Bail Out!

Could You, Would You Do It?

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Pilot: "Why would anyone jump out of a perfectly good airplane?"
Skydiver: "There's no such thing as a perfectly good airplane."

Pilot: "But there's no such thing as a perfectly good parachute, either."
Skydiver: "That's why we carry two of 'em!"

Sounds like the start of another spirited hangar flying session. While we can have fun debating whether it's more exciting to fly an airplane or to fall freely out of one, what about this fatalistic sounding refrain:

> *The FAA requirement to wear parachutes during aerobatics is moot. If things get that bad, we won't have time to use that overpriced lump of fabric anyway!*

The mindset represented by that last statement has always bothered me. It has bothered me for two reasons: First, I know pilots who have successfully bailed out in emergency situations. But were they just lucky? Second, I've been donning a parachute regularly throughout my flying career, yet I hadn't ever jumped out of an airplane. Would I actually be able to take the plunge if necessary?

To address the first question, I performed searches of the NTSB on-line database for the keywords "parachute," "chute," and "bail" for the range of years available (1983–2001). I disqualified accidents involving skydiving operations, aircraft equipped with ballistic recovery systems (with the exception described later), high performance military aircraft (other than two T-6's and two T-28's), and accidents in which it was unclear from the narrative whether or not those on board were wearing parachutes.

Seventy-nine accidents remained. These accidents involved an ultralight, a homebuilt amphibian, gliders, factory and experimental aircraft, aerobatic and non-aerobatic airplanes, and a total of ninety-six people. Sixty-two of the accidents had just a pilot on board; seventeen had a pilot and a passenger on board. The broad causes for the accidents broke down thus:

Mechanical Problems (32)			Loss of Control (26)		Other Causes (21)			
Control Failures	Structural Failures	Flutter	Spins	Other	Fire, Fuel, Engine	Low-Level Aerobatics	Mid-air	Other
18	11	3	15	11	6	5	4	6

Those Who Didn't Get Out

The synopses revealed twenty-one fatal accidents during which it appears no attempt was made to bail out. No one on board these aircraft survived—thirty-three fatalities in all. Five accidents, four of which had two people on board at the time, involved ill-advised attempts at low-level aerobatics. What was the point of complying with 91.307 while disregarding 91.303?[1] Two other cases may have involved pilot incapacitation: physical impairment was listed as the cause of one accident; in the other, the pilot may have been incapacitated when the wing separated from the airplane.

[1] See 14 CFR 91.303 Aerobatic flight and 91.307 Parachutes and parachuting.

The synopses also revealed two non-fatal accidents where no bail out was attempted. These were unusual cases, to say the least. In the first, the parachute itself seems to have contributed to the accident. The pilot was testing out a new parachute in his airplane. The chute, however, moved the pilot several inches closer than normal to the rudder pedals, restricting full movement of the stick. Consequently, the pilot lost directional control during landing and received minor injuries.

The second accident involved a non-recoverable deep stall in a Velocity. The test pilot started to bail out in this case. However, noticing the slow, wings-level descent and a lack of forward speed, the pilot re-strapped himself into the seat and descended with the airplane into the water. He was not injured!

I found four more accidents involving five people in which it appears those on board had initiated emergency egress procedures. Sadly, all were fatal. In three cases, those on board had released their seatbelts prior to impact. In the other case, it appears the pilot was struck in the head by the canopy of his glider as it was jettisoned, rendering him unable to bail out before impact.

I found two other accidents, each with two people on board, in which one of those on board bailed out while the other apparently made no effort to egress. The two who bailed out survived (one with serious and one with minor injuries); the two who did not bail out sustained fatal injuries.

Those Who Got Out

I found fifty accidents, involving fifty-two people, in which all on board managed to bail out. Included were two accidents, each with two people on board, wherein both pairs bailed out and survived: one person sustained serious injuries; one person, minor injuries; two people, no injuries. The breakdown of injuries sustained by all those involved in these accidents-with-bail outs was as shown in the table to the right.

