

## Bird Strike

The following story was contributed by a reader. Thanks.

*"We use our JetRanger as a survey platform. Many of our potential job sites are not easily accessible from the ground by either vehicle or foot. The helicopter allows us the luxury of having everyone who needs to look at the site have a good look before making our proposals. Then during the work we occasionally move people and equipment as necessary.*

*On this particular flight I flew three men to the Lancaster Airport just south of Dallas where their car was located. I dropped them off just after dusk. The flight back to my helipad would take just about an hour. The route back home was mainly over open country – farms and ranches. I was by myself and feeling good; enjoying the flight on a beautiful night. There were lots of stars; but I think the moon had not yet risen. It was dark.*

*About 30 miles north of home I passed the dam on the south end of the lake. This is wonderful farm and ranching country with small towns scattered around.*

*When all of a sudden, without a bit of warning, Crash, Whoosh, Bang!*

*I was dazed by the impact and the sudden, massive rush of air. The chin bubble in front of me had been smashed inwards throwing a blizzard of stuff up into me. My right leg took a hard hit and was hurt. I had no feeling below the right knee. My immediate reaction was that I had been shot by a hunter. This shook me up pretty bad.*

*When my thoughts cleared after just a few seconds I recognized that it was a bird that had blasted through the chin bubble, past my pedals, and was now plastered against the bulkhead immediately below and in front of my seat. Strangely enough almost immediately I also noticed that there was another hole in the upper left hand side of the co-pilot's windscreen*

*With a cruise airspeed of around 110 knots the blast of air, mixed with feathers, plexiglass, blood and guts was staggering. After I understood what had happened my first conscious decision was to slow the airspeed in order to reduce the torrent of air coming through the hole in the chin bubble. I got it back around 50-60 knots and it got better. Next I noticed that I had lost 400 feet of altitude. It later upset me that I had lost so much altitude before I knew it. I don't really know how*

*that happened. I don't remember if the aircraft went through some pitch and roll excursions; but I am fairly certain that I did what almost all helicopter pilots do in an unusual situation – lower the collective. That would explain the loss of altitude.*

*My right leg was a mixture of pain and numbness. I couldn't feel or move my foot itself; but I could control the pedals. I knew I could fly the helicopter and make a normal landing.*

*It took only seconds to sense that the aircraft was flying OK. My next conscious decision was to try to fly the remaining 20 minutes back to my helipad.*

*I was in the middle of nowhere. My helipad was as close as any other prepared landing spot, and my GPS told me exactly how to get there.*

*Even at the reduced airspeed the airflow was substantial. Somehow I thought it would help to open the sliding window in my door, so I did. There was no noticeable change, so I left it open.*



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*As I continued toward my helipad my right ankle and leg remained numb, and the wind through the hole in the chin bubble made me very cold. I landed without incident, and was met by one of my family members.*

*After shutting down I sat in the seat for a while to calm my nerves, relax that I had landed safely, and move my right leg around. The feeling in my right*



*ankle and foot returned and I was able to get out and walk around without any problems.*

*After we were able to inspect the aircraft that night and then in the morning light we determined that I had hit three different birds. One came through the right chin bubble, the second hit and broke a hole in the upper left corner of the copilot's windscreen, and the third was wedged between the rear landing gear cross tube and the fuselage on the left side.*

*During the cleanup I found a glob of bird flesh plastered to the center of the airspeed indicator glass, with a long drip of congealed blood oozing down from it.*

*I took one of the bird carcasses to a local university where it was identified as a Merganser.*

*The aircraft was repaired and returned to service.*

*I reflected on this experience many times since.*

*I never knew that birds would fly at night. Maybe I spooked those birds into flight when I crossed over the lake. Maybe some hunters or fishermen spooked them.*

*I also recognize that I was very lucky. I could have easily been disabled if the bird had come through the upper windscreen; or blinded if the blast of feathers, plexiglass, and stuff had hit me in the eyes.*

*But the strongest thought that came out of this experience is that whatever happens, the first thing to do is to fly the aircraft."*

This episode has several items that deserve mention, but the most obvious is that a Bird Strike can be a very serious matter.

How can that be? Those cute little sparrows and mockingbirds that flit around your house seem much too tiny and soft to pose any threat to us humans. After all, birds always fly away when we approach them. Their survival instincts have them programmed to take to the sky to escape earth-bound creatures intent on catching and eating them. This fly-away-from-danger technique has been very effective, and will always be what a bird will do.

