March 21, 2018

Mr. Ali Bahrami
Associate Administrator for Aviation Safety
Federal Aviation Administration
800 Independence Avenue, SW
Washington, D.C. 20591

Dear Ali,

The Performance Based Operations Aviation Rulemaking Committee (PARC) is pleased to submit the following recommendation, which will update a current design standard requirement and for RNP AR instrument approach procedures. A brief summary is noted below, and the entire recommendation and supporting information is detailed following this letter.

The PARC Navigation Working Group revisited a requirement for a minimum 50 second straight segment on an RNP AR approach with initial missed approach segment of less than 1 NM, following an RF turn onto the final segment. Since the inception of the 50 second design requirement, operational mitigations were put in place to address concerns or gaps in aircraft capabilities. Aircraft avionics design improvements are serving to mitigate the issues originally put forth when the 50 second rule was put in place.

The February 2018 recommendation allows a shorter minimum straight segment of 15 seconds, regardless of initial missed approach segment RNP value. This will add more potential to take advantage of RNP AR procedures in locations that heretofore could not leverage the advantages of performance based navigation procedures.

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

The PARC appreciates your continued support of its activities and looks forward to your response.

Sincerely,

Mark Bradley
Chairman, PARC
404-915-2144

Cc: Mark Steinbicker
Chris Hope
Mike Cramer
Merrill Armstrong
Donna Creasap
TJ Nichols

RECOMMENDATION FOR REMOVAL OF 50-SECOND RULE FROM AR

The RNP AR requirement that the end of a turn in the final segment (an RF) be at least 50 seconds prior to the DA is contained in Order 8260.58A Chapter 4-2-2(b) and in AC90-101A Appendix 2 Figure 1. The requirement applies when the RNP value in the initial missed approach segment is less than 1 NM. This restriction on RNP AR approach design has resulted in the inability to provide a procedure in cases where it would be very beneficial operationally. The Navigation Working Group has been studying this requirement to determine if a reduction of the time delay might now be feasible, since the origin of the rule was in 2005 when RNP AR was introduced as criteria for public procedures and it was driven by avionics concerns for systems that did not automatically remain in LNAV following the start of a go-around. The WG has reached consensus on a recommendation for moving forward. The recommendation will be stated first, then it will be followed by tracing the origins of the rule and how it has been retained for reasons not embedded in the original perceived need. Supporting papers will referenced and included with the recommendation.

Recommendation

The Nav WG recommends the following change to procedure design criteria:

1. The Nav WG recommends that the 8260.58A RNP AR design criteria apply a standard minimum 15 second segment regardless of the missed approach RNP value. This should also be reflected in the update to AC90-101A.

Origin

When the RNP SAAAR Notice was converted to public criteria (late 2004 to early 2005), the PARC queried all OEMs and avionics manufacturers regarding several items. One of the items was related to the standard design of autopilot configurations that were originally designed for ILS approaches and which incorporated a “straight-in” assumption at the DA. These systems either entered a track hold mode or a wings level mode at activation of the missed approach, TO/GA. Thus, if the aircraft was in a turn or was slightly after the turn, the aircraft could be driven off path without active intervention by the flight crew. The question asked can be found in Attachment 1, question number 1. The Airbus and Boeing responses can be found in Attachments 2 & 3, where without specifying a particular aircraft they recommended 50 seconds and 40 seconds respectively.

At the time, there was considerable debate about whether this should be covered in operational approvals or procedure design criteria. The consensus was to place the requirement in criteria since no aircraft had yet implemented a TO/GA to LNAV (continuous LNAV) function in the autoflight systems.

History – What has happened since 2005

The intervening years have seen multiple changes for operational approval and avionics designs which all serve to mitigate this as an issue. The following have been updated or implemented over time and justify removal of the 50-second requirement.

1. Currently, every operational approval requires mitigation when an operator uses the TOGA function when abandoning the approach OR conducting a go-around during RNP AR operations. The following apply to this requirement:
    a. RF leg path compliance, not DA(H), is focus of mitigation due to potential excursion outside lateral OEA absent continuous LNAV
    b. An operator can also use alternative flight crew technique to abandon approach without using TOGA (e.g. flight level change [FLCH] in lieu of TOGA)
2. New production aircraft are being delivered with continuous LNAV (e.g. "TOGA-to-LNAV") & most OEMs offer an upgrade for RNP system continuous LNAV
3. Since inception of the RNP AR program, no operator of a legacy aircraft requesting RNP AR operational approval has presented documentation stating a performance requirement requiring the 50 second constraint
4. ACs, RNP MASPS/MOPS, TC/STC and TSOs now require continuous LNAV
5. Although most OEMs & operators have been training techniques and best practices for abandoning an approach at any location along the lateral path, not just at the DA(H), it should be required.

