

The Dutch Safety Board

Occurrence #: 2006088 **Classification:** Serious incident

FACTUAL INFORMATION

Date:	06-08-2006	Cockpit crew:	2
Place:	Amsterdam Schiphol Airport	Cabin crew:	4
Aircraft registration:	TC-SKB	Passengers:	Unknown
Aircraft model:	Boeing 737-400	Injuries:	None
Type of aircraft:	Passenger aircraft	Lighting conditions:	Darkness
Type of flight:	Commercial air transport, passenger		
Phase of operation:	Taxiing		
Damage to aircraft:	Serious		

The flight and the occurrence

The Boeing 737-400, registration TC-SKB, landed at 20.09 UTC¹ on runway 18R of Amsterdam Schiphol Airport (EHAM). Scheduled arrival time was 19.45. The 'on blocks' time at gate G5 was 20.25.

The tug driver of the ground handling company who had to perform the push-back manoeuvre for the TC-SKB declared that he started his duty at 20.00, 30 minutes earlier than scheduled because of the workload that evening. According to the planning, TC-SKB was the first aircraft he had to handle during that shift, but because loading was still in progress when he arrived at gate G5 he first handled an aircraft at gate G3. When the tug driver returned at gate G5 the aircraft was almost ready to depart. He parked his towbarless tug² in front of the aircraft and walked around the aircraft to check if all doors had been closed. Thereafter he waited for the bridge to be disconnected from the aircraft. At 21.17 the crew received the clearance from Schiphol Ground to start the engines and for push-back. After the tug driver had established contact with the cockpit crew the nose-wheel was lifted. He then received the command from the captain to start the push-back. During push-back the tug driver informed the crew that the engines could be started which was consequently done by the crew. When the aircraft was at the final position the tug driver requested to set the aircraft brakes, which was confirmed. Subsequently the tug driver lowered the nose gear and drove the tug back till the communication cord³ was stretched taut. The tug was positioned diagonally opposite on the right side of the nose of the aircraft. The tug driver stated that the tug was well visible for the first officer. According to the tug driver the captain said "Everything ok, disconnect". The tug driver replied that he would be standing on the right side of the aircraft. At 21.21 the flight crew received clearance to taxi to runway 36L via W3 and information that a Boeing 737 was waiting for them to pass on the right-hand side.

Subsequently the tug driver got out of the tug and disconnected the cord and put this on the tug. He subsequently closed the panel of the aircraft and removed the steering by-pass pin.⁴ Then the tug driver walked to his tug with his back towards the aircraft, the pin in his hand and his arms beside his body. This to avoid that the crew could think that they can start taxiing. The flashing light of the tug was on. The tug driver stated that at that moment he heard that power was added. He turned around and noticed that the aircraft was rolling forward and that the taxi light was on. Subsequently he ran around his tug and gave a stop sign by sweeping his hands crossed above his head. According him the aircraft then stopped. The captain stated that after receiving taxi clearance he released the brakes and the aircraft started to roll, probably because of some slope of the apron. Because he was not sure about the

¹ All times in this report are universal time co-ordinated (UTC) unless otherwise specified. At the time of the occurrence, local time (LT) at Amsterdam Schiphol Airport was UTC + 2 hours.

² In case of a towbarless tug, no use is made of a so-called tow bar, but the nose wheel of the aircraft is lifted up by the tug.

³ A cord is connected between the aircraft and the tug to facilitate communication (via a headset) between the tug driver and the pilots. The cord is plugged in the aircraft via a panel on the nose gear.

⁴ The steering by-pass pin is used to disconnect the steering of the nose-wheel, by the flight crew, from the hydraulic system of the aircraft. By installing the pin the tug driver gets control of the nose-wheel steering instead of the flight crew.

position of the tug driver he immediately stopped the aircraft. The first officer stated he also called the captain to stop the aircraft.

Because the aircraft had moved forward the distance between the tug, in front of the right-hand engine, and the aircraft became approximately 2.5 meter. The tug driver did not drive the tug away immediately, because it was dark and the gate was poorly illuminated. According to the tug driver he was more visible for the crew at his present position. He then stepped on the foot-board of his tug to show the steering by-pass pin to the crew. Thereafter he wanted to enter the cabin of the tug to drive away, but he saw that the aircraft was moving forward. He left the tug and ran away towards the stairs of the gate. The right-hand engine of the aircraft collided with the tug. This was at approximately 21.22. The first officer stated that when he saw the tug driver showing the pin, he also saw that the tug was still in front of the right-hand engine. He described this as a 'wrong picture' and instructed the captain to stop, but the captain had already added power and the right-hand engine of the aircraft hit the tug.

As a result of the collision the cowling of the right-hand engine was damaged and the cord of the tug driver's headset was sucked into the engine and damaged two fan blades out of limits. Two other fan blades were damaged within limits, but had to be reworked. The tug sustained some dents.



Picture 1: The tug in contact with the engine
(Source: AAS).



Picture 2: The damage to the engine nacelle.

