

HUMAN A.D.

Heliprops

HELicopter **PRO**fessional Pilots Safety Program
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Bell 429 EMS

The Meaning of Slope Limits



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Background:

To understand the value of a published slope landing limitation it is important to consider the test conditions used to demonstrate this maximum slope value. Testing will typically be conducted with a wind less than 5 knots and a neutral lateral center of gravity. Testing will be conducted on a firm, dry, grass-covered slope. Neither the pilot nor co-pilot will have abnormally large diameter knees or legs. What a published slope landing limitation really means is that under the best of conditions it is possible for a pilot using good pilotage skills to land on the stated slope angle.

The people who wrote the FAA helicopter certification requirements recognized that a successful slope landing is a pilot controlled outcome and not simply a function of aircraft design. When conducting slope landing operations the pilot must consider wind direction and velocity, lateral center of gravity, and the appearance and condition of the landing area (loose rock, soft mud, snow, wet grass, etc. can limit the helicopter's ability to "stick" on the slope), but the limiting factor to any slope landing is cyclic control margin. If the pilot determines that he is approaching the limit of lateral cyclic control margin prior to being firmly planted on the slope with collective reduced to low power it is his responsibility to abort the landing attempt. It makes no difference why the pilot is running out of control margin,

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The Meaning of Slope Limits (con't)

whether it's a wind effect or lateral center of gravity effect, or the helicopter begins sliding down the hill or his leg is becoming pinched between the cyclic stick and the collective stick or whatever; the pilot action is the same, abort the landing attempt. For this reason slope landing accidents are considered to be pilot error accidents.

At the time the 212 was FAA certified (more than 35 years ago) there were no requirements in CFR 14, FAR Part 29 to publish slope landing limitations in the Rotorcraft Flight Manual and to this day there are still no FAR Part 29 requirements to publish this information. Many later helicopters models including the Bell 412 and 430 do have published slope landing limits. Instead of being hard limits the information would be more accurate if the RFM stated "side slope landings have been demonstrated up to 10 degrees" or whatever the appropriate value may be.

One reason the industry began to publish slope landing limits for later helicopters is because these values are typically required information for military flight manuals. Since many commercial pilots began their careers as military pilots it was thought this information would be helpful. Since limitations must be something that a pilot can comply with the value of publishing a slope landing limit is questionable. I have never heard of a pilot flying in the mountains, then hovering and dropping a passenger onto the proposed landing area with some sort of slope measurement device to determine if the slope is within the aircraft's published limits. Reading the attitude indicator's roll angle after landing is history.

During helicopter pilot training and certification it's important for pilots to learn and understand the conditions that may limit any particular slope landing attempt. Adverse conditions can limit the maximum slope to a value significantly less

than an aircraft's published slope landing limits.

Summary:

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. Remember, slope landing limitations, which may be published in the flight manual were demonstrated under ideal conditions.

The factors that influence slope landing capabilities are cyclic 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.



POLAR FIRST

Crewmembers Jennifer Murray and Colin Bodill prepare for departure on their Polar attempt from the Bell Training Academy at Alliance Airport, Texas. The record attempt maybe tracked on the Polar First web site at: <http://www.polarfirst.com>. The trip began on 5 December 2006 and will end on 23 May 2007. Data taken from the latest attempt will be used to assess the durability of Bell developed safety enhancement equipment and its usefulness under extreme weather conditions.

Oral Miscommunications

By Jim Szymanski

Every once in a while you will hear someone say "Sticks and Stones may break my bones, but words will never hurt me." Usually old sayings like this are universally true. Unfortunately this one is not. Words can kill you if they are a part of an oral miscommunication.

How many times have you said or heard, "Say again," or "You were stepped on," or "You were broken," or "What did he say," or many other expressions that indicate that you or someone you were speaking to did not receive or understand what was said. Sometimes these sender-receiver misunderstandings are clarified. Sometimes they are not. Sometimes they are not even noticed. Sometimes they result in a mishap.

There are many examples of confusion and misunderstanding in oral communications

NTSB Aircraft Accident Report:

N70AM. April 1994.

The 412 helicopter with a crew of four were inbound on an IFR flight plan to Bluefield, Virginia. The crew requested vectors for the ILS Runway 23 approach. An early request from the flight crew was, "There is no need to turn us on too close to the outer marker." Careful reading of the entire NTSB accident report can lead one to believe the crew meant that they were not in a rush, and did not want to be vectored to join the localizer course "too

close" to the outer marker.

The controller responded, "Roger. Turn left heading..." Although ambiguous in that it did not specify a specific distance, to the flight crew, the term "too close" meant far enough outside the outer marker that would allow them enough time to stabilize on the localizer course. In the response to their request, when the flight crew heard the controllers word "Roger," it appears that their expectation was that they would get what they requested. In the post accident interview the controller indicated that the request, "There is no need to turn us on too close to the outer marker" did not mean anything to him. He was going to vector the aircraft the way he always does.

