GENERAL NONPRECISION DESCENT ANGLE POLICY.

Descent Angle Parameters

The range of acceptable descent angles applicable to nonprecision approaches is 2.75°(MINIMUM)-3.77° (MAXIMUM). The preferred range is 2.75°-3.50°. The OPTIMUM angle is 3.00°.

Descent Angle Policy

Construct original nonprecision approaches to provide a descent angle within the preferred range. If a VGSI serves the runway with an angle within the preferred range, construct the procedure descent angle coincident (± 0.2°, TCH ± 3') with the VGSI. If either the VGSI angle is not within the preferred range, or the VGSI TCH is not within the parameters of TERPS Table 18A, construct an OPTIMUM 3° descent angle to an appropriate Table 18A TCH value, and publish a note stating "VGSI AND DESCENT ANGLES NOT COINCIDENT." If a VGSI does not serve the runway, construct an OPTIMUM 3° descent angle to the Table 18A recommended TCH.

NOTE: Table 18A specifies the MINIMUM, MAXIMUM, and OPTIMUM (± 5-foot window) TCH values for both nonprecision and precision approach procedures. The 60' Maximum TCH restriction is applicable to precision approaches only and is not applicable in nonprecision evaluations.

Adding Descent Angle To Existing Nonprecision Approaches During Periodic Review Or Amendment.

When adding the descent angle to an existing nonprecision approach supported by a VGSI set within the acceptable descent angle range (2.75°-3.77°) and TCH within Table 18A parameters, adjust the intermediate altitude or FAF position as necessary to achieve coincidence (± 0.2°, TCH ± 3') with the VGSI angle/TCH. If coincidence cannot be achieved, or if a VGSI does not serve the runway, determine the FAF altitude (and location if necessary) for an OPTIMUM 3° angle to a TCH within TERPS Table 18A parameters. Round the altitude to the nearest 100' increment. If the existing VGSI is not coincident, publish the descent angle calculated from the revised FAF altitude and the note "VGSI AND DESCENT ANGLES NOT COINCIDENT."

INITIAL NONPRECISION DESCENT ANGLE IMPLEMENTATION POLICY.

In order to rapidly generate a significant number of nonprecision approaches depicting descent angle information, all currently published nonprecision approach procedures should be analyzed under TERPS paragraph 252 to determine descent angle and TCH. Consider the following for each nonprecision approach procedure analyzed:

Runways with a VGSI

Case 1. Runway Served By VGSI Angle Coincident With Descent Angle

If the VGSI TCH is within Table 18A values for nonprecision approaches, and you can achieve a descent angle that is within 0.2° of the VGSI by calculating the descent gradient to a TCH within ± 3 feet of VGSI TCH, the descent path is considered coincident**. Publish the descent angle and VGSI TCH value by P-NOTAM.**

Case 2. Runway served by VGSI Angle Not Coincident With Descent Angle

If the descent angle from FAF (at FAF altitude) to TCH (VGSI TCH height[± 3 feet]) is not within 0.2° of the VGSI angle, adjust the FAF altitude to attempt to gain VGSI coincidence. If the FAF altitude must be decreased, do not take action since flight inspection would be necessary, but note the required change for future amendment. If you gain coincidence by increasing the FAF altitude**, publish the new FAF altitude, descent angle, and TCH value by P-NOTAM**. If you do not gain coincidence but can achieve a descent angle within the specified range to a Table 18A TCH value, **publish the descent angle, TCH value used and the note "VGSI AND DESCENT ANGLES NOT COINCIDENT" by P-NOTAM.**

Case 2 Example:

The VGSI at this location is set to 3°, the FAF altitude is 2,700 feet, the VGSI TCH is 68 feet and threshold elevation is 1,005.6 feet. The LOM is 5.8 NM from the runway threshold. The procedure will be amended adding a descent angle and TCH. To determine the currently published descent angle from FAF altitude to the VGSI TCH:

$$\text{Angle} = \left(\frac{\text{FAF Altitude - }(\text{THRe} + \text{TCH})}{\text{SL} \times 6{,}076.11548} \right)$$

$$\text{ArcTan}\left[\frac{2{,}700 - (1{,}005.6 + 68)}{5.8 * 6{,}076.11548} \right] = 2.64° \; .$$

