

# Helicopter Safety

## for Outdoor Leaders and Guides

*by Cyril Shokoples ACMG / IFMGA*



**Draft for discussion only**

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## **Preface**

This is not a basic introduction to helicopter safety, although some basics will be reviewed. This article addresses helicopter safety from the perspective of an outdoor leader or guide who is already familiar with helicopter operations. It is intended to present issues commonly left out of booklets addressing general helicopter safety for a broader audience. Guides should also consult the excellent section in the ACMG "*Technical Handbook for Professional Mountain Guides*".

The discussion will revolve around concerns specific to wilderness and mountain areas of Western Canada. The helicopters included in this discussion are those light and medium helicopters commonly employed for transportation of hikers, climbers and skiers in both commercial and non-commercial capacities. We will look briefly at emergency procedures for the light Aerospatiale A350 (A-Star) BA, B2 and B3 models, the light Bell 206 (Jet Ranger), 206L (Long Ranger) and 407 models and the medium Bell 204, 205, 212, 412 and 214 models. Photos of some of these aircraft are sprinkled throughout the text.

Since this is not an exhaustive text, be sure that you thoroughly review helicopter safety before you assume responsibility for a group operating around a helicopter. It is always best to have a detailed discussion with the pilot regarding the specifics of the particular helicopter(s) you will be using and what your role as a leader or guide will be.

Always ask for a briefing for your group before you begin flying. This is standard operating procedure and pilots generally insist upon it. Be sure you stress to the group the importance of listening carefully, even if they have flown on this type of helicopter before. I have found that the worst people at a helicopter briefing are those who have flown a few times and think they are "experts". Set a good example by paying attention yourself, even if you have heard the briefing a hundred times before. Having the leaders or guides joking around to one side while a briefing is underway conveys the message that this is all unimportant. Look interested and ask questions if you are uncertain or if you think a concept may not have come across clearly. You may even choose to ask the group to repeat what they have just learned to verify their understanding.

AND, never assume you know everything. I have flown with a lot of exceptional experienced mountain pilots. I have attended literally hundreds of briefings as a heliski guide and took the time to try to learn from every pilot I flew with. I still feel there is so much more for me to know to be as safe as I can be.

I always thought that nothing dangerous would ever happen. Then one day I was waiting for an extremely protracted time for a helicopter to pick my group up. The helicopter had already picked up the two groups before me and I was next in line, eager to get out skiing and show everyone a great time. The helicopter never arrived. We heard from our base via the radio that something had gone terribly wrong... The helicopter had a "hard landing" at 3,000m or 10,000 feet above sea level with a group of 12 people on board. On impact the landing gear broke off, the tail boom broke in half and the lower glass chin bubble was pushed into the cockpit area when it impacted the snow. Fortunately no-one was seriously injured. I have been a lot more attentive since that day and I take very little for granted anymore when flying.

## ***Some common helicopter terminology***

**Collective** - is the lever positioned to the pilot's side that changes the pitch of the rotor blades. Raising the collective increases pitch and the helicopter ascends. Lowering the collective decreases the pitch and the helicopter descends.

**Cyclic** – is the stick positioned between the pilot's legs that controls the direction the rotor blades or “disc” is pointed in. Tilting the cyclic forward moves the helicopter forward. Sideways and backwards motion are directed by similar action

**Helipad** – is a small area upon which the helicopter's skids or landing gear rest upon landing.

**Landing** – is the area where the helicopter lands to drop people off. (also landing zone or LZ)

**Main Rotor** – large horizontally mounted blades used to provide lift and control direction of flight. The small and medium helicopters discussed in this article have 2, 3 or 4 blades. When they are spinning they appear to be a disc. Controlling this “rotor disc” controls the gross directional movements in flight.

**Pedals** - are positioned at the pilot's feet and control the pitch of the tail rotor. Used to change the direction the helicopter is pointed in and to counteract the tendency of the helicopter to spin as a result of the rotation of the main rotor.

**Pickup** – is the location where the helicopter lands to pick people up.

**Pitot Tube** – is the small tube located at the front of an aircraft that takes in air to measure airspeed. It is often heated in winter.

**Skids** – are usually tubular landing gear upon which the helicopter sits. They may have a wide area attached at the back sometimes called a “bear paw” which helps keep the helicopter from sinking in soft ground or snow. Even with bear paws it is common for a helicopter to sink up to it's belly in soft snow in the winter.

**Tail Boom** – is the rearward extension of the helicopter upon which the tail rotor is mounted.

**Tail Rotor** – small vertically oriented blades or propellers at the tail end of the helicopter. Used to control the direction of flight and to keep the helicopter from spinning opposite to the rotation of the main rotor.



## **General considerations**



If you are involved with flying into a backcountry area using a helicopter from a heli-ski or heli-hiking company you should be aware that certain things occur before flying every day. Each morning during a meeting of the guides and pilots, a general operational plan is discussed. This plan takes into account weather, flight safety, snow safety and operational considerations. This group will usually have a backup operational plan in case conditions change. Your flights will be fit in with the flights of

the heli-skiers or hikers and you may take second priority. You may want to discuss with the pilot and lead guide for the day what their plan is and how you fit into it. Also ask about weather and other factors that may affect the day's flying.

If you have a good relationship with the heli-ski or hiking company you may ask if it is possible for you to sit in on the morning guide's meeting. This is an excellent opportunity to get the very best weather, snowpack and flight planning information available for the area. Do not be surprised if your request is denied. It is after all a private professional meeting at which confidential information may be discussed. If you are allowed to attend the meeting, remember that your attendance is a privilege rather than a right. Be sure you are on time and strive not to disrupt the meeting in any way. In winter, it is best to have already briefed yourself with public weather and stability forecasts so that the more detailed information discussed at the meeting is not a surprise to you.

If you are flying using a helicopter not devoted to heli-skiing or hiking, you should find out what other groups are flying with the same helicopter that day and how you fit into the flight schedule. You may be "dovetailing" with another group coming out from the area you are going into. This is common in backcountry hut or lodge scenarios. It is an excellent way for you to reduce costs as well, as you do not have to pay for flight time for an empty helicopter. For example you may be paying for the inbound flights and the other group is paying for the outbound flights.

