

AERONAUTICAL CHARTING MEETING
Instrument Procedures Group
Meeting 23-01 – April 24-25, 2023

RECOMMENDATION DOCUMENT

FAA Control #23-01-374

Subject: Definition of Vectors to Final Approach Course

Background/Discussion:

Vectors to the Final Approach Course for an ILS is straightforward and unambiguous: Join the extension of the localizer navigation aid.

Other approaches may have ambiguities manifested into today's FMS selections and, in the future, in data-driven charting displays. Some members of the FAA have raised questions about how vectors to final approach course work with RNP approaches, some suggesting the term "vectors to final" is obsolete.

In this document a number of examples of increasing ambiguity are provided. In most of the examples provided, a prudent instrument pilot might query ATC to resolve the ambiguity.

First, the GED VOR RWY 22 shown in Figure 1. If the pilot is given vectors outside of ATR to intercept the final, do they: intercept 234 (annotation #1) or intercept 213 (annotation #2)?

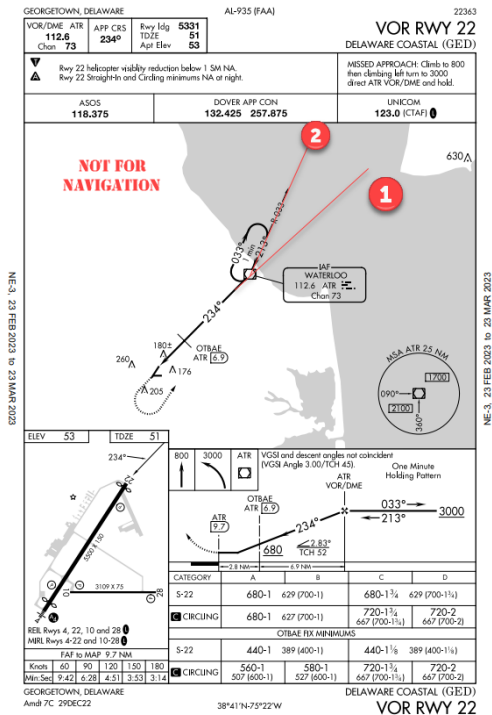


Figure 1. VOR vectors to final.

Next, the LGA RNAV (GPS) Y RWY 31 shown in Figure 2. In this RNP approach if the pilot is given a vector to intercept the final approach course, do they: intercept the 313 extension out of MANLL (annotation #1); intercept the 302 extension formed by NYJET to MANLL (annotation #2); or intercept the 248 extension formed by GEMKE (IF) to NYJET (annotation #3)?

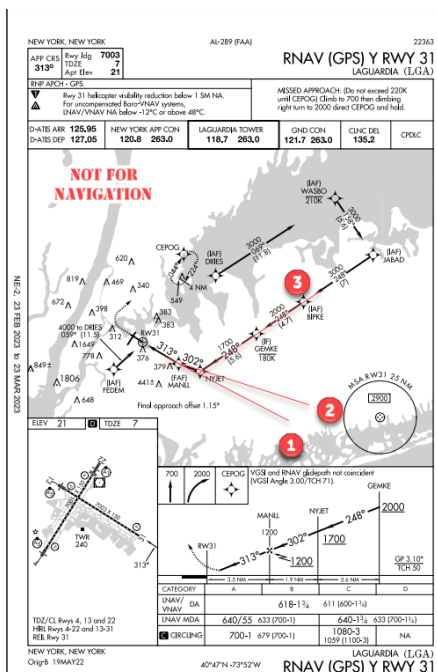
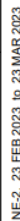


Figure 2. RNP Vectors to Final.

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Next, the BWI RNAV (GPS) Z RWY 33L shown in Figure 4. In this RNP approach if the pilot is given a vector to intercept the final approach course, do they: intercept the RF leg from LABPI to MILRE (annotation #1); intercept the JANNIS to MILRE leg (annotation #2); or intercept the LIYCO to MILRE leg (annotation #3)? There may even be additional ambiguity by the small RF leg between MILRE and GRAFE (FAF).

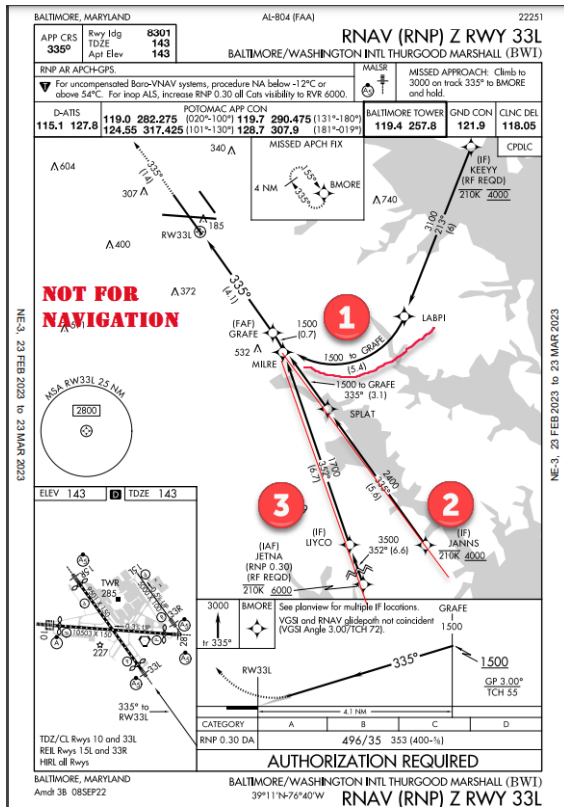


Figure 4. RNP Vectors to Final with three potential options.

