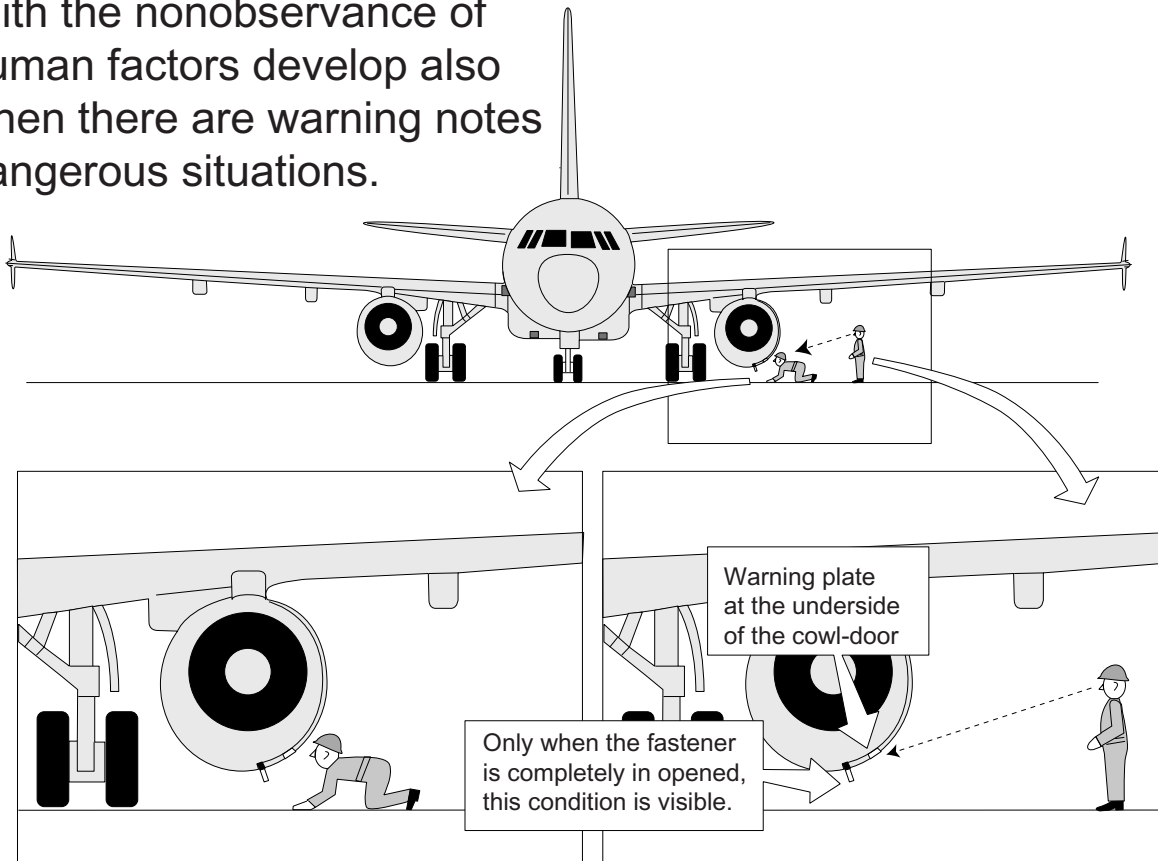


With the nonobservance of human factors develop also when there are warning notes dangerous situations.



To certain identify the condition of the cowl-fasteners the attendant has to move on his knees.

