5990 — If the alternate static source is used, the resulting reading will be:

a Too low reading of altitude.

b **Too high reading of altitude.**

c Too low reading of airspeed.

d No reading of airspeed.

11 id 5998 — Total air pressure consists of static pressure plus:

a Differential pressure.

b Total pressure.

c **Dynamic pressure.**

d Still air.

12 id 6008 — When the OAT is +25°C, the deviation from standard temperature for aerodynamic computations is:

a 0° C.

b +15o C.

c -15° C.

d **+10° C**

13 id 6029 — If the pitot tube is clogged, which instrument(s) is/are affected?

a Altimeter only.

b **Airspeed indicator only.**

c Vertical speed indicator only.

d Altimeter and airspeed indicator.

22.01.01.02. Altimeter

14 id 531 — The error in altimeter readings caused by the variation of the static pressure near the source is known as:

- **a** **position pressure error.**
- **b** barometric error.
- **c** instrument error.
- **d** hysteresis effect.

15 id 532 — If the static source of an altimeter becomes blocked during a descent the instrument will:

- **a** **continue to display the reading at which the blockage occured**
- **b** gradually indicate zero
- **c** under-read
- **d** indicate a height equivalent to the setting on the millibar subscale

16 id 533 — The primary factor which makes the servo-assisted altimeter more accurate than the simple pressure altimeter is the use of:

- **a** combination of counters/pointers
- **b** more effective temperature compensating leaf springs
- **c** **an induction pick-off device**
- **d** a sub-scale logarithmic function

17 id 534 — If the static source to an altimeter becomes blocked during a climb, the instrument will:

- **a** under-read by an amount equivalent to the reading at the time that the instrument became blocked
- **b** **continue to indicate the reading at which the blockage occured**
- **c** over-read
- **d** gradually return to zero

18 id 1288 — At sea level, on a typical servo altimeter, the tolerance in feet from indicated must not exceed :

- **a** **+/-60 feet**
- **b** +/-75 feet
- **c** +/-30 feet
- **d** +/-70 feet

19 id 2343 — When flying from a sector of warm air into one of colder air, the altimeter will :

- **a** be just as correct as before.
- **b** underread.
- **c** **overread.**
- **d** show the actual height above ground.

20 id 2599 — The hysteresis error of an altimeter varies substantially with the:

- **a** mach number of the aircraft.
- **b** **time passed at a given altitude.**
- **c** aircraft altitude.
- **d** static temperature.

21 id 2600 — The purpose of the vibrating device of an altimeter is to:

- **a** reduce the hysteresis effect
- **b** inform the crew of a failure of the instrument
- **c** allow damping of the measurement in the unit
- **d** **reduce the effect of friction in the linkages**

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22 id 2601 — The static pressure error of the static vent on which the altimeter is connected varies substantially with the:

- **a** deformation of the aneroid capsule
- **b** **Mach number of the aircraft**
- **c** aircraft altitude
- **d** static temperature

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23 id 2602 — The altitude indicated on board an aircraft flying in an atmosphere where all the atmosphere layers below the aircraft are cold is :

- **a** lower than the real altitude.
- **b** the same as the real altitude.
- **c** **higher than the real altitude.**
- **d** equal to the standard altitude.

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24 id 2603 — The altitude indicated on board an aircraft flying in an atmosphere where all atmosphere layers below the aircraft are warm is:

- **a** higher than the real altitude.
- **b** the same as the real altitude.
- **c** **lower than the real altitude.**
- **d** equal to the standard altitude.

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25 id 2604 — On board an aircraft the altitude is measured from the:

- **a** density altitude
- **b** **pressure altitude**
- **c** temperature altitude
- **d** standard altitude

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26 id 2605 — The density altitude is :

- **a** the pressure altitude corrected for the density of air at this point
- **b** the temperature altitude corrected for the difference between the real temperature and the standard temperature
- **c** the pressure altitude corrected for the relative density prevailing at this point
- **d** **the altitude of the standard atmosphere on which the density is equal to the actual density of the atmosphere**

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27 id 2607 — The pressure altitude is the altitude corresponding :

- **a** in ambiant atmosphere, to the pressure Ps prevailing at this point
- **b** in ambiant atmosphere, to the reference pressure Ps
- **c** in standard atmosphere, to the reference pressure Ps
- **d** **in standard atmosphere, to the pressure Ps prevailing at this point**

28 id 2752 — If an aircraft is equipped with one altimeter which is compensated for position error and another altimeter which is not ; and all other factors being equal...

a There will be no difference between them if the air data computer (ADC) is functioning normally

b At high speed the non-compensated altimeter will indicate a lower altitude

c **At high speed, the non-compensated altimeter will indicate a higher altitude**

d ATC will get an erroneous altitude report SSR

29 id 4233 — The altimeter consists of one or several aneroid capsules located in a sealed casing. The pressures in the aneroid capsule (i) and casing (ii) are respectively :

a **(i) vacuum (or a very low pressure) (ii) static pressure**

b (i) static pressure at time t (ii) static pressure at time t - t

c (i) total pressure (ii) static pressure

d (i) static pressure (ii) total pressure

30 id 4598 — In case of accidental closing of an aircraft's left static pressure port (rain, birds), the altimeter:

a keeps on providing reliable reading in all situations

b overreads the altitude in case of a side-slip to the right and displays the correct information during symmetric flight.

c **overreads the altitude in case of a sideslip to the left and displays the correct information during symmetric flight.**

d underreads the altitude.

31 id 4612 — The QNH is by definition the value of the:

a **altimeter setting so that the needles of the altimeter indicate the altitude of the location for which it is given.**

b atmospheric pressure at the sea level of the location for which it is given.

c altimeter setting so that the needles indicate zero when the aircraft is on ground at the location for which it is provided.

d atmospheric pressure at the level of the ground overflown by the aircraft.

32 id 5379 — The altimeter is fed by :

a differential pressure

b dynamic pressure

c total pressure

d **static pressure**

33 id 5999 — When flying with an indicated altitude of 3000 ft into a low pressure area, the actual altitude:

a **will decrease.**

b will increase.

c will be the same as indicated altitude.

d will be as before entering a low-pressure area.

34 id 6000 — The altimeter is based upon the same principle as:

a **The aneroid barometer.**

b The hygrometer.

c The mercury barometer.

d The Bourdon tube manometer.

35 id 6001 | When the barometric subscale of the altimeter is adjusted to 1013.2 hPa, what type of altitude is being measured?

a Relative height.

b **Pressure altitude.**

c Indicated altitude.

d True altitude.

36 id 6016 | Without readjusting the barometric setting of the Altimeter, it will under-read when:

a **flying from a low pressure area into a high pressure area.**

b flying from a high pressure area into a low pressure area.

c flying in headwind with constant barometric pressure.

d flying in tailwind with constant barometric pressure.

37 id 6017 | We are maintaining a constant flight level. That means:

a the altitude above sea level is constant.

b **the outside air pressure is constant.**

c the altitude is constant when the sea-level pressure is constant.

d the outside air pressure is constant if the temperature remains constant.

38 id 6018 | When the altimeter indicated 0 (zero) ft when the aircraft was parked for the night, and 1.000 ft the following morning, this shows that:

a the barometric pressure has increased by approx. 33 hPa.

b **the barometric pressure has decreased by approx. 33 hPa.**

c the barometric pressure is constant, but the temperature has fallen during the night.

d a formation of fog has most probably taken place.

39 id 6021 | An aircraft is in level flight at FL100 over a mountain range, which extends up to 2.400 metres AMSL. If the regional QNH is 998 hPa (use 30 ft/hPa), what is the approximate terrain clearance?

a 2.581 feet

b **1.681 feet**

c 7.869 feet

d 450 feet

40 id 6031 | You are departing an aerodrome (600 ft AMSL, QNH 1012 hPa) and proceed to another airfield (150 ft AMSL) with the same QNH. After landing, which barometric setting on the altimeter makes it again indicate 600 ft?

a **1027.**

b 997.

c 1032.

d 992.

22.01.01.03. Airspeed indicator

41 id 535 | If the static source to an airspeed indicator (ASI) becomes blocked during a descent the instrument will:

a under-read

b read zero

c continue to indicate the speed applicable to that at the time of the blockage

d **over-read**

42 id 536 — When climbing at a constant Mach number below the tropopause, in ISA conditions, the Calibrated Airspeed (CAS) will:

a remain constant

b increase at a linear rate

c **decrease**

d increase at an exponential rate

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43 id 537 — For a constant Calibrated Airspeed (CAS) and a level flight, a fall in ambient temperature will result in a:

a **lower True Airspeed (TAS) due to an increase in air density**

b higher True Airspeed (TAS) due to a decrease in air density

c higher True Airspeed (TAS) due to an increase in air density

d lower True Airspeed (TAS) due to a decrease in air density

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44 id 538 — When descending through an isothermal layer at a constant Calibrated Airspeed (CAS), the True Airspeed (TAS) will:

a remain constant

b increase at a linear rate

c **decrease**

d increase at an exponential rate

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45 id 539 — A leak in the pitot total pressure line of a non-pressurized aircraft to an airspeed indicator would cause it to:

a over-read.

b **under-read.**

c over-read in a climb and under-read in a descent.

d under-read in a climb and over-read in a descent.

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46 id 540 — The airspeed indicator circuit consists of pressure sensors. The pitot tube directly supplies:

a **the total pressure**

b the static pressure

c the total pressure and the static pressure

d the dynamic pressure

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47 id 1289 — With a pitot probe blocked due to ice build up, the aircraft airspeed indicator will indicate in descent a :

a **decreasing speed.**

b constant speed.

c increasing speed.

d fluctuating speed.

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48 id 2577 — The limits of the yellow scale of an airspeed indicator are :

a VFE for the lower limit and VNE for the upper limit

b VLO for the lower limit and VNE for the upper limit

c VLE for the lower limit and VNE for the upper limit

d **VNO for the lower limit and VNE for the upper limit**

49 id 2578 | The limits of the green scale of an airspeed indicator are :

a VS1 for the lower limit and VNE for the upper limit

b VS0 for the lower limit and VNO for the upper limit

c VS1 for the lower limit and VNO for the upper limit

d VS1 for the lower limit and VLO for the upper limit

50 id 2579 | The limits of the white scale of an airspeed indicator are :

a VSI for the lower limit and VFE for the upper limit

b VSO for the lower limit and VFE for the upper limit

c VSO for the lower limit and VLE for the upper limit

d VSI for the lower limit and VLE for the upper limit

51 id 2580 | The velocity maximum operating (V.M.O.) is a speed expressed in :

a computed airspeed (COAS).

b equivalent airspeed (EAS).

c true airspeed (TAS).

d calibrated airspeed (CAS).

52 id 2583 | After an aircraft has passed through a volcanic cloud which has blocked the total pressure probe inlet of the airspeed indicator, the pilot begins a stabilized descent and finds that the indicated airspeed :

a decreases steadily

b increases abruptly towards VNE

c increases steadily

d decreases abruptly towards zero

53 id 2586 | During a climb after take-off from a contaminated runway, if the total pressure probe of the airspeed indicator is blocked, the pilot finds that indicated airspeed :

a decreases abruptly towards zero

b increases abruptly towards VNE

c decreases stadily

d increases steadily

54 id 2587 | With a constant weight, irrespective of the airfield altitude, an aircraft always takes off at the same :

a ground speed.

b calibrated airspeed.

c true airspeed.

d equivalent airspeed.

55 id 2592 | The calibrated airspeed (CAS) is obtained by applying to the indicated airspeed (IAS) :

a and instrument and density correction.

b an antenna and compressibility correction.

c an instrument and position/pressure error correction.

d a compressibility and density correction.

56 id 2595 | VNO is the maximum speed :

a which must never be exceeded.

b **not to be exceeded except in still air and with caution.**

c at which the flight controls can be fully deflected.

d with flaps extended in landing position.

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57 id 2596 | VNE is the maximum speed :

a at which the flight controls can be fully deflected

b not to be exceeded except in still air and with caution

c **which must never be exceeded**

d with flaps extended in landing position

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58 id 2597 | VLO is the maximum :

a flight speed with landing gear down.

b **speed at which the landing gear can be operated with full safety.**

c speed with flaps extended in a given position.

d cruising speed not to be exceeded except in still air with caution.

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59 id 2598 | VLE is the maximum :

a speed at which the landing gear can be operated with full safety

b **flight speed with landing gear down**

c speed with flaps extended in a given position

d speed authorized in flight

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60 id 3006 | VFE is the maximum speed :

a **with the flaps extended in a given position.**

b with the flaps extended in landing position.

c at which the flaps can be operated.

d with the flaps extended in take-off position.

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61 id 4176 | The airspeed indicator of an aircraft is provided with a moving red and white hatched pointer. This pointer indicates the:

a maximum speed in VMO operation, versus temperature

b **maximum speed in VMO operation versus altitude**

c speed indicated on the autothrottle control box, versus temperature

d speed indicated on the autothrottle control box versus altitude

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62 id 4182 | The airspeed indicator of a twin-engined aircraft comprises different sectors and color marks. The blue line corresponds to the :

a speed not to be exceeded, or VNE

b **optimum climbing speed with one engine inoperative, or Vy**

c minimum control speed, or VMC

d maximum speed in operations, or VMO

63 id 4243 Today's airspeed indicators (calibrated to the Saint-Venant formula), indicate, in the absence of static (and instrumental) error :

a The true airspeed

b **The calibrated airspeed (CAS) in all cases**

c The airspeed, whatever the altitude

d The equivalent airspeed, in all cases

64 id 4353 Considering the maximum operational Mach number (MMO) and the maximum operational speed (VMO), the captain of a pressurized aircraft begins his descent from a high flight level. In order to meet his scheduled time of arrival, he decides to use the maximum ground speed at any time of the descent. He will be limited :

a **initially by the MMO, then by the VMO below a certain flight level**

b initially by theVMO, then by the MMO below a certain flight level

c by the MMO

d by the VMO in still air

65 id 4613 All the anemometers are calibrated according to:

a Bernouilli's limited formula which takes into account the air compressibility.

b **St-Venant' formula which takes into account the air compressibility.**

c St-Venant's formula which considers the air as an uncompressible fluid.

d Bernouilli's limited formula which considers the air as an uncompressible fluid.

66 id 5982 The Airspeed Indicator measures:

a Absolute pressure.

b Total pressure.

c **Differential pressure.**

d Relative pressure.

67 id 5983 What is the significance of the yellow arc in an airspeed indicator?

a Flap operating range.

b Never exceed range.

c **Structural warning range.**

d Normal operating range.

68 id 5986 The upper airspeed limit of the green arc on the airspeed indicator represents:

a **Maximum structural cruising speed (VNO)**

b Landing gear lowering speed (VLE)

c Design manoeuvring speed (VA)

d Maximum allowable speed for smooth-air operations (VNE)

69 id 5992 In the air-tight instrument case of the airspeed indicator we will find:

a Total pressure.

b **Static pressure.**

c Dynamic pressure.

d Ram air.

70 id 5993 — If indicated airspeed is corrected for a positive error, the resulting calibrated airspeed will be:

- **a** **Lower.**
- **b** It will not be CAS but EAS.
- **c** Higher.
- **d** It will not be CAS but TAS.

71 id 5995 — Indicated airspeed corrected for position error is:

- **a** Equivalent air speed.
- **b** True air speed.
- **c** **Calibrated airspeed.**
- **d** Ground speed.

72 id 5997 — As an airplane climbs higher, the true airspeed for a given indicated airspeed will:

- **a** Be lower than indicated.
- **b** The true airspeed and the indicated will be the same.
- **c** Decrease.
- **d** **Increase.**

73 id 6013 — Indicated airspeed (as read on the airspeed indicator] will:

- **a** Increase in headwind.
- **b** Increase in tailwind.
- **c** Decrease in tailwind.
- **d** **Remain unchanged in headwind and tailwind.**

74 id 6014 — When side-slipping, one of the instruments below will give an incorrect indication:

- **a** Vertical Speed Indicator.
- **b** Altitude Indicator.
- **c** Attitude Indicator.
- **d** **Airspeed Indicator.**

75 id 6022 — Match indicated airspeed (IAS) with the associated definition:

- **a** Actual speed of an aircraft over the ground,
- **b** **The airspeed you read directly from the airspeed indicator.**
- **c** Indicated airspeed corrected for installation and instrument errors.
- **d** Calibrated airspeed corrected for altitude and non-standard temperature.

76 id 6023 — Match calibrated airspeed (CAS) with the associated definition:

- **a** Calibrated airspeed corrected for altitude and non-standard temperature.
- **b** Actual speed of an aircraft over ground.
- **c** The airspeed you read from the airspeed indicator.
- **d** **Indicated airspeed corrected for installation and instrument errors.**

77 id 6024 | Match true airspeed (TAS) with the associated definition:

- **a** The airspeed you read directly from the airspeed indicator.
- **b** **Calibrated airspeed corrected for altitude and non-standard temperature.**
- **c** Actual speed of an aircraft over ground.
- **d** Indicated airspeed corrected for installation and instrument errors.

78 id 6025 | Match groundspeed (GS) with the associated definition:

- **a** Indicated airspeed corrected for installation and instrument errors.
- **b** Calibrated airspeed corrected for altitude and non-standard temperature.
- **c** **Actual speed of an aircraft over ground.**
- **d** The airspeed you read directly from airspeed indicator.

