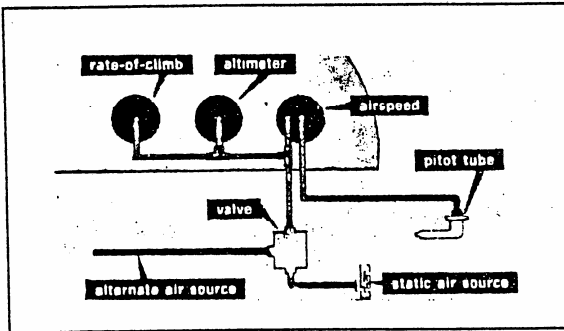




Aircraft Instruments



Pitot Static System

The pitot tube provides information to the airspeed indicator only. The static vent provides information to the airspeed indicator, altimeter and vertical speed indicator.

If the pitot tube and drain hole get blocked the airspeed indicator will react like an altimeter. In level flight, LAS remains the same as it was prior to blockage, and no variation in IAS will occur. Once a climb is established, the indicated airspeed will increase.

If the static vent becomes blocked, the vertical speed indicator will remain at zero.

If you switch to an alternate static source within the aircraft (where the pressure is less) the lower static pressure will cause the LAS to read higher, the altimeter to read higher, and the vertical speed indicator (VSI) to show a momentary climb.

Airspeed Indicator (Cont)

Indicated airspeed (IAS) is the direct reading you obtain from the airspeed indicator, uncorrected for atmospheric density or instrument error.

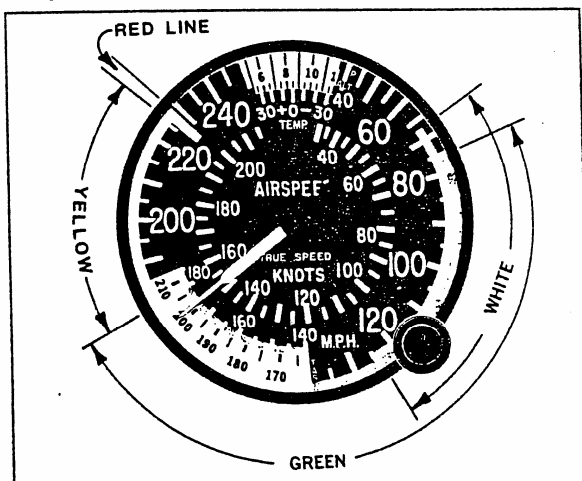
Calibrated airspeed (CAS) is the indicated airspeed corrected for installation and instrument errors.

True airspeed (TAS) is your actual speed, and is found on a flight computer by matching pressure altitude with temperature, then reading TAS on the outer scale opposite CAS on the middle scale.

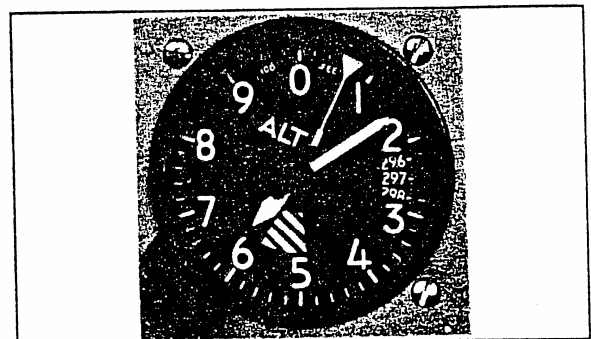
A Mach meter indicates ratio of TAS to speed of sound. (.90 Mach = 90% speed of sound.)

Maneuvering speed is the "rough air" speed and maximum speed for abrupt maneuvers. It is slower than cruising speed so the amount of excess load that can be imposed on the wing will be decreased.

Airspeed Indicator



Altimeter



Indicated altitude is the direct reading from the altimeter, and shows the height in relation to the pressure level set in the barometric window. If

the current altimeter setting is in the window, the altimeter should read the field elevation (true altitude) while on the ground.

True altitude is your actual altitude above sea level. This is computed on the flight computer.

Pressure altitude is indicated any time 29.92 is set in the Kollsman window. Use 29.92 as a standard setting when above 18,000 MSL. Pressure altitude equals true altitude whenever standard conditions exist.



Altimeter (Cont)

Density altitude is pressure altitude corrected for non-standard temperature, and is used to determine aircraft performance. Pressure altitude and density altitude are equal at standard temperature.

The local altimeter setting should be used by all pilots in a particular area to provide for better vertical separation of aircraft.

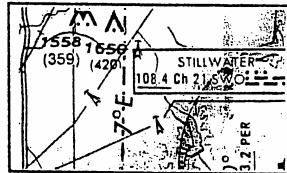
If the local altimeter setting is not available before takeoff, set the altimeter to the airport elevation. In flight, ATC will periodically advise you of the proper altimeter setting.

If you fly from HIGH to LOW and do not set in the new altimeter setting, or into lower than standard temperatures, look out below. Your altimeter indicates higher than you actually are.

If you have the wrong altimeter setting in the Kollsman window, your altimeter will read incorrectly at the rate of 1 inch per 1000 feet. As you increase the Kollsman window setting one inch, indicated altitude increases 1000 feet.

Magnetic Compass

Magnetic variation is the angle between true and magnetic north, and is found on the enroute low altitude charts, and also listed in the Airport/Facility Directory.



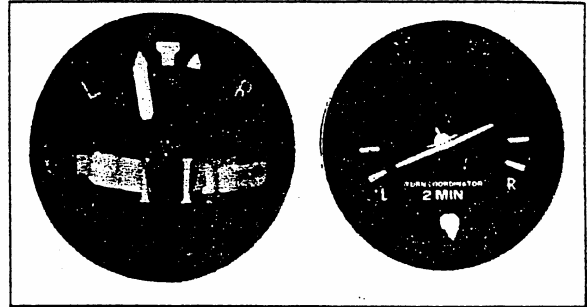
Deviation is the angle between magnetic north and compass north, caused by metals and electrical systems within the aircraft.

Errors (caused by magnetic dip) are:

TURNING ERROR - Turning on a southerly heading (091 degrees to 269 degrees) in either direction, the compass will lead your turn. Turning on any northerly heading (271 degrees to 089 degrees), the compass will turn in the opposite direction then lag your turn. There are no turning errors on headings of east and west.

ACCELERATION ERROR - On an easterly or westerly heading, if you accelerate, the compass turns north; if you decelerate, it turns south. There are no acceleration - deceleration errors on headings of north or south.

Turn & Slip And Turn Coordinator



The standard rate of turn is 3 degrees per second. A 360 degree turn will take 2 minutes. A half-standard rate turn will take 4 minutes.

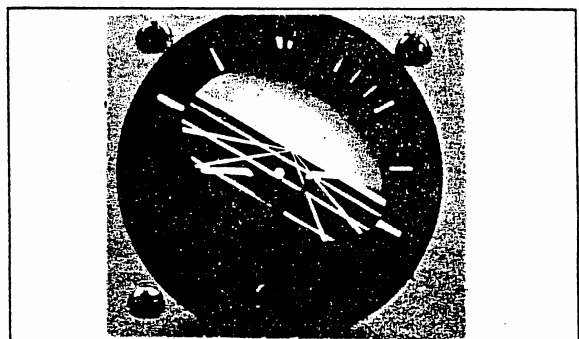
Turn and slip indicators show rate of turn and coordination.

Turn coordinators show roll rate, rate of turn, coordination, and an indirect indication of bank.

