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of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Continuous Descent Final Approach

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AC No: 120-108A

Change:

This advisory circular (AC) provides recommendations for operators using a continuous descent final approach (CDFA) technique while conducting a Nonprecision Approach (NPA) instrument approach procedure (IAP). The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

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CHAPTER 1. GENERAL

1.1 Purpose of This Advisory Circular (AC). This AC describes how to use a continuous descent final approach (CDFA) technique on a Nonprecision Approach (NPA), as well as recommended general procedures and training guidelines for implementing CDFA as a standard operating procedure (SOP). The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

1.2 Audience. The information in this AC applies to all operators conducting CDFA operations under Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 91 subpart K (part 91K), 121, 125, and 135 within the U.S. National Airspace System (NAS).

1.3 Where You Can Find This AC. You can find this AC on the Federal Aviation Administration's (FAA) website at https://www.faa.gov/regulations_policies/advisory_circulars and the Dynamic Regulatory System (DRS) at https://drs.faa.gov.

1.4 What This AC Cancels. AC 120-108, Continuous Descent Final Approach, dated January 20, 2011, is canceled.

1.5 Related 14 CFR Regulations.

- Part 91, General Operating and Flight Rules.
- Part 97, Standard Instrument Procedures.
- Part 119, Certification: Air Carriers and Commercial Operators.
- Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations.
- Part 125, Certification and Operations: Airplanes Having a Seating Capacity of 20 or More Passengers or a Maximum Payload Capacity of 6,000 Pounds or More; and Rules Governing Persons On Board Such Aircraft.
- Part 135, Operating Requirements: Commuter and On Demand Operations and Rules Governing Persons On Board Such Aircraft.

1.6 Related Reading Material (current editions). The majority of the document references in this AC are from the most current version as designated by parentheses ( ) placed at the end of the document title. In some cases, a letter will indicate the actual version.

1.6.1 FAA ACs and Aviation Handbooks and Manuals. The following are the latest ACs and/or aviation handbooks and manuals:

- AC 91-79( ), Mitigating the Risks of a Runway Overrun Upon Landing.
- FAA Aeronautical Information Manual (AIM).
- FAA Instrument Procedures Handbook (FAA-H-8083-16B).

1.6.2 Orders.

- FAA Order 8260.3( ), United States Standard for Terminal Instrument Procedures (TERPS).
- FAA Order 8260.19( ), Flight Procedures and Airspace.

1.7 **AC Feedback Form.** For your convenience, the AC Feedback Form is the last page of this AC. Note any deficiencies found, clarifications needed, or suggested improvements regarding the contents of this AC on the Feedback Form.

CHAPTER 2. BACKGROUND

2.1 NPAs. Current NPAs are designed with and without step-down fixes in the Final Approach Segment (FAS). NPAs designed without step-down fixes in the FAS allow for an immediate descent to the minimum descent altitude (MDA) after crossing the final approach fix (FAF). The aircraft remains at the MDA until it descends for the runway or reaches the missed approach point (MAP). This technique is described as the "dive and drive." NPAs with step-down fix altitudes in the FAS do not allow an immediate descent to the MDA; they require additional pitch and power changes during the vertical descent to the MDA in order to cross at or above the step-down fix altitude. Once the aircraft reaches the MDA, it again remains at the MDA until it descends for the runway or reaches the MAP. In both scenarios, NPAs flown without a constant descent require multiple thrust, pitch, and altitude adjustments inside the FAF. These adjustments increase pilot workload and potential errors during a critical phase of flight. The dive and drive technique also results in the aircraft maintaining an extended level flightpath as low as 250 feet (ft) above the ground in instrument meteorological conditions (IMC). This technique could result in an unsafe final Vertical Path (VPATH) to the runway. This AC describes how to conduct more stabilized approaches.

2.2 Stabilized Approaches. A stabilized approach is a key feature to a safe approach and landing. Operators are encouraged to use the stabilized approach concept (refer to AC 91-79( )) to help eliminate controlled flights into terrain (CFIT). AC 91-79( ) describes a profile that has an aircraft stabilized before descending through a 1,000 ft window in IMC, or through a 500 ft above touchdown zone elevation (TDZE) window in visual meteorological conditions (VMC) to the landing touchdown point. This profile is characterized by maintaining a stable approach speed, constant descent rate, constant vertical Flight Path Angle (FPA), and the same aircraft configuration. This AC will focus on techniques to fly a stabilized vertical descent from the FAF to the landing touchdown point. It assumes the aircraft is in final configuration approaching the FAF and that the descent profile will adhere to the stabilized approach concept referenced in AC 91-79( ).

2.3 Approach Designs and Continuous Descent. A precision instrument approach procedure (IAP) (e.g., instrument landing system (ILS) and Ground Based Augmentation System (GBAS) Landing System (GLS)) and some NPA Area Navigation (RNAV) Global Positioning System (GPS) approach procedures with vertical guidance (APV) (e.g., lateral navigation (LNAV)/vertical navigation (VNAV) and localizer performance with vertical guidance (LPV)) have a continuous descent approach profile in their design. Conventional NPAs (e.g., Localizer (LOC) only and very high frequency (VHF) omni-directional range (VOR)) and NPA RNAV approaches (e.g., LNAV and Localizer Performance (LP)) are not designed with a vertical flightpath. RNAV approaches without approved vertical guidance and conventional NPAs should be flown, whenever possible, using a CDFA technique. Flying NPAs with a continuous descent profile can provide a safety advantage over flying approaches using the dive and drive technique. Therefore, the goal of using a CDFA on an NPA is to incorporate the safety benefits from flying a stabilized continuous descent as a standard practice.

