

A Question of Survival

by

[William D. Waldock](#)

(Editor's Note: While this column deals with aviation crash survival, it is equally applicable for every endeavor where safety and survival preparations should be considered and addressed.)

Most of us who fly don't like to consider the possibility that we might be involved in a crash. While we usually understand that there is some element of risk associated with aviation, accidents happen to the other guy. Beyond that, statistics tell us that some 85% of all crashes happen on or near an airport, relatively close to civilization. If we survive the crash, help is probably going to be there soon.

What about the 15% of accidents that happen someplace else? What can we do to stay alive until we get found? What can we do to make sure we DO get found? An examination of two very similar accident situations with very different outcomes can help us understand what is truly necessary to withstand and survive a crash in the boonies.

Personal Significance

The first accident happened on January 17, 1998. As of this writing, it is still under investigation by the NTSB. The investigator has been unable to examine the aircraft since it is still buried under 15 feet of snow. This one has personal significance to me. Like most folks who stay around aviation for very long, I've had my share of friends and acquaintances who have crashed. Some have died.

The passenger/observer on this flight was one of my better students. Franco had just graduated in December with an Aviation Safety minor. He was in my Crash Management class that last term. Little did anyone know that he was going to get a real-life exposure to some of the things we cover in that class. The accident involved a Cessna 402C (medium piston twin), operated as a contract express mail/cargo aircraft. The flight originated in Reno, Nevada on a VFR (Visual Flight Rules) flight plan, bound for Columbia, California as a repositioning flight. Since he was a friend of the pilot, Franco had been flying in the right seat as an observer to gain experience. The aircraft took off from Reno at 12:08 in the afternoon and headed south. A little under half an hour later it collided with high mountain terrain 11 miles south-southwest of Walker, California (southwest of Carson City, Nevada).

Little Memory Of The Accident

Franco has little memory of the accident itself. The last thing he remembers prior to going through the trees is seeing Carson City pass by on the left of the aircraft. Then he has flashes of the trees coming at him.

The aircraft impacted a 10-20 degree uphill slope at around 10,000 ft. elevation, coming to rest inverted. As the aircraft descended through the trees, it broke up, with the nose and forward cockpit area rotating and tearing away to the left. Both wings separated, along with the right engine and left horizontal stabilizer. Numerous penetrations occurred in the belly of the fuselage and wings, probably from impact with the trees.

The clearing where the aircraft came to rest was covered with 2-4 feet of snow. The pilot was ejected from the aircraft and did not survive. Franco remained in his seat, but all the structure in front of, and beside him was torn away.

Franco was knocked unconscious during the initial impact. He regained consciousness while upside down, still strapped into the seat. He realized that his right leg was hanging down in front of him, the

result of a bad compound fracture of the femur. He spent the first few minutes orienting himself, and yelling for the pilot. He realized that there was "nothing left in front of him" and that he could "reach out and touch the snow". The temperature at the time was about 25 degrees (F), the winds were gusting and he was getting very cold.

Franco released the restraints and fell forward into the snow. As he looked around the area, he spotted the company cellular phone that had been in the pilot's flight bag. He grabbed it and, realizing he had to get out of the wind before hypothermia set in, crawled in the snow around the wreckage, back to the cabin. The baggage door was damaged in the impact and jammed shut, forcing him to kick in a window to gain entry to the cabin--difficult and painful with both ankles broken. He finally succeeded and managed to worm his way through the window into the sheltered cabin.

Out Of The Weather

Once inside, he found his own flight bag and retrieved the handheld radio he always carries when he flies. Fortunately, he makes it a point to always keep the battery charged up. Tuning in 121.5 MHz (the emergency communications frequency), he discovered that the ELT (Emergency Locator Transmitter) was not transmitting. He crawled back to the rear of the aircraft where the ELT was located and tried to activate it manually, but was unsuccessful (the reason for the ELT's failure to activate is not known as of this writing).

He then began to broadcast a "mayday" on 121.5 using his handheld. After about 15 minutes of trying there was still no response, so he tuned in one of the Oakland Center frequencies he remembered from their departure. He made contact initially with a Cessna 414 twin, who offered to relay the mayday, though the signal was weak. As he was talking to the Chancellor pilot, the crew of a Nevada Air National Guard C-130 Hercules operating in the area overheard the communications and initiated the Search and Rescue (SAR) effort. They were returning from a training flight and happened to still be at altitude and on Center frequency. Unfortunately, they didn't have direction-finding equipment in the aircraft and were forced to use the old null-signal approach to locate the downed airman.