Investigation & Analysis

Amsterdam Airport Schiphol (AAS) issued tow regulations to ensure that push-back and push-pull (PB/PP) movements of aircraft on the airport take place safely; this to prevent incidents and accidents. The regulations apply to everybody who is involved in the execution of those movements on the entire airport. The aircraft technical aspects and the companion instructions and procedures of PB/PP are the responsibility of the airline or of those who take care of the technical dispatch of an aircraft.

A tug driver must be authorized to perform PB/PP movements. The tow authorization is issued by AAS. The airlines and ground handling companies have qualified instructors who take care of the training of their tug drivers. AAS plays the role of examiner and supervisor. The actual supervision is done by the ground handling company and/or airline.

The ground handling company concerned performs ramp safety turnaround audits regularly to check if their employees operate in accordance with the regulations. When certain deviations reoccur frequently they will become part of a risk improvement programme, till operations proceed normal again.

The Aircraft Ground Operations Manual of the ground handling company describes the push-back procedure in chapter 6 "Aircraft Ramp Handling & Servicing", accompanied with pictures and drawings. It states that after removal of the steering by-pass pin, the head set and the chock, the tug has to be removed to a safe position whereafter the by-pass pin has to be displayed to the captain.

In the same chapter it is stated that due to the simple push-back manoeuvre on most of the aircraft stands at EHAM, where the aircraft are pushed back to a push-back line at an angle of in most cases less than 30°, a single-man push-back is possible when using a towbarless tug.

The tug driver involved, who had been employed in this function at the airport since 1996, stated that it was normal practice for him during night time and bad visibility conditions not to drive the tug immediately away at the end of the push-back manoeuvre. However he then normally stepped on the foot-board of the tug and swayed with the pin. He stated that he is well visible at this position also due to the flashing light on the tug. If he sees that the crew has understood that the pin has been removed and everything is clear, he then normally drives the tug to a safe position. According to the tug driver there is enough time to do this because first the parking brake of the aircraft has to be released and thereafter the crew has to apply power before the aircraft starts to roll, after the crew has obtained taxi clearance.

The Board is of the opinion that this practice of the tug driver is in conflict with the company procedure, which states that the by-pass pin has to be displayed to the captain after the tug has been removed to a safe position. The tug driver had apparently developed an own practice, which had never been noticed during ramp safety turnaround audits by the ground handling company.

The cockpit voice recorder (CVR) was removed from the aircraft after the occurrence. The sound quality as recorded on the CVR was good, but the occurrence was overwritten by other data. The flight data recorder (FDR) was not removed from the aircraft.

The taxiway at the height of gate G5 has an upslope in the intended taxi direction of the aircraft. Therefore, despite the contradictions in the statements of the tug driver and both pilots, the first forward movement of the aircraft must have been caused by selecting thrust by one of the pilots.

The last item on the 'after start checklist' of the airline is 'ground equipment'. According to the checklist, the reply 'removed' on this item has to be given by the captain. It is possible that the tug was not visible from the left-hand seat in the cockpit, because it was still parked close to the right-hand side of the aircraft and it was dark. Therefore it is remarkable that the aircraft started to taxi immediately, according to the statement of the tug driver, after the pin had been shown to the flight crew as the 'all clear' signal. The first officer instructed the captain to stop, but the aircraft started to move already. The cockpit crew was familiar with the push-back procedures at EHAM.

Based upon this the Board wonders if the 'after start checklist' had been completed by the crew before the thrust levers were advanced.

The crew declared that they were not in a hurry, despite the delay of 40 minutes on arrival at EHAM and because of the Boeing 737 that was waiting for them at the time they received the taxi-clearance.

The Manager Health and Safety of the ground handling company at EHAM stated that during the observation period which had been carried out for the past three years, a similar deviation from the company push-back procedure was never observed. Therefore no separate risk inventory had been carried out on the push-back process.

The Schiphol Safety Platform⁵ had a look at the trend analysis of push back occurrences that took place in 2006. It was decided that the next platform safety campaign will focus on push-back incidents.

Following the occurrence, actions were taken by the ground handling company, aimed at preventing similar occurrences:

- Gather the push-back procedures of all airlines, which are dispatched by the ground handling company.
- Communication procedures between flight crews (of all airlines) and tug drives have to be present in the tugs.
- The subject of the next recurrent training will be 'adherence to the correct procedures'.
- Investigation into actions for the long term.

⁵ The Schiphol Safety Platform is a group practice of all companies that play a role in the aviation process. The goal of their cooperation is to guarantee and entirely improve the safety at Amsterdam Schiphol Airport.

The Board concludes that the occurrence under consideration was caused by a combination of factors.

Non-adherence by the tug driver to the company push-back regulations. He gave the signal that all equipment was clear of the aircraft while the tug was still within the aircraft's manoeuvring area. This led to confusion of the flight crew members. On the other hand the flight crew added power before being sure that the tug was clear of the aircraft. It could not be determined if the after start checklist had been completed by the flight crew before the throttles were advanced.

The Board emphasizes the importance of:

- compliance with procedures. This also applies to the push-back and push-pull procedures, especially because there is no verbal communication anymore between the tug driver and the flight crew after removal of the head set;
- harmonisation of standards between airlines and ground handling companies.