

Factual Report

The Investigation Report was written in accordance with para 18 Law Relating to the Investigation into Accidents and Incidents Associated with the Operation of Civil Aircraft stating facts only.

Identification

Type of Occurrence:	Serious incident
Date:	11 August 2015
Location:	Frankfurt/Main
Aircraft:	Airplane
Manufacturer / Model:	The Boeing Company / B 747-8
Injuries to Persons:	Some persons suffered minor injuries
Damage:	Aircraft undamaged
Other Damage:	Two vehicles (passenger buses) damaged
Information Source:	Investigation by BFU
State File Number:	BFU 15-1075-5X

Factual Information

As a Boeing 747-8 turned into parking position C15 at Frankfurt/Main Airport two passenger busses, standing in the area of the jet blast of the aircraft, were damaged.

Approximately 70 passengers were in one of the busses, who had just disembarked from an aircraft parked in a parking position south of the turning Boeing. One passenger suffered minor injuries.

History of the Flight

On 11 August 2015 the Boeing 747-8, coming from Newark, USA, touched down at 0719 hrs¹ on runway 25L of Frankfurt/Main Airport. The Boeing left the runway via taxiway M21 and taxied via the taxiways M, M8, L5, N3, and N to the parking position C15. According to witness' statements a passenger bus was standing south of taxiway N in the area of parking position V127. The driver had the order to pick up passengers from the aircraft at parking position V129. The bus stood parallel to the taxiway edge marking facing west. As the aircraft turned from taxiway N left into parking position C15 the bus began to move and described a left-hand turn. The vehicle stopped about parallel to the centreline of parking position V128 facing south. During this manoeuvre a window at the right side of the bus between the doors 1 and 2 burst. Parallel to the centreline of parking position V129 stood another passenger bus facing south. The first bus passed this one on the left. The BFU was able to reconstruct the positions of the busses with the help of the description of the airport operator. The BFU was not able to determine the exact distances of the busses to the taxiway edge marking.

The second bus had already begun to board passengers of an aircraft parked at parking position V129. Two windows on the aft left part of the bus were destroyed. According to witness' statements approximately 70 passengers had at that time already been on board. One passenger suffered from minor cuts to the face.

The Flight Data Recorder (FDR) recording showed that the heading of the aircraft changed approximately 10 minutes and 58 seconds after the landing over a time of 35 seconds from 070° to 330°. During this time period the recorded groundspeed decreased from 5 kt to 1 kt and increased again to 7 kt. At the same time the FDR recorded an increase of engine rpm N1 of engine #4 (right outer engine) to 50%. Engine rpm of the engines #1 and #3 were recorded with 40% N1 and 43% N1, respectively. Engine rpm of engine #2 was 0% N1.

Personnel Information

Pilot in Command (PIC)

The 61-year-old PIC held an Airline Transport Pilot's Licence (ATPL(A)) issued on 13 May 2014 in accordance with Part-FCL. The licence listed the ratings as PIC for

¹ All times local, unless otherwise stated.

Boeing 747/400 in accordance with instrument flight rules (PICIR). The rating was valid until 29 February 2016. The rating included the type rating for Boeing 747-8. The PIC held a class 1 medical certificate issued on 7 May 2015 in accordance with Part-MED and valid until 17 November 2015.

Co-pilot

The 37-year-old co-pilot held an Airline Transport Pilot's Licence (ATPL(A)) issued on 18 February 2014 in accordance with Part-FCL. The licence listed the ratings as co-pilot for Boeing 747/400 in accordance with instrument flight rules (COPIR) valid until 19 February 2016. The rating included the type rating for Boeing 747-8. In addition, the co-pilot held a valid rating as PICIR for Airbus A318/319/320/321.

The co-pilot held a class 1 medical certificate issued on 9 December 2014 in accordance with Part-MED and valid until 11 January 2016.

Aircraft Information

The Boeing 747-8 is a low-wing transport aircraft with conventional tail and equipped with four turbofan engines.

Manufacturer:	The Boeing Company
Initial Registration:	27 June 2013
Year of manufacture:	2013
Manufacturer's Serial Number (MSN):	37834
Engines:	Four General Electric GEnx-2B67B
Maximum Take-Off Mass:	442,252 kg

A valid airworthiness certificate had been provided to the BFU. The aircraft had a German certificate of registration and was operated by a German operator.

