

AERONAUTICAL CHARTING MEETING

Instrument Procedures Group

Meeting 19-02 – October 2019

RECOMMENDATION DOCUMENT

FAA Control # 19-02-344

Subject: Intermediate Segment Stepdown Altitudes

Background/Discussion:

In 2011, FAA AFS 400 published a policy memorandum ([attached](#)) providing guidance for the locating the fixes used for ATC vertical separation purposes and glidepath intercept support regarding simultaneous operations. Paragraph 3 of the memo provided guidance for locating fixes on straight-in aligned procedure for ATC vertical separation purposes at locations where high temperatures induce premature descent. The purpose of this guidance was to ensure that fixes located on the intermediate segment of approaches supporting simultaneous operations could reasonably be expected to be at or below the ILS glideslope so that the aircraft could descend on the ILS glideslope and remain at or above the published intermediate segment step-down fix altitudes leading to the PFAF. This is in accordance with the safety risk findings supporting simultaneous parallel approach operations.

This policy memorandum was supposed to be incorporated into JO 8260.3 U.S. Standard for Terminal Instrument Procedures (TERPS). NBAA has learned that this did not occur, and further that the FPTs never applied this memorandum to any procedures then in development or currently deployed in the NAS. FAA did include a reference to the need to “consider” the effect of high temperature in the TERPS reference guidance on simultaneous independent approaches in Appendix E, paragraph 5.f.:

f. Approach design for fixes on the portion of the approach that is aligned with the FAC. **It is highly recommended that the high temperature algorithm (also called temperature compensation) be used when placing fixes on the FAC and extended FAC.** The advantage is to allow aircrews to make a stabilized descent, even on days with high temperatures. If the high temperature algorithm is not applied, on high temperature days the pilot might have to shallow out or even briefly level off to meet an altitude restriction instead of being able to follow the glide slope indication. However, since the algorithm results in the fixes being further out, there may be circumstances, such as airspace constraints, that preclude applying the high temperature algorithm. TERPs specialists should coordinate with the affected ATC facility.

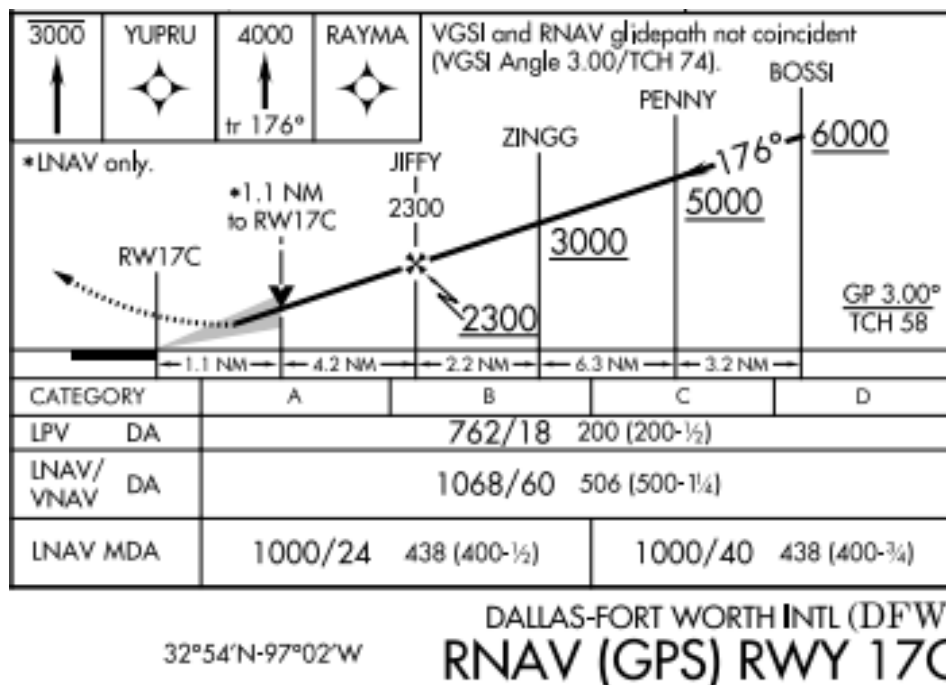
However, no algorithm is furnished in TERPS or any other FAA Order to the TERPS specialist for completing this analysis nor is it required that they do so.

