AERONAUTICAL CHARTING FORUM
Instrument Procedures Group
Meeting 04-01 – April 26-27, 2004
History Record

FAA Control # 04-01-250

SUBJECT: RNAV and Climb Gradient Missed Approach Procedures

BACKGROUND/DISCUSSION: There are many SIAPs in mountainous areas that have high minimums, not because of obstacle or descent issues along the approach segments, but because of obstacles in the missed approach procedure. Part of this problem lies with using obsolete, hugely wasteful missed approach trapezoids from the "lighted airway" days, and part of the problem is the failure to provide public missed approach procedures with realistic climb gradients that can be easily achieved by today's vast fleet of corporate turbine aircraft and fractional-owner turbine aircraft fleets. These aircraft represent a significant portion of the serious air commerce of the United States.

RECOMMENDATION: Criteria already exist to provide United States military operations with climb gradient missed approach procedures where reasonable and where an operational advantage will be achieved. The high-performance business aircraft fleets should be given the same operational flexibility. Alternate, ***public*** (14 CFR, Part 97), missed approach procedures designed to 2 x 1.0 RNP linear containment areas should be developed for every SIAP where missed approach obstacles limit approach minimums. In many cases, offending obstacles could be laterally avoided by taking advantage of RNP/LNAV technology. In other cases, employment of such RNP/LNAV containment areas in conjunction with reasonable climb gradients should be used to achieve the lowest possible minimums. Such climb gradient missed approach procedures must be ***public***, rather than specials, because specials are not feasible for an airport used only on occasion. In any case, the concept would be no different than what is provided for climb gradient takeoff minimums today; i.e. "3,000 and 5 or Standard with 400 feet per mile to 11,000."

COMMENT: This recommendation affects FAAH 8260.3B, 8260.19C, and various internal FAA directives.

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Initial Discussion - Meeting 04-01: New issue presented by Steve Bergner, NBAA. Steve noted that in many cases specifying a climb gradient for the missed approach may provide lower landing minimums. Alternatively, a RNP missed approach design may be able to take advantage of a less onerous route that will eliminate the need for a climb gradient. He used Rifle, CO as an example. Steve further noted that criteria already exist to provide US

military operations with climb gradient missed approach procedures where reasonable and where an operational advantage will be achieved. The high-performance business aircraft fleets are fully capable of these higher gradients and should be given the same operational flexibility. Frank Flood, Air Canada, commented that EUROCONTROL routinely allows 3-5% missed approach climb gradients to gain operational advantages. Vinny Chirasello, AFS-410, noted that SAAAR will provided the desired concept. Steve noted that NBAA cannot live with Special approaches, these procedures must be public under Part 97. Ted Thompson, Jeppesen, noted that developing multiple missed approaches for a single approach would result in the need to code duplicate versions of the same procedure. This would not be feasible and separate procedures with suffixes in the identification would be required. Tom Schneider, AFS-420, commented that his office is studying the feasibility of linear obstacle evaluation areas (OEAs) vice trapezoids for RNP procedure design. ACTION: AFS-420.

MEETING 04-02: Tom Schneider, AFS-420, reported that RNAV missed approaches with climb gradients and small RNP containment values are currently available under Notice 8000.287, *Airworthiness and Operational Approval for Special Required Navigation Performance (RNP) Procedures with Special Aircraft and Aircrew Authorization Required (SAAAR).* It is not currently planned to expand this application to public Part 97 procedures. Brad Rush, AVN-101, noted that the SAAAR Notice has a flaw in the missed approach required obstacle clearance (ROC) application that he will address to AFS-420. Kevin Comstock, ALPA, stated that if the SAAAR criterion is made public, FAA must ensure that adequate training/pilot education material is prepared. ACTION: AFS-420.

