CRITERIA FOR THE DEVELOPMENT OF INSTRUMENT PROCEDURES
TP 308 / GPH 209 – CHANGE 7

VOLUME 5
HELCICOPTER INSTRUMENT PROCEDURE CONSTRUCTION

TRANSPORT CANADA
NATIONAL DEFENSE
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CHAPTER 1. HELICOPTER PROCEDURES

SECTION 1. ADMINISTRATION

100. General

This chapter contains criteria for application to “helicopter only” procedures. These criteria are based on the premise that helicopters are approach Category A aircraft with special maneuvering characteristics. The intent, therefore, is to provide a relief from those portions of other chapters that are more restrictive than the criteria specified herein. However, any criteria contained elsewhere in other chapters of this document may be applied to helicopter only procedures when an operational advantage may be gained.

   a. Identification of Inapplicable Criteria. Criteria contained elsewhere in TP308 applies to helicopter procedures, except as detailed in this chapter. Circling approach and high altitude penetration criteria do not apply to helicopter procedures.

   b. Use of Existing Facilities. Helicopter-only procedures based on existing facilities may be developed using criteria contained in this chapter.

101. Terminology And Abbreviations

The following terms are peculiar to helicopter procedures and are defined as follows:

HAL. Height above landing area elevation.

Height Above the Surface (HAS). The height of the MDA above the highest terrain/surface within a 5,200-foot radius of the MAP in Point in Space procedures.

Supplementary note: The highest terrain/surface used to calculate HAS includes vegetation.

Landing Area. As used in helicopter operations, refers to the portion of the heliport or airport runway used, or intended to be used for the landing and take-off of helicopters.

Landing Area Boundary (LAB). The beginning of the landing area of the heliport or runway.

Point in Space Approach (PINSA). An instrument approach procedure to a point in space, identified as a Missed Approach Point, which is not associated with a specific landing area within 2,600 feet of the MAP.

Touchdown Zone (TZ). As used in helicopter procedures, is identical to the landing area.

Touchdown Zone Elevation (TDZE). As used in helicopter procedures, is the highest elevation in the landing area.

102. RESERVED
103. Type Of Procedure

HELICOPTER ONLY PROCEDURES are designed to meet low altitude straight-in requirements ONLY.

104. Facilities For Which Criteria Are Not Provided

This chapter does not include criteria for procedures predicated on VHF/UHF DF, area navigation (RNAV), airborne radar approach (ARA) or microwave landing system (MLS). Procedures utilizing VHF/UHF DF may be developed in accordance with the appropriate chapters of this document. Criteria for RNAV, ARA, and MLS with high glide path angle or selectable glide path angle capability will be developed at a later date.

105. Procedure Identification

Identify helicopter-only procedures using the term “COPTER,” the type of facility or system providing final approach course guidance, and:

a. For approaches to runways. The abbreviation RWY, and the runway number; e.g., COPTER ILS or LOC RWY 17; COPTER RNAV (GPS) RWY 31.

b. For approaches to heliports and a point-in-space. The magnetic final approach course value and degree symbol; e.g., COPTER ILS or LOC 014°; COPTER TACAN 097°; COPTER RNAV (GPS) 010°.

c. For approaches based on an ARC final. The word ARC will be used, and will be followed by a sequential number; e.g., COPTER VOR/DME ARC 1.

d. For separate procedures at the same location. Use the same type of facility and same final approach course, add an alpha suffix starting in reverse alphabetical order; COPTER ILS or LOC Z RWY 28L (first procedure), COPTER ILS or LOC Y RWY 28L (second procedure), COPTER ILS or LOC X RWY 28L (third procedure), etc.
SECTION 2. APPLICATION

106. General Criteria
These criteria are based on the unique manoeuvring capability of the helicopter at airspeeds not exceeding 90 knots.

107. Point In Space Approach
Where the centre of the landing area is not within 2,600’ of the MAP, an approach procedure to a point in space may be developed using any of the facilities for which criteria are provided in this chapter. In such procedures the point in space and the missed approach point are identical and upon arrival at this point, helicopters must proceed under visual flight rules (or special VFR in control zone as applicable) to a landing area or conduct the specified missed approach procedure. The published procedure shall be noted to this effect and also should identify available landing areas in the vicinity by noting the course and distance from the MAP to each selected landing area. Point in space approach procedures will not contain alternate minima.

108. Approach Categories
When helicopters use instrument flight procedures designed for fixed wing aircraft, approach Category “A” approach minima shall apply.

