No: 12/92 **Ref: EW/G92/08/27** **Category: 1c**

Aircraft Type and Registration:	Piper PA-34-200-2 Seneca, G-AZTO
No & Type of Engines:	2 Lycoming IO-360-C1E6 piston engines
Year of Manufacture:	1972
Date & Time (UTC):	27 August 1992 at 0735 hrs
Location:	Beverley Airfield, Humberside
Type of Flight:	Public Transport
Persons on Board:	Crew - 1 Passengers - 5
Injuries:	Crew - None Passengers - None
Nature of Damage:	Severe distortion of port wing, rear fuselage and landing gear. Port propeller and engine damaged.
Commander's Licence:	Commercial Pilot's Licence with Instructor rating
Commander's Age:	27 years
Commander's Flying Experience:	1,770 hours (of which 230 were on type) Last 90 days - 65 hours Last 28 days - 35 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot. Further inquiries by AAIB and study of other reports.

History of the flight

The aircraft took off from Stapleford aerodrome at 0630 hrs and arrived overhead Beverley airfield at 0735 hrs. The commander states that the flight was VMC throughout, despite passing the occasional shower south of Humberside, and that there was no cloud below the aircraft as he arrived overhead Beverley. He then circled the airfield at 1700 feet to check for any activity and to assess the direction and strength of the wind from the windsock. The wind favoured runway 12, being about 20°-30° from the right, so he positioned downwind and proceeded to the final approach. The threshold speed was 77 kt IAS, with 40° flap, and the throttles were closed when about 30 feet over the hedge. Although the speed had reduced to about 50 KIAS as the aircraft touched down, the aircraft seemed to float as if the wind had changed and the commander considered initiating a 'go around'. However, with only 50 kt IAS and with full flap and gear down, he decided against this and applied maximum braking. He reports that this was not as effective as he expected and the aircraft continued along the runway, decelerating slowly to a walking pace, and ran off the end of the runway into a 10 foot deep ditch.

The commander reports that he was not aware of any rain in the immediate area and, as it was not raining at the time of his arrival, he did not anticipate wet grass. In the event, the runway was wet and the commander states that had he realised this before landing, he would have diverted to Humberside.

The lap and diagonal safety harnesses successfully restrained the front seat occupants as did the lapstraps of the rear seats. There was no fire and the occupants vacated the aircraft from the rear exit in less than one minute.

Flight preparation

The commander had been briefed by telephoned the previous evening by another company pilot whom he was to replace. This pilot also briefed him on the particular requirements of operating into and out of Beverley. The task was to fly three passengers from Stapleford aerodrome, in Essex, to Beverley aerodrome, Yorkshire.

The commander reported for duty at Stapleford at 0600 hrs and carried out a self briefing for a departure at 0630 hrs. This briefing included checking the destination weather and the fuel, as well as calculating the weight and balance of the aircraft and the landing and take-off performance figures for Beverley. Beverley is an unlicensed grass aerodrome which requires that operators obtain prior permission to land, but the company's operations staff had not obtained this. The commander believed that prior permission to land had already been obtained by the company but, nevertheless, as he approached the airfield he tried unsuccessfully to make radio contact and landed at Beverley at 0735 hours. The published hours of operation are '0800 hrs to sunset'.

The destination area weather, provided by an observation taken 40 minutes before his departure from Stapleford, was recorded on the commander's navigation log as:

EGNJ (Humberside) 0550 hrs 190°/17kt , 27/1900, 4/4500, 8/1600, +15°/13°, 1007mb

Whereas the actual weather reported was:

EGNJ (Humberside) 0550 hrs 170°/15 kt, 5 km, Slight rain, 4/700, 8/1300, +12°, 999mb

The TAF for Humberside was also recorded on the navigation log and it forecast rain.

The commander anticipated using runway 12 at Beverley, which provides a Landing Distance Available (LDA) of 626 metres, and calculated that, at his planned landing weight, the Landing Distance Required (LDR) on dry grass would be 625 metres.

However, when the passengers arrived at Stapleford, the commander noted that there were five instead of the planned three and that they were pressing for a speedy departure. He states that, although he

made a quick calculation of the revised take-off weight and found it to be approaching the Maximum Total Weight Authorised (MTWA) of the aircraft, 1905 kg, he did not make out a revised loadsheet.

Meteorology

No in-flight weather reports were recorded on the navigation log. At the time of his arrival at Beverley, the actual weather reports available were:

Humberside (20 nm south) 0720 hrs: 200°/22-33 kt, 8 km, Rain, 2/1000 feet, 3/1500, 997mb
Linton (30 nm northwest) 0700 hrs: 140°/12 kt, 5 km, Rain/Drizzle, 5/300 feet, 6/500, 996mb
Finningley (35 nm southwest) 0700 hrs: 180°/12 kt, >10 km, Rain 2/900 feet, 996mb
Leconfield (Local) Wind reported only: 0700 hrs 150°/10 kt and 0800 hrs 160°/17kt

Aircraft loading limitations

The take-off weight shown on the loadsheet for the departure from Stapleford was 1830 kg which, corrected for various errors, should have read 1798 kg. The Regulated Take-off Weight would have been the same as the MTWA of 1905 kg, providing an underload of 107 kg before any last minute changes. Therefore, the last minute addition of two adult passengers, even allowing that both might be females (standard weight 65 kg), would have caused the MTWA to be exceeded.

The estimated landing weight shown on the loadsheet for Beverley was 1772 kg, 42 kg below the maximum structural limit for landing. Even using the previous corrections to increase this underload to 74 kg, the addition of two adult passengers would have caused the maximum structural limiting weight to be exceeded by a significant margin.

Performance

The commander has stated that he calculated that the LDR on the (dry) grass runway would be about 625 metres at his planned landing weight. This, even using his own calculated LDR of 578 metres factored by 110% for dry grass, was incorrect and should have read 636 metres, which just exceeded the LDA. He then estimated that the two extra passengers made the weight up to the maximum, but omitted to calculate that, even using the dry grass increment, this would have put the LDR up to 650 metres, thereby significantly exceeding the LDA. Using the necessary wet grass factor of 125%, quoted in the Operations Manual, the LDR would have increased to 739 metres, which represents an excess requirement of 113 metres over the LDA.

The airspeed indicator

At the commander's instigation, the airspeed indicator was calibrated after the flight. This confirmed his suspicion that it was under reading. At an indicated threshold speed of 77 kt the actual flying speed was 95 kt and, at an indicated touchdown speed of 50 kt the actually speed was 70 kt. This unrealised 40% increase in touchdown speed totally invalidated any LDR calculations and was, no doubt, a major factor in the overrun.