2.4 Definition of CDFA. CDFA is a technique for flying the FAS of a NPA as a continuous descent. The technique is consistent with stabilized approach procedures and has no level off. A CDFA starts from an altitude/height at or above the FAF and proceeds to an altitude/height approximately 50 ft (15 meters) above the landing runway threshold or to a point where the type of aircraft will begin the flare maneuver.

2.5 Advantages of CDFA. The following is a list of benefits that operators may realize when using a CDFA technique versus not using it:

- Increased safety by employing the concepts of stabilized approach criteria and procedure standardization.
- Improved pilot situational awareness (SA) and reduced pilot workload.
- Improved fuel efficiency by minimizing the low-altitude level flight time.
- Reduced noise level by minimizing the level flight time at high-thrust settings.
- Procedural similarities to APV and precision approach operations.
- Reduced probability of infringement on required obstacle clearance during the FAS.

2.6 Approved NPAs. The FAA recommends accomplishing a CDFA on all of the following published NPAs:

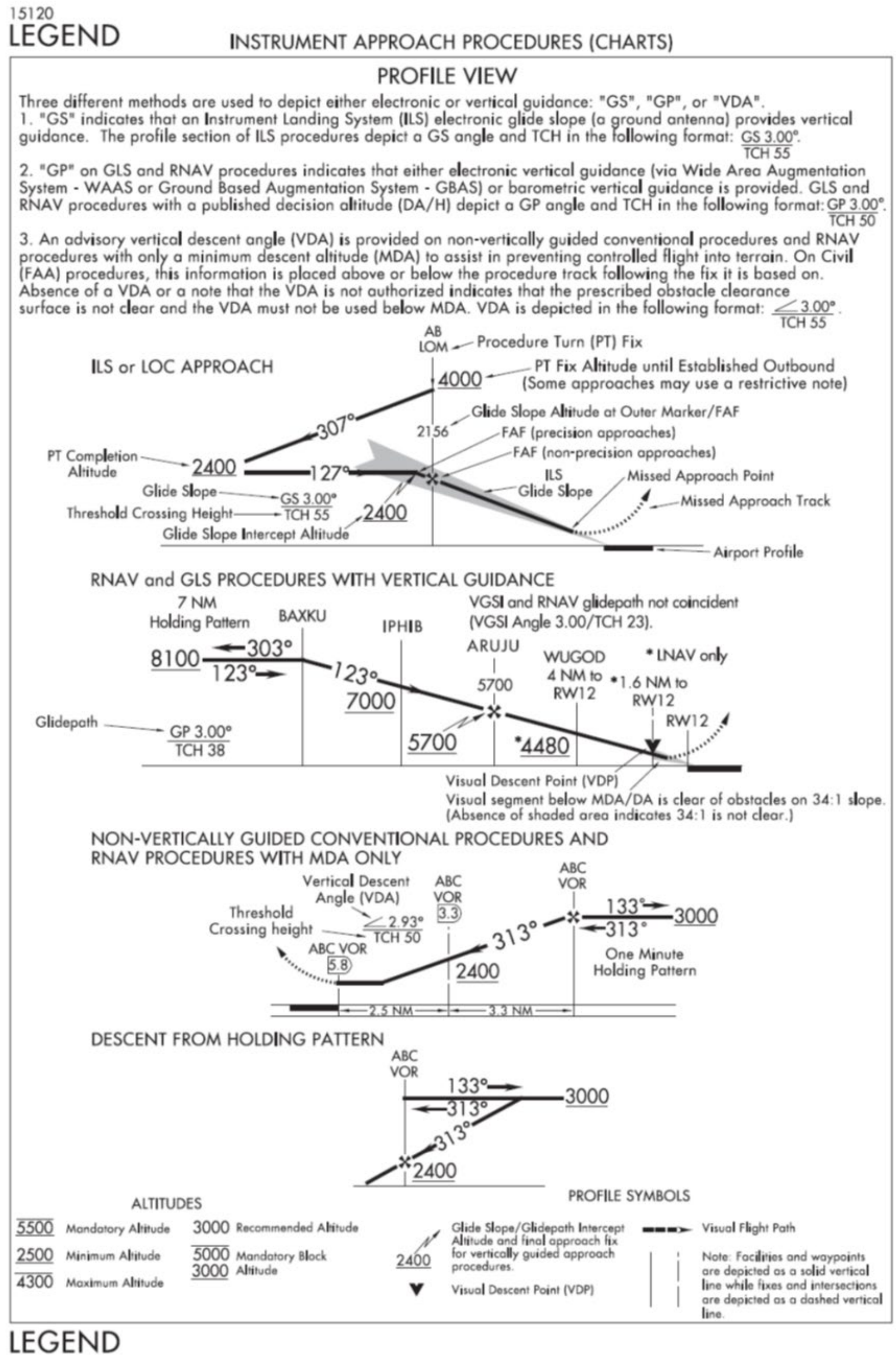
- VOR;
- VHF omni-directional range station/distance measuring equipment (VOR/DME);
- Non-directional radio beacon (NDB);
- NDB/DME;
- LOC, Localizer back course (LOC BC);
- LOC/DME;
- Localizer type directional aid (LDA);
- LDA/DME;
- Simplified Directional Facility (SDF);
- SDF/DME;
- RNAV (GPS) LNAV line-of-minima;
- RNAV (GPS) LP line-of-minima; and
- Tactical Air Navigation System (TACAN).

