The training session on regulations had numbed our senses, so the chief pilot posed a question to get us thinking. I don’t remember the exact wording, but it was something like: “Is it ever legal to descend below decision height without the required visual references in sight?”

The answer is yes: If you decide to go around upon reaching decision height because you don’t see what you need to see, the airplane most likely will descend below DH while you’re cobbing the power, cleaning up and otherwise getting out of Dodge.

Perfectly legal. That’s why it’s called decision height.

Here’s a question for you: What is takeoff decision speed?

If you responded that it’s an old, discarded definition of $V_1$, you’re right.

If, however, you said that it is $V_1$, put on the dunce cap and go to the corner with the U.S. Federal Aviation Administration (FAA), the U.S. National Transportation Safety Board, the Transportation Safety Board of Canada, the Australian Transport Safety Bureau, the New Zealand Transport Accident Investigation Commission, and probably many others (you know who you are). All have defined $V_1$ in recent publications as takeoff decision speed.

Even the Dutch Safety Board, which recently published a probing report on a high-speed rejected takeoff (RTO), used “takeoff decision speed” in the title (see p. 18, this issue). Inside the
The old definition of V1 was officially scrapped because it created ‘a great deal of misunderstanding and disagreement.’

In Sight report, where there was plenty of room, the board did publish the current definition:

$V_1$ means the maximum speed in the takeoff at which the pilot must take the first action (e.g., apply brakes, reduce thrust, deploy speed brakes) to stop the airplane within the accelerate-stop distance. $V_1$ also means the minimum speed in the takeoff, following a failure of the critical engine at $V_{EF}$, at which the pilot can continue the takeoff and achieve the required height above the takeoff surface within the takeoff distance.

Whew. That is a great explanation of the V1 concept, but as a V-speed definition, it is downright obese.

It replaced takeoff decision speed 13 years ago, when the FAA, followed closely by the Joint Aviation Authorities, precursor of the European Aviation Safety Agency, overhauled the transport category airplane takeoff performance certification standards (Flight Safety Digest, 10/98). Among the changes were requirements to account for worn brakes and wet runways in establishing accelerate-stop performance.

The old definition of V1 was officially scrapped because it created “a great deal of misunderstanding and disagreement” by insinuating that it is the speed at which the go/no-go decision is made, according to the FAA.

Unlike decision height on approach, the go/no-go decision following an engine failure or other big problem on takeoff must be made before reaching $V_1$. This is critical to takeoff safety.

Regulations require transport category airplane pilots to ensure that the departure runway is long enough to allow the takeoff to be safely continued or rejected from a predeter-
determined go/no-go point on the runway. That point is where the airplane reaches $V_1$ while accelerating for takeoff.

During certification, manufacturers designate $V_1$ speeds for various airplane configurations and takeoff weights, and for the temperatures and field elevations at which the airplane is expected to operate. Typical practice is to establish $V_1$ speeds that result in equal accelerate-stop and accelerate-go distances. This “balanced field length” ends at a point where the airplane, with one engine inoperative, will be either stopped on the runway or at a specific height — 35 ft over a dry runway or 15 ft over a wet runway.

The accelerate-stop distances or balanced field lengths published in airplane flight manuals are based on the assumption that the first action to reject the takeoff is made at $V_1$.

Although the current “definition” of $V_1$ nicely encapsulates the overall concept, it is an unwieldy, writer’s-cram-inducing monster that has spooked folks who should know better into conjuring takeoff decision speed from the ashes because it’s … wieldy.

I have long suspected that the continued use of the discarded definition by authoritative sources might have something to do with the continuing prevalence of accidents and incidents involving high-speed RTOs.

This creeping malaise prompted me, on my own, to petition the FAA to take another shot at redefining $V_1$. The current definition, I said, “is too long to be conveniently used in publications and presentations, thus the persistent use of the confusing and inaccurate — and abandoned — definition: takeoff decision speed.” I asked the agency to change the definition to takeoff action speed or a “similar term that reflects the $V_1$ concept and ends the confusing connotation that $V_1$ is the airspeed at which the decision must be made to reject or continue the takeoff.”

The FAA duly stamped “FAA-2009-0562” on my petition and posted it on a Web site, <regulations.gov>, where it has languished for two years with nary a comment.

Recently, I came across this statement: “One common and misleading way to think of $V_1$ is to say, ‘$V_1$ is the decision speed.’ This is misleading because $V_1$ is not the point to begin making the operational go/no-go decision. The decision must have been made by the time the airplane reaches $V_1$.”

That is from the Takeoff Safety Training Aid, an excellent product of a joint effort by the industry and the FAA that was published 18 years ago. I’d say it is high time for action.