Study Unit 3 – Navigation Systems

Page 74, Subunit 3.8, 4.: New information added on the subject of handheld GPS use.

3.8 GLOBAL POSITIONING SYSTEM (GPS)

1. You should refer to the flight manual supplement to determine if an installed GPS is approved for IFR en route and IFR approaches.
   a. Hand-held GPS systems and GPS systems certified for VFR operation may be used during IFR operations only as an aid to situational awareness.

2. During IFR en route and terminal operations using an approved GPS system for navigation, the aircraft must be equipped with an approved and operational alternate navigation system that is appropriate to the route.
   a. Any ground-based navigational facilities required for use with the alternate navigation system (e.g., VORs, NDBs, etc.) must be available and operational along the entire route of flight.
   b. It is not necessary to actively monitor an alternate means of navigation unless the GPS is not equipped with Receiver Autonomous Integrity Monitoring (RAIM), or RAIM becomes unavailable or predicts an outage.

3. One of the primary benefits of satellite based area navigation (e.g., GPS or RNAV) is that it permits aircraft to fly optimum routes and altitudes.

4. Bear in mind that although handheld GPS units are an excellent aid to situational awareness, they are not an approved navigation source for any IFR operation, regardless of whether you are in visual or instrument meteorological conditions.
89. A handheld GPS is
   A. not authorized for IFR use.
   B. authorized for IFR use under VMC.
   C. authorized for IFR use under IMC until the runway is in sight.

   Answer (A) is correct. *(AIM Para 1-1-19)*

   **DISCUSSION:** A handheld GPS may be used as an aid to situational awareness in any flight condition, but it is not authorized for any IFR operations.

   Answer (B) is incorrect. While a handheld GPS may be used as an aid to situational awareness in any flight condition, it is not authorized for any IFR operations, regardless of whether you are in instrument or visual conditions. Answer (C) is incorrect. While a handheld GPS may be used as an aid to situational awareness in any flight condition, it is not authorized for any IFR operations, regardless of whether you are in instrument or visual conditions.

Study Unit 4 – Federal Aviation Regulations

Page 117, New question added to Sec. 61.57 to test on instrument currency.

17. A pilot plans an IFR flight on July 10 of this year. In order to meet IFR currency requirements the pilot must have
   A. performed his/her currency tasks between January 10 and July 10.
   B. performed his/her currency tasks between February 10 and July 10 with none of it before February 10.
   C. completed an IPC within the last year.

   Answer (A) is correct. *(FAR 61.57)*

   **DISCUSSION:** For IFR currency, a pilot must meet the recent experience requirements within a 6-month period to continue to fly as PIC in instrument conditions. After that time, a pilot may meet the requirements within the next 6-month period but may not act as PIC in instrument conditions until the experience requirements are met. Following that time, the pilot would be required to complete an instrument proficiency check to regain PIC privileges in instrument conditions.

   Answer (B) is incorrect. A pilot has 6 months, not 5, to maintain instrument currency and retain PIC privileges in instrument conditions. Answer (C) is incorrect. An IPC need only be completed if more than 12 months have passed since the pilot was last qualified under the instrument recent experience requirements.

Study Unit 5 – Airports, Air Traffic Control, and Airspace

Page 137, Subunit 5.2, 4.: Edited and added material on airport direction signs.

4. Direction signs consist of black lettering on a yellow background.
   a. These signs **a taxiway directional sign** indicates the designation (name) and direction (orientation) of taxiways leading out of an intersection.
   b. A runway exit sign indicates the designation and direction of an exit taxiway from the runway.
Page 142, Subunit 5.10, 16. and 17.: Added information on Land and Hold Short Operations (LAHSO).

16. **Pilots never have to accept a controller’s clearance, regardless of meteorological conditions.**

   a. A pilot should only accept a LAHSO (Land and Hold Short Operation) clearance provided (s)he feels (s)he can land the plane within the available distance without compromising safety.

16-17. **Minimum fuel** is just an advisory to ATC that indicates an emergency situation is possible should any undue delay occur.

Page 148, New questions: Questions added to Subunit 5.2 to test on airport direction signs.

18. When exiting the runway, what is the purpose of the runway exit sign?

   A. Indicates designation and direction of exit taxiway from runway.
   
   B. Indicates designation and direction of taxiway leading out of an intersection.
   
   C. Indicates direction to take-off runway.

   **Answer (A) is correct. (PHAK Chap 13)**

   **DISCUSSION:** This direction sign has a yellow background with black text, and it defines the direction and designation of an exit taxiway from the runway.