79 id 6032 | If, when correcting an EAS value of 150 Kt, a TAS value of 146 Kt is obtained:

- **a** an error must have been made in the calculation.
- **b** no allowance has been made for compressibility.
- **c** **the density of the atmosphere must be greater than the ISA mean sea level air density.**
- **d** no allowance has been made for position error.

80 id 6033 | The reason for having a square-law compensation in the airspeed-indicator mechanism is:

- **a** The static pressure decreases with altitude according to a square law.
- **b** The density of the air decreases with altitude according to a square law.
- **c** **The differential pressure increases with the square of the airspeed.**
- **d** The compressibility of the air increases with the square of the airspeed.

81 id 6241 | TAS is:

- **a** ground speed
- **b** the reading on the ASI
- **c** **the aircraft's true airspeed which is EAS corrected for altitude and temperature**
- **d** true airspeed of the aircraft which is RAS corrected for altitude and temperature

22.01.01.04. Mach meter

82 id 541 | Machmeter readings are subject to:

- **a** temperature error.
- **b** density error.
- **c** **position pressure error**
- **d** setting error.

83 id 1083 | If the outside temperature at 35 000 feet is -40°C, the local speed of sound is :

- **a** 307 kt.
- **b** 247 kt.
- **c** **596 kt.**
- **d** 686 kt.

84 id 2576 | During a straight and uniform climb, the pilot maintains a constant calibrated airspeed (CAS) :

a The Mach number is constant and the true airspeed (TAS) decreases.

b The Mach number increases and the true airspeed (TAS) is constant.

c The Mach number is constant and the true airspeed (TAS) is constant.

d The Mach number increases and the true airspeed (TAS) increases.

85 id 2581 | A VMO-MMO warning device consists of an alarm connected to :

a a barometric aneroid capsule subjected to a static pressure and an airspeed sensor subjected to a dynamic pressure.

b a barometic aneroid capsule subjected to a dynamic pressure and an airspeed sensor subjected to a static pressure.

c a barometric aneroid capsule and an airspeed sensor subjected to dynamic pressure.

d a barometric aneroid capsule and an airspeed sensor subjected to a static pressure.

86 id 2582 | The reading of a Mach indicator is independent of :

a the static pressure

b the outside temperature

c the total pressure

d the differential pressure measurement

87 id 2584 | The principle of the Mach indicator is based on the computation of the ratio :

a (Pt + Ps) to Ps

b Pt to Ps

c (Pt - Ps) to Pt

d (Pt - Ps) to Ps

88 id 2585 | The mach number is the:

a equivalent airspeed (EAS) divided by the local speed of sound

b corrected airspeed (CAS) divided by the local speed of sound

c indicated airspeed (IAS) divided by the local speed of sound

d true airspeed (TAS) divided by the local speed of sound

89 id 2750 | Indication of Mach number is obtained from:

a Indicated speed (IAS) compared with true air speed (TAS) from the air data computer

b An ordinary airspeed indicator scaled for Mach numbers instead of knots

c A kind of echo sound comparing velocity of sound with indicated speed

d Indicated speed and altitude using a speed indicator equipped with an altimeter type aneroid

90 id 3410 | At a constant calibrated airspeed (CAS), the Mach number :

a increases when the altitude increases

b decreases when the altitude increases

c remains unchanged when the outside temperature increases

d remains unchanged when the outside temperature decreases

91 id 3411	At a constant Mach number, the calibrated air speed (CAS) :

a remains unchanged when the outside temperature increases

b increases when the altitude increases

c **decreases when the altitude increases**

d remains unchanged when the outside temperature decreases

92 id 4190	The Mach number is :

a the ratio of the aircraft conventionnal airspeed to the sonic velocity at the altitude considered

b a direct function of temperature ; it varies in proportion to the square root of the absolute temperature

c the ratio of the indicated airspeed to the sonic velocity at the altitude considered

d **the ratio of the aircraft true airspeed to the sonic velocity at the altitude considered**

93 id 4614	Sound propagates through the air at a speed which only depends on :

a temperature and the pressure.

b **temperature.**

c pressure.

d density.

94 id 4615	The velocity of sound at the sea level in a standard atmosphere is:

a 644 kt.

b 1059 kt.

c **661 kt.**

d 332 kt.

95 id 6015	If the ambient temperature decreases, the TAS of an aircraft cruising at a constant Mach number will:

a remain constant

b increase because local speed of sound decreases

c increase because local speed of sound increases

d **decrease because local speed of sound decreases**

96 id 6020	An aircraft is flying at an TASof 310 Kt at FL290, temperature deviation is -6º C. The local speed of sound is:

a 570 Kt

b **583 Kt**

c 596 Kt

d 563 Kt

97 id 6061	What is the Mach number?

a It is the speed of the aircraft in Mach percentages.

b **It is the ratio of the aircraft's true airspeed to the local speed of sound of the air in which the aircraft is moving.**

c It is the ratio of the aircraft's indicated airspeed to the local speed of sound of the air in which the aircraft is moving.

d It is the ratio of the aircraft's true airspeed to the aircraft's indicated airspeed.

98 id 6062 | How many diaphragms are present in a basic Mach meter?

a Three.

b **Two.**

c Four.

d One.

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99 id 6063 | The Mach number is a function of the

a humidity of the air.

b **Absolute temperature of the air.**

c Isobaric gradient of the fluid.

d relative air temperature.

22.01.01.05. Vertical Speed Indicator (VSI)

100 id 2594 | The vertical speed indicator of an aircraft flying at a true airspeed of 100 kt, in a descent with a slope of 3 degrees, indicates :

a **- 500 ft/min.**

b - 300 ft/min

c - 150 ft/min

d - 250 ft/min

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101 id 2606 | The response time of a vertical speed detector may be increased by adding a:

a return spring

b bimettalic strip

c **correction based on an accelerometer sensor.**

d second calibrated port

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102 id 5378 | The vertical speed indicator (VSI) is fed by :

a dynamic pressure

b **static pressure**

c total pressure

d differential pressure

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103 id 5426 | The operating principle of the vertical speed indicator (VSI) is based on the measurement of the rate of change of:

a Kinetic pressure

b Dynamic pressure

c Total pressure

d **Static pressure**

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104 id 5987 | What does a vertical speed indicator actually measure?

a **The rate of pressure change.**

b The rate of temperature change.

c The rate of altitude change.

d The rate of temperature and altitude change.

105 id 6019	How does lag error in an Instantaneous VSI (IVSI) compare to that in a normal VSI?

a It is eliminated by using a logarithmic scale.

b It is eliminated by passing static pressure initially to the case and then through the metering device.

c **It is virtually eliminated by using an acceleration pump.**

d It is virtually eliminated by using a servomotor.

106 id 6030	The purpose of the IVSI is to

a automatically initiate climbs and descents through the automatic flight control system.

b **give an instantaneous indication of the aircraft's vertical speed when a climb or descent has been initiated.**

c indicate to the pilot instantaneously when an aircraft pitches in turn, especially steep turns.

d eliminate lag by passing static pressure directly into the case before entering the metering device.

107 id 6034	The Vertical Speed Indicator (VSI) give:

a Immediate trend information and immediate climb or descent information.

b **Immediate trend information and stable climb or descent information after 6 to 12 seconds (depending on type).**

c No trend information, but stable climb or descent information after 6 to 12 seconds (depending on type).

d Immediate stable climb or descent information, but unreliable trend information.

108 id 6035	Within a temperature range of +50° and -20° C the VSI is accurate to within limits of:

a **+/- 200 ft/min.**

b +/- 0 ft/min.

c +/- 30 ft/min.

d +/- 300 ft/min.

109 id 6067	The vertical speed indicator reads:

a **The differential pressure between the capsule pressure and the case pressure.**

b The differential pressure between the capsule pressure and the outside static pressure.

c The differential pressure between the static pressure and pitot pressure.

d Only the outside static pressure.

110 id 6068	Which statement is correct for the Vertical Speed Indicator (VSI) during a climb :

a The pressure inside the capsule equalises the pressure inside the case.

b **The pressure inside the capsule drops faster than the pressure inside the case.**

c The pressure inside the case drops faster than the pressure inside the capsule.

d The pressure into the capsule drop shower than the pressure into the case.

111 id 6069	Aircraft with pressurized cabine in flight: When switching to the alternate static pressure source, the pointer of the Vertical Speed Indicator :

a does not move.

b indicates a climb, then maintains this position.

c indicates a climb, then settles down and reads correctly.

d **indicates a climb, then settles down and reads incorrectly.**

22.01.01.06. Air Data Computer (ADC)

112 id 2593 — The advantages provided by an air data computer to indicate the altitude are : 1. Position/pressure error correction 2. Hysteresis error correction 3. Remote data transmission capability 4. Capability of operating as a conventional altimeter in the event of a failure The combination of correct statements is :

a 1,2,3,4

b **1,3,4**

c 2,3,4

d 1,2,3

113 id 2640 — Given : - Ts the static temperature (SAT) - Tt the total temperature (TAT) - Kr the recovery coefficient - M the Mach number The total temperature can be expressed approximately by the formula :

a $Tt = Ts(1-0.2 M^2)$

b **$Tt = Ts(1+0.2 M^2)$**

c $Tt = Ts(1+0.2 Kr.M^2)$

d $Tt = Ts/(1+0.2 Kr.M^2)$

114 id 2748 — In An Air Data Computer (ADC), aeroplane altitude is calculated from:

a Measurement of elapsed time for a radio signal transmitted to the ground surface and back

b The difference between absolute and dynamic pressure at the fuselage

c Measurement of outside air temperature (OAT)

d **Measurement of absolute barometric pressure from a static source on the fuselage**

115 id 2749 — An Air Data Computer (ADC) :

a Measures position error in the static system and transmits this information to ATC to provide correct altitude reporting

b Is an auxiliary system that provides altitude information in the event that the static source is blocked

c Converts air data measurements given by ATC from the ground in order to provide correct altitude and speed information

d **Transforms air data measurements into electric impulses driving servo motors in instruments**

116 id 6009 — The measurement of SAT (static air temperature) by direct means is not possible on some (fast) aircraft because

a the boundary layer around the aircraft gets very turbulent.

b most temperature sensors have a low recovery factor.

c **of the effects from adiabatic compression and friction.**

d the airflow causes too much cooling of the sensing probe.

117 id 6010 — The ram air temperature (RAT) is defined as:

a the OAT (outside air temp.) plus the SAT.

b the temperature of the ram rise.

c the temperature raise caused by adiabatic compression.

d **SAT plus the ram rise.**

118 id 6011 A temperature sensor having a recovery factor of 0.75 indicates 30° C. Static Air Temperature (SAT) is 25° C. How high is the Ram-rise?

a 6.7° C

b 40° C.

c 18.8° C.

d **5° C.**

119 id 6012 The recovery factor of a "flush bulb" temperature sensor generally varies from

a 0.90 to. 1.00.

b 0.75 to 0.90.

c 0.50 to 0.75.

d **0.35 to 0.50**

120 id 6059 The standard temperature for all our aerodynamic computations is:

a 0° C or 32° F.

b **15° C or 59° F.**

c 273° K or 492° R.

d 0° F or 460° R.

121 id 6060 To obtain total air temp. (TAT) the airflow to the sensor

a must not be submitted to adiabatic compression and friction.

b must be laminar without any turbulence or vortex.

c **must be brought to rest without addition or removal of heat.**

d must be brought to rest with the removal of the ram rise.

22.01.02. Gyroscopic instruments

22.01.02.01. Gyro fundamentals

122 id 2589 The basis properties of a gyroscope are : 1. The gyro's weight. 2. The rigidity in space. 3. The inertia. 4. The high RPM. 5. The precession The combination of correct statements is :

a 2,3,5

b **2,5**

c 1,3,5

d 3,4

123 id 2617 A rate integrating gyro is a detecting element used in 1. An inertial attitude unit 2. An automatic pilot 3. A stabilizing servo system 4. An inertial navigation system 5. A rate-of-turn indicator The combination of correct statements is :

a 1,2,3,4,5.

b **1,4.**

c 2,3,5.

d 2,3,4.

124 id 3027 — Compared with a conventional gyro, a laser gyro :

a is influenced by temperature

b **has a longer life cycle**

c has a fairly long starting cycle

d consumes a lot of power

---

125 id 3028 — A laser gyro consists of :

a a gyro with 2 degrees of freedom

b 2 electrodes (anodes+cathodes)

c **a laser generating two light waves**

d two moving cavities provided with mirrors

---

126 id 4600 — In the building principle of a gyroscope, the best efficiency is obtained through the concentration of the mass :

a **on the periphery and with a high rotation speed.**

b close to the axis and with a high rotation speed.

c on the periphery and with a low rotation speed.

d close to the axis and with a low rotation speed.

---

127 id 5423 — Among the systematic errors of the "directional gyro", the error due to the earth rotation make the north reference turn in the horizontal plane. At a mean latitude of 45°N, this reference turns by...

a 15°/hour to the right.

b **10.5°/hour to the right.**

c 7.5°/hour to the right.

d 7.5°/hour to the left.

---

128 id 6003 — Deviation compensation in a flux gate compass is done:

a Electronically

b **Mechanically**

c There is no provision for deviation compensation.

d Automatically within the compass system

---

129 id 6038 — Rigidity in a gyroscope is

a a way to express the stability of the inner and outer gimbal rings

b to what extremes the flight attitudes might be before the gyro topples

c the reaction 90° in the direction of rotation when applying force to the spinning wheel

d **the tendency it has to remain in its plane of rotation and resist attempts to alter its position**

---

130 id 6039 — Precession in a gyroscope is

a the tendency it has to remain in its plane of rotation

b a caging device

c the angular limits to which the gimbals may travel before the gyro topples and the indication becomes useless

d **the reaction at 90 degrees in direction of rotation caused by a applied force to the spinning wheel**

131 Why do some gyro instruments topple when the aircraft is placed in an extreme attitude?
id 6040

- **a** because the air supply to the gyro is discontinued
- **b** because the wedge-shaped erection device is displaced beyond its operating range
- **c** **because the gimbals reach their limiting stops**
- **d** because the air jet hits the buckets at an extreme angle

---

132 How is vacuum provided for the air-driven gyro instruments?
id 6041

- **a** By the static tube
- **b** **By an engine-driven pump**
- **c** By the static vent
- **d** All of the above

---

133 The rotational speed of an air-driven gyro is normally:
id 6042

- **a** 400-800 RPM
- **b** **9000- 12000 RPM**
- **c** 24000 RPM
- **d** 50 RPM

---

134 Air-driven gyro rotors are prevented from spinning too fast by the
id 6043

- **a** air filter
- **b** **vacuum relief valve**
- **c** suction gage
- **d** bearing friction

---

135 Apparent drift in a direction indicator is
id 6044

- **a** 15°/hour at the equator and zero at the poles
- **b** 7 1/2°/hour at 30°N and 30°S, and zero at the poles
- **c** **7 1/2°/hour at 30°N and 30°S, and zero at the equator**
- **d** non-existent at all latitudes because of the drift-nut attached to one of the gimbals

---

136 The error in a direction indicator caused by the convergence of the meridians in northerly and southerly latitudes is called
id 6045

- **a** mechanical error
- **b** drift error
- **c** **transport error**
- **d** turning error

---

137 Failure of the electrical supply to an electrically driven direction indicator may be indicated by:
id 6056

- **a** A low ammeter reading.
- **b** **A red warning flag.**
- **c** Low suction.
- **d** A low voltmeter reading.

138 The directional gyro keeps its rotation axis aligned toward
id 6064

a a point on the Earth's surface.

b a point in space.

c magnetic North.

d geographic North.

139 Erection systems are provided for the purpose of:
id 6065

a Erecting the gyro to its vertical position.

b Erecting the gyro to its horizontal position.

c Maintaining the gyro in its vertical position.

d Erecting and maintaining the gyro in its vertical position.

140 The operating principle of the pendulous vane unit erecting system is:
id 6066

a The air flow reaction through the open vanes.

b The influence of gravity on the pendulous vanes.

c The influence of gravity on the gyro rotors.

d The influence of gravity on the pendulous vanes and the gyro rotors.

141 What is the main cause of precession?
id 6070

a Magnetic variation.

b Magnetic declination.

c Bearing friction.

d The Earth's rotation.

22.01.02.02. Directional gyro

142 The indications on a directional gyroscope or gyrocompass are subject to errors, due to: 1- rotation of Earth. 2- aeroplane motion on Earth. 3- lateral and transversal aeroplane bank angles. 4- north change. 5- mechanical defects. Chose the combination with true statements only:
id 553

a 1,2,3,5.

b 3,4,5.

c 1,2,4,5.

d 2,3,5.