Be sure you realize that helicopter flying schedules are not like Swiss train schedules and you can't set your watch by them. Anything can happen during the day and if your flights go off without a hitch consider yourself lucky. Don't get stressed about delays. They are a fact of life when dealing with the interplay between weather and flying machines. Be sure your group is aware of this as well. There is no point in creating undue anxiety during peoples' holiday or long anticipated hiking, skiing or climbing trip. The operational concept to live by with helicopters is "Hurry Up and Wait." Be ready to go as soon as possible and then settle in and relax until the actual flight time arrives.

When flying into your camp site, hut or destination one of the most experienced people in your group should be on the first flight sitting in the front seat next to the pilot. I believe it is a mistake to give the front seat to an inexperienced person on the way in to your trip. An observant leader or guide can gather an immense amount of information from the front seat regarding possible climbing or ski routes, avalanche conditions, general terrain layout, etc. At one heliski operation where I used to work we jokingly referred to the helicopter as the “million dollar preview machine”. Don’t miss the chance to get that extra information from up front. In addition you will want that experienced person to handle unloading and loading concerns at your destination for subsequent inbound flights.

Even on the outbound flights at the end of your trip, always give the front seat to experienced people if the weather is at all questionable or changeable. Their role as observer is now part of your safety considerations. I make this my personal rule when I am in charge of planning seating for flights. Sometimes guides and leaders are overly concerned that inexperienced people should get the added thrill of being up front during a flight. As leaders and guides we should not be driven by our need to reward trip participants as our primary motivator. Even on the way home, *think safety first*. I fully appreciate that the pilots who normally fly in the mountains are more than capable of doing all the flying without our assistance. That’s fine, but consider your responsibilities as a leader or guide as well. Your trip is not over until everyone in your group is safely in their vehicles and on their way home.



When I am in the front seat of a helicopter, I consider myself part of the flight crew. Although I have far less flight experience than the pilot, I am always looking out for safety concerns as well. In marginal or poor weather, always watch for trees or snags that may not be visible to the pilot in fog or dim light. They are called “widow makers” for a reason. When flying with fog or broken cloud conditions always keep watch out your side window to be sure you can see if the pilot can safely break off and descend in your direction if visibility deteriorates. Take a quick look up every once in a while to see if wispy cloud is condensing in the wake of the rotor blades (sometimes referred to as “making clouds”). If so, tell the pilot. If other aircraft are known to be in the area, be sure to keep scanning the area to see if you can make visual contact. As you approach the landing area look for any hidden hazards. You can be a valuable “silent” asset to the pilot.

If you have time and it does not disrupt the flow of things, learn about the flight controls, instrument panel and what the gauges mean. What is the “master caution” indicator and what does it mean? What are the important things to do in case of a hard landing or crash? Where are the switches for the fuel shut off, fire extinguishers and batteries / power? How do they operate and is there a specific order? These may be things that are important if the pilot is incapacitated. Try to learn a bit more each time you fly.

## **Ground to air radio communication**

If you are going to use radios be sure you know how to use the radio properly. You must prearrange with the pilot to communicate on a common frequency. Be sure your radio has that frequency programmed in. Test it to be sure it is working properly. When using the radio, keep the chatter to a minimum. Be brief and concise. The pilot may be communicating with other stations that you cannot hear. In addition, the pilot will be monitoring a separate channel on the aircraft band which you almost certainly cannot hear. As the pilot approaches your location, convey information about visibility, cloud cover or fog, snow or rain intensity, wind speed and direction and whether the wind is steady or gusting. When referring to directions relative to the helicopter, you may chose to use the words tail (toward the back), nose (toward the front) or use hands on a clock. In front of the pilot is the 12 o'clock position, out the right window is 3 o'clock, out the left window is 9 o'clock, behind is 6 o'clock. Remember that anyone can be monitoring what you say, so avoid profanity and don't say anything you want to be kept confidential. This is particularly true in emergency situations where reporters may actually be monitoring the radio frequency with a scanner once they know an accident has occurred.

To contact the pilot, use the last three letters of the helicopter's aircraft registration (spoken twice) followed by your call sign. For example if you are trying to contact a helicopter whose registration is C-GXYZ, your first contact and the ensuing conversation might sound like this:

*"Helicopter XYZ, helicopter XYZ, this is Fairy Meadow hut." (If no contact try again later.)*

*"Fairy Meadow hut, XYZ. Go ahead."*

*"Helicopter XYZ, good morning, this is Tim at the Fairy Meadow hut. We were just wondering if you had an ETA (estimated time of arrival) at our location."*

*"Hi, Tim, it's Dan flying today. I am inbound to your location from Golden with a load of 4 passengers. ETA at your location is approximately 25 minutes. There are going to be skis in the basket and dunnage in the tail boom for you to unload. What's your weather like this morning?"*

*"Okay Dan, we copy four passengers, skis and dunnage. Weather here at the hut this morning is overcast with visibility of better than five miles. The cloud ceiling is pretty high, I would say about 10,000 feet. We have intermittent very light rain but the weather seems to be slowly improving. A few breaks in the clouds here and there. Temperature is plus two degrees and we have a light breeze out of the west. As you approach the hut, the wind will probably be right on your nose."*

*"Very good, I copy all that. I'll call you again when we are five minutes out. Helicopter XYZ."*

*"We'll see you then. Fairy Meadow hut standing by."*

This conversation is perhaps a bit formal, but is a reasonable model to follow in the beginning. For more information on radios, see the article "Emergency & Radio Communications for Outdoor Guides and Leaders" available from Rescue Dynamics in Edmonton, Alberta.

