June 19, 2015

Ms. Margaret Gilligan
Associate Administrator for Aviation Safety
Federal Aviation Administration
800 Independence Avenue
Washington, DC 20591

Dear Peggy:

The Performance-based operations Aviation Rulemaking Committee (PARC) is pleased to submit the following recommendations which address two issues that were requested by FAA and Industry. These two items are 1. Standard Terminal Arrival Route (STAR) and Instrument Approach Procedure (IAP) Common Point, and 2. RNP AR temperature effect on intermediate segment.

The PARC Navigation Working Group was assigned these tasks, which they completed in April 2015. The WG recommendations were approved by the PARC SG during the June 5, 2015 telecom discussion. I have attached a single document, which combines both recommendations, to this letter.

PARC has retained a history of meetings and backup substantiation of conclusions on the PARC website. The PARC appreciates your continued support of its activities and invites you to discuss any aspects of these recommendations at your earliest convenience. The PARC respectfully requests the FAA to provide the PARC with a formal response.

Sincerely,

Mark Bradley
Chairman, PARC

Cc: R. Dunham
M. Steinbicker
B. DeCleene
M. Cramer

RNP AR COLD TEMP EFFECT ON INTERMEDIATE SEGMENT

The Navigation WG reached consensus in support of this proposal as written. Circumstances have changed since the original criteria, particularly the fact that now all non-precision procedure segments, including the intermediate will be temperature limited if necessary when standard ROC and methods are applied. Since the AR methodology was defined before this temperature limit began being applied to segments other than final, the PARC team working on 8260.52a considered it appropriate to compensate using the method described in Section 2.9. Now that AFS is applying temperature limits to the intermediate (and all other segments), the Nav WG agrees that this eliminates the principal need for the AR connection method of section 2.9 and standard ROC can be applied. Reverting to the standard 500' ROC value for the intermediate in all cases will streamline the criteria and make it consistent across all designs.

Proposal from AFS to PARC is copied below:

Proposal to Remove VEB ROC Application in RNP AR Intermediate Segments
PARC WG White Paper

Overview

This White Paper discusses the issues associated with VEB ROC application in lieu of standard ROC in the intermediate segment and proposes the deletion of this requirement from RNP AR design criteria.

Background

Order 8260.52, United States Standard for Required Navigation Performance (RNP) Approach Procedures with Special Aircraft and Aircrew Authorization Required (SAAAR) stated that a comparison must be made between the 500 ft intermediate ROC value and the ROC value provided by the VEB; which is the difference between the glidepath altitude and OCS elevation at the location of the intermediate segment controlling obstacle. When the VEB ROC exceeds 500 ft, this value must be used to derive the minimum intermediate segment altitude.

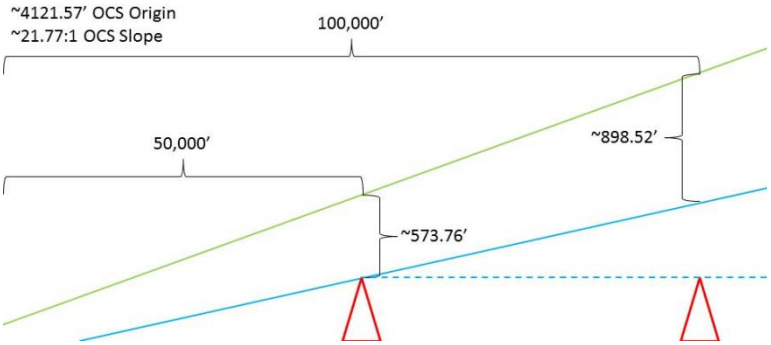
Order 8260.58, United States Standard for Performance Based Navigation (PBN) Instrument Procedure Design amended this requirement by ending VEB application at the elevation of the intermediate segment controlling obstacle. Therefore, the VEB ROC is equal to the difference between the glidepath altitude and the OCS elevation at the point where the OCS reaches the height of the intermediate controlling obstacle.

Discussion

The automated implementation of this criteria reflects that of 8260.52, which can be particularly troublesome when the intermediate controlling obstruction is located at great distances from the LTP/FTP. See image below (not to scale):

RNP AR COLD TEMP EFFECT ON INTERMEDIATE SEGMENT

5433.80′ Airport Elevation
5377.90′ LTP Elevation
-30°C Delta ISA
3.00° GPA
60′ TCH
7000′ PFAF
0.3 RNP
Wide body
TF



Other issues include, but are not limited to:

1) The VEB slope and origin must be recalculated when the PFAF altitude is changed
2) Moving the PFAF may cause obstacles that were previously excluded to penetrate the final OCS
3) Moving the PFAF may require the relocation of downstream waypoints, which could bring in higher terrain and obstructions

To avoid undue burden, it has become commonplace for procedure designers to find a warmer critical low temperature that either nullifies the requirement or produces a more manageable VEB ROC value. This practice negatively affects the usability of the procedure. While the 8260.58 interpretation of the VEB ROC does provide some relief to the problem, the specialist would have to apply a manual workaround until automation could be updated.

Cold Temperature Restricted Airports:
Cold Temperature Restricted Airports List

A policy that became effective on January 8, 2015 has put restrictions on certain airports during cold weather operations. A quote from this study states:

> If a probability of the ROC being exceeded went above one percent on a segment of the approach, a temperature restriction was applied to that segment. In addition to the low probability that these procedures will be required, the probability of the ROC being exceeded precisely at an obstacle position is extremely low, providing an even greater safety margin.

Beginning in the March 2015 charting cycle, a snowflake symbol and temperature (-XX°) will be incrementally added to the IAPs at the airports identified by the above criteria. When the reported temperature is at or below the charted temperature, pilots must correct their altitude in accordance with the following table, which can be found in AIM 7-2-3.

RNP AR COLD TEMP EFFECT ON INTERMEDIATE SEGMENT

ICAO Cold Temperature Error Table

∨**Reported Temp ºC** ∨**Height Above Airport in Feet**

	200	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**	**1500**	**2000**	**3000**	**4000**	**5000**
+10	10	10	10	10	20	20	20	20	20	30	40	60	80	90
0	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1210
-50	60	90	120	150	180	210	240	270	300	450	590	890	1190	1500

EXAMPLE-
Temperature -10 degrees Celsius and the aircraft altitude is 1,000 feet above the airport elevation. The chart shows that the reported current altimeter setting may place the aircraft as much as 100 feet below the altitude indicated by the altimeter.

The formula that was used to derive the values is shown below, which is comparable to the ISAD formula from 8260.58 Vol 5, Ch. 5:

$$\text{Ceiling}\left(\frac{Height \times (15 - Temp°C)}{273 + Temp°C - 0.5 \times 0.00198 \times Height}, 10\right)$$

Proposed solution:
In light of the recent Cold Temperature Restricted Airports report and the precedent set by all other forms of final approach guidance, standard 500’ ROC should be applied in all RNP AR intermediate segments. If standard ROC is not applied, the pilot will be doubly penalized during cold weather operations.

April 30, 2015