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Ten tactics

for better aviation operations

In-depth surveys of selected units, interviews with commanders and safety officers, and information from the Army Safety Management Information System show that units with successful safety programs share ten positive common denominators:

1. Direct command involvement and supervision of all flight operations.

2. Training tailored to specific mission requirements with aviation safety officer participation in planning phases.

3. Detailed briefing of every mission by the chain of command to ensure mission requirements and limitations are understood by all crewmembers.

4. Risk management practiced by everyone in the organization.

5. All risk factors identified and understood so good risk management decisions can be made.

6. Risk management decisions made at the proper level - the greater the risk, the higher the decision level.

7. Breaches of flight discipline not accepted by anyone in the organization.

8. High risk aviation personnel identified and eliminated.

9. Experienced aviators paired with the inexperienced.

10. Command attendance and participation in safety meetings that produce countermeasures.

These ten tactics pay big dividends by allowing high performance units to train smart and safe, achieving better mission results. (*Flightfax* 10 Apr 85)

The <u>11th</u> Tactic for Better Aviation Operations: Leader Development

Thoughts from an Aviation Task Force Commander

Flightfax published the "Ten tactics for better aviation operations" in 1985 resulting from a series of surveys conducted with operational units, interviews with commanders and safety officers, and from a review of the accident cases in USACRC's mishap database. The striking fact is these ten tactics could have been written in 2014 instead of almost 30 years ago and would still apply directly to how we manage risk in aviation. However, there is one improvement to this list that needs to be made which is to "implement an aviation leader development program."

Our training doctrine (ADP 7.0) states that commanders are responsible for ensuring their units are capable of performing their missions, and that commanders are directly responsible, and accountable, for all aspects of unit training. As aviation units execute their collective training tasks to become proficient in their METL, the normal routine is the company commanders receive their missions, conduct an assessment to determine levels of risk, and then assign aircrews with the requisite experience to execute the training. The challenge in selecting the right aviators to perform the flight is that while the Commander's Guide (TC 3.04-11) states that a PC should be proficient in all tasks, the reality is that each aviator has a different level of flight skill, situational awareness, technical knowledge, and tactical proficiency. A common metric of aviator experience is total flight time and most units have developed a series of thresholds based on this flight time to measure ability. Below 500 flight hours is a "red aviator" restricted to only the lowest risk missions, between 500 and 1000 hours is an "amber aviator," and above 1000 hours is the "green aviator" which is assigned to the most complex and demanding missions. Since Soldiers do what leaders measure, there is the predictable push by pilots to fly enough flight hours to advance to the next higher category, often without regards to the quality of flight experience that they gain in the process.

So, the leader development opportunity we are missing by using predetermined flight hour thresholds is that total flight time doesn't allow for command discretion and has no quantifiable bearing on a pilot in command's maturity, judgment, and tactical proficiency. In the above scenario, a pilot with 990 hours would be restricted to the moderate complexity missions, and magically ten flight hours later, would be authorized to fly on the most difficult and dangerous missions. The amount of experienced gained in those ten flight hours is negligible and probably doesn't warrant this significant jump in mission proficiency.

Wouldn't it be better if the commander had a system that linked the objective metrics (total flight hours, NVG hours, METL task repetitions) with some of an aviator's subjective qualities (maturity, judgment, decision making, stress management, METL task proficiency), and then matched these qualities to the mission that the unit is assigned to perform? This type of system has been commonly referred to as "aircrew tiering" and was used by 25CAB and subsequent brigades to great success in OEF.

Incorporating subjective criteria for the assessment of aircrew members helps commanders select the best aircrews for each mission, instead of just selecting pilots that have met the flight hour thresholds. More importantly, it forms the basis for an incredibly effective aviation leader development and counseling program that can clearly show each aviator how to improve. The first step in this type of development program is for the commander to develop his/her subjective and

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objective criteria, conduct a leader assessment of their Soldiers, and then counsel each aircrew member on their initial levels. The second step is the selective assignment of aircrews to aviation missions targeted to increase their mission proficiency or the pairing of a pilot with a senior aviator to work on specific qualities (decision making in flight, air sense, maturity, etc). As part of the post-mission AAR, the senior pilots should provide feedback on the specifics of the flight along with reports back to the command on how the aviator is progressing. Lastly, the commander reviews each aircrew member's development and makes the decision to advance them to the next higher proficiency category or keep them at the same level. At each review, the aircrew members should receive feedback on their "tier level" and what is needed for them to progress. Almost exactly the process envisioned in ADP 7.0 where aircrew members "learn to adapt to new situations and develop on the job through training and education. More significantly, they develop through challenging, unfamiliar experiences that require them to adapt theory to reality. They learn through regular and as-needed feedback."