The ball shows quality of turn, and skids to the outside of the turn, or slips to the inside of the turn. The position of the ball has no effect on the accuracy of the needle.

The horizontal component of lift (always equal to centrifugal force) causes the airplane to turn, and determines rate of turn. Radius of turn can be decreased, and rate of turn increased by decreasing airspeed and increasing bank.

Attitude Indicator



Centrifugal force during turns, especially skidding turns, will cause errors of 5 degrees bank and slight nose-up pitch after 180 degrees of turn. After a 180 degree turn to the right, if the airplane is rolled out to straight-and-level by visual references, the miniature aircraft will show a slight climb and a turn to the left.



Attitude Indicator (Cont)

Acceleration will cause some attitude indicators to precess and incorrectly indicate a climb, and deceleration will indicate a descent.

Preflight Engine And Instrument Indications

Prior to electrical power being turned on:

- Turn and Slip - make sure the needle is centered and the tube full of fluid.
- Magnetic Compass - check the approximate magnetic heading and the amount of fluid.

Listen for any unusual or irregular mechanical noises when electrical power first is turned on.

Pre-takeoff indications should be:

- VSI - if the needle is not zeroed (100FPM), use this as your zero indication.
- Altimeter - with correct altimeter setting, it should show within 75 feet of airport elevation.
- Magnetic Compass - card should swing freely.
- Turn and Slip - the ball moves freely opposite the turn, and the needle deflects in the direction of the turn.
- Heading indicator - set the indicator and check for proper alignment after taxi turns.
- Attitude Indicator - the horizon bar (not miniature aircraft) should be erect and stable within 5 minutes.

Attitude Instrument Flying

The three skills used in instrument flying are (given in the correct sequence): cross-check, instrument interpretation, and aircraft control.

To level-off from a descent, lead the desired altitude by 10% of the vertical speed, or about 50 feet. Addition of power should be made 100-150 feet above the desired altitude.

if you wish to establish a climb at a slower speed, increase back elevator pressure until the attitude indicator shows the approximate pitch attitude for the climb airspeed.

Primary And Supporting instruments

Pitch instruments consist of attitude indicator, altimeter, airspeed indicator and VSI.

Bank instruments consist of attitude indicator, heading indicator, and turn coordinator. (Notice-magnetic compass not listed.)

Power instruments consist of manifold pressure or tachometer, and airspeed indicator.

A PRIMARY instrument is one that defines the quality of each maneuver, in terms of pitch, bank and power. The primary instruments for pitch, bank and power tell you if you are doing exactly what you mean to do.

SUPPORTING instruments confirm the information shown on the primary instruments, but it is the primary instruments that tell you if you are being successful.

Example: While attempting to maintain straight and level, constant airspeed flight, the altimeter is primary pitch, telling you that you are exactly on the desired altitude. The heading indicator is primary bank, showing heading. The airspeed indicator is primary power, indicating whether or not you are at your desired airspeed.

Wind Shear On The Glideslope

If a headwind shears to a calm or tailwind, aircraft pitch decreases, IAS decreases then increases, VSI increases, and you must first add thrust then reduce it. There is a tendency to go below the glideslope.

If a tailwind shears to a calm or headwind, pitch increases, IAS increases then decreases, VSI decreases, and you must decrease thrust then increase it. There is a tendency to go above the glideslope.

Unusual Attitudes

While recovering from any unusual attitudes, first adjust power; then, if you are nose-high, adjust pitch then bank. if nose-low, adjust bank, then pitch.

If recovering without the aid of your attitude indicator, determine pitch recovery by noting altitude, rate of climb, and airspeed indications. As the rate of movement of altimeter and airspeed indicator decreases, the attitude is approaching level flight. When the needles stop and reverse direction, the aircraft is passing through level flight.

4056. H814 IRA

You check the flight instruments while taxiing and find that the vertical speed indicator (VSI) indicates a descent of 100 feet per minute. In this case, you

- A) must return to the parking area and have the instrument corrected by an authorized instrument repairman.
- B) may take off and use 100 feet descent as the zero indication.**
- C) may not take off until the instrument is corrected by either the pilot or a mechanic.

4089. I22 IRA

Under what condition is pressure altitude and density altitude the same value?

- A) At standard temperature.**
- B) When the altimeter setting is 29.92" Hg.
- C) When indicated, and pressure altitudes are the same value on the altimeter.

4090. I22 IRA

Under which condition will pressure altitude be equal to true altitude?

- A) When the atmospheric pressure is 29.92" Hg.
- B) When standard atmospheric conditions exist.**
- C) When indicated altitude is equal to the pressure altitude.

4091.

Which condition would cause the altimeter to indicate a lower altitude than actually flown (true altitude)?

- A) Air temperature lower than standard.
- B) Atmospheric pressure lower than standard.
- C) Air temperature warmer than standard.**

4093.

When an altimeter is changed from 30.11" Hg to 29.96" Hg, in which direction will the indicated altitude change and by what value?

- A) Altimeter will indicate 15 feet lower.
- B) Altimeter will indicate 150 feet lower.**
- C) Altimeter will indicate 150 feet higher.

4109.

Under what condition will true altitude be lower than indicated altitude with an altimeter setting of 29.92" Hg?

- A) In warmer than standard air temperature.
- B) In colder than standard air temperature.**
- C) When density altitude is higher than indicated altitude.



4110. I22 IRA

Which of the following defines the type of altitude used when maintaining FL 210?

- A) Indicated.
- B) Pressure.**
- C) Calibrated.

4111. H808 IRA

Altimeter setting is the value to which the scale of the pressure altimeter is set so the altimeter indicates

- A) true altitude at field elevation.**
- B) pressure altitude at field elevation.
- C) pressure altitude at sea level.

4444. J26 IRA

What is the procedure for setting the altimeter when assigned an IFR altitude of 18,000 feet or higher on a direct flight off airways?

- A) Set the altimeter to 29.92" Hg before takeoff.
- B) Set the altimeter to the current • altimeter setting until reaching the assigned altitude, then set to 29.92" Hg.
- C) Set the altimeter to the current reported setting for climbout and 29.92" Hg upon reaching 18,000 feet.**

4445. J26 IRA

En route at FL 290, the altimeter is set correctly, but not reset to the local altimeter setting of 30.57" Hg during descent. If the field elevation is 650 feet and the altimeter is functioning properly, what is the approximate indication upon landing?

- A) 715 feet.
- B) 1,300 feet.
- C) Sea level.**

4446. J26 IRA

While you are flying at FL 250, you hear ATC give an altimeter setting of 28.92" Hg in your area. At what pressure altitude are you flying?

