

AERONAUTICAL CHARTING FORUM
Instrument Procedures Group
October 21-22, 2002
HISTORY RECORD

FAA Control # 02-02-246

Subject: Turn Angle Limits for RNAV Approaches without TAA's

Background/Discussion:

TERPS 2-232 and Chapter 15, paragraphs 1510/1512 limit turns at IAFs to 120 degrees unless a course reversal is designated. TERPS 2-242 specifies similar turn angle limits at Intermediate Fixes.

Procedures such as the Indianapolis RNAV (GPS) Rwy 5L and RNAV (GPS) Rwy 32 have no Hold in Lieu Racetrack reversals but instead use IAF waypoints/intersections that are part of the enroute structure.

In the era of VOR/TACAN navigation, aircraft were not able to navigate randomly to airway intersections; thus the turn angle limits were often intrinsic to the configuration of the approach procedure and surrounding airways. RNAV implies virtually unlimited "direct-to" navigation capability and therefore introduces opportunities for confusion and inadvertent containment busts due to misunderstandings amongst pilots and controllers on the subject of turn angle limits for Initial (and Intermediate) approach segments.

Further, when an approach has a HIL racetrack – and therefore an IF/IAF – it is imperative that pilots and controllers know when it is necessary to begin the approach at the IAF and fly the racetrack reversal. Procedures such as the Fort Lauderdale RNAV (GPS) Rwy 27R have HIL racetracks, but do not specify turn angle limitations on radar monitored clearances direct-to the IF.

Recommendations:

Establish a system of criteria and charting specifications that will provide explicitly defined and graphically depicted turn angle limits and arrival sectors.

Comments:

This recommendation affects all RNAV SIAPs without TAA's as well as guidance in FAA Orders 8260.3B, 7110.65 and the AIM.

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Date: October 4, 2002

RNAV (GPS) RWY 32
INDIANAPOLIS INTL (IND)

APP CRS 317°	Rwy Idg 7605
	TDZE 792
	Apt Elev 797

NA BARO-VNAV NA below -16°C (3°F).
ASR GPS or RNP-0.3 required. DME/DME RNP-0.3 NA.
For inoperative MALSR increase LNAV/VNAV CAT D visibility to RVR 5000 and LNAV CAT D visibility to RVR 6000.

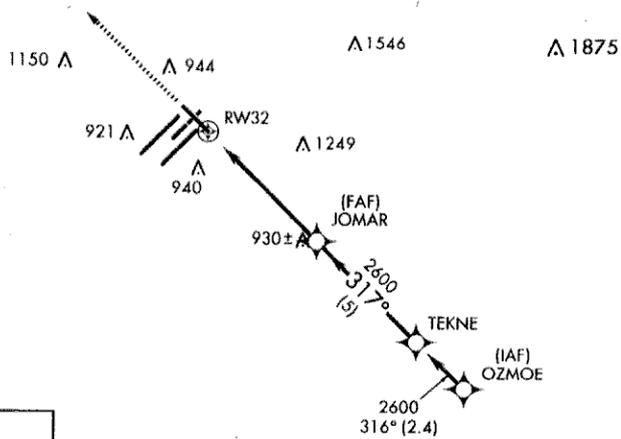
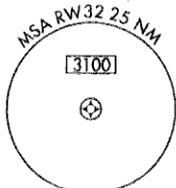


MISSED APPROACH: Climb to 2500 direct WOREL WP and hold.

ATIS 124.4	INDIANAPOLIS APP CON 119.3 317.8	INDY TOWER 120.9 257.8	GND CON 121.9 257.8	CINC DEL 128.75 257.8
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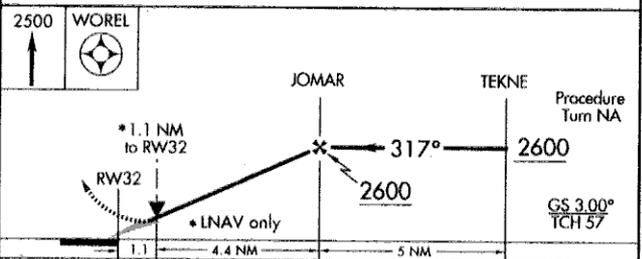
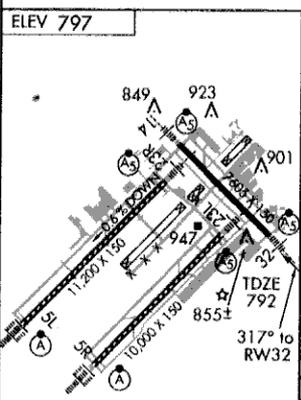
NOT FOR NAVIGATION

