



ON TRACK



Articles of Interest for the Professional Aviator ICP Flight - Central Flying School

What Altitude is Safe?

By: Allan di Dio, Captain, ICP Flight

Recently a number of ICPs got together to discuss an interesting dilemma regarding Minimum Decent Altitudes (MDAs) on the VOR RWY 28 Approach for Charlottetown, Prince Edward Island (GPH 200 Vol 5, Page 41). This approach is available as a VOR ONLY approach, or as an approach to lower minima as a VOR/DME or VOR/NDB approach with a stepdown fix. (The DME or NDB determining a common Final Approach Fix at 4.0 DME). The scenario in question deals with an aircraft fitted with either DME or NDB equipment with the aircraft being capable of determining the Final Approach Fix (FAF) at 4.0 DME. The aircraft has completed the procedure turn and is established on the final inbound track. While inspecting the approach plate, the pilot recognizes that the aircraft may descend to 800 feet prior to the FAF for the VOR/DME or VOR/NDB approach “OR” the aircraft may descend to 600 feet for the VOR ONLY approach. (This difference in altitude occurs due to variations in obstacle clearances required for VOR/DME approaches and VOR ONLY approaches). However, in our scenario, the aircraft is experiencing icing and while the aircraft is located prior to the FAF, descends to the VOR Only altitude of 600 feet (still prior to the FAF). The aircraft continues to the FAF after leaving the icing conditions and arrives at the FAF at 600 feet. Since the aircraft is fitted with DME (or NDB) equipment, the pilot now determines that the aircraft is at the FAF (at 4.0 DME) and now descends to VOR/DME or VOR/NDB minima of 500 feet to continue the remainder of the approach.

Was the pilot safe in applying the correct MDAs during this approach?

Unfortunately, the pilot was not safe (technically) during this approach although at a quick glance the decision making process may appear reasonable. Here is why! Approach designers have provided a stepdown fix (during the VOR/DME or VOR/NDB approach) due to some obstacle in the final approach. The designer has determined that the aircraft should be at 800 feet prior to the FAF on a VOR/DME or VOR/NDB approach. Once past the FAF, the aircraft can then descend to a minimum of 500 feet. This is 100 feet lower than the 600 foot minima determined for the entire final segment and MDA for the VOR ONLY approach. You may ask that if it is safe for a VOR ONLY aircraft to complete this entire final segment at 600 feet – why can the aircraft not be past the FAF and descend to 500 feet from that point? Well – approach designers consider that an aircraft will descend at certain, “maximum” rates. In general, without considering fix displacement errors, if an obstacle is close to a Final Approach Fix or Stepdown Fix, the designer may be able to “ignore” the obstacle if it does not penetrate the “reasonable” maximum descent rate of an aircraft (and the required obstacle clearance) after leaving

the fix. The descent gradient is set at 7:1 (vertical to horizontal) and encompasses an area that may extend 1 nautical mile past the fix. This 7:1 gradient in our scenario starts basically at the FAF “at 800 feet” – the position the aircraft should be in to proceed, as a VOR/DME or VOR/NDB equipped aircraft to descend to the minima of 500 feet. Since our aircraft left the fix at 600 feet – it is possible that the required obstacle clearance was

not met for an obstacle close to the fix. Therefore, our pilot was truly not safe and was below minimums. The lesson learned is that you cannot be at 3.999 DME and be safe at the next stepdown altitude (500 feet in our scenario). Designers consider that an aircraft will descend at a maximum rate of 7:1 or 868 feet per nautical mile during the final approach segment and may therefore ignore obstacles within a mile of the fix!