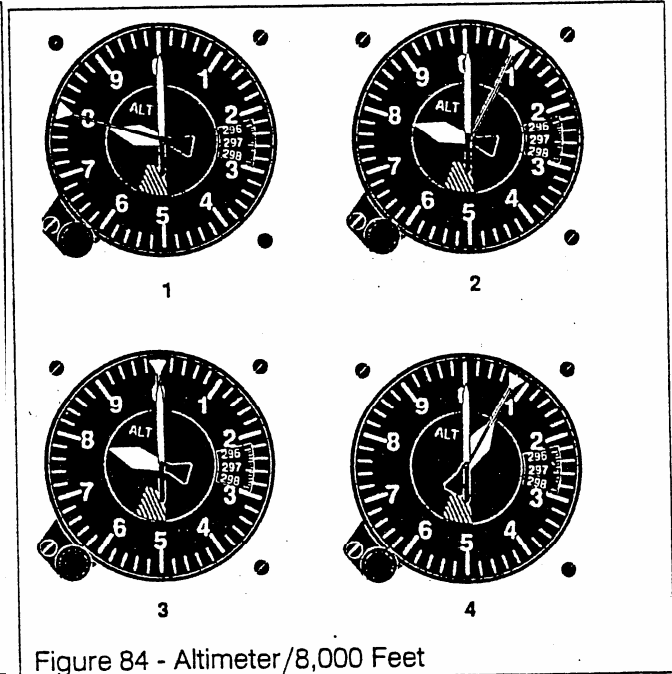
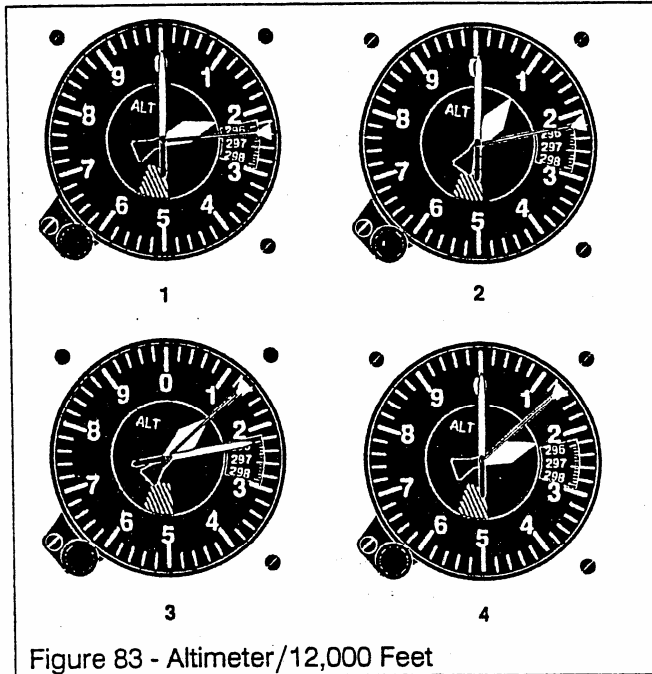
- A) 24,000 feet.
- B) 25,000 feet.**
- C) 26,000 feet.

4477. H808 IRA

How can you obtain the pressure altitude on flights below 18,000 feet?

- A) Set your altimeter to 29.92" Hg.**
- B) Use your computer to change the indicated altitude to pressure altitude.
- C) Contact an FSS and ask for the pressure altitude.

NOTE: CORRECT ANSWER IN BOLD ITALICS



4478.

How can you determine the pressure altitude at an airport without a tower or FSS?

- A) Set the altimeter to 29.92" Hg and read the altitude indicated.
- B) Set the altimeter to the current altimeter setting of a station within 100 miles and correct this indicated altitude with local temperature.
- C) Use your computer and correct the field elevation for temperature.

4479.

Which altitude is indicated when the altimeter is set to 29.92" Hg?

- A) Density.
- B) Pressure.**
- C) Standard.

4480. J26 IRA

If you are departing from an airport where you cannot obtain an altimeter setting, you should set your altimeter

- A) on 29.92" Hg.
- B) on the current airport barometric pressure, if known.
- C) the airport elevation.**

NOTE: CORRECT ANSWER IN BOLD ITALICS

4481. J26 IRA

En route at FL 290, your altimeter is set correctly, but you fail to reset it to the local altimeter setting of 30.26" Hg during descent. If the field elevation is 134 feet and your altimeter is functioning properly, what will it indicate after landing?

- A) 100 feet MSL.
- B) 474 feet MSL.
- C) 206 feet below MSL.**

4482. J26 IRA

How does a pilot normally obtain the current altimeter setting during an IFR flight in Class E airspace below 18,000 feet?

- A) The pilot should contact ARTCC at least every 100 NM and request the altimeter setting.
- B) FSS's along the route broadcast the weather information at 15 minutes past the hour.
- C) ATC periodically advises the pilot of the proper altimeter setting.**

4483. H808 IRA

(Refer to figure 83.) Which altimeter depicts 12,000 feet?

- A) 2.
- B) 3.
- C) 4.**

4484. H808 IRA

(Refer to figure 84.) Which altimeter depicts 8,000 feet?

- A) 1.
- B) 2.**
- C) 3.

4720. K04 IRA

When passing through an abrupt wind shear which involves a shift from a tailwind to a headwind, what power management would normally be required to maintain a constant indicated airspeed and ILS glide slope?

- A) Higher than normal power initially, followed by a further increase as the wind shear is encountered, then a decrease.
- B) Lower than normal power initially, followed by a further decrease as the wind shear is encountered, then an increase.**
- C) Higher than normal power initially, followed by a decrease as the shear is encountered, then an increase.

4721. I10 IRA

What effect will a change in wind direction have upon maintaining a 3° glide slope at a constant true airspeed?

- A) When groundspeed decreases, rate of descent must increase.
- B) When groundspeed increases, rate of descent must increase.**
- C) Rate of descent must be constant to remain on the glide slope.

4727. K04 IRA

While flying a 3° glide slope, a constant tailwind shears to a calm wind. Which conditions should the pilot expect?

- A) Airspeed and pitch attitude decrease and there is a tendency to go below glide slope.
- B) Airspeed and pitch attitude increase and there is a tendency to go below glide slope.
- C) Airspeed and pitch attitude increase and there is a tendency to go above glide slope.**

4739.

Thrust is managed to maintain IAS, and glide slope is being flown. What characteristics should be observed when a headwind shears to a constant tailwind?

- A) **PITCH ATTITUDE: Increases; REQUIRED THRUST: Increased, then reduced; VERTICAL SPEED: Increases; IAS: Increases, then decreases to approach speed.**
- B) PITCH ATTITUDE: Decreases; REQUIRED THRUST: Increased, then reduced; VERTICAL SPEED: Increases; IAS: Decreases, then increases to approach speed.**
- C) **PITCH ATTITUDE: Increases; REQUIRED THRUST: Reduced, then increased; VERTICAL SPEED: Decreases; IAS: Decreases, then increases to approach speed.**



4755. K04 IRA

While flying a 3° glide slope, a headwind shears to a tailwind. Which conditions should the pilot expect on the glide slope?

- A) Airspeed and pitch attitude decrease and there is a tendency to go below glide slope.**
- B) Airspeed and pitch attitude increase and there is a tendency to go above glide slope.
- C) Airspeed and pitch attitude decrease and there is a tendency to remain on the glide slope.

4756.

The glide slope and localizer are centered, but the airspeed is too fast. Which should be adjusted initially?

- A) Pitch and power.
- B) Power only.**
- C) Pitch only.

4820. H814 IRA

As a rule of thumb, altitude corrections of less than 100 feet should be corrected by using a

- A) full bar width on the attitude indicator.
- B) half bar width on the attitude indicator.**
- C) two bar width on the attitude indicator.

4821. L57 IRA

If both the ram air input and drain hole of the pitot system are blocked, what airspeed indication can be expected?

- A) No variation of indicated airspeed in level flight even if large power changes are made.**
- B) Decrease of indicated airspeed during a climb.
- C) Constant indicated airspeed during a descent.