III. 19.1.1-6.3

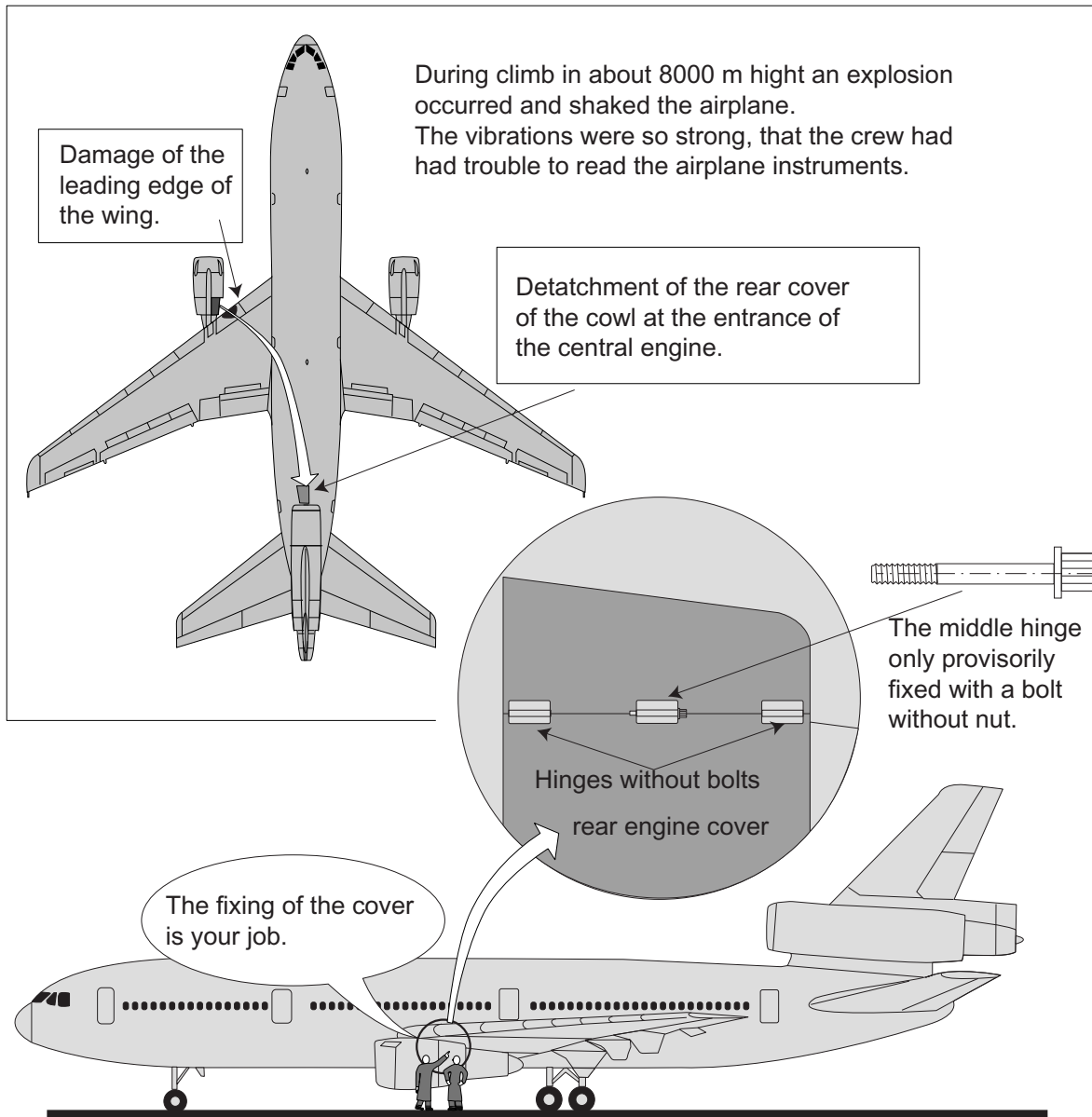
From 3 meters distance the cowl-fasteners are not visible. Standing, the warning plate at the cowl-door in closed position is only difficult to see.

control tour of the pilot before the flight. That this chance could not be used, must be seen in connection with the missing inscription in the „**journey logbook**“. This should rather contain unfinished work as an information for the pilot („**2f**“).

III. 19.1.1-6.3 (Lit. 19.1.1-1): To this the background is described in Ill. 19.1.1-6.1. The only slammed but unlocked **maintenance cover/door** of the engine cowl was **torn off during start**. It damaged the nacelle and the control surfaces. To the accident contributed, that it was only

possible **with effort** (on the knees, sketch below left) to **inspect the locking mechanism** möglich. Standing, for example during a control tour of the supervisor or pilot it was not possible to see at the closed door if the fastener/locking lever was correct activated. This was merely possible if the locking lever (ca. 10 cm long) was opened downward. A **warning plate** on the door above the fastener, that points to the problem, was **only easily readable at the opened maintenance door** (sketch below right). Such an **ergonomic deficit** may for example violate the rules of the „**human factors design guide**“ (Lit. 19.1.1-1.9).

A shift changeover with a not accomplished maintenance process is a potential risk.



*Ill. 19.1.1-7 (Lit. 19.1.1-8): Especially for problems in the line of shift changeovers during maintenance work **maintenance ports** and doors seem especially prone (see also Ill. 19.1.1-6.1). In this case ripped the torn off fuselage sided **door of the nacelle** from the left engine a big hole into*

*the leading edge of the related wing. It was then ingested by the middle engine which was thereby in- and outside heavily damaged. Possible reason was a **failure of the maintenance personnel** of the operator.*

Maintenance: „Human Factors“ Shift changeover and communication

Two days before the accident at this airplane a maintenance was carried out because of an indication of the locking warning light of the thrust reverser with the following distinctive features:

- The thrust reverser was exchanged, what required the **disassembly of the maintenance door** of the cowl.

- After the exchange the **door was again provisionally fixed**. Thereby merely the bolt of the middle hinge was inserted. A **securing with the appropriate nut did not occur**.

- The following shift was **verbal informed about the unfinished work**.

- But this shift could dedicate itself **not at once** to this task, because other airplanes had to be preferred. At the return **the supervisors supposed despite the former information**, that all three hinge bolts are attached and secured. They shut the door and secured the fastener.

- Obviously a **documentation** about the work at the thrust reverser and the door **did not occur in the maintenance lists**. This was also **not caught up during the approval of the airplane**. This went into the air traffic with the in the form papers as open listed work.

This process was **contrary to the approach defined** for inspections, maintenance and modifications, by the operator. This should prevent that an airplane goes into air traffic before the completion of all work:

- The organisation manual for the maintenance (**maintenance administration manual**) defines clearly **responsibilities** during shift changeovers.

- The manual for checks/inspections (**base check manual**) of the operator demands the **examination of deviations** to rule out a annoyance of the flight safety. Especially not normal opened doors and **covers/cowls must be opened once again for safety reasons**. This is to record in a maintenance attachment (**maintenance supplement**). In spite of the clear instructions such a record did not happen.

Note:

- **Don't leave provisionally conditions, respectively don't deliver those during a shift hand-over.**

Verbal informations to the following shift are from experience not sufficient safe. Even open work in the maintenance papers can not avoid surely the flight approval.