Emergency Procedures Training

The General Aviation Joint Steering Committee (GAJSC) has identified a number of fatal general aviation accidents that occurred following powerplant failure. Mismanagement of light, twin-engine airplanes in single-engine operations was of particular concern. The GAJSC believes that scenario-based training in emergency procedures will be effective in reducing these kinds of mishaps.

Here's the Scenario ...

Every pilot needs to prepare for the unexpected. Engine failures and inflight emergencies have a nasty habit of cropping up at the most inopportune times. However, with the right training and preparation, you can be ready for any hazardous situation that comes your way.

During your initial pilot training, you may recall the layers of learning involved with acquiring and mastering aeronautical skills. You might begin your learning path by **memorizing** certain facts or details like airspeeds for best rate (V_y) or angle of climb (V_x). You would then need to **understand** the relationship between these speeds in order to best choose which speed might be applicable for your environment. You would then **apply** that knowledge by actually choosing to fly at V_x to clear an obstacle on takeoff.

Finally, through **correlation** of V_x/V_y knowledge with climb performance at high density altitudes, engine cooling, and traffic spotting requirements, a pilot may opt to begin a departure climb at V_x, transition to V_y after obstacles are cleared, maintain V_y until a safe maneuvering altitude is reached, and then transition to cruise climb to improve traffic spotting.

Correlative learning takes place when students are able to apply previously acquired knowledge to solve new problems. This is often accomplished through scenario-based training (SBT) that provides realistic, complex problems for students to solve in a controlled environment.

SBT promotes the development of judgement and decision-making by including the kind of consequences or external pressures that the pilot will inevitable face outside the training environment. The beauty of SBT is that it puts the traditional tasks in the Airman Certification Standards or Practical Test Standards in the context of missions that mimic the type of flying that you will actually do.

The real world operational environment leads to another important benefit of SBT: Pilots who train with SBT more quickly develop the habit of carefully and thoughtfully considering all aspects of the flight

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as it progresses. They also learn the critical skill of making, and carrying out, realistic contingency plans to deal with unexpected or emergency events.

Multi-Engine Scenario

Let's look at an example of an engine loss on takeoff for a multi-engine airplane, an all too often fatal accident scenario. Your aircraft is climbing after takeoff and the critical engine fails. With climb attitude and airspeed, you're close to V_{mc} (minimum control speed). Any reduction in speed or increase in angle of attack is likely going to result in an un-commanded yaw and roll toward the dead engine.

Losing an engine en route or on approach is less critical because you'll likely have more airspeed and possibly more altitude to deal with; but what if you have to go around? Single-engine go-arounds in light twins often don't go well and they should be avoided if possible. Another point worth noting: While an engine failure represents a 50% loss of available power, it can result in as much as an 80% loss of performance. Planning for these types of emergencies and practicing your response in advance will give you a huge advantage if they really happen.

Simulate to Stimulate

Flight simulation is another great tool for planning and preparing emergency procedures. Today's flight training devices for GA offer a tremendous range of possibilities. With the assistance of a qualified instructor, you can experience an engine failure after takeoff, or practice your reaction to a primary or multi-function flight display failure. Your instructor can also give you practice with electrical failures, control-system failures, and more.

Flight simulation software on your home computer or personal electronic device can also help you practice handling a variety of malfunctions and failures. Some of these programs will let you set up random failures during a flight and let you experience them as you would in real-world flying.

One of the biggest benefits of such practice is the ability to experience both sudden and subtle failures, become familiar with their early indications, and practice overcoming the natural human tendency toward denial ("this can't be happening to me") and rationalization ("it's probably just a gauge problem").

And you don't need a multimillion dollar simulator to get effective training. Great instructors and great SBT programs equal great training in any aircraft or simulator.

Three Keys to Success

1. *Plan what you'll do in emergency situations*. For takeoffs, know the runway length and calculate accelerate/stop distance. Also know where you'll go if you can't make it back to the departure airport. For multi-engine airplanes, know your best single-engine climb speed (V_{yse}). This will be your target airspeed after engine failure.
2. *Review your plan before you fly*. Professional crews brief every takeoff, approach, and landing and you should do the same. Reviewing what you'll do before you do it can improve the likelihood of a timely and correct response.
3. *Practice SBT with a flight instructor*. It's the best preparation for a successful emergency response.

Resources

- Intro to SBT— slide presentation, FAASafety.gov https://go.usa.gov/xn5gC
- *FAA Safety Briefing: "*Be Prepared" (Jul/Aug 2013) http://1.usa.gov/1NhfjyY and "Handling Abnormal and Emergency Situations" (Nov/Dec 2010) https://go.usa.gov/xnqxa