Summary

The origin of the requirement has been mitigated entirely by the production of aircraft that have continuous LNAV. The issue has moved into being one of pilot situational awareness regarding runway orientation when DA is at or just after the end of a turn. This aspect of the issue is currently being mitigated by RNP AR operators training to abandon the approach at ANY point along the lateral path AND by the recommendation that the lateral path MUST continue to the runway from the DA. Continuous LNAV is also available for retrofit from most OEMs, so after the requirement is removed, there is still a path to AR approval for aircraft lacking the function. This, taken in conjunction with the fact that no operator requesting RNP AR approval of a legacy aircraft has shown a need for the 50 seconds, supports the WG recommendation to replace the 50-seconds with a minimum of 15 seconds from FROP to FAF.

Example – 50 second rule prevents procedure from being implemented – KLGA RW 13

Recently, RNP AR approaches have been difficult to design at several airports constrained by either airspace or terrain. The issue has been caused by criteria (8260.58, para. 4-2-2) that states there must be 15 or 50 seconds between the final rollout point (FROP) and the decision altitude (DA). An approach designed for KLGA is the latest example that best demonstrates this issue.

When runway 13 at KLGA is required for arrivals, KTEB departures are highly restricted due to airspace constraints. To facilitate a better arrival rate to runway 13 in IFR conditions the FAA has implemented a RNAV (GPS) RWY 13 approach but this approach has limitations that can be corrected with an RNP AR approach. The GPS approach has high minimums along with a 15-degree offset and many consider this type of approach a moderate level of risk. To reduce this risk a RNAV (RNP) approach has been proposed but the 15 and 50 second rule may not allow this approach to be implemented.

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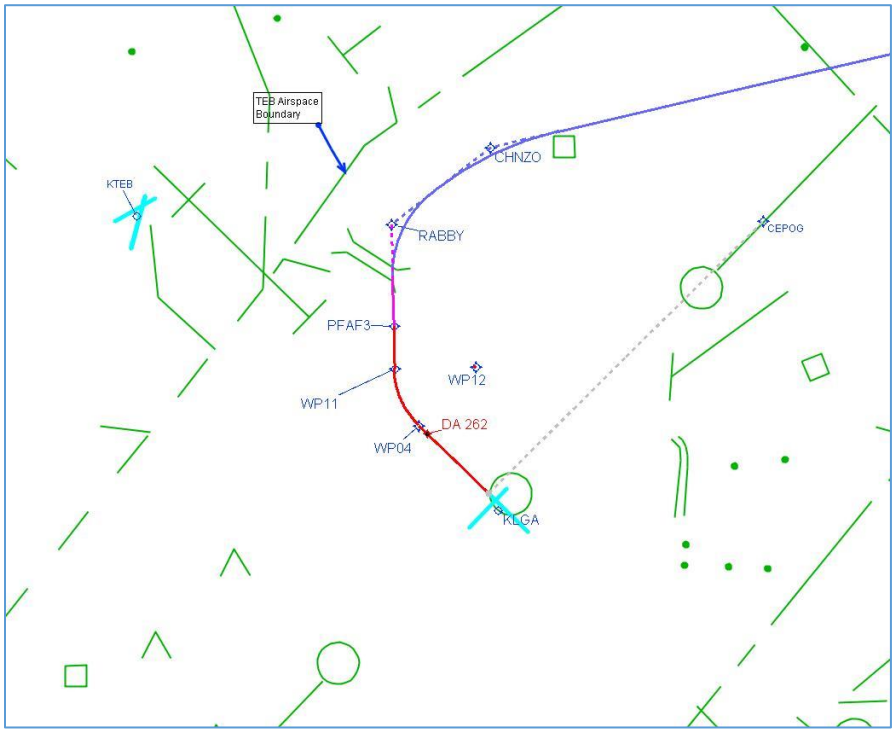
RECOMMENDATION FOR REMOVAL OF 50-SECOND RULE FROM AR

The picture below shows the RNAV (RNP) approach that remains clear of KTEB airspace and overlays the existing RNAV (GPS) approach that meets the requirements for ATC and Environmental approval. The problem lies with the distance from the FROP (WP04) to the DA being less than the required distance to comply with the 15/50 second rule.