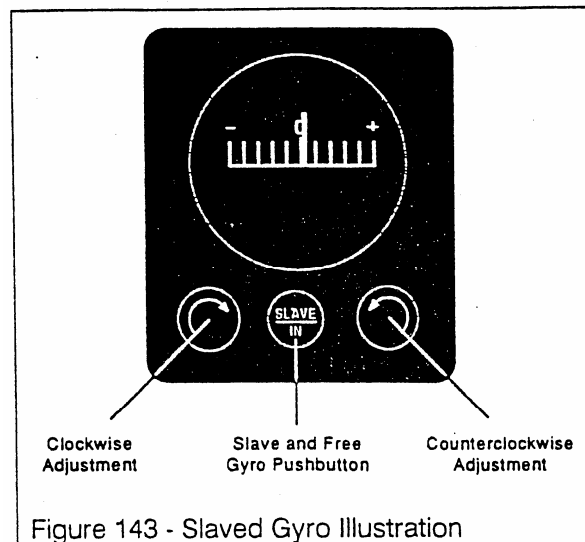


Figure 143 - Slaved Gyro Illustration

NOTE: CORRECT ANSWER IN BOLD ITALICS



4827. H809 IRA
(Refer to figure 143. Previous Page) The heading on a remote indicating compass is 120° and the magnetic compass indicates 110°. What action is required to correctly align the heading indicator with the magnetic compass?

- A) Select the free gyro mode and depress the counter-clockwise heading drive button.
- B) Select the slaved gyro mode and depress the clockwise heading drive button.
- C) Select the free gyro mode and depress the clockwise heading drive button.**

4828. H809 IRA
(Refer to figure 143.) When the system is in the free gyro mode, depressing the clockwise manual heading drive button will rotate the remote indicating compass card to the

- A) right to eliminate left compass card error.**
- B) right to eliminate right compass card error.
- C) left to eliminate left compass card error.

4829. H809 IRA
(Refer to figure 143.) The heading on a remote indicating compass is 5° to the left of that desired. What action is required to move the desired heading under the heading reference?

- A) Select the free gyro mode and depress the clockwise heading drive button.
- B) Select the slaved gyro mode and depress the clockwise heading drive button.
- C) Select the free gyro mode and depress the counter-clockwise heading drive button.**

4830. L57 IRA
If both the ram air input and the drain hole of the pitot system are blocked, what reaction should you observe on the airspeed indicator when power is applied and a climb is initiated out of severe icing conditions?

- A) The indicated airspeed would show a continuous deceleration while climbing.
- B) The airspeed would drop to, and remain at, zero.
- C) No change until an actual climb rate is established, then indicated airspeed will increase.**

4831. H812 IRA
What indication should be observed on a turn coordinator during a left turn while taxiing?

- A) The miniature aircraft will show a turn to the left and the ball remains centered.
- B) The miniature aircraft will show a turn to the left and the ball moves to the right.**
- C) Both the miniature aircraft and the ball will remain centered.

4832. H810 IRA
The gyroscopic heading indicator is inoperative. What is the primary bank instrument in unaccelerated straight-and-level flight?

- A) Magnetic compass.**
- B) Attitude indicator.
- C) Miniature aircraft of turn coordinator.

4833. H816 IRA
When airspeed is decreased in a turn, what must be done to maintain level flight?

- A) Decrease the angle of bank and/or increase the angle of attack.**
- B) Increase the angle of bank and/or decrease the angle of attack.
- C) Increase the angle of attack.

4834. H816 IRA
On the taxi check, the magnetic compass should

- A) swing opposite to the direction of turn when turning from north.
- B) exhibit the same number of degrees of dip as the latitude.
- C) swing freely and indicate known headings.**

4835. H812 IRA
Which condition during taxi is an indication that an attitude indicator is unreliable?

- A) The horizon bar tilts more than 5° while making taxi turns.**
- B) The horizon bar vibrates during warmup.
- C) The horizon bar does not align itself with the miniature airplane after warmup.

4836. H815 IRA
What instruments are considered supporting bank instruments during a straight, stabilized climb at a constant rate?

- A) Attitude indicator and turn coordinator.**
- B) Heading indicator and attitude indicator.
- C) Heading indicator and turn coordinator.

4837. H823 IRA
What instruments are primary for pitch, bank, and power, respectively, when transitioning into a constant airspeed climb from straight-and-level flight?

- A) Attitude indicator, heading indicator, and manifold pressure gauge or tachometer.**
- B) Attitude indicator for both pitch and bank; airspeed indicator for power.
- C) Vertical speed, attitude indicator, and manifold pressure or tachometer.

NOTE: CORRECT ANSWER IN BOLD ITALICS



4838.

What is the primary bank instrument once a standard rate turn is established?

- A) Attitude indicator.
- B) Turn coordinator.**
- C) Heading indicator.

4839.

What does the miniature aircraft of the turn coordinator directly display?

- A) Rate of roll and rate of turn.**
- B) Angle of bank and rate of turn.
- C) Angle of bank.

4840. H813 IRA

What is the correct sequence in which to use the three skills used in instrument flying?

- A Aircraft control, cross-check, and instrument interpretation.
- B) Instrument interpretation , cross-check , and aircraft control.
- C) Cross-check, instrument interpretation, and aircraft control.**

4842. H812 IRA

What pretakeoff check should be made of the attitude indicator in preparation for an IFR flight?

- A) The horizon bar does not vibrate during warmup
- B) The miniature airplane should erect and become stable within 5 minutes.
- C) The horizon bar should erect and become stable within 5 minutes.**

4843. H807 IRA

The rate of turn at any airspeed is dependent upon

- A) the horizontal lift component.**
- B) the vertical lift component.
- C) centrifugal force.

4844. H807 IRA

During a skidding turn to the right, what is the relationship between the component of lift, centrifugal force, and load factor?

- A) Centrifugal force is less than horizontal lift and the load factor is increased.
- B) Centrifugal force is greater than horizontal lift and the load factor is increased.**
- C) Centrifugal force and horizontal lift are equal and the load factor is decreased.

NOTE: CORRECT ANSWER IN BOLD ITALICS

4845. H815 IRA

As power is increased to enter a 500 feet per minute rate of climb in straight flight, which instruments are primary for pitch, bank, and power respectively?

- A) Attitude, indicator, heading indicator, and manifold pressure gauge or tachometer.**
- B) VSI, attitude indicator, and airspeed indicator.
- C) Airspeed indicator, attitude indicator, and manifold pressure gauge or tachometer.

4847. H810 IRA

What indications are displayed by the miniature aircraft of a turn -coordinator?

- A) Rate of roll and rate of turn.**
- B) Direct indication of bank angle and pitch attitude.
- C) Indirect indication of bank angle and pitch attitude.

4848. H827 IRA

What is the primary pitch instrument during a stabilized climbing left turn at cruise climb airspeed?

- A) Attitude indicator.
- B) VSI.
- C) Airspeed indicator.**

4850. H816 IRA

What is the primary pitch instrument when establishing a constant altitude standard rate turn?

- A) Altimeter.**
- B) VSI.
- C) Airspeed indicator.

4851. H816 IRA

What is the initial primary bank instrument when establishing a level standard rate turn?

- A) Turn coordinator.
- B) Heading indicator.
- C) Attitude indicator.**

4853.

What instrument(s) is (are) supporting bank instrument when entering a constant airspeed climb from straight-and-level flight?

- A) Heading indicator.
- B) Attitude indicator and turn coordinator.**
- C) Turn coordinator and heading indicator.

4854. L57 IRA

What indication should a pilot observe if an airspeed indicator ram air input and drain hole are blocked?