CHAPTER 3. OPERATIONAL PROCEDURES AND FLIGHT TECHNIQUES

3.1 Equipment Requirements. A CDFA does not require specific aircraft equipment; however, the aircraft must be equipped to accomplish the NPA procedure. Pilots can safely fly NPAs with a CDFA using basic piloting techniques, aircraft flight management systems (FMS), or RNAV systems. Pilots can use points defined by a DME fix, crossing radial, GPS distance from the runway, etc., on the approach plate to track their progress along both the lateral and vertical approach paths to the MAP.

3.2 Approach Requirements. A CDFA may be flown on any NPA. There are no specific approach requirements nor any requirement for a vertical descent angle (VDA), glide path (GP), or visual descent point (VDP) to be published on an IAP in order to fly a CDFA. However, the use of a published VDA or a GP with a published or derived VDP on the IAP can help pilots calculate a desired rate of descent. This rate of descent may be flown by using the aircraft's Vertical Velocity Indicator (VVI). A VDA provides FAS advisory vertical information only. A GP provides approved vertical guidance for the FAS. The Terminal Procedures Publication (TPP) IAP Legend (see Figure 3-1, Instrument Approach Procedures Legend) defines both the VDA and GP. Conventional NPAs or RNAV approaches with LNAV- or LP-only minima may or may not be published with a VDA. RNAV approaches with a published decision altitude (DA) (e.g., those with LNAV/VNAV or LPV minima) depict a GP angle. A GLS procedure is also published with a DA and a GP. Aircraft with FMS, barometric vertical navigation (baro-VNAV), Satellite-Based Augmentation System (SBAS) (implemented in the United States as wide area augmentation system (WAAS)), or similar equipment may provide the published VDA or GP when the IAP is selected from the database. Aircraft equipped with FPA allows the pilot to enter an electronic descent angle based on the published VDA or GP. Pilots flying aircraft without either type of equipment should manually compute a required rate of descent for accomplishing the CDFA.

Figure 3-1. Instrument Approach Procedures Legend



Note: Use the "Legends & General Information (PDF)" hyperlink at the bottom of the following Terminal Procedures web page to view current legend information: https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/.

3.3 VDA Design. A VDA is calculated from the FAF altitude to the threshold crossing height (TCH) altitude. It is published on the IAP with the VDA symbol 3.21° TCH 40. The optimum VDA is 3.0°. The minimum VDA is 2.75°. Table 3-1 below provides the maximum VDAs for different aircraft categories. In some cases, the VDA is calculated from a step-down fix altitude to the TCH instead of the FAF altitude to the TCH.

Table 3-1. Maximum VDAs

CAT	Maximum Angle
A (80 knots or less)	6.40
A (81-90 knots)	5.70
B	4.20
C	3.77
D	3.50
E	3.10*

*United States Air Force (USAF)/United States Navy (USN) Category (CAT) E maximum is 3.5°.

3.3.1 VDA Based on Step-Down Fix. On approaches with step-down fixes, the goal is to publish a VDA that keeps the VPATH above the step-down fix altitude. However, in some cases the VDA is calculated from the step-down fix altitude to the TCH. In this situation, the VDA symbol is published on the IAP following the associated step-down fix (see Figure 3-4, Instrument Approach Procedures With Controlling Step-Down Fix (Not for Navigation)). In this example, using an obsolete approach procedure at Tallahassee Regional (now Tallahassee International), the 2.98° VDA is applicable from waypoint WAPIM to a TCH of 46 ft. Paragraph 3.5.3 below will demonstrate how to calculate descent rates for this type of example. In most of these cases, the descent angle between the FAF altitude and the step-down fix altitude is slightly shallower than the published VDA for the segment between the step-down fix and the runway.

Note: Third-party designed IAPs may depict this type of approach in a different format.

3.3.2 NPA Without a Published VDA. When an approach is published without a VDA, Flight Inspection Services (FIS) has previously determined that a VDA should not be published due to obstacles. Flying the VDA below the MDA might not provide acceptable obstacle clearance. The VDA will not be published and a chart profile note reading "Visual Segment – Obstacles" should be published on the TPP IAP. Operators may still calculate and fly a CDFA to the runway, but, if doing so, must not descend below the MDA without visual requirements (refer to part 91, § 91.175). Once passing the MDA into the visual segment of the IAP, operators must see and avoid all obstacles.

3.4 Rate of Descent Discussion. U.S. Government and private flight information publications offer a pilot a way to compute a rate of descent in feet per minute (fpm) from a descent angle (degrees) and/or a descent gradient (feet per nautical mile (NM) (ft/NM)). (See Figure 3-2, Climb/Descent Table (Not for Navigation).) Pilots may use a published VDA or GP in the chart to get a ft/NM descent gradient or a fpm descent rate. Pilots may also calculate a rate of descent without a VDA or GP to accomplish a CDFA. This is accomplished by:

1. Calculating a descent gradient by subtracting the TDZE from the FAF altitude, minus 50 ft and then dividing by the distance from the FAF to runway, published in NM; and then
2. Turning the descent gradient into a rate of descent from the Climb/Descent table.

Note: In both scenarios, the calculated fpm descent rate may be flown using the aircraft's VVI.

3.4.1 Descent Gradient and Rate of Descent Calculation. See Figure 3-3, Sample Approach: Localizer/Non-Directional Beacon La Porte Muni Runway 2 (Not for Navigation). In this example the climb/descent table, aircraft groundspeed (GS), and a published VDA are used to determine the descent gradient and rate of descent/VVI needed to fly a CDFA on the LOC/NDB Runway 2 approach at La Porte Municipal Airport.

