



NTSB MEMORANDUM OF RECORD

Lynn Spencer
Air Safety Investigator
Eastern Region, Office of Aviation Safety (AS-ERA)
National Transportation Safety Board

NTSB Accident Number: ERA22FA384
Subject: E-mail Correspondence Summary
Date: 12/22/2022,

The following are excerpts from e-mails received from Mr. Gard Ward, an aerobatic pilot who flies an MX2, on December 5, 2022, at 1547 EST, and January 27, 2023, at 0921 EST:

December 5, 2022:

I weigh only about 155# and have never flown serious aerobatics in my aircraft at the weights Mitch was flying with. I would like to think that recovery from an inverted flat spin would be possible under those conditions but can't be sure.

I doubt seriously that Mitch was doing an intentional inverted spin. I'm not even sure he was proficient in Inverted Spins either normal or flat. I have done many inverted flat spins in my MX2 with a passenger but have never done one with a passenger weighing more than 200#. Also with no gas in the wing tanks. I was doing inverted flat spins in airshows and practice them frequently. Most pilots hate them.

The most important thing about spins is initial recognition because improper control inputs can aggravate them. The basic procedure for recovering from an inadvertent spin where you are not sure what kind of spin you are in is to bring power to idle, apply opposite rudder and essentially let the stick go. The rotation will stop and then you recover from the dive.

I am providing a separate attachment with some quick thoughts on spins and how one could get into one inadvertently from a botched hammerhead. While Mitch was competent at hammerheads, it is possible he was letting his pilot/passenger attempt one.



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In an attachment to the e-mail, Mr. Ward added the following information on spins:

To understand inverted spins and inverted flat spins, it helps first to understand upright spins. The basic spin entry is to reduce power to idle, slow to a stall, hold the stick full aft and apply full left rudder and the aircraft will enter a autorotational, stabilized spin to the left. Note: sometimes the aircraft will not fall so easily into the spin and may require a little finessing but that's unimportant for this discussion.

Assume we are in a stabilized spin to the left and the nose is about 45 to 60 degrees below the horizon. If the stick is kept full aft and moved to the right rear corner, the spin will flatten out to some degree, ie, the nose will rise, because we have "outspin aileron" input which is lifting the inboard wing. To make this spin go really flat, add power and it will really flatten out. The power itself is not causing this. Instead, it is the gyroscopic recession caused by the rotating propeller which is essentially acting as a gyroscope. The gyroscopic recession is lifting the nose up. If we did this to the right, the gyroscopic recession would tend to push the nose down, making the spin less flat. A really good way to visualize this is to mount a bicycle wheel on an axel, spin it up by hand and note the effects of movement in different directions. Recovery from a normal spin to the left would be to apply Right rudder followed by forward stick then recover.

In the MX2, I can recover from a fully developed upright spin to the left in $\frac{1}{4}$ turn while maintaining full power: I apply full right rudder and move the stick first to the left rear corner ("In-spin Aileron") then moving it forward and recover. In a fully developed inverted flat spin, you would have full power, full right rudder and the stick would be in the right front corner. Best recovery technique would be to first reduce power to idle, apply full left rudder and essentially turn the stick loose and let it seek its own position....or move the stick to the left then aft. Then recover when the spin is broken. Keep in mind that in these type aircraft, the fast spinning propeller is what makes them go really flat. As viewed from above, the rotation will be counterclockwise for the upright and the inverted flat spins. If they are done in a clockwise rotation, the gyroscopics will try to pull the nose down.

During a proper hammerhead maneuver, the airplane is pulled vertical and held that way until vertical speed is approximately zero then apply full left rudder to pivot the aircraft around to the left. As the aircraft has rotated approximately 90 degrees, about half of the rudder input is taken out followed by all when the nose is pointing straight down. Continue vertically downward until there is enough airspeed for recovery. As you start the vertical pull, you are looking straight ahead. As you approach about 45 degrees nose up, you should make quick glances out at the right and left wing tips to establish and maintain vertical position. As the aircraft gets slower and slower it will take more and more right aileron as well as some forward stick. Most pilots inexperienced in aerobatics will initially experience difficulty in maintaining a vertical attitude.



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Most tend to start getting very negative, ie, on their backs. Most will attempt to apply left rudder too soon, then right rudder and with the stick in the right forward position, things can get ugly very fast and it is very easy to wind up in an inverted spin going flat. I have had this happen many times with “students” but it is not an issue with me as I am comfortable recovering from anything they can put me in.

There are other spin variations such as accelerated spins and cross over spins but those require a much more detailed explanation and likely were not a factor in Mitch's crash.

January 27, 2023:

The fuel consumption can vary during aerobatics but I would say a range of 20-25 gph would be close for a practice aerobatic flight. During “all out” aerobatics the consumption could go up to 25-30 gph. Normal cruise consumption is 15-18 gph at low level.

Most of us performing airshows in these small, high performance airplanes like to keep weight at a minimum during a performance so we take off with minimum fuel.

When I perform a 10 minute airshow routine over an airport, I take off with about 9-10 gallons of gas and will land with 4-5 gallons.

When I perform at a remote site I add enough fuel for the trip out and back plus just a little more. For example, when I perform at the Pensacola Beach airshow which is 9 NM from the PNS regional airport, I take off with 12-13 gallons. I power way back for the trip out and back so will only use 3 gallons max for that portion.