- A) The airspeed indicator will react as an altimeter.**
- B) The airspeed indicator will show a decrease with an increase in altitude.
- C) No airspeed indicator change will occur during climbs or descents.



4855. H813 IRA

What are the three fundamental skills involved in attitude instrument flying?

- A) Instrument interpretation, trim application, and aircraft control.
- B) Cross-check, instrument interpretation, and aircraft control.**
- C) Cross check, emphasis, and aircraft control.

4856. H816 IRA

What indication is presented by the miniature aircraft of the turn coordinator?

- A) Indirect indication of the bank attitude.**
- B) Direct indication of the bank attitude and the quality of the turn.
- C) Quality of the turn.

4857.

During normal operation of a vacuum-driven attitude indicator, what attitude indication should you see when rolling out from a 180° skidding turn to straight-and-level coordinated flight?

- A) A straight-and-level coordinated flight indication.
- B) A nose-high indication relative to level flight.
- C) The miniature aircraft shows a turn in the direction opposite the skid.**

4858. H816 IRA

What is the primary bank instrument while transitioning from straight-and-level flight to a standard rate turn to the left?

- A) Attitude indicator.**
- B) Heading indicator.
- C) Turn coordinator (miniature aircraft).

4859. H813 IRA

What is the third fundamental skill in attitude instrument flying?

- A) Instrument cross-check.
- B) Power control.
- C) Aircraft control.**

4860.

During normal coordinated turns, what error due to precession should you observe when rolling out to straight-and-level flight from a 180° steep turn to the right?

- A) A straight-and-level coordinated flight indication.
- B) The miniature aircraft would show a slight turn indication to the left.**
- C) The miniature aircraft would show a slight descent and wings-level attitude.

4861.

During coordinated turns, which force moves the pendulous vanes of a vacuum-driven attitude indicator resulting in precession of the gyro toward the inside of the turn?

- A) Acceleration.
- B) Deceleration.
- C) Centrifugal.**

4862. H813 IRA

What is the first fundamental skill in attitude instrument flying?

- A) Aircraft control.
- B) Instrument cross-check.**
- C) Instrument interpretation.

4863. H814 IRA

As power is reduced to change airspeed from high to low cruise in level flight, which instruments are primary for pitch, bank, and power, respectively?

- A) Attitude indicator, heading indicator, and manifold pressure gauge or tachometer.
- B) Altimeter, attitude indicator, and airspeed indicator.
- C) Altimeter, heading indicator, and manifold pressure gauge or tachometer.**

4864. H810 IRA

What information does a Mach meter present?

- A) The ratio of aircraft true airspeed to the speed of sound.**
- B) The ratio of aircraft indicated airspeed to the speed of sound.
- C) The ratio of aircraft equivalent airspeed, corrected for installation error, to the speed of sound.

4665. H814 IRA

Which instrument provides the most pertinent information (primary) for bank control in straight-and-level flight?

- A) Turn-and-slip indicator.
- B) Attitude indicator.
- C) Heading indicator.**

4866. H816 IRA

Which instruments are considered primary and supporting for bank, respectively, when establishing a level standard rate turn?

- A) Turn coordinator and attitude indicator.
- B) Attitude indicator and turn coordinator.**
- C) Turn coordinator and heading indicator.

NOTE: CORRECT ANSWER IN BOLD ITALICS



4867. H818 IRA

While recovering from an unusual flight attitude without the aid of the attitude indicator, approximate level pitch attitude is reached when the

- A) airspeed and altimeter stop their movement and the VSI reverses its trend.
- B) airspeed arrives at cruising speed, the altimeter reverses its trend, and the vertical speed stops its movement.
- C) altimeter and vertical speed reverse their trend and the airspeed stops its movement.

4868. H703 IRA

What is the relationship between centrifugal force and the horizontal lift component in a coordinated turn?

- A) Horizontal lift exceeds centrifugal force.
- B) Horizontal lift and centrifugal force are equal.**
- C) Centrifugal force exceeds horizontal lift.

4869. H813 IRA

Which instruments, in addition to the attitude indicator, are pitch instruments?

- A) Altimeter and airspeed only.
- B) Altimeter and VSI only.
- C) Altimeter, airspeed indicator, and vertical speed indicator.**

4870. H807 IRA

What force causes an airplane to turn?

- A) Rudder pressure or force around the vertical axis.
- B) Vertical lift component.
- C) Horizontal lift component.**

4871. H814 IRA

Which instrument provides the most pertinent information (primary) for pitch control in straight-and-level flight?

- A) Attitude indicator.
- B) Airspeed indicator.
- C) Altimeter.**

4872. H816 IRA

Which instruments are considered to be supporting instruments for pitch during change of airspeed in a level turn?

- A) Airspeed indicator and VSI.
- B) Altimeter and attitude indicator.
- C) Attitude indicator and VSI.**

4873. H818 IRA

If an airplane is in an unusual flight attitude and the attitude indicator has exceeded its limits, which instruments should be relied on to determine pitch attitude before starting recovery?

- A) Turn indicator and VSI.
- B) Airspeed and altimeter.**
- C) VSI and airspeed to detect approaching VSI or VMO.

4874. H816 IRA

Which instrument is considered primary for power as the airspeed reaches the desired value during change of airspeed in a level turn?

- A) Airspeed indicator.**
- B) Attitude indicator.
- C) Altimeter.

4875. H826 IRA

Which is the correct sequence for recovery from a spiraling, nose-low, increasing airspeed, unusual flight attitude?

- A) Increase pitch attitude, reduce power, and level wings.
- B) Reduce power, correct the bank attitude, and raise the nose to a level attitude.**
- C) Reduce power, raise the nose to level attitude, and correct the bank attitude..

4876. H822 IRA

Which instruments should be used to make a pitch correction when you have deviated from your assigned altitude?

- A) Altimeter and VSI.
- B) Manifold pressure gauge and VSI.
- C) Attitude indicator, altimeter, and VSI.**

4877. H758 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the left from an east heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the right.
- B) The compass will remain on east for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4878. H825 IRA

When airspeed is increased in a turn, what must be done to maintain a constant altitude?

- A) Decrease the angle of bank.
- B) Increase the angle of bank and/or decrease the angle of attack.**
- C) Decrease the angle of attack.

4879. H808 IRA

What would be the indication on the VSI during entry into a 500 FPM actual descent from Level flight if the static ports were iced over?

- A) The indication would be in reverse of the actual rate of descent (500 FPM climb).
- B) The initial indication would be a climb, then descent at a rate in excess of 500 FPM.
- C) The VSI pointer would remain at zero regardless of the actual rate of descent.**

NOTE: CORRECT ANSWER IN BOLD ITALICS



4880. J26 IRA

How should you preflight check the altimeter prior to an IFR flight?

- A) Set the altimeter to the current temperature. With current temperature and the altimeter indication, determine the calibrated altitude to compare with the field elevation.
- B) Set the altimeter first with 29.92" Hg and then the current altimeter setting. The change in altitude should correspond to the change in setting.
- C) Set the altimeter to the current altimeter setting. The indication should be within 75 feet of the actual elevation for acceptable accuracy.**

4881. L59 IRA

Which practical test should be made on the electric gyro instruments prior to starting an engine?

- A) Check that the electrical connections are secure on the back of the instruments.
- B) Check that the attitude of the miniature aircraft is wings level before turning on electrical power.
- C) Turn on the electrical power and listen for any unusual or irregular mechanical noise.**

4882.

