System

Diverse Vector Areas

Departure planning has gotten even more complex now that diverse vector areas are being published. What are they, and how are pilots supposed to use them?

By **estaff** - **Published:** February 10, 2015 **Updated:** November 12, 2019 2

Imagine you're departing into a low overcast, and the tower assigned you a heading. ATC has some way to keep you from hitting anything on that vector, right? Yeah...sorta.

Diverse Vector Areas (DVAs) have been established at some larger airports for a safe and standardized way to guarantee obstacle clearance for aircraft departing on radar vectors. DVAs have been surveyed and found to be clear of obstructions on a standard—or published non-standard—climb gradient. They've recently started to appear in the terminal procedures publication.

If every airport where controllers vector aircraft immediately after departure had published DVAs, the obstruction standards would be clear. While the current description of DVAs found in AIM 5-2-8(c)(2) makes it sound like all radar vectors are based on DVAs, this is not the case. At airports without DVAs where ATC provides departure vectors, a case could be made that flying an obstacle departure procedure is safer. Let's take a look at what this means for pilots.

Vectors Below the MVA

For most purposes, the minimum vectoring altitude (MVA) identified for an area is the minimum altitude that ATC can provide radar vectors. MVA assessment is part of TERPS and provides at least 1000 feet of obstacle clearance. However, ATC facilities at large airports need to have the ability to vector aircraft shortly after departure, where the aircraft is clearly below the MVA.

Section 5-6-3 of the ATC manual, FAA Order 7110.65, provides the requirements that must be met for ATC to issue radar vectors below the MVA. It states that controllers may use a DVA, if published. Otherwise, to summarize, controllers must ensure the aircraft flight path is three miles horizontally (or with lateral separation increasing), or 1000 feet vertically from obstacles depicted on the radar scope. Controllers have used these standards for years, and continue to use them at many airports, but they raise two potential safety issues.

by an airport obstruction survey (which often notes trees and light poles), there's no way a controller could display all of those points on their radar scope in a useful manner. Therefore, while vectoring aircraft to remain clear of obstacles, ATC must display only a subset of the obstacles, which must be continually updated to account for the ever-changing landscape.

When the FAA conducts a TERPS evaluation of a departure, they consider all available obstacles in the vicinity of the airport. There's a lot of math behind the FAA's statement that a given departure procedure will clear all obstacles on the requisite climb gradient. Even doing the mental arithmetic needed to determine whether a given aircraft—with its speed, climb rate and distance from the obstacle—will clear the obstacle is non-trivial.

Obviously, since airplanes aren't falling out of the sky on departure vectors, these standards have been good enough. ATC facilities often have standard operating procedures for various departure scenarios that avoid known obstacles. However, these local procedures lack the rigorous TERPS analysis and flight check validation provided by even obstacle departure procedures.

Diverse Vector Areas

The primary benefit of diverse vector areas is that they do ensure that a rigorous analysis and validation has been completed, thus removing ATC guesswork, sufficient though it may have been. DVA evaluation has been a part of TERPS for well over a decade, but has not been widely used and, until recently, wasn't published.

Starting in late 2014, DVAs have been published textually in the recently renamed "Takeoff Minimums, (Obstacle) Departure Procedures, and Diverse Vector Area (Radar Vectors)" section at the front of the AeroNav terminal procedures publication, and on the airport information page on charts from Jeppesen.

When you get a radar vector below the MVA at an airport with published DVAs, certain requirements must be met to assure obstacle clearance. DVAs require a continuous climb to an altitude at or above the (still unpublished) MVA. In addition, just like with diverse departures, pilots are expected to climb on runway heading to 400 feet before turning, and to maintain a standard 200 feet/nm climb gradient, unless there is a published non-standard climb gradient.

The discussion of DVAs found in AIM 5-2-8(c)(2), will be updated to reflect changes to the DVA evaluation and to provide additional guidance for pilots. In particular, DVAs have historically required a standard 200 feet/nm climb gradient, which has limited their deployment at airports where this is impractical. However, recently this has changed to allow non-standard climb gradients on DVAs, which will be included in the DVA description text.

Staying Safe on Vectors

Keep in mind that ATC does not assume obstacle clearance responsibility until the controller provides navigational guidance in the form of vectors. Just because an airport has a control tower, or even if that airport has a published DVA, you are still responsible for obstacle clearance until ATC gives you a radar vector. Also, being told to "enter controlled airspace" on a heading is not considered a vector.

DVA doesn't mean that you should ignore the obstacle departure procedures. Unless you are given a radar vector after departure, the ODP remains your best option for ensuring obstacle clearance on departure. When in doubt, just ask for a clarification.

Finally, when you're given a heading to fly after departure from an airport without a published DVA, know that controllers are basically eyeballing it, but that might still be just fine. As part of your preflight planning, take a look at the obstacle departure procedure for your departure runway. If it's unrestricted, or you can comply with any climb restrictions, you'll be effectively protected by the ODP's TERPS analysis while on the vector and climbing.

However, if there are ODP restrictions that you cannot comply with, or if the ODP has a required route that you are not being vectored on, be particularly cautious.

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Justin Gillmor May 23, 2023 At 2:24 pm

One issue with DVA's is the pilot does not know when they are on a DVA or regular radar vectors, all the pilot hears is "turn heading XXX, climb and maintain XXX". Which means pilots do not know if they need to comply with the higher than standards climb gradients associated with the DVA. The safest option is to deny (unable) any radar vector clearance and use the ODP or SID if one is published.

Reply

Robert Vaughan May 25, 2023 At 12:15 pm

It's always the PIC's responsibility to know the performance of the aircraft and that it meets the min performance for the departure. When tower gives us a heading for departure, they may not know about the min climb gradient that is published in the Chart Supplement, that's the pilot's responsibility to know if a non-standard gradient is required and can be met.

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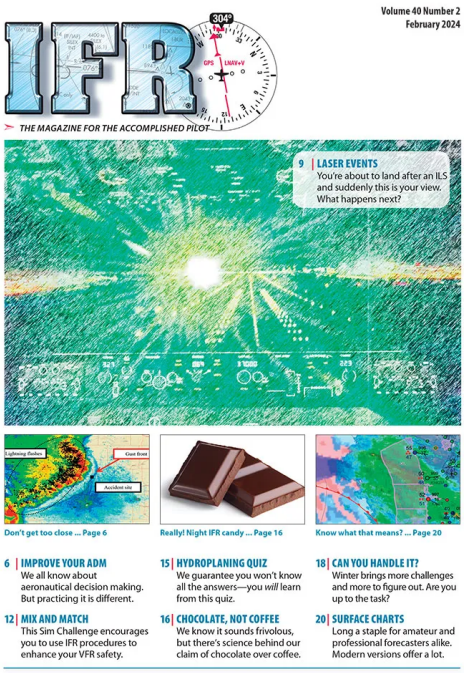

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