

DAVE SWARTZ

Why Should I Buy a 406 MHz ELT?

It was not a dark and stormy night, at least not yet.

That April day was a fairly typical day in south-central Alaska. Spring was in the air and the weather was nice, but winter in Alaska does not give up easily. That fateful morning, Richard (names have been changed) took off in an Astar helicopter with three telecommunications technicians on board for the short trip from Anchorage to several transmitters located on the hills around Anchorage, Palmer, and Wasilla. At the first stop, Richard dropped off George, one of the techs, and agreed to pick him up at about 1:00 p.m. The idea was to get in, do the job, and get out before an approaching storm.



Photo by H Dean Chamberlain

Another tech, John, had arranged to take his 15-year-old stepson, Jack, along. John and Jack met the helicopter at a rest stop along the Glenn Highway outside Palmer. Jack was excited to get

How to take the search out of search and rescue: 406 ELT plus GPS.

to fly in a helicopter. He thought about how cool it was that a helicopter could fly sideways as the pilot picked the ship up and spun it around on its axis as they lifted off. The helicopter headed up the valley toward a communications site near the small town of Chickaloon in the Talkeetna Mountains. As they flew off, dark clouds were already visible on the horizon.

Meanwhile, about 50 miles southeast at Kulis Air Force Base, a Sikorsky HH-60 *Pave Hawk*, pride of the Alaska Air National Guard 210th Rescue Squadron, sat on the pad, fueled and ready to go. Thirty miles to the east, or about 20 minutes in a *Pave Hawk*, is the town of Palmer. The Mat-Su Medical Center has a well-equipped trauma center with 22 beds. It also has a helipad.

Accidents Happen

Most kids in Alaska are taught to be prepared; Jack was no exception. He had brought along a small backpack with lunch and two bottles of water. At 9:23 a.m., Jack dropped the backpack on the helicopter's fuel-control lever. No one had told him to be careful of the levers on the floor. A sudden surge of fuel entered the Turbomeca engine, and the turbine quickly began to overspeed. Within seconds, the engine hit 150 percent of its design speed and the turbine blades began to shed. The engine quickly lost power.

The pilot knew he was in trouble. The aircraft was in the so-called dead man's curve, too low and too slow for autorotation, but the pilot did what he could. He shouted, "Hold on! We are going to crash." Just before the Astar hit, he pulled collective and slowed the impact as much as possible, but they still hit hard. The helicopter went into a ravine; its fall arrested by some willow brush and about 4 feet of snow. After the helicopter came to rest, someone shouted for everyone to get out. At least one of the other adults was still alive.

Help Is (Not Yet) on the Way

This helicopter was equipped with an older emergency locator transmitter (ELT) that operates on the 121.5 MHz frequency instead of the new 406 MHz frequency. It also had a commercial satellite-based tracking system on board. At 9:30 that morning, the system sent a message to a computer at corporate headquarters that the aircraft was overdue. Unfortunately, no one was watching the screen.

At 11:21 a.m., two hours after the Astar hit the ravine, the SRSAT satellite (which was still monitoring 121.5 at that point) picked up an ELT signal from one of the old 121.5 ELTs. No one in the Rescue Coordination Center (RCC) knew of an overdue aircraft, so the duty crew followed procedure and began a telephone search. Because it was a 121.5 ELT, they didn't know whom to call. You see, a 121.5 ELT is not very smart. It does not transmit any identification information. All the RCC could do at that point was to call the troopers and see if they knew anything. They did not.

At 1:00 p.m., two things happened. The first was that George, the tech who had been dropped on the

