FACTUAL INFORMATION

Identification number:	2006082
Classification:	Accident
Date and time:	18 July 2006, 09.47 hours[1]
Location:	Rotterdam Airport (EHRD)
Aircraft registration:	TC-OAN
Aircraft model:	Airbus A321
Type of aircraft:	Passenger aircraft
Type of flight:	Commercial air transport
Phase of operation:	Landing
Damage to aircraft:	Substantial damage
Crew members:	2/5
Passengers:	146
Injuries:	None
Other damage:	None
Lighting conditions:	Daylight

SUMMARY

During the landing at Rotterdam Airport the aircraft experienced a tail strike.

FACTUAL INFORMATION

In the morning the aircraft departed from Antalya Airport (LTAI) in Turkey, as flight OHY601, with 146 passengers and seven crew members on board. The maximum capacity of the aircraft was 219 passengers.

At Rotterdam Airport the aircraft made a VOR-DME approach to runway 06. During this approach the aircraft was flown manually and the engine thrust was dictated by the auto thrust system. At 09.47 hours the aircraft touched down short of the runway threshold. During this touch down the aircraft's tail struck a paved surface, resulting in substantial damage to the empennage.

The captain, who was the pilot flying of the aircraft, stated that the aircraft lost speed and altitude during the final part of the approach. He reacted by increasing the aircraft's pitch attitude. According to him this should have caused the auto thrust system to add power. He indicated that he did not observe the desired response by the auto thrust system as he was looking outside at that moment. It is not clear if and how the first officer monitored the aircraft's instruments during this flight phase. He did not intervene or draw the captain's attention to the speed decay.

[1] Unless stated otherwise all times in this report are local times (UTC+2).

The weather conditions at the time of the accident were good, with a visibility of more than 10 kilometers and wind from the north with 3 knots.

Figure 1: TC-OAN experiencing the tail strike
(source: Rotterdam Airport authorities)

Figure 2: view on the aircraft's empennage with scrape marks

Figure 3: close up of the damaged area

INVESTIGATION AND ANALYSIS

When the captain raised the aircraft's nose, he intended the auto thrust system to add power. However, that did not happen. The increasing pitch attitude of the aircraft resulted in an increase of drag. As no thrust was added to overcome this drag, the aircraft lost even more speed and descended even faster. The aircraft touched down approximately 120 meters before the threshold of runway 06. This runway has a displaced threshold.[2] In this case this means that the threshold is located 200 meters from the beginning of the paved surface. So although the aircraft landed short it did however land on a paved surface.

After the flight the baggage was weighed and the passenger distribution was evaluated. It was concluded the weight and the weight distribution were within limits during the approach and landing.

Investigation of the aircraft maintenance logbook revealed five complaints with regard to the auto thrust system. This system regulates engine thrust and maintains the aircraft's speed. These five complaints, listed in appendix A, all stated that it did not function properly. The complaints were investigated by the company's technical department and various actions, which are noted as possible remedies in the aircraft maintenance manual, were performed. None of these actions solved the complaint, however. The last complaint was also noted in the hold item list (HIL). The HIL lists the deferred defects of the aircraft. According to the company's minimum equipment list (MEL) this aircraft is allowed to be operated with this particular complaint for a maximum of ten days. This may be done only after a placard is placed over the switch that operates the system from the cockpit (see figures 4 and 5). The placard indicates that the system is unserviceable. This placard was not found in the cockpit.

When a crew is offered an aircraft to be operated, the company's procedures require the flight crew to inspect the HIL to inform themselves regarding the status of the aircraft. The complaints noted in the HIL will be accompanied by a reference to the applicable chapter of the MEL. This should also be checked by the crew. In this case the HIL referred to MEL 22-30-1 where the restrictions for an unserviceable auto thrust system are described and the requirement that the auto thrust system switch in the cockpit should be placarded is laid down.

