Australian Government
Australian Transport Safety Bureau

**ATSB TRANSPORT SAFETY INVESTIGATION REPORT**
Aviation Occurrence Report – 200505808
Final

# Wheels-up landing – Birdsville, Qld – 12 November 2005
# VH-DEQ
# Piper Aircraft Corporation PA-31 Navajo

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Illustration of landing gear selector courtesy of Piper Aircraft Corporation.



**Abstract**

A Piper Aircraft Corporation PA-31 Navajo, registered VH-DEQ, was on a private VFR flight when it made a wheels-up landing on Runway 14 at Birdsville, Qld. The two occupants were unharmed, but the aircraft was substantially damaged. The pilot flying was gaining experience on the aircraft under the supervision of a Grade 1 flight instructor as part of a class endorsement on the aircraft.

The pilot flying reported that on late downwind he moved the gear selector to the DOWN position. Both pilots believed the landing gear was down and locked but could not recall whether the three green Down-Locked lights had illuminated. The landing gear selector was still in the DOWN position after the landing.

The Pilot's Operating Handbook explained that the gear selector moved from the DOWN to a neutral position when the landing gear extension cycle was complete. It stated that the gear lights were the primary means of confirming the landing gear status.

A post-accident examination of the landing gear system by an engineer did not find any defect.

The investigation found that although the pilot flying may not have operated the aircraft's landing gear selector correctly, contributing to the wheels-up landing, neither he nor the instructor had effectively ensured that the landing gear was down and locked.

# THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal Bureau within the Australian Government Department of Transport and Regional Services. ATSB investigations are independent of regulatory, operator or other external bodies.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations. Accordingly, the ATSB also conducts investigations and studies of the transport system to identify underlying factors and trends that have the potential to adversely affect safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and, where applicable, relevant international agreements. The object of a safety investigation is to determine the circumstances in order to prevent other similar events. The results of these determinations form the basis for safety action, including recommendations where necessary. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations.

It is not the object of an investigation to determine blame or liability. However, it should be recognised that an investigation report must include factual material of sufficient weight to support the analysis and findings. That material will at times contain information reflecting on the performance of individuals and organisations, and how their actions may have contributed to the outcomes of the matter under investigation. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. While the Bureau issues recommendations to regulatory authorities, industry, or other agencies in order to address safety issues, its preference is for organisations to make safety enhancements during the course of an investigation. The Bureau prefers to report positive safety action in its final reports rather than making formal recommendations. Recommendations may be issued in conjunction with ATSB reports or independently. A safety issue may lead to a number of similar recommendations, each issued to a different agency.

The ATSB does not have the resources to carry out a full cost-benefit analysis of each safety recommendation. The cost of a recommendation must be balanced against its benefits to safety, and transport safety involves the whole community. Such analysis is a matter for the body to which the recommendation is addressed (for example, the relevant regulatory authority in aviation, marine or rail in consultation with the industry).

# FACTUAL INFORMATION

The information presented below, including any analysis of that information was prepared principally from information supplied to the Bureau.

On 12 November 2005, a Piper Aircraft Corporation PA-31 Navajo, registered VH-DEQ, was being operated in accordance with the visual flight rules on a private flight from Ayers Rock, NT to Birdsville, Qld. At about 1235 Eastern Standard Time[1], the aircraft was landed on runway 14 at Birdsville with the landing gear retracted. The two occupants, both pilots, were uninjured but the aircraft was substantially damaged.

The pilot flying reported that the aircraft was being ferried from Perth, WA, to Archerfield, Qld, via refuelling stops at Kalgoorlie, Ayers Rock and Birdsville, with an overnight stop at Ayers Rock. The flight also incorporated conversion training for the pilot flying in order gain a class endorsement for the aircraft type. The other pilot was a Grade 1 flight instructor, endorsed on the class of aircraft. The flight to Kalgoorlie, WA, was conducted as a dual training exercise and the pilot flying subsequently flew the aircraft under the supervision of the instructor[2].