The policy memorandum was issued as result of pilot altitude deviations occurring on the ILS approaches at Chicago O'Hare (KORD) to the newly commissioned runways. The memorandum was to ensure, obstructions and terrain needs notwithstanding, that an aircraft could descend on the ILS glidepath with reasonable confidence that it would remain above published intermediate stepdown fix altitudes.

NBAA has recently learned that certain WAAS-SBAS capable RNAV systems will begin using WAAS-SBAS vertical guidance starting at the Final Approach Course Fix (FACF), which is typically, but not always co-located with the intermediate fix (IF) on an RNAV approach. Since the WAAS-SBAS generated vertical path is not subject to hot/cold temperature effects as occurs with a barometric derived (Baro-VNAV) vertical path, the effects of hot temperatures on

compliance with the intermediate segment stepdown fix altitudes on these approaches is similar to an ILS glideslope, as illustrated by this example - KDFW RNAV(GPS) Rwy 17C:

- At 100°F, ZINGG is 200' above the WAAS-SBAS glidepath
- At 130°F (charted limit), ZINGG is 300' above WAAS-SBAS glidepath



An aircraft descending using VNAV, which is generated by WAAS/SBAS and not Baro-VNAV, and on the vertical path would cross below the published altitudes at PENNY, ZINGG and JIFFY if BOSSI is designated at the FAF in nav-database coding.

Recommendations:

NBAA recommends that the policy memorandum be incorporated into JO 8260.3 U.S. TERPS and on approaches where LPV minima are published, in FAA Order 8260.58.

Comments:

This request affects FAA Order 8260.3 and FAA Order 8260.58.

Submitted by: Richard J. Boll II

Organization: NBAA

Phone: 316.655.8856

E-mail: Richard.boll@sbcglobal.net

Date: 9/16/19

Initial Meeting 19-02: Rich Boll, NBAA, briefed the new issue using slides. FAA recognized the temperature compensating altitude issue, and issued a policy memo in 2011. This memo was planned to be incorporated onto TERPS changes, however this did not happen, instead there was language added to the simultaneous approach operations guidance suggesting altitudes be compensated at locations with high temperatures, but the algorithm was never added to TERPS. Rich also stated there are errors in the algorithm that need repairs. The NBAA recommendation is to move the policy memorandum language into TERPS, and correct the algorithm. Some locations with this concern moved the impacted fixes farther out facilities to alleviate the problem. Gary McMullin, Southwest Airlines, pointed out there can be discrepancies in indicated altitudes between aircraft flying LPV or LNAV/VNAV vertical guidance on the same approach since the LNAV/VNAV glidepath is derived by barometric altimeter. John Collins, general aviation pilot, added pushing out the last fix some distance would help. Rich pointed out AIM changes might be required in the future, but would depend on Flight Procedures and Airspace Group decisions.

Action Items:

- FAA Flight Procedures and Airspace Group will review the 2011 policy memorandum and determine if it should be incorporated into Order 8260.3

Status: Item open

Meeting 20-02 Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue summary and current status from the [slide](#). A memo was published in 2011 to provide guidance for adjusting intermediate segment fix locations for high temperature effects. The memo advised that guidance would be placed in a future revision of FAA Order 8260.3, but this has not yet occurred. The plan at this point is to include it in a revision in the near future. Appropriate guidance will be included as an appendix to the order, and language currently referencing the 2001 memo will be revised to reference the appendix. Gary Fiske, FAA ATC Procedures (Terminal) Team, said as a result of the 2011 memo, KLAX ILS finals were revised to account for high temperature days by moving some fixes. John Blair, FAA Flight Operations Group (FOG), advised he and Joe Lintzenich, FOG, worked the situation in depth, and they found that over the years many locations had applied the memo guidance and support including the guidance in Order 8260.3. Rich Boll, NBAA, added this is also an RNAV issue, particularly for SBAS approach procedures. Jeff said they will ensure language in Order 8260.3 (and also Order 8260.58 if necessary) will point to the appendix. Paul Hannah, Lean Engineering, discussed that the PARC NAV WG has discussed similar capture fix issues, and Gary Petty, FPAG, said the changes would be coordinated as necessary to ensure there is no disconnect and would not have an unexpected negative effect on existing procedures.