109. Procedure Construction
Volume 1, Para 214, applies except for the reference to circling approach.

110. Descent Gradient
The descent gradient criteria specified in other chapters of this document do not apply. The OPTIMUM descent gradient in all segments of helicopter approach procedures is 400 feet per nautical mile. Where a higher descent gradient is necessary, the recommended MAXIMUM is 600 feet per nautical mile. However, where an operational requirement exists a gradient of as much as 800 feet per nautical mile may be authorized provided the gradient used is depicted on approach charts. See special procedure turn criteria in Para 112.

111. Initial Approach Segments Based On Straight Courses And Arcs With Positive Course Guidance
Volume 1, Para 232, is changed as follows:

a. Alignment.

(1) Courses. The two-mile lead radial specified in Para 232.a.(1) is reduced to 1 NM (see Figure 2–3).

(2) Arcs. The MINIMUM arc radius specified in Para 232.a.(2) is reduced to 4 NM. The 2-mile lead radial may be reduced to 1 NM (see Figure 2–10).
112. Initial Approach Based On Procedure Turn

Volume 1, Para 234, applies except for all of subparagraph d. and the number 300 in subparagraph e.(1), which is changed to 600. Since helicopters operate at approach Category A speeds, the 5 NM procedure turn will normally be used (see Figure 1-105). However, the larger 10 and 15 NM areas may be used if considered necessary.

Descent Gradient. Because the actual length of the track will vary with environmental conditions and pilot technique it is not practical to specify a descent gradient solely in feet per mile for the procedure turn. Instead the descent gradient is controlled by requiring the procedure turn completion altitude to be as close as possible to the final approach fix altitude. The difference between the procedure turn completion altitude and the altitude over the final approach fix shall not be greater than those shown in Table 1–23.

113. Intermediate Approach Segment Based On Straight Courses

Volume 1, Para 242, is changed as follows:

a. Alignment. The provisions of Volume 1, Para 242.a, apply with the exception that the intermediate course shall not differ from the final approach course by more than 60 degrees.

b. Area.

(1) Length. The OPTIMUM length of the intermediate approach segment is 2 NM. The MINIMUM length is 1 mile and the recommended MAXIMUM is 5 NM. A distance greater than 5 NM should not be used unless an operational requirement justifies the greater distance. When the angle at which the initial approach course joins the intermediate course exceeds 30 degrees (see Figure 2–3), the MINIMUM length of the intermediate course is as shown in Table 1–24.

114. Intermediate Approach Segment Based On An Arc

Volume 1, Para 243, is changed as follows: Arcs with a radius of less than 4 NM or more than 30 NM from the navigation facility shall not be used.

a. Area.

(1) Length. The OPTIMUM length of the intermediate approach segment is 2 NM. The MINIMUM length is 1 NM and the recommended MAXIMUM is 5 NM. A distance greater than 5 NM should not be used unless an operational requirement justifies the greater distance. When the angle at which the initial approach course joins the intermediate course exceeds 30 degrees (see Figure 2–3), the MINIMUM length of the intermediate course is as shown in Table 1–24.

115. Intermediate Segment Within A Procedure Turn Segment

Volume 1, Para 244, is changed as follows: The normal procedure turn distance is 5 NM from the fix or from the facility. This produces an intermediate segment 5 NM long. The portion of the intermediate segment considered for obstacle clearance will always have the same length as the procedure turn distance. A distance greater than 5 NM should not be used unless an operational requirement justifies the greater distance (see Figure 2–13, Volume 1, Para 244).
116. Final Approach

Volume 1, Para 250, applies except that the word runway is understood to include landing area and the reference to circling approach does not apply. The final approach course in precision approach procedures shall be aligned as indicated in Paras 152 and 159. For non-precision procedures final approach course alignment shall be as follows:

a. Approaches to a Landing Area. The final approach course should be aligned so as to pass through the landing area. Where an operational advantage can be achieved, a final approach course which does not pass through the landing area may be established, provided such a course lies within 2,600 feet of the centre of the landing area at the MAP.

b. Point in Space Approaches. The final approach course should be aligned to provide for the most effective operational use of the procedure consistent with safety.

117. Missed Approach Point (MAP)

Volume 1, Para 272, is changed to state that the specified distance may not be more than the distance from the final approach fix to a point not more than 2,600 feet from the centre of the landing area. The MAP may be located more than 2,600 feet from the landing area, provided the MINIMUM visibility agrees with the increased distance; e.g., MAP 3,800 feet from the landing area, basic visibility is ¾ mile (see Figure 1-108). For point in space approaches the MAP is on the final approach course at the end of the final approach area.

