Avoiding an Auto

A helicopter carrying out autorotational training can be hurtling towards the ground at up to 2000 feet per minute. Fixed-wing pilots operating nearby should know the limitations of a helicopter in an autorotation, and where to look for this traffic.

On 17 February 2008, a Cessna 152 and an R22 collided in mid-air over Paraparaumu, resulting in three deaths. At 11:11, the aeroplane pilot transmitted "Paraparaumu Traffic – Echo Tango Yankee overhead the field 1500 feet, commencing standard overhead rejoin 34 seal". The helicopter was early into its crosswind turn for the opposing grass 34 circuit. Thirty eight seconds later, the helicopter pilot transmitted, "Paraparaumu Traffic – Hotel Golf Victor is close in downwind grass 34, practice 180 autorotation to the centre grass 1000 feet".

The two aircraft collided at 90 degrees to each other at 1000 feet as the C152 was turning left to cross the upwind end of sealed runway 34, and the helicopter was midway along a close downwind leg for grass runway 34.

The Transport Accident Investigation Commission report into the accident states:

"The pilots in the helicopter should have understood what was meant by a standard overhead rejoin and the general flight path an aeroplane would have followed when flying the procedure to runway 34 seal. Equally the aeroplane pilot should have understood what was meant by an autorotation, as this was taught to local students early in their training. He should certainly have known where the helicopter was when the helicopter pilot transmitted that the helicopter was 'close in downwind grass 34, practice 180 autorotation to the centre grass 1000 feet'."

But how many fixed-wing pilots really know what an autorotation is, where a helicopter in an auto will be positioned (compared to a normal circuit), and what to do if they hear one being conducted?

What is an Autorotation?

An autorotation is essentially a forced landing for a helicopter. The engine normally turns the rotors. If the engine fails, the collective is lowered to reduce the angle of attack on the rotor blades, and begin a descent. The relative airflow coming up through the rotor disk can then keep the rotors turning. With the rotors still turning, it is possible to maintain control of the helicopter.

The descent rate during an auto is generally between 1000 and 2000 feet per minute. When approaching the ground, the pilot slows the descent to a manageable rate by using aft cyclic to flare. The flare must be timed so that the descent rate goes to zero just above the ground. The helicopter is then put into a level attitude and collective is used to cushion the touchdown.

A standard "straight-in" autorotation is carried out after the helicopter has been positioned on finals. Once a student is competent at this manoeuvre, they will be taught the 180 degree autorotation. This is commenced from a downwind position, turning through 180 degrees to land into wind.

What to Expect

Here are some important considerations for fixed-wing aircraft operating at an aerodrome where helicopter autorotation training is carried out.

On the Ground

If you are at a hold point waiting to cross a grass runway, or needing to taxi past any area used for helicopter autorotation training, a thorough lookout is essential.

Where to look:

» A helicopter doing a standard auto (straight-in) will be a lot higher on finals than one on a powered approach profile.

» A helicopter doing a 180 degree auto will start overhead the aerodrome, usually between 1500 and 1000 feet agl, and often in a very close downwind position. The aircraft roof could make it very hard to see traffic in this position.

If you hear a helicopter commencing an auto overhead from 1000 feet, it may look as though you have plenty of time to taxi across the runway or the area they are aiming for. But with descent rates of up to 2000 feet per minute, it will only take them around 30 seconds to touch down right where you may be considering taxiing. They will take considerably less time to get on the ground than a fixed-wing glide approach would.

In the Air

If you are about to join, and you hear a helicopter intending to carry out a 180 degree auto (particularly to a parallel runway with an opposing circuit direction), then it is not advisable to fly a standard overhead join, as there will be no non-traffic side. If there is no ATIS or AWIB to tell you the wind direction, circle overhead at least 500 to 1000 feet above the aerodrome circuit altitude, to determine the wind. If you have not positively identified the helicopter and its phase of flight, then vacate the area completely to descend to circuit height, before returning to join straight in or downwind for the appropriate runway.

There is a critical period of time while a helicopter pilot is transitioning to autorotation and a stable descent, when their ability to respond to a traffic conflict is compromised. For a trainee, the transition from the engine generating the required rotor rpm, to the relative airflow generating it, is a high work load time, requiring split-second timing and decision-making. During this brief period, a helicopter pilot's attention is focussed inside the cockpit.

A fixed-wing aircraft joining will normally be descending at around 600 feet per minute. If you compare this to the helicopter's descent rate of up to 2000 feet per minute, it becomes clear that a fixed-wing pilot's ability to react and avoid a conflict is much greater than a helicopter pilot's ability during this critical period.

Once established in an auto, however, helicopters can go around and be responsive to traffic conflicts.

Communication, a listening watch, an appreciation of the other aircraft's capabilities, and a thorough lookout, are essential for safe operations. The safest course of action is to give a helicopter performing an autorotation a very wide berth. ■

R22 ZK-HGV (left) and C152 ZK-ETY (right) collided in midair over Paraparaumu in 2008.