Prior to starting an engine, you should check the turn-and-slip indicator to determine if the

- A) needle indication properly corresponds to the angle of the wings or rotors with the horizon.
- B) needle is approximately centered and the tube is full of fluid.**
- C) ball will move freely from one end of the tube to the other when the aircraft is rocked.

4883.

What indications should you observe on the turn-and-slip indicator during taxi?

- A) The ball moves freely opposite the turn, and the needle deflects in the direction of the turn.**
- B) The needle deflects in the direction of the turn, but the ball remains centered.
- C) The ball deflects opposite the turn, but the needle remains centered.

4884. H807 IRA

Which instrument indicates the quality of a turn?

- A) Attitude indicator.
- B) Heading indicator or magnetic compass.
- C) Ball of the turn coordinator.**

NOTE: CORRECT ANSWER IN BOLD ITALICS

4885.

What pretakeoff check should be made of a vacuum-driven heading indicator in preparation for an IFR flight?

- A) After 5 minutes, set the indicator to the magnetic heading of the aircraft and check for proper alignment after taxi turns.**
- B) After 5 minutes, check that the heading indicator card aligns itself with the magnetic heading of the aircraft.
- C) Determine that the heading indicator does not precess more than 2° in 5 minutes of ground operation.

4886. H758 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from an easterly heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the left.
- B) The compass will remain on east for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4887. H758 IRA

What should be the indication on the magnetic compass as you roll 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 initially 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 aircraft.

4888. H758 IRA

On what headings will the magnetic compass read most accurately during a level 360° turn, with a bank of approximately 15°?

- A) 135° through 225°.
- B) 90° and 270°.**
- C) 180° and 0°.

4889. H809 IRA

What causes the northerly turning error in a magnetic compass?

- A) Coriolis force at the mid-latitudes.
- B) Centrifugal force acting on the compass card.
- C) The magnetic dip characteristic.**

4890. H809 IRA

What should be the indication on the magnetic compass when you roll into a standard rate turn to the left from a south heading in the Northern Hemisphere?

- A) The compass will indicate a turn to the left, but at a faster rate than is actually occurring.**
- B) The compass will initially indicate a turn to the right.
- C) The compass will remain on south for a short time, then gradually catch up to the magnetic heading of the aircraft.



4891. H314 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from a westerly heading in the Northern Hemisphere?

- A) The compass will initially show a turn in the opposite direction, then turn to a northerly indication but lagging behind the actual heading of the aircraft.
- B) The compass will remain on a westerly heading for a short time, then gradually catch up to the actual heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4892. H314 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the right from a northerly 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 initially indicate a turn to the left.**
- C) The compass will remain on north for a short time, then gradually catch up to the magnetic heading of the aircraft.

4893. H314 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the left from a west heading in the Northern Hemisphere?

- A) The compass will initially indicate a turn to the right.
- B) The compass will remain on west for a short time, then gradually catch up to the magnetic heading of the aircraft.
- C) The compass will indicate the approximate correct magnetic heading if the roll into the turn is smooth.**

4894. H314 IRA

What should be the indication on the magnetic compass as you roll into a standard rate turn to the left from a north heading in the Northern Hemisphere?

- A) The compass will indicate a turn to the left, but at a faster rate than is actually occurring.
- B) The compass will initially indicate a turn to the right.**
- C) The compass will remain on north for a short time, then gradually catch up to the magnetic heading of the aircraft.

4895.

If a half-standard rate turn is maintained, how long would it take to turn 360°?

- A) 1 minute.
- B) 2 minutes.
- C) 4 minutes**

4896.

If a standard rate turn is maintained, how long would it take to turn 180°?

- A) 1 minute.**
- B) 2 minutes.
- C) 3 minutes.

4897.

If a half-standard rate turn is maintained, how much time would be required to turn clockwise from a heading of 090° to a heading of 180°?

- A) 30 seconds.
- B) 1 minute.**
- C) 1 minute 30 seconds.

4898.

During a constant-bank level turn, what effect would an increase in airspeed have on the rate and radius of turn?

- A) Rate of turn would increase, and radius of turn would increase.
- B) Rate of turn would decrease, and radius of turn would decrease.
- C) Rate of turn would decrease, and radius of turn would increase.**

4899.

The three conditions which determine pitch attitude required to maintain level flight are

- A) flight path, wind velocity, and angle of attack.
- B) airspeed, air density, and aircraft weight.**
- C) relative wind, pressure altitude, and vertical lift component.

4900. H810 IRA

Errors in both pitch and bank indication on an attitude indicator are usually at a maximum as the aircraft rolls out of a

- A) 180° turn.**
- B) 270° turn.
- C) 360° turn.

4901. H810 IRA

If a 180° steep turn is made to the right and the aircraft is rolled out to straight-and-level flight by visual reference, the miniature aircraft will

- A) show a slight climb and turn to the left.**
- B) show a slight climb and turn to the right.
- C) show a slight skid and climb to the right.

4902. H810 IRA

One characteristic that a properly functioning gyro depends upon for operation is the

- A) ability to resist precession 90° to any applied force.
- B) resistance to deflection of the spinning wheel or disc.**
- C) deflecting force developed from the angular velocity of the spinning wheel.

NOTE: CORRECT ANSWER IN BOLD ITALICS



4903.

If a standard rate turn is maintained, how much time would be required to turn to the right from a heading of 090° to a heading of 270°?

- A) 1 minute.
- B) 2 minutes.
- C) 3 minutes.

4904.

If a standard rate turn is maintained, how much time would be required to turn to the left from a heading of 090° to a heading of 300°?

- A) 30 seconds.
- B) 40 seconds.
- C) 50 seconds.

4905.

If a half-standard rate turn is maintained, how long would it take to turn 135°?

- A) 1 minute.
- B) 1 minute 20 seconds.
- C) 1 minute 30 seconds.

4906.

Approximately what percent of the indicated vertical speed should be used to determine the number of feet to lead the level-off from a climb to a specific altitude?

- A) 10 percent.
- B) 20 percent.
- C) 25 percent.

4907. H824 IRA

To level off from a descent to a specific altitude, the pilot should lead the level-off by approximately

- A) 10 percent of the vertical speed.
- B) 30 percent of the vertical speed.
- C) 50 percent of the vertical speed.

4908. H758 IRA

If, while in level flight, it becomes necessary to use an alternate source of static pressure vented inside the airplane, which of the following should the pilot expect?

- A) The altimeter to read lower than normal.
- B) The vertical speed to momentarily show a descent.
- C) The vertical speed to momentarily show a climb.

4909. H808 IRA

During flight, if the pitot tube becomes clogged with ice, which of the following instruments would be affected?

- A) The airspeed indicator only.
- B) The airspeed indicator and the altimeter.
- C) The airspeed indicator, altimeter, and Vertical Speed Indicator.

4910. H312 IRA

The local altimeter setting should be used by all pilots in a particular area, primarily to provide for

- A) the cancellation of altimeter error due to nonstandard temperatures aloft.
- B) better vertical separation of aircraft.
- C) more accurate terrain clearance in mountainous areas.

4911. H808 IRA

At an altitude of 6,500 feet MSL, the current altimeter setting is 30.42" Hg. The pressure altitude would be approximately

- A) 7,500 feet.
- B) 6,000 feet.
- C) 6,500 feet.

4912. H808 IRA

The pressure altitude at a given location is indicated on the altimeter after the altimeter is set to

- A) the field elevation.
- B) 29.92" Hg.
- C) the current altimeter setting.

