

Andrew Hartzell

N430AB Stall Speed Explanation

I hold a commercial pilot certificate with airplane single engine land, airplane multiengine land, and instrument ratings. I am a certified flight instructor and hold complex, high performance, and tailwheel endorsements. I worked for Aerial Banners as a banner tow pilot from July 2022 to November 2022. I accumulated 180 hours in the Piper Pawnee (PA-25), with 34 of those hours in N430AB.

I decided to reach out to the NTSB because of my experience with the stall speed of N430AB being significantly higher than most of the other PA25s I flew. My personal experience in N430AB is that it stalled at 70mph IAS as opposed to the published 55mph IAS. The following description of my experience is to the best of my recollection and is my opinion of flying the plane and towing banners.

I first flew N430AB on 19 July 2022. I was on a proficiency flight after taking a few days off to move to Florida after completing my banner training. I flew without a banner and performed stalls, slow flight, steep turns, and practiced landings. I took note of the higher stall speed. This was not unusual for me as my first time towing a banner in a PA25 was with an aircraft that also had a significantly higher stall speed (N337AB).

Significance of N337AB: I had my first solo banner flight and my first PA25 banner flight in N337AB. During this flight I could barely maintain control and was completely task saturated with keeping the plane in the air. I was taught to tow at 55mph IAS, but the plane was all over the place and the left side window kept flapping up and hitting me while I was flying well above 55 IAS. I wasn't physically able to fly slower. At the time I was a brand new commercial pilot with just over 300 hours. I was so overwhelmed that I didn't understand this meant the plane was stalling, it just felt different because of the banner. After I landed, another pilot told me the stall speed was 70. Only after reflecting on it afterwards did I understand that the airplane was stalling at a much higher airspeed and was exhibiting different stall characteristics because of the banner. Flying N337AB, I had never experienced stalling a PA25 (or any aircraft) with a banner attached before.

The stalling characteristics of the PA25 are significantly different when a banner is attached to the plane. The banner is dragging the tail down and adding directional stability, keeping the airplane from spinning. The weight of the banner is also adding downward pressure on the tail, keeping the nose from dropping. The airplane will continue in a nose up attitude, but it will be descending. The pilot will experience the "region of reverse command", where the maximum thrust is applied, and the aircraft is pitched up, but not climbing. The nose must be lowered to get the airplane to climb. This applies regardless of the stall speed. However, if the pilot is not aware of a higher stall speed, the pilot may be looking at the airspeed indicator and seeing a speed much higher than the published stall speed and not understand why the aircraft isn't climbing. This is what happened to me when I was towing for the first time in N337AB. The airplane maybe stalling, but because of the attached banner, it does not exhibit the normal series of stall characteristics.

I flew N430AB for the first time with a banner on 4 Aug 2022. I had subsequent flights with banners on 11, 18, and 19 Aug 2022. On 20 Aug 2022 I was flying a letter banner in N430AB towards the

beach when I was contacted by company over the radio. I was told that the banner was spinning¹ and that I needed to slow down. I replied I could not go any slower, as this airplane stalled at a higher speed. I also replied that I would try adding another notch of flaps (which did not solve the issue) and do my best to slow down.

Since I was towing at around 70mph IAS, the letter banner was spinning. I had towed a letter banner only once before with N430AB. Over land the airplane is constantly bouncing around due to thermals and small wind changes, but once you get out over the shore the wind become steady and the banner usually flies properly even if you are towing at a higher speed. I continued the flight in N430AB and once I got over the beach the banner flew fine and only had occasional spins. Upon returning to KHWO the chief pilot confirmed that N430AB stalled at 70mph IAS. I squawked the issue as instructed, but nothing changed. It is my opinion that the only way to correct this issue is to significantly alter or rebuild the airplane. After this flight, I annotated the stall speed in my logbook to ensure I would remember for any future flights. This logbook entry is why I reached out to the NTSB. I made additional banner towing flights in N430AB on 2 September 2022, 1 October 2022, and 8 October 2022 without incident.

In my experience, with the banner attached, the plane will start to stall, and you will feel the controls become mushy or less responsive. This is a normal stall characteristic, but it is more pronounced in the PA25. The PA25 is a lazy airplane. You must make deliberate control inputs to get the airplane to do what you want it to do. Because of this, you will feel a point during the stall where control inputs become excessive, and you have a vertical drop or falling feeling (like on a rollercoaster or a tipping chair). This is your stall warning as a PA25 banner tow pilot. The PA25s that I flew had no stall buzzer. They had a stall light, which during banner operations, is almost always on in my experience. The airplane doesn't really show a pronounced shudder/buffet and/or nose drop since it is at a nose high attitude, with a high-power setting, and the banner is dragging it down. This is especially true in a climb with a max power setting. My description is purely based on my personal experience. I did not fully understand or feel this sequence until I spent many hours towing banners.

¹ Banner spinning: If a banner tow plane is flying too fast, the banner will spin behind the airplane making it hard to read. The bigger/heavier the banner is, the harder it is to spin. Letter banners are usually lighter and therefore are more susceptible to spinning than billboards.