The currently published FAF altitude yields a descent angle that is not within the specified range and not coincident the VGSI angle. To determine the FAF altitude that may achieve an angle coincident with the VGSI angle:

$$\text{FAF Altitude} = \text{THRe} + \text{TCH} + \left[\text{Tan}(\text{VGSI Angle}) \times \text{SL} \times 6{,}076.11548 \right]$$

$$\text{Where THRe} = \text{THR Elevation}$$

$$\text{SL} = \text{Segment Length (NM)}$$

$$1{,}005.6 + 68 + \text{Tan}(3°) \times (5.8 \times 6{,}076.11548) = 2{,}920.53' \quad \text{(round t nearest 100')}$$

This rounds to 2,900 which yields a descent angle of:

$$\text{Angle} = \left(\frac{\text{FAF Altitude - }(\text{THRe} + \text{TCH})}{\text{SL} \times 6{,}076.11548} \right)$$

$$\text{ArcTan}\left[\frac{2{,}900 - (1{,}005.6 + 68)}{5.8 * 6{,}076.11548} \right] = 2.97° \; .$$

The FAF altitude will be amended from 2,700' to 2,900', the descent angle of 2.97°, and the 68' TCH would be issued by P-NOTAM.

<u>Case 3.</u> Runway NOT Served By A VGSI

If the runway is not served by a VGSI, calculate the angle from the published FAF altitude to an appropriate Table 18A' TCH value. If the calculated descent angle is within the specified range, **publish the descent angle and TCH by P-NOTAM.** If the calculated descent angle is <u>not</u> within the specified range, adjust the FAF altitude to achieve a descent angle (as close to 3° as possible) and to an appropriate Table 18A TCH value. If the descent angle generated by the increased FAF altitude is within the specified range, **publish the revised FAF altitude, descent angle, and TCH by P-NOTAM.**

<u>Stepdown fixes</u>

Where stepdown fixes exist, calculate the descent angle from the stepdown fix to TCH. Compare this angle to the angle from FAF to TCH. If the angle from the stepdown fix is equal to or lower than the angle from the FAF, the stepdown fix is not a descent angle factor(the stepdown altitude will not change). If the angle from the stepdown is greater than the angle from the FAF, attempt to raise the FAF altitude in order to equal or exceed the angle from the stepdown fix. If this can be accomplished, and the TCH and descent angle are within the specified ranges, **publish the revised FAF altitude, descent angle, and TCH value (and VGSI note if appropriate) by P-NOTAM.**

Remote Altimeter Locations and Temperature Restrictions

Publishing angles on nonprecision approach procedures is informational only. There is not an instrument in the aircraft that provides deviation from descent angle information. Aircraft are authorized descent to the MDA at their discretion. Remote altimeter will not affect the publishing of angles. Procedural application of temperature correction is a factor in Baro-VNAV only. A pilot using Baro-VNAV without special authorization from the Flight Standards Service must not penetrate the MDA until the landing environment is in sight (no protection for a missed approach dip down is provided).

CALCULATION TOOLS

You may use the embedded spreadsheet to assist in descent angle evaluation. Double click on the spreadsheet to activate it.

Nonprecision Angle Calculation Tool

Determine angle based on published FAF location and altitude

Published FAF Alt:	2,700.00		
RWT Elev:	1,005.60	Recommend for Height Groups	Allowable Height Groups
TCH:	68.00	**Above Recommended Ranges**	**3 & 4 (PA Requires Waiver)**
Seg Length (NM):	5.80		
Angle:	**2.64°**	***Below Allowable Range (2.75°-3.77°)***	

Matching a VGSI angle and TCH

Angle to Match:	3.00°		
RWT Elev:	1,005.60	Recommend for Height Groups	Allowable Height Groups
TCH:	68.00	**Above Recommended Ranges**	**3 & 4 (PA Requires Waiver)**
Seg Length (NM):	5.80		
FAF Alt:	2,921		
Publish:	**2,900**		
Net Angle:	**2.97°**	***Within Preferred Range (2.75°-3.5°)***	

Determining FAF to RWT Distance

Angle to Match:	3.00°	
RWT Elev:	1,005.60	
TCH:	55.00	
FAF Altitude:	2,900	
FAF Distance to RWT	**35,097.84 Ft**	**5.78 NM**