This pedestrian-to-bird relationship should not affect our thinking when in the cockpit of an airborne flying machine. When we are flying we are in the birds' domain. They are not programmed to watch for us. When they do spot an approaching aircraft they will generally do what they do on the ground – fly away from approaching danger.

But they don't always spot us. They may be too busy flying formation on the goose ahead, or

searching the ground for a field mouse dinner.

Birds are everywhere. We have to watch out for them. Why?

Consider the following NTSB Reports:

[FTW97LA354/206L.](#)

"A bird struck and sheared the cyclic push pull tube during the helicopter's cruise flight at 800 feet MSL. The helicopter started shaking violently and cyclic inputs did not correct the attitude of the aircraft. When the pilot lowered the collective full down and rolled the throttle to the idle position, the helicopter entered a near level attitude with a slight left bank. At about 15 feet AGL, the pilot applied full aft cyclic and pulled pitch for the landing. The helicopter touched the ground in a left sideward movement and bounced before coming to rest."



[NYC98LA072/Mooney](#)

...2015 eastern standard time, a Mooney M20J ... was substantially damaged when it collided with a goose while on approach to the Wilkes-Barre/Scranton International Airport ... the pilot was not injured. Night visual meteorological conditions prevailed ..."

### **NYC89LA079/Cessna 150**

"The flight instructor with a student pilot in control of the airport took off and at approximately 500 feet AGL, a 4 pound bird flew through the left side windshield striking the student pilot on the left side of the face. The flight instructor was not injured ... took control ... and landed immediately."

### **NYC87LA030/206B**

"The on-demand cargo flight encountered a bird strike enroute from New Jersey to Jamaica, New York. The pilot received serious injury to the eye and cheekbone but was able to accomplish an emergency landing in a parking lot without further damage or injury."

### **NYC85LA214/Grumman American AA-5**

"The pilot reported that the flight was uneventful until he was in a descent ... he said that a large bird suddenly appeared in front of the aircraft and collided with the right wing. The bird strike put a large hole in the right wing root, severed a fuel line, and damaged the right fuel tank, but the aircraft landed safely."



### **MIA97IA237/Boeing 737**

"When descending into Tampa at an altitude of 4,000 feet msl the flight struck a large bird. The First Officer's Number 1 window shattered both panes of the windshield, sending glass into the cockpit, and into the forward galley. The flight landed without further incident. The Captain and First Officer were taken to the hospital to have glass removed. According to the pilot's statement they saw other birds before the bird strike, and they described the birds that they had seen with wings spans of 4 feet..."

### **MKC86LA025/Boeing 727**

"During a night arrival, a Boeing 727 ... was vectored for an approach to runway 32L. While descending through about 5,000 feet MSL ... the aircraft collided with a flock of snow geese... After landing damage was found on the radome, leading edge slats, and on the forward fuselage."

### **BFO94LA058/PA38**

"The pilot was doing a straight-in approach to runway 14 at Wilmington, Delaware, at night when the aircraft struck birds. The airplane was descending through 1,800 feet MSL... The pilot reported he experienced a loss of electrical power, yaw

control problems, and a partial loss of engine power. However he continued to the airport and landed... Examination of the airplane revealed the battery case, firewall, and wings were damaged... and there was debris in the engine air inlet."

I think you get the idea.

A hawk, buzzard, goose or duck packs a big wallop when it strikes at high speed. A high-speed head-on collision with a one pound bird can generate a force over two tons! If a bird strike can sever a control tube, penetrate a windshield, and punch a hole in a wing leading edge, imagine what one can do with a direct hit on you.

A mid-air collision with a bird can be as serious as a mid-air collision with an aircraft. Just as you must see-and-avoid other aircraft you must also take precautions for bird strikes. One precaution might be the wearing of safety glasses, or using the visor in your helmet.

Obviously, a bird is harder to spot than a much larger aircraft. It may not be possible to see a bird until it is too late to avoid it. That doesn't mean that you can't be looking for them, contemplate where they will be, and be prepared to take evasive action. Apparently birds also fly at night. Unfortunately they do not have position or landing lights. You do. Perhaps using both could help.

You must recognize that you share the sky with other flying creatures. It's up to you to see and avoid them.



# There I Was...

*Here are some accounts sent to us by readers.*

## Hughes 369.

"This was my third solo flight. I began to have some trouble with a rough running engine. I was following Interstate 5 back down toward Van Nuys where I wanted to return. The roughness continued. I picked out a precautionary landing spot in a cemetery. As I descended and backed the throttle off a bit the engine smoothed out. I added some power and limped back up to my previous altitude. I nervously made it back to the airport. Turning base with reduced power and it got rough again. It didn't seem to be making enough power.

