

Recommended Safety Equipment

What is the most efficient way to spend my safety dollars? While it would be nice to simply buy every safety product and aircraft upgrade available, this is not always economically or practically feasible. As a stand up comic noted, “You can’t have everything- where would you keep it?” You have already sought out what Aviation Consumer recently declared to be both the number one and two most desirable safety upgrades- training (recurrent and IFR, respectively). After all, most accidents don’t occur because the Skywatch failed, leading to a midair collision, they occur because of insufficient or rusty piloting skills. So congratulations yourself on a good start to safer flying, and consider the following recommendations.

While everyone stands in awe of \$20,000+ traffic detection systems and \$10,000 lightning detection devices, consider this: less than 2 percent of accidents result from midair collisions. \$20,000 to avoid 2% would equate total expenditure on all safety items of \$1,000,000! Let me be clear- in no way am I discouraging the purchase of collision avoidance gear- it is high on my list of internal, or fixed, safety gear purchases. But if you could purchase an entire basket of safety devices, which would help in a wide variety of situations, for a fraction of the price of that Skywatch, wouldn’t it be wise?

1. Smoke Hood

Did you know that in airline accidents, involving enormous crash speeds, most fatalities are not the result of blunt trauma (the crash and sudden stop), but rather from smoke inhalation and/or post crash fire (after healthy passengers are unable to evacuate due to smoke). While extricating yourself from a typical GA airplane is simpler and quicker than from the middle seat of a widebody, if the plane is filled with smoke the task will be vastly complicated. How long can you hold your breath? Long enough to cut yourself out of your seatbelt, find that your door has deformed permanently shut, crawl across the seat next to you and kick out the window of the copilot door after it, too, won’t open? Oh, and while you may be holding your breath during this, the smoke is filling your eyes with tears, reducing the little visibility you have. Sure, this is a worst case scenario, but isn’t that what we’re trying to plan for?



For a more likely scenario, consider cruising at altitude over inhospitable terrain- maybe mountains, maybe water, maybe it’s just IMC. Dense smoke starts filling the cabin, and despite your best efforts to evacuate the smoke (you have practiced this with an instructor, haven’t you?) the smoke is just getting worse. How much would you pay for fifteen minutes of protection from both the smoke and the Carbon Monoxide that is likely accompanying it? How does \$65 sound? That’s the price of an EVACU8 smoke hood, a must-have item. The hood performs three vital functions- screens the toxic smoke that will poison you, converts deadly CO to relatively (in the situation) benign CO₂, and keeps a smoke free bubble around your

head, both protecting your eyes, and improving visibility. Even if you don't succumb to smoke inhalation, how will you control an aircraft in IMC if you can't see the instruments? Worst-case scenario you can press the edge of the hood to your instruments, the space between your eyes and the hood will be smoke free. One for each pilot is an absolute minimum, one for each passenger nice-to-have. Don't skip this one.

2. Pouch Type Constant Wear Life Vests

Consider the following accidents:

A PA-32 ditches in 39 degree water. All six occupants successfully exit the aircraft- one with a life vest, five without. Search and rescue personnel arrive at the ditching site only **ten minutes** after the event. While the passenger wearing the life vest survives, four of the five without vests drown in those ten minutes.

A Cessna 402 ditches in 48 degree water. All ten occupants successfully exit the aircraft- five with life jackets on, five without. Search and rescue personnel arrive at the ditching site one hour after the event. *All five passengers with life vests survive, all five without drown.*



The message is simple- in cold water those with life jackets on survive, those without, don't. Even relatively warm 65 degree water only has a 50% survival rate after three to four hours without a life jacket. In both accidents *life jackets were available to all the aircraft occupants*, however, only some made it out of the aircraft with a vest. Second message- it's not enough to have life jackets on board the aircraft, *they must be worn in flight*. These two accidents demonstrate clearly that in the confusion of a ditching there isn't

always time to don a vest.

Of course, no one wants to fly for hours with an uninflated life vest wrapped around his or her body. The good news is, you don't have to. A pouch type life vest, available from Sporty's is designed to be worn as a belt during flight, while being very unobtrusive. Airline quality, these vests are dual cell, with an oral inflation backup. While almost everyone accepts the necessity of life vests for over water flights, few consider that for only a few extra dollars, you can purchase a vest you *know* will leave the aircraft with you. A no-brainer for anyone flying over any body water, no matter how small.