Injuries Related to Bail Outs			
Fatal	Serious	Minor	None
9 (17%)	9 (17%)	18 (35%)	16 (31%)

Eighty-three percent of those who bailed out survived. Sixty-six percent experienced minor or no injuries. Seventeen percent received serious injuries. Although the extent of the serious injuries was not listed in the accident synopses, one of the nine narratives noted that the pilot sustained a broken ankle.

Let's look at those who managed to bail out, but didn't survive:

Four of the nine fatalities appear to have been emergency egresses at altitudes too low for parachute deployment. The narratives used phrases such as "bailed out too low," "chute did not open," and "chute did not fully deploy." One of these involved a flat spin entered between 7,000 and 8,000 feet MSL; the pilot, however, stayed in the airplane until an estimated height of 500-600 feet AGL.

One fatality occurred during the test flight of a special parachute system mounted on a Cessna 150. When the system was deployed around 3,000 feet AGL, the lines of the chute wrapped around a gear leg/wheel of the airplane. The pilot bailed out at approximately 400 feet AGL. His chute was not deployed. His blood alcohol level was 0.10.

One tragic case involved a pilot returning home from an aerobatic contest. For undetermined reasons, the pilot had to bail out of the airplane. Since it was a cross-country flight, the pilot was apparently sitting on, but not securely fastened into, his parachute. Upon deployment, the pilot and parachute separated.

Another fatality occurred when the pilot's parachute apparently deployed too soon during the egress process, becoming entangled inside the aircraft.

One fatality occurred when the parachute itself suffered a structural failure, most likely as the result of deployment at high speed.

The last of the nine fatal cases was preliminary. Even though an eyewitness reported seeing a parachute, additional details were unavailable at the time.

Tales of Survival

The odds of successfully bailing out in an emergency seem pretty good, especially when compared to the statistics when no bail out was attempted at all, or was attempted too late. It's also likely that a number of the fatal bail outs would have been survivable had the pilots exercised better judgment before or as the accidents unfolded.

Those who escaped with their lives did so from a range of estimated bail out altitudes: 300, 400, 500, 560, 1000, 1300, 1800, 2000, 4500, 6500 feet. They exited from a variety of aircraft: Rebel 300, Beech A36, Cessna 150 and P210, Bellanca 7 and 8KCAB's, Pitts S-1 and S-2B, One Design, Su-29, Aeronca 7BCM, Cap 10B, DG-400 and Concept 70 motor-gliders, T-28, Slingsby Dart and Vega gliders, Goshawk 350, Cassutt, Velox Revolution II.

Some of the narratives tell amazing stories: the pilot who attempted to land his crippled airplane, aborted the idea, climbed back to altitude, and bailed; the pilot who parachuted to Earth while still strapped to the tail section of his Moni after it disintegrated around him; the strange case of a Cessna 150 pilot who ran out of fuel on final approach, turned the airplane away from the airport, and jumped.

Of the bail out survivors, fifty-six percent exercised the option to use their parachutes as a result of some sort of mechanical problem with their aircraft (elevator, aileron, or rudder control problems, structural failures, flutter). Twenty-five percent successfully used their parachutes following the loss of control of the airplane (spins, severe turbulence, etc.). Thirteen percent exercised the bail out option as a result of fire, fuel, or engine problems. Seven percent bailed out after a mid-air.

The Willingness to Jump

With the first question answered—bailing out is a viable, survivable, often preferable option in an emergency—would I actually be able to jump if the situation warranted? Of course I brief my students on egress procedures. I've read the "how to" articles and attended the forums on emergency bail outs (Allen Silver's are among the best). I've collected literature from parachute manufacturers. Sure, I've strapped on a chute, pulled the ripcord, and watched as the rigger repacked it. I've even come close to doing a tandem jump before—once while videotaping skydivers at Snohomish, WA for a video project (had to get back to Arlington to give a forum), and once as part of an aerobatic contest in Fond du Lac, WI (weather didn't cooperate). All of that, but still no jump until 2001.