118. Straight Missed Approach Area

Volume 1, Para 273, applies with the exception that the length of the primary and secondary missed approach area is reduced from 15 NM to 7.5 NM and will have the width of the appropriate airway at termination.

119. Straight Missed Approach Obstacle Clearance

Volume 1, Para 274, applies except that “TDZ or airport elevation” is changed to “landing area elevation”; the slope of the missed approach surface is changed from 40:1 to 20:1 and the secondary area slope is changed from 12:1 to 4:1.
120. **Turning Missed Approach Area**

The provisions of Volume 1, Para 275, apply with the exception that when applying missed approach criteria shown in Figures 2–19 through 2–24, and Table 2–5, change all flight path lengths to 7.5 NM, missed approach surface slope to 20:1, secondary slopes to 4:1, obstacle clearance radius \( R_1 \) to 1.3 NM and flight path radius \( R_1 \) to 4,000 feet (66 NM). The area width will expand uniformly to the appropriate airway width.

121. **Turning Missed Approach Obstacle Clearance**

All missed approach areas described in Volume 1, Para 276, and depicted in Figures 2–25 and 2–26 will be adjusted for helicopter operation using the values shown in Volume 1, Para 120. The area width will expand uniformly to the appropriate airway width.

122. **Combination Straight And Turning Missed Approach**

Volume 1, Para 277, applies except that the values shown in Volume 5, Para 120, shall be used and point B is relocated to a position abeam the MAP. The area width will expand uniformly to the appropriate airway width (see Figure 1-106).

123. **Holding Alignment**

The provisions of Volume 1, Para 1820.a, apply with the exception that when the final approach fix is a facility, the inbound holding course shall not differ from the final approach course by more than 90 degrees.

124. **Holding Area**

Volume 1, Para 1820.b, applies except that the MINIMUM size pattern is No. 1.
SECTION 3. TAKE-OFF AND LANDING MINIMA

125. Application
The minima specified in this section apply to Helicopter Only procedures.

126. Altitudes
Volume 1, Chapter 3 is used as follows for helicopter criteria:

a. In Volume 1, Para 321, reference to 40:1 is changed to 20:1.

b. Volume 1, Paras 322 and 351, do not apply.

c. Volume 1, Paras 324, 938, and 1028, apply except that a DH of 100 feet may be approved without approach lights. Table 3-1, referenced in Volume 1, Para 350, does not apply.

d. Table 1–29 in Volume 5, Para 167, governs the establishment of the DH.

127. Visibility
Volume 1, Chapter 3 is used changed as follows for helicopter criteria:

a. Volume 1, Paras 330, 331, 332, and 343, do not apply.

b. Straight-in Minima.
   (1) Non-precision Approaches (landing area within 2,600 feet of MAP). The minimum visibility may not be less than the visibility associated with the HAL as specified in Table 1–25.
   (2) Precision Approaches. The minimum visibility authorized ¼ mile (1400 RVR).

c. Point in Space Approaches. The minimum visibility shall be 1 SM. Table 1–25 does not apply.

128. Visibility Credit
Where visibility credit for lighting facilities is allowed for fixed wing operations, the same type credit should be considered for helicopter operations. The approving authority will grant credit on an individual case basis until such time as a standard for helicopter approach light systems is established. The minimum visibility authorized prior to applying credit for lights may be reduced ¼ mile for both precision and non-precision procedures where approved approach light systems are operative. In addition, in precision approach procedures where RVR is approved and minima have been reduced to ¼ mile, 1,400 RVR may also be authorized.

129. Take-Off Minima
Helicopter take-off minima will be in accordance with the appropriate civil or military regulations as applicable.
SECTION 4. ON-HELIPORT VOR, NO FAF

130. General
Volume 1, Para 400, does not apply. These criteria apply to procedures based on a VOR facility located within 2,600 feet of the centre of the landing area in which no final approach fix is established. These procedures must incorporate a procedure turn.