I rolled the throttle to flight idle.

This was a "tweener." Not a flameout but not good smooth power either. The decision to autorotate or to continue was not an easy choice. I made a sort of a "powered autorotation" and used what power there was to help with the touchdown."



## 206B

"This was back in the late 70's. I was in a new job. On this particular day I had a head cold, but since I was new with the company I didn't want to call in sick so I went in and flew anyway. I did not anticipate any significant altitude changes, so I didn't see any real problem. My job that day was slash burning. The rig was suspended beneath the aircraft, and could be jettisoned if necessary. I was flying with the pilot's door removed so I could see what I was doing better. I took off and was on route to the location where I was to work and to meet the support truck.

I was trying to get a fire started on some piles of slash, but they were too wet to start easily. I kept trying. The rig could spin on its cables, and sometimes it would be quite rapid when the cables crossed.

I was almost empty so I flew over to where I was to land. While still in a high hover I made a pedal turn while I was looking down. As soon as I raised my head it hit me.

A severe case of vertigo. I had to look at the instruments or straight down from the helicopter, because when I raised my head and looked straight ahead at the horizon I had this strong feeling of spinning around. It wasn't as bad looking at the instruments or looking down. I set it down OK, but the spinning sensation was with me all the way."

# Helicopter Operating Limitations

*by Jim McCollough, Principle Experimental Test Pilot*

Many pilots have asked, "Where do helicopter operating limitations come from?" Unfortunately, the question has no simple answer.

Operating limitations may be based on structural loads, handling qualities, cooling margins, the certification agency's requirements, the project pilot's judgement, or some other criteria. Examples discussed below list some of the parameters that are considered.

Limitations must be presented in a way that can be easily understood by the operator. They are usually proposed by the manufacturer and approved by the certification agency who is responsible for seeing that all limitations conform to the intent of the appropriate certification basis.

All aircraft have operating limitations, but the reason for a limitation on helicopter "A" may be quite different from the limiting factor on helicopter "B". For example, the longitudinal center of gravity of a helicopter may be based on one or more of the following: excessive main rotor flapping, high main rotor mast bending loads, adequate controllability margin in forward or rearward flight, high main rotor flexure loads, high elevator spar loads at high speeds or unacceptable handling qualities.

Some limitations may be placed on an aircraft to reduce the criticality of certain system failures. For example, an aircraft may exhibit excessive yaw or roll rates or other adverse characteristics following an engine failure during a high power/high speed dive. In this case the  $V_{ne}$  must be reduced or power

## limitations ... pg. 4 cont'd.

must be limited above some air-speed. This is also considered when a single engine Vne is established for a twin engine aircraft.

Some limitations, although unpublished, certainly exist. An FAA certified helicopter need not have sideward flight airspeed limits published in the Flight Manual. The reason for this omission is that even though the aircraft has demonstrated the FAA's required sideward flight tests, this limitation is not required for a light helicopter Flight Manual. While this may seem strange, remember that it is the pilot's responsibility to maintain control of the aircraft. If the pilot is reaching a controllability limit as evidenced by a pedal or other control approaching the limit of its travel, the pilot is at the aircraft's limit.

The same comment may be made regarding a helicopter's slope landing capability. Normally, a slope landing limit will not be given because it is of little use to the pilot.

The factors that influence slope landing capabilities are control power, cross wind, lateral center of gravity, gross weight, and the steepness and surface characteristics of the slope. Because the aircraft's controllability limitations are evident to the pilot by control positions during the landing, maintaining aircraft control defines the aircraft's limitations.

During developmental tests, the more restrictive limiting factors encountered define the aircraft's operating envelope. These limiting factors are used to formulate helicopter limitations. Once a limitation is defined, no flight test effort will be expended to discover what the next limiting factor would be if the first limit did not exist. This means that if you violate a limitation, you may quickly be in an area of the flight envelope that has not been explored by a test pilot in an instrumented aircraft. It should be noted that in many cases, several limitations will be reached at about the same time.

Some people believe that all limitations have a 10% (or some number) safety margin built in. This is simply not true. A manufacturer wants to build an aircraft that will meet his customers' needs at a reasonable cost while having minimum operating restrictions. All limitations are carefully reviewed and packaged to allow the operator to fly the aircraft to its maximum within safety and component fatigue life constraints.