3.4.1.1 **VDA.** Find the published VDA on Figure 3-3. In this example, it is 3.20°.

3.4.1.2 **How to Calculate a Descent Gradient for a Published VDA.** Find the descent gradient that equates to a VDA of 3.20° (see Figure 3-2, column 1). In this example, 3.2° equates to 340 ft/NM found in column 2, same row.

3.4.1.3 **How to Calculate a Descent Rate for a Given GS.** Find the descent rate based on GS (see Figure 3-2). Find the column with a GS of 120 knots (kts). Move down the column until it intersects the row with 3.2°/340 ft/NM. The two intersect at 680; so a 680 fpm rate of descent is required to fly the 3.20° descent angle at 120 kts.

Figure 3-2. Climb/Descent Table (Not for Navigation)

CLIMB/DESCENT TABLE 10042

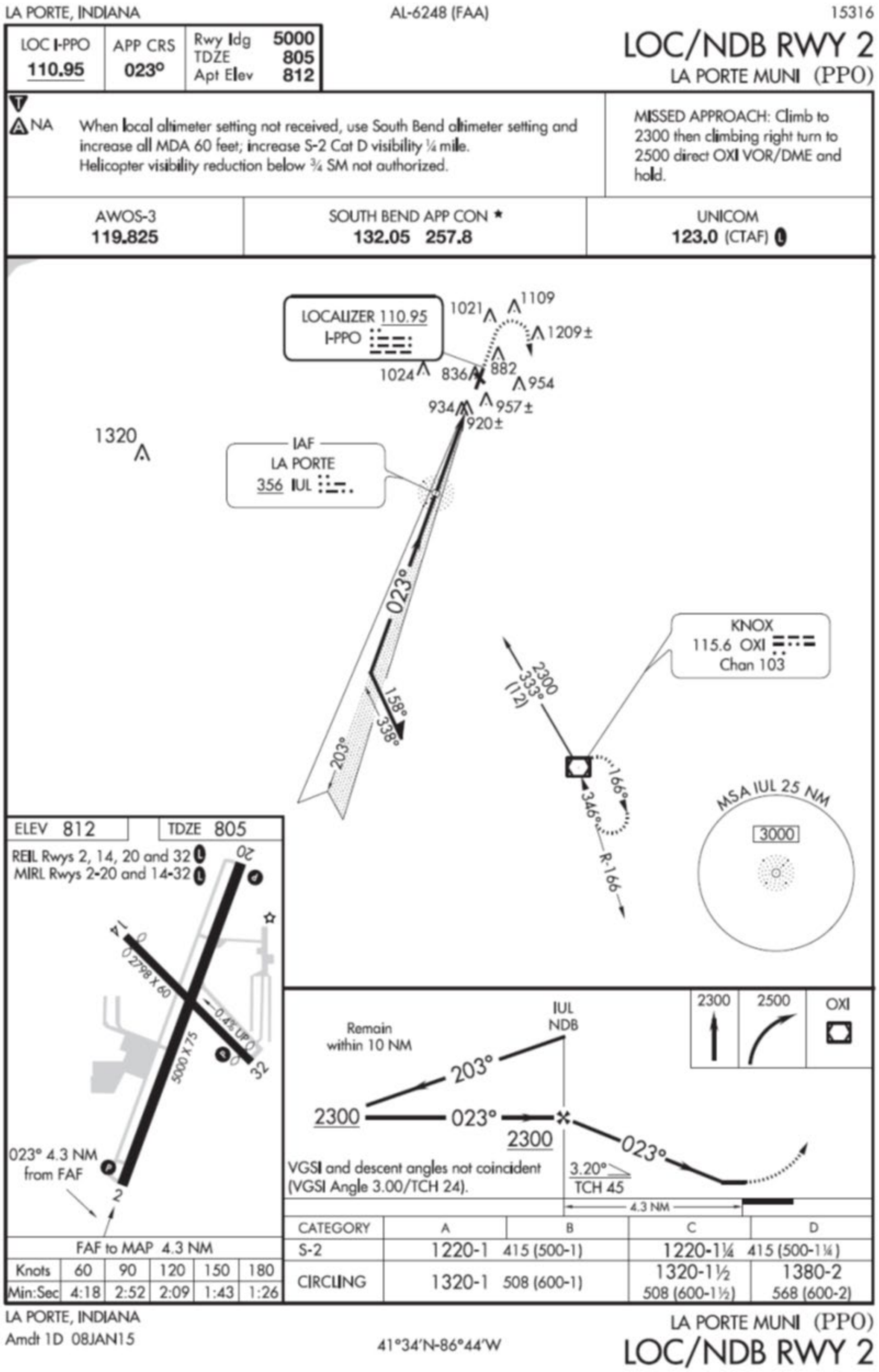
INSTRUMENT TAKEOFF OR APPROACH PROCEDURE CHARTS
RATE OF CLIMB/DESCENT TABLE
(ft. per min)

A rate of climb/descent table is provided for use in planning and executing climbs or descents under known or approximate ground speed conditions. It will be especially useful for approaches when the localizer only is used for course guidance. A best speed, power, altitude combination can be programmed which will result in a stable glide rate and altitude favorable for executing a landing if minimums exist upon breakout. Care should always be exercised so that minimum descent altitude and missed approach point are not exceeded.