131. Initial And Intermediate Segments
These criteria are contained in Section 2 of this chapter.

132. Final Approach Segment
Volume 1, Para 413, does not apply except as noted below. The final approach begins where the procedure turn intersects the final approach course inbound.

   a. Alignment. Volume 1, Para 116.a, applies.

   b. Area. The primary area is longitudinally centred on the final approach course. The minimum length is 5 NM. This may be extended if an operational requirement exists. The primary area is 2 NM wide at the facility, and expands uniformly to 4 NM wide at 5 NM from the facility. A secondary area is on each side of the primary area. It is zero NM wide at the facility and expands uniformly to .67 NM on each side of the primary area at 5 NM from the facility (see Figure 1–107).

   c. Obstacle Clearance. Volume 1, Para 413.c.(1), applies.

   d. Procedure Turn Altitude. The procedure turn completion altitude shall be in accordance with Table 1–23.

   e. Use of Step-down Fix. Volume 1, Para 413.e, applies except that 4 NM is changed to 2.5 NM.

   f. Minimum Descent Altitude. Criteria for determining MDA are contained in Section 3 of this chapter and Chapter 3.
SECTION 5. TACAN, VOR/DME, AND VOR WITH FAF

133. **Final Approach Segment**

Volume 1, Para 513, does not apply except as noted below.

a. **Alignment.** Volume 1, Paras 116.a and b, apply.

b. **Area.** Volume 1, Para 513.b, applies except that portion which refers to the minimum length of the final approach segment. The minimum length of the final approach segment is shown in Table 1–26.

c. **Obstacle Clearance.** Volume 1, Para 513.c.(1), applies.

134. **Reserved**

135. **Missed Approach Point**

The identification of the MAP in Volume 1, Para 514, is changed as follows: The missed approach point is a point on the final approach course which is not farther than 2,600 feet from the centre of the landing area (see Figure 1–108). For point in space approaches the MAP is on the final approach course at the end of the final approach area.

136. **Arc Final Approach Segment Radius**

Volume 1, Para 523.b, does not apply. The final approach arc shall be a continuation of the intermediate arc. It shall be specified in NM and tenths thereof. The minimum arc radius on final approach is 4 NM.

137. **Arc Final Approach Segment Alignment**

Volume 1, Para 523.b.(1), does not apply. The final approach arc should be aligned so as to pass through the landing area. Where an operational advantage can be achieved, a final approach course, which does not pass through the landing area may be established provided the arc lies 2,600 feet of the landing area at the MAP.

138. **Reserved**
SECTION 6. ON-HELIPORT NDB, NO FAF

139. General

Volume 1, Para 600, does not apply. These criteria apply to procedures based on an NDB facility located within 2,600 feet of the centre of the landing area in which no final approach fix is established. These procedures must incorporate a procedure turn.

140. Final Approach Segment

Volume 1, Para 613, does not apply except as noted below. The final approach begins where the procedure turn intersects the final approach course inbound.

a. Alignment. Volume 1, Para 116.a, applies.

b. Area. The primary area is longitudinally centred on the final approach course. The minimum length is 5 NM. This may be extended if an operational requirement exists. The primary area is 2.5 NM wide at the facility, and expands uniformly to 4.25 NM wide at 5 NM from the facility. A secondary area is on each side of the primary area. It is zero NM wide at the facility, and expands uniformly to .67 NM wide on each side of the primary area at 5 NM from the facility. Figure 1–109 illustrates the primary and secondary areas.

c. Obstacle Clearance. Volume 1, Para 613.c.(1), applies.

d. Procedure Turn Altitude (Descent Gradient). The procedure turn completion altitude shall be in accordance with Table 1–23.

e. Use of Step-down Fix. Volume 1, Para 613.e, applies except that 4 NM is changed to 2.5 NM.

f. Minimum Descent Altitude. Criteria for determining the MDA are contained in Section 3 of this chapter and Chapter 3.
SECTION 7. NDB PROCEDURES WITH FAF

141. General
These criteria apply to procedures based on an NDB facility that incorporates a final approach fix.

142. Final Approach Segment
Volume 1, Para 713, does not apply except as noted below:

a. Alignment. Volume 1, Paras 116.a and b, apply.

b. Area. Volume 1, Para 713.b, applies except that portion which refers to the minimum length of the final approach segment. The minimum length is specified in Table 1–26.

c. Obstacle Clearance. Volume 1, Para 713.c.(1), applies.

143. Missed Approach Point
The identification of the MAP in Volume 1, Para 714, is changed as follows: The missed approach point is a point on the final approach course which is not farther than 2,600 feet from the centre of the landing area (see Figure 1–108). For point in space approaches, the MAP is on the final approach course at the end of the final approach area.

SECTION 8. RESERVED

144—149. Reserved
SECTION 9. ILS PROCEDURES

150. **General**

Chapter 9 is changed as noted in this section. These criteria apply to the present design of instrument landing systems (on airport) only.

151. **Intermediate Approach Segment**

Volume 1, Para 922, applies with the exception that Table 1–27 specifies the minimum length of the intermediate segment based on the angle of intersection of the initial approach course with the localizer course.