3. Survival Kit

Even with an EPIRB and handheld radio, you may spend some time alone in the wilderness, or worse, your electronics may be damaged or lost in the crash. Some simple tools can vastly aid your chance of rescue. Start with parachute flares and a signal mirror. Our first objective is to be found, after all. Add a Leatherman-type multi tool, and a single hand opening knife, also good day-to day-tools to have at hand. For the knife, a serrated blade makes cutting through a seat belt much easier than a straight edge.



While the body can survive weeks without food, and days without water, it will perish in mere hours if exposed to cold. So our first thought should be shelter and fire. A tightly rolled tarp and some line can set up an admirable shelter in dire situations. More important, multiple methods of fire starting should be carried. Several brands of waterproof/ windproof lighters are available. One combined with a box of waterproof matches, a candle, and perhaps some stick type fire starters, should enable anyone with some basic training (training, again!) to start a fire. Store with some basic first aid supplies in a Nalgene water bottle, and you can take care of the most immediate needs for several days.



4. Pulse Oximeter

This is a must have for anyone who plans on doing any amount of lengthy flying, and/ or flies an aircraft equipped with on board oxygen. Part 91 regulations regarding oxygen use are so liberal as to be a virtual invitation to hypoxia. Hypoxia affects everyone differently, and one man's comfortable cruise altitude is another's invitation to degraded performance.

A pulse oximeter uses a light beam to measure the oxygen saturation of hemoglobin molecules oxygen in your blood, a key determination of hypoxia. While not cheap at about \$400, the variety of accidents hypoxia opens you to is staggering enough to make this purchase justified. Degraded judgment and performance stack the deck against you in: weather avoidance, IFR approach execution, and visual approach/ landing. By telling you when to go down (if you don't have oxygen), or when the system isn't working right (if you do), the device helps keep the safety deck stacked in your favor. Unless you plan on doing all of your flying below 10,000 feet, a must have.



5. Carbon Monoxide Detector



Next on the list is an electronic CO detector. In June, 2004 the NTSB released a recommendation that CO detectors be made required equipment on most single-engine aircraft. In reviewing 40 years of accident reports, they found 125 accidents or incidents involving muffler failure, and 84 deaths attributable to CO poisoning. While this is a small number overall, the cost of equipping with protection is low enough to also make this a must have item. Unfortunately, the little cardboard spot detectors have been shown to be next to useless until the CO level is high enough to already have done serious harm.

For just under \$100, the CO Experts Model 2004 has been tested against several competitors and came up the winner. It will detect and display CO levels far below that of other detectors. As a bonus, where there's smoke, there's also CO, and the Coex 2004 may well alert you to an engine or avionics fire long before your Mark I sniffer (nose) does.

6. Personal Locator Beacon (PLB)

Conventional 121.5 MHz ELT's are so inaccurate as to be nearly useless in many situations. It is estimated that there are nearly 10,000 false ELT alarms for every legitimate activation. Additionally, limitations in the satellites that receive the signal means that several hours often pass between ELT activation and the information being passed to search and rescue (S&R) personnel. The good news is the availability of 406 MHz PLB's means you no longer must settle for ELT's limitations.



The first benefit is response time- an PLB activation will usually have S&R moving within an hour of signal receipt, vs. 6 for an ELT, if the signal is received at all. The second is accuracy- a conventional ELT has S&R searching over 450 square miles, an PLB from 12.5 square miles in a worst case to as little as 1200 square feet! Finally, every PLB sends a code with specific information about the owner- not only does S&R know that someone is in trouble, they know who it is.

Beyond the technological benefits, PLB's shine in their portability. In a ditching/ post crash fire scenario, there may be no ELT left to signal S&R. Not a comforting thought in a remote setting. The PLB can exit the aircraft with you. A waterproof PLB with internal GPS will cost about \$700, certainly not cheap. For any significant overwater or back country flying this is money well spent, however. In strictly high population area flying, I might passing on this, otherwise, a must have.