Leader development is fundamental to improving aviation operations. Whether through this example of a subjective assessment system, or by other methods, we owe constant and relevant feedback and developmental opportunities to our aircrew members. Let's make this the 11th tactic and watch the improvements!

Until next month, fly safe and manage your risk levels!

LTC Mike Higginbotham
Aviation Director, Future Operations
US Army Combat Readiness Center
email: michael.d.higginbotham.mil@mail.mil

UAS Class A – C Mishap Table as of 25 Nov 14

	FY 13					FY 14			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	6		4	10	W/GE				
MQ-5	1	1		2	Hunter			`1	1
RQ-7		13	11	24	Shadow		1		1
RQ-11			1	1	Raven				
RQ-20			1	1	Puma				
YMQ-18									
SUAV					SUAV				
Aerostat	3	2	3	8	Aerostat				
Total for Year	10	16	20	46	Year to Date	0	1	1	2

Chinook Safety Performance Review

In the five-year period FY10 – FY14 (493,000+ flight hours), the CH-47 series aircraft had 90 Class A - C mishaps recorded. There were 17 Class A, 11 Class B, and 62 Class C with a cost of $266 million in damage and injuries; there was 1 fatality. The Class A flight mishap rate per 100,000 hours was 3.04. Review of the Class A mishaps shows that human error was the primary cause factor in 14 (82%) of the incidents, materiel failure accounted for 1 (6%) with 2 (12%) unknown or not yet reported with a cause factor. Two of the mishaps were flight related (loss of external load). Highlights from some of the more frequent types of mishaps:

Engine failure/malfunction

Engine failure or malfunction played a role in one Class A.

Scenario *Engine failure*
Aircraft experienced #2 engine failure during approach to land. The #1 engine did not have sufficient power to maintain the aircraft's altitude at their slow airspeed and was forced to land short of the LZ, impacting on a stone wall. Four passengers received minor injuries and the aircraft was severely damaged. The failure was caused by improper measurements and clearance checks to verify that the 4th stage rotor was seated on the 3rd stage shaft during a hot end inspection of the engine that were performed by unit maintenance.

Degraded Visual Environment

Seven of the 15 Class A flight mishaps were associated with DVE.

Scenario 1 *Blade strike*
Chalk 2 trail aircraft contacted the VSP tower on the crew's 3rd landing attempt in dust conditions. The forward main rotor blades struck the mounted MK19 40mm launcher system resulting in ignition of some of the cartridges. Aircraft and VSP tower sustained explosion damage.

Scenario 2 *Dust landing*
While conducting an approach during an EXFIL mission under night vision goggles, the pilot lost visual references. The aircraft drifted aft, followed by a left drift and roll. The fore and aft rotor discs struck the ground simultaneously. The aircraft came to rest on its left side. The aircraft sustained extensive damage and the crew received minor injuries.

Scenario 3 *Dynamic rollover*
During an approach, the pilot on the flight controls was unable to maintain visual reference with the intended termination point. Prior to touchdown, the pilot induced a right drift. The landing gear made contact with the ground creating a pivot point. The right drift created a rolling motion and the aircraft exceeded the critical angle resulting in dynamic rollover. The aircraft was destroyed and there were minor injuries.

Scenario 4 *Blade strike*
During the conduct of a night vision goggle approach in low illumination conditions, the pilot allowed the aircraft to descend below his planned altitude approximately .5 nautical miles short of the intended landing zone. The aircraft’s forward rotor blades struck a sand dune. The aircraft spun counter-clockwise, striking the aft cabin area into the sand dune and coming to rest on its right side. Seven crew members and passengers were injured and the aircraft was significantly damaged.

Scenario 5 *Hard landing*
While conducting a night extraction of ground troops using night vision goggles, the pilot on the controls did not maintain proper control of the aircraft during an approach in a dusty environment,

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causing a hard landing. During the approach the rate of descent and ground speed became excessive and the aircraft impacted the ground at an estimated 400-800 feet per minute rate of descent and 22-26 knots ground speed into hard packed, up sloping, and terraced terrain. After impact, the aircraft continued to roll approximately 50 feet causing damage to the aft landing gear, aft cabin section and aft pylon section.

Scenario 6 *Dust landing*
While flying a night vision goggle approach to an unimproved landing area, the aircrew lost visual reference with the ground as a result of heavy dust conditions. The aircrew, attempting an OGE dust landing utilizing symbology, descended and bounced off the ground. The resultant ground contact of the aircraft landing gear caused the position hold function to disengage, thereby turning off all velocity stabilization modes. The pilot, at this time, applied right cyclic which caused the aircraft to slide right approximately 50 feet in 3 seconds into a ditch. The aircraft rolled right causing the blades to contact obstacles. While adding power to attempt a takeoff, the aircraft proceeded to roll over onto its upper right side. The aircraft was extensively damaged and the aircrew received minor injuries.

