

SERIOUS INCIDENT

Aircraft Type and Registration:	1) Cessna 182T Skylane, G-ORDM 2) Hercules C130J C Mk 4, ZH878
No & Type of Engines:	1) 1 Lycoming IO-540-AB1A5 piston engine 2) 4 AE2100D3 Turboprop
Year of Manufacture:	1) 2003 (Serial no: 18281206) 2) Not known
Date & Time (UTC):	20 July 2018 at 1215 hrs
Location:	RAF Brize Norton, Oxfordshire
Type of Flight:	1) Private 2) Military
Persons on Board:	1) Crew - 1 Passengers - None 2) Crew - 3 Passengers - None
Injuries:	1) Crew - None Passengers - N/A 2) Crew - None Passengers - N/A
Nature of Damage:	1) Airframe and engine damage 2) No damage
Commander's Licence:	1) Airline Transport Pilot's Licence 2) Airline Transport Pilot's Licence
Commander's Age:	1) 39 years 2) 48 years
Commander's Flying Experience:	1) 3,567 hours (of which 3 were on type) Last 90 days - 63 hours Last 28 days - 39 hours 2) 6,057 hours (of which 679 were on type) Last 90 days - 55 hours Last 28 days - 22 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and the report from the joint investigation conducted by the aircraft operator and the pilot's employer

Synopsis

While being positioned for pre-takeoff engine checks, G-ORDM, a Cessna 182, was caught in the propwash from a Hercules C-130J (ZH878) stationary at the runway holding point ahead. The Cessna was tipped onto its right wingtip and slid sideways for several metres before coming to rest on all three wheels. The pilot was uninjured and vacated the aircraft without external assistance.

History of the flight

G-ORDM had taxied behind ZH878 to Holding Point G (Golf) at RAF Brize Norton, with the pilot maintaining, what he assessed to be, 50 to 100 m separation behind the C-130J. He did not encounter any adverse propwash effects while taxiing to the holding point. On arrival at Golf, he began to turn his aircraft into wind to conduct engine power-up checks. At this point, ZH878 was stationary while the crew completed their Pre-Take Off checks unaware that G-ORDM was behind them (Figure 1). The last item in those checks was the Propeller Overspeed Check which required an increase in engine power from Ground to Flight Idle.



Figure 1

Relative positions of the aircraft at Golf and approximate ground track of G-ORDM

Midway through his positioning turn, the pilot of G-ORDM heard the C-130J's engine note increase and immediately felt violent buffet from its propwash. The turbulent airflow lifted the Cessna's nosewheel clear of the ground and its wings began to rock violently. Concerned that his aircraft might be flipped backwards, G-ORDM's pilot attempted to clear the propwash area by turning right. Despite the application of left aileron to hold the wing down, the aircraft was briefly lifted off the ground before being tipped onto its right wing. It then pivoted on the right mainwheel and nosewheel and was blown sideways for approximately 8 m before coming to rest upright, on all three wheels (Figure 2).



Figure 2

G-ORDM on the taxiway after the accident

During the sideways movement the propeller struck the ground numerous times before the engine failed (Figure 3). The pilot, who was uninjured, transmitted a Mayday call and vacated the aircraft unaided.



Figure 3

Witness marks on the taxiway from G-ORDM's nosewheel and propeller

Personnel

The accident pilot had spent most of his career flying large aircraft, including the C-130J, and had recently renewed his Single Engine Piston aircraft class rating.

Human factors

G-ORDM's pilot had used visual cues, based on the size of the C-130J ahead, to assess his taxi spacing. He believed that he had consistently maintained 50 to 100 m behind the other aircraft en route to the holding point. Analysis of the relative positions of the aircraft after the accident, supported by eye-witness testimony, suggested that the actual separation at the time of the propwash encounter was approximately 25 m. The pilot stated that while taxiing he did not experience any thrust effects from the preceding C-130J and, consequently, the separation distance achieved became his 'safe-norm' for the situation. Even though he was qualified on the C-130J, the pilot was surprised by the intensity and extent of the propwash hazard area. He further observed that Flight Idle thrust was significantly higher than the breakaway thrust requirement for even a fully-laden C-130J.

The C-130J commander considered it normal to conduct the propeller overspeed check at the runway holding point. He did not consider that it constituted a high-power ground run and therefore did not feel obliged to pre-warn ATC or other aircraft.

Other information

Company investigation

The Hercules and Cessna were operated by two different companies but within a parent business group. The Cessna pilot was employed by the Hercules operator and the aircraft was being flown in support of that company. Due to the interlinked nature of the flights, a joint investigation into the accident was undertaken by the Cessna's operator and the company employing the pilot.

The joint investigation noted that there was no promulgated data for C-130J propwash intensity, nor were there any associated warnings in the C-130J Aircrew Manual. While unable to determine a '*quantitatively "safe" distance that the Cessna should have maintained*', the investigation determined that the accident was a result of insufficient separation between the two aircraft at Holding Point Golf.

The investigation report surmised that pilots flying light aircraft, but more familiar with operating larger aeroplanes, could become desensitised to the risks associated with jet blast and propwash. In relation to the C-130J propeller overspeed check, the report stated:

'the normalisation of conducting the test at the holding point may lead to C-130 crews not appreciating that the test is a "high-power pre-flight check" and considering a large enough safety margin behind the aircraft.'

Large aircraft taxi-thrust requirements

Due to their inertia, ground manoeuvring can require increased thrust levels from large aircraft. Examples of situations where above-idle thrust can routinely be expected are: the use of breakaway thrust¹ to taxi off from a standstill or heavy aircraft making tight-radius turns.

Analysis

While generated for their internal audience, the companies' joint investigation report's conclusion has relevance for the wider aviation community. Pilots of light aircraft need to anticipate and, where possible, avoid areas where propwash and jet blast from large aircraft could be encountered during ground operations. The checklist item requiring increased power might not have been reasonably anticipated, but the potential for the C-130J to use increased thrust when taxiing forward to the runway remained.

In this accident, the increased thrust from the preceding aircraft was significantly higher than the breakaway requirement. Had the C-130J crew considered the check to be a high-power event it is likely they would have communicated their intent to ATC, thereby alerting the pilot of G-ORDM to their intentions.

While qualified on the C-130J, the accident pilot was nonetheless surprised by the extent and intensity of the propwash effects encountered.

Unless backed up by known distance markers, the assessment of taxi separation is subjective. On this occasion the pilot's perception of aircraft separation distance at the holding point appears to have been at least double that achieved.

Conclusion

This accident serves as a reminder to all pilots of light aircraft of the dangers of overestimating separation and underestimating thrust effects from larger aeroplanes. Where it is not possible to avoid taxiing behind other aircraft, separation distances should always err on the generous side. It can be anticipated that heavy aircraft may need to use increased thrust when moving from a standstill or conducting tight manoeuvres and spacing should be increased accordingly. By communicating their intent to increase thrust above normal ground manoeuvring levels, pilots of any sized aircraft can help others anticipate and avoid potential hazard areas.

Footnote

¹ Increased engine power needed to initiate movement and reach taxiing speed.