ACCIDENT

Aircraft Type and Registration:	Diamond DA 42 M Twin Star, G-DOSB	
No & Type of Engines:	2 Thielert TAE 125-02-99 piston engines	
Year of Manufacture:	2008 (Serial no: 42.328)	
Date & Time (UTC):	6 April 2018 at 0743 hrs	
Location:	Bournemouth Airport, Dorset	
Type of Flight:	Training	
Persons on Board:	Crew - 2	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to propellers, engine gearboxes, lower engine cowlings and various underside panels	
Commander's Licence:	Commercial Pilot's Licence	
Commander's Age:	63 years	
Commander's Flying Experience:	9,000 hours (of which 4,000 were on type) Last 90 days - 100 hours Last 28 days - 27 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and enquiries made by the AAIB	

Synopsis

Whilst downwind to land, the student pilot and his instructor were distracted while ensuring they had visual contact with an aircraft flying ahead of them in the circuit. Then, on base leg, when the student believed that he had lowered the landing gear, the instructor noticed the parking brake had been inadvertently applied and, although they rectified this, the instructor continued to consider the issue. He then realised they were on final approach, and overlooked a check of the aircraft's landing configuration, while coaching the student towards the runway. After touchdown it became apparent that the landing gear was UP and damage was incurred as the aircraft slid to a halt on the runway.

History of the flight

As part of a preparatory flight for a multi-engine class rating test, the student pilot re-joined the airfield circuit and made an approach, with the flaps configured normally. He encountered some difficulty maintaining the approach centreline and the correct speed, due to the "challenging" conditions; there was turbulence and an estimated crosswind of 14 kt. Nevertheless, a satisfactory touch-and-go landing was achieved and the aircraft then manoeuvred onto the downwind leg, for an approach to land, without the use of flaps.

While downwind, the student actioned the '*Pre Landing*' checklist, which includes confirmation that the parking brake is selected '*Off*'. He then commenced the '*Final Descent*' checklist

and believes he said “gear down”, before reducing power and commencing a turn onto base leg. However, the instructor recalled that the student placed one hand on the landing gear control lever and was about to turn onto the base leg, when it became apparent that neither of them could see a preceding aircraft. Because of this, the instructor asked the student to continue downwind but, after a short time, they spotted the aircraft ahead and then began the turn onto the base leg.

Once on the base leg, the instructor noticed the parking brake was on and pointed this out, but the student responded that he thought the parking brake lever was off. They then discussed the fact that the aft positions of the two adjacent heating controls are labelled OFF, whereas the parking brake lever functions in the opposite sense; its aft position is labelled LOCK and the checklists refer to this as ‘*On*’. Consequently, the student released the parking brake, by moving the lever forward to the ‘*Off*’ position (labelled RELEASE), but the instructor remained distracted for several seconds, contemplating why the parking brake lever had been erroneously set.

The aircraft was established on short final approach, but offset from the centreline, before the instructor switched his attention away from the issue of the lever positions and markings. He considered instigating a go-around but decided instead to coach the student back towards the centreline. While he did this, the student made large power changes, to try and control the airspeed, which was tending to increase. Because he was fully occupied monitoring the student’s actions, the instructor overlooked a required check that the aircraft was stable and in a landing configuration at 100 ft aal.

As they passed over the runway threshold, the student gradually reduced power and the aircraft made a gentle touchdown on the asphalt runway, without any initial indication of abnormality. However, unusual noises were then heard and it became apparent that the landing gear was UP and that the propellers were striking the surface as the aircraft slid to a halt, with the underside of the engine cowlings and the fuselage in contact with the runway. The instructor then shut the aircraft systems down, before he and the student opened the canopy and vacated. They observed that the landing gear lever was in the UP position but noticed that the gear doors appeared to have opened and that the tyres had become partially visible (Figure 1).

Crew comments

Following the accident, the instructor stated that he and the student overlooked checking the landing gear indications for three reasons. Firstly they were distracted by looking for the traffic ahead of them in the circuit, secondly there was some confusion due to the mis-selection of the parking brake and, thirdly they continued an unstable approach, which led to the instructor coaching the student and forgetting to check the aircraft was stable and in the landing configuration at 100 ft.

The student reflected that he might have been distracted, either by the other traffic or by the parking brake position, and that it is possible he did not move the landing gear lever. He observed that earlier in the flight, and also on previous flights, he had been asked to respond to simulated emergencies using ‘touch drills’ only; touching the relevant levers or

switches but not activating them. He said it was possible, because of his high workload, that he inadvertently touched the landing gear lever but did not move it.

Figure 1

G-DOSB prior to an attempt to raise it using airbags.
The nose landing gear doors are open and the nosewheel appears to rest on the runway

During the latter stages of the approach, the student remembered that the airspeed kept increasing. He had assumed this was due to the additional power he applied to compensate for the strong crosswind, or because it was a flapless approach. However, he realised after the accident that, because the landing gear was UP, the aircraft had created less drag than normal and therefore less thrust was required.

The aircraft operator stipulates an '*Approach Gate*' at 400 ft aal when on a visual approach and, at this point, the student should have called '*400 stable*' or '*400 not stable, go-around*'. One of the parameters which has to be checked before calling '*400 stable*' is that the landing gear is DOWN, with three green indicators lit. Neither crew member recalled this being said and the student suspected that he either forgot it, because he was working hard to manage the approach, or that he made it without actually looking at the position of the landing gear lever. His recollection was, that at 100 ft aal, he did state '*100 landing*', which suggests he had convinced himself the landing gear was down. However, he noted that most of his previous experience had been on types with fixed landing gear and this could have influenced his decision making process at a time of high workload.

Earlier in the flight, while practising an engine fire drill, the student recalled hearing an intermittent aural warning from a remote cockpit speaker, which indicated the landing gear was UP and one power lever was positioned at 17% of its range, or less. Neither pilot recalled hearing this aural warning prior to the aircraft's final touchdown.

Operator's report

The aircraft operator's initial report suggested that the parking brake may have been selected '*On*' instead of the gear lever being set to DOWN. When this was noticed, it led to distraction and some confusion, partly due to the different directions in which the parking brake lever and the adjacent heating controls operate. This distraction prevented the instructor from effectively monitoring the student, who was working at high capacity during the approach.

It is possible that the landing gear was either fully or partially deployed for the landing but it retracted after touchdown, so checks will be made on the serviceability of the landing gear and its aural warning system when the aircraft is repaired. The aircraft operator also plans to review the operating parameters and the adequacy of the aural warning system, and to consider incorporating the labelled positions for the parking brake lever in the aircraft checklists.

Other recommendations from the aircraft operator's internal report included:

- Crews be reminded of the necessity for carrying out entire checklists correctly and without interruption. In addition, there should be an internal review of the manner in which checklists are completed, and guidance provided on the actions required if a checklists is interrupted.

- Crews be reminded of the importance of the 'Approach Gate' checks, with instructors reminded also of the prime importance of monitoring students' actions, especially at crucial stages of flight.

- Crews be reminded that a go-around is often the best and safest course of action if an approach becomes unstable or is rushed. Any unresolved or unusual aircraft situations should be dealt with at a safe altitude, when time and available capacity allow the best opportunity for problem solving.