Super Bowl Sunday. Early morning at Skylark Airport, Lake Elsinore, CA. The air: cold. The sky: clear blue. A quick mental calculation of the likely air temperature at 12,500 feet, our jump altitude: barely above 0 degrees F. The thermal underwear and extra shirts I'm wearing will serve me well this morning. Also converging on Skydive Elsinore from my home airport: an instructor named Mike, his student Courtney, and her brother Chris. Together we will face the prospect of leaving an airplane that's more than two miles above terra firma. But first, the paperwork.

Skydiving is serious business. The process begins with a four page Waiver of Liability. Fill in the contact information, read and initial nineteen different paragraphs—nineteen permutations of the same theme: everything I'm about to do I am doing of my own free will and I understand and accept full responsibility for the risks inherent in this activity. At the bottom of the last page I read: "STOP!!! PLEASE WAIT TO DATE AND SIGN. WE WILL VIDEO YOU SIGNING." Sure enough, out comes a video camera, red light on as I read the last paragraph aloud, stating my name and date as I sign the document. Not done yet.

We're chaperoned into a small classroom with a TV/VCR, told to sit still during the presentation, and handed another four-page Waiver of Liability. This one's for the equipment manufacturer. The video reiterates in no uncertain terms the risks we are about to assume. It also describes the tandem parachute system and highlights it in action. Strong Enterprises developed the tandem system in the mid-1980's. We're using the Strong Dual Hawk System, consisting of two ram-air parachutes. The main parachute is 400 square feet; the reserve, 425 square feet. The reserve is also equipped with a Cypres automatic activation device in the event we pass through 1900 feet AGL falling faster than 79 mph. Maximum suspended weight for the system is 500 lbs.

Since we're freefalling with the frontal area of one person, but with the weight of two, the instructor deploys a drogue chute as soon as we're clear of the airplane. This keeps our freefall speed down to a more normal 120 mph versus the 180 mph we'd experience without the drogue. Once the main parachute deploys, our forward speed under the canopy is around 30 mph, with a rate of descent of 12 to 14 feet per second.

Onward

Time to go outside for some hands-on training. Our group gathers around a mock-up of the jump plane's exit door. An instructor runs through all the how-tos: position in the doorway, exit the aircraft, assume the stabilizing arch position, look at the wrist altimeter, look at and pull the ripcord, prepare for landing. We each take a turn simulating the actions.

Practicing at the Mock Up

After a potty break, we meet our individual jump instructors. Mine is Laurent "Lob" Lobjoit. He and his wife manage the jump school. Lob's background: competed in skydiving for eight years on the South African national team, participated in three world championships, accomplished over 9,300 jumps including 2,600 tandems. He's also a private pilot working on his Commercial rating.

On to the dressing room for a fitting—colorful jumpsuit, soft helmet, goggles, gloves, wrist altimeter (one instructor slyly refers to it as the "dirt meter"). Lob outfits me with my half of the tandem system harness. It's a lot like strapping on an emergency parachute, but with additional straps and no parachute. He briefs me on the wrist altimeter. Our pull altitude is 5,500 feet. I get one shot at yanking the ripcord before Lob will intervene on our behalf.

Outside again. We meet our videographers. Peter Lugo double-checks my harness and altimeter, asks me to run through the jump for him, and explains precisely what he'll be doing throughout. He then says, "You're going to save Lob's life today, right?" I'm given an important responsibility. I must focus on doing all the right things rather than giving in to the uneasy feeling welling up in the pit of my stomach. The tandem entourage waddles over to another mock-up. We again simulate the jump as the jump plane—a de Havilland Twin Otter—taxis up.