As the SAR system began to crank up, helicopters from Fallon Naval Air Station, Nevada, were called up for the search effort. Meanwhile, Franco had made himself as comfortable as possible in the cabin of the inverted Cessna, donning his ski jacket and several articles of extra clothing to keep warm. To conserve battery in his handheld, the Herc crew put him on a 15-minute communications schedule. Around this time, the FAA had obtained the number of the cell-phone in the aircraft and he was able to communicate that way as well.

Because of the lack of good signal for direction-finding, the search aircraft were flying in and out of canyons, trying to get a fix on his position. The Herc crew asked him to try to manually activate the ELT again. He crawled back and tried several times, but it still wouldn't work. By this time, it was getting toward evening and there was a major storm front approaching the area from the north. If he didn't get found soon, there would be no way for him to survive the below-freezing temperatures and snow.

The C-130 crew maintained communications and the Navy helicopters were finally beginning to hear his transmissions as well. They were able to narrow the area down to one of two canyons and he finally began to hear aircraft operating in the distance.

"Hard Right, Hard Right!"

The sun was setting, it was beginning get dark and Franco realized the battery in his radio was beginning to run down. Suddenly, he heard a deep "thumping" of rotors and a Boeing CH-46 Sea Knight appeared

around one of the peaks. He began to yell into the radio, "Hard Right, Hard Right!" When he let up on the transmit button, he realized that the display on the face of the radio was blank. There was just enough power left for him to hear the Sea Knight crew call, "Aircraft in sight."

They overflew his position and tried to find a place to land. Unfortunately, because of the terrain, snow, and trees, they couldn't set the big twin rotor chopper down. A Bell UH-1 Huey also participating in the search flew in and was able to drop two rescue specialists nearby and they hiked to the crash site.

Franco noted that his first sight of the guy in the baggy orange pants and white helmet was one of the most beautiful sights he'd ever seen. It had taken 4 1/2 hours for help to arrive.

The rescuers stabilized his leg and got him in a Stokes litter to hoist him into the helo. Inside the Huey they had the heater going full-blast as they worked on him to keep him alive. He was medivac'd to the hospital in Carson City where he underwent hours of surgery to repair his leg and other injuries. He now has a steel rod in his upper right leg and a pin in his big toe, but he has made a complete recovery. He has returned to flying and on April 21st of this year he flew a Cessna 172 from Northern California to Prescott, Arizona to share his experience with students and his old professors at Embry-Riddle University. He attributes his survival to being prepared and knowing what to expect, as well as a whole lot of luck.

Making His Own Luck

After hearing his experiences and seeing the pictures of the accident scene, I must say that this is one of those cases where you have to step back and reflect. Call it luck, fate, or the hand of God--something reached out and protected Franco during that crash. Seeing his seat, upside down, with nothing around it but snow, I would have said that surviving the impact was impossible. It is absolutely amazing that he came through this ordeal alive and in relatively good shape.

Once on the ground, he made a lot of his own luck. Even though he was seriously injured, he didn't panic. Franco took control of the situation and he displayed remarkable resourcefulness. He was able to protect himself from the life threatening elements and found a way to establish communications quickly. He made the most of his available resources to stay as warm as possible until he was found. The fact that he had the handheld radio undoubtedly saved his life. The ELT didn't activate (they have an abysmal 98% false alarm rate, going off when they shouldn't and not activating when they should), and by the time the flight plan expired and the normal progression of the SAR system geared up for the overdue flight it is extremely unlikely that searchers would have found the aircraft before dark.

When asked what he would suggest pilots carry in their survival kit, the [handheld radio](#) was, not surprisingly, his number-one choice. He still has the one that saved his life, and the first thing he did once he got home was recharge it. The number two item on his survival kit list would be a GPS receiver. If he'd had that, he could have relayed his position and probably gotten fished out a lot sooner. Franco's experience has caused me to revise my own priority list for survival kits to include those two items as absolutely essential.

(Editor's note: A [back-up set of alkaline, or even better, lithium batteries](#) would be a good idea as well. It's easy to forget to recharge batteries and rechargeable batteries also generally have shorter storage and working life. They also don't work as well at low temperatures, particularly compared to lithium batteries.)

A Different Outcome

The outcome of the other accident wasn't so positive. This one involved a Cessna 182 single which was attempting a VFR cross-country from Auburn, Washington to Boise, Idaho on April 12, 1995. The private pilot was a Civil Air Patrol (CAP) volunteer and the purpose of the flight was a CAP proficiency training flight. From the flight plan, the intended route of flight was Auburn to Yakima, Washington, then to Boise. The aircraft departed Auburn at 5:02 in the morning and the pilot opened his flight plan with Seattle Flight Service Station at 5:19. That was the last communication with the aircraft. Later examination of radar data indicated a primary target about 20 miles southeast of Auburn at about the same time.