## ***Weather and related flight considerations***

While flying in on a first flight, you may need to discuss with the pilot the proposed landing site and determine where it is safe to land based on cloud, wind, temperatures, group weight and other operational considerations. Once again, your decisions should be based on safety first. Once the safety issues are addressed, strive to take your group to the best possible landing to fit in with your plans. The pilot has the ultimate call on where you will land. There are a number of factors that may affect the pilot's decision making:

- Fog - This is a very significant concern. Helicopters in the mountains cannot fly on instruments alone and thick fog can affect your ability to go to some locations or to fly at all. Some locations rarely encounter heavy fog while others constantly battle the problem. It is possible on some occasions that you cannot fly at all. On some days you may send a vehicle ahead to report on conditions at a staging area to determine if you are only dealing with valley fog at the heliport or helicopter base or if it is a more widespread condition.
- 
- Cloud - Similar to fog, clouds can reduce the locations at which you can land. In general, if you cannot see a landing, you cannot go there! Happily on many days when clouds affect higher landings you may be able to access lower elevations safely. This may require altering your initial plans.
  - Freezing rain and icing - Freezing rain and icing conditions destroy the aerodynamic flow of air over the rotor blades, significantly reducing lift and also adding weight to the helicopter. This dramatically reduces safety margins and can cause a crash. If a pilot encounters significant freezing rain, (s)he may decide that it is unsafe to continue flying in the area where the problem exists.
  - Winds - Some wind is actually desirable for flying, but especially strong or gusty winds make flying difficult or in some cases unsafe. Your pilot likely has extensive experience in mountain flying and will use only those landings where they feel the winds are acceptable. That may mean that on some days with blue skies you may not be able to land on mountain tops or areas where gusts are a problem. A landing in a wind-sheltered location lower down may be possible.
  - Darkness – Helicopters flying in mountainous terrain cannot fly in darkness or at night. On very rare emergency occasions a helicopter may fly at night but it is extremely high risk. Do not expect your pilot to fly in these conditions.
  - Warm temperatures - The warmer the temperature, the less lifting capacity a helicopter has. Each day your pilot completes a series of calculations called a "weight and balance" which tells them how much weight can be taken to a given altitude. If temperatures are warm and group weights are high, the flying may be restricted to below certain elevations. Strive to

keep your weight down for safety reasons. If conditions for flying are not optimal you may be required to take lighter loads and do more trips. If you have not planned with weight restrictions in mind, your flights may suddenly become more costly.

- Altitude - As with temperature, the higher the altitude, the less lifting capacity a helicopter has. The pilot's "weight and balance" tells them how high they can fly with a given weight for the day. If temperatures are warm and group weights are high, the flying may be restricted to below certain elevations for safety reasons.
- Weight of group and gear - The heavier a group of passengers is, the more difficult it may be to fly above certain elevations, especially when temperatures are warmer. For this reason and others, ask your group to reduce the items they bring to only those that are truly necessary.

Since weather can have such a tremendous effect on your ability to fly, it is best to never get separated from your sleeping bag. In addition, you should always have a supply of food to last you a couple of days in an emergency. I know of more than one occasion when a group was delayed in flying by one or two days. I also know of a case in which the first flight of a group made it in to the location just fine. The remainder of the group took four days to join them as the weather turned sour and didn't allow flying for that long. The poor folks who flew in first didn't have food with them! Even on good weather days, flying with food and sleeping bags is wise as I have twice had helicopters shut down due to mechanical problems. In severe situations this may have you stranded or separated for at least a day or two.

Since you and the pilot cannot change the weather or any of the other factors listed above, it is best for you to relax and realize these factors and more will be taken into consideration before you take off. On days when the morning weather is questionable, departure may be delayed to see if the weather improves. If you cannot fly because of weather considerations, you don't pay for anything, so try to make the best of the situation with your group. Check the weather forecast the night before. If it looks less than perfect you may even want to have an alternate plan already made in case you can't fly.

## ***Safety briefings***

On your first morning of helicopter flying, you may attend, or in some cases conduct, a number of procedural and safety briefings (depending upon your level of experience). These briefings will vary depending upon the season and the purpose of your flights. They may also include information specific to your intended destination. It is normal for your pilot to conduct the briefing about general helicopter safety. In winter, you may also give sessions on how your group's gear / skis /



snowboards / snowshoes are handled as well as a short avalanche safety review or practice if you are going to be skiing immediately after your arrival at your destination.

## Classic safety briefing

- **Demeanor** – Helicopters are exciting to work around, even for experienced people. Never rush around the helicopter. Try to stay calm and focused. The tendency is to hurry when it really should be to slow down and think about everything you are doing. Remember, you only pay for the helicopter when it is in the air. Time spent on the ground being safe and careful is rarely wasted. If you are in charge of a group, keep them calm and control their actions by communicating clearly.
- **Landing area procedures and etiquette** – Keep unnecessary people 30m away from the helipad for a light helicopter and 50m away from a medium helicopter. Neatly arrange all cargo at the helipad in preparation for flight operations. Make a separate stack of cargo for each flight. Stack heavier items on top and lighter objects on the bottom. Secure all light objects that may get blown around by the rotor wash. Position items on the side of the helipad that they will get loaded on, i.e. skis on the ski basket side, cargo on the cargo compartment side, people on the side they will be loading from. Remove or clearly mark obstructions that may endanger the helicopter. Clear the helipad and landing area of garbage and debris.
- **Smoking and fires** - There is no smoking in or around the helicopter, or near where fuel is stored. If someone “needs” to smoke, ask the pilot where it may be acceptable. It is usually at least 30 metres or 100 feet away from the helicopter or fuel. Even better still would be to abstain from smoking when you are around the helicopter or fuel. Keep all fires well away from the helipad and extinguish fires before the helicopter arrives.
- **Safe approach** – generally approach the helicopter from the front or possibly the sides and in plain view of the pilot. Never approach from the back. Never walk downhill toward a helicopter, you may walk into the main rotor. Pick an approach that will take you on flat ground or uphill to the machine. Crouch down as you approach the main rotor or when you leave the area around the helicopter.
- **Hazard from the main rotor** – on sloping ground, on snow and when the blade is moving slowly are three particularly hazardous times in which the main rotor may strike a person on the ground. You are most at risk when you are at the edge of the rotor disc on the front or sides, where it is capable of the most movement. Have people crouch down when approaching or leaving the helicopter. Drag long objects such as skis when approaching a running helicopter. Never throw anything near a helicopter. That includes long objects which may strike the rotor or light objects which may get blown into the rotor or engine intake. Never lift anything above shoulder height even when the blades are not spinning. Rotor blades can be easily damaged whether they are stopped or moving and repairs are insanely expensive. The rotor may also begin turning unexpectedly, so by always keeping items low, you will never have to worry in that regard. When the rotor is turning you may generally stand upright when you are well clear of the rotor disc or when you are within arm’s reach of the helicopter. In winter, skiing, snowboarding or snowshoeing under the rotor disc is dangerous and forbidden even for leaders and guides.
- **Rotor wash** – Winds generated during take off and landing can exceed 100 km/h which can blow dirt, rocks, sticks, snow and even moderately heavy objects around. Hang on to

or lay on top of anything that may move. Keep unnecessary people away from the helipad. Wear glasses or goggles when working around the helicopter. Hang on to your hat or better yet remove it and place it in a location where it cannot get blown off. Alert your group to the possible hazard each time the helicopter is inbound. Move your expensive vehicle with the new paint job away from the helipad!