   Answer (B) is incorrect. A taxiway intersection sign is located on a taxiway and denotes proper taxi routes. It does not provide runway exit information. Answer (C) is incorrect. A direction sign indicates the necessary taxi route to get to the end of a specific runway. It does not provide guidance on exiting a runway.

19. A runway exit sign

   A. points toward a named taxiway that leads off the runway.
   
   B. designates an intersection of two or more runways.
   
   C. shows the direction to exit from a named taxiway onto a runway.

   **Answer (A) is correct. (PHAK Chap 13)**

   **DISCUSSION:** This direction sign has a yellow background with black text, and it defines the direction and designation of an exit taxiway from the runway.

   Answer (B) is incorrect. A runway intersection sign is a mandatory sign that indicates an area where an airplane must hold. It does not provide guidance on exiting the runway. Answer (C) is incorrect. The runway exit sign indicates the direction to exit from a runway onto a taxiway, not from a taxiway onto a runway.

Study Unit 6 – Holding and Instrument Approaches

Page 181, Subunit 6.14, 6. and 7.: Added material dealing with GPS/WAAS approaches.

6. **Baro-VNAV** is a navigational system that presents computed vertical guidance based on barometric altitude.

   a. Cold temperatures have a pronounced effect on Baro-VNAV operations because barometric altimeters will substantially over-read in very low temperatures.

   b. For this reason, a minimum temperature limitation is published for each procedure for which Baro-VNAV minimums are published. At this published temperature, the use of Baro-VNAV is not authorized to the LNAV/VNAV DA.

   c. On Figure 152, page 264, the note “BARO-VNAV NA below –20°C (–5°F)” implies that the approach may not be flown at all using Baro-VNAV when the temperature is below –20°C.
d. However, Baro-VNAV may be used for approach guidance down to the published LNAV MDA.

e. A Baro-VNAV approach, along with the traditional LNAV approach, is terminated at the missed approach point (MAP), which is where the missed approach segment begins.

7. On a GPS with WAAS capability, the appearance of “LNAV+V” on the display indicates that advisory vertical guidance will be provided by the receiver that you may opt to follow in lieu of the published step-down fixes.

a. Bear in mind that this is advisory guidance. It will not offer lower approach minimums than what is published for the standard LNAV approach procedure.

Page 250, Question 158: Corrected the answer foil for B.

158. What international Morse Code identifier is used to identify a specific interim standard microwave landing system?

A. A two letter Morse Code identifier preceded by the Morse Code for the letters “IM”.
B. A three four letter Morse Code identifier preceded by the Morse Code for the letter “M”.
C. A three letter Morse Code identifier preceded by the Morse Code for the letters “ML”.

Answer (B) is correct. (AIM Para 1-1-11)

DISCUSSION: MLS identification is a four-character alphabetic designation starting with the letter “M,” transmitted in international Morse Code at least 6 times per minute.

Answer (A) is incorrect. The identifier letter is the single character “M,” which is followed by three other letters. Answer (C) is incorrect. The identifier letter is the single character “M,” which is followed by three other letters.

Page 251, Added questions: New questions added to Subunit 6.14 regarding GPS/WAAS approaches.

164. On a GPS with WAAS capability, what is the significance of “LNAV+V” being displayed?

A. Approved vertical guidance to descend to the decision height is provided to the pilot.
B. Advisory vertical guidance is provided as an aid to the pilot during the descent to the runway.
C. Advisory vertical guidance is provided to the pilot that must be used in lieu of published step-down fixes on the instrument approach.

Answer (B) is correct. (AIM Para 1-1-20)

DISCUSSION: LNAV+V is not an approach type; rather, it provides advisory vertical guidance that may be used in lieu of the published step-down fixes on the IAP.

Answer (A) is incorrect. LNAV+V offers advisory, not approved, vertical guidance. Answer (C) is incorrect. LNAV+V offers advisory vertical guidance that may, not must, be used in lieu of the published step-down fixes on the IAP.

165. The missed approach for the BARO-VNAV and LNAV is initiated at the

A. decision height.
B. missed approach point.
C. final approach fix.

Answer (B) is correct. (IAIP)

DISCUSSION: The BARO-VNAV and LNAV approaches are terminated at the missed approach point, which is where the missed approach segment begins.