CLIMB/ DESCENT ANGLE (degrees and tenths)	ft/NM	GROUND SPEED (knots)										
		60	90	120	150	180	210	240	270	300	330	360
2.0	210	210	320	425	530	635	743	850	955	1060	1165	1275
2.5	265	265	400	530	665	795	930	1060	1195	1325	1460	1590
VERTICAL PATH ANGLE 2.7	287	287	430	574	717	860	1003	1147	1290	1433	1576	1720
2.8	297	297	446	595	743	892	1041	1189	1338	1486	1635	1783
2.9	308	308	462	616	770	924	1078	1232	1386	1539	1693	1847
3.0	318	318	478	637	797	956	1115	1274	1433	1593	1752	1911
3.1	329	329	494	659	823	988	1152	1317	1481	1646	1810	1975
3.2	340	340	510	680	850	1020	1189	1359	1529	1699	1869	2039
3.3	350	350	526	701	876	1052	1227	1402	1577	1752	1927	2103
3.4	361	361	542	722	903	1083	1264	1444	1625	1805	1986	2166
3.5	370	370	555	745	930	1115	1300	1485	1670	1860	2045	2230
4.0	425	425	640	850	1065	1275	1490	1700	1915	2125	2340	2550
4.5	480	480	715	955	1195	1435	1675	1915	2150	2390	2630	2870
5.0	530	530	795	1065	1330	1595	1860	2125	2390	2660	2925	3190
5.5	585	585	880	1170	1465	1755	2050	2340	2635	2925	3220	3510
6.0	640	640	960	1275	1595	1915	2235	2555	2875	3195	3510	3830
6.5	690	690	1040	1385	1730	2075	2425	2770	3115	3460	3805	4155
7.0	745	745	1120	1490	1865	2240	2610	2985	3355	3730	4105	4475
7.5	800	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
8.0	855	855	1280	1710	2135	2560	2990	3415	3845	4270	4695	5125
8.5	910	910	1360	1815	2270	2725	3180	3630	4085	4540	4995	5450
9.0	960	960	1445	1925	2405	2885	3370	3850	4330	4810	5295	5775
9.5	1015	1015	1525	2035	2540	3050	3560	4065	4575	5085	5590	6100
10.0	1070	1070	1605	2145	2680	3215	3750	4285	4820	5355	5890	6430

CLIMB/DESCENT TABLE 10042

Figure 3-3. Sample Approach Localizer/Non-Directional Beacon La Porte Muni Runway 2 (Not for Navigation)



3.5 Calculating a Descent Point for a Step-Down Fix Associated with a VDA Published Between the Step-Down Fix and Runway. When the charted VDA is between the step-down fix and the runway, beginning a normal CDFA descent at the FAF may result in the aircraft crossing the step-down fix below the minimum allowable altitude. To prevent this, pilots may use one of two methods to fly this type of approach. The two methods are a descent at the FAF and a descent past the FAF.

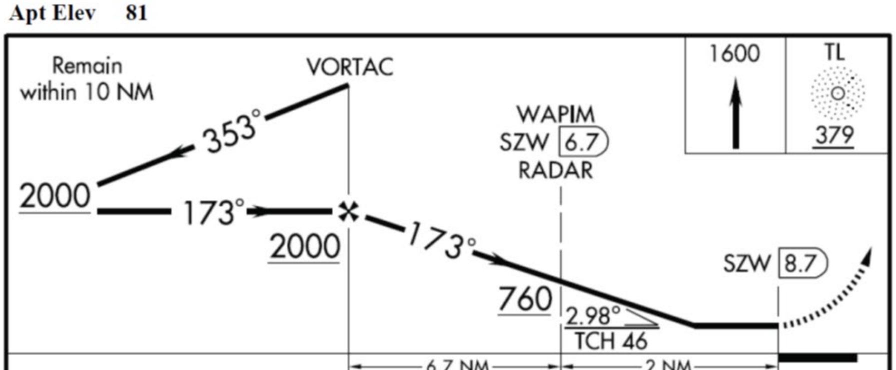
3.5.1 Descent at the FAF. When a descent begins at the FAF, descend from the FAF at a rate of descent to cross at or above the step-down fix altitude. When the aircraft reaches the step-down fix, transition to the published VDA rate of descent. In this scenario, the rate of descent from the FAF to the step-down fix will tend to be shallower than the rate of descent from the step-down to the runway. (See paragraph 3.5.3.1.)

3.5.2 Descent Past the FAF. Begin a descent at a point past the FAF that will allow the aircraft to descend at the published VDA rate of descent for the entire FAS and cross at or above the step-down fix altitude. (See paragraph 3.5.3.2.)

3.5.3 Demonstration of Descent Techniques. Both techniques are demonstrated using an example based on an obsolete approach at Tallahassee Regional (now Tallahassee International) VOR RWY 18 approach (see Figure 3-4).

Figure 3-4. Instrument Approach Procedures With Controlling Step-Down Fix (Not for Navigation)

Rwy ldg 6076
TDZE 81
Apt Elev 81



CATEGORY	A	B	C	D
S-18	760-1 679 (700-1)		760-2 679 (700-2)	760-2¼ 679 (700-2¼)
CIRCLING	760-1 679 (700-1)		760-2 679 (700-2)	760-2¼ 679 (700-2¼)
WAPIM FIX MINIMUMS				
S-18	540-1 459 (500-1)		540-1¼ 459 (500-1¼)	540-1½ 459 (500-1½)
CIRCLING	540-1 459 (500-1)		580-1½ 499 (500-1½)	640-2 559 (600-2)

TALLAHASSEE, FLORIDA
Amdt 11A 09043

TALLAHASSEE RGNL (TLH)
VOR RWY 18

3.5.3.1 Calculate the Descent Rates for Step-Down Fix from FAF. In this example, the descent angle from the FAF to the step-down fix is abnormally shallow compared to the published VDA.

