INCIDENT

Aircraft Type and Registration:	AS332L2 Super Puma, G-REDN
No & Type of Engines:	2 Turbomeca Makila 1A2 turboshaft engines
Year of Manufacture:	2004
Date & Time (UTC):	14 December 2007 at 1000 hrs
Location:	Aberdeen Airport, Scotland
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	None
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	39 years
Commander's Flying Experience:	7,400 hours (of which 5,400 were on type) Last 90 days - 125 hours Last 28 days - 34 hours
Information Source:	Aircraft Accident Report Form submitted by both pilots and operator's own incident report

Synopsis

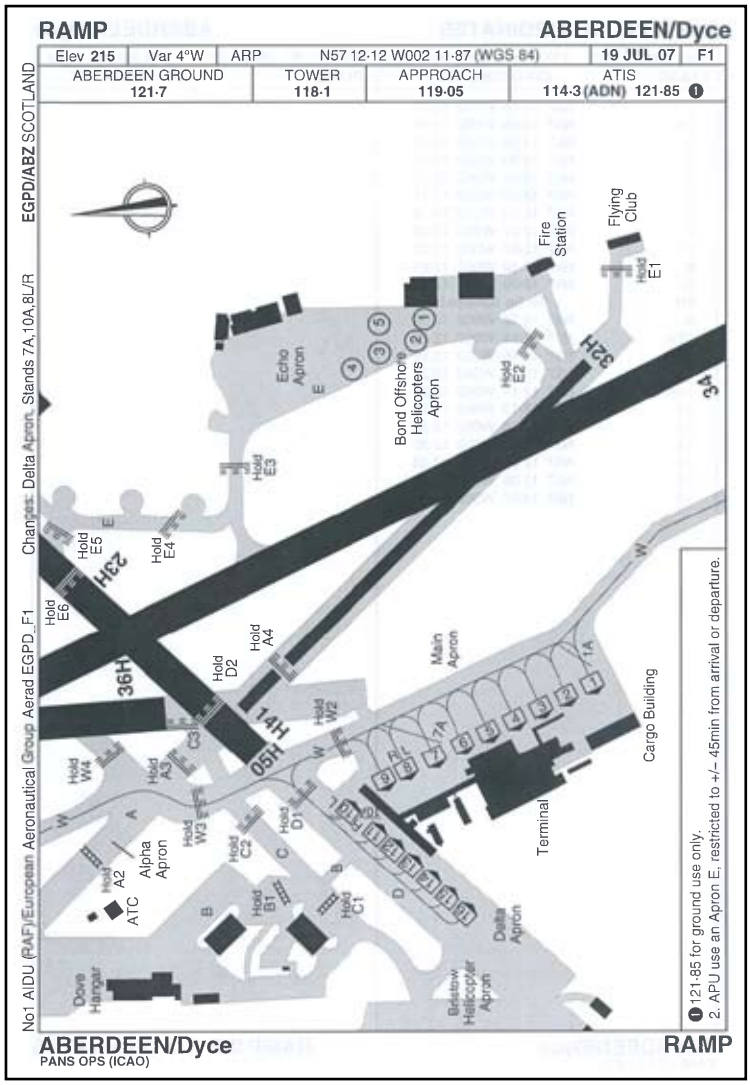
During a ground taxi, the crew felt a control restriction when attempting to turn left and realised that the nose wheel locking pin had become engaged. Collective pitch was increased in an attempt to disengage the pin by reducing the weight on the nosewheel. The aircraft subsequently rolled and pitched to excessive attitudes before control was regained.

History of the flight

After landing on Runway 23, the co-pilot, who was the pilot flying (PF), taxied the helicopter to the apron. The crew had been instructed to disembark their passengers on Spot 5 (Figure 1) and then taxi to nearby Spot 3 to shut down.

Whilst taxiing from Runway 23 to Spot 5, the aircraft completed various turns in both directions without incident. On Spot 5 the chocks were fitted and, with the rotors running, the passengers disembarked. The commander took control for the taxi to Spot 3, as he had a better view of other aircraft positioned nearby. It is unclear when he actually took control and which of the pilots actioned the taxi checks; however, the commander stated that the checks but completed before he commenced the taxi. He initially steered to the right without difficulty but when he commenced a turn to the left there was no response from the helicopter.

The crew checked and then realised that the nosewheel



Taken from:
AERAD Terminal Charts

Figure 1

lock had engaged but attempts by the co-pilot to release it were unsuccessful. The commander stated that he increased collective pitch with the intention of reducing the pressure acting on the pin, so that it could be released. In doing so he felt the helicopter become unstable and so continued to lift it into the hover, this being done with the Automatic Flight Control System (AFCS) disengaged. The helicopter rolled and pitched before it could be brought into a stable hover where the AFCS was then engaged by the commander using the engagement button positioned on the cyclic. The helicopter was hover taxied the rest of the way to Spot 3 where it landed safely.