143 The indication of the directional gyro as an on-board instrument are valid only for a short period of time. The causes of this inaccuracy are : 1. The earth's rotation 2. The longitudinal acceleration 3. The aircraft's motion over the surface of the earth. 4. The mechanical defects of the gyro 5. The gyro's weight 6. The gimbal mount of the gyro rings The combinatio
id 2588

a 2,5,6

b 1,3,4

c 1,2,3,4,5,6

d 1,3,4,6

144 id 2591 — The characteristics of the directional gyro (DG) used in a gyro stabilised compass system are :

a **two degrees of freedom, whose horizontal axis corresponding to the reference direction is maintained in the horizontal plane by an automatic erecting system.**

b two degrees of freedom, whose axis aligned with the vertical to the location is maintained in this direction by an erecting system.

c one degree of freedom, whose horizontal axis is maintained in the horizontal plane by an automatic erecting system.

d one degree of freedom, whose vertical axis, aligned with the real vertical to the location is maintained in this direction by an automatic erecting system.

---

145 id 2612 — The directional gyro axis no longer spins about the local vertical when it is located :

a on the North pole

b in the latitude 30°

c in the latitude 45°

d **on the equator**

---

146 id 2613 — The directional gyro axis spins about the local vertical by 15°/hour :

a in the latitude 30°

b **on the North pole**

c in the latitude 45°

d on the equator

---

147 id 2614 — The pendulum type detector system of the directional gyro feeds :

a a torque motor on the sensitive axis

b a nozzle integral with the outer gimbal ring

c **a levelling erection torque motor**

d 2 torque motors arranged horizontally

---

148 id 2615 — The gimbal error of the directional gyro is due to the effect of :

a the aircraft's track over the earth

b an apparent weight and an apparent vertical

c too slow precession on the horizontal gimbal ring

d **a bank or pitch attitude of the aircraft**

---

149 id 3407 — An airborne instrument, equipped with a gyro with 2 degrees of freedom and a horizontal spin axis is:

a an artificial horizon

b **a directional gyro**

c a turn indicator

d a fluxgate compass

---

150 id 3413 — An airborne instrument, equipped with a gyro with 2 degrees of freedom and a horizontal spin axis is :

a an artificial horizon

b **a directional gyro**

c a turn indicator

d a flux gate compass

151 id 5401 — For an aircraft flying a true track of 360° between the 005°S and 005°N parallels, the precession error of the directional gyro due to apparent drift is equal to:

- **a** **0°/hour**
- **b** +5°/hour
- **c** -5°/hour
- **d** depends only on the aircraft's ground speed

152 id 5410 — A directional gyro is: 1- a gyroscope free around two axis 2- a gyroscope free around one axis 3- capable of self- orientation around an earth-tied direction 4- incapable of self-orientation around an earth-tied direction The combination which regroups all of the correct statements is:

- **a** **1 - 4**
- **b** 2 - 4
- **c** 2 - 3
- **d** 1 - 3

153 id 5411 — The maximum directional gyro error due to the earth rotation is:

- **a** 90°/hour
- **b** **15°/hour**
- **c** 180°/hour
- **d** 5°/hour

154 id 5428 — The heading read on the dial of a directional gyro is subject to errors, one of which is due to the movement of the aircraft. This error...

- **a** is at its greatest value when the aircraft follows a meridional track
- **b** is, in spite of this, insignificant and may be neglected
- **c** **is dependent on the ground speed of the aircraft, its true track and the average latitude of the flight**
- **d** shows itself by an apparent rotation of the horizontal axis of the gyroscope which seems to turn at 15° per hour to the right in the northern hemisphere

22.01.02.03. Slaved gyro compass

155 id 526 — A failed RMI rose is locked on 090° and the ADF pointer indicates 225°. The relative bearing to the station is :

- **a** **135°.**
- **b** Impossible to read, due to failure RMI.
- **c** 315°.
- **d** 225°.

156 id 2344 — A slaved directional gyro derives it's directional signal from :

- **a** **the flux valve.**
- **b** the air-data-computer.
- **c** a direct reading magnetic compass.
- **d** the flight director.

157 id 3003 | The input signal of the amplifier of the gyromagnetic compass resetting device originates from the:

a directional gyro erection device.

b flux valve.

c directional gyro unit.

d **error detector.**

158 id 3004 | The heading information originating from the gyromagnetic compass flux valve is sent to the:

a **error detector.**

b erector system.

c heading indicator.

d amplifier.

159 id 3005 | The gyromagnetic compass torque motor :

a **causes the directional gyro unit to precess**

b causes the heading indicator to precess

c feeds the error detector system

d is fed by the flux valve

160 id 4342 | A gyromagnetic compass or heading reference unit is an assembly which always consists of : 1- a directional gyro 2- a vertical axis gyro 3- an earth's magnetic field detector 4- an azimuth control 5- a synchronising control The combination of correct statements is :

a 2,5

b 2,3,5

c 1,4

d **1,3,5**

161 id 5403 | Heading information from the gyromagnetic compass flux gate is transmitted to the :

a erecting system.

b **error detector.**

c heading indicator.

d amplifier.

162 id 5413 | Heading information given by a gyro platform, is given by a gyro at :

a 2 degrees-of-freedom in the vertical axis

b **2 degrees-of-freedom in the horizontal axis**

c 1 degree-of-freedom in the horizontal axis

d l degree-of-freedom in the vertical axis

163 id 5417 A flux valve senses the changes in orientation of the horizontal component of the earth's magnetic field. 1- the flux valve is made of a pair of soft iron bars 2- the primary coils are fed A.C. voltage (usually 487.5 Hz) 3- the information can be used by a "flux gate" compass or a directional gyro 4- the flux gate valve casing is dependent on the aircraft three inertial a

a 1 - 4 - 5

b 1 - 3 - 4 - 5

c 3 - 5

d **2 - 3 - 5**

---

164 id 6002 While flying, a red flag labelled "HDG" appears in the indicator (HSI) of a Slaved Gyro Compass System. This indicates that:

a You are off course.

b No reliable navigation signals (from VORs) are being received.

c Electrical power is lost.

d **The flux valve is not supplying reliable information to the compass system.**

---

165 id 6004 The principal advantage of a gyromagnetic compass (slaved gyro compass) is:

a **It combines the north-seeking ability of the magnetic compass with the stability of the direction indicator.**

b There are no toppling limits.

c The flux-valve system makes it very suitable for Polar navigation.

d An expensive vacuum system may be omitted in the airplane.

---

166 id 6005 The "sensor part" of the flux-valve is:

a The excitation coil.

b **The three pick-up coils.**

c The three excitation coils.

d The pick-up coil.

---

167 id 6006 In a Slaved Gyro Compass System the output of the flux-valve is fed to:

a **the stator in the slaved gyro control.**

b the slaving torque motor directly.

c to the indicator.

d to the powersupply of the gyro unit.

---

168 id 6007 The purpose of the slaving torque motor is:

a **to produce a precessive force in order to align the gyro with the earth's magnetic field.**

b to cancel out the effect of transport error.

c to ensure that the gyro wheel maintains sufficient speed to stay rigid in space.

d to send heading information to the compass card in the heading indicator.

169 id 6058 — The purpose of the flux-valve is:

- **a** to measure the strength of the earth's magnetic field.
- **b** **to sense the direction of the earth's magnetic field relative to the airplane.**
- **c** to provide flux for the automatic slaving system.
- **d** to align the spokes with the earth's magnetic field in order to get maximum voltage from the pick-up coils.

22.01.02.04. Attitude indicator (vertical gyro)

170 id 2590 — Among the flight control instruments, the artificial horizon plays an essential part. It uses a gyroscope with : Note : in this question, the degrees of freedom of a gyro are determined by the number of gimbal rings it comprises.

- **a** one degree of freedom, whose vertical axis oriented in the direction of the real vertical to the location is maintained in this direction by an automatic erecting system
- **b** two degrees of freedom, whose horizontal axis corresponding to a reference direction is maintained in a horizontal plane by an automatic erecting system
- **c** one degree of freedom, whose horizontal axis is maintained in a horizontal plane by an automatic erecting system
- **d** **two degrees of freedom, whose axis is oriented and continously maintained to local vertical by an automatic erecting system.**

171 id 2608 — When an aircraft has turned 270 degrees with a constant attitude and bank, the pilot observes the following on a classic artificial horizon :

- **a** **too much nose-up and bank too high.**
- **b** too much nose-up and bank too low.
- **c** attitude and bank correct.
- **d** too much nose-up and bank correct.

172 id 2609 — When an aircraft has turned 360 degrees with a constant attitude and bank, the pilot observes the following on a classic artificial horizon :

- **a** too much nose-up and bank too high
- **b** too much nose-up and bank too low
- **c** too much nose-up and bank correct
- **d** **attitude and bank correct**

173 id 2610 — When an aircraft has turned 90 degrees with a constant attitude and bank, the pilot observes the following on a classic artificial horizon :

- **a** too much nose-up and bank correct
- **b** attitude and bank correct
- **c** **too much nose-up and bank too low**
- **d** too much nose-up and bank too high

174 id 2611 — A gravity type erector is used in a vertical gyro device to correct errors on :

- **a** **an artificial horizon**
- **b** a directional gyro unit
- **c** a turn indicator
- **d** a gyromagnetic indicator

175 id 2753 | A Stand-by-horizon or emergency attitude indicator:

a Is automatically connected to the primary vertical gyro if the alternator fails

b **Contains its own separate gyro**

c Is fully independent of external energy resources in an emergency situation

d Only works of there is a complete electrical failure

176 id 3007 | Following 180° stabilized turn with a constant attitude and bank, the artificial horizon indicates (assume air-driven and turning clockwise, when viewed from above):

a too high pitch-up and too low banking

b too high pitch-up and correct banking

c attitude and banking correct

d **too high pitch up and too high banking**

177 id 5419 | During an acceleration phase at constant attitude, the resetting principle of the artificial horizon results in the horizon bar indicating a :

a constant attitude

b nose-down attitude

c **nose-up attitude**

d nose-down followed by a nose-up attitude

178 id 5430 | A gravity erector system is used to correct the errors on :

a **an artificial horizon.**

b a directional gyro.

c a turn indicator.

d a gyromagnetic compass.

179 id 6046 | In a vacuum operated attitude indicator, automatic erection of the gyro is performed by

a **the pendulous unit**

b a caging device

c adjusting the miniature airplane

d a counter-weight on the horizon bar

180 id 6047 | You have just taken off in a fast aircraft fitted with a vacuum operated attitude indicator. While climbing straight ahead - still accelerating - the instrument may for a short while indicate

a a high nose-up attitude

b a flatter attitude than actual

c a climbing turn to the left

d **a climbing turn to the right**

181 id 6048 | What angle of bank should you adopt on the attitude indicator for a standard rate (rate 1) turn while flying at an IAS of 130 Kt?

a 15°

b 18°

c **20°**

d 23°

182 id 6072 | The higher the airspeed is:

- **a** **The higher the bank angle must be to turn at the standard rate.**
- **b** The lower the bank angle must be to turn at the standard rate.
- **c** There is no relation between the speed and the rate of turn.
- **d** The higher the left or right rudder input must be to turn in a co-ordinated manner.

---

183 id 6076 | If a 180º steep turn is made to the right and the aircraft is rolled out to straight and level flight by visual reference, the miniature aircraft on the Attitude Indicator will ...

- **a** show a slight skid and climb to the right
- **b** **show a slight climb and turn to the left**
- **c** show a slight slip and descent to the right
- **d** show a slight climb and turn to the right

22.01.02.05. Turn and bank indicator (rate gyro)

184 id 2320 | A turn indicator is built around a gyroscope with:

- **a** **1 degree of freedom.**
- **b** 0 degree of freedom.
- **c** 2 degrees of freedom.
- **d** 3 degrees of freedom.

---

185 id 2616 | Under normal operating conditions, when an aircraft is in a banked turn, the rate-of-turn indicator is a valuable gyroscopic flight control instrument ; when it is associated with an attitude indicator it indicates : 1. the angular velocity of the aircraft about the yaw axis 2. The bank of the aircraft 3. The direction of the aircraft turn 4. The angular velocity of the a

- **a** 3,4.
- **b** 1,2.
- **c** **1,3.**
- **d** 2,4.

---

186 id 2724 | At a low bank angle, the measurement of rate-of-turn actually consists in measuring the :

- **a** angular velocity of the aircraft
- **b** pitch rate of the aircraft
- **c** roll rate of the aircraft
- **d** **yaw rate of the aircraft**

---

187 id 2725 | The rate-of-turn is the:

- **a** yaw rate in a turn
- **b** **change-of-heading rate of the aircraft**
- **c** aircraft speed in a turn
- **d** pitch rate in a turn

188 id 2726 | On the ground, during a right turn, the turn indicator indicates :

a **needle to the right, ball to left**

b needle to the right, ball to right

c needle in the middle, ball to right

d needle in the middle, ball to left

---

189 id 2727 | On the ground, during a left turn, the turn indicator indicates :

a needle in the middle, ball to the left

b needle to the left, ball to the left

c needle in the middle, ball to the right

d **needle to the left, ball to the right**

---

190 id 2728 | When, in flight, the needle and ball of a needle-and-ball indicator are on the left, the aircraft is:

a turning left with not enough bank

b **turning left with too much bank**

c turning right with too much bank

d turning right with not enough bank

---

191 id 2729 | When, in flight, the needle and ball of a needle-and-ball indicator are on the right, the aircraft is :

a turning left with too much bank

b turning right with not enough bank

c **turning right with too much bank**

d turning left with not enough bank

---

192 id 2730 | When, in flight, the needle of a needle-and-ball indicator is on the right and the ball on the left, the aircraft is :

a **turning right with not enough bank**

b turning right with too much bank

c turning left with not enough bank

d turning left with too much bank

---

193 id 2731 | When, in flight, the needle of a needle-and-ball indicator is on the left and the ball on the right, the aircraft is:

a turning right with too much bank

b turning left with too much bank

c turning right with not enough bank

d **turning left with not enough bank**

---

194 id 3412 | An airborne instrument, equipped with a gyro with 1 degree of freedom and a horizontal spin axis is a :

a gyromagnetic compass

b **turn indicator**

c fluxgate compass

d directional gyro

195 id 3417 | In a turn at constant rate, the turn indicator reading is:

a independent to the aircraft true airspeed

b proportional to the aircraft true airspeed

c **inversely proportional to the aircraft true airspeed**

d proportional to the aircraft weight

196 id 3418 | In a Turn-indicator, the measurement of rate-of-turn consists for :

a high bank angles,in measuring the yaw rate

b low bank angles , in measuring the roll rate

c **low bank angles, in measuring the yaw rate**

d high bank angles, in measuring the roll rate

197 id 4597 | The turn rate indicator uses a gyroscope: 1 - with one degree of freedom. 2 - with two degrees of freedom 3 - the frame of which is supported by two return springs. 4 - the spinning wheel axis of which is parallel to the pitch axis. 5 - the spinning wheel axis of which is parallel to the yawing axis. 6 - the spinning wheel axis of which is horizontal. The com

a 1-6

b 1-3

c 2-5

d **1-3-4**

198 id 4599 | An aircraft is flying at a 120 kt true airspeed (VV), in order to achieve a rate 1 turn, the pilot will have to bank the aircraft at an angle of:

a 30°.

b 12°.

c 36°.

d **18°.**

199 id 5424 | A turn indicator is an instrument which indicates rate of turn. Rate of turn depends upon : 1 : bank angle 2 : aeroplane speed 3 : aeroplane weight The combination regrouping the correct statements is :

a 1 and 3.

b **1 and 2.**

c 2 and 3.

d 1, 2, and 3.

200 id 6049 | What is an operational difference between the turn coordinator and the turn and slip indicator?

a the turn coordinator is always electric; the turn and slip indicator is always vacuum-driven

b the turn coordinator indicates bank angle only; the turn and slip indicator indicates rate of turn and co-ordination

c **the turn coordinator indicates roll rate, rate of turn, and co-ordination; the turn and slip indicator indicates rate of turn and co-ordination**

d the turn coordinator indicates angle of bank; the turn-and-slip indicator indicates turn rate in co-ordinated flight

201 id 6050 | What indications should you get from the turn-and-slip indicator during taxi?

a the needle and ball should move freely in the direction of the turn

b **the ball moves freely opposite the turn, and the needle deflects in the direction of the turn**

c the needle deflects in the direction of the turn, but the ball remains centred

d the ball deflects opposite the turn, but the needle remains centred

202 id 6071 | The needle of the Turn and Bank indicator shows:

a The bank angle at which the aircraft is turning about the roll axis.

b **The rate at which the aircraft is turning about the yaw axis.**

c The pitch angle during a turn.

d The rate at which the aircraft is rolling into a turn.

22.01.02.06. Gyro stabilised platform (gimballed platform)

203 id 556 | While inertial platform system is operating on board an aircraft, it is necessary to use a device with the following characteristics, in order to keep the vertical line with a pendulous system:

a without damping and a period of about 84 seconds

b without damping and a period of about 84 minutes

c **with damping and a period of about 84 minutes.**

d with damping and a period of 84 seconds

204 id 3408 | The heading reference unit of a three-axis data generator is equipped with a gyro with:

a 2 degrees of freedom and vertical spin axis

b **2 degrees of freedom and horizontal spin axis**

c 1 degree of freedom and horizontal spin axis

d 1 degree of freedom and vertical spin axis

205 id 3409 | The vertical reference unit of a three-axis data generator is equipped with a gyro with :

a 1 degree of freedom and horizontal spin axis

b 2 degrees of freedom and horizontal spin axis

c **2 degrees of freedom and vertical spin axis**

d 1 degree of freedom and vertical spin axis

206 id 6077 | In an Inertial Navigation System (INS), the main causes of Cumulative Track errors are

a wander in the levelling gyros, which causes a Schuler oscillation.

b integrator errors in the second stage of integration.

c **initial azimuth misalignment of the platform and wander of the azimuth gyro.**

d because recorded value of the distance run is increasingly divergent from the true distance run.