Lastly, the PSP RNP (RNP) Z RWY 13R shown in Figure 5. In this RNP AR with RF legs approach if the pilot is given a vector to intercept the final approach course, do they intercept at annotation #1 or annotation #2?

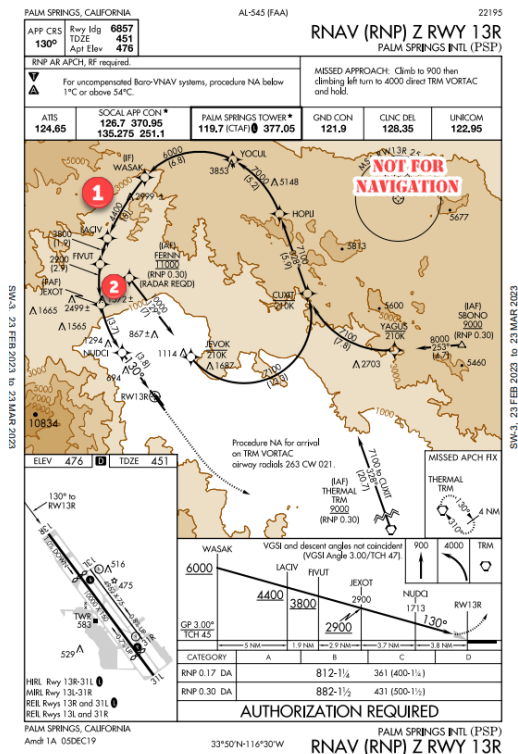


Figure 5. RNP AR RF Vectors to Final.

There is a large body of knowledge on vectors to final by reputable authors available to pilots:

- AIM 5-4-6e
- AOPA (2016): <https://www.aopa.org/news-and-media/all-news/2016/august/pilot/on-instruments>
- 7110.65() (current): Section 5-9-1 “Vectors to Final Approach Course”
- AvWeb (2019): <https://www.avweb.com/flight-safety/vectors-to-final/>
- FAASafety.gov (n.d.) discussing Destin/Eglin AFB Part 93: https://www.faasafety.gov/gslac/ALC/course_content.aspx?cID=47&sID=282&review=true
- Aviation Safety Magazine (2019) <https://www.aviationsafetymagazine.com/features/approach-vectors-checklist/>

Without a clear coming together of procedure design, ATC practices, ARINC practices, and FAA AFS-4XX it is difficult for avionics interfaces to best assist the pilot.

Recommendations:

These possible recommendations:

1. At the procedure design level, clarify what the ARINC coding should be to define the vectors to final transition; and/or
2. Update AIM guidance to align controllers and pilots on the meaning of vectors to final approach course;
3. Develop a unified message within the FAA regarding the role vectors to final approach course plays in the NAS; and/or

4. Provide guidance to avionics manufacturers on what options to present to pilots consistent with operational practices of ATC.

Benefits:

By clarifying this issue, the following benefits will be achieved:

1. More efficient radio communications between controllers and pilots.
2. Prevent the likelihood of clearance deviations.
3. Better align navigation database ARINC coding with FAA NAS intentions (contributing to 1 & 2 above).
4. Optimized avionics design, lowering crew workload, and improving safety.

Comments:

It will be useful in the IPG to hear from pilots and controllers.

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Initial Meeting 23-01: Jeff Rawdon, FAA Flight Procedures and Airspace Group (FPAG), briefed that this issue was discussed internally prior to introduction here. The decision was reached that there is nothing the ACM could do regarding this RD, that it is out of scope of the ACM, and would probably be better suited for the PARC PCPSI. However, Jeff said the decision to introduce the item here was supported for the purpose of discussion.

Bill Tuccio, Garmin, briefed the RD ([slide](#)). Radar vectors to intercept approach procedure tracks are a frequent occurrence, especially at larger airports. The question would be what vectors to final would mean for a procedure designer. Jeff pointed out that 8260-series orders do not address this concern; it is out of scope for procedure design and evaluation and is an ATC and operational issue.

Bill participates on an RTCA committee and voiced that data-driven charting questions are at the heart of the concern. John Barry, FAA Aircraft Certification, participates on the same RTCA committee, and said there is no ATC representation.

Based on the displayed examples, John discussed what segment of the instrument approach would be expected for the aircraft to join after ATC vectors.

Darrell Pennington, Air Line Pilots Association (ALPA), pointed out that vectors to intercept a segment of an RNAV approach should not be issued per Order 7110.65 as controllers should only clear aircraft to an IAF or IF.

Rich Boll, NBAA, discussed AIM paragraph 5-4-6 language for intercepting tracks based on the RD example. Rich voiced that any vector to final on an RNAV approach would increase pilot workload.

Kevin Allen, American Airlines, pointed out an arrival procedure in Germany where they frequently are vectored to various points of the approach.

Gary Fiske, FAA ATC Procedures (Terminal) Team (AJV-P310), advised Order 7110.65 paragraph 5-9-1 covers vectors to final and clarified that ATC can issue approach clearances to RNAV/GPS approaches and vector to the final approach course, however controllers are not permitted to reduce the distance prior to the approach gate to join the final as permitted on other types of approaches. Gary does not feel like any air traffic changes concerning vectors to final should be necessary. Bennie Hutto, NATCA, agreed with Gary.

Bill concurred with closing the issue, but expressed the opinion that some type of 8260-series order language should be considered. Bill said Garmin will discuss internally and Jeff reiterated that if this would be addressed, it should be by some group other than ACM.

Status: Item closed