When the Chips are Down, Let George Do It

by Bill Frank

By now, most pilots flying technically advanced aircraft are, or should be, aware of the concept of single pilot resource management (SRM). The idea is to transfer the benefits of crew-oriented task management into the single pilot cockpit.

To do this successfully, without a copilot familiar with CRM, requires a degree of automation now available in general aviation aircraft. Until recently, if an airplane even had an autopilot, most pilots avoided using it for fear of being considered inferior. "Real pilots" considered the autopilot a crutch. Additionally with the poor performance and reliability of autopilots in the 70's and 80's, it was most often relegated to cruise mode only. With the advent of capable autopilots integrated with flight management systems, the old ways of thinking are finally changing. Even the FAA is coming around to endorsing the value of automation and SRM. The main benefits of this automation to the single pilot are decreased workload and increased situational awareness.

At the risk of committing aviation heresy, let's consider the concept of using the autopilot during an emergency. After all, what better time to decrease pilot workload and increase situational awareness than in an emergency with a single pilot? This is when SRM is needed most. Flying the airplane, contemplating the nature and extent of the emergency, taking decisive action, and running checklists can easily lead to task saturation – so why not let "George" do it?

Before going on, I must preface my thoughts with a few comments. First, I'm not suggesting abdicating aircraft control and management of the flight to the autopilot. The concept is to shed workload, allowing you, the PIC, to deal with the particular situation while avoiding task saturation. Secondly, these are techniques and options, not gospel, and are presented for you to consider as an adaptation of SRM to some emergency situations.

Autopilot Use During Emergencies

Let's start with the more obvious situations. Analyzing system failures and running checklists to diagnose the problem are good times to employ the autopilot. Remember, the autopilot is powered by the essential bus that in turn can be powered by battery #2. So, even if you are dealing with an electrical problem, the autopilot should be good to go. Make sure the autopilot is engaged in **both** a pitch and roll mode, preferably heading and altitude hold. Now you have the freedom to assess and deal with the system failure while your copilot is flying the airplane. You must, however, still remain in the loop and periodically monitor the autopilot to ensure that it is doing what you told it to. Any good captain will keep an eye on his copilot, human or otherwise.

Another obvious use for the autopilot is with a PFD failure. This creates a partial panel situation requiring use of the backup attitude indicator, airspeed indicator and altimeter. You could hand fly under this circumstance using the position page on the Garmin 430 or magnetic compass, but you still have a functional autopilot to do the work for you. Why not let "George" do the flying while you contemplate your next move? Simply engage NAV GPSS mode and ALT hold while you talk to ATC about a "direct to an airport with a GPS approach." Remember, you must have a "direct to destination" or a route selected. If you are receiving radar vectors when the PFD failure occurs, the HDG mode will become inoperable.

A more serious situation is VFR into IMC. With sudden or even gradual unexpected loss of outside references, both non-instrument and instrument-rated pilots get into trouble. The

loss of visual references too often leads to spatial disorientation, frequently with fatal results. There are many times as an instructor when I created this scenario and the training pilot, after analyzing the situation, initiated a climb, descent or 180-degree turn, hand flying the aircraft while a perfectly good autopilot remained idle. I've even had pilots disengage the autopilot to extract themselves from this situation. Most pilots probably feel confident in hand flying the airplane under instrument conditions, but it is sometimes the inadvertent penetration into IMC conditions that can throw off even seasoned instrument pilots, causing immediate disorientation.

A prominent example is the accident that took the life of John F. Kennedy, Jr. After flying along in cruise with the autopilot presumably engaged, he began a descent into virtual IMC conditions by disengaging the autopilot. He rapidly became disoriented and lost control of the aircraft. This situation can lead right to the next scenario, that of recovery from unusual attitudes. If you feel or sense that you are losing control of the aircraft, provided the aircraft has been trimmed for level flight, let go of the controls and try engaging the autopilot. That might have saved John Jr. Again, it's a matter of using all your resources and that's what SRM is all about.

Moving into more controversial territory – serious mechanical failures leading to equally serious emergencies. These are fortunately very rare, but can quickly result in task saturation. It's the pilot overload that often creates the dangerous situation rather than the problem itself. With that in mind, let's talk about engine failures.