152. **Final Approach Segment**

Volume 1, Para 930, applies except that glide slope intersection need not occur prior to the FAF normally used for fixed operations.

a. The **optimum length** of the final approach course is 3.0 NM. The minimum length is 2.0 NM. A distance in excess of 4.0 NM should not be used unless a special operational requirement exists.

b. **Final Approach Termination.** The final approach shall terminate at a landing point (runway) or at a hover point between the Decision Height and the GPI. Where required, visual hover/taxi routes will be provided to the terminal area.

153. **Missed Approach Area**

Normally existing missed approach criteria described in Volume 3, Para 3.9, will be utilized for helicopter operations. However, if an operational advantage can be gained, the areas described in Volume 1, Para 168 through 171, may be substituted.

154. **Reserved**

155. **Localizer**

Chapter 9 is changed as noted in this paragraph.

a. **Alignment.** Volume 1, Para 902, applies except that alignment shall be as specified in Para 116.a and b.

b. **Area.** Volume 1, Para 903, applies except that portion which refers to the minimum length of the final approach segment. The minimum length of the final approach segment is shown in Table 1–26.

c. **Missed Approach Point.** The identification of the MAP in Volume 1, Para 907, is changed as follows: The missed approach point is a point on the final approach course which is not farther than 2,600 feet from the landing area (see Figure 1–108). For point-in-space approaches, the MAP is on the final approach course at the end of the final
SECTION 10.  PRECISION APPROACH RADAR (PAR)

156. Intermediate Approach Segment

Volume 1, Para 1014, applies with the exception that Volume 5, Table 1–27, specifies the MINIMUM length of the intermediate segment based on the angle of intersection of the initial approach course with the intermediate course.

157. Reserved

158. Final Approach Segment

The provisions of Volume 1, Paras 1020.b.(1) and (2), do not apply. The minimum distance from the glide slope intercept point to the GPI is 2 NM.

159. Final Approach Alignment

Volume 1, Para 1020.a, applies with the exception that a final approach course shall be aligned to a landing area. Where required, visual hover/taxi routes shall be established leading to terminal areas.

160. Final Approach Area

a. Length. The final approach area is 25,000 feet long, measured outward along the final approach course from the GPI. Where operationally required for other procedural considerations or for existing obstacles, the length may be increased or decreased symmetrically, except when glide slope usability would be impaired or restricted (see Figure 1–110).

b. Width. The final approach area is centred on the final approach course. The area has a total width of 500 feet at the GPI and expands uniformly to a total width of 8,000 feet at a point 25,000 feet outward from the GPI. The widths are further uniformly expanded or reduced where a different length is required as in Volume 1, Para 160.a above (see Figure 1-110). The width either side of the centreline at a given distance “D” from the point of beginning can be found by using the formula:

\[ 250 + 0.15D = \frac{1}{2} \text{ width}. \]

161. Reserved
162. Final Approach Obstacle Clearance Surface

Volume 1, Para 1021, does not apply. The final approach obstacle clearance surface is divided into two sections.

a. Section 1. This section originates at the GPI and extends for a distance of 775 feet in the direction of the FAF. It is a level plane, the elevation of which is equal to the elevation of the GPI.

b. Section 2. This section originates 775 feet outward from the GPI. It connects with Section 1 at the elevation of the GPI. The gradient of this section varies with the glide path angle used.

(1) To identify the glide slope angle and associated final approach surface gradient to clear obstacles in Section 2:

(a) Determine the distance “D” from the GPI to the controlling obstacle and the height of the controlling obstacle above the GPI.

(b) Enter these values in the formula:

\[
\text{TAN ANGLE} = \frac{\text{Obstacle Height}}{D - 775}
\]

(c) Using the TAN table (see Volume 1, Annex D) convert the tangent angle to a degree angle. This is the angle of the Section 2 approach surface gradient that is required to clear the obstacle, measured from the beginning of Section 2 at the height of the GPI.

The minimum glide slope angle required is found in Table 1–28.

163. Transitional Surfaces

Volume 1, Para 1022, does not apply. Transitional surfaces for PAR are inclined planes with a slope of 4:1, which extend outward and upward from the edges of the final approach surfaces. They start at the height of the applicable final approach surface, and are perpendicular to the final approach course. They extend laterally 600 feet at the GPI and expand uniformly to a width of 1,500 feet at 25,000 feet from the GPI.

Note: The distance to the outer edge of the 4:1 transitional surface from the final approach course centreline is: \(\frac{5}{8}W = 0.186D + 850\). To determine the width of the transitional area, subtract the final approach primary area width found in Para 160.b.