MEETING 05-01: Tom Schneider, AFS-420, briefed the following update from Jack Corman, AFS-420: Draft FAA Order 8260.RNP SAAAR, *United States Standard for Required Navigation Performance (RNP) Approach Procedures with Special Aircraft and Aircrew Authorization Required (SAAAR)*, provides design criteria to achieve lowest minimums where missed approach obstructions penetrate the standard 40:1 obstacle clearance surface through use of altered missed approach path, minimum climb gradients, or a combination of both. These RNP SAAAR procedures will be 14 CFR Part 97 public approach procedures. Signature of Order 8260.RNP SAAR is targeted for June. Jack recommended the item be closed upon implementation of this order. The issue is closed for further discussion and will be tracked until criteria is published. ACTION: None required at present, awaiting NBAA concurrence to close the issue

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MEETING 05-02: Tom Schneider, AFS-420, briefed Order 8260.52, *United States Standard for Required Navigation Performance (RNP) Approach Procedures with Special Aircraft and Aircrew Authorization Required (SAAAR)*, was signed on June 3, 2005. This Order provides design criteria to achieve the lowest minimums where missed approach obstructions penetrate the standard 40:1 obstacle clearance surface through use of altered missed approach path, minimum climb gradients, or a combination of both. Tom asked whether this Order satisfies the NBAA concern. Steve Bergner, NBAA, stated that the original NBAA intent was not to develop RNP SAAR procedures, but to use RNAV as a means of applying smaller containment areas for missed approach procedures, thereby lowering minimums. Ted Thompson, Jeppesen, mentioned potential database coding problems and avionics limitations that could arise with the establishment of multiple missed approach procedures. Brad Rush, NFPG, noted that ARINC 424 allows coding of multiple missed approach

procedures. Ted responded that while that may be true, most databases can't handle more than one. Tom added that criteria is being discussed and ultimately will be incorporated into the new 8260 RNAV/LPV Order. One option would be to simply add RNAV initial transition(s) to a conventional ILS approach, with appropriate equipment notes (applicable to individual RNAV transition route, or as a procedure note for the entire procedure). Another option would be to create a separate ILS approach with RNAV Transitions as a separate procedure, which would be titled ILS-Z. He will take the issue back to AFS-420 for further work. ACTION: AFS-420.

MEETING 06-01: Tom Schneider, AFS-420, briefed the following update from Jack Corman, AFS-420: The initial issue of 8260.RNAV will contain criteria for RNAV transition to an LPV/ILS final segment, and an LPV RNAV missed approach. There are placeholders for addition of en route criteria, LNAV, LNAV/VNAV, and criteria addressing RNAV missed approach climb gradients in excess of 200 ft/NM. The initial issue of the Order (predicted by early May in the update above) will not contain the climb gradient criteria. It is scheduled for change 1 to the document. Vincent Chirasello, AFS-410, stated the Order must clarify whether RNAV may be used for missed approach guidance from a conventional approach. Tom agreed to mention this to Jack Corman, the AFS-420 RNAV criteria specialist. The NBAA request to apply a missed approach climb gradient to gain lower minima is still under study. Ted Thompson, Jeppesen, again mentioned the problems associated with coding more than one missed approach procedure; e.g., with/without climb gradients, with/without RNAV, etc. *(Also see new issue 06-01-264)*. ACTION: AFS-420.

MEETING 06-02: Tom Schneider, AFS-420, briefed that guidance has been developed for Order 8260.19 to allow an option to use a missed approach climb gradient to gain lower minimums. When this is done a second line of minima must also be published to accommodate a 200 Ft/NM climb rate. Mark Ingram, ALPA, asked whether this would present coding problems. Ted Thompson, Jeppesen, noted that only one missed approach track could be coded per procedure. Danny Hamilton, NFPG, replied that ground tracks would always be the same regardless of climb gradient. Ted responded that as long as the ground track is the same, coding would not be a problem. Rich Boll, NBAA, requested the proposed guidance be included in the minutes – see below.