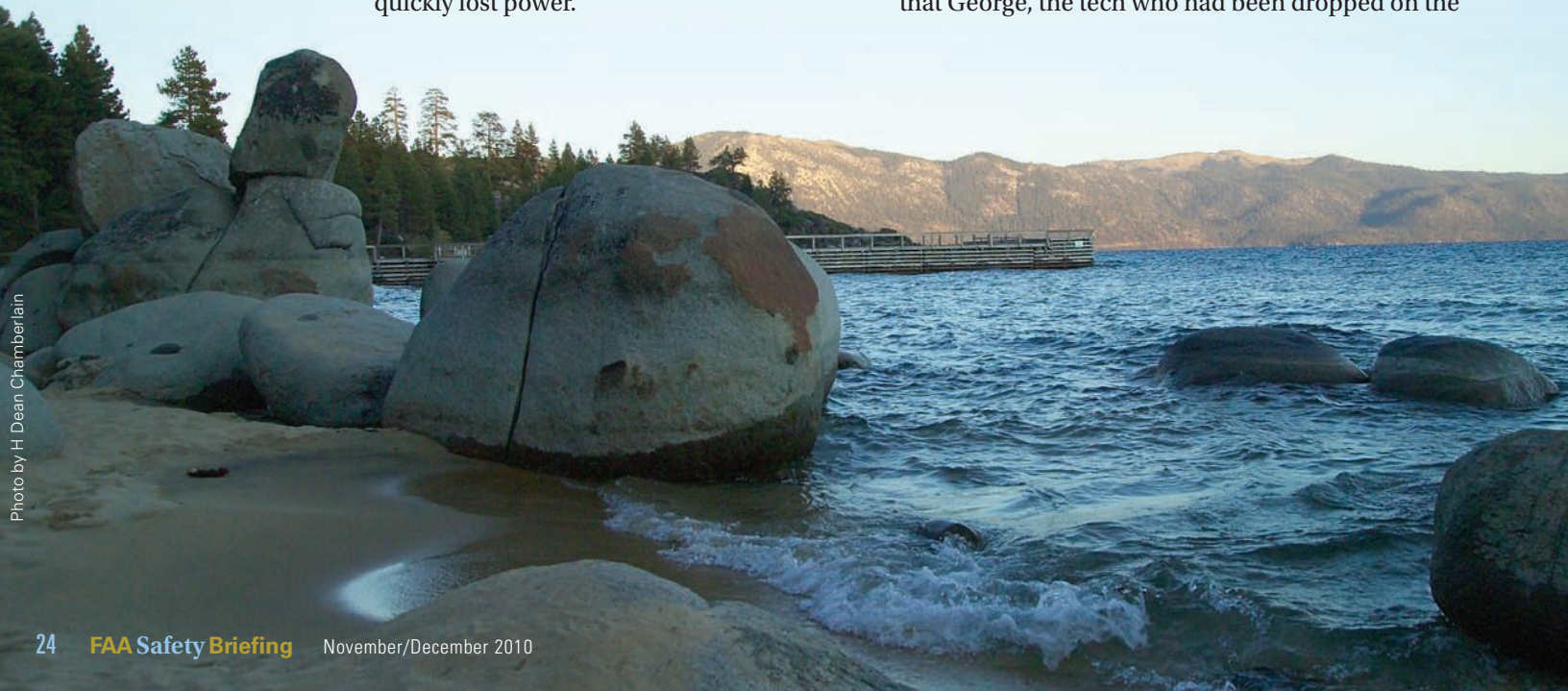


Photo by H. Dean Chamberlain

mountaintop, began to get worried. He expected to be picked up at 1:00 p.m., but no helicopter was in sight and the weather was starting to close in. Being a tech-savvy guy with a lot of gear, he called the shop. They told him to sit tight and wait. By 2:00 p.m., George was worried enough to call the shop again. The shop started to try to raise the helicopter over the radio, with no answer. At 3:40 p.m., the shop placed the call that no one wants to make: They called the FAA and reported the helicopter overdue.

Needle in a Haystack

The second event at 1:00 p.m. was that the RCC decided to launch—only they had no idea where to send the *Pave Hawk*. In fact, the RCC still didn't know that there really was an aircraft down. After all, 121.5 ELTs have a large false-call rate; they can be triggered by things like microwave ovens. After the RCC received the overdue aircraft news that George's shop had provided, they had a general idea where to look, but still no specifics about where the crash site might be. The problem now was the weather.

The storm hit at 2:00 p.m. Visibility fell to between one and two miles in snow. The *Pave Hawk* tried to enter the valley two times where they thought the accident site might be; twice they were turned back by weather. Soon, the Civil Air Patrol and the Alaska State Troopers joined the search.

At the accident scene, Jack was scared. It was getting cold and the snow had begun to fall. Back on the mountaintop, George faced the fact that he was going to have a long cold night alone at the equipment shack.

As night fell, the searchers had to face the hard reality that continuing to fly in the mountains in the dark in a blizzard was tantamount to suicide. They were forced to return to base. By now, the ground searchers had the bit in their teeth and, despite the conditions, crews from Alaska Mountain Search and Rescue, the Alaska State Troopers, and the Air National Guard continued searching all night.