164. Obstacle Clearance

Volume 1, Para 1024, does not apply. No obstacle should penetrate the applicable final approach surface specified in Para 162 or the transitional surfaces specified in Para 163. Obstacle clearance requirements greater than 500 feet need not be applied unless required in the interest of safety due to precipitous terrain or radar system peculiarities (see Figure 1–111).

Note: Provided the surface is free of obstacles, the terrain within Section 1 and 2 may rise at a gradient of 75:1 without adverse effect on minima. The 75:1 gradient begins at the GPI and extends until it meets the Section 2 obstacle clearance gradient (see Figure 1-111a). This is intended to allow for terrain undulations only. Any vegetation or non-frangible man-made obstructions within this area must be treated in accordance with Para 162.
165. Glide Slope Landing Area

Required obstacle clearance is specified in Para 164. In addition, consideration requirements shall be given to the following in the selection of the glide slope angle:

a. If angles less than 3 degrees are established, the obstacle clearance requirements shall be arrived at in accordance with Volume 1, Paras 1024 and 1025.

b. Angles greater than 6 degrees shall not be established without authorization of the approving authority. The angle selected should be no greater than that required to provide obstacle clearance.

c. Angles selected should be increased to the next higher tenth of a degree, e.g., 4.71 degrees becomes 4.8; 4.69 degrees becomes 4.7.

166. Relocation Of The Glide Slope

Volume 1, Para 1027, does not apply. The GPI shall normally be located at the arrival edge of the landing area. If obstacle clearance requirements cannot be satisfied, or if operational advantages will result, the GPI may be moved into the landing area provided sufficient landing area is available forward of the displaced or relocated GPI.

167. Adjustment Of DH

Volume 1, Para 1028, does not apply. An adjustment is required whenever the angle to be used exceeds 3.8 degrees (see Table 1–29). This adjustment is necessary to provide ample deceleration between the DH point and the landing area.

168. Missed Approach Obstacle Clearance

No obstacle may penetrate a 20:1 missed approach surface that overlies the missed approach areas illustrated in Figures 1–113, 1–114, and 1–115. The missed approach surface originates at the GPI. However, to gain relief from existing obstacles in the missed approach area the point at which the surface originates may be relocated as far backward from the GPI as a point on the final approach course that is directly below the MAP. In such cases the surface originates at a height below the DH as specified in Table 1–30 (see Figure 1–112).

When penetration of the 20:1 surface originating at the GPI occurs, an upward adjustment to the DH equal to the maximum penetration of the surface should be considered.
169. Straight Missed Approach Area
The straight missed approach (maximum of 15 degrees turn from final approach course) area starts at the MAP and extends to 7.5 NM.

a. Primary Area. This area is divided into three sections.
   
   (1) Section 1A is a continuation of the final approach area. It starts at the MAP and ends at the GPI. It has the same width as the final approach area at the MAP.

   (2) Section 1B is centred on the missed approach course. It begins at the GPI and extends to a point 1 mile from the MAP outward along the missed approach course. It has a beginning width the same as the final approach area at the MAP and expands uniformly to 4,000 feet at 1 mile from the MAP.

   (3) Section 2 is centred on the continuation of the Section 16 course. It begins 1 mile from the MAP and ends 7.5 NM from the MAP. It has a beginning width of 4,000 feet expanding uniformly to a width equal to that of an initial approach area at 7.5 NM from the MAP.

b. Secondary Area. The secondary area begins at the MAP, where it has the same width as the final approach secondary area. In Section 1A the width remains constant from the MAP to the GPI, after which it increases uniformly to the appropriate airway width at 7.5 NM from the MAP (see Figure 1–113).

170. Turning Missed Approach Area
Where turns of more than 15 degrees are required in a missed approach procedure, they shall commence at an altitude that is at least 400 feet above the elevation of the landing area. Such turns are assumed to commence at the point where Section 2 begins. The turning flight track radius shall be 4,000 feet (0.66 NM).

a. Primary Area. The outer boundary of the Section 2 primary area shall be drawn with a 1.3 mile radius. The inner boundary shall commence at the beginning of Section 1B. The outer and inner boundary shall flare to the width of an initial approach area 7.5 NM from the MAP.

b. Secondary Area. Secondary areas for reduction of obstacle clearance are identified with Section 2. The secondary areas begin after completion of the turn. They are zero NM wide at the point of beginning and increase uniformly to the appropriate airway at the end of Section 2. Positive course guidance is required to reduce obstacle clearance in the secondary area (see Figure 1–114).
171. Combination Straight And Turning Missed Approach Area