In the picture below Targets generated a distance based on both the 15 and 50 second rule. The proposed RNP approach for LGA may be possible using a RNP 1 missed approach segment that will facilitate the use of a 1.40NM FROP segment length. However, if the FAA moves the DA to a higher altitude the 15 second rule will cause the FROP to move away from runway 13 causing an airspace issue that will prevent this approach from being developed. If the DA remains where it is, the 50 seconds prevents development of the procedure. TARGETS clearly shows that 15 seconds will work and the 50 will prevent implementation.

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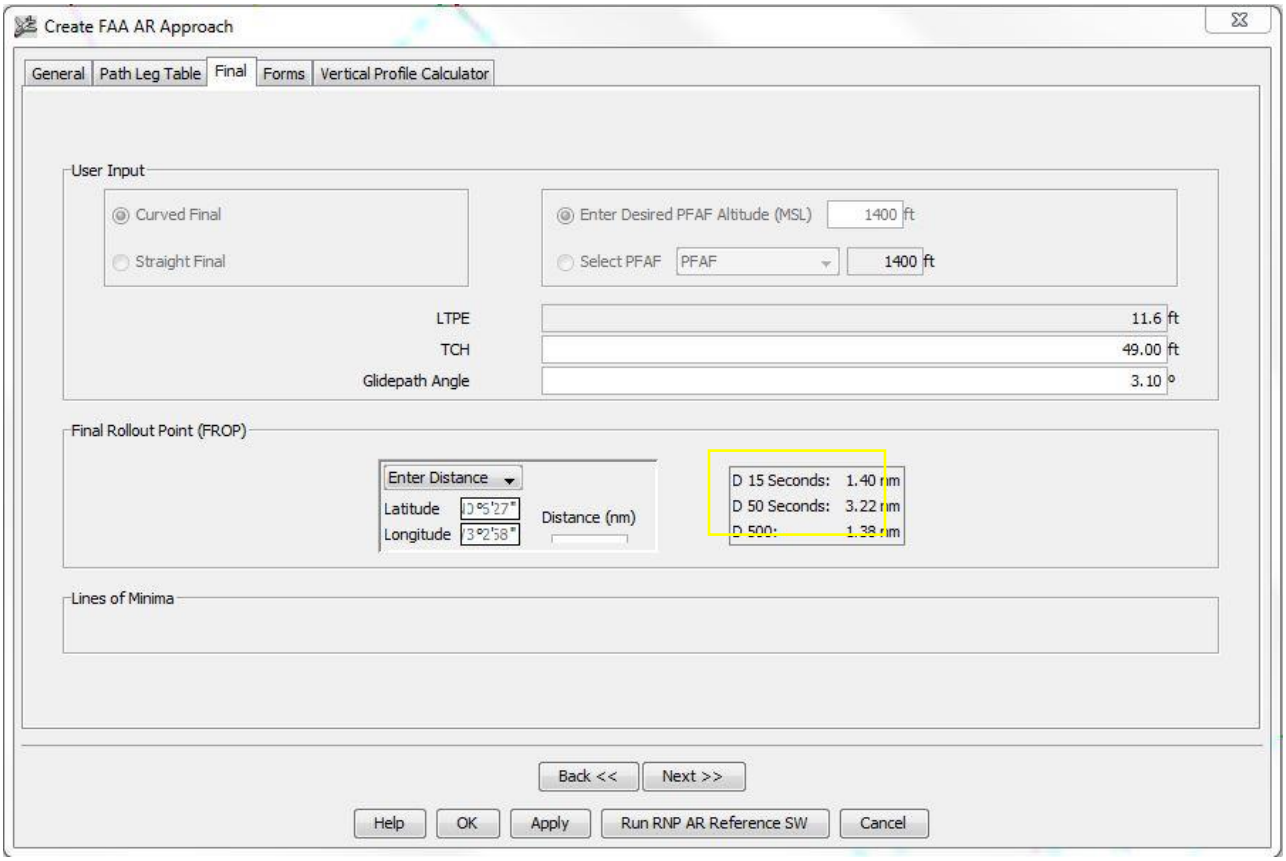
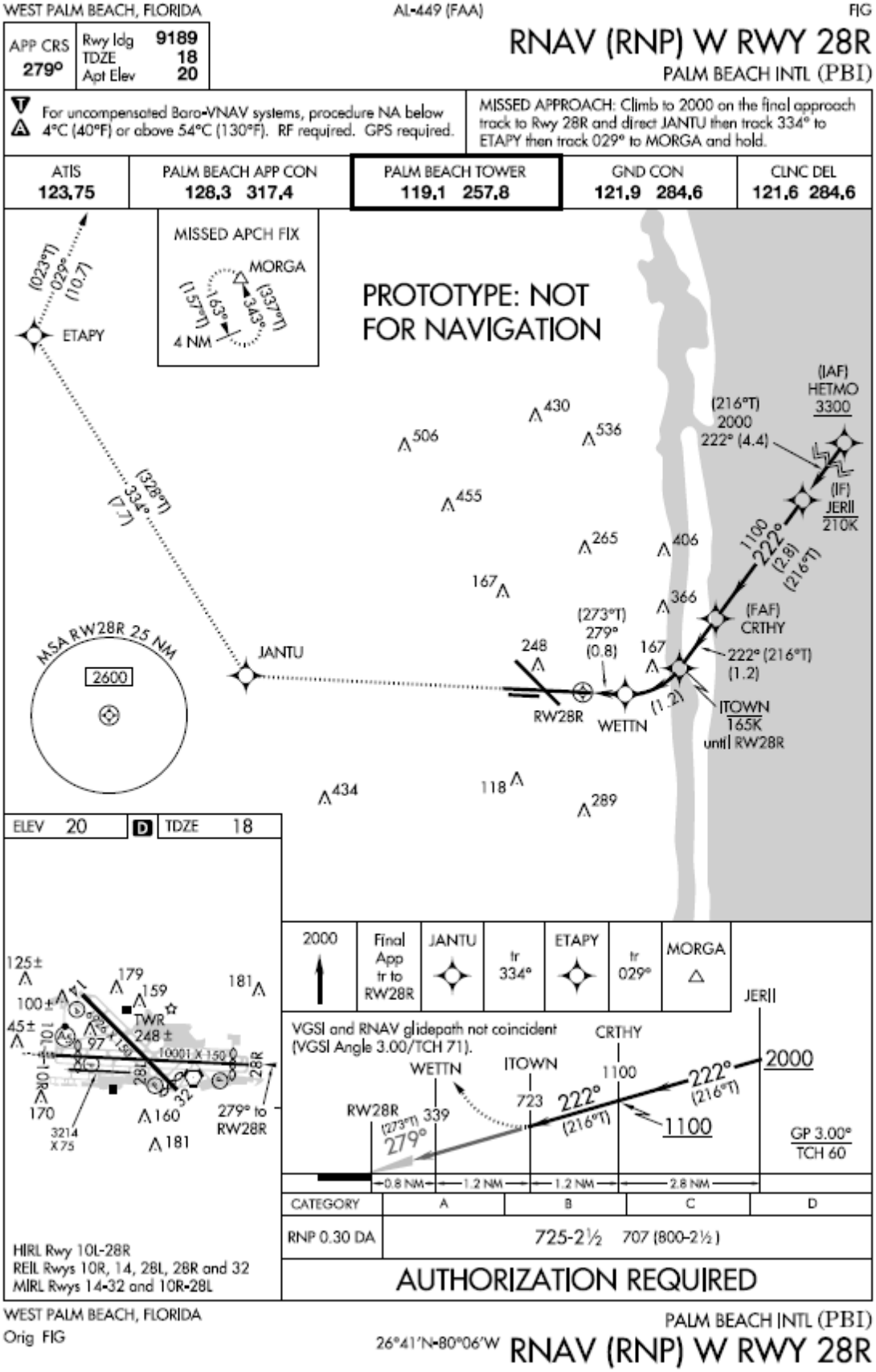
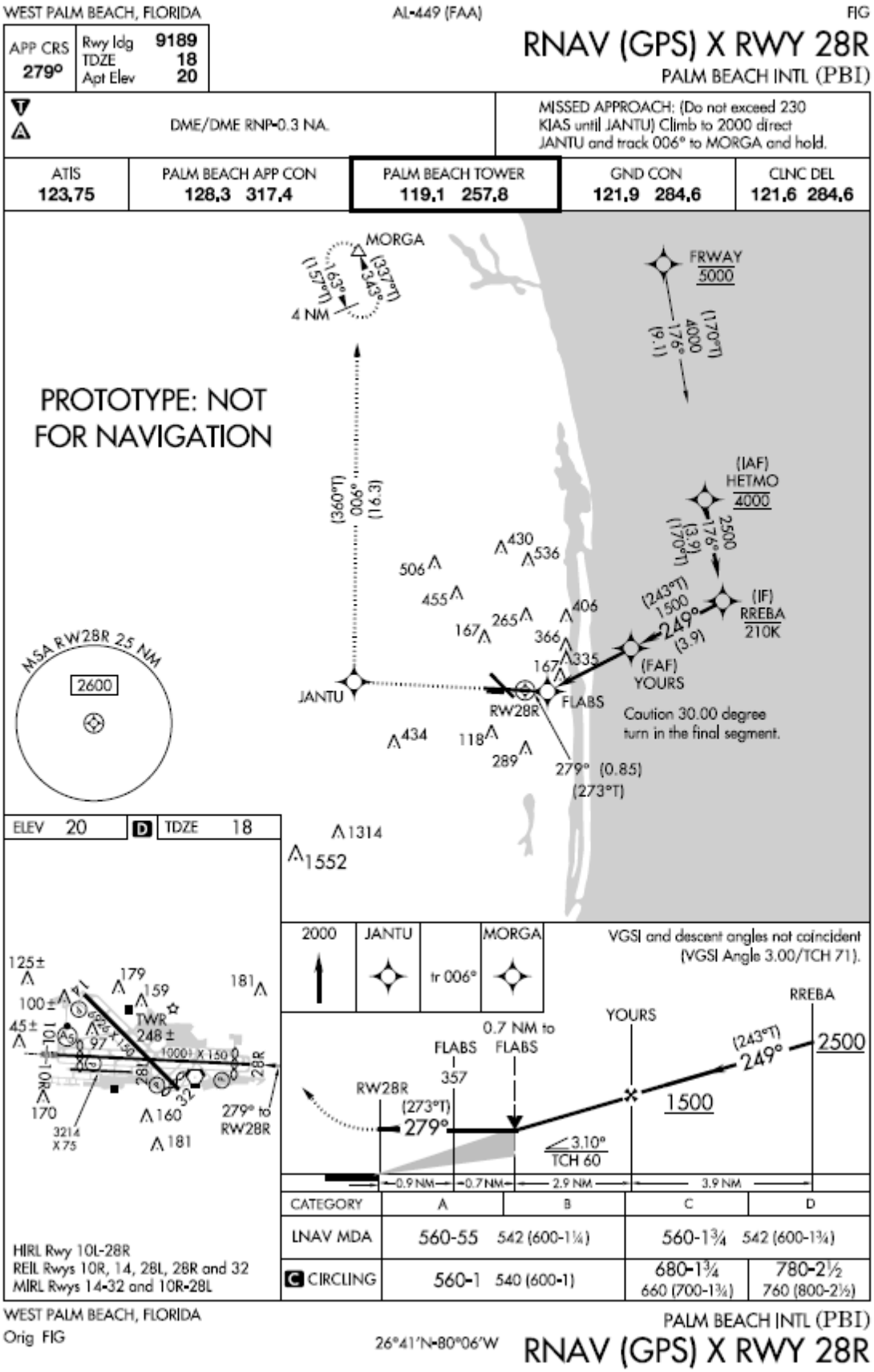


