

AAIB Bulletin No: 2/96

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Category: 1.2

Aircraft Type and Registration: Piper PA-23-250 Aztec, G-BATX

No & Type of Engines: 2 Lycoming IO-540-C4B5 piston engines

Year of Manufacture: 1973

Date & Time (UTC): 28 October 1995 at 1225 hrs

Location: Southend Airport, Essex

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - 1

Injuries: Crew - None Passengers - None

Nature of Damage: Right engine and propeller; right flap, aileron, landing gear doors and wingtip

Commander's Licence: Private Pilot's Licence

Commander's Age: 34 years

Commander's Flying Experience: 153 hours (of which 44 were on type)
Last 90 days - 58 hours
Last 28 days - 22 hours

Information Source: AAIB Field Investigation

During his pre-start checks, the pilot noticed that when the battery master switch was selected ON only the nose and left main landing gear green 'down-and-locked' lights illuminated immediately, but the right main green light illuminated some four seconds later. This anomaly was put down to an indication fault since the aircraft had a history of right main landing gear down-and-locked indication problems. The subsequent takeoff and flight to Southend was uneventful. During the final approach to land the pilot lowered the landing gear and saw the three landing gear green down-and-locked lights illuminate. However, he noted that the flaps displayed a tendency to retract and this was countered by the passenger holding the flap selector in the DOWN position. The landing was carried out successfully and the aircraft taxied off the runway to the left. Just after clearing the runway the aircraft started to 'list' and turn to the right. The pilot applied left rudder to counter the right swing but the right-hand propeller blades contacted the tarmac taxiway surface. The aircraft was brought to a halt and the engines shut down.

The site of the accident was examined and it was noted that as the aircraft had taxied left from the runway to the taxiway the left mainwheel had entered a rain water drainage gully, approximate 115 mm deep, that ran along the edge of the runway and taxiway.

The landing gear and flap systems on this type are operated by hydraulic pressure which is generated by a single hydraulic pump fitted to the No 1 engine. The system is managed by a hydraulic powerpack unit located in the control pedestal below the cockpit instrument panel. The operation of the powerpack is controlled by the flap selection lever, mounted on the left-hand side and the landing gear selection lever, mounted on the right-hand side (some 130 mm apart). The landing gear lever has a sprung mechanical latch which has to be displaced to one side before the lever can be moved to the UP position. The powerpack also serves as a hydraulic fluid reservoir. The landing gear and flap hydraulic systems are similar in operation. When either lever is moved to the UP or DOWN position, a detent spring holds the lever in that position. The movement of either lever allows hydraulic pressure to the appropriate sides of the extension/retraction actuators and also opens non-return valves. Once the extension/retraction actuators have achieved their full travel there is a build-up of hydraulic pressure within the system which, when it achieves a set pressure, withdraws the detent spring which allows the lever to return to the centre OFF position. This action also closes non-return valves which lock hydraulic fluid pressure in the appropriate system. Both levers can be returned manually to the OFF position at any time during the extension/retraction process. If both landing gear and flap selectors are moved to the extension or retraction positions at the same time, the flap system will not activate until the landing gear has completed its operation. In addition, a manual hydraulic pump is mounted within the powerpack and is operated by an extending handle in the cockpit. There is an oleo actuated hydraulic bypass valve on the left main landing gear which, when the oleo is compressed (ie aircraft on the ground), prevents hydraulic pressure entering the landing gear retract line if the landing gear lever is moved inadvertently to the UP position.

Following the accident, a local aircraft engineering company recovered the aircraft from the taxiway by lifting the right wing and manually locking down the right main landing gear leg. They did not require to use the manual hydraulic pump, or operate the landing gear selector lever to extend the landing gear. The aircraft was examined by the AAIB four days later and it was noted that when the electrical master switch was selected ON there were green landing gear down-and-locked lights illuminated for the two main landing gears, but not for the nose gear; the landing gear selector lever was in the neutral position. When the landing gear lever was selected DOWN and the hydraulic system pressurised using the manual pump, the nose gear green light illuminated. The aircraft was then placed on jacks and the landing gear retraction/extension system exercised using the manual hydraulic pump; during these tests, no fault could be found. However, it was noted that with the landing gear extended and the three green down-and-locked lights illuminated, if the landing gear lever was selected from neutral to UP, with no hydraulic pump pressure, the nose gear unlocked and the associated green down-and-

locked light went out. The landing gear was then selected and pressurised to extend and with the three green down-and-locked lights illuminated the aircraft was taken off the jacks. Two weeks later the aircraft was examined and it was noted that the three green down-and-locked lights were still illuminated, indicating that there was no leak in the landing gear hydraulic system. The absence of the nose gear green light noted earlier thus suggested that prior to the first inspection by the AAIB the landing gear lever had been selected to the UP position with little or no hydraulic pressure in the system. The aircraft was placed on jacks for a second time, the hydraulic system contents checked and found to be within limits and a comprehensive check of the system made using a ground hydraulic rig. No fault could be found with the operation of either the flap or the landing gear system except that the nose landing gear down lock was mis-rigged. The engine driven hydraulic pump was not tested at this time, but this will be tested at a later date and reported in an AAIB Bulletin addendum if a fault is found. Although the nose leg normally unlocks and begins its retraction before the right leg, it was found that with very little force the nose gear could be held in the extended position after it had unlocked and that the right main gear would then unlock and start to retract. The nose gear retracts rearwards but in its extended position it is angled forward of the vertical which, with the weight of the aircraft on the ground, would be sufficient to stop the nose gear from retracting after it had unlocked.

The aircraft's maintenance organisation stated that previous right landing gear down-and-locked indication problems were found to be due to corrosion within the cockpit indicator panel. This panel was replaced during a maintenance check prior to this accident.