4913. H808 IRA

If the outside air temperature increases during a flight at constant power and at a constant indicated altitude, the true airspeed will

- A) decrease and true altitude will increase.
- B) increase and true altitude will decrease.
- C) increase and true altitude will increase.

4914. H807 IRA

Rate of turn can be increased and radius of turn decreased by

- A) decreasing airspeed and shallowing the bank.
- B) decreasing airspeed and increasing the bank.
- C) increasing airspeed and increasing the bank.

4915. H807 IRA

The primary reason the angle of attack must be increased, to maintain a constant altitude during a coordinated turn, is because the

- A) thrust is acting in a different direction, causing a reduction in airspeed and loss of lift.
- B) vertical component of lift has decreased as the result of the bank.
- C) use of ailerons has increased the drag.

4916. H303 IRA

If severe turbulence is encountered during your IFR flight, the airplane should be slowed to the design maneuvering speed because the

- A) maneuverability of the airplane will be increased.
- B) amount of excess load that can be imposed on the wing will be decreased.
- C) airplane will stall at a lower angle of attack, giving an increased margin of safety.



4917.

When a climb or descent through an inversion or wind-shear zone is being performed, the pilot should be alert for which of the following change in airplane performance?

- A) A fast rate of climb and a slow rate of descent.
- B) A sudden change in airspeed.**
- C) A sudden surge of thrust.

4918.

When an airplane is accelerated, some attitude indicators will precess and incorrectly indicate a

- A) climb.**
- B) descent.
- C) right turn.

4919.

When an airplane is decelerated, some attitude indicators will precess and incorrectly indicate a

- A) left turn.
- B) climb.
- C) descent.**

4920. H814 IRA

For maintaining level flight at constant thrust, which instrument would be the least appropriate for determining the need for a pitch change?

- A) Altimeter.
- B) VSI.
- C) Attitude indicator.**

4921. H816 IRA

The displacement of a turn coordinator during a coordinated turn will

- A) indicate the angle of bank.
- B) remain constant for a given bank regardless of airspeed.
- C) increase as angle of bank increases.**

4922. H808 IRA

Altimeter setting is the value to which the scale of the pressure altimeter is set so the altimeter indicates

- A) pressure altitude at sea level.
- B) true altitude at field elevation.**
- C) pressure altitude at field elevation.

4923.

The altimeter indicates the aircraft altitude in relation to

- A) sea level.
- B) the standard datum plane.
- C) the pressure level set in the barometric window.**

4924.

To enter a constant-air-speed descent from level-cruising flight, and maintain cruising airspeed, the pilot should

- A) first adjust the pitch attitude to a descent using the attitude indicator as a reference, then adjust the power to maintain the cruising airspeed.
- B) first reduce power, then adjust the pitch using the attitude indicator as a reference to establish a specific rate on the VSI.
- C) simultaneously reduce power and adjust the pitch using the attitude indicator as a reference to maintain the cruising airspeed.**

4925. H815 IRA

To level off at an airspeed higher than the descent speed, the addition of power should be made, assuming a 500 FPM rate of descent, at approximately

- A) 50 to 100 feet above the desired altitude.
- B) 100 to 150 feet above the desired altitude.**
- C) 150 to 200 feet above the desired altitude.

4926. H815 IRA

To level off from a descent maintaining the descending airspeed, the pilot should lead the desired altitude by approximately

- A) 20 feet.
- B) 50 feet.**
- C) 60 feet.

4927. H818 IRA

During recoveries from unusual attitudes, level flight is attained the instant

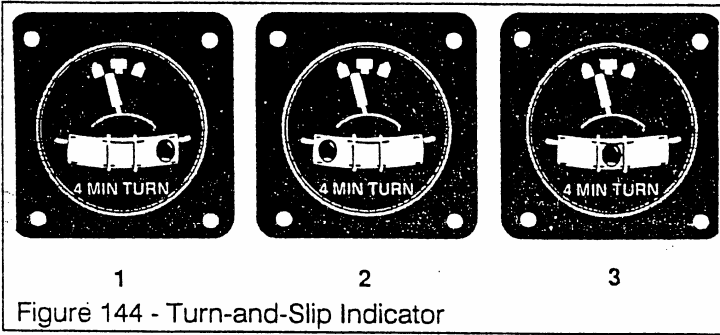
- A) the horizon bar on the attitude indicator is exactly overlapped with the miniature airplane.
- B) a zero rate of climb is indicated on the VSI.
- C) the altimeter and airspeed needles stop prior to reversing their direction of movement.**

4928. H815 IRA

While cruising at 160 knots, you wish to establish a climb at 130 knots. When entering the climb (full panel), it is proper to make the initial pitch change by increasing back elevator pressure until the

- A) attitude indicator, airspeed, and vertical speed indicate a climb.
- B) vertical speed indication reaches the predetermined rate of climb.
- C) attitude indicator shows the approximate pitch attitude appropriate for the 130-knot climb.**

NOTE: CORRECT ANSWER IN BOLD ITALICS



4933. H758 IRA
(Refer to figure 144.) Which illustration indicates a skidding turn?

- A) 2.
- B) 1.**
- C) 3.

4934. H814 IRA
(Refer to figure 144.) What changes in control displacement should be made so that "1" would result in a coordinated standard rate turn?

- A) Increase right rudder and decrease rate of turn.
- B) Increase right rudder and increase rate of turn.**
- C) Decrease right rudder and increase angle of bank

4935.
(Refer to figure 144.) Which illustration indicates a slipping turn?

- A) 1.
- B) 3.
- C) 2.**

4936. H814 IRA
(Refer to figure 145.) What is the correct sequence for recovery from the unusual attitude indicated?

- A) Reduce power, increase back elevator pressure, and level the wings.
- B) Reduce power, level the wings, bring pitch attitude to level flight.**
- C) Level the wings, raise the nose of the aircraft to level flight attitude, and obtain desired airspeed.

4937. H818 IRA
(Refer to figure 146.) Identify the system that has failed and determine a corrective action to return the airplane to straight-and-level flight.

- A) Static/pitot system is blocked; lower the nose and level the wings to level-flight attitude by use of attitude indicator.**
- B) Vacuum system has failed; reduce power, roll left to level wings, and pitchup to reduce airspeed.
- C) Electrical system has failed; reduce power, roll left to level wings, and raise the nose to reduce airspeed.

4938. H818 IRA
(Refer to figure 147.) Which is the correct sequence for recovery from the unusual attitude indicated?

- A) Level wings, add power, lower nose, descend to original attitude, and heading.
- B) Add power, lower nose, level wings, return to original attitude and heading.**
- C) Stop turn by raising right wing and add power at the same time, lower the nose, and return to original attitude and heading.

4929.

While cruising at 190 knots, you wish to establish a climb at 160 knots. When entering the climb (full panel), it would be proper to make the initial pitch change by increasing back elevator pressure until the

- A) attitude indicator shows the approximate pitch attitude appropriate for the 160-knot climb.**
- B) attitude indicator, airspeed, and vertical speed indicate a climb.
- C) airspeed indication reaches 160 knots.

4930. H758 IRA

If while in level flight, it becomes necessary to use an alternate source of static pressure vented inside the airplane, which of the following variations in instrument indications should the pilot expect?

- A) The altimeter will read lower than normal, airspeed lower than normal, and the VSI will momentarily show a descent.
- B) The altimeter will read higher than normal, airspeed greater than normal, and the VSI will momentarily show a climb.**
- C) The altimeter will read lower than normal, airspeed greater than normal, and the VSI will momentarily show a climb and then a descent.