207 id 6078 | In an Inertial Navigation System (INS), the main causes of Cumulative Distance errors are

a misalignment of the accelerometers in the horizontal plane.

b **wander in the levelling gyros and integrator errors in the second stage of integration.**

c initial azimuth misalignment of the platform and wander of the azimuth gyro.

d because the true value of the distance run is increasingly divergent from the apparent distance run.

208 What is known as the "Schuler Period" has a length of
id 6079

a **84.4 minutes**

b 84.4 seconds

c 84.4 hours

d 84.4 Hertz

22.01.02.07. Fixed installations (strap down systems)

209 In order to align a strapdown inertial unit, it is required to insert the local geographical coordinates. This is necessary to:
id 557

a **Position the computing trihedron with reference to earth.**

b Check operation of laser gyros.

c Determine magnetic or true heading.

d Re-erect laser gyros.

210 The sustained oscillation in the Ring Laser Gyro (RLG) is initially caused by
id 6080

a **the gas (or plasma) inside the triangular cavity is ionised by the voltage, causing helium atoms to collide with and transfer energy to the neon atoms.**

b the spontaneous return of photons to a higher energy level, which in turn produces, excited neon atoms.

c the pressure fluctuation in the high pressure mixture of helium and neon gases in the triangular cavity.

d the corner mirrors, which reflect the radiation energy, back to the photons.

22.01.03. Magnetic compass

22.01.03.01. construction and principles of operation

211 In the northern hemisphere, during deceleration following a landing in an Easterly direction, the magnetic compass will indicate :
id 3008

a **an apparent turn to the South.**

b an apparent turn to the North.

c a constant heading.

d a heading fluctuating about 090°.

212 During deceleration following a landing in Northerly direction, the magnetic compass will indicate :
id 3009

a **no apparent turn.**

b an apparent turn to the East.

c an apparent turn to the West.

d a heading fluctuating about 360°.

213 During deceleration following a landing in a Southerly direction, the magnetic compass will indicate :
id 3010

a **no apparent turn.**

b an apparent turn to the East.

c an apparent turn to the West.

d a heading fluctuating about 180°.

214 id 3011 — In the Southern hemisphere, during deceleration following a landing in a Westerly direction, the magnetic compass will indicate :

- **a** **an apparent turn to the North.**
- **b** an apparent turn to the South.
- **c** no apparent turn.
- **d** a heading fluctuating about 270°.

---

215 id 3012 — In the Northern hemisphere, during deceleration following a landing in a Westerly direction, the magnetic compass will indicate :

- **a** a heading fluctuating about 270°.
- **b** an apparent turn to the North.
- **c** no apparent turn.
- **d** **an apparent turn to the South.**

---

216 id 3013 — In the Southern hemisphere, during deceleration following a landing in an Easterly direction, the magnetic compass will indicate :

- **a** a heading fluctuating about 090°.
- **b** an apparent turn to the South.
- **c** no apparent turn.
- **d** **an apparent turn to the North.**

---

217 id 3014 — The quadrantal deviation of a magnetic compass is corrected by using :

- **a** magnetized needles
- **b** hard iron pieces
- **c** pairs of permanent magnets
- **d** **soft iron pieces**

---

218 id 3015 — The quadrantal deviation of the magnetic compass is due to the action of :

- **a** the hard iron ices and the soft iron pieces influenced by the hard iron pieces
- **b** **the soft iron pieces influenced by the geomagnetic field**
- **c** the hard iron pieces influenced by the geomagnetic field
- **d** the hard iron pieces influenced by the mild iron pieces

---

219 id 3018 — A pilot wishes to turn right on to a southerly heading with 20° bank at a latitude of 20° North. Using a direct reading compass, in order to achieve this he must stop the turn on an approximate heading of :

- **a** 170°
- **b** 150°
- **c** **210°**
- **d** 190°

---

220 id 3019 — A pilot wishes to turn left on to a southerly heading with 20° bank at a latitude of 20° North. Using a direct reading compass, in order to achieve this he must stop the turn on an approximate heading of :

- **a** 190°
- **b** 200°
- **c** 170°
- **d** **160°**

221 id 3020

A pilot wishes to turn left on to a northerly heading with 10° bank at a latitude of 50° North. Using a direct reading compass, in order to achieve this he must stop the turn on an approximate heading of :

a 355°

b 030°

c 330°

d 015°

222 id 3021

A pilot wishes to turn right on to a northerly heading with 20° bank at a latitude of 40° North. Using a direct reading compass, in order to achieve this he must stop the turn on to an approximate heading of :

a 030°

b 350°

c 330°

d 010°

223 id 3022

The purpose of compass swinging is to determine the deviation of a magnetic compass :

a on a given heading

b on any heading

c at any latitude

d at a given latitude

224 id 3023

The compass heading can be derived from the magnetic heading by reference to a:

a map showing the isogonic lines

b map showing the isoclinic lines

c deviation correction curve

d compass swinging curve

225 id 3024

The magnetic heading can be derived from the true heading by means of a :

a map showing the isoclinic lines

b map showing the isogonal lines

c deviation correction curve

d compass swinging curve

226 id 5406

The purpose of a compass swing is to attempt to coincide the indications of:

a compass north and true north.

b compass north and magnetic north.

c true north and magnetic north.

d compass north and the lubber line.

227 id 5414

Magnetic compass swinging is carried out to reduce as much as possible :

a variation.

b deviation.

c regulation.

d acceleration.

228 id 5418 | An aircraft takes-off on a runway with an alignment of 045°. The isogonic line on the area chart indicates 0°. The compass deviation is O°. On a take-off with zero wind, the northerly turning error:

a will be nul if the wings are kept level.

b is such that the compass will indicate a value noticeably above 045°.

c **is such that the compass will indicate a value noticeably below 045°.**

d will be nul

---

229 id 5425 | When turning onto a northerly heading the rose of a magnetic compass tends to "undershoot;" when turning onto a southerly heading it tends to "overshoot": 1)these compass indications are less reliable in the northern hemisphere than in the southern hemisphere. 2)these compass oscillations following a lateral gust are not identical if the aircraft is heading north or south. 3

a 2, 3, and 4.

b 1, 2, and 4.

c **2 and 3.**

d 1 and 3.

---

230 id 5991 | In the Northern Hemisphere, a magnetic compass will normally indicate a turn towards North if:

a **An aircraft is accelerated while on an east or west heading.**

b An aircraft is decelerated while on an east or west heading.

c A left turn is entered from a west heading.

d A right turn is entered from an east heading.

---

231 id 5996 | The main reason for having the centre of gravity below the pivot point in a card-type magnetic compass is:

a To compensate for the horizontal magnetic component H such that the magnet system is within approx. 2° of the true horizontal between 60° N and 40° S.

b To cancel out the systems pendulosity and its tendency to oscillate backwards and forwards about its equilibrium position.

c To make it less sensitive to hard- and soft-iron magnetism in the aircraft.

d **To compensate for the vertical magnetic component Z such that the magnet system is within approx. 2° of the true horizontal between 60° N and 40° S.**

---

232 id 6026 | In the vicinity of the magnetic North Pole the magnetic compass is useless because:

a The magnetic field is too strong.

b The magnetic pole is moving.

c **The horizontal component of the magnetic field is too weak.**

d The variation is too large.

---

233 id 6027 | If the CH = 220°, var. = E12, dev. = W2, what is the corresponding TH?

a TH = 234°.

b TH = 206°

c **TH = 230°**

d TH = 210°

234 id 6036 In the Northern Hemisphere, a magnetic compass will normally indicate a turn towards North if

- **a** a right turn is entered from an east heading.
- **b** a left turn is entered from a west heading.
- **c** an aircraft is deccelerated while on an east or west heading.
- **d** **an aircraft is accelerated while on an east or west heading.**

---

235 id 6037 What should be the indication on the magnetic compass when rolling into a standard rate turn to the right from a south heading in the Northern Hemisphere?

- **a** **The compass will indicate a turn to the right, but at a faster rate than is actually occurring.**
- **b** The compass will indicate a turn to the left.
- **c** The compass will remain on south for a short time, then gradually catch up to the magnetic heading of the airplane.
- **d** The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.

22.01.03.02. errors (deviation, effect of inclination)

236 id 2321 The fields affecting a magnetic compass originate from: 1. magnetic masses 2. ferrous metal masses 3. non ferrous metal masses 4. electrical currents The combination of correct statements is:

- **a** 1, 2, 3
- **b** **1, 2, 4**
- **c** 1, 2, 3, 4
- **d** 1, 3, 4

---

237 id 5395 Among the errors of a magnetic compass, are errors:

- **a** of parallax, due to oscillations of the compass rose
- **b** due to cross-wind gusts particularly on westerly or easterly headings
- **c** due to Schüler type oscillations
- **d** **in North seeking, due to bank angle and magnetic heading**

---

238 id 5408 In a steep turn, the northerly turning error on a magnetic compass on the northern hemisphere is:

- **a** none on a 270° heading in a left turn.
- **b** **equal to 180° on a 090° heading in a right turn.**
- **c** none on a 090° heading in a right turn.
- **d** equal to 180° on a 270° heading in a right turn.

---

239 id 5988 Concerning magnetic compasses, deviation is:

- **a** The angular difference between magnetic North and true North.
- **b** **The angular difference between magnetic North and compass North.**
- **c** Compass North.
- **d** A card in the cockpit showing compass heading errors.

240 Variation is defined as the angle between:
id 6028

a MN and CN.

b TN and CN.

c **TN and MN.**

d CN and the longitudinal axis of the aircraft.

241 A remote indicating compass has usually less deviation error than a panel mounted compass because:
id 6057

a it is carrying a well damped floating magnet.

b **it is normally mounted in a part of the airplane where magnetic interference is minimal.**

c the indication system consists of toroidal-wound coils forming a Magnesyn system with little interference.

d it receives a higher flux-density from the earth's magnetic field.

22.01.04. Radio Altimeter

22.01.04.02. frequency band

242 The operating frequency range of a low altitude radio altimeter is:
id 1803

a **4200 MHz to 4400 MHz.**

b 5400 MHz or 9400 MHz.

c 2700 MHz to 2900 MHz.

d 5 GHz.

243 Modern low altitude radioaltimeters emit waves in the following frequency band:
id 2322

a HF (High Frequency).

b VLF (Very Low Frequency).

c **SHF (Super High Frequency).**

d UHF (Ultra High Frequency).

244 The aircraft radio equipment which emits on a frequency of 4400 MHz is the :
id 2618

a primary radar.

b high altitude radio altimeter.

c weather radar.

d **radio altimeter.**

245 The operating frequency of the Radio Altimeter is normally
id 6081

a between 4,250 and 4,350 kHz, FMCW

b **between 4,250 and 4,350 MHz, FMCW**

c between 4,250 and 4,350 kHz, CW

d between 4,250 and 4,350 MHz, AM

246 The modulation technique used by the Radio Altimeter is referred to as
id 6083

a Continuous Modulated Frequency Wave

b Amplitude Modulated Continuous Wave

c Pulse Modulated Continuous Wave

d **Frequency Modulated Continuous Wave**

22.01.04.03. principle of operation

247 id 1076 — In low altitude radio altimeters, the reading is zero when main landing gear wheels are on the ground. For this, it is necessary to:

- **a** change the display scale in short final, in order to have a precise readout.
- **b** place the antennas on the bottom of the aeroplane.
- **c** **compensate residual altitude due to antennas height above the ground and coaxial cables length.**
- **d** account for signal processing time in the unit and apply a correction factor to the reading.

248 id 1077 — The low-altitude radio altimeters used in precision approaches: 1 operate in the 1540-1660 MHz range. 2 are of the pulsed type. 3 are of the frequency modulation type. 4 have an operating range of 0 to 5000 ft. 5 have a precision of +/- 2 feet between 0 and 500 ft. The combination of the correct statements is :

- **a** 2, 3, 4
- **b** 3, 4
- **c** **3, 5**
- **d** 1, 2, 5

249 id 1078 — The data supplied by a radio altimeter:

- **a** concerns only the decision height.
- **b** **indicates the distance between the ground and the aircraft.**
- **c** is used only by the radio altimeter indicator.
- **d** is used by the automatic pilot in the altitude hold mode.

250 id 2803 — In low altitude radio altimeters, the height measurement (above the ground) is based upon:

- **a** a triangular amplitude modulation wave, for which modulation phase shift between transmitted and received waves after ground reflection is measured.
- **b** a pulse transmission, for which time between transmission and reception is measured on a circular scanning screen.
- **c** a wave transmission, for which the frequency shift by DOPPLER effect after ground reflection is measured.
- **d** **a frequency modulation wave, for which the frequency variation between the transmitted wave and the received wave after ground reflection is measured.**

251 id 3406 — The operation of the radio altimeter of a modern aircraft is based on:

- **a** amplitude modulation of the carrier wave.
- **b** **frequency modulation of the carrier wave.**
- **c** pulse modulation of the carrier wave.
- **d** a combination of frequency modulation and pulse modulation.

252 id 4343 — A radio altimeter can be defined as a :

- **a** **self-contained on-board aid used to measure the true height of the aircraft**
- **b** self-contained on-board aid used to measure the true altitude of the aircraft
- **c** ground radio aid used to measure the true height of the aircraft
- **d** ground radio aid used to measure the true altitude of the aircraft

253 id 4595 During the approach, a crew reads on the radio altimeter the value of 650 ft. This is an indication of the true:

- **a** height of the aircraft with regard to the runway.
- **b** height of the aircraft with regard to the ground at any time.
- **c** **height of the lowest wheels with regard to the ground at any time.**
- **d** altitude of the aircraft.

22.01.04.04. display

254 id 3333 The Decision Height (DH) warning light comes on when an aircraft:

- **a** passes over the outer marker.
- **b** **descends below a pre-set radio altitude.**
- **c** descends below a pre-set barometric altitude.
- **d** passes over the ILS inner marker.

22.01.04.05. errors

255 id 2751 For most radio altimeters, when a system error occurs during approach the ..

- **a** DH lamp flashes red and the audio signal sounds
- **b** **Height indication is removed**
- **c** DH lamp flashes red
- **d** Audio warning signal sounds

22.01.05. Electronic Flight Instrument System (EFIS)

22.01.05.01. information display types

256 id 1079 Regarding Electronic Instrument System (EFIS) : 1- the Navigation Display (ND) displays Flight Director Bars. 2- the altimeter setting is displayed on the PFD (Primary Flight Display). 3- the PFD is the main flying instrument. 4- the FMA (Flight Mode Annunciator) is part of the ND. The combination regrouping all the correct statements is :

- **a** 1, 2.
- **b** 3, 4.
- **c** 1, 4.
- **d** **2, 3.**

257 id 2323 The Primary Flight Display (PFD) displays information dedicated to:

- **a** weather situation.
- **b** **piloting.**
- **c** engines and alarms.
- **d** systems.

22.01.06. Flight Management System (FMS)

22.01.06.01. general principles

258
id 4179

All the last generation aircraft use flight control systems. The Flight Management System (FMS) is the most advanced system ; it can be defined as a:

a **global 3-D Flight Management System**

b management system optimized in the vertical plane

c management system optimized in the horizontal plane

d global 2-D Flight Management System

22.02. AUTOMATIC FLIGHT CONTROL SYSTEMS

259 id 4860 — When the altitude acquisition mode is engaged on a jet transport airplane equipped with autopilot (AP) and auto-throttle (ATS) systems the:

- **a** true airspeed (TAS) is maintained constant by the autopilot by means of elevator.
- **b** **indicated airspeed (IAS) is maintained constant by the autopilot by means of elevator.**
- **c** true airspeed (TAS) is maintained constant by the auto-throttle system.
- **d** indicated airspeed (IAS) is maintained constant by the auto-throttle system.

22.02.01. Flight Director

260 id 1080 — Flight Director Information supplied by an FD computer is presented in the form of command bars on the following instrument:

- **a** BDHI Bearing Distance Heading Indicator.
- **b** **ADI Attitude Display Indicator.**
- **c** RMI Radio Magnetic Indicator.
- **d** HSI Horizontal Situation Indicator.

261 id 1081 — The Head Up Display (HUD) is a device allowing the pilot, while still looking outside, to have:

- **a** **a synthetic view of the instrument procedure.**
- **b** a flying and flight path control aid.
- **c** a monitoring of engine data.
- **d** a monitoring only during Cat III precision approaches.