Scenario 7 *Ditch*
While performing a night vision goggle approach to an unimproved HLZ with dust conditions, the aircraft contacted the ground with approximately 15-20 knots ground speed, allowing the aircraft to roll after touchdown. Aircraft rolled forward dropping off of a level area into a four foot dry wadi. The right main landing gear sustained damage and the forward rotor system came into contact with the ground damaging all three forward rotor blades.

Blade Strikes

Six blade strikes not associated with DVE were reported.

Scenario 1 *Fuselage strike*
Aft Main Rotor System made contact with the fuselage during RL-progression roll-on training.

Scenario 2 *Terrain strike*
Crew was conducting a pinnacle landing in conjunction with high altitude environmental training when the rotor system contacted the mountainside. The aircraft descended into a ravine and crashed. One crewmember was fatally injured. Three crewmembers were able to egress with injuries. The aircraft was destroyed in a post-crash fire.

Scenario 3 *Terrain strike*
While conducting a hasty air assault utilizing night vision goggles, the pilot on the controls over controlled the aircraft during an up-slope landing in the vicinity of the landing zone. The pilot unintentionally activated the Common Missile Warning System (CMWS), causing numerous flares to deploy. The pilot reacted by displacing the cyclic control forward, driving the forward rotor disk into the ground. The rotor system became unbalanced and desynchronized, causing significant aircraft damage and four minor injuries.

Scenario 4 *Tree strike*
While conducting a NVG approach to an unimproved landing area at an elevation of 9814' msl, the blades of the aft rotor system contacted a tree during landing. The tree strike caused the tip caps and counter weights of at least one blade to break free, causing an imbalance that shook the aft pylon, causing either the #8 or #9 drive shaft to fail at the combining gear box which caused the

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blades to desynchronize, allowing the fore and aft blades to come in contact with each other. The resulting blade contact caused the aft pylon to shear away coming to rest along the right side of the aircraft after impacting the ground. After impact, small fires were scattered among the debris. The aircraft was destroyed and there were 8 personnel injured.

Scenario 5 *Air-to-air blade strike*
While conducting initial NVG helicopter aerial refueling training, while at 2500' AGL and 115 knots indicated airspeed, the aircraft initiated a movement to contact. The movement resulted in a miss in which the drogue became snagged on the probe tip. As the aircraft continued forward a main rotor blade contacted and severed the refuel hose and caused the drogue to be propelled up and into the rotor system resulting in main rotor blade damage. The aircraft landed as soon as possible to a rain-soaked field and executed a roll-on landing. The aircraft landing gear sank into the soft ground as the aircraft continued its ground run for 75 feet before the aft right landing gear sheared. The aircraft turned right approximately 15 degrees and continued the ground run for another 75 feet before coming to rest. The deceleration of the landing as the aircraft came to rest induced rotor blade flexing and main rotor blades contacted the ground and fuselage causing catastrophic damage to the aircraft.

Scenario 6 *Terrain strike*
While attempting a two wheel landing on a small pinnacle emerging from a steep rocky surface at approximately 13,000 feet, the aircraft contacted its aft rotor system with the steep, rocky surface removing an estimated 1-2 feet of the aft rotor system causing serious vibration in the cabin and pitching the aircraft nose downward. The damaged rotors maintained their integrity even with the loss of outer lift surface allowing continued controlled flight. The crew initiated an approach to an emergency landing area where ground contact with a large rock short of the landing area caused additional extensive aft rotor and fuselage damage.

Hard landing

Scenario
While conducting a hasty air assault at night in low illumination conditions, the crew began an approach to a pick-up zone to exfil ground troops. The pilot on the flight controls maneuvered the aircraft into an unperceived out of ground effect hover condition at a low torque setting with an excessive upward pitch attitude. The aircraft descended rapidly and impacted aft first with a significant right roll. The impact caused minor injuries to the crew and separated the aft pylon from the aircraft.

External loads

Scenario 1
Crew was on climb-out, at approx. 150 Feet AGL, at approx. 40KTS IAS, when all 3 cargo hooks reportedly released and jettisoned the M777 Towed Howitzer sling load. Aircraft was returned to the airfield and shut down w/o further incident. M777 deemed a total loss.