4931. H758 IRA

(Refer to figure 144.) What changes in control displacement should be made so that "2" would result in a coordinated standard rate turn?

- A) Increase left rudder and increase rate of turn.**
- B) Increase left rudder and decrease rate of turn.
- C) Decrease left rudder and decrease angle of bank.

4932. H814 IRA

(Refer to figure 144.) Which illustration indicates a coordinated turn?

- A) 3.**
- B) 1.
- C) 2.

NOTE: CORRECT ANSWER IN BOLD ITALICS

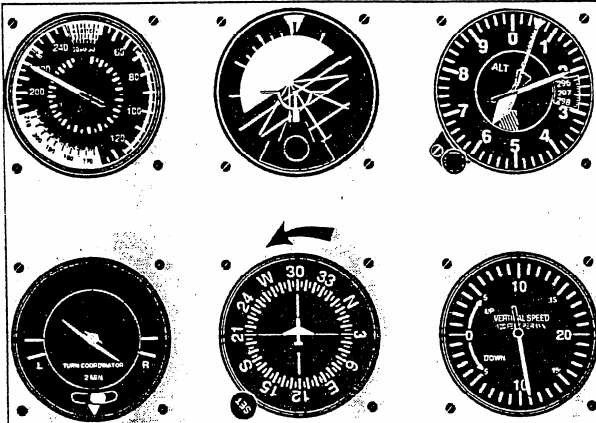


Figure 145 - Instrument Sequence (Unusual Attitude)

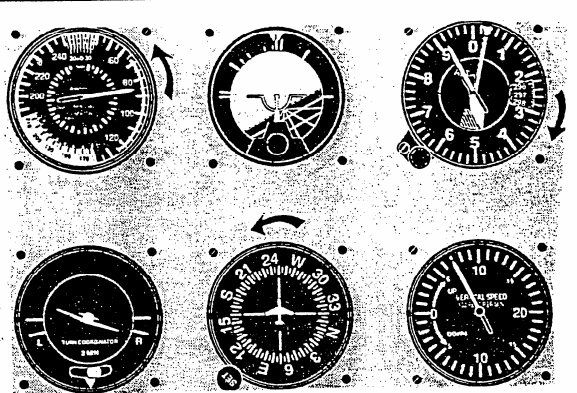


Figure 147 - Instrument Sequence (Unusual Attitude)

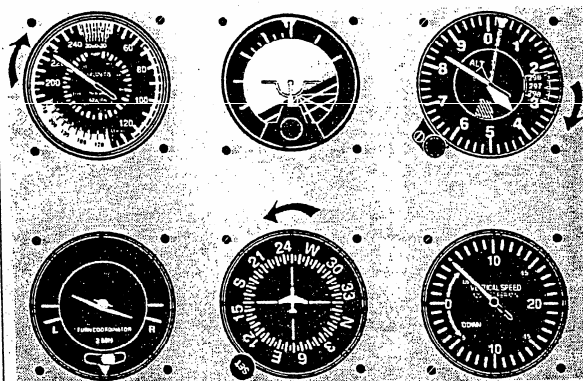


Figure 146 - Instrument Sequence (System Failed)

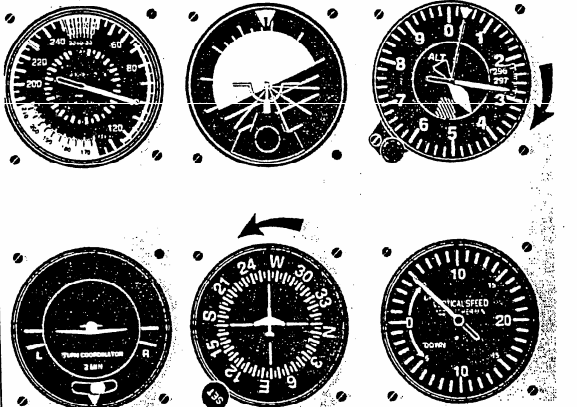


Figure 148 - Instrument Interpretation (System Malfunction)



Figure 149 - Instrument Interpretation (System Malfunction)

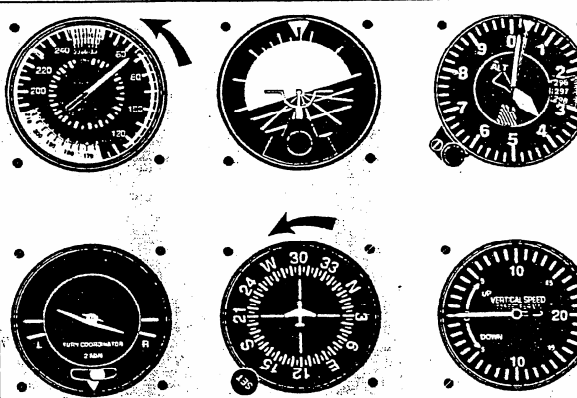


Figure 151 - Instrument Interpretation (Malfunction)



Figure 150 - Instrument Interpretation (Malfunction)

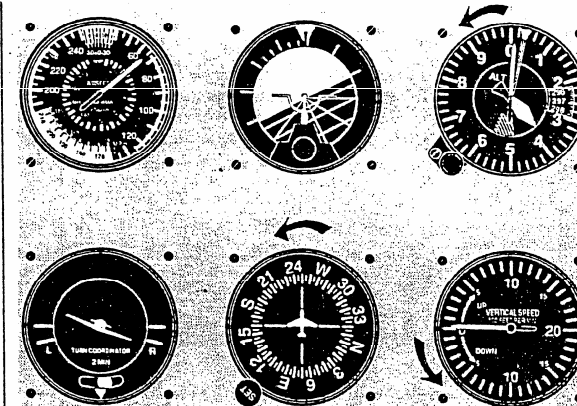


Figure 152 - Instrument Interpretation (System Failed)

4939. H826 IRA

(Refer to figure 148.) What is the flight attitude? One system which transmits information to the instruments has malfunctioned.

- A) Climbing turn to left.
- B) Climbing turn to right.**
- C) Level turn to left.

4940. H826 IRA

(Refer to figure 149.) What is the flight attitude? One system which transmits information to the instruments has malfunctioned.

- A) Level turn to the right.
- B) Level turn to the left.
- C) Straight-and-level flight.**

4941. H826 IRA

(Refer to figure 150.) What is the flight attitude? One instrument has malfunctioned.

- A) Climbing turn to the right.**
- B) Climbing turn to the left.
- C) Descending turn to the right.

4942. H826 IRA

(Refer to figure 151.) What is the flight attitude? One instrument has malfunctioned.

- A) Climbing turn to the right.
- B) Level turn to the right.**
- C) Level turn to the left.

4943. H826 IRA

(Refer to figure 152.) What is the flight attitude? One system which transmits information to the instruments has failed.

- A) Climbing turn to right.
- B) Level turn to left.
- C) Descending turn to right.**

2005IFR. 795. H1432 IRA

(Refer to figure 152) Why is there a note stating a temperature limitation for executing this approach with BARO-VNAV equipment?

- A) The descent gradient exceeds the maximum standard of 400-foot per Nautical Mile at low temperatures.
- B) The decision altitude and final approach segment height above obstacles or terrain is unsafe when temperatures are lower than charted.**
- C) The missed approach climb gradient exceeds the airplane maximum standard of 40 to 1 at low temperatures.

NOTE: CORRECT ANSWER IN BOLD ITALICS