262 id 2754 — Mode "Localizer ARM" active on Flight Director means:

- **a** Localizer ALARM, making localizer approach not authorized
- **b** **System is armed for localizer approach and coupling will occur upon capturing center line**
- **c** Coupling has occurred and system provides control data to capture the centerline
- **d** Localizer is armed and coupling will occur when flag warning disappears

263 id 4180 — The "heading hold" mode is selected on the flight director (FD) with a course to steer of 180°. Your aircraft holds a heading of 160°. The vertical bar of the FD:

- **a** **is centered if the aircraft is on optimum path to join heading 180°**
- **b** is centered if the aircraft has a starboard drift of 20°
- **c** is centered if the aircraft has a port drift of 20°
- **d** cannot be centered

264 id 4350 — The essential components of a flight director are : 1- a computer 2- an automatic pilot 3- an autothrottle 4- command bars The combination of correct statements is :

- **a** 1,2
- **b** **1,4**
- **c** 2,4
- **d** 2,3

265 id 4602 On a modern aircraft, the flight director modes are displayed on the:

- **a** upper strip of the ND (Navigation Display).
- **b** **upper strip of the PFD (Primary Flight Display).**
- **c** upper strip of the ECAM (Electronic Centralized A/C Management).
- **d** control panel of the flight director only.

266 id 4607 The aim of the flight director is to provide information to the pilot:

- **a** allowing him to return to a desired path according to a 45° intercept angle.
- **b** about his position with regard to a radioelectric axis.
- **c** **allowing him to return to a desired path in an optimal way.**
- **d** allowing him to return to a desired path according to a 30° intercept angle.

267 id 4620 For capturing and keeping a preselected magnetic heading, the flight director computer takes into account: 1- track deviation 2- rate of track closure 3- rate of change of track closure 4- wind velocity given by the inertial reference unit The combination regrouping all the correct statements is :

- **a** 1,3,4
- **b** 1,2,4
- **c** 2,3,4
- **d** **1,2,3**

268 id 4848 The flight director indicates the :

- **a** **optimum instantaneous path to reach selected radial.**
- **b** optimum path at the moment it is entered to reach a selected radial.
- **c** path permitting reaching a selected radial in minimum time.
- **d** path permitting reaching a selected radial over a minimum distance.

269 id 4904 The command bars of a flight director are generally represented on an:

- **a** HSI (Horizontal Situation Indicator)
- **b** **ADI (Attitude Director Indicator)**
- **c** RMI (Radio Magnetic Indicator)
- **d** ILS (Instrument Landing System)

270 id 5393 An aeroplane is equipped with a Flight Director (with crosshair trend bars), heading 270°, in HDG mode (heading hold). A new heading, of 360°, is selected the vertical trend bar :

- **a** **deviates to the right and will be centred as soon as you roll the aircraft to the bank angle calculated by the flight director.**
- **b** deviates to the right and remains in that position until the aircraft has reached heading 360°.
- **c** disappears, the new heading selection has deactivated the HDG mode.
- **d** deviates to its right stop as long as the aeroplane is more than 10° off the new selected heading.

271 id 5407 The position of a Flight Director command bars:

- **a** repeats the ADI and HSI information
- **b** **indicates the manoeuvers to execute, to achieve or maintain a flight situation.**
- **c** enables the measurement of deviation from a given position.
- **d** only displays information relating to radio-electric deviation.

22.02.02. Autopilot

272
id 2757

The Altitude Select System:

- **a** Engages autopilot Auto Trim at selected altitude
- **b** Illuminates a light when selected altitude is attained
- **c** **Is annunciated by light and/or sound when airplane is approaching selected altitude**
- **d** Disengages autopilot Auto Trim at selected altitude

273
id 3002

Landing shall be considered as having been carried out automatically when the autopilot and the auto-throttle of an aircraft are disengaged by flight crew :

- **a** during the flare.
- **b** **during ground roll.**
- **c** at the decision height.
- **d** at the outer marker.

274
id 3553

A closed loop control system in which a small power input controls a much larger power output in a strictly proportionate manner is known as :

- **a** a feedback control circuit.
- **b** an amplifier.
- **c** **a servomechanism.**
- **d** an autopilot.

275
id 4012

An autopilot capable of holding at least altitude and heading mode is compulsory:

- **a** on airplanes over 5.7 t.
- **b** on multipilot airplanes.
- **c** for VFR and IFR flights with only one pilot.
- **d** **for IFR or night flights with only one pilot.**

276
id 4181

The interception of a localizer beam by the autopilot takes place :

- **a** according to an interception versus radio deviation law
- **b** at a constant magnetic course
- **c** **at a constant heading**
- **d** according to an interception versus range and angular

277
id 4351

A pilot has to carry out a single-pilot IFR flight on a light twin-engined aircraft for cargo transport. The purpose of the automatic pilot is at least to hold the:

- **a** altitude
- **b** heading
- **c** **heading and to hold the altitude**
- **d** heading, to hold the altitude and to have a radio axis tracking function

278
id 4352

An automatic landing is carried out when the automatic pilot :

- **a** and the autothrottle ensure a correct final approach, at least up to flare-out while the human pilot controls the power
- **b** ensures a correct final approach, at least up to ground roll while the human pilot controls the power
- **c** and the autothrottle ensure a correct final approach, at least up to flare-out
- **d** **and the autothrottle ensure a correct final approach, at least up to ground roll**

279 id 4609 The correction of the control surface deflection made by the automatic pilot calculator in order to stabilize the longitudinal attitude will be all the more significant as the : 1- difference between the reference attitude and the instantaneous attitude is high. 2- rate of change of the difference between the reference attitude and the instantaneous attitude is high. 3- temp

a **1,2.**

b 1, 2, 3, 4.

c 1, 2, 3.

d 2, 3, 4.

---

280 id 4610 The correction of the control surface deflection made by the auto-pilot calculator in order to keep a given altitude will be all the more significant when the : 1- difference between the attitude necessary to keep the given or reference altitude and the instantaneous attitude is high. 2 - variation speed of the difference between the attitude necessary to maintain the altitude

a 1 and 2.

b **1, 2, 3 and 4.**

c 3 and 4.

d 1, 2 and 3.

---

281 id 4845 When only one autopilot is used for climbing, cruising and approach, the system is considered:

a **"fail passive" or without failure effect but with disconnection.**

b "fail soft" or with minimized failure effect.

c "fail survival" or without failure effect with function always ensured.

d "fail safe" with failure effect without disconnection.

---

282 id 4846 In automatic landing mode, when the 2 autopilots are used, the system is considered:

a **"fail operational" or without failure effect with function always ensured.**

b "fail soft" or with minimized failure effect.

c "fail passive" or without failure effect but with disconnection.

d "fail hard" or with failure effect and disconnection.

---

283 id 4847 In automatic landing mode, in case of failure of one of the two autopilots, the system is considered:

a **"fail passive" or without failure effect but with disconnection.**

b "fail survival" or without failure effect with function always ensured.

c "fail hard" or without failure effect and disconnection.

d "fail soft" with minimized failure effect.

---

284 id 4849 During an automatic landing, from a height of about 50 ft the:

a glideslope mode is disconnected and the airplane continues its descent until landing.

b **autopilot maintains a vertical speed depending on the radio altimeter height.**

c autopilot maintains an angle of attack depending on the radio altimeter height.

d Loc and Glideslope modes are disconnected and the airplane carries on its descent until landing.

285 id 4850 — In a selected axis capture mode, the autopilot gives a bank attitude input :

a of a fixed value equal to 20°.

b of a fixed value equal to 27°.

c **proportional to the deviation between the selected heading and the current heading but not exceeding a given value.**

d proportional to the aircraft true airspeed but not exceeding a given value.

---

286 id 4863 — The synchronization of the autopilot control channel system : 1- enables the prevention of jerks during disengagement 2- enables the cancellation of rudder control signals 3- enables the prevention of jerks during engagement 4- functions in the heading, navigation, approach modes The combination regrouping all the correct statements is:

a 2, 3

b 2, 4

c 1, 4

d **3, 4**

---

287 id 4874 — An automatic landing system which can keep on operating without deterioration of its performances following the failure of one of the autopilots is called "FAIL...:

a "REDUNDANT"

b "PASSIVE"

c "SAFE"

d **"OPERATIONAL"**

---

288 id 4875 — An automatic landing system necessitating that the landing be continued manually in the case of a system failure during an automatic approach is called "FAIL...."

a **"PASSIVE"**

b "OPERATIONAL"

c "SAFE"

d "REDUNDANT"

---

289 id 4876 — A semi-automatic landing system disconnects itself automatically:

a at the decision height.

b **at approximately 100 ft.**

c on ground.

d when going around.

---

290 id 4878 — A landing is performed automatically when the autopilot and auto-throttle ensure good performance from the final approach :

a **during the landing roll and sometimes until the aircraft comes to a complete stop.**

b until reaching 100 ft, height at which point the autopilot is automatically disconnected.

c until the flare.

d until reaching decision height.

---

291 id 4879 — When an aircraft, operating in the VOR coupled mode, approaches the "cone of confusion" over a VOR station, the roll channel of the autopilot :

a **temporarily switches over to the heading mode.**

b is damped by a trim input signal from the lateral trim system.

c remains always coupled to the selected VOR radial.

d is temporarily disconnected.

292 id 4891	The control law of a transport airplane autopilot control channel may be defined as the relationship between the :

a **computer input deviation data and the output control deflection signals.**

b computer input deviation data and the signals received by the servoactuators.

c input and output signals at the amplifier level respectively control deviation data and control deflection signals.

d crew inputs to the computer and the detector responses (returned to the airplane).

293 id 4892	In a transport airplane, an autopilot comprises, in addition to the mode display devices, the following fundamental elements : 1- Airflow valve 2- Sensors 3- Comparators 4- Computers 5- Amplifiers 6- Servo-actuators The combination regrouping all the correct statements is:

a 2, 3, 4, 5

b **2, 3, 4, 5, 6**

c 1, 3, 4, 6

d 1, 2, 6

294 id 4894	The autopilot basic modes include, among other things, the following functions : 1- pitch attitude hold 2- pressure altitude hold 3- horizontal wing hold 4- heading hold The combination regrouping all the correct statements is :

a 1, 2, 3, 4

b **1, 3**

c 1, 2, 3

d 1, 4

295 id 4897	During a Category II automatic approach, the height information is supplied by the :

a altimeter.

b GPS (Global Positioning System).

c encoding altimeter.

d **radio altimeter.**

296 id 4900	A pilot engages the control wheel steering (CWS) of a conventional autopilot and carries out a manoeuvre in roll. When the control wheel is released, the autopilot will :

a restore the flight attitude and the rate of turn selected on the autopilot control display unit.

b roll wings level and maintain the heading obtained at that moment.

c maintain the track and the flight attitude obtained at that moment.

d **maintain the flight attitude obtained at that moment.**

297 id 4901	The functions of an autopilot (basic modes) consist of :

a monitoring the movement of the airplane centre of gravity.

b **stabilizing and monitoring the movement around the airplane centre of gravity.**

c guiding the airplane path.

d stabilizing and monitoring the movement around the airplane aerodynamic centre.

298 id 4902 From a flight mechanics point of view, the "guidance" functions of a transport airplane autopilot consist in:

a stabilizing and monitoring the movements around the aerodynamic centre.

b stabilizing and monitoring the movements around the centre of gravity.

c monitoring the movements of the aerodynamic centre in the three dimensions of space (path).

d **monitoring the movements of the centre of gravity in the three dimensions of space (path).**

299 id 4920 Among the following functions of an autopilot, those related to the airplane stabilization are: 1- pitch attitude holding 2- horizontal wing holding 3- displayed heading or inertial track holding 4- indicated airspeed or Mach number holding 5- yaw damping 6- VOR axis holding The combination regrouping all the correct statements is:

a 2, 4, and 5.

b 1, 2, 3 and 6.

c 3, 4, 5 and 6.

d **1, 2 and 5.**

300 id 4921 Among the following functions of an autopilot, those related to the airplane guidance are: 1- pitch attitude holding 2- horizontal wing holding 3- indicated airspeed or Mach number holding 4- altitude holding 5- VOR axis holding 6- yaw damping The combination regrouping all the correct statements is:

a 1, 2, and 6.

b **3, 4 and 5.**

c 1, 2, 3 and 6.

d 1, 3, 4 and 5.

301 id 4922 When using the autopilot, the function of the pitch channel automatic trim is to: 1- cancel the hinge moment of the elevator 2- ease as much as possible the load of the servo-actuator 3- restore to the pilot a correctly trimmed airplane during the autopilot disengagement The combination regrouping all the correct statements is:

a 1 and 2.

b 3.

c 1 and 3.

d **1, 2 and 3.**

302 id 4923 A landing will be considered to be performed in the SEMI-AUTOMATIC mode when: 1- the autopilot maintains the airplane on the ILS beam until the decision height is reached then is disengaged automatically. 2- the autothrottle maintains a constant speed until the decision height is reached then is disengaged automatically. 3- the autopilot maintains the airplane on the ILS beam

a 1 and 4.

b 3, 4 and 5.

c **1 and 2.**

d 2, 3 and 5.

303 id 4924 A landing will be considered to be performed in the AUTOMATIC mode when: 1- the autopilot maintains the airplane on the ILS beam until the decision height is reached then is disengaged automatically. 2- the autothrottle maintains a constant speed until the decision height is reached then is disengaged automatically. 3- the autopilot maintains the airplane on the ILS beam until

a 1 and 4.

b 1 and 2.

c 2, 3 and 5.

d **3, 4 and 5.**

304 id 4928 When an automatic landing is interrupted by a go-around : 1- the autothrottle reacts immediately upon the pilot action on the TO/GA (Take-off/Go-around) switch in order to recover the maximum thrust 2- the autopilot monitors the climb and the rotation of the airplane 3- the autopilot retracts the landing gear and reduces the flap deflection in order to reduce the drag 4-

a **1, 2 and 5.**

b 1, 4 and 5.

c 1, 3 and 4.

d 1, 2 and 3.

305 id 4929 The calibrated airspeed (CAS) or Mach holding mode is carried out by: 1- the autopilot pitch channel in the climb mode at a constant calibrated airspeed (CAS) or Mach number 2- the autothrottles in the climb mode at a constant calibrated airspeed (CAS) or Mach number 3- the autopilot pitch channel in the altitude or glide path holding mode 4- the autothrottles in the alti

a 1 and 3.

b 2 and 4.

c **1 and 4.**

d 2 and 3.

306 id 5042 The engagement of an autopilot is not possible when: 1- there is a fault in the electrical power supply 2- the controlled-turn knob is not set to centre-off 3- there is a synchronization fault in the pitch channel 4- there is a fault in the attitude reference unit The combination regrouping all the correct statements is:

a 1, 2, 4.

b **1, 2, 3, 4.**

c 2, 3, 4.

d 1, 3, 4.

307 id 5384 On an autopilot coupled approach, GO AROUND mode is engaged:

a if the aircraft reaches the decision height selected on the radio altimeter at a higher speed than the one selected.

b by the pilot selecting G.A. mode on the thrust computer control panel.

c automatically in case of an autopilot or flight director alarm.

d **by the pilot pushing a button located on the throttles.**

308 id 5391 When being engaged, and without selecting a particular mode, an automatic pilot enables :

- **a** all aeroplane piloting and guidance functions except maintaining radio-navigation course lines.
- **b** aeroplane piloting and guidance functions.
- **c** a constant speed on track, wings horizontal.
- **d** **aeroplane stabilisation with attitude hold or maintaining vertical speed and possibly automatic trim.**

309 id 5392 An automatic pilot is a system which can ensure the functions of:

- **a** piloting only.
- **b** **piloting and guidance of an aircraft in both the horizontal and vertical planes.**
- **c** navigation.
- **d** piloting from take-off to landing without any action from the human pilot.

310 id 5398 When the auto-pilot is engaged; the role of the automatic trim is to:

- **a** relieve the pressure on the control column and return, the aircraft in-trim at A.P. disconnect
- **b** **relieve the A.P. servo motor and return the aircraft in-trim at A.P. disconnect**
- **c** react to altitude changes in Altitude Hold mode
- **d** synchronize the longitudinal loop

311 id 5399 The command functions of an autopilot include, among others, the holding of : 1- vertical speed 2- altitude 3- attitude 4- bank 5- heading The combination which regroups all of the correct statements is :

- **a** **1 - 2 - 5**
- **b** 1 - 2 - 3 - 5
- **c** 3 - 5
- **d** 2 - 3 - 4

312 id 5412 In an auto-pilot slaved powered control circuit, the system which ensures synchronisation :

- **a** is inhibited when the automatic pilot is engaged.
- **b** intervenes only when the automatic pilot has been engaged.
- **c** prevents uncommanded surface deflection when the automatic pilot is disengaged.
- **d** **can itself, when it fails, prevent the automatic pilot from being engaged.**

313 id 5431 An autopilot is selected "ON" in mode "altitude hold," the pilot alters the barometric pressure set on the sub-scale of his altimeter the:

- **a** **aircraft will remain at the same altitude, the autopilot takes its pressure information from the static source**
- **b** aircraft will remain at the same altitude, the autopilot takes its pressure information from the altimeter corrected to standard pressure, 1013.25 hPa
- **c** aircraft will climb or descend in the sense of the change, the autopilot takes its pressure information from the altimeter
- **d** mode altitude hold will disengage

314 id 7457 The autopilot is divided into two basic modes, what are they called?