When the pilot didn't close his flight plan, the FAA initiated an airport telephone search for the aircraft. At 8:50, when he still hadn't turned up, the aircraft was declared overdue and an ALNOT (alert notice) was issued. The SAR system began to gear up and search activities commenced. These were complicated by poor weather in the search area, including low ceilings, snow, and thunderstorms--about the worst conditions in which you can try to conduct a search. Throughout the search, intermittent weak ELT signals were heard, but no location could be established.

The search continued for the next 3 days, with the weather still hindering the ability of crews to search effectively. At about 11:15 AM on the 15th of April, a Washington Civil Air Patrol aircraft located the wreckage of the 182 about 32 miles northwest of Yakima. The aircraft had crashed in the William O. Douglas Wilderness Area on a mountain ridge at an elevation of about 7,100 feet.

Battery Drained

It had come to rest on a slope that varied from 10 degrees just uphill of the crash site, to about 40 degrees downhill. It was resting in snow 5 to 10 feet deep, in a grove of trees. The fuselage was laying in a 28 degree nose down attitude with most of the nose embedded in the snow. Part of the windscreen was broken and the left door was found some distance from the wreckage.

The fuselage had split open at the rear window and about one foot of snow was found in the wreckage. The propeller was examined and showed no evidence of rotational scarring, indicating that the engine was stopped before impact. The inside of the fuselage was intact and all seats had remained attached to the rails. The left hand grip of the pilot's yoke was found to have been torn off. The pilot's body was found inside the fuselage.

The battery was found still hooked up, but completely drained of charge. Power switches on the two VHF comm radios were found in the "on" position and a CAP FM comm radio was found on as well. The ELT was removed by rescue personnel, but the coaxial cable remained in the aircraft. The antenna cable had partially separated from the base mount but was still resting against the jack when found. It fell off when the rescuers brush against it.

The ELT had probably activated upon impact, as designed, but due to excessive tension on the cable (caused by the manner in which it had been mounted), the cable had pulled out during the crash. The intermittent signal reported by rescue personnel was most likely due to the separation.

Pilot Survived The Crash

A post-mortem examination of the pilot's body revealed that he had sustained minor injuries including bruises, cuts, and abrasions during the crash. The cause of death was attributed to hypothermia. When found, he was wearing a flight suit over dress clothes, a flight jacket, and dress shoes. Examination of the crash scene showed that he had attempted to use parts of the aircraft to build a shelter and that he had written several notes after the crash.

One note, written on the 12th at 2:00 in the afternoon, stated that he had lost engine power and crashed about 6:15 and that he had been unconscious for a while after the crash. Other notes were somewhat incoherent, but indicated that he might have been considering hiking away from the plane, if he wasn't found. Several food wrappers were found in and around the fuselage, along with evidence that he had moved about outside the aircraft quite a bit.

Examination of the engine showed no evidence of malfunction or cause of failure and the engine ran normally when mounted in a test stand. The battery was tested and accepted a full charge. No reason for the engine stoppage could be found.

There was no survival kit or survival equipment found in the aircraft. His survival kit was found in the trunk of the car at the airport. Additional information gathered from the CAP indicated that the pilot was well-acquainted with survival in the field and, in fact, was a survival instructor for the CAP.

Lessons To Be Learned

What are the lessons to be learned from these two accidents? First and foremost, both folks survived the crash. While Franco was seriously injured, the CAP pilot had only minimal injuries. Survival in both cases depended on what the people did, and what they had with them when they crashed.

Both ELTs failed to operate properly, and in neither case were they a help in finding the downed aircraft. Franco had the handheld radio in his flight bag and used it to get help. The CAP pilot apparently tried to use the aircraft radios, but was unsuccessful.

Both accidents happened in harsh mountain terrain, in conditions where hypothermia was a strong possibility. The CAP pilot almost certainly survived for at least two days. Had he been able to attract help, he might have had an interesting story to tell. Instead, he failed the survival test in the most direct way possible.

From long experience and lots of real case information, the most basic key to surviving after a crash away from an airport is to get found in the first 24 hours. Flight plans go a long way to making this happen, but the ability to tell people what has happened and where you are is paramount.

Equipping yourself with appropriate survival equipment, and knowing how to use it, couldn't hurt. It does no good on a store shelf or in the trunk of your car.