Scenario 2
While conducting sling load operations, the sling load separated from the aircraft and impacted the ground. The rigged and certified TRICON and its contents were destroyed. Loss of the load was a result of an 11K reach pendant's failure.

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Summary

11 (65%) of the Class A events occurred under N/NVG conditions. 12 (70%) occurred in OEF. Class B incidents included two additional external load mishaps, two incidents where rotor wash caused blowing debris or blew over tents causing injuries, three DVE related mishaps; one wire strike; one hard landing; one blade strike with terrain and one rotor strike with the fuselage during shutdown in high winds. More detailed information, for accident prevention purposes, may be obtained by your safety officer through the Risk Management Information System (RMIS) on the safety.army.mil website. Registration is required.

	H-47 CLASS A – C Mishaps				
FY	Class A	Class B	Class C	Class A Flt Rate	Fatal
2010	5	3	11	3.49	0
2011	3	5	18	2.66	0
2012	5	0	19	5.19	0
2013	1	2	11	1.09	0
2014	3	1	3	2.56	1
Total	17	11	62	3.04	1

	Manned Aircraft Class A – C Mishap Table									as of 25 Nov 14
	Month	FY 14					FY 15			
		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities		Class A Mishaps	Class B Mishaps	Class C Mishaps	Fatalities
1st Qtr	October	0	0	2	0		0	1	3	0
	November	3	0	5	0		2	0	1	2
	December	1	0	3	0					
2nd Qtr	January	2	2	4	4					
	February	1	0	3	0					
	March	0	3	0	0					
3rd Qtr	April	1	1	5	0					
	May	3	1	2	2					
	June	2	0	6	0					
4th Qtr	July	2	0	5	0					
	August	0	0	0	0					
	September	0	1	2						
	Total for Year	15	8	37	6	Year to Date	2	1	4	2
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.31		3 Yr Avg: 1.25			FY 14: 1.42			Current FY: 1.39	

The Heart of Risk Mitigation - Be a Mentor

CW4 Charles C. Jaszczak
Directorate of Evaluation and Standardization
U.S. Army Aviation Center of Excellence
Fort Rucker, Ala
UH60 SP/IE H60 Branch Chief

As part of the Profession of Arms, we have the responsibility to mitigate risk. Frequently, I see the paperwork get processed IAW a SOP or policy letter to be filed away as nothing more than a record. Only after being tasked to do the investigation of a Class A accident did I truly recognize how important risk mitigation is and how the process is largely misunderstood.

Early in my career, I had a number of misconceived notions. One of which was how the paperwork was in the way, consuming time and limiting my ability to operate. Over time, my opinion of the process has changed. As a current member of DES, I have had the opportunity to look at organizations from an outside perspective and now look at things considerably different than before. I believe we need to go back to the basics and look at some definitions to assure that the message I am trying to send is not lost. First, I would like to define mitigation as the action for reducing the severity, seriousness, or painfulness of something. It is amazing how often that definition can change the way we look at our process of risk assessment, mitigation and approval. It is not that we fail to do the steps; it is more about the recognition that what we do as aviators is dangerous and the ultimate outcome of a misunderstanding could be catastrophic. As an organization, we spend a significant amount of energy on our risk assessment and mitigation processes and place ownership of that process on the chain of command through the approval process. It took too long in my career to recognize that everything is subject to scrutiny from the accident backwards and success is not necessarily an indicator of competence. Without perspective, the process of assessment, mitigation and approval would seem to be somewhat of a legal action. However, I challenge everyone to recognize that the process is more about mentorship than the endorsement of legal procedure.

We, as a culture, accept the rule of law as a founding principle. It is easy to see how the intent is easily lost. At one point in most of our lives, we were willing to blindly follow an SOP, regulation, or policy in order to gain the permission of our leaders. Much like asking permission to take the car out for a drive, your parents probably gave you limitations based on their expectation of your abilities and past performance. If you stay within a set of boundaries, you can take the car to the store. In order to get that far you already had to meet the legal requirements and take your driver's test which was designed to verify your ability to understand and apply the rules entered into record. If you think about it, the rules are important to you for your safety but are only significant to establish liability after the accident. If running a stop sign is only important when you are caught by an authority or struck by another vehicle, you have demonstrated a weakness of character and risk losing trust. I challenge that risk assessment, mitigation and approval is as much about mentorship (mentorship - a personal developmental relationship in which a more experienced or more knowledgeable person helps to guide a less experienced or knowledgeable person) and assists in character development.