Unfortunately the vectors did not turn the flight onto the localizer outside the outer marker. The flight crew failed to recognize their position with respect to the airport and struck a mountain beyond the departure end of the runway. Another example of how words - ambiguous words - and false expectations can contribute to a fatal accident.

But wait, there are more ways that we can baffle each other by the way we use our words. Irony is one of them. Irony is the use of words to convey a meaning other than, and usually the opposite of, the literal meaning of the words. Imagine that. There are times that we say things but

our true meaning is the opposite of what we say! The golfer who looks out the window at the pouring rain and says to his playing partner "Isn't this weather great" is being ironic. Verbal irony is usually used between individuals who know and perhaps like each other. Using irony with strangers can make for some awkward situations. So how does one "break the code," and get the true meaning of an ironic statement? It requires an understanding of the person speaking, the situation, and an ability to read the body language, tone of voice, and facial expression. But even then the true meaning can be missed.

Someone identified another indirect expression as "Hint and hope." This is a method of dropping a hint in vague terms, hoping the other person will understand the true meaning.

This technique is often used by a

...saying what you need to and saying what you mean can save your life.

junior to a senior, a subordinate to a superior, or by someone who feels that he does not have the position

or authority to ask for something directly. Imagine Johnny, the ten year old boy whose neighbor friend Bobby just got a new Play Station, saying to his father, "Bobby has a new Play Station." Johnny really wants a new Play Station too. But instead of asking for it in clear terms, "Dad, can I have a new Play Station," he drops the hint, hoping that his dad will understand his true meaning.

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What is your Answer?

There is currently a worldwide effort underway to reduce helicopter accidents by 80% over the next ten years.

“What is the best safety advice you have ever received?”

Share it with other helicopter pilots.



Email your answer to:

jwilliams2@bellhelicopter.textron.com

**You can also fax your answer to
817-278-3688**

or Mail them to:

**Bell Helicopter Textron, Inc.
John Williams
HELIPROPS Manager
P.O. Box 482
Fort Worth, Texas 76101**

Q & Your Answers...

In the last issue we asked

“When you do a Preflight Check, which specific items are difficult for you to inspect?”

A “I’m not very tall, and I fly a 407 on high skids. Without a ladder or a stool I just simply cannot get my eye high enough to look at the tail rotor gearbox sight gage.”

A “The 430 transmission oil level sight gauge is a vertical, clear tube mounted on the right aft side of the transmission. It has two black horizontal lines that indicate the low and high levels. With all the cowlings in place, this gauge is very difficult to see through the access door.”

A “I flew for a company in the Gulf (of Mexico). They were very particular about the quality of the fuel (something I was quite happy with). They required a daily fuel sample be taken from the aircraft tank and checked for water, contaminants, whatever. The pilots were required to get the sample. It wasn’t all that difficult, but it could be awkward. We had a home-made rig – which was essentially a PVC cup on the end of a broomstick. You would have to put the glass jar in the cup, and with the broomstick, reach under the helicopter (206b and 206L) to place the jar under the fuel drain, hold it there, and press the drain button on the side of the helicopter. The flotation bags on the skids did not make it easier to position your body (and mine is a bit short and round) for this simple task.”

A “The oil level sight gages on the 212 and 412 main transmission are located on the right side of the lower transmission casing. To see these gages one must look through a small hole in the bulkhead in the cabin. Without a flashlight it is always too dark inside that compartment to read the oil level. I am told there is a light inside that compartment that can be illuminated with a button on certain similar models such as the UH-1N? If the oil is clean it is doubly difficult to see the oil level. I know of two instances of overfilling because of misreading the gage.”

A “I went to pick up a 206L model on high-skid gear from a customizing shop. It was parked at the far end of the shop’s ramp so that it would be out of their operating area. It was too far to carry a step-ladder and the shop offered no assistance for me to preflight the aircraft. A Long Ranger with the standard hang-down foot pads offered no easy way to climb to the top-left side of the transmission cowling to inspect that area. Being vertically chal-

lenged (short) meant that I had to place one foot in the fuselage step and the other foot on the passenger seat platform. Standard fuselages had no hand-holds to assist the climb up, which required that I jump from my left foot in order for my left hand to reach up and grab the rim of the transmission cowling. I missed. My hand bounced off the cowling and I fell backward onto the skid gear. My backbone landed squarely on the ground handling wheel attaching lug on the skid. No one else saw this happen. I lay there moaning to myself for thirty minutes. At first I was sure I had hurt myself for life. The pain was intense, but then slowly eased. During that time somehow I thought about how much pain equals how much time and effort it takes to carry the proper equipment to safely preflight a helicopter. The flight manual depicts what you should inspect; but it leaves the safety of how you do it up to you.”