1. Find the Descent Gradient/Descent Angle from the FAF to Step-Down Fix. Take the FAF altitude (2,000 ft) and subtract the step-down fix altitude (760 ft) to get 1,240 ft.

   FAF (2,000 ft) – 760 ft = 1,240 ft

2. Descent Gradient from the FAF to Step-Down Fix. Take 1,240 ft and divide by the distance between the FAF and step-down fix (6.7 NM).

   1,240 ft / 6.7 NM = 185 ft/NM

   The descent gradient calculated is 185 ft/NM, which translates to a descent angle of less than 2.0° from the climb/descent table (see Figure 3-2). Although the chart does not have values for less than a 2.0° angle, a rate of descent can still be calculated for 120 kts, or 2 miles per minute.

3. Descent Rate from the FAF to Step-Down Fix. Take 185 ft/NM and multiply by 2 miles per minute and the rate of descent is 370 fpm.

   185 ft/NM × 2 miles per minute = 370 fpm

   Maintain the 370 fpm rate of descent until reaching the step-down fix. This should place the aircraft at the step-down fix altitude of 760 ft. At the 760 ft step-down fix, transition to a descent rate commensurate with the published 2.98° VDA. The climb/descent table (see Figure 3-2) shows that 2.98° equates to a descent gradient of 316 ft/NM or a rate of descent of 632 fpm at 120 kts.

3.5.3.2 Calculate the Descent Point Beyond the FAF to Meet Step-Down Fix Altitude. This example shows how to calculate a descent point beyond the FAF, which allows a single rate of descent commensurate with the VDA from the descent point to the runway, while placing the aircraft at or above the step-down fix.

1. Find Desired Altitude to Lose. Take the FAF altitude, subtract the TDZE, and subtract the published TCH if available. If the TCH is not available, use 50 ft. This gives you desired altitude to lose in order to be at threshold at the TCH.

   FAF (2,000 ft) – TDZE (81 ft) – TCH (46 ft) = 1,873 ft

2. Find Distance from Runway to Descent Point. Take the desired altitude to lose (1,873 ft) and divide by the descent gradient 316 ft/NM or a 2.98° VDA.

   1,873 ft / 316 ft/NM= 5.9 NM

This distance is 5.9 NM from the runway threshold or 2.8 DME from the SZW Collocated VOR and TACAN (VORTAC).

8.7 NM – 5.9 NM = 2.8 NM

A descent from 2,000 ft beginning at 5.9 NM from the runway or 2.8 DME from SZW will allow the aircraft to descend at a 2.98° VDA or a descent rate of 632 fpm at 120 kts. The aircraft should cross the step-down fix at or above 760 ft and the threshold at 46 ft.

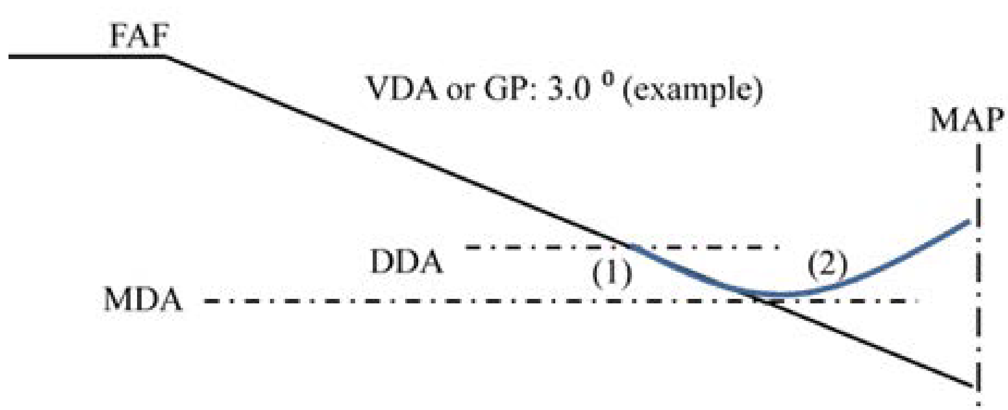
Note: During any approach, pilots must use a vertical FPA that meets all IAP altitude restrictions in order to maintain obstacle and/or terrain clearance. Pilots should use the aircraft barometric altimeter to meet all altitude restrictions.

3.6 Timing-Dependent Approaches. Control of airspeed and rate of descent is particularly important on approaches dependent on timing to identify the MAP. Pilots should cross the FAF at the final approach speed and be configured for landing.

3.7 Derived DA (DDA). Pilots must not descend below the MDA when executing a missed approach from a CDFA. Pilots must initiate a go-around at an altitude above the MDA (sometimes referred to as a DDA) to ensure the aircraft does not descend below the published MDA. (Refer to § 91.175.)

3.8 Decision Approaching MDA. Flying the published VDA will have the aircraft intersect the MDA at a point before the MAP. Approaching the MDA, the pilot has two choices: continue the descent to land with required visual references, or execute a missed approach, not allowing the aircraft to descend below the MDA. (See Figure 3-5 below.)