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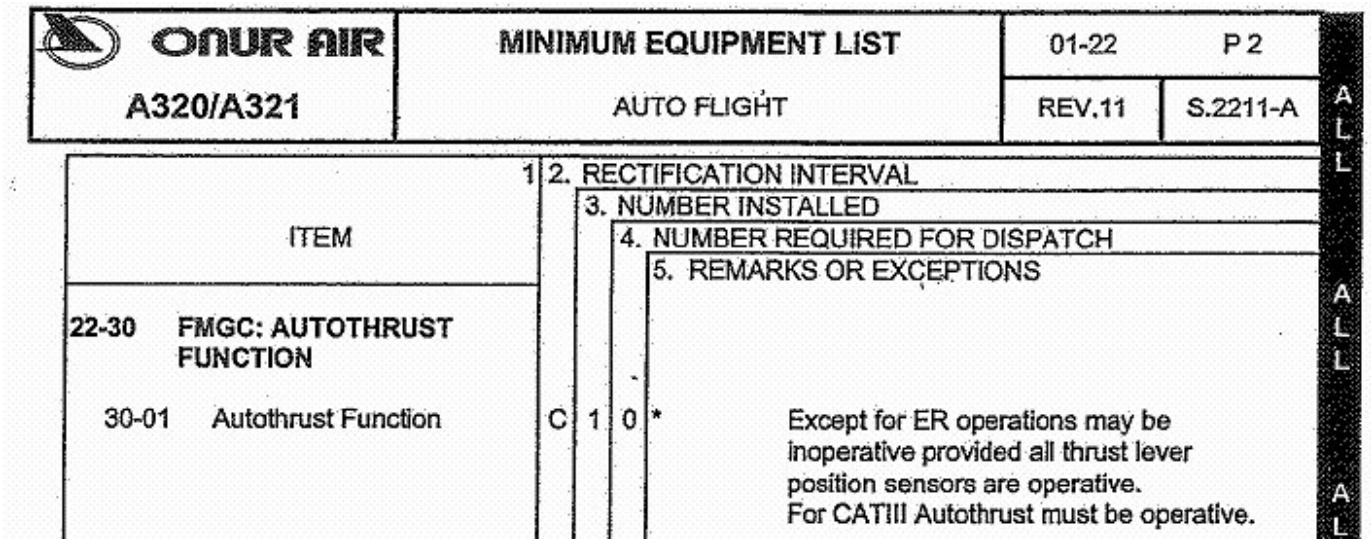
[2] A displaced threshold is used to accommodate an obstacle free approach path.