Attempting to mitigate risk is almost as detailed as planning the mission. There are an incredible number of rules and regulations related to every mission. Each briefer and approval authority is an additional set of eyes that should attempt to assure compliance to prevent exposure to ridicule that could affect the public trust even if there is no damage. If the rule of law is what binds us, we will

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always require more detail to ensure a common interpretation. If we have character and are moral, do we need regulation? Where moral is currently defined as being concerned with the principles of right and wrong behavior and the goodness or badness of human character. It is important to note the relationship between the level of professionalism within an organization and the rules needed to regulate its activities. Where professionalism is defined as the skill, good judgment and polite behavior is expected from a person who is trained to do a job well. The more professional a force we have the less we need to regulate it’s activities. Unfortunately, the converse is true as well. This situation clearly identifies the paradox of command and control. The greater the trust a command has in an organization or individual, the lower the control mechanisms (e.g. regulation) required to keep it operating safely. Our leaders not only recognize the need to provide the foundation for our development as a profession at all levels within the Army, but know the common perceptions of others will enhance our capability by maintaining the public trust allowing us freedom to maneuver.

Trust is required at all levels, for the risk assessment, mitigation and approval process to work. As a recent participant in a Center for the Army Profession and Ethic (CAPE) lecture at Fort Rucker, I found an interesting connection that applies to maintaining trust as both an organization and individual. The facilitator asked the audience for a definition of trust and some interesting definitions were offered. Merriam-Webster defines trust as a belief that someone or something is reliable, good, honest, effective, etc. For the purpose of this discussion, I prefer one of the definitions offered during the presentation “an emotional expectation of future performance.” When we use the word trust, we are making a decision that comes from the gut “do you trust him/her?” It is critical to remember that mitigation relies on an anticipation of upcoming events but your feelings about someone’s performance and their decision making process is established over time. One slide in the presentation stood out. The word trust was in bold at the center of a Venn diagram. The diagram hypothesize that in order to maintain trust you must have competence, commitment, and character. Since character speaks to the values of a person and commitment relates to their dedication to the common goal, it is easy to see how someone's commitment and character are immediately brought into question when they have violated your trust or had an accident. To further complicate things, I believe that the technical expertise required in our profession leads us to super-elevate the importance of competence above commitment and character. Through the assessments that I have been part of, I have come to believe that an organization can be good when it is competent but will only be great when it has a balanced approach and does not forget about commitment and character. The Commanders Guide (TC 3-04.11) and Aviation Flight Regulations (AR 95-1) spend a significant amount of time talking about the maturity and judgment required in character, but fall short of explaining why they are so important. Consequently, mentorship is a key factor in developing the understanding related to our doctrine and regulation that comes from the wisest of our leadership. I only use wise to exemplify that mentors do not have to be old to be wise. Where wise is having or showing experience, knowledge, and good judgment. It is my assessment that time spent at the battalion level and above focused on character and commitment is every bit as valuable to the organization as the time spent on competence. The establishment of expectations related to character and commitment allow the organization and individual to maintain trust. We talk about maturity and judgment as selection criteria for AMC and PC, but we ultimately must be able trust each other to make the “right” decision.

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Finally, in order to mitigate risk, you must be able to see yourself to identify your weaknesses. However, it is difficult if not impossible to see yourself. As a member of DES, we attempt to help units and individuals see themselves. During our assessments, it is much easier to identify negative behavior than positive behavior and it is not always received well. Hence, it is critical to emphasize the positive. Not to ingratiate anyone, rather to communicate in a manner that is constructive and well received. I have used two lenses to help me identify an organization or individual with challenges to their professionalism. First, the July 2010 Knowledge magazine article by then Brig. Gen. Crutchfield on where he identifies the five most common words found in accident reports at NTC - Untrained, Unsupervised, Undisciplined, Overconfident and Complacent. Second, the recognition of hazardous attitudes within the context of factors affecting decision-making contained in chapter 8 of the October 2010 version of the Aviation Instructor’s Handbook - Anti-authority, Impulsivity, Invulnerability, Macho, and Resignation. There are definite parallels between the two references, but I have yet to find a problem related to organizations or individuals that does not fit in one of the two lists. Going back to the positive, I believe the Army values are the best positive lens that can be used to see the professionalism of an organization - Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, and Personal Courage. I encourage units to pay close attention to their attitudes related to the Army values, but it is difficult to objectively assess the values of an organization or individual within a short period of time or during an assessment.