- **Noise** – Noise levels close to the helicopter can be high enough that sustained and repeated exposure could cause permanent hearing loss. Ear protection is mandated for ground crew who constantly work around the machine. Because of this, communication can be difficult and uncertainty can creep in. Move slowly and methodically and don't do anything until you are certain it should be done. The loud noise also tends to accelerate people's heart rate and increase their anxiety occasionally causing them to behave unpredictably. Watch for unusual behavior at all times.
- **Hazards near the front of a helicopter** – When moving around the front of the helicopter stay about one meter away from the nose. Avoid the pitot tubes. They are vital for indicating airspeed and are delicate and often hot enough to burn you or damage your clothing. They are also often at eye level when you are crouching down. Don't use the pitot tubes as a handle. If you break them off your flying will be done for the day and you may end up paying a repair bill. Some aircraft may have radio antennae protruding from the front. Use the same precautions as with pitot tubes.
- **Hazards at the rear of the helicopter** – The tail rotor on the light and medium helicopters is located where it could easily injure or kill an unsuspecting person. The tail rotor spins so fast it becomes invisible. In addition, the hot exhaust gases escape at the rear of the helicopter. Never duck under the tail boom unless specifically directed to do so by the pilot. Some helicopters have various antennae protruding from the tail boom which can injure you or be broken off. Never move behind the cargo compartments of a helicopter that is running.
- **Static discharge** – Do not touch an incoming helicopter until it has touched the ground. A static charge often builds up during flight and you can get a significant shock when you touch the helicopter. It may cause you to stumble, fall or lose your balance.
- **Location and operation of emergency equipment** – The Emergency Locator Transmitter (ELT), fire extinguisher, first aid and possibly survival equipment should be pointed out and applicable details of operation discussed as necessary.
- **Operation of doors and cargo compartments** – Each helicopter is different and proper operation must be reviewed with the pilot.
- **Cargo handling** – Only delegated people should handle loading and unloading cargo. Skis and poles should be properly bundled together according to the pilot's preference. Skis or long objects must be dragged and not carried around the helicopter. Ice axes should have all sharp points covered and taped. Ideally it is better to have several axes taped together to form a neat package rather than having a pile of loose axes. Crampons should have points padded and be hidden within packs, not hanging unprotected or strapped loosely to the outside. Load items slowly and methodically. This is not a pickup truck. Jamming or forcing items is not a good idea and can damage the aircraft.
- **Entering the helicopter** – If you are not already there, safely proceed to the side of the helicopter where passenger loading takes place taking appropriate precautions. When you are on the passenger's side of the aircraft, wait for a signal from the pilot or crew that it is okay to enter. When instructed to do so, you may open the door and begin entering the

helicopter. You may have a designated door person on each flight perform this task. If you are not familiar with the operation of the door, have someone show you how it functions. Open the door gently. Never slam the door in either direction. (The newer Bell 407 may be an exception where a light 'slam' is required!) Depending upon the model of helicopter, there may be a handle or strap for you to grab on to as you enter. In winter, kick your boots together to remove some snow, but do not kick the step or helicopter! Carefully step up on the step and move to the farthest available seat. Do not worry if snow gets into the helicopter with you. It is not a problem! In helicopters with more than one row of seats, alternate back and forth between the front and rear facing seats in order for everyone to be able to enter without difficulty. When you have found your seat, buckle up your seatbelt and be sure it is snug. Then help the next person with their seatbelt. Different aircraft may have somewhat different seatbelt configurations and the seatbelts may vary between the front seat and the rear seats.

- **During flight** - Leave your seatbelt fastened at all times during flight. Review the flight safety card. It is usually OK to take pictures while flying but ask the pilot first. Smoking is not allowed. Do not scrape or push on the windows with your hand or gloves. They are often part of the emergency exit system and may be designed to come out if you push on them! In addition, you may scratch the very expensive windows. Do not stamp your feet on the floor. Loud noises can give pilots a heart attack.
- **Flight controls** – on some helicopters such as the Aerospatiale A350 A-Star, BA, B2 or B3 the 'collective' is often located where the foot or boot of an unwary passenger could possibly contact it. Pushing it down by accident could result in the aircraft descending unexpectedly. Be aware that this lever is NOT a foot rest.
- **Intercom** – you may be instructed on how to wear a headset and communicate with the pilot during flight. The helicopter may be equipped with a 'Vox' system which has voice activated control. When you speak the pilot and others in the aircraft wearing a headset would be able to hear you. On other aircraft you may be required to toggle a switch or push a button to talk to the pilot. There may be a separate switch to transmit via the aircraft radio to ground personnel or other aircraft.
- **Exiting the helicopter** - Do not remove your seatbelt until your pilot instructs you to do so or a designated person has opened the door and motioned you to exit. Be sure you put your hat and gloves on before you exit. Loosely fitting hats should be stored in a pocket. Hang on tightly to any personal items. The rotor wash around a helicopter can easily blow loose items away. Don't chase them! Slowly and carefully exit the helicopter. In winter or rainy weather, remember that the floor and step(s) may be slippery.
- **After exiting** – Follow any instructions given during your specific briefing. It is NOT normal for your instructions to include running uphill or away from the helicopter! Typical procedure may include the following: A crew member (leader, guide) will position the first person about one and a half meters (five feet) away from the helicopter, in the pilot's view. The rest of the group will then huddle around this person and remain crouched down and close to the helicopter. A designated door person in your group will close and lock the door and give the pilot the "thumbs up" signal. While the group is getting out of the helicopter, a designated leader or guide may go around to the other side to unload cargo, skis, etc. When the pilot receives a "thumbs up" from appropriate personnel on both sides of the helicopter, the pilot flies away from the group. If you are not designated to do so, your job is not to give a thumbs up. That signal should only be

given by a delegated person who has verified that their side of the helicopter is “good to go.” Do not move away from the helicopter after exiting unless you are very specifically instructed to do so. Normally the group must now stay crouched down in a huddle until the helicopter has taken off and is a safe distance away.