△1866



EC-2, 03 OCT 2002

EC-2, 03 OCT 2002



CATEGORY	A				B		C		D	
GLS PA DA	NA									
LNAV/VNAV DA	1100/24				308 (400-½)				1100/40 308 (400-¾)	
LNAV MDA	1180/24				388 (400-½)				1180/50 388 (400-1)	
CIRCLING	1260-1				463 (500-1)		1320-1½ 523 (600-½)		1360-2 563 (600-2)	

HIRL all Rwy's
TDZ/CL Rwy's 5L and 5R

INDIANAPOLIS, INDIANA
Orig 02164

39°43'N-86°18'W

INDIANAPOLIS INTL (IND)
RNAV (GPS) RWY 32

RNAV (GPS) RWY 27R
FORT LAUDERDALE-HOLLYWOOD INTL (FLL)

APP CRS 273°	Rwy ldg 8396
	TDZE 7
	Apt Elev 9

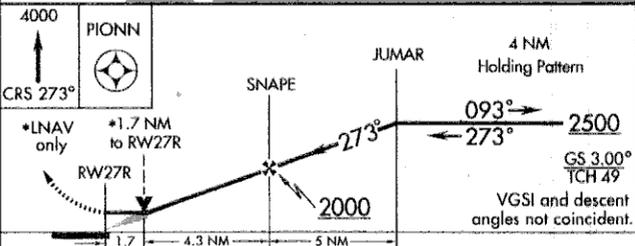
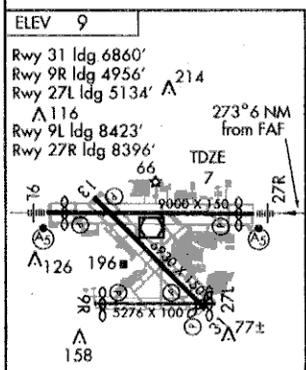
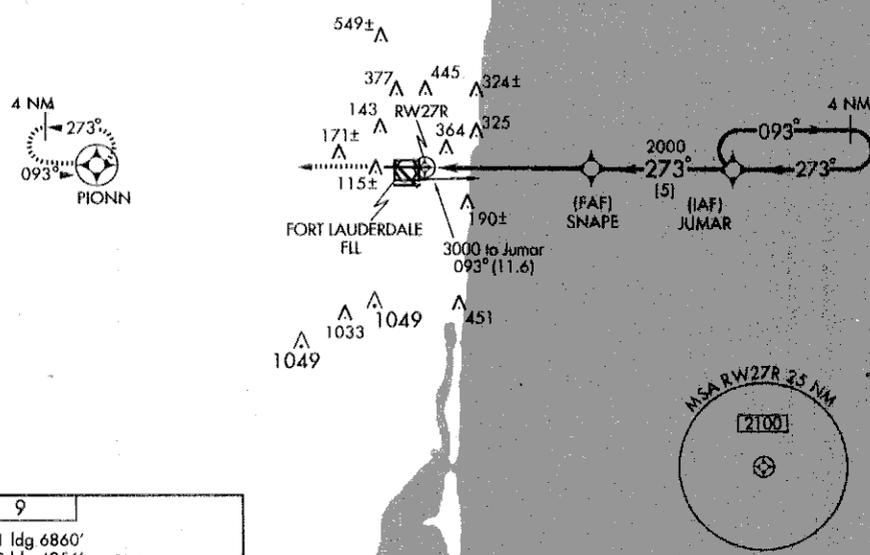
Baro-VNAV NA below -15°C (5°F).
GPS or RNP-0.3 Required.
DME/DME RNP-0.3 NA.

MALS
MISSED APPROACH: Climb to 4000 via 273° course to PIONN WP and hold.

▲ NA
For inoperative MALS, increase LNAV Cat. A, B visibility to RVR 5000.

ATIS 135.0	MIAMI APP CON 133.775 285.6	FORT LAUDERDALE TOWER 119.3 257.8	GND CON 121.4	CLNC DEL 128.4
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NOT FOR NAVIGATION



CATEGORY	A	B	C	D
GLS PA DA	NA			
LNAV/VNAV DA	620-1¾ 613 (700-1¾)			
LNAV MDA	620/40	613 (700-¾)	620/60 613 (700-1¾)	620-1½ 613 (700-1½)
CIRCLING	680-2¼ 671 (700-2¼)			700-2¼ 691 (700-2¼)

