Piper PA-28-181, G-BOXY

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INCIDENT

Aircraft Type and Registration:	Piper PA-28-181, G-BOXY
No & Type of Engines:	1 Lycoming 0-360-A4M piston engine
Year of Manufacture:	1988
Date & Time (UTC):	1 October 2000 at 1530 hrs
Location:	Netherthorpe Airfield, Nottinghamshire
Type of Flight:	Training
Persons on Board:	Crew - 1 - Passengers - 3
Injuries:	Crew - None - Passengers - None
Nature of Damage:	Nosewheel spat
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	35 years
Commander's Flying Experience:	510 hours (of which 90 were on type) Last 90 days - 168 hours Last 28 days - 140 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

History of the flight

The aircraft was being operated by a flying club and had been hired for a trial lesson. The lesson had been given to the trainee as a birthday present, and he and his friends, two of whom were to accompany him on the flight, arrived at the airfield in good time for the planned departure. The flying instructor tasked to conduct the flight had flown the aircraft on its previous flight and, prior to meeting the passengers, he refuelled the aircraft to half-full tanks.

The weather for the flight was fine with a low-pressure system to the northwest of Ireland producing a moderate south to southwesterly airstream over the area and a temperature of 15°C. Mean sea level pressure was 998 millibars which gave a pressure altitude at Netherthorpe, which is 250 feet above mean sea level, of 700 feet. The surface wind at the time of the accident was

approximately 150°/7 kt. Netherthorpe is a grass airfield with two intersecting runways available for take off and landing. Runway 24, which was in use at the time of the accident, has a take-off run available (TORA) of 488 metres with an upslope of 1.9%.

The flying instructor briefed the student and passengers on their safety harnesses and emergency egress procedures. None of the occupants was weighed and weight and balance calculations for the proposed flight were not carried out.

The pilot decided to use flap 10° for the take-off with a rotation speed of 55 kt. The aircraft appeared to accelerate normally and the passengers recall that the nosewheel lifted off the ground some time before the aircraft became airborne. The pilot stated in his report that the aircraft seemed to lose power shortly after becoming airborne and it would not climb above a few feet. As he became aware that the perimeter hedge was rapidly approaching, he pitched the aircraft nose up to climb over the hedge. Immediately the aircraft pitched up the stall warning sounded and the right wing dropped slightly. Realising that the aircraft had insufficient performance to continue, the pilot closed the throttle and landed the aircraft straight ahead in a field of sugar beet. The aircraft came to a halt facing to the east about 180 metres beyond the end of the runway having sustained minor damage to a wheel spat.

Post incident flight test

Initial examination of the aircraft found no major fault with the engine and a flight test was therefore conducted. The test was carried out in accordance with the CAA Airworthiness Flight Test Schedule and revealed that the aircraft was performing in accordance with published performance figures.

Video recording of the flight

A video recording of the flight was taken by one of the passengers. Analysis of the frequency spectrum recorded on the audio channel of the video shows that the engine RPM remained constant at approximately 2,340 RPM from just after the beginning of the take-off roll to the point where the stall warning sounds and the aircraft descends into the field.

Aircraft performance

None of the passengers was weighed prior to the accident and it has therefore not been possible to determine an accurate figure for the weight of the occupants. However, weights obtained after the event indicate that the total occupant weight was approximately 355 kilograms. Similarly an accurate fuel load was not available. The pilot had refuelled the aircraft by visually checking the level in the tanks. Since the amount of fuel was below the level of the fuel tank tab indicators the exact amount of fuel on board is not certain. The pilot estimates that there was 65 kg of fuel on board.

The aircraft's basic empty weight was 720 kg and using the above estimates for occupant and fuel weight, the total take-off weight was therefore 1,140 kg. The maximum take-off weight for this aircraft is 1,160 kg.

The Pilot's Operating Handbook (POH) provides unfactored performance figures based on flight test data using a new aircraft and engine. Take-off data assumes that full throttle is applied before brake release and that the runway is a dry, paved, level surface. The POH makes no mention of flap

10° as a recommended take-off flap setting and no performance data for flap 10° is provided; however, flap 0° and flap 25° data is given. The recommended flap setting for a short field take off is flap 25°. The remainder of this performance analysis provides figures for both flap 0° and flap 25° on the assumption that flap 10° performance lies somewhere between the two. The take-off distance required to a height of 50 feet assuming zero wind, 15°C and weight of 1140 kg is 609 metres for flap 0° and 539 metres for flap 25°.

The CAA General Aviation Safety Sense leaflet No 7B, entitled Aeroplane Performance, provides guidance on how to factor the above figures for a grass surface and slope. The recommended factor for a dry grass surface and a 2% slope are 1.2 and 1.1 respectively. By applying these factors, the take-off distances required for the incident aircraft would have been 803 metres for flap 0° and 711 metres for flap 25°.

The Safety Sense leaflet also strongly recommends that distances should be factored to take account of lack of practice, incorrect speeds/techniques, aeroplane and engine wear and tear and less than favourable conditions. The safety factor recommended is 1.33 and when this is applied to the above figures the take-off distance required for flap 0° becomes 1,067 metres, and for flap 25° becomes 945 metres. Both these figures are well in excess of the runway length available.

The aircraft POH also provides performance figures for take-off ground roll. The CAA factors are designed to be applied to data for take-off distance to a height of 50 feet and they do not provide a completely accurate picture when applied to ground roll alone; however, their application to ground roll data can provide a useful guide. In this accident the factored ground roll required for take off is 587 metres for flap 0° and 512 metres for flap 25°. The available length of Runway 24 was 488 metres.

Organisational and management information

The CAA's Aeroplane Performance Safety Sense leaflet quotes Article 43 of the Air Navigation Order which states that it is the responsibility of the pilot in command to ensure that the aircraft will have adequate performance for the proposed flight. The leaflet goes on to say that it may not be necessary to check the performance data before every flight especially if there is an obvious surfeit of runway available.

Netherthorpe, however, is a licensed airfield with one of the shortest available take-off and landing distances in the UK. All the runways are grass and the longest runway (Runway 24) which is oriented into the prevailing wind has an upslope of 1.9%. Performance margins for light aircraft loaded with more than two persons can become very tight and there have been previous accidents and incidents where the lack of available runway length has been a contributory factor.

The Aero Club provides no written performance guidance for its members or instructors and relies instead on the commander's responsibility to ensure availability of adequate aircraft performance. Requests for non-fare paying passengers to be carried on trial lesson flights are normally approved in principle by operations staff, and it is the responsibility of the operating instructor to check if the passengers can be carried within normal performance margins.

Discussion

The post incident flight test and the frequency analysis of the video recording audio indicate that it is unlikely that an engine malfunction caused this accident. Analysis of the performance data from

the POH, factored in accordance with CAA recommendations, indicates that there was insufficient take-off run available for the aircraft to become safely airborne and avoid the perimeter hedge.

Ultimate responsibility to ensure adequate performance for the flight rests with the commander, but in the flying club environment, where the level and type of experience can vary widely, the club should provide some guidance. In particular, flying clubs should have a policy on the application of CAA recommended performance factors and should provide guidance on preferred flap settings, carriage of passengers and the need to check operating handbook performance data.

Safety recommendation

Recommendation 2001-01

It is recommended that the CAA should encourage flying clubs to develop a written policy on the application of CAA recommended performance factors and to make this policy, together with performance guidance, available to flying instructional staff and club members. The club management should routinely monitor the implementation of its policy.