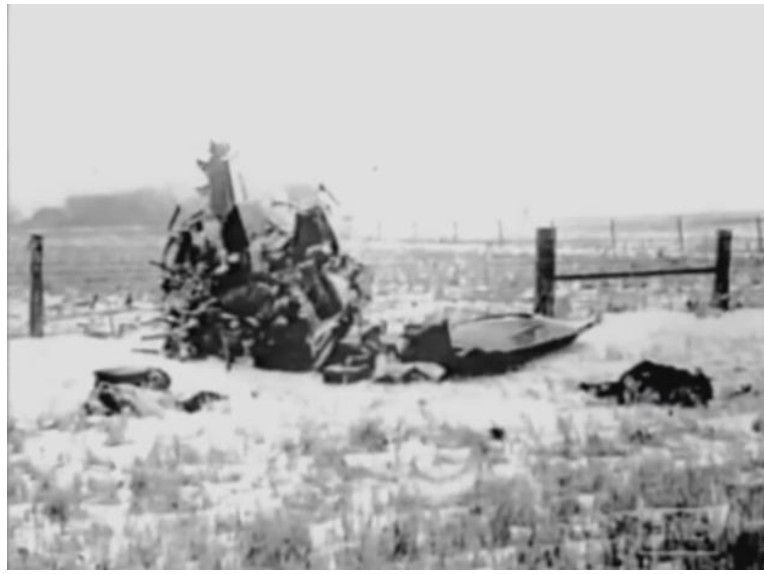
If all we do in daily operations is run processes, we miss the greater good of engaging in professional dialog. The transfer of knowledge from one soldier to another is critical for individual development (aka mentorship). We have all known the next organization or individual that was competent but easily identified as on their way to the next accident. Please take the time to read the references provided in the previous paragraph. I postulate that it is a flaw of character or lack of commitment that will either cause them or prevent you from breaking the chain of events leading to that accident. If we are not engaged, thinking Soldiers, we are limited to individual discovery and doomed to repeat the failure of others. Together we will succeed and overcome events that would slow or stop any of us individually. Use your risk assessment, mitigation and approval process to mentor and develop our junior aviators. Don't just be part of our profession, be professional and be a mentor.

After about 30 minutes I puked all over my airplane. I said to myself, "Man, you made a big mistake."

— *Charles 'Chuck' Yeager, regards his first flight*

Mishap Review: The day the music died

A Beech Bonanza crashed at night approximately 5 miles northwest of the Mason City Municipal Airport, Mason City, Iowa, at approximately 0100 hrs, February 3, 1959. The pilot and three passengers were killed and the aircraft was demolished.



History of flight

The mission was a scheduled charter flight transporting three passengers from Mason City, Iowa, to Fargo, North Dakota. The passengers, Charles Hardin Holley, J.P. Richardson, and Ricardo Valenzuela were members of a group of entertainers appearing in Clear Lake, Iowa, the night of February 2, 1959. The following night they were to appear in Moorehead, Minnesota, and arrangements were made to charter an aircraft to fly to Fargo, North Dakota, the nearest airport to Moorhead.

Take-off was scheduled for approximately 0100 hours with an estimated en route time of two hours for the VFR flight. At approximately 1730, the pilot went to the Air Traffic Communications Station (ATCS) to obtain necessary weather pertinent to the flight. Initial weather indicated ceilings greater than 5,000 feet and visibility of 10 miles with light snow after 0200 hours. A final weather update at 2320 advised that the stations en route were reporting ceilings of 4,200 feet or better with visibilities 10 miles or greater. Conditions at the departure airport were ceilings at 5,000 feet, light snow falling, temperature 15 degrees with winds out of the south at 25 to 32 knots and an altimeter setting of 29.90.

The passengers arrived at the airport at 0040, stowed baggage and boarded the aircraft. The pilot's intention was to file the flight plan by radio when airborne. While the aircraft was being taxied to the end of Runway 17, the pilot called ATSC and asked for the latest local and en route weather. It was reported that en route weather had not changed materially but the local weather was reported as precipitation ceiling 3,000 feet, sky obscured, visibility 6 miles, light snow, wind south 20 knots, gusts to 30 knots, altimeter setting 29.85 inches.

A normal takeoff was made at 0055. The aircraft was observed to depart toward the south in a normal manner, turn and climb to an estimated altitude of 800 feet, and then head in a northwesterly direction. When approximately 5 miles had been traversed, the tail light of the aircraft was seen to descend gradually until it disappeared from sight. Following this, many unsuccessful attempts were made to contact the aircraft by radio. The time was approximately 0100.

After an extensive air search, the wreckage was sighted in an open farm field at approximately

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0935 that morning. All occupants were dead and the aircraft was demolished. The field in which the aircraft was found was level and covered with about four inches of snow.

Crewmember experience

The 21 year old pilot, sitting in the left seat and flying single-pilot, had 711 flying hours, of which 128 were in the Bonanza aircraft. Almost all of the Bonanza time was acquired during charter flights. He held an airman certificate for single-engine land and flight instructor ratings. He was not instrument rated but had approximately 52 hours of dual instrument training and had passed his instrument written examination. He failed an instrument flight check nine months prior to the accident.