All limitations are made for the benefit of you and your passengers. Know your aircraft's limitations, understand what the limitations say and don't violate the published limitations. If you're involved in an accident and it can be proved that you violated an operating limitation, you may be liable for civil or criminal penalties as well as loss or suspension of your pilot privileges.

What is the most important thing that a pilot should know about operating limitations?

**Don't violate them.**



## YOUR ANSWERS. . . . .

*In the last issue we asked "Tell us about an incident you had with passengers in and around your helicopter"*



*Here are some of your answers:*

### **Human AD.**

#### **Anxious.**

*"Back in '78 I was doing 135 and 91 work from Gen Dewitt (M01) in Memphis, Tennessee. We had a flight to go to the international airport (MEM), pick up two passengers and take them to*

*(I can't remember). I was to use a H269-300 for the flight. Memphis International is almost two airports in one. The north side has three runways and is the "general aviation" side. The south side has two runways and that was the "airline side."*

*I landed, found the passengers, did a briefing, loaded everybody, and restarted the aircraft. The middle passenger seemed a little anxious. Memphis was landing a lot of airliners to the south. I got a clearance to depart and instructions to follow the takeoff clearance. At that time, when tower cleared you to takeoff, you needed to go, now. I*

*was acknowledging the tower and as the nose dipped so I could accelerate, the center passenger lost all restraint. He grabbed me around the neck, grabbed his friend by the arm, and using his feet, braced the console.*

*With the tower trying to understand what I was doing and where I was going and the passenger trying to strangle me I managed to get to the ground without further incident.*

*After I got on the ground, I explained my problem and that my passenger needed to walk back to the terminal. A once young pilot has remembered that for another 9,000 hours."*

## S-76

*"It was another 12 passengers out to the rig, and 12 others back to the shore. As I landed on the rig a passenger seated next to the left cabin door inadvertently pulled the emergency jettison handle, recognized his mistake, and returned the jettison handle back to its normal position. Then without informing me or anyone else, he opened the door normally and exited the aircraft.*

*We loaded the 12 new passengers and took off. At cruise I closed the pilot's door window. That changed the air pressure inside the cabin, and about 30 seconds later the left cabin door departed – with a loud bang – fell into the water and sank.*

*Needless to say, the "Bang" got my attention, and scared the wits out of the passengers in the cabin.*

*Subsequent investigation learned of the departing passenger's action to pull and reset the emergency jettison handle. Apparently when he reset the jettison handle the locking pins did not set properly."*

## 212

*It was approaching dusk. I was trying to beat the setting sun. Landed on an oil rig. Engines still running. An electrician with his toolbox approached the aircraft. He walked around the front and then*

*down the left side past the closed cabin door. I shouted to get his attention but it was too noisy. He disappeared from my view from the pilot's seat. In just a few seconds I notice all my gyro driven instruments go screwy.*

*The electrician had dumped his heavy toolbox on top of the delicate gyros in the avionics bay on the left side.*

*It wasn't over yet.*

*Another passenger decided to enter the cabin from the left side. So he walked around and slid the cabin door open forcefully enough to shear off the avionics bay door."*

## AStar

*"It was an early morning takeoff for an inspection of several ongoing construction activities throughout the district. On board and occupying the left front seat of the A-Star was an engineer that I had flown many times before and who was well aware of helicopter operations. We were also to pick up two other engineers who would accompany us out to an outlying facility some six miles from the airport. Within about four feet of touchdown to the rather confined helicopter landing pad at this facility the aircraft suddenly and rapidly rotated to the right nearly 180 degrees.*

*I was taken by complete surprise as there was no accompanying noise indicative of a failure but I felt the pedals rapidly deflecting to their maximum.*

*As I jammed opposite pedal and simultaneously arrested our rate of descent I felt resistance in the pedals but I was able to stop the rotation and complete the landing without damaging the machine.*

*When I looked over at*

*the passenger's startled face I noticed his legs stretched fully out. As he was doing his early morning yawn and body stretch maneuver his foot had apparently knocked the plastic protective cover off of the floor exposing the stubs for the dual control foot pedals. One of his heels had caught one of the now exposed pedal control tube stubs which protruded an inch or so above the floor level when the control pedals are removed."*

## SA365

*... we had an accident which cost a passenger his life. This didn't happen to me, but it happened in a town which I fly to often, and it happened in a type aircraft that I fly regularly: the SA365N1.*

*A corporate SA365 was coasting down when the executive riding in the aircraft decided to disembark the aircraft before the rotors stopped. His head was struck by one of the rotor blades near the front of the aircraft where the blades have the lowest clearance, and was killed instantly.*