Meteorological Information

The aviation routine weather report (METAR) of Frankfurt/Main Airport of 0650 hrs read:

Wind:	310° / 6 kt, variable between 250° and 340°
Visibility:	More than 10 km

Clouds: 1-2 oktas in 1,700 ft, 3-4 oktas in 6,000 ft

Temperature: 19°C

Dewpoint: 16°C

Barometric air pressure (QNH): 1,016 hPa

At the time of the occurrence it was daylight.

Radio Communications

At the time of the occurrence, the aircraft had radio contact with Frankfurt Apron. Radio communications were held in English.

Aerodrome Information

Frankfurt/Main Airport is located 6.5 Nautical Miles (NM) south-west of Frankfurt City. Aerodrome elevation is 364 ft AMSL.

The airport has three parallel runways oriented 068°/248° and one runway oriented 178°. The apron at which the occurrences took place is located in the northwest part of the airport, north of the threshold of runway 25C. Aeronautical Information Publication (AIP) AD2 EDDF 1-18 point 3 stipulated the procedures for aircraft ground movement. The traffic and registration regulations the airport operator had issued were the valid and binding rules for operation of ground vehicles.

Flight Recorder

The Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) were removed and read out at the BFU. The FDR data was used for the depiction of the factual information. The CVR recordings did not contain any information relevant for the safety investigation.

FDR

Manufacturer: L-3COM

Type: FA 2 100

Part Number: 2100-4045-022

Serial number: 837919

The data of the last five hours were recorded.

CVR

Manufacturer: L-3COM

Type: FA 2 100

Part Number: 2100-1025-022

Serial number: 716703

120 minutes of recording were generated.

Wreckage and Impact Information

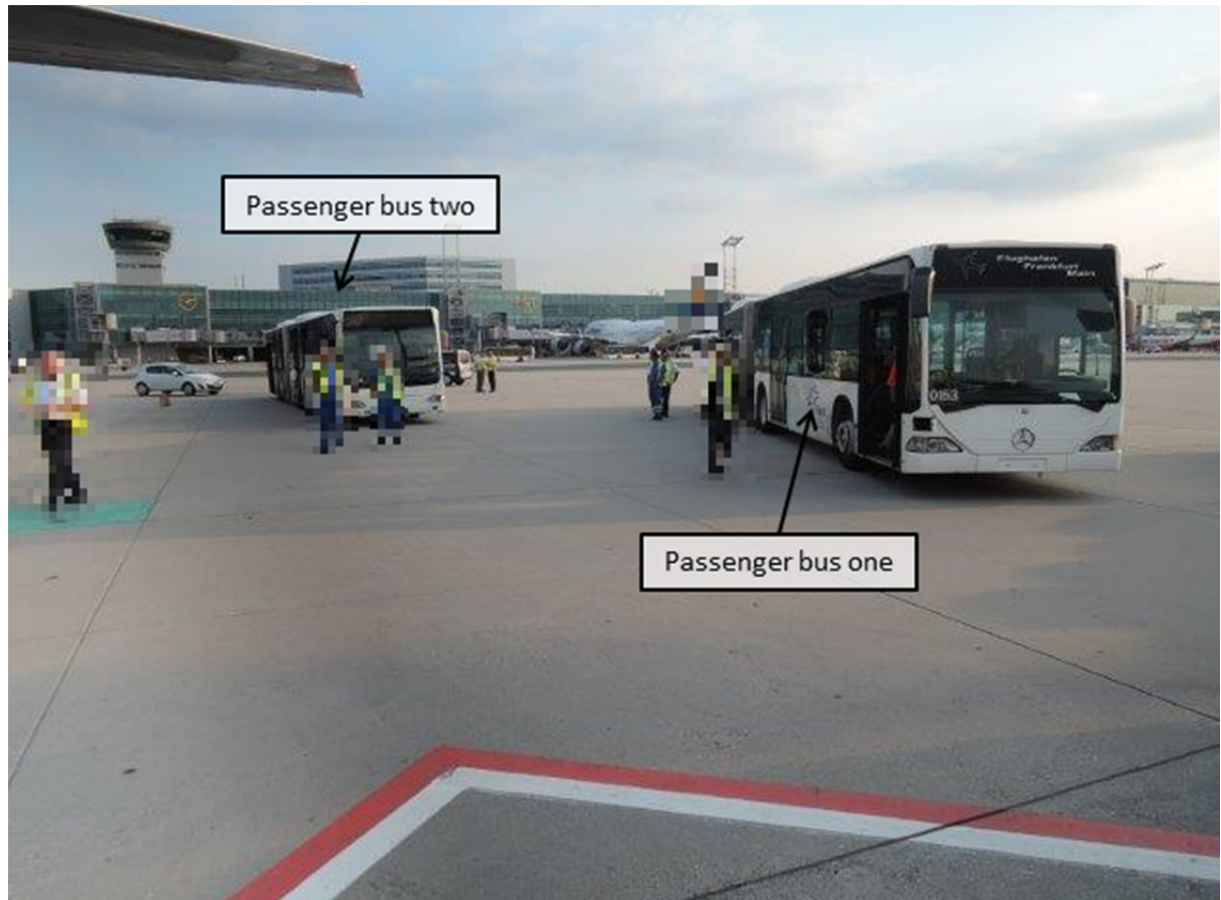
The aircraft was not damaged during the occurrence. Witnesses described the damage on the passenger busses as follows:

On the right side of the first vehicle one window between the front and centre access door had been destroyed. The aft left engine cover of the vehicle had been torn from its mounting and deformed. Two windows at the aft left side, abeam of the rear axle, of the second bus, which was positioned at parking position V129, had been destroyed. The fracture pieces burst through the open rear door (right) of the vehicle on to the apron. Witnesses stated that the pieces had scattered across parking position V129.



View on parking position V129 in westerly direction

Photo: BFU



Damaged passenger busses on V129

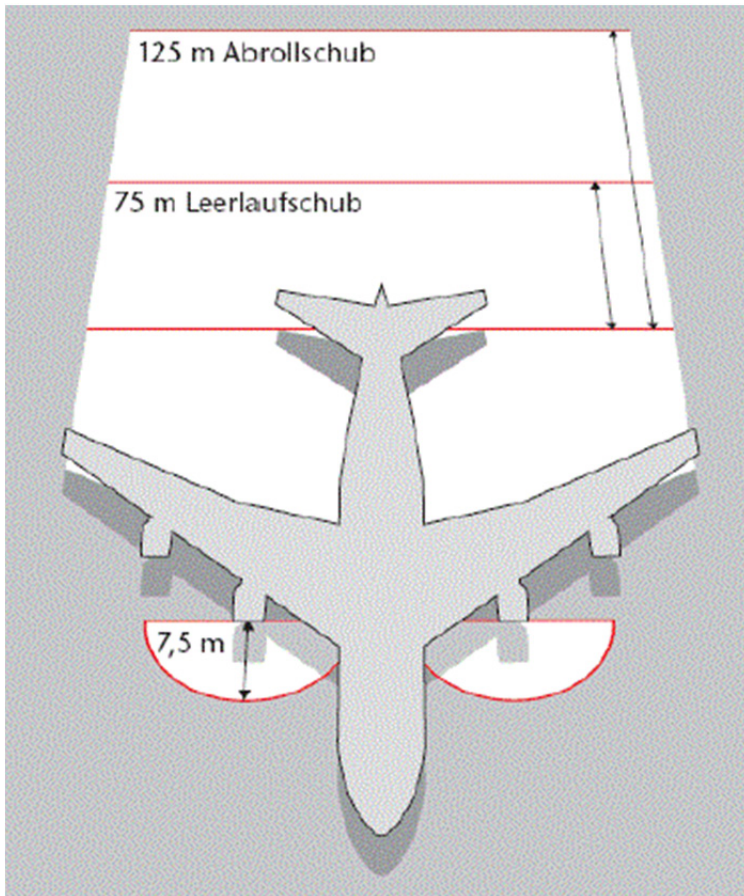
Photo: BFU

Organisations and their Procedures

The AIP AD 2EDDF 3.6.1 stipulated the following: *“Aircraft shall only be taxied with the absolutely necessary minimum engine rpm [...]”*

The traffic and registration regulations 1.3 (7) of Frankfurt/Main Airport stipulated the following: *“Behind aircraft taxiing autonomously (rolling thrust) by means of turboprop engines a safety distance of 50 m, and with jet engines of 125 m has to be adhered to. The operator describes in the Operations Manual Part-B (OM-B) 2-3-10 Taxi the use of thrust during taxiing: “[...] Idle thrust is adequate for taxiing under most conditions. A slightly higher thrust setting is required to begin taxiing. [...]. Breakaway power should be limited to 40% N1!” OM-B 2-1-70 states: “One or two engine(s) should be shutdown for environmental reasons and fuel saving, taking into account*

condition of taxiways and ramps (i.e. upslope, icing etc.). [...] Two engines out taxi-in permitted if all conditions are favorable (e.g. weight, taxi route, weather)."



