

# Piper PA-28-181, G-BEMW, 21 October 1997

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| <b>Aircraft Type and Registration:</b> | Piper PA-28-181, G-BEMW   |
| <b>No &amp; Type of Engines:</b>       | 1 Lycoming O-360-A4M piston engine  |
| <b>Year of Manufacture:</b>            | 1976  |
| <b>Date &amp; Time (UTC):</b>          | 21 October 1997 at 1230 hrs   |
| <b>Location:</b>                       | Thrupton Airfield, Andover, Hampshire   |
| <b>Type of Flight:</b>                 | Private   |
| <b>Persons on Board:</b>               | Crew - 1 - Passengers - 1   |
| <b>Injuries:</b>                       | Crew - None - Passengers - None   |
| <b>Nature of Damage:</b>               | Damage to left wing tip, leading edge and root area                                   |
| <b>Commander's Licence:</b>            | Private Pilot's Licence   |
| <b>Commander's Age:</b>                | 49 years  |
| <b>Commander's Flying Experience:</b>  | 460 hours (of which 103 were on type)<br>Last 90 days - 5 hours<br>Last 28 days - Nil |
| <b>Information Source:</b>             | Aircraft Accident Report Form submitted by the pilot                                  |

On parking the aircraft on the apron at Thrupton, the right brake pedal offered no resistance to foot pressure. The pilot subsequently found a brake pad, together with a quantity of brake fluid, on the ground next to the right landing gear. Upon his request, two engineers from a maintenance organisation based on the airfield inspected the right wheel and found that two bolts on the brake assembly had failed. They agreed to replace the bolts, but asked the pilot to taxi the aircraft to the hangar, which was a considerable distance away. The pilot was reportedly initially reluctant to taxi his aircraft, but after discussions with the engineers on controlling the aircraft by means of the left brake and rudder pedal steering, he agreed.

The defective brake unit was secured to the right landing gear and, with the aid of a marshaller and safety personnel, the aircraft was taxied at a slow pace to the hangar. There were no problems with

directional control until the final turn, which was to the right, to park the aircraft outside the hangar. The initial part of the turn, made in response to the marshaller's instructions, was normal. However the turn radius began to increase despite corrective rudder pedal application. Realising that the aircraft was now heading for the hangar, the pilot closed the mixture control to stop the engine, but was unable to prevent the left wing tip/leading edge from striking part of the hangar support structure.

The apron in front of the hangar was large enough to complete a 180° turn, although there was a distinct slope. In retrospect, the pilot considered that the slope further degraded the turning ability of the aircraft. He also regretted that he allowed himself to be persuaded to taxi the aircraft, instead of using a towing arm, and of course he could have insisted that the aircraft be repaired at its initial location.

The original problem, as noted above, was the failure of two bolts that held together the brake calliper assembly. This essentially consisted of the brake cylinder (which contained the piston) and a backing plate. Each bolt had been secured by threaded holes in the backing plate. Both bolts had failed through their threaded sections, just below the surface of the plate. The bolts, which were not subject to a finite life, were examined by insurance assessors and according to a verbal report were found to be approximately 1/16 inch shorter than those specified by the correct part number. This had resulted in the bolts not extending into the complete depth of the holes in the backing plate, with an area of exposed threads in the unthreaded hole in the cylinder (the latter is flush with the face of the backing plate when assembled). In addition, the bolts were old and worn in appearance, with areas of the protective cadmium plating in a deteriorated condition. Although a metallurgical examination has not yet been carried out, it is probable that one bolt failed as a result of a fatigue crack extending from a corrosion pit. This would have caused bending loads in the remaining bolt during brake applications. Associated distortion was visible on one of the bolts. Failure of the second bolt, according to the verbal report, appeared to have occurred as a result of bending fatigue and overload.

It was reported that the left brake unit bolts were AN4-17H items and were of the correct length. They had not failed, although they had the appearance of having been on the aircraft for a long time.

It was not established where, or when, the brake unit bolts had been last replaced. However, it must be assumed that the brake pads had been replaced at regular intervals. Such occasions provide opportunities to inspect such bolts, in accordance with normal engineering practice and the Civil Aviation Authority have indicated that they will include an article on this subject in a future issue of the General Aviation Safety Information Leaflet (GASIL).