*The passenger had flown on the aircraft for years, but all it takes is allowing yourself to become complacent once.*

*I hope that all helicopter pilots take the time to educate their passengers on the proper way to enter and exit their helicopters.*

*I could not imagine having been the pilot of that aircraft after the rotor strike."*

## UH-1N

*"I was flying VIP white top UH-1N helicopters with the U.S. Air Force 1st Helicopter Squadron at Andrews Air Force Base, Maryland in the mid 1980's. This day I was to fly U.S. Army General Vessey, Chairman of the Joint Chief of Staff, from the Pentagon helipad to his waiting C-20 in front of base operations at Andrews AFB. The*



weather was rainy with high ceilings and good visibility. I had flown many such flights. The flight was uneventful. After landing about 50 yards off the nose of the C-20 with the aircraft at flight idle, my flight engineer got out of the left cockpit seat and proceeded to open the cabin door to escort General Vessey away from the aircraft. Approaching from the 10 o'clock position was an Air Force officer, who despite my frantic signaling not to, walked under the turning rotor system with an open large umbrella to shield General Vessey from the light rain.

Thank God the officer had a good grip on that umbrella.

When we got back to the Squadron, I called down to Base Operations. I educated them about the dangers of umbrella and helicopter rotor systems. As highly scrutinized as we were flying VIPs, if that umbrella had gotten into the rotor system my career would have been over as I was the Squadron Safety Officer at the time."

47

"In 1971 I was flying a 47G3B1 on a fire suppression contract in central Arizona. After three days of constant fire fighting activity my helitac crew was scattered all over the forest.



Returning from a helispot, dispatch advised me to pick up a firefighter at the base camp and recon a nearby ridgeline for a possible helispot. Once my passenger was seated and belted in, I attempted to brief him over the noise of the engine as he did not have a headset. The Native American firefighter nodded "Yes" to everything I had said.

Once over the ridgeline I made a few orbits until I found a saddle that had the potential as a helispot once some brush was cleared. The aircraft was light on fuel and I had a good headwind, so I came to a fifteen foot hover to get a closer look at the area. I nodded to my passenger and smiled, hopeful that he agreed with my choice.

Much to my surprise, the firefighter unbuckled his seatbelt, and before I could yell anything, stepped out on the skid and jumped. After regaining my composure and the control of the aircraft, I circled the calmly waving firefighter. He appeared to have no injuries.

When I explained the situation to dispatch, they advised me to return to the base camp, pick up another firefighter and a chainsaw. Upon my return to the helispot, the second firefighter lowered the chainsaw to my original passenger. In a few hours he had cleared a helispot large enough for a 205.

I never saw the stalwart passenger again. I subsequently learned that heli-jumpers were trained to do exactly what he had done. They had canceled the program due to injuries."

!#%&@!

As a relief pilot for a medical evacuation helicopter service I was sent to a midwest hospital in a medium-sized town. On arrival, as a part of my orientation, I was advised that one of the local

approach controllers seemed almost to resent our operations and, despite continued "Lifeguard" designations when appropriate, would vector our helicopters around the airport and out of the way of non-existent fixed-wing traffic. Written memos to the controller's supervisor had no effect, and pending further correspondence, I was advised to follow the controller's instructions.

One night I was dispatched to a motorcycle accident and the flight path took us directly over the airport in question. Sure enough, Controller "X" was on duty and made me divert about four miles en route to the scene.

The patient, a thirty year old male, was determined to be unconscious from the closed-head injury. This trauma will manifest itself in a number of ways, including combativeness, muscular spasms of immense strength, and verbosity.

This victim would, about every thirty seconds, scream out a burst of the most vile invective imaginable. Since the pilot station was not separated from the patient area this cursing was picked up by my microphone. On my return flight to the hospital I timed all my communications with the Controller "X" to coincide with the outbursts from the patient, and I am sure the background sounds and words were more than understandable.

This event seemed to convince the Controller "X" that when we requested "Lifeguard" priority we really needed it, and from that night Controller "X" was more than happy to grant us the handling we needed."

### Helicopter Safety Information

The National Aeronautics and Space Agency (NASA) will soon have a Helicopter-related Website. You can access it via their address: [Safecooper.arc.nasa.gov](http://Safecooper.arc.nasa.gov)

# WHAT'S YOUR ANSWER ?

## QUESTION:

"Tell us about a birdstrike experience you have had."?

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Mail your  
**ANSWERS** to:

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Letters with constructive comments and suggestions are invited. Correspondents should provide name, address and telephone number to:

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