ONUR AIR

A320/A321

MINIMUM EQUIPMENT LIST

AUTO FLIGHT

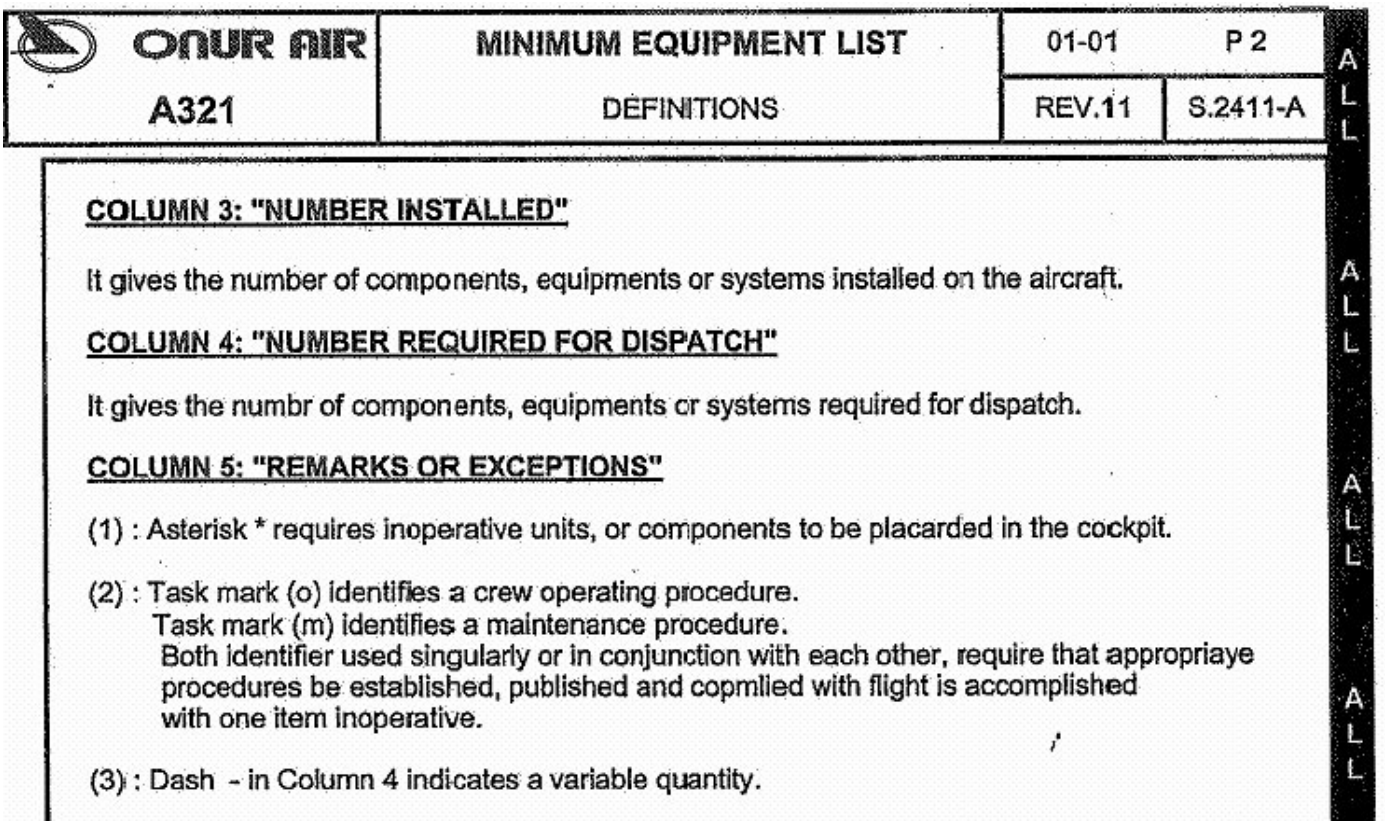
01-22 P 2

REV.11 S.2211-A

ALL ALL ALL

ITEM	1	2. RECTIFICATION INTERVAL	3. NUMBER INSTALLED	4. NUMBER REQUIRED FOR DISPATCH	5. REMARKS OR EXCEPTIONS
22-30 FMGC: AUTOTHRUST FUNCTION					
30-01 Autothrust Function	C	1	0	*	Except for ER operations may be inoperative provided all thrust lever position sensors are operative. For CATIII Autothrust must be operative.

Figure 4: copy of the Onur Air MEL, regarding the auto thrust system



ONUR AIR

A321

MINIMUM EQUIPMENT LIST

DEFINITIONS

01-01 P 2

REV.11 S.2411-A

ALL ALL ALL ALL

COLUMN 3: "NUMBER INSTALLED"

It gives the number of components, equipments or systems installed on the aircraft.

COLUMN 4: "NUMBER REQUIRED FOR DISPATCH"

It gives the numbr of components, equipments or systems required for dispatch.

COLUMN 5: "REMARKS OR EXCEPTIONS"

(1) : Asterisk * requires inoperative units, or components to be placarded in the cockpit.

(2) : Task mark (o) identifies a crew operating procedure.
Task mark (m) identifies a maintenance procedure.
Both identifier used singularly or in conjunction with each other, require that appropriaye procedures be established, published and copmlied with flight is accomplished with one item inoperative.

(3) : Dash - in Column 4 indicates a variable quantity.

Figure 5: copy of the Onur Air MEL, regarding the placard procedure

The MEL chapter regarding this subject also states that automatic approaches and landings (CAT III)[3] require the auto thrust system to be serviceable. This information is useful when a crew has the intention

[3] CAT III is terminology used to indicate that an aircraft is capable to make an automatic approach and landing during specific (poor) visibility conditions. This depends on aircraft equipment in combination with aerodrome approach equipment, ILS (Instrument Landing System).

to operate to a destination with poor visibility. Based on this information a crew can decide not to accept an aircraft with this complaint. The company's technical staff has used the MEL information outside its context and wrote in the maintenance logbook, without explicitly referring to the auto thrust failure: *"Managed speed dropping in VLS[4] zone on final approach. A/C no CAT III capability".*

The captain stated that he was convinced that despite the information in the maintenance log and in the minimum equipment list the auto thrust system could be used during this flight. He stated that because they executed a non precision approach the complaints in the maintenance log and the consequences thereof did not effect their operation.

It is possible that the remark "A/C no CAT III capability" confused the flight crew and let them to believe that the system was serviceable for all other types of flights and approaches. The use of the English language could also have been a factor.

During the accident flight the target speed during the approach was 129 knots. At approximately 180 feet radio altitude the aircraft's speed dropped below this target speed. At the moment of touch down the speed had dropped to 120 knots and the pitch attitude reached 9 degrees aircraft nose up. During this last part of the approach there was no reaction from the auto thrust system to correct the speed. Figure 6 depicts the aircraft's radio altitude, approach speed target, the computed airspeed, engine thrust, auto thrust system status, pitch attitude and side stick pitch inputs.

After the event the auto thrust system was extensively tested by Airbus and Onur Air by means of Airbus bench and simulator tests. Thereafter the system was flight checked by Onur Air during revenue flights, with the restriction that the system was not to be used below 1000 feet. Besides these tests various components were replaced and/or swapped with other aircraft. The most significant replacement was the replacement of all three angle of attack vanes[5] which were found out of limits. The under speed problem did not reoccur. Onur Air and Airbus agreed that the system is allowed to be used for revenue flights again. On request of Airbus, Onur Air has fitted extra memory cards in the aircraft to facilitate analysis by Airbus in case of re-occurrence of under speed events.

CONCLUSION

The accident could have been prevented if the Onur Air procedures would have been followed correctly. Due to the limited scope of this investigation the underlying causes for not following these procedures was not investigated.

This report is published in the Dutch and English languages.
In the event of conflict in interpretation, the Dutch text will be deemed binding.

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4 VLS: lowest selectable speed.

