Takeoff

G550 App - User Tips

Obstacle Clearance Computations

This document contains some helpful information regarding the use of AFM Solutions G550 Apps when it comes to finding a maximum takeoff weight for obstacle clearance.

Standard Flight Profile vs. Extended 2nd Segment Climb Profile

1-First, the user must enter the obstacle distance from the **brake release** point and the obstacle height above brake release.

2-Select either **On** or **Off** in the "*Using Standard Flight Path*" option selector.

The main consideration in selecting one method or the other, is the 5-minute takeoff thrust limit imposed on the engines when attempting to clear an obstacle with a height of more than 1500 feet, which is the recommended level-off height. If the obstacle's height and distance do not require a 3rd segment horizontal acceleration and a final climb segment, then the obstacle will be cleared during the 2nd segment climb and the two methods will yield identical results.

With Obstacles height and distance are entered are those from the brake release point. If the runway slopes upward or downward, the program finds the corrected height due to the runway slope at the end of accelerate-go distance.
Whenever a full 4-segment climb is required, the program will perform all the following calculations:

- Horizontal distance travelled during the 2nd segment
- Horizontal distance travelled during the 3rd segment acceleration
- Horizontal distance travelled during the final segment
- Vertical height achieved above 1500 feet during the final segment climb

The program then makes sure that the **net flight path** clears the obstacle by a minimum of 35 feet.

When considering an extended 2nd segment climb, the program makes sure that the required net altitude is reached within the five minutes allowed for maximum takeoff thrust.

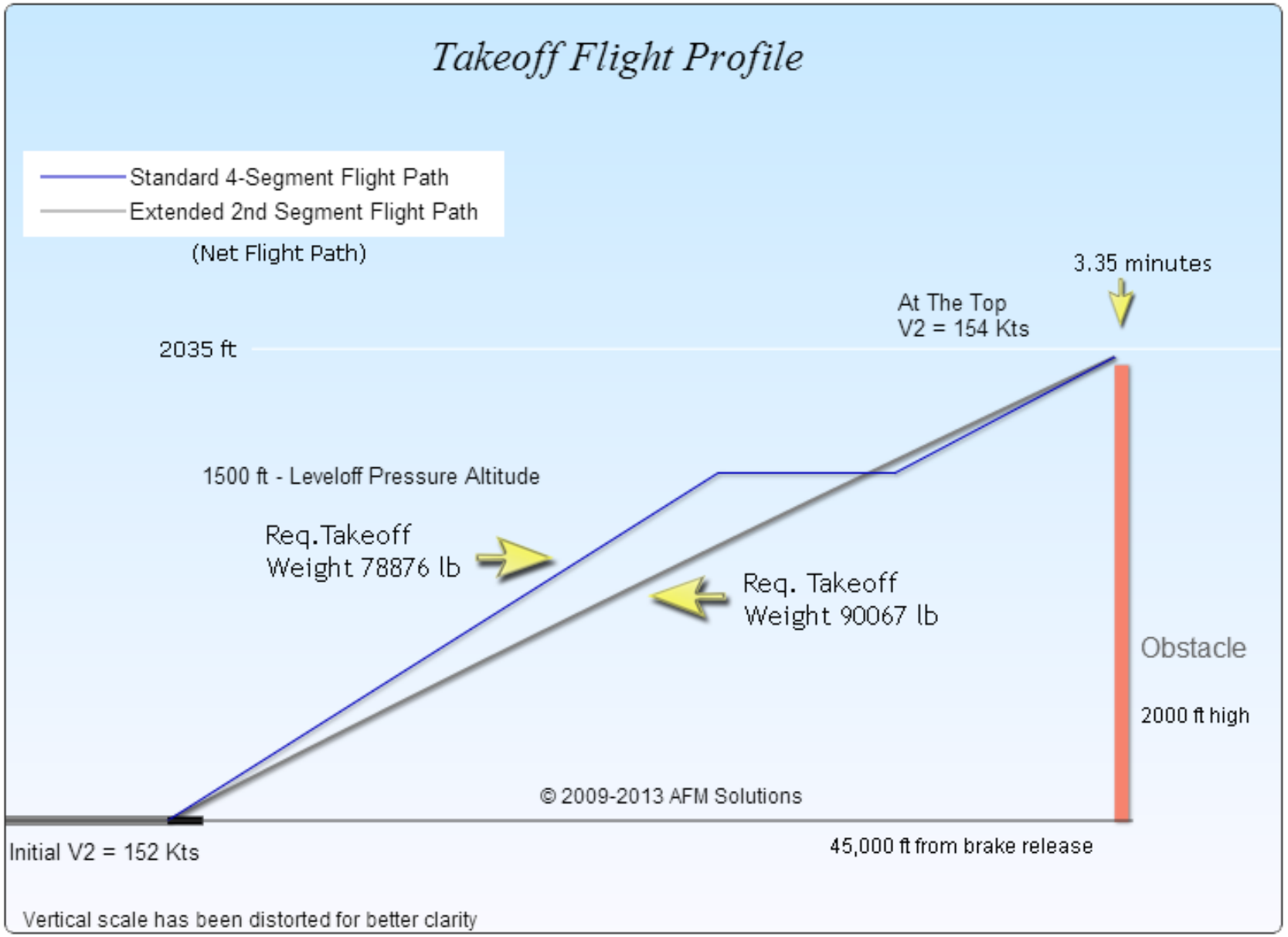
If a SID gradient option is selected, it is assumed that the climb begins at the end of the runway. Therefore, if the actual accelerate-go distance is shorter than the runway length, the unused portion of the runway effectively reduces the required climb gradient, allowing for a higher takeoff weight.

