

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Eurocopter AS350B2, G-PDGF	
<b>No &amp; Type of Engines:</b>	1 Turbomeca Arriel 1D1 turboshaft engine	
<b>Year of Manufacture:</b>	2000 (Serial no: 9024)	
<b>Date &amp; Time (UTC):</b>	3 March 2020 at 1430 hrs	
<b>Location:</b>	Glencoe, Argyll, Scotland	
<b>Type of Flight:</b>	Aerial Work	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	No damage to the helicopter or lifting equipment, underslung load destroyed	
<b>Commander's Licence:</b>	Commercial Pilot's Licence	
<b>Commander's Age:</b>	66 years	
<b>Commander's Flying Experience:</b>	20,600 hours (of which 8,150 were on type) Last 90 days - 30 hours Last 28 days - 30 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and additional enquiries by the AAIB	

**Synopsis**

During the refurbishment of an electricity line, G-PDGF was carrying an underslung load consisting of a 700 kg wooden pole which was then inadvertently released. The pole broke into two pieces when it struck a steep hill approximately 200 m from a minor public road, but clear of any built-up areas and third parties. There was no damage to the helicopter or lifting equipment. The operator considered the most probable cause for the inadvertent release of the load was that the sling, which was carrying the load, was not positioned correctly in the helicopter's hook which was of the spring-loaded keeper design. As a result of this incident, the operator is continuing to phase out the use of this design of hook for most of its operations and has changed its procedures so that only the operator's employees are permitted to load the hook when spring-loaded keeper hooks are used.

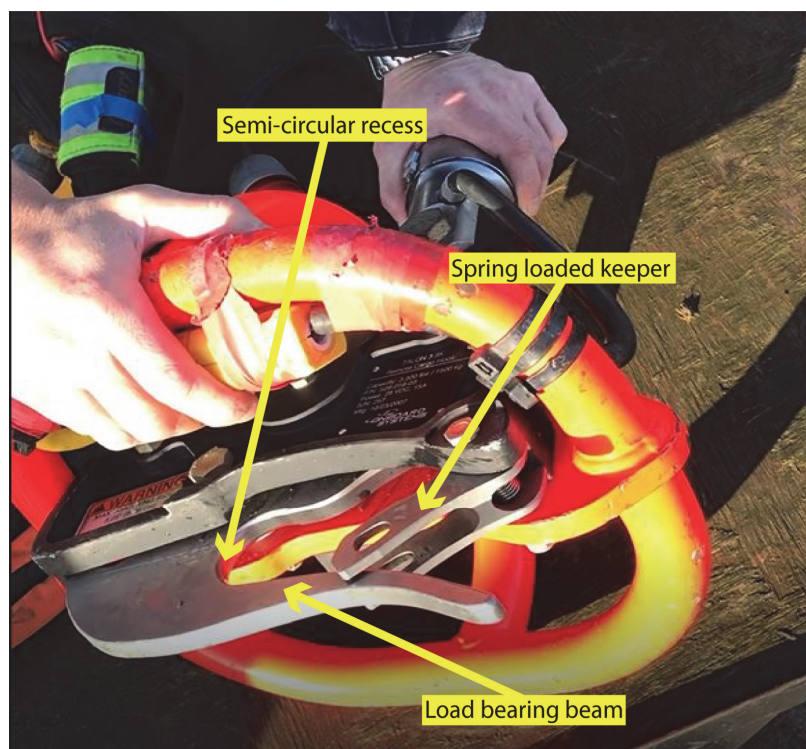
**History of the flight**

G-PDGF was being used to transport wooden poles from a storage facility to work sites alongside an electricity line which was being refurbished. Forty-seven poles were to be transported over the course of two days. The pilot of G-PDGF met his ground handler, who worked for the same company, and three of the client's employees prior to starting the lifting operation.

The client's employees had previously attended a training course on helicopter operations, which covered lifting underslung loads. The ground handler briefed the employee who would be hooking on the loads at the storage facility. The ground handler's task was to assist and oversee this operation but also to refuel the aircraft at a separate refuel site. This meant that, whilst the ground handler was at the refuelling site, the client's employee would be left unsupervised to 'hook on' the loads.

During the afternoon of day one, after successfully transporting several loads during the morning, G-PDGF arrived to pick up a 700 kg pole whilst the ground handler was away from the storage facility. The pilot manoeuvred the helicopter to allow the client's employee to attach the load to the hook.

The design of the hook (Figure 1) consists of a load bearing beam which, when electrically actuated by the pilot, causes the beam to rotate around a pivot allowing the load to be released before then re-closing. There is a spring-loaded keeper which enables access to place the load across the beam. The beam also features a semi-circular recess where the sling, which is usually used to carry a load, should be positioned.



**Figure 1**

The spring-loaded keeper hook fitted to G-PDGF

Once the load was attached the pilot climbed G-PDGF to lift the pole off the ground. He transitioning to forwards flight whilst, as was his usual practice, cross-referencing the engine instruments and checking the load in a mirror as he increased airspeed in 10 kt increments. He stabilised the helicopter at 60 kt and 200 ft agl, as opposed to his usual transit speed of 80 kt, for the short flight to the work site.

However, after about 6 km the pole began to develop a spinning motion, which rapidly increased in intensity, and which the pilot could feel through the airframe. Immediately, he lowered the collective and applied rear cyclic to bring G-PDGF rapidly to the hover but, before he could complete this manoeuvre, the pole fell from the helicopter. The pole struck the side of a steep hill approximately 200 m from a minor public road, but clear of any built-up areas and third parties. It broke into two pieces. The pilot immediately returned G-PDGF to the refuel site and shutdown. He inspected the undamaged hook, which was found in the closed position, and the strop that was later recovered from the hillside was also undamaged.

## Analysis

The operator's assessment of the incident considered four causes for the inadvertent release of the load: the inadvertent release of the electrically-operated hook by the pilot; the release of the hook due to an electrical malfunction; and two causes, similar in nature, that could cause the spring-loaded keeper to be forced open during flight.

The operator considered the most likely cause was that, when the load was hooked on at the storage facility, the sling carrying the load was not positioned fully into the semi-circular recess on the load bearing beam which normally provides additional protection against any movement of the sling. This would have allowed the sling to move during flight and, as the load spun rapidly, to overcome the resistance of the spring-loaded keeper thereby releasing the load. The operator considered it unlikely that the load was released inadvertently by the experienced pilot because the release system requires two independent switches on the cyclic to be depressed simultaneously to command a release. The hook and its release system were electrically checked by the operator's engineering department and no faults were found; however, an intermittent fault could not be ruled out as an alternative cause for the inadvertent release of the load.

## Conclusion

The most probable cause for the inadvertent release of the load was that the load had not been positioned correctly across the hook's load bearing beam when the load was hooked on. At this time, the client's employee, although having been trained in underslung load lifting operations, was working alone and was not being directly supervised. However, an intermittent fault could not be ruled out as an alternative cause for the release.

## Safety action

As a result of this incident, the operator is taking the following action:

The operator is continuing to phase out the use of hooks with spring-loaded keepers in favour of using keeperless hooks for most of its operations. Additionally, the operator has amended its procedures so that, if spring-loaded keeper hooks are used, only the operator's employees will carry out loading operations. The operator advised that, as keeperless hooks require the use of two hands, it will retain a few spring-loaded keeper hooks for tasks such as lifting a load from a scree-covered hillside, where using both hands poses a greater risk to the loader.