Answer (A) is incorrect. There is no decision height published for BARO-VNAV and LNAV approaches.

Answer (C) is incorrect. The final approach fix is where the final approach and descent to the runway begins. The missed approach point is where the missed approach segment begins.
6. Test data indicate that ice, snow, or frost having a thickness and roughness similar to medium or coarse sandpaper on the leading edge and upper surface of a wing can reduce wing lift by as much as 30% and increase drag by 40%.

   a. When ice does accumulate, it is harder to remove from the upper surface of the wing than the leading edge. Generally speaking, smooth ice on top of the wing is more dangerous than heavy accumulated icing on the leading edge.

7. With a standard (average) temperature lapse rate of 2°C per 1,000 ft., the freezing level can be determined by knowing the current temperature and elevation.

   a. EXAMPLE: At a field elevation of 1,350 ft. MSL, the temperature is +8°C. To reach the freezing level, the temperature must drop 8°C. Thus the freezing level is 4,000 ft. (8°C ÷ 2°C/1,000 ft.) above field elevation, or 5,350 ft. MSL (1,350 + 4,000).

8. When conditions favoring the formation of ice are present, pilots should check for ice accumulation prior to flight by using a flashlight to scan the surface of the airframe and watch for light reflections.

9. The most susceptible surface of the airframe to accumulate icing is the tailplane due to its position being outside the visual range as well as its thin, simple shape.

   a. A tailplane stall as the result of ice accumulation is most likely to occur during the extension of the flaps to the landing position. Thus, tailplane stalls due to icing are mostly likely during the approach and landing phase of flight.

   b. Any of the following symptoms, occurring singly or in combination, may be a warning of tailplane icing:

      1) Elevator control pulsing, oscillations, or vibrations
      2) Abnormal nose-down trim change
      3) Any other unusual or abnormal pitch anomalies (possibly resulting in pilot induced oscillations)
      4) Reduction or loss of elevator effectiveness
      5) Sudden change in elevator force (control would move nose-down if unrestrained)
      6) Sudden uncommanded nose-down pitch

   c. To recover from a tailplane stall, you should retract the flaps to the last safe position and increase power only to the extent that you compensate for the loss of lift created from retracting the flaps.

      1) Over-increasing the power can aggravate and deepen a tailplane stall in some aircraft.
10. Another serious result of icing is uncommanded roll due to ice accumulation forward of the ailerons.

a. The following procedures apply if you experience roll upset while flying in icing conditions:

1) Reduce the angle of attack (AOA) by increasing airspeed or extending wing flaps to the first setting if at or below the flaps extend speed ($V_{FE}$). If in a turn, roll wings level.

2) Set appropriate power and monitor the airspeed/AOA. A controlled descent is a vastly better alternative than an uncontrolled descent.

3) If flaps are extended, do not retract them unless it can be determined that the upper surface of the airfoil is clear of ice, because retracting the flaps will increase the AOA at a given airspeed.

4) Verify that wing ice protection is functioning normally and symmetrically by visual observation of the left and right wing. If not, follow manufacturer’s instructions.

11. If you detect icing accumulation in flight, especially if the aircraft is not equipped with a deicing system, you should leave the area of precipitation, if you are able, or fly to an altitude where the ambient temperature is above freezing.

a. Be aware that warmer temperatures are not always found at lower altitudes. In the case of a temperature inversion, for instance, warmer air will be above rather than below.

12. In an aircraft equipped with a pneumatic deicing system, the appropriate technique for removing ice is to operate the pneumatic deicing system several times.

a. This technique will clear accumulated ice as well as residual ice left behind between system cycles.

b. The FAA recommends that the deicing system be activated at the first indication of icing rather than after any significant amount of ice is allowed to accumulate.

1) Because some residual ice continues to adhere between pneumatic boot system cycles, the wing is never entirely “clean.”

2) The amount of residual ice increases as airspeed and/or temperature decrease due to the more favorable conditions for ice accumulation associated with these conditions.

3) At airspeeds typical of small airplanes, it may take many boot cycles to effectively shed the ice.

Page 279, New questions: New questions added to Subunit 8.7 dealing with airframe icing.