- **a** Lateral mode (HDA) and NAV mode.
- **b** Approach and Go around mode.
- **c** **Lateral mode (HDA) and Vertical mode (VS).**
- **d** Vertical mode (VS) and NAV mode

22.02.03. Flight envelope protection

315 id 4862 The computers of the electrical flight controls system comply with programs defined by attitude control laws such as : 1- on the longitudinal axis, the law may combine the load factor and the changes in the pitch rate as control data sources 2- the trimming is automatic and ensures neutral stability 3- the protections apply to pitch and bank attitudes depending on the speed<

- **a** 1, 2, 3, 4
- **b** 2, 3
- **c** **1, 2, 3**
- **d** 1, 3, 4

22.02.04. Yaw damper

316 id 3734 The yaw damper, which suppresses Dutch roll:

- **a** controls the rudder, with Mach Number as the input signal.
- **b** controls the ailerons, with Mach Number as the input signal.
- **c** **controls the rudder, with the angular rate about the vertical axis as the input signal.**
- **d** controls the ailerons, with the angular rate about the vertical axis as the input signal.

317 id 4193 The yaw damper indicator supplies the pilot with information regarding the:

- **a** yaw damper action only on the ground
- **b** rudder displacement by the rudder pedals
- **c** **yaw damper action on the rudder**
- **d** rudder position

318 id 6084 The Yaw Damper signal for a given rate of oscillation, is

- **a** varied proportional according to the airspeed.
- **b** **varied inversely according to the airspeed.**
- **c** constant regardless of airspeed.
- **d** increased proportional with the square of the airspeed.

22.02.05. Automatic pitch trim

319 id 2756 The purpose of Auto Trim function in autopilot is to :

- **a** **control elevator trim tab in order to relieve elevator load**
- **b** help Auto Pilot compensate for crosswind influence
- **c** tell the pilot when elevator trimming is required
- **d** trim throttles to obtain smooth engine power variation

320 id 3521 | Which one of the following statements is true with regard to the operation of a Mach trim system :

a **It only operates above a pre-determined Mach number.**

b It operates to counteract the larger than normal forward movements of the wing centre of pressure at high subsonic airspeeds.

c It only operates when the autopilot is engaged.

d It operates over the full aircraft speed range.

---

321 id 3522 | In the automatic trim control system of an autopilot, automatic trimming is normally effected about the :

a **pitch axis only.**

b roll and yaw axes only.

c pitch roll and yaw axes.

d pitch and roll axes only.

---

322 id 4192 | Mach Trim is a device to compensate for :

a weight reduction resulting from fuel consumption during the cruise

b the effects of fuel transfer between the main tanks and the tank located in the horizontal tail

c the effects of temperature variation during a climb or descent at constant Mach

d **backing of the aerodynamic center at high Mach numbers by moving the elevator to nose-up**

---

323 id 4858 | The automatic trim is a component of the autopilot pitch channel. Its function is to:

a **transfer a stabilized aeroplane to the pilot during autopilot disengagement.**

b reset the attitude, after engaging (the autopilot).

c set the attitude to an instantaneous value before engaging the autopilot.

d automatically disengage the autopilot in the case of an excessive pitch up.

---

324 id 4896 | The purpose of an airplane automatic trim system is to trim out the hinge moment of the :

a elevator(s) and rudder(s)

b rudder(s)

c **elevator(s)**

d elevator(s), rudder(s) and ailerons.

---

325 id 5035 | The purpose of the automatic trim is to: 1- reduce to zero the hinge moment of the entire control surface in order to relieve the load on the servo-actuator 2- ensure the aeroplane is properly trimmed when the autopilot is disengaged 3- maintain the same stability/manoeuverablity trade-off within the whole flight envelope The combination regrouping all the correct sta

a 1, 3.

b 1, 2.

c **1, 2, 3.**

d 2, 3.

22.02.06. Thrust computation

326 id 2341 — The Engine Pressure Ratio (EPR) is computed by :

- **a** multiplying compressor discharge pressure by turbine inlet pressure.
- **b** dividing compressor discharge pressure by turbine discharge pressure.
- **c** multiplying compressor inlet pressure by turbine discharge pressure.
- **d** **dividing turbine discharge pressure by compressor inlet pressure.**

327 id 4864 — A Full Authority Digital Engine Control (FADEC) has the following functions : 1- flow regulation (fuel, decelerations and accelerations monitoring) 2- automatic starting sequence 3- transmissions of engine data to the pilot's instruments 4- thrust management and protection of operation limits 5- monitoring of the thrust reversers The combination regrouping al

- **a** 1, 3, 5
- **b** 2, 4, 5
- **c** **1, 2, 3, 4, 5**
- **d** 1, 3, 4, 5

328 id 4866 — The two main sources of information used to calculate turbojet thrust are the:

- **a** fan rotation speed (or N1) or the total pressure at the high pressure compressor outlet.
- **b** high pressure turbine rotation speed or the EPR (Engine Pressure Ratio).
- **c** **fan rotation speed (or N1) or the EPR (Engine Pressure Ratio).**
- **d** fan rotation speed (or N1) or the total pressure at the low pressure turbine outlet.

329 id 4925 — An airplane is in steady cruise at flight level 290. The autothrottle maintains a constant Mach number. If the total temperature increases, the calibrated airspeed:

- **a** increases.
- **b** **remains constant.**
- **c** decreases.
- **d** increases if the static temperature is higher than the standard temperature, decreases if lower.

330 id 4926 — An airplane is in steady cruise at flight level 290. The autothrottle maintains a constant Mach number. If the total temperature decreases, the calibrated airspeed:

- **a** decreases if the outside temperature is lower than the standard temperature, increases if higher.
- **b** increases.
- **c** decreases.
- **d** **remains constant.**

331 id 4927 — An airplane is in steady descent. The autothrottle maintains a constant Mach number. If the total temperature remains constant, the calibrated airspeed:

- **a** **increases.**
- **b** decreases.
- **c** remains constant.
- **d** decreases if the static temperature is lower than the standard temperature, increases if above.

332 id 5255 | An aeroplane is in steady cruise at flight level 270. The autothrottle maintains a constant calibrated airspeed. If the total temperature increases, the Mach number :

a decreases.

b increases.

c **remains constant.**

d decreases if the outside temperature is higher than the standard temperature, increases if lower.

333 id 5256 | An aeroplane is in steady cruise at flight level 270. The autothrottle maintains a constant calibrated airspeed. If the total temperature decreases, the Mach number :

a increases if the outside temperature is higher than the standard temperature, decreases if lower.

b increases.

c decreases.

d **remains constant.**

334 id 5257 | An aeroplane is in a steady climb. The autothrottle maintains a constant Mach number. If the total temperature remains constant, the calibrated airspeed :

a **decreases.**

b increases.

c remains constant.

d decreases if the static temperature is lower than the standard temperature, increases if higher.

335 id 5258 | An aeroplane is in steady descent. The autothrottle maintains a constant calibrated airspeed. If the total temperature remains constant, the Mach number :

a increases.

b **decreases.**

c remains constant.

d increases if the static temperature is lower than the standard temperature, decreases if higher.

336 id 5259 | An aeroplane is in steady climb. The autothrottle maintains a constant calibrated airspeed. If the total temperature remains constant, the Mach number :

a **increases.**

b decreases.

c remains constant.

d decreases if the static temperature is lower than the standard temperature.

22.02.07. Auto-thrust

337 id 2755 | The purpose of Auto Throttle is:

a to synchronize engines to avoid "yawing"

b automatic shut down of one engine at too high temperature

c to deactivate manual throttles and transfer engine control to Auto Pilot

d **to maintain constant engine power or airplane speed**

338 id 4603 | In order to know in which mode the autothrottles are engaged, the crew will check the :

a TCC (Thrust Control Computer).

b ND (Navigation Display).

c **PFD (Primary Flight Display)**

d throttles position.

339 The autothrottle : 1- enable to catch and to maintain the N1 RPM 2- enable to catch and to maintain the N2 RPM 3- enable to catch and to maintain an airplane indicated airspeed (IAS) 4- is always engaged automatically at the same time as the autopilot The combination regrouping all the correct statements is:

id 4859

a 1, 3 and 4

b 2 and 3

c 1 and 4

d **1 and 3**

340 The automatic power control system (autothrottle) of a transport airplane has the following mode(s) : 1- capture and holding of speeds 2- capture and holding of Mach number 3- capture and holding of flight angle of attack 4- capture and holding of N1 or EPR (Engine Power Ratio) 5- capture and holding of flight paths The combination regrouping all the correct sta

id 4903

a 1, 2, 3, 5

b **1, 2, 4**

c 2, 4

d 1, 4, 5

22.03. WARNING AND RECORDING EQUIPMENT

22.03.01. Warnings general

341 id 5394 — Alarms are standardised and follow a code of colours. Those requiring action but not immediately, are signalled by the colour:

- **a** red
- **b** **amber**
- **c** green
- **d** flashing red

342 id 7453 — Cockpit voice recorders shall record the following:

- **a** All speech and sound in cockpit.
- **b** **All speech and sound in cockpit, signals from radionavigation aids and radio communication.**
- **c** Only the communication on the public address installation.
- **d** All air to ground communication.

22.03.02. Altitude alert system

343 id 4594 — A transport airplane has to be equipped with an altitude warning device. This system will warn the crew about : 1 - getting close to the preselected altitude, during both climb and descent. 2 - getting close to the preselected altitude, during climb only. 3 - the loss of altitude during take-off or missed approach. 4 - a wrong landing configuration. 5 - a variation hi

- **a** 2
- **b** 3,4
- **c** **1,5**
- **d** 1,3,4

344 id 4880 — An "altitude warning system" must at least warn the crew : 1- when approaching the pre-selected altitude 2- when the airplane is approaching the ground too fast 3- in case of a given deviation above or below the pre-selected altitude (at least by an aural warning) 4- in case of excessive vertical speed 5- when approaching the ground with the gear retracted The c

- **a** 2, 4, 5
- **b** 1, 2, 3, 4, 5
- **c** **1, 3**
- **d** 1, 3, 4

345 id 5037 — The purpose of the altitude alert system is to generate a visual and aural warning to the pilot when the:

- **a** **airplane altitude differs from a selected altitude.**
- **b** airplane altitude is equal to the decision altitude.
- **c** proximity to the ground becomes dangerous.
- **d** altimeter setting differs from the standard setting above the transition altitude.

22.03.03. Ground proximity warning system (GPWS)

346
id 4236

The operation of the GPWS (Ground Proximity Warning System) is governed by laws taking the aircraft height into account as well as : 1- the descent rate 2- the climb rate 3- the aircraft configuration 4- the selected engine rpm The combination of correct statements is :

a 2,4

b 1,2,4

c **1,3**

d 2,3

347
id 4344

The Ground Proximity Warning System (GPWS) generates the following sound signal or signals when the aircraft is sinking after a take-off or a go-around :

a DON'T SINK always followed by WHOOP WHOOP PULL UP

b WHOOP WHOOP PULL UP repetitive only

c **DON'T SINK repetitive only**

d DON'T SINK followed by WHOOP WHOOP PULL UP if the sink rate overshoots a second level

348
id 4349

A ground proximity warning system (GPWS), when mandatorily installed on board an aircraft, must in all cases generate :

a a sound and visual alarm

b a sound alarm or a visual alarm

c **at least one sound alarm to which a visual alarm can be added**

d a visual alarm to which a sound alarm can be

349
id 4407

A Ground Proximity Warning System (GPWS) generates automatically a distinct warning to the flight crew with aural and/or light warning signals in the case of: 1- an excessive rate of descent with respect to terrain 2- a dangerous proximity to the ground 3- a loss of altitude following take-off or go-around 4- an abnormal flight attitude 5- an abnormal landing configura

a 1,2 and 4.

b 1, 2, 3, 4 and 5.

c **1, 2, 3, 5 and 6.**

d 3, 4, 5 and 6.

350
id 4596

A transport airplane is compelled to carry on board a Ground Proximity Warning System (GPWS). This system will warn the crew in case of : 1 - keeping the altitude at a lower level than the one shown in the flight plan entered in the FMS. 2 - dangerous ground proximity. 3 - loss of altitude during take-off or missed approach. 4 - wrong landing configuration. 5 - descen

a 1,3,4

b 2

c **2,3,4,5**

d 2,5

351
id 4601

The Ground Proximity Warning System (GPWS) is a system working according to a height span ranging from :

a the ground to 1 000 ft

b **50 ft to 2 500 ft**

c 30 ft to 5 000 ft

d the ground to 500 ft

352 id 4617 The GPWS calculator receives the following signals : 1 - vertical speed 2 - radio altimeter height 3 - pressure altitude 4 - glidepath deviation 5 - gear and flaps position 6 - angle of attack The combination regrouping all the correct statements is :

a 2,3,4,6

b 1,3,4,5,6

c 1,2,5,6

d **1,2,4,5**

---

353 id 4618 The GPWS calculator is able to operate in the following modes : 1- excessive descent rate 2- excessive rate of terrain closure 3- excessive angle of attack 4- too high descent attitude 5- loss of altitude after take-off 6- abnormal gear/flaps configuration 7- excessive glidepath deviation The combination regrouping all the correct statements is:

a **1,2,5,6,7**

b 1,2,4,6,7

c 3,4,5,6

d 2,3,5,7

---

354 id 4619 The GPWS (Ground Proximity Warning System) is active for a height range from:

a 0 ft to 2 500 ft measured by the radio altimeter.

b **50 ft to 2 500 ft measured by the radio altimeter.**

c 0 ft to 5 000 ft measured by the radio altimeter.

d 50 ft to 5 000 ft measured by the radio altimeter.

---

355 id 4809 The GPWS (Ground Proximity Warning System) releases a warning in the following cases : 1- excessive rate of descent 2- excessive ground proximity rate 3- loss of altitude after take-off or go-around 4- abnormal gear/flaps configuration 5- excessive deviation under the glidepath 6- abnormal airbrakes configuration The combination regrouping all the correct sta

a 1, 2, 3, 4, 5, 6

b 2, 4, 5, 6

c **1, 2, 3, 4, 5**

d 3, 4, 5, 6

---

356 id 4882 The requirement to carry a GPWS (Ground Proximity Warning System) concerns aeroplanes which are, depending on their age, weight and passenger capacity : 1- turboprop-powered 2- piston-powered 3- jet-powered The combination regrouping all the correct statements is :

a 3

b 1

c 1, 2, 3

d **1, 3**

357 id 5046 The inputs to the GPWS (Ground Proximity Warning System), are: 1- Air Data Computer - (Mach number and Vertical Speed) 2- Radio Altimeter 3- NAV/ILS (Glide Slope) 4- NAV/VOR 5- Flap (position) 6- Angle of Attack 7- Landing Gear (position) The combination of correct statement is:

- **a** **1,2,3,5,7**
- **b** 2,3,4,5,7
- **c** 1,2,5,6,7
- **d** 1,3,5,6,7

358 id 5047 If an aircraft is flying (with flaps and landing gear retracted) in proximity to terrain and its GPWS (Ground Proximity Warning System) get activated, because it is detecting that the aeroplane has an excessive rate of descent, the system provides the following aural warning signals :

- **a** "DON'T SINK, DON'T SINK"
- **b** **"SINK RATE, SINK RATE" followed by "WHOOP WHOOP PULL UP" (twice)**
- **c** "TERRAIN, TERRAIN" followed by "WHOOP WHOOP PULL UP" (twice)
- **d** "TOO LOW, TERRAIN" (twice) followed by "TOO LOW GEAR" (twice)

359 id 5048 If the GPWS (Ground Proximity Warning System) activates, and alerts the pilot with an aural warning "DON'T SINK" (twice times), it is because :

- **a** **during take-off or missed approach manoeuvre, the aircraft has started to loose altitude.**
- **b** the aircraft experiences an unexpected proximity to the terrain, with landing gear retracted.
- **c** at too low altitude, the aircraft has an excessive rate of descent.
- **d** the aircraft experiences an unexpected proximity to terrain, without landing-flap selected.

360 id 6085 The Ground Proximity Warning Systems (GWPS) Mode 1 is activated when

- **a** an excessive height loss is experienced after take-off or during go-around.
- **b** **the barometric descent rate is excessive with respect to the aircraft height above the terrain.**
- **c** the aircraft is flying into rising terrain.
- **d** when the aircraft is significantly below the ILS glidepath.

361 id 6086 The Ground Proximity Warning Systems (GWPS) Mode 2 is activated when

- **a** an excessive height loss is experienced after take-off or during go-around.
- **b** the barometric descent rate is excessive with respect to the aircraft height above the terrain.
- **c** **the aircraft is flying into rising terrain.**
- **d** when the aircraft is significantly below the ILS glidepath.

362 id 6087 The Ground Proximity Warning Systems (GWPS) Mode 3 is activated when

- **a** **an excessive height loss is experienced after take-off or during go-around.**
- **b** the barometric descent rate is excessive with respect to the aircraft height above the terrain.
- **c** the aircraft is flying into rising terrain.
- **d** when the aircraft is significantly below the ILS glidepath.

363 The Ground Proximity Warning Systems (GWPS) Mode 4 is activated when
id 6088

a an excessive height loss is experienced after take-off or during go-around.

b **an unsafe terrain clearance situation is experienced, with the aircraft not in the landing configuration.**

c the aircraft is flying into rising terrain.

d when the aircraft is significantly below the ILS glidepath.

