

April 24, 2017

Mr. John Hickey
Acting Associate Administrator for Aviation Safety
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear John:

The Performance-based Operations Aviation Rulemaking Committee (PARC) is pleased to submit the recommendations for “RNP to GLS and LPV” in the attached report. The Performance-based Operations Aviation Rulemaking Committee (PARC) requested the Navigation Working Group (Nav WG) conduct an analysis to address the procedure design criteria for RNAV procedures that would connect, seamlessly, to an ILS, GLS, or LPV procedure. The initial recommendation, provided to AVS-1 on 28 August, 2014 contained recommendations for RNAV to ILS procedures. Those recommendations were subsequently incorporated into FAA Order 8260.58A.

The attached recommendations address both GBAS (GLS) and LPV criteria, which required additional analysis.

The Nav WG has done an exemplary job working through the myriad of analysis requested by the PARC Steering Group. Their steady and purposeful work continues to close gaps in order to foster more effective and efficient performance based navigation procedures. They should be commended.

It is the request of the PARC SG, as always, that we be provided a formal response.

The PARC appreciates your continued support of our activities and invites you to join us in a discussion of these recommendations at your convenience. Please call me if you have any questions or would like to set up a discussion.

Sincerely,



Mark Bradley
Chairman, PARC

Cc: Bruce Decleene
Mike Cramer
Mark Steinbicker
Danny Hamilton
Merrill Armstrong
T.J. Nichols
Lou Volchansky

In 2014, the PARC Nav WG completed its recommendations for RNP to ILS operations and criteria. Since that time, research has been conducted into RNP to GLS and RNP to LPV operations based on the same criteria. Tests using the ILS criteria to connect to a GLS final, as well as to lay the shallow temperature compensating intermediate segment along the RF from downwind to final, were conducted in Boeing engineering lab simulators for validation. For LPV final segments, a survey was completed among all the vendors for LPV equipment. They were asked to review the ILS criteria to determine if it could be used unchanged to connect to an LPV final in their equipment.

Since GLS equipment was designed to mimic ILS operation in the aircraft, the Boeing tests verified the WG expectation that the design criteria will work the same with GLS as with ILS. The significant finding was that the temperature compensating segment worked equally whether aligned with the final segment OR wrapped around the RF leg to a capture fix on the RF. These tests were conducted in Seattle on September 23, 2016 and presented to the WG in the October F2F meeting. The results are available on the PARC website.

The survey of LPV manufacturers (Garmin, Universal, Honeywell, Rockwell, CMC) resulted in agreement that the ILS criteria as defined in the appendix would work equally well with an LPV final segment. Email from each of the vendors has been captured on the PARC website in the recommendation folder for RNP to xLS.

Note: It is important to keep in mind that this recommendation only applies to the use of RF to implement the turn to final. The use of TF transitions results in a need for both longer (minimum of 5 NM) final segments AND for the temperature compensating straight segment (the intermediate segment) to lie along the final approach course prior to the FAF following the turns to final.

Based on the testing and survey results, the PARC Navigation WG reached consensus on the following recommended changes to 8260.58A Appendix C criteria:

1. Add wording that states that the ILS criteria can be applied as written to connect to either GLS or LPV once the final segment is defined.
2. Add wording to allow the shallow segment to lie along the RF coming into the FAF to shorten the overall path length if necessary.

The WG also recommends that FAA update the RF leg test cases (contained in AC20-138C) to demonstrate the most stringent operation allowed under the recommendation. The test would be defined as follows to assure operational feasibility and equipment capability:

1. Add test cases using a 2 NM RF to turn from downwind to a 3 NM xLS final with:
 - a. The capture fix along the final approach course coincident with or following the end of the RF;
 - b. The capture fix along the RF leg with the RF ending at the FAF.