82. With regards to icing, which is true?

A. Heavy icing on the leading edge is not as bad as light icing on the upper surface.

B. Smooth ice on the upper surface will not cause any problems.

C. Light icing is more of a problem than heavy icing.

Answer (A) is correct. (AC 91-51A)

DISCUSSION: Ice on the leading edge, while seemingly more dangerous, can be removed using deicing systems. Ice on the upper surface is much more difficult to clear from the structure, thus making it more dangerous.

Answer (B) is incorrect. Smooth ice on the upper surface will disrupt laminar flow of the air across the upper wing surface, and it is much more difficult to remove than ice buildup on the leading edge. Answer (C) is incorrect. Light icing is generally less of a problem aerodynamically than heavy icing. Light icing is slightly more difficult to remove with most deicing systems, but it is considered less of an immediate threat than heavy icing.
83. Should you experience uncommanded roll due to icing forward of the ailerons, the most appropriate response is to
   A. begin a steady climb.
   B. retract the flaps in increments and employ available ice removal equipment.
   C. reduce the angle of attack by increasing airspeed or extending flaps to the first setting.

Answer (C) is correct. (AC 91-51A)
   DISCUSSION: If you encounter uncommanded roll due to ice accumulation, you must reduce the angle of attack. You can do this by increasing forward airspeed or extending flaps to the first position, provided you are below maximum flap extension speed.

Answer (A) is incorrect. In the case of uncommanded roll, you should decrease the angle of attack on the wing; thus, climbing is a poor choice. Answer (B) is incorrect. While you should employ any ice protection equipment available, you should not retract the flaps, regardless of their level of extension, during uncommanded roll as this will actually increase the angle of attack. However, if you can verify that the upper surface of the wing is clear of ice, you may retract the flaps if necessary. Bear in mind this is the exception to the rule.

84. Should you experience buffeting or vibrations after extending the flaps upon exiting or during icing conditions, the most likely reason is
   A. incipient tailplane stall.
   B. aerodynamic stall due to increased angle of attack.
   C. aerodynamic instability due to ice accumulation forward of the ailerons.

Answer (A) is correct. (AC 91-51A)
   DISCUSSION: Elevator control pulsing, oscillations, or vibrations as well as any other unusual or abnormal pitch anomalies (possibly resulting in pilot-induced oscillations) are indicative of tailplane ice accumulation and the potential for a tailplane stall. You should retract the flaps to the last safe setting in this situation.

Answer (B) is incorrect. Buffeting after the extension of flaps, especially when in icing conditions, is characteristic of an incipient tailplane stall, not an aerodynamic stall.

Answer (C) is incorrect. Uncommanded roll, not buffeting or vibrations, would accompany aerodynamic instability due to ice accumulation forward of the ailerons.

85. The best technique for using deicing boots is to
   A. use them immediately upon visual detection of any ice.
   B. allow ice to build first to reduce likelihood of “ice bridging.”
   C. cycle several times after exiting to obtain a completely clean wing.

Answer (A) is correct. (IFH Chap 2)
   DISCUSSION: The FAA recommends that the deicing system be activated at the first indication of icing.

Answer (B) is incorrect. In times past, the FAA did recommend delaying activation of deicing boots until a significant amount of ice built up on the surface. Due to the dangers associated with tailplane icing, however, the FAA now recommends that deicing boots be activated at the first indication of ice. Answer (C) is incorrect. Some residual ice continues to adhere between pneumatic boot system cycles, so the wing is never entirely “clean.” The amount of residual ice increases as airspeed and/or temperature decrease due to the more favorable conditions for ice accumulation associated with these conditions.
86. How should deicing boots be used after exiting flight in icing conditions?

A. It is no longer necessary to operate the boots after leaving icing conditions.

B. You should continue to cycle the boots several times to remove residual ice left behind after normal boot operation.

C. Only continue to cycle the boots if you are concerned you may still be accumulating ice.

Answer (B) is correct. (AC 91-74)

DISCUSSION: Some residual ice continues to adhere between pneumatic boot system cycles. The amount of residual ice increases as airspeed and/or temperature decrease due to the more favorable conditions for ice accumulation associated with these conditions. At airspeeds typical of small airplanes, it may take many boot cycles to effectively shed the ice.

Answer (A) is incorrect. Residual ice lingers after normal boot system operation. You should continue to operate the boots until all possible residual ice is removed.

Answer (C) is incorrect. Once you leave conditions favorable for icing conditions, you will not accumulate further ice. However, boots should still be operated after leaving icing conditions to remove residual ice left behind after normal boot system cycles.