- **Final check** – If you are responsible for loading or unloading people or cargo, you should do a final safety check before giving a thumbs up. Be sure all seat belts are inside the helicopter. Verify that all doors, ski baskets, racks and cargo compartments are properly closed and latched. Visually check that all other latches, cowlings, panels etc. appear to be in normal positions. Quickly scan for evidence of abnormal fluid or leaks. Make sure your group is properly positioned in a safe place. With that all done, give the thumbs up from a safe location, often beside the huddle.
- **Emergency procedures** – these will be discussed in more detail later in this article.

## Leaders, guides and ground crew briefing

You may want to have a separate briefing for the trip leaders and guides who will be responsible for loading and unloading passengers and baggage. People who will be filling these roles should have the most experience around helicopters. In my experience, groups who do not delegate these functions but let everyone participate often have a needlessly high number of people in potentially hazardous locations and chaos occasionally rules. Your ground crew should know: how to prepare for each flight; how the doors open and close; which cargo compartments you will use and how they operate; how the ski basket or rack functions (if applicable); how to do a final safety check around the helicopter; how the radio and intercom functions once on board; where the emergency equipment is located; how it works; and slinging procedures if required. Slinging is beyond the scope of this article and may require a detailed hands-on briefing.

## Bundling skis and snowboards



If you are in a winter ski-touring or heli-skiing situation using helicopter access, your first briefings may be how to bundle skis for loading into a helicopter equipped with a ski basket or a ski rack. Having loose skis, poles, shovels and ice axes may be a hazard during loading and unloading. Depending upon the helicopter company or heli-ski operation you are working with, there may be a very specific way in which these items are to be bundled and loaded. A common technique is to put the ski bases together, then drape one ski pole strap over each ski tip and wind the straps snugly together. Then take a long ski strap and bind the whole package together around the area of the bindings as in the photo to the left. Always inquire about the local procedure with each company you fly with. Don't assume that it is always the same.

With snowboards or snowshoes, keep in mind they are great for catching rotor wash and can easily get blown out of the hands of a person carrying one.

Have people carry their snowboard or snowshoes with two hands at all times. Never handle a snowboard or snowshoes so that any part of them are above mid-chest height at any time. Ice axes, if not handled with appropriate care could easily penetrate the thin skin of a helicopter and cause considerable damage. Cover the picks, spikes and edges and bundle them appropriately.

If you are using a helicopter for mechanized skiing there is usually a specific procedure for where and how you stop and bundle your skis. If you are leading a group and approaching a helicopter pickup location, your basic procedure should be the same regardless of whether the helicopter is at the landing or not, running or shut down. Good habits can prevent problems.

When you are still well away (>100m or >100 yards) from where the helicopter will land, stop and tell your group not to hike, ski, snowboard or snowshoe past you as you approach the pickup! This is a rule to be followed all day long in all situations when you are potentially going to approach a helicopter pickup or landing. When you come to the bottom of the run, stop 10 to 20 meters (10 to 20 yards) back from the proposed helicopter pickup spot or the landing stake in the case of an established run. The landing stake is usually a black stake with a red flag on it. The helicopter may or may not be here yet. In any case, chose a safe place to stop based on your communications with the pilot beforehand.

### ***Choosing and preparing a pickup or landing site***

Ideally the helicopter should have a clear flight path of a minimum 20 - 30m width to take off and land into the wind. The landing area should be flat or very nearly so. If it is not and you cannot rectify the situation, notify the pilot by radio if possible. The pilot may still be able to land but may have to hold power during the entire loading or unloading operation. In essence the pilot may still be “flying” the aircraft in ground effect with a skid in contact with the ground. If this is the case, you are paying for the entire time the helicopter is holding power. (Normally you only pay for the time that the aircraft is actually “in the air”.)



In a perfect world, every pickup or landing spot would be at the top of a broad ridge with a good drop off below. This allows the pilot to hover briefly to take off, then almost immediately begin to move forward, descend slightly and then gain more forward speed as the terrain drops off. Once the helicopter has forward speed, the rotor disc develops lift just like a fixed wing aircraft and the helicopter now requires less power to stay airborne.

Avoid pickup locations that are small openings in the trees, in depressions or in tight creek bottoms. Although helicopters can hover into and out of such locations, it may require full power with reduced safety margins. In some cases, it may be impossible to land or take off at all, particularly if the helicopter is heavy. If your load or group weight is too heavy, the pilot may have to fly you out in several trips with less weight per trip. This means increased costs to you and your group. Although you can sometimes get away with less, in the ideal situation you should look for a clear area about the length of a football field or soccer pitch that is unobstructed by any large trees or boulders. You would like to have enough room for the entire helicopter to turn around in the clearing with good clearance for the main and tail rotors on all sides. This may require a clear area in all directions for 20m for a light helicopter or 30m for a medium helicopter. When in doubt consult the pilot via radio if possible.

## ***Procedure if the helicopter is NOT at the pickup / landing site***

In summer, proceed to the pickup / landing area and get your group set up. Prepare the helipad and get packs ready for flying by preparing stacks of gear for the cargo compartments, etc.

In winter if a helipad already exists, make a path to the pickup / landing area and have your group follow exactly in your footsteps. Drag your skis by the tips or carry your snowboards or snow shoes properly to the heli pad. Stack the packs, gear, skis, snowboards and/or snowshoes in an orderly fashion on the side of the helipad that they will be loaded into the helicopter. Be sure the stacks will not get blown over and are easy to handle when the helicopter lands. You may assign as many people as necessary to hold things in place as the helicopter approaches.