On the late downwind position in the circuit, the pilot flying reported moving the gear selector to the DOWN position. Both pilots reported that they usually checked for landing gear down indications, but could not recall whether the three green Down-Locked lights or the red Not-Locked light were illuminated.

The instructor reported that when the aircraft was on final approach, he asked the pilot flying whether he had carried out the finals checks. Those checks included checking that the landing gear was down and locked. The pilot flying reported that he checked the aircraft was correctly configured for the landing. He also reported that the approach and landing was normal until the propellers contacted the bitumen runway. Neither the instructor nor the pilot recalled hearing the gear unsafe warning horn. The gear selector was still in the DOWN position after the wheels-up landing.

A gear unsafe horn activates when the landing gear is not locked down and the throttle setting on one or both engines is reduced below 12 inches of manifold pressure. During a normal powered approach, the throttle setting can be greater than 12 inches of manifold pressure until the throttles are closed just before touchdown.

The pilot's operating handbook for the Navajo advised that to lower the landing gear, the gear selector handle is pulled aft and then lowered to the DOWN position. That action opens the inboard gear doors, illuminates a red Not-Locked light and extends the landing gear. When the landing gear legs are locked down, the three green Down-Locked lights illuminate. Once the inboard gear doors are closed, the extension cycle is complete and the gear selector automatically returns to a neutral position (Figure 1) and the red Not-Locked light extinguishes. In most other aircraft with retractable landing gear, the selector remains in the down position.

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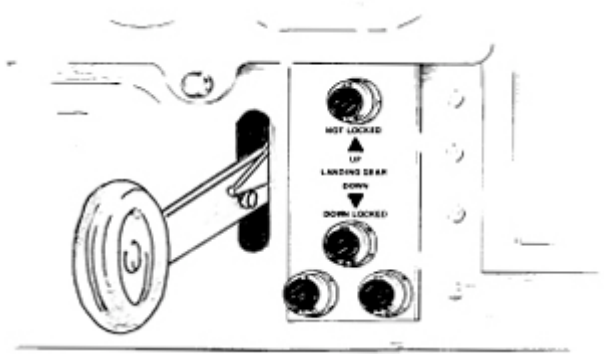
1 The 24-hour clock is used in this report to describe the local time of day, Eastern Standard Time (EST), as particular events occurred. Eastern Standard Time was Coordinated Universal Time (UTC) +10 hours.

2 A pilot cannot exercise command privileges, including in-command under supervision, on an aircraft until the type or class endorsement has been entered into the pilot's log book by the flight instructor or approved person.

**Figure 1: Landing gear selector (shown in a neutral position)**




Following the wheels-up landing, a licensed aircraft maintenance engineer examined the landing gear system. The aircraft was lifted on jacks and the landing gear was manually extended. The engineer reported that the landing gear sequenced normally, the three green Down-Locked lights illuminated and the gear selector returned to a neutral position. Subsequently, the engine-driven hydraulic pumps and the gear unsafe horn were checked and found to operate normally.

# ANALYSIS

Although the pilots reported that the landing gear was selected down, the landing gear remained retracted during the approach and landing. The manual extension of the landing gear after the occurrence and subsequent checks of the landing gear system found no mechanical defect.

The investigation was unable to establish the reason why the landing gear did not extend during the approach to land at Birdsville. It was possible that the pilot flying did not fully engage the landing gear selector and used the position of the gear selector as an indication of landing gear extension. More importantly, it appeared that neither pilot confirmed that the landing gear was down and locked by checking that the three green Down-Locked lights were illuminated.

The gear unsafe horn system is designed to prevent an inadvertent wheels-up landing. However, neither pilot reported hearing the gear unsafe horn. Normally, during a powered approach with more than 12 inches of manifold pressure, the system would not activate until the throttles were almost closed during the landing. At that point a pilot would probably not be able to conduct a safe go-around or have sufficient time to extend the landing gear.