Flight data

Data was successfully downloaded from the aircraft's HOMP (Helicopter Operations Monitoring Program) and Solid State CVR systems by the operator. This was analysed along with film of the incident captured by two CCTV cameras overlooking the apron.

The data showed that whilst taxiing from Spot 5, the aircraft turned right through about 150º onto a heading of 326ºM. The turn was initiated by the selection of approximately 50% right yaw pedal, progressively reversed to almost full left pedal, stopping the turn and starting the attempted turn to the left as the helicoopter

approached Spot 3. The helicopter turned left through about 10º. CCTV footage indicates that this appears to have been achieved with the aircraft skidding to the right. Recorded data shows a developing roll of 4º right, with collective power simultaneously being applied. The helicopter's two rear wheels broke contact with the ground and its tail moved right, through approximately 20º, the front wheel remaining in contact with the ground. It then lifted into the hover, rolling 9.1º to the right before pitching about 15º nose-down.

Nosewheel locking pin

The nosewheel locking pin, when engaged, prevents the helicopter's nosewheel rotating. It is normally placed into the locked position prior to take off and is kept locked when landing at offshore installations. The pin is unlocked after landing at onshore locations to enable manoeuvring during ground taxi.

The nosewheel locking pin lever is painted black and is located between the pilots' seats, just aft of the brake lever, which is painted red. Both levers are aligned fore and aft when in the 'OFF' position (Figure 2).

The nosewheel locking pin is engaged by raising the lever and rotating it to the right (Figure 3), the pin then dropping under spring pressure and entering into a fixed hole on the nosewheel leg when the nosewheel is centred. This also causes a flag (see Figure 4) to drop below the body of the aircraft in front of the wheel indicating the pin has been applied. The flag will drop as soon as the lever is rotated, even if the pin has not engaged into the fixed hole in the nosewheel leg.

The locking pin is released by rotating the lever and pushing it down, causing a spring to force the pin out of the hole and allowing the body of the nosewheel to rotate freely. If the handle is not pushed fully down to release the locking pin it is possible for the pin to re-engage when the wheels align fore and aft.

Company checklist procedures

Normal operations are conducted using an Abbreviated Normal Checklist. The checklist is a challenge and response procedure with the pilot not flying (PNF) reading the list and completing any actions required.

Figure 2

Figure 3 (left)

Figure 4 (right)

Crew duty times

The crew's duty period started at 0600 hrs with the incident happening some four hours later. During this period they completed two sectors, each of approximately 1.5 hours duration.

This was the fifth consecutive day on duty for both pilots, prior to which they had had eight days off. During these duty days, the commander had amassed 24.40 hours duty time and the co-pilot 30 hours. This was the fourth consecutive early duty start for the commander and the third for the co-pilot.

Analysis

The aircraft was able to turn normally during its taxi from Runway 23 to Spot 5 which suggests the nosewheel locking pin was in the unlocked position. Nothing in the checklist calls for the pin to be re-engaged after parking; the pre-taxi checks also require a check that the pin is in the unlocked position.

Had the nosewheel locking pin been set to the locked position with the nosewheel offset to the right when the aircraft was parked on Spot 5 the pin would have been unable to engage. The helicopter would have been able

to continue a turn to the right when it recommenced its taxi. When the aircraft then turned to the left, however, the pin would have engaged as the nosewheel passed through the central position, preventing the helicopter continuing the turn. The forces exerted on the aircraft by the application of left yaw pedal whilst the helicopter was unable to turn would have created a rolling moment, exasperated by the increase in collective pitch application. This is probably the reason the helicopter rolled to the right when it was sufficiently light on its wheels.

It seems that the most likely cause of the nosewheel lock having been set is that the lever was placed in the engaged position instead of the parking brake after parking on Spot 5. The helicopter would probably have remained stationary without the parking brake being set due to the apron being flat and chocks being put in place quickly after it parked.

It is recognised that the levers may be confused due to their proximity, which has led to attempts to differentiate between them by colour. Identification of the mistake through the use of the checklist was unsuccessful probably as the result of the change in PF role at that point. It is unclear exactly when the checklist was actioned and it is possible a check of the locking pin position was overlooked. Fatigue may have been a contributory factor due to the early start of this and the previous duty periods, although they were of a relatively short duration.

Safety actions

The operator has carried out a thorough investigation of the incident and its safety department has made several recommendations. These include:

- changes to the checklist relating to the nosewheel locking pin
- reinforcing amongst crews the need for discipline when using checklists
- improved training on the use of the nosewheel locking pin and in particular the actions to be taken should it be found to be inadvertently locked during taxi
- introduction of procedures for ground crew to check the locking pin flag position prior to taxi
- proposed improvements to the positioning and ground handling of aircraft on the company apron to provide better clearance between them
- improvements to the handling of data after an incident or accident

In view of these recommendations, no further Safety Recommendations are made.