If this is the first time this spot has been used as a pickup or landing you may need to do some work. Be sure there are no obstructions or obstacles that will endanger the helicopter. A small bush saw is useful to remove dangerous small trees near an improvised helipad. Remove logs or boulders that could damage the landing gear, hook a skid or make the ground uneven.

In summer, when no ski basket is in place, you will often position your group on the same side of the helicopter as the cargo. In this case, you may well remain with the group in the huddle until the pilot signals you that it is OK to proceed with loading.



When on snow, take the time to stamp out a helipad with your skis first and then on foot if you have time. Consult the pilot beforehand to ascertain how large this area should be. It will vary depending upon the size of the helicopter. When in doubt make it 6m x 6m (6 yards X 6 yards) or the length of 3 skis laid end to end. That should be adequate to land most medium helicopters you are likely to be using. The longer before the helicopter arrives that this makeshift helipad is stamped out in the snow, the more consolidated the snow will be. If the terrain is not level, shovel snow to make the area flat, then pack the snow with skis to get it to set up and harden. If the snow is still soft when the helicopter arrives it may still sink up to it's belly in the snow.

If no landing stake is in place, improvise one with a piece of surveyors' flagging tape tied to a stick or pair of skis firmly planted in the snow. This should be placed right beside where you anticipate the tip of the skid on the pilot's side of the aircraft will finally come to rest. Don't be surprised to see a good pilot land within inches of the stake, but consider that the helicopter may actually touch

down or land as much as a meter away in some instances.

In winter, once your landing site is prepared, have your group bundle their skis together tightly as they were shown at their briefing. Snowboarders and snowshoers should remove their boards / shoes and if a snowboard has high back bindings, fold them down. Stack the skis, boards or shoes next to the landing stake on the ski basket side of the helicopter. Position your group just off the edge of the helipad on the side that they will enter the helicopter. In many instances that will be on the opposite side to the ski basket if one is in place. You will likely remain beside the stake on the ski basket side. You will stabilize the stack of skis, snowboards or snowshoes when the helicopter is landing as well as acting as a crucial observer for the pilot.

It is important that you have properly briefed your group on what to expect when the helicopter comes in (wind, blowing snow / dirt, noise). Assign a door person who has operated the helicopter door before and review the procedure you want them to follow. Have the group crouch down and form a huddle as the helicopter begins its approach. Make sure there is adequate room for the helicopter to land between the group and the landing stake if they are on opposite sides.

Usually in winter situations the pilot lands using the stake as their only visual reference for the last few meters. If there is a lot of loose snow, a miniature whiteout often called a “snowball” engulfs the helicopter and reduces the visibility to zero. The pilot now relies on the landing stake for visual reference for the crucial final moments of the approach and landing. The pilot will not be able to see the opposite side of the aircraft during this time and you will have to watch what the pilot cannot see.

If you are experienced in this kind of situation wear your glasses or goggles and position yourself beside the stake. As the helicopter sets up for the approach stand upright with your back to the



wind and your arms pointed in the direction the wind is blowing. As the pilot begins the final approach crouch down next to the stake in a very stable position and be ready to stabilize the stack of skis. Stay in place and don't move away during this time. If you move, you may destroy the pilot's perception of where firm ground is. Don't shut your eyes or look down. Watch your group, your gear and the helicopter, scanning back and forth for anything that could cause a

problem, all the while keeping the helicopter in your sight. If a serious problem occurs use hand signals to wave off the pilot or make him / her aware of the situation. Use your radio to communicate if there is time. If there are no problems the landing will proceed as normal. Once the helicopter lands and the pilot is satisfied that all is okay you will get a signal to proceed with loading.

## ***Approaching when the helicopter is already at the pickup / landing***

Stop your group 10 – 20m back of the edge of the rotor disc. When it is safe to do so, you should slowly and carefully approach the helicopter after instructing your group on what to do and how to act. Approach the helicopter from the front unless specifically told to do otherwise by the pilot or unless it is dangerous to do so. NEVER approach the helicopter from the rear! Hot jet exhaust gases and the invisible tail rotor await you there. Remind your group that they should never move aft of the passenger doors or ski basket for any reason.

If on snow, have your group properly bundle their skis. Then make a path to the helipad or helicopter. Have your group follow exactly in your footsteps. Have your group drag their skis by the tips and tell them not to lift them up for any reason. Be sure everyone crouches as you approach the helicopter. Don't let anyone carry their skis over their shoulder! Snowboards or snowshoes should be carried held firmly against the body with one hand between the bindings and the other holding near the tip. Demonstrate the correct method for your group before approaching. This is the way skis, boards and snowshoes are handled regardless of whether the main rotor is spinning or not. The rotor may begin turning unexpectedly, so by always keeping your gear low, you will never have to worry in that regard. Have your group hand you their skis / board / snowshoes without lifting them when they get to the basket. As you or another leader or guide loads the ski basket have a trained door person go to the opposite side of the helicopter to open the door. Do not let anyone go to the rear of the helicopter behind the ski basket.

Everyone must now proceed to the other side of the helicopter where passenger loading takes place. Remind people about the pitot tubes. Have them stay one meter (one yard) away from the front of the helicopter as they walk around.

## ***Entering the helicopter***

When you are on the passenger's side of the aircraft, wait for a signal from the pilot that it is okay to enter. If you are the door person, when instructed to do so, you may open the door and begin entering the helicopter. Get instructions if you are not familiar with the operation of the door. Open the door gently until it stops. Don't slam the door in either direction unless specifically directed to do so. (The possible exception is closing the door of the newer Bell 407 which may require a gentle "slam".) If there is a handle or strap to assist entry, visibly point to it as each person enters. Motion people to kick their boots together to remove snow or mud if necessary, but try to prevent them from kicking the step or helicopter. Have people move to the farthest available seat.

In helicopters with two rows of seats, people must alternate back and forth between the front and rear facing seats in order for everyone to be able to enter without difficulty. When people have found their seats, motion to them to buckle up their seatbelt if they have not done so already and be sure they are snug. Visually check that each belt is properly fastened.