Action Items:

- Flight Procedures and Airspace Group will brief the Order 8260.3 changes.

Status: Item open

Meeting 21-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue summary and current status from the [slide](#). The addition of the algorithm to Order 8260.3 has not been accomplished yet, but is planned for the next draft revision of the order. Jeff explained the intent would be to include the algorithm in an appendix, and reference usage in applicable points of Orders 8260.3 and 8260.58. Rich Boll, NBAA, asked if this would be optional or mandatory, and Jeff the plan is for the application to be optional. Rich added he is concerned about some users having issues and will want to see the language, indicating a non-concur would likely follow if the application was not mandated. He said the temperature adjustments are primarily used with simultaneous parallel independent approaches, and the vertical path has to be above the stepdown fix altitudes. He added that the stepdown fix altitudes must support intercepting the glideslope or an SBAS generated glide path. Jeff will have an off-line discussion with the Flight Operations Group, and may loop Rich in on the further discussion.

Action Items:

- Flight Procedures and Airspace Group will brief the Order 8260.3 changes

Status: Item open

Meeting 21-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue summary and current status from the [slide](#). A calculation methodology for this has been added into a new appendix for draft Order 8260.3E Change 2. There was a 2011 memo that explained the methodology, and that was refined slightly for inclusion with explanatory language added. Rich Boll, NBAA, discussed the original concern was step down fixes at the published glideslope crossing altitudes. On a warmer than standard day, an aircraft flying the ILS will cross the fix with an indicated altitude lower than the published altitude, which is problematic if the published altitude is required for separation on simultaneous parallel independent operations. Rich added at the last meeting it was briefed the application of the appendix was optional, not mandatory, and Jeff said it would remain that way. Rich felt this could set up pilots for deviations, but Jeff said in areas where this may factor, the procedure designers could consider revised fix placement using this methodology to mitigate the problem. Rich asked about any explanatory accompanying language for the draft appendix, and said they will comment during coordination on the draft. Jeff read the draft language for the draft appendix. Dan Wacker, FPAG, asked if Aeronautical Information Services (AIS) would include this in automation software, but Jeff had not had those conversations with them. Dan will reach out to AIS and discuss the matter.

Actions: The Agency will continue the coordination process on the draft order and report status at the next ACM.

Status: Item open

Meeting 22-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue ([slide](#)). There is a 2011 memo on crossing altitudes in intermediate segments, and it is now incorporated into Order 8260.3E, Change 2 as an appendix. Dan Wacker, FPAG, will discuss with Aeronautical Information Services and MITRE to determine if this capability will be added to TARGETS, adding there may be some confusion with cold weather adjustments.

Actions: FPAG will report on status of the order revision. FPAG will meet with Aeronautical Information Services and MITRE to determine if this capability will be added to TARGETS and will report on outcome of those discussions.

Status: Item open.

Meeting 22-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue ([slide](#)) summary. Dan Wacker, FPAG, advised the Order 8260.3E (Change 2) draft incorporated the necessary criteria in an appendix and has held discussions with Aeronautical Information Services (AIS) and MITRE to determine the possibility of implementing in automation. Dan suggested the issue could be closed. Jeff Rawdon, FPAG, pointed out there were no concerns raised with this criteria change during coordination of the order draft. Since the original proponent (Rich Boll, NBAA) was not present, attendees felt the issue should remain open until he could provide concurrence with closing the issue. Michael Stromberg, Independent Pilots Association (IPA)/UPS, said he believes Rich wanted stronger guidance on the issue to require fix location compensation, and he has the same concern. Jeff recalled Rich's concern but said the Agency decision was that this would be an appendix to the order, and therefore not mandated. Doug Willey, Air Line Pilots Association (ALPA), voiced concerns also, agreeing with Rich and Michael that this should be a standard requirement. Dan pointed out that the addition of this criteria (though not mandated) would support airports where Air Traffic and pilots had perceived altitude compliance issues, and the change would replace the 2011 memo initially providing this information. John Blair, FAA Flight Operations Group, said this was an issue at some locations, and this effort would provide designers the ability to address those locations.

Actions: FPAG will report status of the Order 8260.3E (Change 2) changes at ACM 23-01.