As dawn broke, the searchers threw everything they could into the air. The snow had subsided and at 7:50 a.m., a state trooper helicopter finally located the accident site. As the exhausted ground crews converged on the site, the trooper's observer noticed a young man wandering in the snow at the bottom of the ravine below the accident. The trooper pilot landed next to Jack and immediately flew him the short distance to the Mat-Su Medical Center in Palmer. Jack was incoherent and suffering from hypothermia, according to the troopers who saved him.

Unfortunately, Jack's stepdad John, the pilot Richard, and the other two techs had passed away by the time the troopers arrived. Jack could not remember what occurred that night, so we will never know exactly what happened. We do know that at least one person in addition to Jack survived the impact and, based on indications from seatbelts in the helicopter, another probably did as well.

A Different Outcome

Why do I tell you this story? It comes down to the 406 ELT. That same winter, another airplane had an incident in approximately the same area. In that case, the aircraft was equipped with a 406 ELT. Within 20 minutes after triggering the new 406 ELT, the pilot was aboard a *Pave Hawk*. Odds are that if Jack's helicopter had been equipped with a 406 ELT, rescuers would have been on scene in about the same amount of time instead of 22 hours. They may have been able to get the survivors to the trauma center during the golden hour for emergency medicine. With a 406 ELT, Richard, John, and the other two techs may have had a fighting chance.

What makes a 406 such a big improvement? First, SRSAT can locate a 406 ELT quickly and accurately. SRSAT no longer receives 121.5 ELTs, mostly because the system was flooded with false alarms. When 121.5 ELTs were still being received, it took two satellite passes and 45 to 90 minutes to get a lock. With the new GEOSAR satellite, though, the location lock time is down to one pass and about 5 minutes. Another difference is that 121.5 ELTs could only be located to within a 12 to 25 nautical-mile radius, so the search area was huge. Even without a GPS signal, the new 406 ELTs can locate you within 2 to 3 nautical miles and, with a GPS, that drops to within around 100 yards.

In other words, 406 ELT plus GPS takes the search out of search and rescue. All 406 ELTs come with a remote activation switch. In some cases, as with an in-flight fire or an engine failure, the satellites can locate you before impact. This helps because sometimes, even though the ELT may trigger, the antenna gets sheared off in the crash. It is conceivable that search and rescue might beat you to the accident site!

Another benefit is that 406 ELTs transmit an electronic ID number. This means that with a couple of phone calls, the false calls can be virtually eliminated. As a result, search and rescue can afford

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to launch as soon as they get a confirmed 406 hit on SARSAT, usually within minutes. In practice, this means that as soon as the RCC gets a hit, they launch the rescue crews while they confirm it by calling the numbers on the ELT registration. This is usually complete before the blades start turning on the rescue chopper.

Finally, 406 ELTs have much more reliable G-switches and antennas. A review of the data shows 121.5 ELTs worked in only about 10 to 20 percent of crashes, while 406 ELTs are expected to work in 60 percent of crashes.


Can you afford to be without it?

We all know that cost is still an obstacle to buying a 406 ELT. Costs are coming down, but it is still an expense. The lowest price I have seen so far on a new 406 ELT was at an air show in 2008, where the price was \$581, plus installation, battery, and antenna if needed. My local shop estimates the cost is between \$2,000 and \$2,200 for everything, including installation.

There are other technologies available, including the SPOT messenger and the Personal Locator Beacon (PLB). These have their place and, if you

really can't afford a 406 ELT or if you fly a rental airplane with a 121.5 ELT only, I recommend one. Still, these devices do not compare to the 406 ELT.

It does make a difference. I recently led a team that reviewed fatal and serious injury accidents in Alaska. Our team looked at the causes of death and the nature of injuries to occupants. We reached the conclusion that in the last five years, a 406 ELT would have changed the outcome in about 12 percent of the fatal and serious injury accidents. Put another way, we had a shot at saving about 12 lives.

If you don't get a 406 ELT for yourself, I personally recommend that you get one for the people you fly with—your kids, your spouse, or your friends. If you don't get one, consider the lives you will put at risk searching for you if you go down. The same brave soldiers from the Alaska Air National Guard who searched for Jack also serve our country in the military around the world, including in Iraq and Afghanistan. They could use a break. 

Dave Swartz, Ph.D., is a senior aerospace engineer at FAA's Anchorage Aircraft Certification Office. He holds private pilot land and sea ratings and likes to fly on skis. He is the proud owner of a 1949 Aeronca Sedan.