And Upward

The sky by now is cloudy as the crammed Twin Otter ascends to jump altitude. Seatbelts off, Lob mates the two halves of our tandem system together. We will be tightly co-joined for the rest of the journey. He clips the orange plastic nub-of-a-ripcord to my harness. The system is now armed. Across the aisle, Peter is shooting video. He quizzes me, "What's your pull altitude?" Then reiterates my mission: "You're going to save Lob's life today."

Next comes a ritual. Starting from the back of the airplane, it ripples forward through the cabin. Not a high five, not a handshake, but a slow hand slide as we wish each other, "Have a good one!" I study Peter. Like a competition pilot walking through an aerobatic sequence, he reviews not only his videotaping procedures, but also what appear to be emergency procedures. The first group of skydivers exit. The tandems will go on the next pass. We shimmy down to the tail end of the airplane, down to the big, open doorway.

What am I doing up here?

Now I'm getting nervous. The air rushing past the door is cold for sure, but nervous is colder. To calm my anxiety, I mentally go over all of the actions simulated on the ground. I sneak a peek outside. The sky is light, bright blue. Thousands of feet

below await puffy clouds, the drop zone, and my wife, who's comfortably sitting in the warm car reading a book. I take slow, deep breaths and concentrate. My turn in the doorway. The frigid slipstream slaps at my face. I don't look down. Lob rocks us back and forth, "one…two…threeee!"

Going Down?

Freefall with good form!

The first seconds are a blur as the din of the Twin Otter explodes into the angry wail of freefall air. Head up, I extend my belly toward the ground with all my might. Unlike some amusement park rides (or when an airplane swaps ends during a tailslide), I don't have any sensation of falling. Suspended in mid-air, I look around. Hey, this isn't so bad! Peter swings into formation, barely ten feet in front of my face. Lob spins us around once for the camera. I look at my altimeter, the clouds below, and give Peter a thumbs-up.

Fifty-five seconds after exiting the Otter, Lob twists my left wrist to my face—the pull altitude! I look at the orange nub. My brain commands my right arm to it. My hand moves agonizingly slowly to the ripcord as if swimming in wet concrete. What's taking so long? I finally grab hold and give a tug.

I perceive a slight deceleration as the main parachute unravels from its container. We fall like this for what seems like a protracted length of time before the canopy fully blossoms. I am aware of several things at once: I feel nothing akin to an opening shock. I'm now suspended vertically in mid-air. It's quiet, peaceful. Peter, still in free fall, rockets past us. I watch as he rolls onto his back, his eyes locked onto us as he vaporizes into a cloud. An incredible sight!

Lob and I carry on a normal conversation as we glide earthward. I can see several other canopies meandering toward the drop zone. The parachute diaper above our heads snaps in the breeze. I grab the steering lines as Lob coaches me through some turns. Physics is physics; nonetheless, I'm surprised by the g's I feel. Two, perhaps? Then we do some stalls. No buffet, no pitch change, simply a cessation of forward movement marked by the lack of wind in my face.

Skydivers and canopies litter the drop zone as we turn onto final approach. The standard tandem landing involves raising the legs and sliding onto the grass. But as we flare, Lob instructs me to stand up. The closest I get is to drop onto one knee. Adrenaline, I guess. Peter greets us, video camera still rolling. I congratulate Lob on a fine ride and wave to the others in our group. We're all smiles.

Epilogue

The day after the jump I noticed a couple of faint red marks along my armpits, with barely a hint of soreness. Comparing notes with the others from Santa Paula, Mike mentioned the slightest bit of tenderness where his leg straps came around his legs. Courtney, on the other hand, didn't report anything at all. Both of them are scheduled to jump again.

I left Skydive Elsinore with a completion certificate, complimentary T-shirt and bumper sticker, as well as a videotape and roll of photos of the experience. More importantly, I got that first jump under my belt. Would I do it over again? Yes, without hesitation. Will I take the next step and enroll in an Accelerated Free Fall course? Maybe someday…

Watch Rich's Tandem Skydive at https://youtu.be/TOn7ccsy50I