Status: Item open

Meeting 23-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue ([slide](#)) summary, actions, and status. He pointed out that while some wanted the fix location adjustment due to high temperature considerations to be a firm requirement, the decision was made to add it as an appendix to Order 8260.3. The Order 8260.3 revision with the new appendix should be signed and published this summer.

Rich Boll, NBAA, asked how the facilities would be aware of this optional capability. Jeff said the explanation and intent would be in the introductory language of the appendix. Rich feels ATC will not want to give up cardinal altitudes and since the adjustment will be optional they may not want to apply it, which could be an operational problem for pilots and voiced that the altitudes need to compensate for the temperatures. Gary Fiske, FAA ATC Procedures (Terminal) Team (AJV-P310), said in practice where this has been previously applied, fix locations were moved on the procedure glideslope to ensure the aircraft crossed at or above specified altitudes since ATC did not want to give up cardinal altitudes.

Jeff showed a slide with the introductory language in the Order 8260.3E Chg 2 appendix: “At locations where higher than standard temperatures may cause glideslope intercept at a specified altitude to occur prior to the fix or may cause aircraft on the glideslope prior to the PFAF to cross fixes with indicated altitudes below the fix crossing altitudes the following methodology may be used to compensate for those effects by adjusting the fix location to insure intercept does not occur prior to the fix when temperatures are as high as the three (3) to five (5) year average airport high temperature.”

John Blair, FAA Flight Operations Group (FOG) discussed the previous high temperature compensation work as Gary discussed. John supports leaving these adjustments as an optional capability for facilities and procedure proponents rather than making it mandatory. Rich discussed simultaneous procedures and altitude assignment issues at glideslope intercept with fixes pushed further out and aircraft having to fly further. Rich and Gary discussed crossing below the glideslope on parallel finals and John said they has not heard this presented as a problem.

Rich questioned if the need for multiple step down altitudes on the approaches was necessary if facilities only needed vertical separation on parallel approaches at turn on. Gary thought the altitudes might help ATC at turn on points on the procedure but added that aircraft crossing beneath the aircraft on the glideslope could be an issue. Jeff reminded the group that this methodology was previously described in a 2011 memo which was to be incorporated into Order 8260.3, this effort completes that interest, and Flight Standards believes this methodology gives procedure developers everything they need to apply these adjustments where desired.

Doug Willey, Air Line Pilots Association (ALPA), said this is still an issue at Chicago O’Hare on hot days when the aircrew follows the glideslope outside the final approach fix.

Rich was concerned about a possible lack of application to SBAS approach procedures and suggested language should be added to allow this methodology for LPV and GLS procedures as well. Jeff said FPAG would consider this for a change or might consider adding language to Order 8260.58 to point to the Order 8260.3 appendix for application on LPV and GLS procedures.

John Barry, FAA Aircraft Certification, agreed with Gary about maintaining altitudes until a fix and supported the concept of placing fix locations as necessary and not just for standard atmosphere days.

John Blair said they would discuss the need for adjustments for simultaneous approach procedure in the Flight Operations group. John believes Chicago had applied the high temperature adjustments, but they will contact the facility to confirm. John requested information from Doug regarding any issues related to the high temperature adjustments. Mark Mentovai, Manhattan Flight Club, asked if this capability would be incorporated into automation, and Nick Pettiet, MITRE, confirmed it could be incorporated into TARGETS but that no specific plans or timelines have been decided. Jeff said FPAG will check to see if Order 8260.58 had been updated to provide application of the methodology to LPV and GLS procedures and would take additional action if necessary. Rich suggested the issue should remain open since SBAS was addressed in the original RD.

Actions: FPAG will review Order 8260.58 and proposed changes for information related to application of the methodology to LPV and GLS procedures and, if not already, will take action to incorporate that information.

Status: Item open

Meeting 23-02: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed the issue from the [slides](#). As previously briefed in ACM 23-01, the fix location adjustment methodology was incorporated in an Order 8260.3 appendix. In answer to the question from ACM 23-02 inquiring if the Order 8260.3 appendix would apply to LPV/GLS also, Jeff briefed that Flight Standards determined it could be applied to LPV/GLS as written. Jeff briefed that the recommendations of the RD had been addressed and would like to close the RD at this time. Rich Boll, NBAA, concurred with closing the RD.

Status: Item closed