Draft language for Order 8260.19D, paragraph 856e:

e. Missed Approach Climb Gradient (CG). *When a missed approach climb gradient in excess of 200 ft per NM has been established, the following items must be accomplished:*

(1) The required gradient must be published on the chart. *Enter the required gradient in the NOTES section as follows:* ***"Chart note: *Missed Approach requires minimum climb of (number) ft/NM to (altitude)****."*

NOTE: An asterisk (*) will be used to indicate which line of minima requires the in excess of 200 ft per NM.

(2) In addition to the lower minima that require the CG, *minima will be published to support a standard 200-ft per NM CG.*

Item Open – Pending Publication.

MEETING 07-01: Tom Schneider, AFS-420, briefed that guidance has been developed for Order 8260.19D to allow an option to use a missed approach climb gradient to gain lower minimums. The guidance was published in the minutes of the last meeting as requested by NBAA. Since the last meeting, the ATO En Route (AJE) and System Operations (AJR) Service Units have non-concurred with the draft 8260.19D. Flight Standards has responded to the comments and is awaiting an AJE-0 and AJR-0 response. Kevin Comstock, ALPA, asked if there was any parallel effort to publish pilot educational material. Rich Boll, NBAA, stated that climb gradient text was added to the DP section of the AIM, but not to the missed approach section. Tom agreed to take this issue to the AFS-420 AIM OPR for consideration. AFS-420 will also track publication of Order 8260.19D. ACTION: AFS-420.

MEETING 07-02: Tom Schneider, AFS-420, briefed that policy has been updated in Order 8260.19D to require rate-of-climb annotation. Additionally, the following change to AIM paragraph 5-4-21-b has been jointly developed by AFS-420, AFS-410 and NBAA and forwarded for publication in the February, 2008 AIM (revised/added text is shown in red):

"Obstacle protection for missed approach is predicated on the missed approach being initiated at the decision altitude/height (DA/H) or at the missed approach point and not lower than minimum descent altitude (MDA). A climb gradient of at least 200 feet per nautical mile is required, (except for Copter approaches, where a climb of at least 400 feet per nautical mile is required), unless a higher climb gradient is published in the notes section of the approach procedure chart. When higher than standard climb gradients are specified, the end point of the non-standard climb will be specified at either an altitude or a fix. Pilots must preplan to ensure that the aircraft can meet the climb gradient (expressed in feet per nautical mile) required by the procedure in the event of a missed approach, and be aware that flying at a higher than anticipated ground speed increases the climb rate requirement (feet per minute). Tables for the conversion of climb gradients (feet per nautical mile) to climb rate (feet per minute), based on ground speed, are included on page D1 of the U.S. Terminal Procedures booklets. Reasonable buffers are provided……Rest of paragraph is unchanged".

Kevin Comstock, ALPA, stated that the charting changes and AIM revision are good steps; however, they don't go far enough. He recommended climb gradient requirements be emphasized in various other mediums including the Instrument Flying Handbook, Practical Test Standards, and various pilot proficiency exams, to name a few. Kevin forwarded a list of recommended mediums to Tom Schneider, the ACF-IPG Chair, who will ensure these needed educational efforts are provided to AFS-600 and 800 and other as appropriate for implementation. ACTION: Chair ACF-IPG.

MEETING 08-01: Tom Schneider, AFS-420, briefed that the AIM change presented at the last ACF-IPG was published in the February 2008 AIM. Tom also briefed that at the last meeting, it was recommended that he, as ACF-IPG Chair, write AFS-600 and AFS-800 requesting climb gradient requirements be emphasized in various other mediums requested by ALPA including the Instrument Flying Handbook, Practical Test Standards, and various pilot proficiency exams, to name a few. The letter was written and a copy was included in the meeting handout material and is attached here . Bill Hammett, AFS-420 (ISI), recommended the issue be closed. Kevin Comstock, ALPA, disagreed and requested the Chair send a follow up letter to obtain a response from AFS-600 & 800 on what actions were taken. Tom agreed to do so. ACTION: Chair ACF-IPG.