

August 25, 2005

Mr. Nicholas Sabatini
Associate Administrator for Regulation and Certification
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Nick,

The PARC is pleased to submit the enclosed government/industry consensus recommendations for addressing the issue of incorrect runway selection in flight management systems, noting operational issues from RNAV implementation in Atlanta.

The PARC Human Factors Working Group objective was to identify ways that errors could be detected and corrected before takeoff. The attached recommendations are focused on short-term actions that can be taken to reduce the risk at DFW procedure activation to an acceptable level.

These recommendations represent a significant effort in the continued implementation of a Performance based NAS. I expect that they will have a positive impact on all follow RNAV implementation sites. This is due to the efforts of Kathy Abbott, Karol Kerns, and the other members of the Human Factors Working Group.

Please call me if you have any questions or would like to set up a discussion.

Sincerely,



Dave Nakamura
Chairman
Performance-based operations Aviation
Rulemaking Committee

Cc: PARC Members
K. Abbott
K. Kerns
J. McGraw
J. Williams

**Recommendations from the PARC Human Factors Working Group for RNAV SIDs multiple runway operations
Addressing the issue of incorrect runway in the FMS**

Goal: identify mechanisms to avoid flight crew error of having a different runway in the FMS than the assigned runway, and identify appropriate mitigations for detecting and correcting the error when it occurs.

The ideal approach would be to prevent the errors from occurring. But one important assumption made by the PARC HF WG was that it is not possible to completely prevent all the errors. Therefore, it is important to identify ways to detect and correct the error before takeoff. The recommendations below are based on this assumption.

These recommendations are focused on short-term actions that can be taken to reduce the risk at DFW procedure activation to an acceptable level. Longer-term recommendations will be provided separately.

1. Provide enhanced pilot training/familiarity/awareness

- **Implement a SID Ops departure page** that has two sections. One section would be generic, to address general RNAV issues related to simultaneous RNAV departures from multiple runways. The second part would contain airport-specific material that would be useful to the pilots. Please see attached example. Note: This information should be placed into source data for all future implementations to ensure that it is provided in all publications, regardless of the provider.
Recommendation for DFW and ATL: This should be required prior to activation.
- **Publish a Safety Alert Notice or local notice to airmen** (this is intended to provide the information to non-airline operators).
Recommendation for DFW: This item is recommended, but not required, before DFW startup.
- **ALPA/APA bulletin.**
Recommendation for DFW: ALPA & APA expect to complete their bulletin in time for the activation of DFW RNAV operations.

2. Give the pilots the best chance of loading the correct runway in the FMS at the gate (although they need to be aware that they may be assigned a different runway based on air traffic needs). This may be done through ATIS, PDC/Departure Clearance, a matrix on the SID Ops page, or a combination of these methods.

- **ATIS** – Provides information to flights on which runways are in use at most locations today.
Recommendation for DFW: Continue to provide runway-in-use information and add a message to advise that RNAV departure procedures are in effect
- **PDC** – This may be a useful tool to provide expected runway; however, there is some concern about the possible misperception by the pilots that this represents a final runway assignment as opposed to a “best guess.” More evaluation is required prior to making a final recommendation.
Recommendation for DFW: No change from current operation is necessary to start operations at DFW.

3. Detect and correcting the error of having a different runway in the FMS from the one assigned:

- **Flight crew procedures** – e.g., performance-based checklist that directs pilots to detect and correct FMS errors through challenge-response. Many operators are currently in the process of revising checklists for this item.

Attachment

- **ATC RNAV Procedure Verification** – This is an adaptation of current Ground Metering function to actively ensure that flight crews have loaded the correct procedure and runway. The group identified this as the most significant means of ensuring compliance with procedures by requiring flight crews to provide runway and first waypoint loaded verbally to ATC.
Recommendation for DFW: Must have in place prior to procedure activation. ATC will ask for FMS runway and first waypoint. If the pilot responds incorrectly, it is expected that ATC will correct them. If the incorrect runway is programmed, any FMS change should be done when airplane is stationary. (Coordinate with ATC on where to be stationary.)
- **Runway Signage** – Discussion on effectiveness of signage as a means to ensure the flight crews had loaded the correct runway in the FMS.
Recommendation for DFW: Optional but not required. Signage may be more helpful for non-air-carrier flight crews.

4. Provide regulatory guidance for inspectors (HBAT Guidance). Need to review with PARC.

- Included in this guidance will be a recommendation for procedural means to verify the loaded runway in FMS. This could be accomplished through checklist modifications. Some operators may already do this.

Recommendation for DFW: This is desirable but not mandatory for initial activation.

5. Conduct an ongoing review of in-service experience during the initial implementation of the departure procedures. Previous implementations (e.g., first activation in DFW, in ATL) did this type of review, and the PARC HF WG recommends that such a review should also be done for future implementations. This review of in-service experience should involve multiple areas of expertise, including flight operations, air traffic operations, flight crew and air traffic training, human factors, avionics, procedure design, and other areas as needed.

Note that there are issues with certain FMSs on implementing speed restrictions (and possibly other restrictions). The recommendations provided above are based on the assumption that the FMS issues have been addressed. In addition, it is assumed that the SID Ops page will be changed to include the up-to-date flight plan suffixes.

Draft DFW RNAV SID Ops Page

Flight crew procedures when flying RNAV SIDs:

1. All aircraft with /E, /F, /G, /R, and /Q filing suffixes should expect an RNAV SID clearance. Verify filed RNAV SID against pre-departure clearance. If unable to accept the RNAV SID clearance, notify Clearance Delivery.
2. After loading the planned RNAV SID and departure runway into the FMS, verify the navigation display map and flight management system (FMS) waypoints against the appropriate chart. Do not modify or manually construct RNAV procedure.
3. **Maintain full awareness of loaded FMS departure runway at all times during ground operations.** After receiving runway assignment, confirm that the FMS has:
 - i. The correct departure runway,
 - ii. RNAV SID, and
 - iii. Initial waypoint.
4. Prior to taking the runway, use the navigation display and/or FMS to verify that the airplane position, runway symbol / identification, and lateral track agree with the departure clearance. *If FMS position is not acceptable prior to takeoff, notify air traffic and follow applicable company procedures.*
5. After takeoff, fly the departure track precisely by using flight director or autopilot in lateral navigation mode in accordance with company procedures. *Maintain awareness of adjacent lateral paths from other departure runways.*
6. Always maintain situation awareness. Parallel RNAV departures must not encroach on the airspace between extended parallel runway centerlines. Manually intervene *if/when* necessary to stay on track or avoid transgressing into a parallel track.

CAUTION

If unable to comply with the SID profile, either laterally or vertically, immediately notify ATC.

Add to DFW specific material

During taxi, ground *control* will direct you to contact "*RNAV Metering*".

Add a matrix to show the typical runway/SID combinations.

Note: use phrase "Within 1000' of a known position," in item 4 only for aircraft that need it. It is unclear how to do this with a generic SID Ops page.