Example – 50 second rule forces higher minimums than RNAV(GPS)

This is our first case of the "no DA in the turn" has caused very high minimums to be placed into a RNP approach. When using the .3 RNP DA, the DA would be in the turn, thus not implementable. However, when using the .1 RNP the DA would be after the turn but not meet the 15 second rule. The solution was to move the DA prior to the turn, a very sub-optimal design for RNP compared to the RNAV procedure. See the two procedures below.

The ironic item is the FAA has designed a GPS approach with lower minimum's that requires the crew to turn the aircraft after the MDA without vertical guidance.


WEST PALM BEACH, FLORIDA
AL-449 (FAA)
FIG
RNAV (RNP) W RWY 28R
PALM BEACH INTL (PBI)
APP CRS 279°
Rwy Idg 9189
TDZE 18
Apt Elev 20
For uncompensated Baro-VNAV systems, procedure NA below 4°C (40°F) or above 54°C (130°F). RF required. GPS required.
MISSED APPROACH: Climb to 2000 on the final approach track to Rwy 28R and direct JANTU then track 334° to ETAPY then track 029° to MORGA and hold.
ATIS 123.75
PALM BEACH APP CON 128.3 317.4
PALM BEACH TOWER 119.1 257.8
GND CON 121.9 284.6
CLNC DEL 121.6 284.6
MISSED APCH FIX
MORGA
4 NM
PROTOTYPE: NOT FOR NAVIGATION
ETAPY
(023°T) 029° (10.7)
(328°T) 334° (7.7)
JANTU
MSA RW28R 25 NM
2600
(IAF) HETMO 3300
(216°T) 2000 222° (4.4)
(IF) JERII 210K
1100 222° (2.8) (216°T)
(FAF) CRTHY
(273°T) 279° (0.8)
222° (216°T) (1.2)
ITOWN 165K until RW28R
RW28R
WETTN
248
167
430
506
536
455
265
406
366
434
118
289
ELEV 20
D
TDZE 18
2000
Final App tr to RW28R
JANTU
tr 334°
ETAPY
tr 029°
MORGA
JERII
VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 71).
WETTN
ITOWN
CRTHY
1100
RW28R
(273°T) 339 279°
723
222° (216°T)
2000
GP 3.00° TCH 60
0.8 NM
1.2 NM
1.2 NM
2.8 NM
CATEGORY
A
B
C
D
RNP 0.30 DA
725-2½ 707 (800-2½)
AUTHORIZATION REQUIRED
HIRL Rwy 10L-28R
REIL Rwys 10R, 14, 28L, 28R and 32
MIRL Rwys 14-32 and 10R-28L
TWR
248 ±
10001X150
3214 X75
279° to RW28R
WEST PALM BEACH, FLORIDA
Orig FIG
PALM BEACH INTL (PBI)
26°41'N-80°06'W
RNAV (RNP) W RWY 28R


WEST PALM BEACH, FLORIDA
AL-449 (FAA)
FIG
RNAV (GPS) X RWY 28R
PALM BEACH INTL (PBI)
APP CRS 279°
Rwy Idg 9189
TDZE 18
Apt Elev 20
DME/DME RNP-0.3 NA.
MISSED APPROACH: (Do not exceed 230 KIAS until JANTU) Climb to 2000 direct JANTU and track 006° to MORGA and hold.
ATIS 123.75
PALM BEACH APP CON 128.3 317.4
PALM BEACH TOWER 119.1 257.8
GND CON 121.9 284.6
CLNC DEL 121.6 284.6
PROTOTYPE: NOT FOR NAVIGATION
MORGA
4 NM
FRWAY 5000
(IAF) HETMO 4000
(IF) RREBA 210K
(FAF) YOURS
JANTU
RW28R
FLABS
Caution 30.00 degree turn in the final segment.
279° (0.85)
(273°T)
MSA RW28R 25 NM
2600
ELEV 20
D
TDZE 18
2000
JANTU
tr 006°
MORGA
VGSI and descent angles not coincident (VGSI Angle 3.00/TCH 71).
0.7 NM to FLABS
YOURS
RREBA
2500
1500
3.10°
TCH 60
0.9 NM
0.7 NM
2.9 NM
3.9 NM
CATEGORY A B C D
LNAV MDA 560-55 542 (600-1¼) 560-1¾ 542 (600-1¾)
C CIRCLING 560-1 540 (600-1) 680-1¾ 660 (700-1¾) 780-2½ 760 (800-2½)
HIRL Rwy 10L-28R
REIL Rwys 10R, 14, 28L, 28R and 32
MIRL Rwys 14-32 and 10R-28L
WEST PALM BEACH, FLORIDA
Orig FIG
26°41'N-80°06'W
PALM BEACH INTL (PBI)
RNAV (GPS) X RWY 28R