364 The Ground Proximity Warning Systems (GWPS) Mode 5 is activated when
id 6089

a an excessive height loss is experienced after take-off or during go-around.

b an unsafe terrain clearance situation is experienced, with the aircraft not in the landing configuration.

c the aircraft is flying into rising terrain.

d **when the aircraft is significantly below the ILS glidepath.**

22.03.04. Traffic collision avoidance system

365 The TCAS (Traffic Collision Avoidance System) is a proximity alarm system which detects a "traffic" when the conflicting traffic is equipped with a :
id 3860

a SELCAL system

b serviceable weather radar

c **serviceable SSR transponder**

d DME system

366 The TCAS 1 (Traffic Collision Avoidance System) provides : 1- traffic information 2- horizontal resolution (RA: Resolution Advisory) 3- vertical resolution (RA: Resolution Advisory) 4- ground proximity warning The combination regrouping all the correct statements is:
id 3881

a **1**

b 1, 2

c 1, 2, 3

d 1, 2, 3, 4

367 The TCAS 2 (Traffic Collision Avoidance System) provides : 1- traffic information (TA: Traffic Advisory) 2- horizontal resolution (RA: Resolution Advisory) 3- vertical resolution (RA: Resolution Advisory) 4- ground proximity warning The combination regrouping all the correct statements is:
id 3882

a 1, 2, 3, 4

b 1, 2

c 1, 2, 3

d **1, 3**

368 The use of the TCAS (Traffic Collision Avoidance System) for avoiding an aircraft in flight is now general. TCAS uses for its operation :
id 4189

a the echos of collision avoidance radar system especially installed on board

b the echos from the ground air traffic control radar system

c **the replies from the transponders of other aircraft**

d both the replies from the transponders of other aircraft and the ground-based radar echoes

369 id 4237 — Concerning the TCAS (Traffic Collision Avoidance System) :

- **a** In one of the system modes, the warning : "TOO LOW TERRAIN" is generated
- **b** **No protection is available against aircraft not equipped with a serviceable SSR transponder**
- **c** In one of the system modes, the warning : "PULL UP" is generated
- **d** Resolution Advisory (RA) must not be followed without obtaining clearance from ATC

370 id 4238 — The TCAS (Traffic Collision Avoidance System) gives avoidance resolutions :

- **a** in horizontal and vertical planes
- **b** only in the horizontal plane
- **c** **only in the vertical plane**
- **d** based on speed control

371 id 4239 — In the event of a conflict, the TCAS (Traffic Collision Avoidance System) will give information such as :

- **a** **climb/descent**
- **b** turn left/turn right
- **c** too low terrain
- **d** glide slope

372 id 4240 — The principle of the TCAS (Traffic Collision Avoidance Systems) is based on the use of :

- **a** airborne weather radar system
- **b** **transponders fitted in the aircraft**
- **c** F.M.S. (Flight Management System)
- **d** air traffic control radar systems

373 id 4795 — The TCAS (Traffic Collision Avoidance System) computer receives information : 1- about the pressure altitude through the mode S transponder 2- from the radio-altimeter 3- specific to the airplane configuration 4- from the inertial units The combination regrouping all the correct statements is:

- **a** 1, 2, 3, 4
- **b** **1, 2, 3**
- **c** 1, 2, 4
- **d** 1, 2

374 id 4807 — When the intruding aircraft is equipped with a transponder without altitude reporting capability, the TCAS (Traffic Collision Avoidance System) issues a :

- **a** "traffic advisory" and vertical "resolution advisory".
- **b** **"traffic advisory" only.**
- **c** "traffic advisory" and horizontal "resolution advisory".
- **d** "traffic advisory", vertical and horizontal "resolution advisory".

375 id 4808 — When the intruding aircraft is equipped with a serviceable mode C transponder, the TCAS II (Traffic Collision Avoidance System) generates a :

- **a** "traffic advisory" and horizontal "resolution advisory".
- **b** **"traffic advisory" and vertical "resolution advisory".**
- **c** "traffic advisory" only.
- **d** "traffic advisory", vertical and horizontal "resolution advisory".

376 On a TCAS2 (Traffic Collision Avoidance System), a corrective "resolution advisory" (RA) is a "resolution advisory":
id 4822

a which does not require any action from the pilot but on the contrary asks him not to modify his current vertical speed rate.

b **asking the pilot to modify effectively the vertical speed of his aircraft.**

c asking the pilot to modify the heading of his aircraft.

d asking the pilot to modify the speed of his aircraft.

377 On a TCAS 2 (Traffic Collision Avoidance System) the preventive "resolution advisory" (RA) is a "resolution advisory":
id 4823

a asking the pilot to modify the speed of his aircraft.

b asking the pilot to modify effectively the vertical speed of his aircraft.

c asking the pilot to modify the heading of his aircraft.

d **that advises the pilot to avoid certain deviations from the current vertical rate but does not require any change to be made to that rate.**

378 An "intruding traffic advisory" is represented on the display system of the TCAS 2 (Traffic Collision Avoidance System) by displaying :
id 4824

a a red full square.

b a blue or white empty lozenge.

c a blue or white full lozenge.

d **a yellow full circle.**

379 A "resolution advisory" (RA) is represented on the display system of the TCAS 2 (Traffic Collision Avoidance System) by a :
id 4825

a **red full square.**

b blue or white full lozenge.

c blue or white empty lozenge.

d red full circle.

380 A "close traffic advisory" is displayed on the display device of the TCAS 2 (Traffic Collision Avoidance System) by :
id 4826

a an orange full circle.

b **a blue or white empty lozenge.**

c a blue or white full lozenge.

d a red full square.

381 The TCAS II data display devices can be in the form of: 1- a specific dedicated screen 2- a screen combined with the weather radar 3- a variometer represented on a liquid crystal screen which allows the display of Traffic Advisory (TA) and Resolution Advisory (RA) 4- an EFIS (Electronic Flight Instrument System) screen The combination regrouping all the correct st
id 4932

a 1, 2 and 3.

b **1, 2, 3 and 4.**

c 3 and 4.

d 1 and 3.

382 id 5009 | A "TCAS II" (Traffic Collision Avoidance System) provides:

- **a** the intruder relative position and possibly an indication of a collision avoidance manoeuvre within both the vertical and horizontal planes.
- **b** a simple intruding airplane proximity warning.
- **c** **the intruder relative position and possibly an indication of a collision avoidance manoeuvre within the vertical plane only.**
- **d** the intruder relative position and possibly an indication of a collision avoidance manoeuvre within the horizontal plane only.

22.03.06. Stall warning

383 id 4191 | In some configurations, modern aircraft do not respect the regulatory margins between stall and natural buffet. The warning system supplies the corresponding alarm. The required margin related to the stall speed is:

- **a** 7%
- **b** **5%**
- **c** 10%
- **d** 3%

384 id 4408 | The calculator combined with the stick shaker system of a modern transport airplane receives information about the: 1- angle of attack 2- engine R.P.M. 3- configuration 4- pitch and bank attitude 5- sideslip The combination regrouping all the correct statements is:

- **a** 1, 2, 3 and 4.
- **b** 1, 2, 3, 4 and 5.
- **c** 1 and 5.
- **d** **1 and 3.**

385 id 4683 | The main input data to the Stall Warning Annunciator System are : 1- Mach Meter indication 2- Angle of Attack 3- Indicate Airspeed (IAS) 4- Aircraft configuration (Flaps/Slats) The combination regrouping all the correct statements is :

- **a** **2,4**
- **b** 2,3
- **c** 1,4
- **d** 1,2

386 id 4799 | The stall warning system receives information about the : 1- airplane angle of attack 2- airplane speed 3- airplane bank angle 4- airplane configuration 5- load factor on the airplane The combination regrouping all the correct statements is:

- **a** 1, 3, 5
- **b** 1, 2, 3, 4, 5
- **c** 2, 3, 4, 5
- **d** **1, 4**

387 id 4857 | The stick shaker calculator receives the following informations : 1- mass of the airplane 2- angle of attack 3- wing flap deflection 4- position of the landing gear 5- total air temperature 6- pressure altitude The combination regrouping all the correct statements is:

- **a** 2, 3, 5
- **b** **2, 3**
- **c** 1, 2, 3, 4
- **d** 1, 2, 3, 4, 5, 6

388 id 4931 The angle of attack transmitter provides an electric signal varying with: 1- the angular position of a wind vane 2- the deviation between the airplane flight attitude and the path calculated by the inertial unit 3- a probe differential pressure depending on the variation of the angle of attack The combination regrouping all the correct statements is:

- **a** 1, 2 and 3.
- **b** **1 and 3.**
- **c** 1.
- **d** 2 and 3.

389 id 5036 The angle of attack transmitters placed laterally on the forward part of the fuselage supply an electrical signal indicating: 1- the angular position of a wind vane 2- a differential pressure in a probe, depending on the variation of the angle of attack 3- a differential pressure in a probe, depending on the variation of the speed The combination regrouping all the co

- **a** 2, 3.
- **b** 1, 2, 3.
- **c** **1, 2.**
- **d** 1, 3.

390 id 5043 The oncoming stall of a large transport airplane appears in the form of:

- **a** **control stick vibrations simulating natural buffeting.**
- **b** an orange light on the warning display.
- **c** a natural buffeting which occurs prior to the simulated buffeting.
- **d** a bell type warning.

391 id 5045 The stall warning system of a large transport airplane includes: 1- an angle of attack sensor 2- a computer 3- a transmitter originating from the anemometer 4- an independent pitot probe 5- a transmitter of the flap/slat position indicating system The combination regrouping all the correct statements is:

- **a** 1, 2, 4.
- **b** **1, 2, 5.**
- **c** 1, 4.
- **d** 1, 2, 4, 5.

392 id 5397 A stall warning system is based on a measure of :

- **a** attitude.
- **b** airspeed.
- **c** **aerodynamic incidence.**
- **d** groundspeed.

22.03.07. Flight data recorder

393 id 1082 Flight recorder duration must be such that flight data, cockpit voice and sound warnings may respectively be recorded during at least:

- **a** 48 hours for flight data, 60 minutes for cockpit voices and warnings horns
- **b** 24 hours for flight data, 60 minutes for cockpit voices and warnings horns.
- **c** 20 hours for flight data, 15 minutes for cockpit voices and warnings horns.
- **d** **25 hours for flight data, 30 minutes for cockpit voices and warnings horns.**

394 id 4684 — In accordance with (ICAO) Annex 6 part I, the flight data recorder is to be located in the aircraft :

- **a** as near to the landing gear as practicable
- **b** as far forward as practicable
- **c** **as far to the rear as practicable**
- **d** at the right or left wing tip

395 id 4883 — The flight data recorder must start data recording automatically:

- **a** **before the airplane is able to move by under its own power.**
- **b** when taking-off.
- **c** when the landing gear is retracted.
- **d** when lining up.

396 id 4884 — The flight data recorder must automatically stop data recording when the:

- **a** main gear shock strut compresses when touching the runway.
- **b** **airplane cannot any longer move by its own power.**
- **c** landing gear is extended and locked.
- **d** airplane clears the runway.

397 id 4895 — Except for airplanes under 5,7 t airworthiness certificate of which is subsequent to 31 march 1998, a flight data recording system must be able to store the recorded data for a minimum of the last :

- **a** **25 hours.**
- **b** 10 hours.
- **c** 30 minutes.
- **d** 60 minutes.

22.03.08. Cockpit voice recorder

398 id 4604 — According to the JAR-OPS regulations, the Cockpit Voice Recorder of a 50 seat multi-engined aircraft having been granted the airworthiness certificate after 1st April 1998 will record: 1- the radiotelephonic communications transmitted or received by the cockpit crew 2- the audio environment of the cockpit 3- the cabin attendants communications in the cabin via the interphone

- **a** **1,2,4,5,6**
- **b** 1,2,3,4,5,6
- **c** 1
- **d** 1,3,4,5

399 id 4605 — According to the JAR-OPS regulations, the Cockpit Voice Recorder of a 50 seat multi-engined aircraft, having been granted an airworthiness certificate after 1st April 1998, shall start recording :

- **a** From the first radio contact with Air Traffic Control until radio shutdown after the flight.
- **b** Automatically when the wheels leave the ground until the moment when the wheels touch the ground again.
- **c** **Automatically prior to the aircraft moving under its own power until flight completion when the aircraft is no longer able to move under its own power.**
- **d** When the pilot selects the "CVR: ON" during engine start until the pilot selects the "CVR: OFF" during the engine shut down.

400
id 4861

The CVR (Cockpit Voice Recorder) includes: 1. a microphone 2. a recorder in compliance with the shock and fire resistance standards 3. an independent battery 4. a flight data recorder The combination regrouping all the correct statements is:

a 1, 4

b **1, 2**

c 1, 2, 3, 4

d 2, 4

401
id 4867

A cockpit voice recorder (CVR) will record : 1. the information exchanged by the cabin crew 2. the conversations between the crew members and voice communications transmitted from or received on the flight deck by radio 3. the announcements made via the public address even if it has not been selected 4. the conversations and alarms audible in the cockpit 5. the captain

a 1, 5

b 3, 4

c 1, 2

d **2, 4**

402
id 5044

The voice recorder records on four different channels the following information: 1- aural warnings 2- radio communications 3- conversations between the crew members through the cockpit interphone 4- announcements to the passengers The combination regrouping all the correct statements is:

a 1, 3.

b **1, 2, 3, 4.**

c 1, 4.

d 1, 2, 3.

403
id 5416

The flight data recorders must preserve the conversation and aural warnings of the last :

a 25 hours of operation

b **30 minutes of operation**

c flight

d 48 hours of operation

22.04. POWER PLANT AND SYSTEM MONIT. INSTR.

22.04.01. Pressure gauge

404 id 3016 — The "Bourdon tube" is used to measure :

- **a** **pressure.**
- **b** temperature.
- **c** quantity.
- **d** a flow rate.

405 id 3404 — If a manifold pressure gauge consistently registers atmospheric pressure, the cause is probably;

- **a** ice in induction system.
- **b** too high float level.
- **c** fuel of too low volatility.
- **d** **leak in pressure gauge line.**

406 id 3405 — A manifold pressure gauge of a piston engine measures :

- **a** absolute airpressure entering the carburettor.
- **b** **absolute pressure in intake system near the inlet valve.**
- **c** fuel pressure leaving the carburettor.
- **d** vacuum in the carburettor.

407 id 4188 — Different pressure sensors are used according to the intensity of the pressure measured (low, medium or high) Classify the following sensors by order of increasing pressure for which they are suitable : 1- bellows type 2- Bourdon tube type 3- aneroid capsule type

- **a** **3,1,2**
- **b** 1,2,3
- **c** 3,2,1
- **d** 2,1,3

408 id 5025 — The pressure probe used to measure the pressure of a low pressure fuel pump is:

- **a** a Bourdon tube.
- **b** a bellows sensor.
- **c** **an aneroid capsule.**
- **d** a differential capsule.

409 id 5026 — The probe used to measure the air intake pressure of a gas turbine engined powerplant is:

- **a** **an aneroid capsule.**
- **b** a differential capsule.
- **c** a Bourdon tube.
- **d** a bellows sensor.

410 Among the following engine instruments, the one operating with an aneroid pressure diaphragm is the :
id 5402

a oil pressure gauge.

b **manifold pressure gauge.**

c fuel pressure gauge.

d oil thermometer.

---

411 A "Bourdon Tube" is used in:
id 5429

a vibration detectors

b **pressure sensors**

c smoke detectors

d turbine temperature probes

---

412 Absolute pressure is
id 6051

a the difference between two pressures

b the amount the pressure has been raised with reference to a initial level

c **measured from zero pressure (vacuum)**

d pressure in a confined area

---

413 The manifold pressure gauge measures
id 6052

a **absolute pressure**

b differential pressure

c gauge pressure

d relative pressure

---

414 In a mechanical oil pressure gauge the sensing element is
id 6053

a an aneroid wafer

b **a bourdon tube**

c a liquid capillary

d a helical bimetallic spring

22.04.02. Temperature gauge

---

415 A thermocouple type thermometer consists of:
id 2291

a two metal conductors of the same type connected at two points.

b **two metal conductors of different type connected at one point.**

c a Wheatstone bridge connected to a voltage indicator.

d a single-wire metal winding.

---

416 The yellow sector of the temperature gauge corresponds to:
id 2296

a a frequent operating range.

b a normal operating range.

c **an exceptional operating range.**

d a forbidden operating range.

417 id 2297 — The white sector of the arc of a temperature gauge corresponds to:

- **a** a forbidden operating range.
- **b** a normal operating range.
- **c** an exceptional operating range.
- **d** **a special operating range.**

418 id 3017 — Given : M is the Mach number Ts is the static temperature Tt is the total temperature

- **a** Ts = Tt.(1+0.2. M^2)
- **b** **Ts = Tt /(1+0.2. M^2)**
- **c** Ts = Tt.(0.2. M^2)
- **d** Ts = Tt/(0.2 M^2)

419 id 3025 — The total air temperature (TAT) is always :

- **a** lower than Static Air Temperature (SAT) depending on the Calibrated Air Speed (CAS).
- **b** **higher than Static Air Temperature (SAT) depending on the Calibrated Air Speed (CAS).**
- **c** higher than Static Air Temperature (SAT) depending on the altitude.
- **d** lower than Static Air Temperature (SAT) depending on the altitude.