SE-3, 03 OCT 2002

SE-3, 03 OCT 2002

Initial Discussion Meeting 02-02: New issue presented by Steve Bergner, NBAA. Steve briefed that his organization is concerned that controllers are clearing aircraft direct to IAFs and sometimes IFs on RNAV approaches without TAAs. In many cases, this direct clearance causes confusion as to whether or not a course reversal is required and in some cases violates TERPS procedure design criteria; e.g., requiring a turn greater than 120 degrees at the IAF, intermediate segment too short for the amount of turn, etc. This is especially noted when the IAF is on an airway and the turn is acceptable for one direction of flight, but not the other. NBAA believes the issue is readily resolved by applying the TAA concept. Steve stated that TAAs resolve ambiguity and facilitate operations. Brad Rush, AVN-160, stated that his office has increased QC of these procedures. He further stated that AVN-100 has issued internal policy to ensure that all RNAV approaches have a TAA, a course reversal, or a restricted procedure entry note that conforms to TERPS. Tom Schneider, AFS-420, stated that guidance has been included in Change 3 to Order 8260.19 that should help resolve the issue for future procedures. Bill Hammett, AFS-420 (ISI), commented that this issue was previously discussed at the ACF and taken to ATPAC by ALPA. As a result of the ATPAC Area of Concern, AFS-420, on July 17th, 2002, forwarded recommendations to ATP-100 for inclusion in Order 7110.65 that would help resolve the issue. AFS-420 will ascertain the status of the ATP-100 response. Steve suggested that the plan view of the chart could depict entry areas where a course reversal is/is not required. This methodology would require an IACC specification change and may not be necessary if the AFS-420 controller guidance is adopted by ATP-100.

MEETING 03-01: Gary Powell, ATP-500, briefed that this issue is being worked through ATPAC. An Air Traffic Document Change Proposal (DCP) based on Air Traffic, Flight Standards, and industry input had been circulated for comment. Comments were received and are being addressed. Steve Bergner, NBAA presented examples from Ft. Lauderdale that demonstrate the confusion. Air Traffic clears aircraft direct to RNAV IAFs and expects the pilot to proceed straight-in when legally a course reversal is required. Additionally, in many cases, the turn angle is greater than the avionics equipment can accept. He re-emphasized that standard guidance must be provided so that pilots and controllers alike are trained on what parameters are allowed so as not to compromise procedure design when a TAA is not published. Steve also recommended that consideration be given to address direct-to-IF clearances for non-RNAV procedures. Kevin Comstock, ALPA, provided feedback directly addressing the DCP keying on the words "RNAV capable". Gary stated that the DCP is attempting to address a current problem. A second DCP is being developed to address RNAV radar vector exceptions. Kevin requested a copy of the second DCP and Gary agreed to provide one. Bill Hammett, AFS-420 (ISI), stated that the issue of "radar monitoring" verses "radar vectoring" must be clarified for pilot/controller understanding. He also recommended proper controller phraseology use; e.g., including the phrase "straight-in" in the approach clearance, may help clarify controller/pilot communications.

ACTION: ATP-500.

MEETING 03-02: Gary Powell, ATP-500, briefed that this issue is being worked through ATPAC. An Air Traffic Document Change Proposal (DCP) based on Air Traffic, Flight Standards, and industry input had been circulated for comment. In the interim, ATC Notice 7110.329 has been published to provide guidance for controllers. Steve Bergner, NBAA, criticized that the notice does not solve the problem and does not provide examples to clarify the guidance. He also provided several examples where charts are misleading, e.g., there are differences in “IAF” and “IAF/IF” labeling between government and Jeppesen charts, there are charts where there is no course reversal at an IAF, etc. Steve noted that the examples provided in his presentation also provide strong support for charting the “IF” (See 02-01-237). Lastly, Steve noted that on October 1, Kevin Comstock, ALPA, had forwarded a detailed e-mail message to ATP-500 detailing what has been accomplished and what remains to be done to resolve this issue. Steve’s power point slides and Kevin’s e-mail synopsis are included as Attachments 4 and 5 to the minutes respectively. Gary agreed to take the issue for further work considering the ALPA and NBAA concerns. **ACTION: ATP-500.**

MEETING 04-01: Steve Bergner, NBAA, gave a presentation highlighting the problems associated with air traffic control use of “direct-to” clearances in RNAV approach clearances. He noted that in his experience, these clearances continue to proliferate. FAA Notice 7110.329 did not resolve the issues and further clarification is required to resolve contradictions in the AIM and Order 7110.65. Current ATC directives do not allow direct to IF clearances. Pilots and controllers alike desire this option; however, the guidance on using this procedure must be clear and have specific limitations; e.g., no greater than 90 degrees from the final approach course. Steve’s briefing also provided several examples of charting anomalies where the charting of (IF) at the intermediate fix and (IAF/IF) at combination fixes would clarify procedures for pilots and controllers alike. Bill Hammett, AFS-420 (ISI) noted that a central issue that will have to be addressed is a Chief Counsel decision on whether a “direct-to” clearance in a radar environment can be considered the same as a “radar vector”. Paul Ewing, ATP-500 (AMTI) agreed to coordinate this issue with AGC and work the AIM and Order 7110.65 material with ATP-120. A copy of Steve’s briefing slides is included in the meeting minutes as attachment 5. **ACTION: ATP-500 and ATP-120.**