Figure 3-5. Approach Example Using Continuous Descent Final Approach



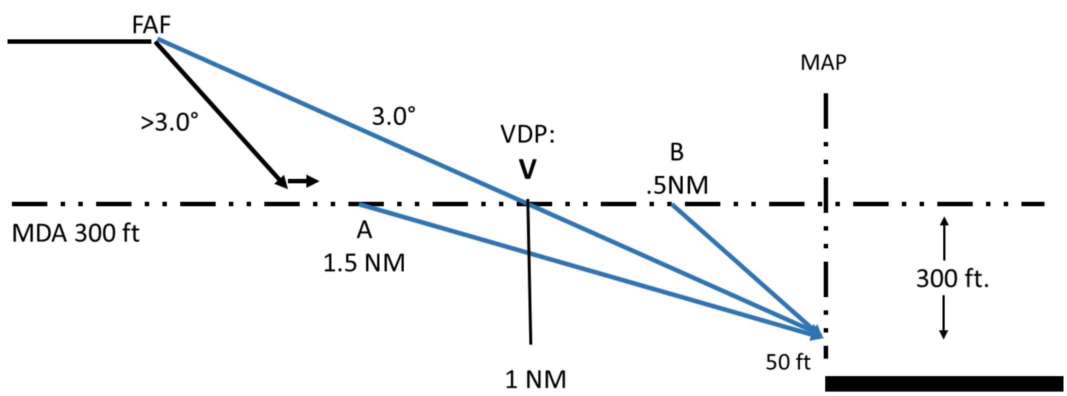
3.8.1 CDFA Visual Example. In this situation, flying a CDFA that equates to a VDA or GP of 3° from the FAF will result in reaching the DDA and/or MDA prior to the published MAP. The pilot has two courses of action to take at the DDA:

1. **Point (1).** If § 91.175 required visual cues are acquired, continue visually to the landing runway while maintaining clear of obstacles.
2. **Point (2).** If § 91.175 required visual cues are not acquired, execute a missed approach procedure. Begin a missed approach at the DDA. Do not descend below the MDA. Proceed on track to the MAP before accomplishing a turn.

3.9 Executing a Missed Approach Prior to MAP. When executing a missed approach prior to the MAP and not cleared for an air traffic control (ATC) climbout instruction, fly the published missed approach procedure. Proceed on track to the MAP before accomplishing a turn.

3.10 Approaches With a VDP. A VDP (see Figure 3-6 below) is shown by a bold letter "V" positioned above the procedure track. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which a normal descent from the MDA to the runway touchdown point may be commenced. Flying the published VDA on an approach constructed with a VDP should have the aircraft cross the MDA at or beyond the VDP. In this example, the dotted lines will not be found on an actual approach plate; the lines are provided to give a visual representation of the MDA and MAP.

Figure 3-6. Approach Example Without Using Continuous Descent Final Approach



3.10.1 Approach Without CDFA (Dive and Drive). This example explains what may happen when using the dive and drive technique and when a descent from the MDA is not accomplished at the published or pilot-computed VDP (3.0°). In both scenarios, the aircraft descended immediately from the FAF to the MDA at a greater than 3.0° descent angle. This maneuver requires multiple thrust, pitch, and altitude adjustments. The pilot levels off at the MDA of 300 ft and continues level flight until reaching the VDP, where, if the visual requirement to continue the approach is met, a descent should begin to the runway at a 3.0° FPA. The VDP will be located approximately 1 NM from the runway with an MDA altitude of 300 ft. See Figure 3-2 to compute rates of descent.

3.10.2 Point A—Descent Before VDP. If the pilot descends .5 NM before the VDP (see Figure 3-6, point A), a 2.0° descent angle is required from the MDA to the TCH. This corresponds to an approximate 425 fpm rate of descent at 120 kts. This low rate of descent requires a higher power setting and an increased deck angle. The aircraft is closer to the ground for a longer period and is more susceptible to a higher drag profile, resulting in obstacle and/or terrain clearance loss.

3.10.3 Point B—Descent After VDP. If the pilot descends .5 NM past the VDP (see Figure 3-6, point B), a 6.0° descent angle is required from the MDA to the TCH. This corresponds to an approximate 1,275 fpm rate of descent at 120 kts. This creates a steep final approach with low power settings, which may lead to an unstable approach, a missed approach, and/or an unsafe landing.

3.11 Quick-Reference Aircraft Height, Distance, and Rate of Descent Techniques. This paragraph discusses how to determine an aircraft's height above the ground at a certain distance from the runway and at a desired rate of descent. This will help operators compare where the aircraft should be in regards to a calculated vertical descent for a CDFA in the FAS. Small differences will occur with different FPAs, but the ability to calculate a number and compare against an actual aircraft position is an invaluable tool for SA.

3.11.1 Aircraft Height and Distance from Runway. This technique provides a simple and quick way to determine the aircraft altitude on a 3.0° FPA. Pilots should remember the ratio 3:1—the aircraft will descend 300 ft for every 1 NM traveled on a 3.0° FPA. This information can then be used to calculate back from the runway to the aircraft to determine an aircraft altitude at a determined distance from the runway. In this discussion we will use the calculated altitude plus 50 ft in order to harmonize with the CDFA's definition of flying a constant descent in the FAS until they reach a height of approximately 50 ft (15 meters) above the landing runway threshold (or to a point where the type of aircraft will begin the flare maneuver). Using the 3:1 ratio and counting back from the runway:

At 1 NM the aircraft should be at 350 ft ((1 NM × 300 ft) + 50 ft),

At 2 NM the aircraft should be at 650 ft ((2 NM × 300 ft) + 50 ft),

At 3 NM the aircraft should be at 950 ft ((3 NM × 300 ft) + 50 ft), and so on.