“During training at Bell I learned that in the 206B there are supposed to be some sponge-like inserts in the slots on the floor plate on which the tail rotor pedals are mounted. These inserts are there to prevent FOD from falling into the slots and preventing full tail rotor pedal movement. I found these inserts were missing on half of the aircraft at our base.”

“The pop-out button on the Bell 412 combining gearbox oil bypass is impossible to see, and without removing the cowling, can only be checked by awkwardly reaching through an access hole and reaching up to feel for it.”

“Draining the Jet Ranger fuel sump for the 10,000th time, I was not too happy when my copilot announced that the bubbles on the concrete looked very much like water droplets! I told him it was not possible as I drained this aircraft every day and there just could not be water in the fuel. Just to appease him I reached down to disperse what I was sure were air bubbles. To my surprise the droplet was actually water. We proceeded to drain five gallons of water from that fuel tank! Would I have seen the water? Probably not. Because I had already expected to see no water, and dismissed the bubbles as air.

Preflight can never be the same old thing. Being alert to the job is the only safety to the task.”

“This does not answer your question directly, but it does fit into the general concept of having some difficulty in checking the aircraft before flight.

I had just landed on an unmanned oil platform in

the Gulf of Mexico. After I shutdown and got out I saw the left side of the Jet Ranger covered with oil. The oil ran back all the way down the tail boom and was dripping off the stinger. This helicopter was painted yellow, and the oil all over the fuselage looked red. Red oil. Must be hydraulic fluid. I climbed up and checked the hydraulic reservoir sight gage, and even removed the reservoir cap and looked inside. I guess it was a bit low, but not all that much.

Because this oil platform was fairly close to the shore, I was able to communicate on the VHF radio with my base manager to tell him that I had a hydraulic leak. He told me to start it up, take off, head to the base, turn off the hydraulic switch while enroute (presumably to save whatever hydraulic fluid that remained), and then turn the hydraulic switch back on when I was about to land at the base. That is exactly what I did. When I got there I simply left the helicopter to the maintenance people and headed into operations to do my paperwork so I could finish up and get out of there. (By the way, this was my last duty day – it was time for me to go home and stay there for a while). Before I left, a mechanic came in and told me how stupid I was. The leak was not hydraulic fluid, it was transmission oil. Wow. I never lost enough transmission oil to have any indications of high temperature or low pressure, but it made me think about what might have happened if that platform had been farther offshore. I’ll never know how much longer I could have flown before I experienced any transmission problems.

As I think back I made a big assumption that the oil on the fuselage was hydraulic fluid. The transmission oil appeared to be red on this yellow helicopter, and it never occurred to me that it could be oil from the engine or transmission.

The business of turning off the hydraulic switch to save hydraulic fluid was a misperception that both the base manager and I had (we didn’t know the aircraft systems that well). Turning off the hydraulic switch does not turn off the pump and would not have prevented a leak from continuing.”

“I know it is not difficult, but I find it less than easy to position my eye to see the caution light panel in the 206B and simultaneously reach with my short arms to position my finger to press the button on the airframe fuel filter.”

“On the 407 it is very difficult see the short drive shaft to inspect for cracks in the flex fingers, and slip-gage marks on the bolts.”

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Q & Your Answers (con't)

“How do you know the mast nut had the proper torque applied? Well the maintenance crew will only apply the mast nut lock after the proper torque has been applied. Well, what if there is no mast nut lock?”

“Impossible” I answered the pilot who had just checked the mast nut on an aircraft he was about to fly. His response was, “Well I can turn the mast nut by hand. Is that too loose?” “No way,” I answered, “That’s impossible.”

It wasn’t impossible. It was loose!

This is why we preflight, and these are the impossible things we look for.”

“The 212 combining gearbox oil reservoir sight gages are near impossible to see – it’s dark in there (even with normal ambient light out on the ramp), and there are other lines that get in the way.”

“The 407 tail rotor gearbox oil sight gage is very difficult to see through the screen mesh in the fairing that covers the gearbox. In addition the sight gage is difficult to read. It is harder to read with bright sunlight on the fairing. It is my opinion that many pilots will go through the motions of trying to look at the gage, but fail to get a positive reading and simply assume that the oil level is OK.”

“Why do you look up inside the rotor hub at the split cones? Because that is the only thing holding the torque between the cones and the mast nut. If it is hanging out on both sides of the groove is that bad? Yes it is, and there it was on an aircraft I was checking. Once the impossible was there right before my eyes.”

“I had a 206L right rear cross tube break completely off where it connects to the skid. This aircraft had the aerodynamic fairings installed. The break was due to a crack that propagated from some corrosion that could not be seen with the fairings in place.”