Example 1

An example of a takeoff scenario in which one might want to use the extended 2nd segment climb rather than a full 4-segment climb:

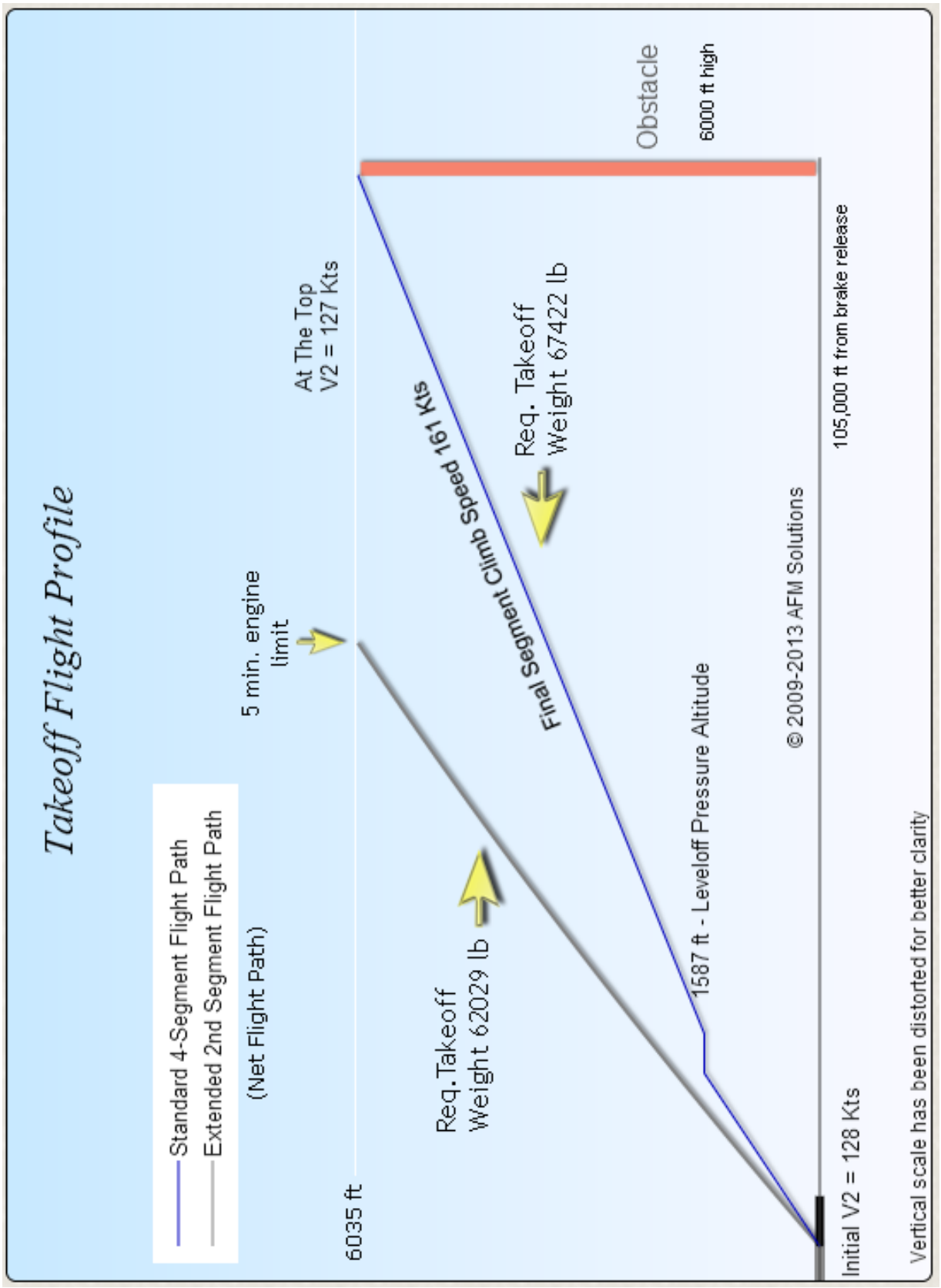
- Obstacle Height from brake release 2000 ft
- Obstacle distance from brake release 45000 ft
- Runway Length 8000 ft at Sea Level, ambient temperature 15°C

The 4-Segment method yields a maximum takeoff weight allowed of 78,876 pounds.
The 2nd-Segment method yields a maximum takeoff weight allowed of 90067 pounds.



Clearly, one can see from the diagram that initial 2nd segment gradient with the 4-segment option (blue line) is steeper than the initial 2nd segment gradient with extended climb (grey line).

Example 2



A scenario with a distant obstacle of considerable height. Here the path in blue has a lower initial climb gradient allowing for a higher takeoff weight.