If a straight climb to an altitude greater than 400 feet is necessary prior to commencing a missed approach turn, a combination straight and turning missed approach area must be constructed. The straight portion of this missed approach area is divided into Section 1 and 2A. The portion in which the turn is made is Section 2B.

a. Straight Portion. Sections 1 and 2A correspond respectively to Section 1 and 2 of normal straight missed approach area and are constructed as specified in Volume 1, Para 169, except that Section 2A has no secondary areas. Obstacle clearance is provided as specified in Volume 1, Para 119. The length of Section 2A is determined as shown in Figure 1–115, and relates to the need to climb to a specified altitude prior to commencing the turn. The line $A^1–B^1$ marks the end of Section 2A. Point $C^1$ is 5,300 feet from the end of Section 2A.

b. Turning Portion. Section 2B is constructed as specified in Volume 1, Para 169, except that it begins at the end of Section 2A instead of the end of Section 1. To determine the height which must be attained before commencing the missed approach turn, first identify the controlling obstacle on the side of Section 2A to which the turn is to be made. Then measure the distance from this obstacle to the nearest edge of the Section 2A area. Using this distance as illustrated in Figure 1–115, determine the height of the 20:1 slope at the edge of Section 2A. This height plus 250 feet (rounded off to the next higher 20-foot increment) is the height at which the turn should be started. Obstacle clearance requirements in Section 2B are the same as those specified in Volume 1, Para 121, except that Section 28 is expanded to start at Point C if no fix exists at the end of Section 2A or if no course guidance is provide in Section 2 (see Figure 1–115).

Note: The missed approach areas expand uniformly to the appropriate airway width.
SECTION 11. AIRPORT SURVEILLANCE RADAR (ASR)

172. Initial Approach Segment
Volume 1, Para 1041.a.(1), applies except that 90 degrees is changed to 120 degrees.

173. Intermediate Approach Segment
Volume 1, Para 1042.b, applies with the exception that the maximum angle of intercept is changed to 120 degrees and Table 1–24 is used to determine the required minimum length of the intermediate segment.

174. Final Approach Segment
Volume 1, Para 1044, applies except for subparagraphs a, c.(2) and d.
   a. Alignment. Volume 1, Paras 116.a and b, apply.

175. Missed Approach Point
The identification of the MAP in Volume 1, Para 1048, is changed as follows. The missed approach point is a point on the final approach course that is not farther than 2,600 feet from the centre of the landing area (see Figure 1–108). For point in space approaches the MAP is on the final approach course at the end of the final approach area.

176—199. Reserved
### Table 1-1 TO 1-22: Reserved.

<table>
<thead>
<tr>
<th>Type Procedure Turn</th>
<th>Altitude Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 NM PT from FAF</td>
<td>Within 6,000 ft of alt over FAF</td>
</tr>
<tr>
<td>10 NM PT from FAF</td>
<td>Within 4,000 ft of alt over FAF</td>
</tr>
<tr>
<td>5 NM PT from FAF</td>
<td>Within 2,000 ft of alt over FAF</td>
</tr>
<tr>
<td>15 NM PT, no FAF</td>
<td>Not Authorized</td>
</tr>
<tr>
<td>10 NM PT, no FAF</td>
<td>Within 4,000 ft of MDA on Final</td>
</tr>
<tr>
<td>5 NM PT, no FAF</td>
<td>Within 2,000 ft of MDA on Final</td>
</tr>
</tbody>
</table>

Table 1-23: Procedure Turn Completion Altitude Differential. Para 112.

<table>
<thead>
<tr>
<th>Angle (Degrees)</th>
<th>Minimum Length (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>1.0</td>
</tr>
<tr>
<td>60</td>
<td>2.0</td>
</tr>
<tr>
<td>90</td>
<td>3.0</td>
</tr>
<tr>
<td>120</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Note:** This Table may be interpolated

Table 1-24: Minimum Intermediate Course Length (Not applicable to PAR or ILS). Para 113.

<table>
<thead>
<tr>
<th>HAL</th>
<th>250 – 600 ft</th>
<th>601 – 800 ft</th>
<th>More than 800 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility (SM) Minima</td>
<td>$\frac{1}{2}$ SM</td>
<td>$\frac{3}{4}$ SM</td>
<td>1 SM</td>
</tr>
</tbody>
</table>

Table 1-25: Effect Of HAL On Visibility Minima. Para 127.b.

