

# The Dutch Safety Board

**Occurrence #:** 2002086 **Classification:** Accident

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## FACTUAL INFORMATION

|                          |                           |                     |                             |
|--------------------------|---------------------------|---------------------|-----------------------------|
| Date of the occurrence:  | 15-06-2002                | Phase of operation: | Landing                     |
| Place of the occurrence: | Maastricht Aachen Airport | Flight crew:        | 3                           |
| Type of flight:          | Test flight               | Passengers:         | 2                           |
| Aircraft registration:   | PH-SDU                    | Injuries:           | None                        |
| Aircraft model:          | DHC-8-311                 | Damage to aircraft: | Considerably damaged        |
| Type of aircraft:        | Passenger aircraft        | Weather conditions: | Of no influence on accident |

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## The flight and the occurrence

Before the aircraft would be returned to the lease company an acceptance flight was made. The cockpit crew consisted of a captain, a copilot and an observer of the lease company. One item of the test program was an instrument approach. After extending the landing gear the crew did not get a green light of the right-hand main landing gear. It turned out that the landing gear could be extended and retracted but it did not get in the (required) locked condition to be able to land. Even after performing the alternate gear extension procedure the problem still existed whereupon the captain decided to go to land. During the rollout after landing the right-hand landing gear collapsed. The aircraft was damaged considerably, the occupants remained unhurt.



The PH-SDU after the accident

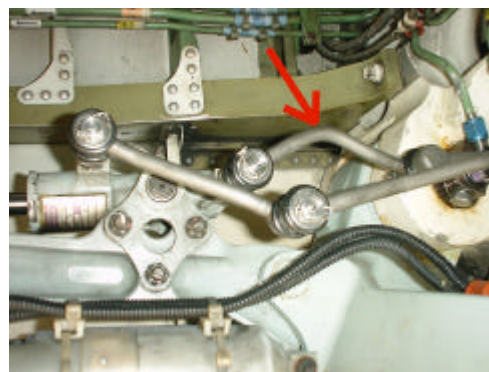
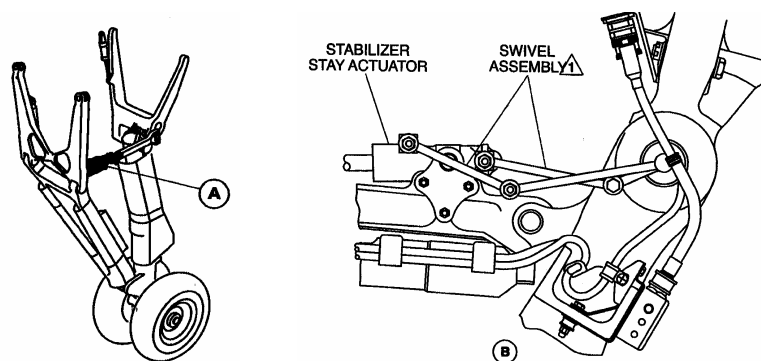


The damaged right-hand side

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## Investigation & Analysis

The incident flight was the first after right-hand landing gear change. Investigation revealed that the problem was caused by an upside down installed hydraulic swivel assembly.



The bent swivel tube (red arrow)

During gear retraction one of the swivel tubes was bent (see arrow in figure) as a result of which the landing gear could not get in the mechanical lock position. It is still unclear why the problem was revealed not until the test flight. After the gear change the wheels were retracted and extended a number of times in the hangar. All those times the mechanism functioned trouble-free.

A team of three experienced mechanics had carried out the gear change in which each others work was checked mutually. For the mechanic that installed the swivel tube it was the first gear change on this type of aircraft. It turned out that the swivel tube could be fitted in two ways, from which only one was correct. The inspection after the activities had concentrated primarily on general oil leakage and lock wiring, not on assembly direction of the swivel tube. None of both other mechanics was consequently aware of the reversed assembly. As far as known two more cases occurred worldwide of reversed assembly. The manufacturer of the aircraft has adapted the Aircraft Maintenance Manual as a result of the incident in Maastricht. A warning was entered in it and the installation was explained in more detail.

Furthermore it turned out that the alternate gear extension procedure did not anticipate on the possibility that the landing gear was permanently not locked. The crew also did not train for this in the simulator training program. In spite of the experienced captain on board the emergency landing procedure was not performed, partly due because it was not referred to in the alternate gear extension procedure. Meanwhile this is adapted by the operator.