While the group gets in, you or a designated person may be loading the skis and boards into the ski basket if necessary. Other gear may get loaded into the various cargo compartments

depending upon the helicopter. Once this is completed, you or a designated person will come around to the passengers side and close and lock the doors after everyone has gotten in.

Do a final safety check. Make sure all seat belt straps are inside the helicopter. Verify that all doors, ski baskets, racks and cargo compartments are properly closed and latched. Visually check that all other latches, cowlings, panels etc. appear to be in normal positions. Quickly scan for evidence of abnormal fluid or leaks. With that all done, get in the front seat, do up your seatbelt, put on your headphones, close the door and tell the pilot when you are ready.

### ***Exiting the helicopter***

Remind people not to remove their seatbelt until the pilot instructs them to do so or until you have opened the door and motioned them to exit. Be sure they hang on tightly to any personal items. Also remind them that the wind around a helicopter can easily blow loose items away and they should not chase after anything. Have everyone slowly and carefully exit the helicopter.

Frequently you will position the first person who exits the helicopter about one and a half meters (five feet) away from the helicopter, in the pilot's view. The rest of the group will then huddle around this person and remain crouched down and close to the helicopter. If you have a door person in your group they will close and lock the door and give the pilot the "thumbs up" signal if appropriate. While the group is getting out of the helicopter, you may have to load or unload cargo or perhaps go around to the other side to unload skis. When you also give the pilot a "thumbs up", the pilot flies away from the group. The normal procedure is for the group to stay crouched down in the huddle until the helicopter has taken off and is a safe distance away.

Having a helicopter take off when it is only one or two meters away is a very exciting part of wilderness flying but it is vitally important that you tell your group that they are not to move away from the group huddle for any reason. If you must have the group move away from the aircraft after exiting, be sure you have reviewed the procedure you will follow as part of your briefing.

If a hat, glove or any other item is blow away from the group, DO NOT let them chase after it. If you are landing in mountainous terrain they could be running off the edge of a cliff, over a cornice or uphill into the rotors. Once the helicopter leaves, check the area to determine if it is OK to safely retrieve the lost item.

### ***Non – Routine Situations***

Accident research has demonstrated that many accidents and injuries occur through human error and when situations occur that are outside of the norm or “non – routine”. If during the preparation, loading or unloading of a helicopter you encounter something out of the ordinary, the best thing to do is stay calm and don't rush around without thinking. If the problem occurs when the helicopter is inbound or on final approach, attempt to radio the pilot or wave the pilot off if you think that it will be unsafe for the pilot to land normally. Rectify the situation, then prepare for a normal landing again.

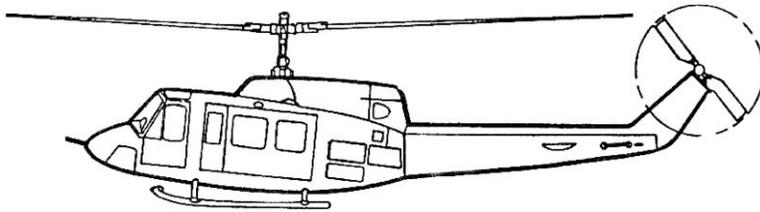
When loading, unloading, entering or exiting the helicopter, if something unusual occurs it is best to discuss the situation with the pilot as soon as possible. A good way to talk with the pilot is to open the front passenger door, if it is safe to do so, and put on the headset so that you can communicate calmly over the intercom. Some situations may require the pilot to depart prematurely or perhaps even shut down so that the problem can be solved without the hazard of rotors spinning over your head. Resist the temptation to think that you have to have all the solutions. Most experienced pilots can give you solutions to your problems, but you have to remember that it is OK to ask them for help!

## ***Emergency Procedures***

Within each helicopter are one or more safety cards which graphically show emergency procedures and exits. They will be specific to that particular model or type of helicopter. Encourage your group to review the safety card prior to lifting off or during flight.

### **Typical emergency procedures for a medium Bell helicopter**

**Bell 204 / 205 / 212 / 214 / 412**



Each medium helicopter has a number of emergency exits. The main emergency exits for the passengers on medium Bell helicopters are often the doors or the large windows.



Each large side facing window in the rear of the helicopter may be an "Emergency Pop-Out Window" or it may have a handle for releasing the window in case of emergency. Pop-out windows are designed to be easily removed by pushing or striking the window on any of the four corners. Since they are designed to come out this way, best to remind your group not to lean against the windows during flight or scrape the windows with their hands or gloves.

All the medium models listed above except the 204 have the capacity to carry up to four additional passengers in seats that face sideways near the center of the body of the helicopter. If it is not possible to exit directly via the door or window, it is possible to join the rest of the passengers in the main compartment by knocking down the back of the seat directly forward of the passengers in the side facing seats. This allows access to all of the other emergency exits.

If the helicopter comes to rest on its side, one set of emergency exits may be blocked and the other set of exits will now be above everyone's head. In an orderly fashion, have the uppermost people slide open the door if possible or remove the emergency exit window. The top person should undo their seatbelt and then exit. Each person should follow, one at a time. To assist in exiting, the seat legs may form a makeshift ladder to climb out of the helicopter. They are sometimes brightly painted to draw your attention to this fact. There may be straps on the roof which also assist. Some models of helicopter may actually have a ladder mounted in the ceiling.

If all of the exits in the passenger compartments are blocked, the passengers can also exit via the front of the helicopter where the pilot sits. To do this easily, remove the headrests separating the compartments by pulling on the attached wire and lifting up. The emergency exit system in the front of the aircraft often consists of a "T shaped handle" (usually painted red) which is pulled up. This removes the attachment for the door and the door falls off.

There often is a fire extinguisher mounted next to the pilot and an Emergency Locator Transmitter (ELT) is often located just behind the pilot's head. There may be a first aid kit in the front area of the helicopter as well. Since these locations vary between models of helicopters they should be reviewed as part of the safety briefing.