<table>
<thead>
<tr>
<th>Magnitude of Turn Over the Facility</th>
<th>Minimum Length (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>1.0</td>
</tr>
<tr>
<td>60°</td>
<td>2.0</td>
</tr>
<tr>
<td>90°</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Note:** This Table may be interpolated

Table 1-26: Minimum Length Of Final Approach Segment (NM). Para 142.b.
### Table 1-27: Intermediate Segment Angle Of Intercept vs Segment Length. Para 151 & 156

<table>
<thead>
<tr>
<th>Angle (Degrees)</th>
<th>Minimum Length (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°</td>
<td>1.0</td>
</tr>
<tr>
<td>60°</td>
<td>2.0</td>
</tr>
<tr>
<td>90°</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Note:** This Table may be interpolated

### Table 1-28: Final Approach Glide Slope – Surface Slope Angles. Para 162.b.

<table>
<thead>
<tr>
<th>Glide Slope Angle (Degrees)</th>
<th>Less Than 3°</th>
<th>3°</th>
<th>4°</th>
<th>5°</th>
<th>6°</th>
<th>7°</th>
<th>8°</th>
<th>12°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2 obstacle clearance surface gradient (degrees)</td>
<td>*</td>
<td>1.65</td>
<td>2.51</td>
<td>3.37</td>
<td>4.23</td>
<td>5.09</td>
<td>5.95</td>
<td>9.39</td>
</tr>
</tbody>
</table>

**Note:** This Table may be interpolated  
* See Para 165.a.

### Table 1-29: Minimum DH – GS Angle Relationship. Para 167.

<table>
<thead>
<tr>
<th>GS Angle (Degrees)</th>
<th>Up to 3.80</th>
<th>3.81 to 5.70</th>
<th>Over 5.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum DH (Feet)</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
</tbody>
</table>

### Table 1-30: Beginning Point Of Missed Approach Surface. Para 168.

<table>
<thead>
<tr>
<th>GS Angle (Degrees)</th>
<th>3</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dist. below DH point (Feet)</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
</tbody>
</table>

**Note:** This Table may be interpolated
Figure 1-105: Helicopter Procedure Turn Area. Para 112.
EXAMPLE:

MDA is 360’ MSL based on obstacles in the approach area. A 1098’ MSL controlling obstacle is 1 NM (6076”) from the near edge of Section 1.

A 20:1 surface that clears the obstacle has a height of 794’ MSL at the near edge of Section 1.

\[ 6076’ \div 20 = 304’ \]
\[ 1098’ - 304’ = 794’ \]

To determine minimum altitude at which the missed approach aircraft may start the turn add 250’ obstacle clearance and round up the sum to the next higher 20’ increment.

\[ 794’ + 250’ = 1044’ \]
\[ Rounded \ up \ = \ 1060’ \]

To climb 700’ from MDA 360’ MSL to turning altitude (1060’ MSL) at the 20:1 climb gradient requires 14,000’. This is the minimum length of Section 1.

**Figure 1-106: Combination Missed Approach Area. Para 122.**
Figure 1-107: Final Approach Primary And Secondary Area. On Heliport VOR, No FAF. Para 132.b and Fig 1 110.

Figure 1-108: Missed Approach Points. Off-Heliport VOR with FAF. Para 135.
Figure 1-109: Final Approach Primary And Secondary Areas. On-Heliport NDB, no FAF. Para 140.

Figure 1-110: PAR Final Approach Area. Para 159 and 160.
Figure 1-111: Final Approach Area Surface And Obstacle Clearance. Para 162 and 164.

Figure 1-111A: Terrain Exclusion Area. Para 164 Note.
Figure 1-112: Missed Approach Surface Options. Para 168.
Figure 1-113: Straight Missed Approach. Para 169.
Figure 1-114: Turning Missed Approach Area. Para 170.
EXAMPLE:

DA is 200' MSL. A 1065' controlling obstacle is 6100' from the near edge of Section 2A. A 20:1 surface that clears the obstacle has a height of 760' MSL at the near edge of Section 2A.

$$6100' + 20 = 305'$$
$$1065' - 305' = 760'$$

To determine minimum altitude at which the missed approach aircraft may start the turn, add 250' obstacle clearance and round up the sum to the next higher 20' increment.

$$760' + 250' = 1010'$$
Rounded up = 1020'

To climb 820' from DH 200' to the turning altitude (1020' MSL) at the 20:1 climb gradient requires 16,400'. Section 1 is 6076' long; therefore, Section 2A is required to be 10,324' long.

Figure 1-115: Combination Straight And Turning Missed Approach. Para 171.
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