Conclusion

At night, with an overcast sky, snow falling, no definite horizon, and a proposed flight over a sparsely settled area with an absence of ground lights, a requirement for control of the aircraft solely by reference to flight instruments can be predicated with virtual certainty.

The board concluded that the pilot, when a short distance from the airport, was confronted with this situation. Because of fluctuation of the rate instruments caused by gusty winds, he would have been forced to concentrate and rely greatly on the attitude gyro, an instrument with which he was not completely familiar. The pitch display of this instrument is the reverse of the instrument he was accustomed to; therefore, he could have become confused and thought that he was making a climbing turn when in reality he was making a descending turn. The fact that the aircraft struck the ground in a steep turn but with the nose lowered only slightly, indicates that some control was being effected at the time. The weather briefing supplied to the pilot was seriously inadequate in that it failed to even mention adverse flying conditions which should have been highlighted.

The board determined that the probable cause of this accident was the pilot's unwise decision to embark on a flight which would necessitate flying solely by instruments when he was not properly certificated or qualified to do so. Contributing factors were serious deficiencies in the weather briefing, and the pilot's unfamiliarity with the instrument which determines the attitude of the aircraft.

Commentary

Information for this mishap review was gleaned from the Civil Aeronautics Board aircraft accident report released September 23, 1959. Although the report noted the deteriorating weather conditions and the need for flying utilizing the instruments, it should be highlighted that the aircraft took off with ceilings of 3,000 feet and 6 miles visibility. Not necessarily considered poor weather, even for night VFR flight. The aircraft was barely out of the pattern when it crashed. What is important is it is believed that shortly after takeoff the pilot entered an area of complete darkness and one in which there was no definite horizon; that the snow conditions and the lack of horizon required him to rely solely on flight instruments for aircraft attitude and orientation. Dark, overcast, limited contrast and little cultural lighting - attempting to fly in VFR conditions without reference to a horizon, either visual or artificial, is a recipe for disaster.

The passengers were better known by their stage names – Buddy Holly, The Big Bopper, and Ritchie Valens.

Failures lead to accidents

April 1992 Flightfax

While participating in a medical readiness training exercise, two UH-60s were independently transporting medical personnel by multiple sorties to remote villages where they provided medical care. At the end of the day, the aircrews returned the medical personnel to a base camp for rest and resupply before the next day's mission. For 5 days, the mission had been completed without event.

On the sixth day, one of the UH-6O crews performed insertion of the medical personnel at the remote villages and then extracted them at the end of the day and returned to the medical base camp. At the base camp, the crew shut down the aircraft and conducted a debrief with the medical team commander, discussing the mission and ensuring that everyone would be ready for the mission the following day. With 700 indicated pounds of remaining fuel, the crew restarted the aircraft and departed for the approximately 15-minute flight to a local airport, where they were to refuel and remain overnight.

As the crew crossed the last ridgeline some 5 minutes away from the airport, the No. 1 low fuel quantity caution light came on. The fuel quantity caution light was quickly followed by the No. 1 low fuel pressure light, the No. 1 engine low oil pressure light, and then the No. 1 engine-out light and audio. Fearing the possibility of losing the second engine or inability to sustain single-engine flight, the PC, who was on the controls, chose to fly directly toward the airport to a point at midfield rather than continue in a normal traffic pattern. The aircraft continued in relatively level flight but soon began rapidly losing rotor rpm and altitude. As it became apparent that flight could not be sustained to the airport runway, the PC selected the only available open area - a soccer field located between some warehouses - and attempted to maneuver the aircraft to this spot. Approaching the soccer field, the aircraft struck a 20-foot-tall tennis court backstop, hit the ground, bounced up against one of the warehouses, fell back to the ground, and slid to a stop, coming to rest on its left side. Through his broken overhead window, the pilot in the left seat observed the bladeless rotor head still turning. He then placed the No.2 power control and fuel levers to the off position and watched as all motion ceased.

The crew then egressed the aircraft with little assistance. One injury occurred when the pilot, standing on top of the aircraft, helped a passenger egress by pulling him by one arm up through the open right crew door, dislocating the passenger's shoulder. The aircraft was a total loss.