If the possibility of fire exists and the pilot is incapacitated you should discharge the engine fire extinguishers. After a suitable period of time has elapsed (usually less than a minute) you should then turn off the main power to the helicopter. This procedure should be reviewed as part of a special briefing for leaders and guides who will be flying in the front seat beside the pilot. If fire hazard exists, bring the small fire extinguisher with you as you exit and conduct an orderly but rapid evacuation. If it is safe to do so, take the time to remove the ELT, first aid kit and portable radio together with any survival gear and move away from the helicopter a safe distance. Be sure the ELT is transmitting with antenna extended if necessary.

## **Typical emergency procedures for a light Bell helicopter 206 (Jet Ranger) / 206L (Long Ranger) / 407**



Each model of light Bell helicopter has a number of emergency exits. They vary slightly from model to model and should be reviewed as part of your briefing. The main emergency exits for the passengers on light Bell helicopters are often the doors and windows. There may be no emergency exit other than the door and the possibility of kicking the window out in dire emergencies. Pop-out windows as discussed earlier are more common in the medium Bell helicopters. In

any case, it is still best to remind the group not to lean against the window during flight or scrape the windows with their hands or gloves.

If all of the exits in the passenger compartments are blocked, the passengers can also exit via the front of the helicopter where the pilot sits. To do this easily, remove the headrests separating the compartments by detaching the headrest and lifting up. The emergency exit system in the front of the aircraft may consist of a "T shaped handle" (usually painted red or yellow) which is pulled up. This removes the attachment for the door and the door falls off. This varies in different models

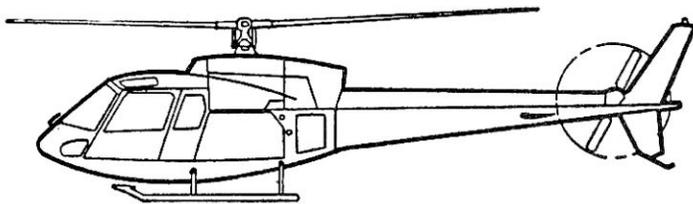
If the helicopter comes to rest on its side, one set of emergency exits may be blocked and the other set of exits will be above your head. In an orderly fashion, have the uppermost people open the door if possible or remove the window. The top person should undo their seatbelt and then exit. Each person should follow, one at a time.

There is often a fire extinguisher mounted next to the pilot and an Emergency Locator Transmitter (ELT) may be located near the pilot or in the nose of the aircraft. There may be a first aid kit in the front or rear area of the helicopter as well. Since these locations vary between models of helicopters they should be reviewed as part of the safety briefing.

If the possibility of fire exists and the pilot is incapacitated you should discharge the engine fire extinguishers. After a suitable period of time has elapsed (usually less than a minute) you should then turn off the main power to the helicopter. This procedure should be reviewed as part of a special briefing for leaders and guides who will be flying in the front seat beside the pilot. If fire hazard exists, bring the small fire extinguisher with you as you exit and conduct an orderly but rapid evacuation. If it is safe to do so, take the time to remove the ELT, first aid kit and portable radio together with any survival gear and move away from the helicopter a safe distance. Be sure the ELT is transmitting with antenna extended if necessary.

## **Typical emergency procedures for a light Aerospatiale helicopter**

### **A350 A-Star BA / B2 / B3**



The helicopter has a few simple emergency exits. The main emergency exits for the passengers are the doors. First try each door for normal operation. If they will not open normally, there may be a brightly painted handle near

the front of the door protected by a plastic safety catch. Remove the plastic and pull back on the handle. This will remove the attachment for the door and the door will fall off.

There is usually a fire extinguisher mounted next to the pilot and an Emergency Locator Transmitter (ELT) is located in a special compartment marked by a notice. If the possibility of fire exists and the pilot is incapacitated you should discharge the engine fire extinguishers. After a suitable period of time has elapsed (usually less than a minute) you should then turn off the main power to the helicopter. This procedure should be reviewed as part of a special briefing for

leaders and guides who will be flying in the front seat beside the pilot. If fire hazard exists bring the small fire extinguisher with you as you exit and conduct an orderly but rapid evacuation. If it is safe to do so, take the time to remove the ELT, first aid kit and portable radio together with any survival gear and move away from the helicopter a safe distance. Be sure the ELT is transmitting with antenna extended if necessary.

There are several special considerations when flying in the A-Star type helicopter. Passengers seated directly behind the pilot should be aware that several flight controls may be in front of their feet. The controls are usually protected by a guard, but it is possible to kick the controls if someone is not paying attention. Be aware that the helicopter rotor blades may be much closer to the ground than you are used to and crouching is absolutely essential when approaching the helicopter. These helicopter are made of lightweight aluminum or composite materials and are easily damaged. Remind your group not to kick the helicopter or stamp their feet. Cabin space is limited. Enter and exit slowly, one at a time. In normal situations there is never a rush to get in or out, so it is best to instruct your group to wait until the person in front of them has fastened their seat belt before they even begin to enter the helicopter. The reverse is true on exiting.



### ***Some common questions your group may ask***

Can I bring my small pack inside the helicopter with me? – It is best if you don't have unnecessary items in the passenger cabin during the flight. Unlike a commercial jet liner, there is no room under the seats of most small helicopters for “carry-on” luggage and packs. Extra gear also adds weight to the helicopter, which reduces safety margins. If you feel you must bring an item, ask your pilot and the person in charge of loading the helicopter to be sure it is OK.

Commercial airplanes land at major airports all the time when it is cloudy. Why can't helicopters land on the mountains tops when it is cloudy? - The preceding pages explain that helicopter flying in the mountains cannot be done on instruments alone and must be done according to Visual Flight Rules (VFR). Even modern GPS systems cannot make it safe to land when visibility is reduced by cloud or fog. As one pilot once stated tongue in cheek, “if you totally rely on GPS for mountain flying it is excellent. It tells you the precise location of the CRASH!”

## ***A last word on Safety***

I believe it is important to discuss and review safety issues with trip participants on the morning of every flying day, not because you expect to have a mishap, but rather because it is far better to be prepared so that **everyone** knows how to react in routine situations, loading and unloading, as well as in emergencies. This enhances the safety of all of the passengers. Even if a group has experience in helicopters, ask everyone to pay attention to the safety briefings so that they can behave appropriately around the helicopter and make their flights as safe as possible.



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