“In my more than 20,000 hours of flying helicopters, and probably an equal number of preflight checks, I discovered perhaps five potentially fatal conditions. You only need one that you don’t find to ruin your whole day.”



Oral Miscommunications (con't)

Helicopter pilots do a lot of things that do not fit clearly within the standards that affect airplane pilots, particularly in dealing with ground controllers, tower operators, and air traffic controllers. Airplane pilots do not cross over taxiways and runways, do not take off from the ramp, and do not land on mountain tops. Sometimes standard radio phraseology may not fit for a helicopter pilot. How does a helicopter pilot use “airplane talk” to tell the tower operator that he wants to land within the airport’s traffic area in the Wal Mart parking lot to deliver Santa Claus?

To do the things helicopter pilots do sometimes requires ordinary language and some level of assertiveness to get their true meaning across to controllers, dispatchers, and everyone else involved in their operations.

Language differences; careless use of acronyms and abbreviations; homophones, ambiguity, irony, and more, can easily contribute to the confusion, assumptions, misperceptions, and expectations that may result in errors that can lead to mishaps. Think about your personal ability to communicate orally – saying what you need to and saying what you mean can save your life.



Notable Recognitions

Addison Clark received a Certificate of Recognition from the Bell Training Academy for his superb handling of an engine failure after take off in Kalispell, UT, November 2, 2006.

Kevin Devore received a Certificate of Recognition from the Bell Training Academy for successfully autorotating his helicopter to an unimproved surface on November 26, 2006, in Brownwood, Texas.

Human AD Newsletter Online

As a convenience to our readers, the Human AD newsletter can now be accessed at the following web link:

http://www.bellhelicopter.com/en/training/index.cfm?content=services/human_ad.cfm

It is recommended this web link be saved to “Favorites” for easy retrieval. Spanish and English versions are available.

Bell Helicopter Award Programs

Many Bell pilots and operators have requested information on what type of Bell Helicopter wings and safety awards are available to them. There are two ways to obtain recognition for pilots who fly Bell helicopters. The first recognition is a Pilot Safety Award issued on the basis of safe flying hours in Bells. The second is a wings award based on the pilot's flight hours in Bell helicopters. It is possible for a pilot to obtain both awards.

Pilot Safety Award

Recognizing an individual pilot for flying safely is far too rare. Most pilots only hear of mistakes made by another pilot in an accident. Bell provides a Pilot Safety Award certificate for hours flown without an accident in a Bell helicopter. This can be achieved in either military or commercial aircraft. The award is given in thousand hour increments to recognize those pilots with a proven commitment and history of safe flying. To apply for this recognition certificate, please send a request letter from the chief pilot, CEO, military commander, or other individual who can confirm how many accident-free flight hours you have flown in Bell helicopters. If you are an individual pilot / owner, you can write the statement yourself. Let us know how you would like the name to appear on the certificate. If you want to include a military rank, you need to indicate that.

The award is maintained through the Bell's Flight Safety Department within Bell Engineering; Lee Roskop (ldroskop@bellhelicopter.textron.com) is the Bell point of contact. His mailing address is:

Bell Helicopter Textron, Inc.
Attn: Lee Roskop
Dept. 81, Group 60
P.O. Box 482
Fort Worth, TX 76101
USA

The pilot's name and safe flight hours are posted on Bell's Flight Safety web page. Link to the following for more information:
http://www.bellhelicopter.textron.com/en/support/index.cfm?content=flightsafety/awards.cfm&g_folder=header_10.

Bell Flight Time Wings Award

The second recognition is for a pilot's flight time in Bell Helicopters. The Bell Training Academy issues this Certificate of Achievement and a Wings Lapel Pin in the following flight time hours:

3,000 hours
plain wings pin + certificate

5,000 hours
5,000 hr. wings pin + certificate

10,000 hours
10,000 hr. wings pin + certificate

15,000 hours
15,000 hr. wings + certificate

20,000 hours
20,000 hr. wings + certificate

Example: If a person had 6,500 hours in Bells he would receive a 5,000 hour pin, although the certificate would read 6,500 hours. Their next opportunity for a higher hour level pin would be at the 10,000 hour level.

For the hour level recognition to be awarded, the pilot (or company) must provide the following: Name of pilot as they would like it printed on a certificate, a verified flight time in Bells by either the Chief Pilot or a Company Administrative Official. In the case of an individual pilot making the request, a signed copy of the page in the pilot's log book that verifies the hour level for the wings requested. Mail or email the information (including copy of documentation) to Rosalind Larmer at: rlarmer@bellhelicopter.textron.com.



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The primary objective of the **HELIPROPS** program and the **HUMAN A.D.** is to help reduce human error related accidents. This newsletter stresses professionalism, safety and good aeronautical decision-making.

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

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