In reviewing the circumstances that led to this accident, the following individual failures were identified:

- The unit maintenance officer and maintenance technician failed to properly diagnose the cause of an engine flameout that this aircraft had experienced about a month before the accident. Following the loss of the No.1 engine, the crew reduced airspeed, continued normal flight for about 15 minutes back to home base, and completed a successful roll-on landing. Following rollout, the crew, presuming that they had experienced a No. 1 engine problem, elected to cross-feed the operating No.2 engine from the No. 1 fuel system, which indicated significantly more fuel remaining than did the No. 2 fuel system. The No.2 engine immediately quit, and the aircraft coasted to a stop at the unit's refuel point. The maintenance crew then wrongly presumed that the fuel gauge was out of calibration and made the following entry in the logbook. ''No. 1 fuel gauge indicated 200 lbs more than actual. Flight below 400 lbs indicated is restricted." The intent of the write-up was to prohibit

Continued on next page

flight below an indication of 400 pounds on the No.1 fuel system indicator, *not* a combined indication of 400 pounds. That was the extent of the troubleshooting efforts by unit maintenance personnel, and no preliminary report of aircraft mishap was submitted on this incident.

- The accident PC failed to adjust airspeed and power requirements when he experienced failure of the No. 1 engine. Remembering the incident that the other two unit pilots had experienced a month prior, the PC was admittedly concerned with the possibility of a No.2 engine failure. Fortunately, this aircraft was equipped with a flight data recorder (FDR) that recorded all actions by the aircrew during the mishap sequence. The data showed that not only did the PC not reduce to single-engine airspeed, but he also increased both airspeed and power demanded of the No.2 engine. Although he was an experienced pilot with a total of 1,314 flight hours (879 of which were in the UH-60), his control inputs demanded performance the No. 2 engine was not capable of providing, and rotor rpm began progressively decaying until further flight was impossible.
- The pilot-a relatively new aviator with only 359 total flight hours, 205 of which were in the UH-60 also failed to accomplish his primary task of providing the PC with critical information on flight, rotor, and engine instrument indications during the in-flight emergency. The pilot was initially monitoring the No.2 Ng but diverted his attention when a stabilator – off caution light came on. He reset the stabilator and soon saw what he thought was the No.2 engine - out light coming on. The FDR established that the No.2 engine never failed, and in fact, power never decreased to the point that the engine-out light would have illuminated. At the time the stabilator failed, the rotor rpm had decreased to below 93 percent, thus it was understandable that the stabilator failure was due to the loss of electrical power.

The ifs

- *If* the maintenance personnel had conducted by-the-book troubleshooting procedures, they would have detected that the No. 1 fuel system boost pump output line had been disconnected and was loose in the cell, allowing the system to cavitate at about the 200 pounds fuel-remaining point. No records existed to show when, why, or by whom the line was disconnected but evidence did exist to show it had once been connected and torqued.
- *If the* PC had followed by-the-book procedures for single-engine operations, the aircraft could have successfully sustained single-engine flight to the civilian airport, where the fault could have been investigated and possibly corrected.
- *If* the pilot had completed his by-the-book crewmember responsibilities, he would have informed the PC of the deteriorating rotor rpm and helped talk the PC through performance of the proper single-engine procedure. *If* he had been more observant, he would have noted that the No.2 engine was running at maximum available power throughout the entire sequence. If anyone of these individual failures had been eliminated, this accident could have been prevented. And accidents can only be prevented by individuals following by-the-book procedures. Anything less will ensure that accidents like this one will continue to happen. +

Caution: Cape does not enable user to fly.

— Batman costume warning label, Wal-Mart, 1995.

Selected Aircraft Mishap Briefs

Information based on Preliminary reports of aircraft mishaps reported in October 2014.

<u>Utility helicopters</u>

H-60 

-A Series. Post-flight inspection revealed that the oil cooler door was missing on the aircraft. Damage to one main rotor blade and a SATCOM antenna is associated with apparent separation in flight. (Class C)

-L Series. While conducting aerial gunnery, the left-side cockpit door came open into the stream of 7.62mm rounds being fired downrange. The left-seat pilot suffered lacerations to the face and upper torso as a result of flying shrapnel, requiring treatment and quarters beyond the day of the accident. (Class C)

-M Series. Crew was conducting dust-landing training in an improved area when the aircraft's stowed FLIR made contact with the sand during a landing iteration. Crew reported 'rapid' settling during which the FLIR released from the stowed position, causing the lens to crack. (Class C)

<u>Observation helicopters</u>

TH-67A 

-Aircraft was repositioning from refuel to parking when it made contact with the ground and subsequently overturned, coming to rest on the right side. Both pilots sustained minor injuries (Class B)

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To err is human. To blame it on the computer, even more so.

If you have comments, input, or contributions to Flightfax, feel free to contact the Aviation Directorate, U.S. Army Combat Readiness Center at com (334) 255-3530, DSN 558-3530

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