5 Angle of attack vanes: sensors placed on the nose of the aircraft used for measuring the angle of the aircraft relative to the air flow around the aircraft during all phases of flight.

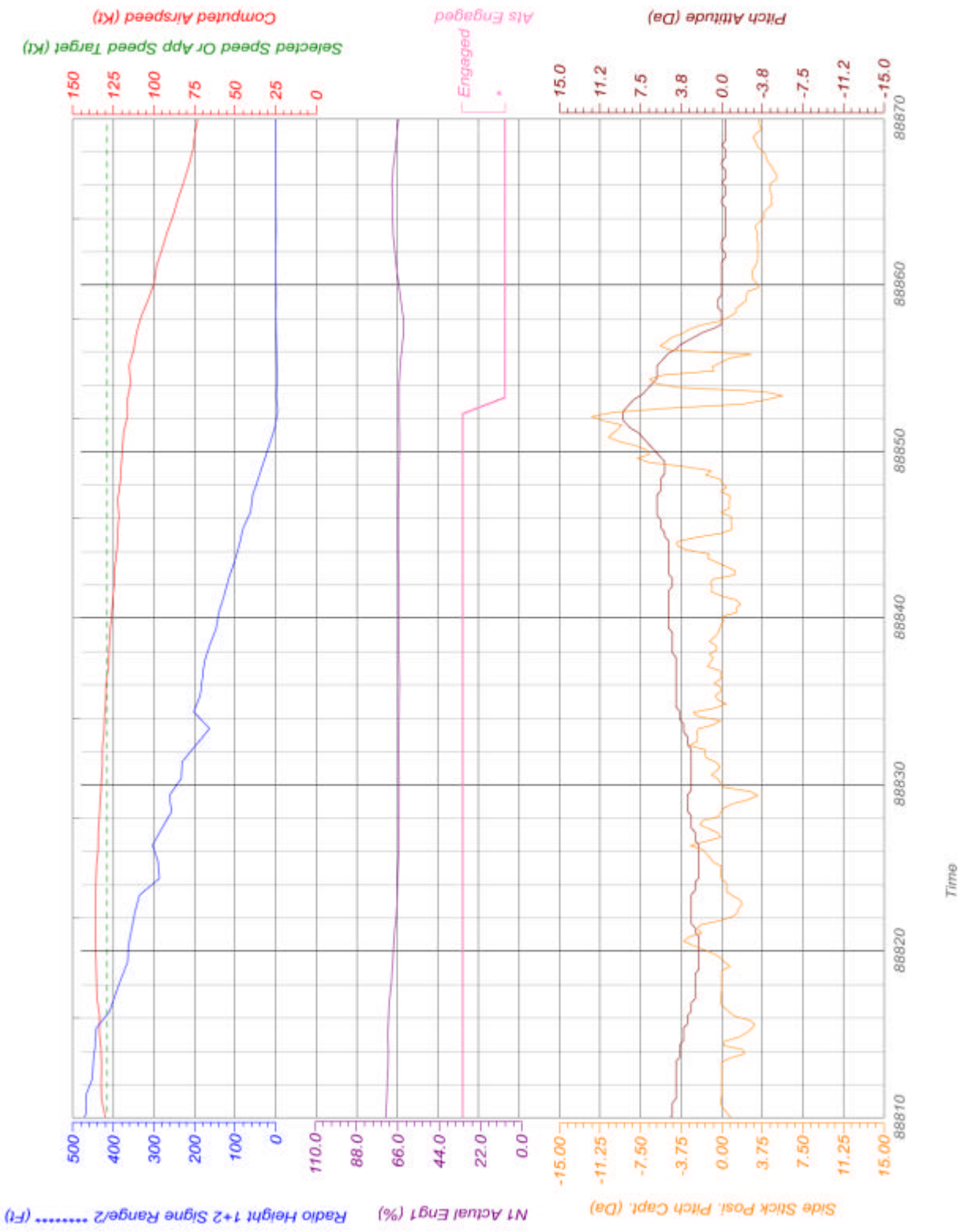

Figure 6 : flight data recorder plot

APPENDIX A: REPORTS IN THE MAINTENANCE LOGBOOK

Complaints with regard to the auto thrust system, as mentioned in the maintenance logbook:

26 June 2006: AFS/A THR FUNC IS UNABLE TO KEEP VAPP SPEED DELAYS TO ADVANCE THRUST

26 June 2006: A/THRT COULDN'T KEEP TARGET SPEED DURING APP. AND SPEED GOING BELOW VLS SPEED

5 July 2006: AS PER PAGE 92 A/TH DOES NOT MAINTAIN SPEED

7 July 2006: AUTO THRUST CAN NOT HOLD SPEED AT FINAL APPROACH

13 July 2006: MANAGED SPEED DROPPING IN VLS ZONE ON FINAL APPROACH A/C STATUS NO CAT III CAPABILITY