On takeoff and departure, an engine failure leaves few options and little time for tasks – push the nose down, maintain a safe airspeed, and look for a place to put the aircraft down, or altitude permitting, activate the CAPS. If you have the presence of mind, and time permitting, secure the engine and electronics. Above all, maintain aircraft control. In cruise flight, the situation is different and the main objective is to diagnose and deal with the engine failure, or problem, **while** heading towards the nearest airport. Every POH of every general aviation aircraft starts the engine failure emergency checklist with "maintain best glide speed." The potential controversy is how to get there. Some would argue for a zoom maneuver, trading airspeed for altitude. There's nothing wrong in concept here, but in twenty-eight years of flight instructing, I have yet to see this happen when I simulate an unexpected engine failure. The other difficulty, even when practiced, is settling in on best glide speed after an abrupt pitch up maneuver. It is debatable whether the altitude gained in the maneuver translates to usable distance gained when the aircraft continues to travel by momentum on its last heading rather than towards a safe harbor. It will of course increase gliding distance, but if you get out and try it in your own airplane, the increase is marginal at best and you're engaging in an abrupt maneuver at a time of mental crisis, where aircraft control is paramount. Once again, why not let "George" do it? Again, it's a matter of using all available resources – including the autopilot.

Assuming that most of us use the autopilot in cruise, why not continue to employ it when things go south? How is this done? Assuming an average cruise speed in an SR22 in the mid 140s KIAS, you get a 55-knot buffer above best glide speed to work with. Instead of trading airspeed for altitude to get to best glide speed, trade it for shortening the distance between you and the nearest airport. To do this, one has to turn immediately towards the airport and maintain altitude as the aircraft slows to best glide speed.

How will the autopilot help us? While in cruise with the autopilot engaged, and once the original shock of disbelief has passed, reach over with your right hand and crank the large knob on the #1 Garmin as far clockwise as you can. As you know, this will take you to the nearest airport page. Push the cursor on, then Direct, ENT, ENT. If it's in the heading mode, an additional double push of the NAV button will be necessary. All this can be accomplished in about five seconds. Now the autopilot is turning and tracking the airplane to the nearest airport. Concurrent with all this, the aircraft is slowing gradually to best glide with the autopilot using aft trim to maintain altitude. A beneficial side effect is that the aircraft is trimming itself for best glide. While all this is happening, you're free to deal with the emergency checklist: Fuel (mixture rich, boost pump on, switch tanks), Air (alternate air-pull) and Ignition (magneto check right, left, both). This can be done in fifteen to twenty seconds; about the time it took you to read the sentence. At this point the aircraft is already on its way to the nearest airport, approaching best glide speed and appropriately trimmed. You've run the bold faced items on the checklist and are ready to take over manual control of the airplane with everything set up. While making forward progress to the nearest airport, altitude is maintained until best glide speed is reached, and without the immediate tasking of flying the airplane, you're able to analyze the engine failure, and work the checklist. Again, this does not mean you stop flying the airplane. You still have to be aware of what the autopilot is doing, especially as it approaches best glide speed. Of course at this point, you will have to disengage the autopilot and fly manually or risk an autopilot induced stall, as the airspeed would continue to

deteriorate. It does, however, unload the burden at a critical time and that is the basic premise of SRM.

When Not to Use the Autopilot in Emergencies

There are emergency scenarios where use of the autopilot is probably not a good idea. These areas include icing, severe turbulence, and engine/cabin fires. With any in-flight fire, the primary objectives are to eliminate, or at least control, the fire and to get the airplane on the ground as soon as possible. The autopilot will not likely be of any help in this situation. In an icing situation, the autopilot may mask the aerodynamic effects of the ice buildup. A classic example was the ATR-72 accident over Roselawn, Ind. Large droplet ice built up behind the de-ice boots until the aircraft entered an uncommanded roll upset as the autopilot disconnected after it was unable to maintain level flight. It is okay to use the autopilot in the initial stages of ice build up while you figure out what your game plan is going to be – that is resource management. Once you have a plan, turn the autopilot off and proceed with the diversion. Be careful when you switch it off in icing conditions as it may already be out of trim. Finally, in moderate or severe turbulence, the idea is to slow down and fly attitude, not altitude. Using the autopilot could lead to overstressing the airframe as it tries to maintain altitude during gust loading. Even if it does ultimately disconnect itself, the damage may already have occurred, so turn it off and hand fly.

Statistics consistently bear out that a two-person crew using CRM techniques is operationally safer than a single pilot. This has to do with more than just task management. It incorporates the product of two inputs into aeronautical decision making. Most of us do not have the luxury of a copilot to back us up, hence the concept of single pilot resource management. By effectively and efficiently using all available resources to free up the pilot with respect to task management, we can do a better job with the judgment and decision making process. This includes using the autopilot and other resources in an emergency. The autopilot is an aid, not a crutch. When the chips are down, use everything you've got, even "George." COPA

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