These quick calculations can be used in instrument flight rules (IFR) or visual flight rules (VFR) and can be used as a quick reference to compare an expected aircraft position to the actual position on the FAS.

3.11.1.1 Barometric Altimeter. When using the barometric altimeter to monitor these altitudes, the altitude will show 350 ft, 650 ft, and 950 ft (plus the pressure altitude correction for each measurement). For a runway with an airfield elevation of 400 ft, the barometric altimeter should show an approximate altitude of 750 ft (350 ft + 400 ft), 1,050 ft (650 ft + 400 ft), and 1,350 ft (950 ft + 400 ft).

3.11.1.2 Radar Altimeter. The radar altimeter shows the height above the ground. The radar altimeter will show 350 ft, 650 ft, 950 ft, etc.

3.11.2 Aircraft Target Rate of Descent. This technique is used to determine a target aircraft's rate of descent that can be checked/flown with the VVI. This calculation is five times the aircraft GS on an approximate 3° FPA.

Using 120 kts GS, the calculation would be 5 × 120 kts GS = 600 fpm. Comparing against Figure 3-2, 120 kts at 3.0° is 637 fpm.

Although not an exact number, it provides the operator a way to quickly determine if the aircraft is close to the desired rate of descent on a 3° FPA.

3.11.3 Height, Distance, and Rate of Descent from Runway. When the two techniques are used together:

At 1 NM we should see a height of 350 ft and a VVI of 600 fpm,

At 2 NM we should see a height of 650 ft and a VVI of 600 fpm, and so on.

Higher FPAs will result in higher heights above the ground and higher rates of descent at the distances of 1 NM, 2 NM, 3 NM, etc.; while lower FPAs will result in lower heights above the ground and lower rates of descent.

CHAPTER 4. FLIGHTCREW TRAINING

4.1 Use of CDFA. Using a CDFA on a suitable NPA should be an SOP. Operators who use a CDFA technique on NPAs should incorporate CDFA training into their training programs where NPAs are performed and evaluated. This AC does not recommend one technique over another or recommend all techniques be covered in training. Operators may choose and train to a preferred CDFA method.

4.2 Manuals and SOPs. Operators should revise their flight manuals and/or SOPs to identify CDFAs as a standard method of performing an NPA.

4.3 Training. Additional flight training to use the CDFA technique is not required for pilots qualified to conduct NPAs with advisory vertical guidance in accordance with the operator's certificate. However, operators should provide flightcrews with appropriate ground training before performing CDFA operations. The ground training may be computer-based, published in flight operations bulletins, or provided via other similar means deemed acceptable by the Principal Operations Inspector (POI). Flightcrew members should receive training specific to the aircraft type, the installed flight guidance, and the navigation system, and on how to utilize the system when using the CDFA technique for applicable approach profiles. Part 91 operators should be familiar with CDFA techniques and be proficient with navigation systems they use to perform a CDFA, if applicable.

4.4 Training Program Topics. Each operator's CDFA training program should address the following topics:

1. <u>Stabilized Approach Concept</u>. Operators should emphasize the stabilized approach concept and the safety benefits of using the CDFA.
2. <u>When Not to Use CDFA</u>. Operators should discuss approach characteristics (e.g., circling-only minima) and environmental factors (e.g., icing) that could make the use of CDFA inadvisable.
3. <u>Baro-VNAV</u>. Operators should discuss the use of the RNP system's baro-VNAV advisory vertical guidance, if applicable, during NPA operations.
4. <u>SBAS/WAAS</u>. Operators should discuss the use of the RNP system's SBAS-based (e.g., WAAS-based) advisory vertical guidance, if applicable, during NPA operations.
5. <u>Calculating Rate of Descent</u>. Operators should discuss methods for translating the published GP or VDA into the required rate of descent for aircraft not equipped with a system capable of computing and flying a vertical profile.
6. <u>Confirming VPATH</u>. Operators should discuss techniques for tracking progress along the final approach vertical profile.
7. <u>Meeting IAP Altitude Restrictions</u>. Operators should discuss techniques for ensuring compliance with all altitude restrictions in the FAS.

8. Calculating a DDA. Operators should discuss how to calculate a DDA to ensure the aircraft does not descend below the MDA when accomplishing a missed approach on a CDFA.

9. Dive and Drive Maneuver. Operators should discuss the impact on approach stabilization by using the dive and drive technique. (See Figure 3-6.)

10. Crew Coordination. Operators should discuss pilot flying (PF) and pilot monitoring (PM) callouts and other crew coordination activities needed to ensure safe transition from the vertical profile to either landing or a go-around/missed approach at the MDA or DDA.

11. Go-Around Prior to MAP. Operators should discuss procedures for executing a go-around prior to reaching the MAP.

12. Visual Glide Slope Indicator (VGSI) and Obstacle Protection. Operators should discuss the need to comply with the VGSI, if available, and discussion of the obstacle protection the VGSI provides in the visual segment.

Advisory Circular Feedback Form

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by contacting the Flight Technologies and Procedures Division at 9-AWA-AFS400-Coord@faa.gov or the Flight Standards Directives Management Officer at 9-AWA-AFB-120-Directives@faa.gov.

Subject: AC 120-108A, Continuous Descent Final Approach

Date: ______________________

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____________ on page ________.

☐ Recommend paragraph ______________ on page ___________ be changed as follows:

____

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☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

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☐ Other comments:

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☐ I would like to discuss the above. Please contact me.

Submitted by: ________________________________ Date: ______________________