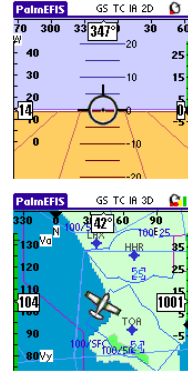
7. ANC Backup

Anyone who's taken even an hour of instrument flight instruction has probably had the phrase "Aviate, Navigate, Communicate" drilled into his or her saturated mind. Yet if communication is the least important item in the IFR hierarchy, why is the first piece of electronic back-up most people buy a handheld radio? Put it this way- if everything electronic in your airplane fails in IMC, what is the first thing you'd like to replace? If you're flying an aircraft with a vacuum driven AI, the Aviate part is OK, but what about the Navigate? Personally, I'd rather know exactly where I am and not be able to talk to ATC, than visa versa. No one who knew exactly where they were has ever hit a mountain- many who thought they did have, while in full contact with ATC. ATC may help you out in an emergency, but they're not the ones who will get you out of the mess- that's the PIC's job.

Worse yet, if your dual-bus, dual-alternator, dual-battery TAA (Technically Advanced Aircraft) has a dual-failure (it happens), how are you going to keep the airplane right side up long enough to use that handheld radio? New "all-electric" aircraft are just that- even the standby AI is electrically powered. Lightning strikes have disabled the electronics of airlines with far more sophisticated electric systems than a GA pilot will ever see. I can't think of much more frightening than being in IMC with no method of telling up from down.

The good news? You can kill the two most important birds with one stone. Both Pocket PC and Palm OS PDA systems are available, which combine a GPS driven moving map

(Navigate) with an AI (Aviate). Most promising is a system from Hangar B-17 that uses GPS inputs to synthesize attitude, eliminating the requirement for a backup AHRS box (another item requiring batteries and cables). With a GPS card in your PDA you have one box which can both keep you right side up and tell you where you are. Or, better yet, pair with a Garmin iQue 3600, a PDA with integrated GPS. While pricey, the implications of not having this backup is frightening enough to make this a must have if you plan on doing serious IMC flying. If not, a nice to have only.



Now that we have taken care of the first two items we can consider a handheld purchase. From a safety point of view, being able to talk to ATC is more important post 9/11 than before, particularly if you operate in a dense metropolitan area. Additionally, a handheld radio can hasten rescue if the aircraft radios are rendered inoperable after a remote crash. Points to consider are true water resistance if you hope to use the handheld after a ditching event, and an external antenna hook up for in-aircraft backup. The only *submersible* transceiver on the market today is the Vertex VXA-700. Unless you plan on remote area/ over water flying, rank this one a nice to have, not a must buy.



8. Life Raft/ Water Gear

At what point are life jackets enough, and at what point is a life raft a good idea? For me the line is gliding distance to land. Inside this, vests alone are OK, outside, a life raft a must have. The exception is people who will be flying strictly over warm (75 degree+) water, or over very heavily used bodies of water. Even with an EPIRB and vests, it can take hours for S&R to reach your location. As water pulls heat from your body at a rate over 30 times faster than air, unless the water is very warm those hours may be too much. As a bonus, a life raft is much more visible from the air than the top of your water logged head. Even so, airborne search and rescue crews have reported that life rafts are still very hard to see. An ideal solution is a brightly colored streamer, which unlike dye packs, will not disperse with time.



If you are flying with a life raft in your aircraft, another must have device is a knife with a fixed blade, or which can be opened single handedly (Spyderco). Picture cruising alone happily when your life raft inadvertently activates in the cabin. Unless you fly a cabin class aircraft with a physical barrier between the cabin and cockpit, you almost definitely will *not* maintain control of the aircraft. Further, you may not be able to use both hands to open the blade on your Leatherman or Swiss army knife. You will want a blade which can be quickly opened to pop that raft before it pins you against the controls.

Summary/ Purchase Information

<u>EVAC-U8</u> Aeromedix.com		\$65
<u>CO Experts Model 2004</u> Aeromedix.com		\$100
<u>Pouch Type Life Vest</u> Sportys.com	ID #: 8619-1A	\$70
<u>Nonin FlightStat Pulse Oximeter</u> Aeromedix.com		\$370
<u>ACR AeroFix 406 with internal GPS</u> Aeromedix.com		\$650
<u>Garmin iQue 3600, Hangar B-17 Software</u> Amazon.com, Hangarb17.com		\$450, \$320
<u>Life Rafts</u> Misc		\$1500-\$3500
<u>Survival Gear</u> EMS, REI, West Marine		\$100-\$500

The total for four life jackets, one of everything else, and a \$2000 life raft is \$4500.