420 id 3026 — The static air temperature (SAT) is :

- **a** a relative temperature expressed in degrees Celsius
- **b** a differential temperature expressed in degrees Kelvin
- **c** **an absolute temperature expressed in degrees Celsius**
- **d** a relative temperature expressed in degrees Kelvin

421 id 3587 — In order to measure temperature the cylinder head temperature (CHT) gauge utilises a :

- **a** bourdon tube.
- **b** wheatstone bridge circuit.
- **c** ratiometer circuit.
- **d** **thermocouple consisting of two dissimilar metals.**

422 id 4013 — In transport airplanes, the temperatures are generally measured with : 1- resistance thermometers 2- thermocouple thermometers 3- reactance thermometers 4- capacitance thermometers 5- mercury thermometers The combination regrouping all the correct statements is :

- **a** 2, 3
- **b** 1, 3, 4, 5
- **c** 1, 2, 5
- **d** **1, 2**

423 id 4593 — The temperature measured by the CHT (Cylinder Head temperature) probe is the :

- **a** temperature of the exhaust gases.
- **b** average temperature within the whole set of cylinders.
- **c** **temperature within the hottest cylinder, depending on its position in the engine block.**
- **d** temperature of the carburator to be monitored when the outside air temperature is between -5°C and 10°C.

424 id 4836 The sensors used to measure the exhaust gas temperature on an airplane equipped with turbojets are:

- **a** based on metallic parts whose expansion/contraction is measured.
- **b** **thermocouples.**
- **c** based on metallic conductors whose resistance increases linearly with temperature.
- **d** capacitors whose capacity varies proportionnally with temperature.

---

425 id 4837 The measurement of the turbine temperature or of the EGT (Exhaust Gas Temperature) is carried out at the :

- **a** high pressure chamber intake.
- **b** combustion chamber outlet.
- **c** combustion chamber intake.
- **d** **high pressure turbine outlet.**

---

426 id 4877 The airplane outside air temperature "probe" measures the :

- **a** "total" air temperature minus compressibility effects in order to obtain the static temperature.
- **b** "static" air temperature minus kinetic heating effects in order to obtain the total temperature.
- **c** **"total" air temperature minus kinetic heating effects in order to obtain the static temperature.**
- **d** "static" air temperature minus compressibility effects in order to obtain the total temperature.

---

427 id 5027 The main advantage of a ratiometer-type temperature indicator is that it:

- **a** can operate without an electrical power supply.
- **b** is simple.
- **c** **carries out an independent measurement of the supply voltage.**
- **d** is very accurate.

---

428 id 5028 A millivoltmeter measuring the electromotive force between the "hot junction" and the "cold junction" of a thermocouple can be directly graduated in temperature values provided that the temperature of the:

- **a** hot junction is maintained constant.
- **b** **cold junction is maintained constant.**
- **c** cold junction is maintained at 15 °C.
- **d** hot junction is maintained at 15 °C.

---

429 id 5029 The electromotive force of a thermocouple is not modified if one or several intermediate metals are inserted in the circuit provided that:

- **a** these metals are not the same as those constituting the thermocouple.
- **b** **contact points are maintained at equal temperature between these different metals.**
- **c** these metals are maintained at a temperature higher than that of the cold source.
- **d** these metals are maintained at a temperature lower than that of the cold source.

---

430 id 5415 A thermocouple can be made of:

- **a** a single wire coil.
- **b** two metal conductors of the same nature fixed together at two points.
- **c** a three wire coil.
- **d** **two metal conductors of different nature fixed together at two points.**

431 id 5420 | To permit turbine exit temperatures to be measured, gas turbines are equipped with thermometers which work on the following principle:

a bi-metallic strip
b **thermocouple**
c liquid expansion
d gas pressure

432 id 6054 | Non-electrical temperature measurements may be done by

a expansion of a liquid
b expansion of a solid
c expansion of a gas
d **all of the above**

433 id 6055 | The measurement of exhaust gas temperature (EGT) is normally based upon the principle of

a **voltage generation in a thermocouple**
b expansion of a liquid in a capillary
c the tension in a helical bimetallic spring
d expansion of a solid

434 id 6073 | Iron and brass are commonly used in bimetallic thermometers, because

a they have two different weights.
b they have two different values of flexional strength.
c they have two different electrical resistance's when the temperature changes.
d **they have two different coefficients of linear expansion.**

435 id 6074 | Which of these statements is true?

a **The probes used for SAT measurements have a recovery factor of 0.75 to 0.90, while the probes used for TAT measurements have a recovery factor of around 1.00.**
b The probes used for SAT measurements have a recovery factor of around 1.00.
c The probes used for TAT measurements are directly connected to the temperature indicator instruments.
d The probes used for SAT measurements have a recovery factor ranging from 75 to 90 percent.

22.04.03. RPM indicator

436 id 2292 | The disadvantage of an electronic rpm indicator is the :

a **necessity of providing a power supply source.**
b generation of spurious signals at the commutator.
c influence of temperature on the indication.
d high influence of line resistance on the indication.

437 id 2295 | A synchroscope is used on aircraft to:

a **set several engines to the same speed.**
b reduce the vibration of each engine.
c reduce the rpm of each engine.
d achieve optimum control of on-board voltages.

438 id 3861 The signal supplied by a transmitter fitted with a 3-phase AC generator, connected to RPM indicator, is :

a an AC voltage varying with the RPM; the indicator rectifies the signal via a diode bridge and is provided with a voltmeter

b a DC voltage varying with the RPM; the indicator is a plain voltmeter with a rev/min. scale

c an AC voltage, the frequency of which varies with the RPM; the indicator converts the signal into square pulses which are then counted

d **a three-phase voltage, the frequency of which varies with the RPM; the indicator is provided with a motor which drives a magnetic tachometer**

---

439 id 3862 The signal supplied by a transmitter fitted with a magnetic sensor, connected to an RPM indicator is :

a a three-phase voltage frequency varies with the RPM; the indicator is provided with a motor which drives a magnetic tachometer

b **an AC voltage, the frequency of which varies with the RPM; the indicator converts the signal into square pulses which are then counted**

c a DC voltage varying with the RPM ; the indicator is a simple voltmeter with a rev/min. scale

d an AC voltage varying with the RPM ; the indicator rectifies the signal via a diode bridge and is provided with a voltmeter

---

440 id 4187 The RPM indicator (or tachometer) of a piston engine can include a small red arc within the arc normally used (green arc) In the RPM range corresponding to this small red arc the :

a rating is the minimum usable in cruise

b rating is the maximum possible in continuous mode

c **propoller generates vibration, continuous rating is forbidden**

d propeller efficency is minimum at this rating

---

441 id 4234 The transmitter of RPM indicator may consist of : 1- a magnetic sensor supplying an induced AC voltage 2- a DC generator supplying a DC voltage 3- a single-phase AC generator supplying an AC voltage 4- a three-phase AC generator supplying a three-phase voltage The combination of correct statements is :

a 2,3,4

b **1,2,3,4**

c 1,4

d 1,2,3

---

442 id 4835 The red pointer which is normally on the red line on the EGT (Exhaust Gas Temperature) indicators:

a shows the limit value not to be exceeded.

b **moves when the corresponding value is exceeded and remains positioned at the maximum value that has been reached.**

c allows the display of the parameter value to be adopted during take-off.

d shows the vibration level of the engine under consideration.

443
id 4865

In a 3-phase synchronous motor type tachometer indicator : 1- the transmitter is a direct current generator 2- the voltage is proportional to the transmitter drive speed 3- the frequency is proportional to the transmitter drive speed 4- the speed indicating element is a galvanometer 5. the speed indicating element is an asynchronous motor driving a magnetic tachometer

a 1, 4

b 1, 2

c 2, 5

d **3, 5**

444
id 4872

The operating principle of an "electronic" tachometer is to measure the:

a rotation speed of an asynchronous motor energized by an alternator.

b electromotive force (EMF) produced by a dynamo or an alternator.

c **frequency of the electric impulse created by a notched wheel rotating in a magnetic field.**

d magnetic field produced by a dynamo or an alternator.

445
id 4873

The operating principle of the "induction" type of tachometer is to measure the:

a electromotive force (EMF) produced by a dynamo or an alternator.

b **rotation speed of an asynchronous motor energized by an alternator.**

c frequency of the electric impulse created by a notched wheel rotating in a magnetic field.

d magnetic field produced by a dynamo or an alternator.

446
id 5033

The advantages of an electrical induction tachometer are: 1- the display is not sensitive to line resistance 2- the measurement is independent of aircraft power supply 3- the measurement is independent of temperature variations 4- the option to use without restriction several indicators connected in parallel to a single transmitter The combination regrouping all th

a **1, 2, 4.**

b 1, 3, 4.

c 1, 2, 3, 4.

d 2, 3, 4.

447
id 5034

The electronic tachometer sensor is composed of:

a the rotor of a three-phase A.C. generator.

b a circular magnet with four poles.

c the rotor of a single phase A.C. generator.

d **a notched wheel rotating in front of an electro-magnet.**

448
id 5038

The advantages of a D.C. generator tachometer are: 1- easy transmission of the information. 2- independence of the information relative to the airborne electrical power supply. 3- freedom from any spurious current due to the commutator. The combination regrouping all the correct statements is:

a 1, 3.

b 1, 2, 3.

c 2, 3.

d **1, 2.**

449 id 5039 The advantages of single-phase A.C. generator tachometer are: 1- the suppression of spurious signals due to a D.C. generator commutator 2- the importance of line resistance on the information value 3- the independence of the information in relation to the airborne electrical power supply 4- the ease of transmission of the information The combination regrouping all

- **a** 2, 4.
- **b** 1, 2, 3, 4.
- **c** 2, 3, 4.
- **d** **1, 3.**

---

450 id 5040 The disadvantages of a single-phase A.C. generator tachometer are: 1- the presence of spurious signals due to a D.C. generator commutator 2- the importance of line resistance on the information value 3- the influence of temperature on the tachometer information The combination regrouping all the correct statements is:

- **a** 1, 2.
- **b** 1, 2, 3.
- **c** **2.**
- **d** 1, 3.

---

451 id 5396 On an aeroplane equipped with a constant speed propeller, the RPM indicator enables :

- **a** selection of engine RPM.
- **b** control of power.
- **c** **control of the propeller regulator and the display of propeller RPM.**
- **d** on a twin-engine aeroplane, automatic engine synchronisation.

22.04.04. Consumption gauge

452 id 5032 When compared with the volumetric fuel flowmeter, the mass fuel flowmeter takes into account the fuel :

- **a** temperature.
- **b** **density.**
- **c** pressure.
- **d** dielectrical constant.

---

453 id 5405 A paddle-wheel placed in a the fuel circuit of a gas turbine engine initially measures:

- **a** mass flow by a tally of the impulses
- **b** **volumetric flow by a tally of the impulses**
- **c** volumetric flow by measure of a voltage proportional to the rotational speed
- **d** mass flow by measure of a voltage proportional to the rotational speed

---

454 id 5422 The operating principle of Flowmeters, or "unit flow meters," the most commonly used at the present time, is to measure across their system the :

- **a** volume and viscosity of the fuel
- **b** pressure and temperature of the fuel
- **c** volumetric mass and di-electric resistance of the fuel
- **d** **quantity of fuel movement**

22.04.05. Fuel gauge

455 id 2293 — The principle of capacity gauges is based on the:

- **a** capacitance variation by the volume measurement carried out on the sensor.
- **b** current variation in the Wheatstone bridge.
- **c** **capacitance variation of a given capacitor with the type of dielectric.**
- **d** flow rate and torque variation occurring in a supply line.

456 id 4235 — The indication of a fuel float gauge varies with : 1- aircraft attitude 2- accelerations 3- atmospheric pressure 4- temperature The combination of correct statements is :

- **a** 1,2,3,4
- **b** **1,2,4**
- **c** 4
- **d** 1,2

457 id 4830 — The float type fuel gauges provide information on:

- **a** mass whose indication is independent of the temperature of the fuel.
- **b** volume whose indication is independent of the temperature of the fuel.
- **c** mass whose indication varies with the temperature of the fuel.
- **d** **volume whose indication varies with the temperature of the fuel.**

458 id 4831 — The capacity fuel gauges provide information:

- **a** on mass whose indication varies with the temperature of the fuel.
- **b** **on mass whose indication is independent of the temperature of the fuel.**
- **c** which is independent of the temperature of the fuel.
- **d** which varies with the temperature of the fuel.

459 id 4869 — The advantages of an "electric" fuel (float) gauge are : 1- easy construction 2- independence of indications with regard to airplane attitude 3- independence of indications with regard to the accelerations 4- independence of indications with regard to temperature variations 5- independence of indications with regard to vibrations The combination regrouping all

- **a** **1**
- **b** 1, 2, 3, 4, 5
- **c** 2, 3, 4, 5
- **d** 2, 3, 4

460 id 4870 — The disavantages of an "electric" fuel (float) gauge are : 1- the design is complex 2- the indications are influenced by the airplane attitude variations 3- the indications are influenced by the accelerations 4- the indications are influenced by temperature variations 5- that an alternative current supply is necessary The combination regrouping all the correct

- **a** 2, 3, 4, 5
- **b** 1, 2, 3, 4
- **c** **2, 3, 4**
- **d** 1

461 id 4871 | In an average or heavy weight transport airplane, generally, the fuel quantity is measured by "capacitor" gauges because these give : 1- indications partly independent of fuel temperature variations 2- indications almost independent of the airplane's attitude and accelerations 3- indications expressed in density The combination regrouping all the correct statements i

a 2

b 1, 2, 3

c **1, 2**

d 1, 3

462 id 4893 | The basic principle used for measuring a quantity of fuel in a transport airplane equipped with "capacitor" gauges is that the:

a internal resistance of a capacity depends on the nature of the dielectric in which it is immersed.

b **capacity of a capacitor depends on the nature of the dielectric in which it is immersed.**

c capacity of a capacitor depends on the distance between its plates.

d electromotive force of a capacity depends on the nature of the dielectric in which it is immersed.

463 id 4898 | If the tanks of your airplane only contain water, the capacitor gauges indicate:

a a mass equal to the mass of a same volume of fuel.

b the exact mass of water contained in the tanks.

c a mass equal to zero.

d **a mass of water different from zero, but inaccurate.**

464 id 5030 | The advantages of an electric float gauge are: 1- ease of manufacture 2- independence of the indication relative to the variations of the aircraft power system if the measurement is made by a ratiometer 3- independence of the indication relative to the variations of the aircraft power system if the measurement is made by a galvanometer 4- independence of the indication re

a 1, 3, 4

b 1, 2, 3, 4

c **1, 2, 4**

d 2, 3, 4

465 id 5031 | The gauge indicating the quantity of fuel measured by a capacity gauging system can be graduated directly in weight units because the dielectric constant of fuel is:

a **twice that of air and varies directly with density.**

b the same as that of air and varies directly with density.

c twice that of air and varies inversely with density.

d the same as that of air and varies inversely with density.

466 id 5404 | The principle of capacitor gauges is based on:

a the variation of capacity by volumetric measurement exercised on the sensor

b the current variation in a Wheastone bridge

c **the variation in capacity of a condensor with the nature of the dielectric**

d the variation of flow and torque exercised in a supply line

467 id 5421 | The quantity of fuel in the tanks is measured by capacitor type contents gauges. The working principle of these sensors is to measure the :

a **charge of condensors**

b di-electric resistivity of the fuel

c height of the fuel

d volume of the fuel

22.04.06. Torque meter

468 id 5400 | Torque can be determined by measuring the :

a **oil pressure at the fixed crown of an epicycloidal reducer of the main engine gearbox.**

b phase difference between 2 impulse tachometers attached to a transmission shaft.

c frequency of an impulse tachometer attached to a transmission shaft.

d quantity of light passing through a rack-wheel attached to a transmission shaft.

22.04.08. Vibration monitoring

469 id 2294 | The principle of detection of a vibration monitoring system is based on the use of:

a **2 accelerometers.**

b 2 high and low frequency amplifiers.

c 2 high and low frequency filters.

d a frequency converter.

470 id 3483 | In an engine vibration monitoring system for a turbojet any vibration produced by the engine is :

a inversely proportional to engine speed.

b **amplified and filtered before being fed to the cockpit indicator.**

c directly proportional to engine speed.

d fed directly to the cockpit indicator without amplification or filtering.

471 id 4232 | A vibration indicator receives a signal from different sensors (accelerometers). It indicates the :

a **vibration amplitude at a given frequency**

b acceleration measured by the sensors, expressed in g

c vibration frequency expressed in Hz

d vibration period expressed in seconds

22.04.10. Electronic Displays

472 id 5041 | In a modern airplane equipped with an ECAM (Electronic centralized aircraft monitor), when a failure occurs in a circuit, the centralized flight management system: 1- releases an aural warning 2- lights up the appropriate push-buttons on the overhead panel 3- displays the relevant circuit on the system display 4- processes the failure automatically The combination

a 1, 3, 4.

b **1, 2, 3.**

c 3, 4.

d 1, 2.