Safety distance behind taxiing aircraft

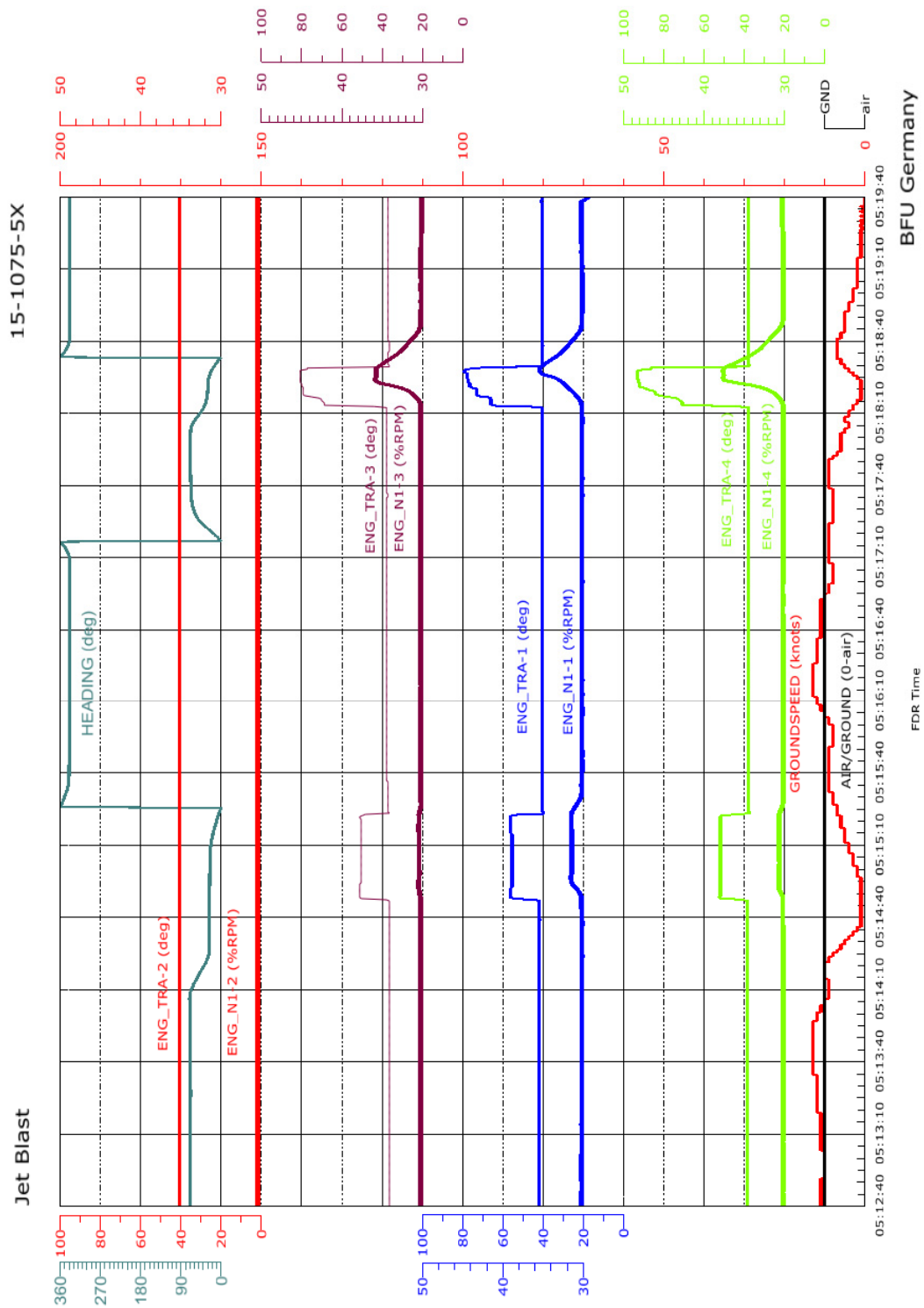
Source: Traffic and registration regulations

Investigator in charge:	Lutz Jäkel
Assistance:	Christian Blanke
Braunschweig	22 June 2016

Appendix

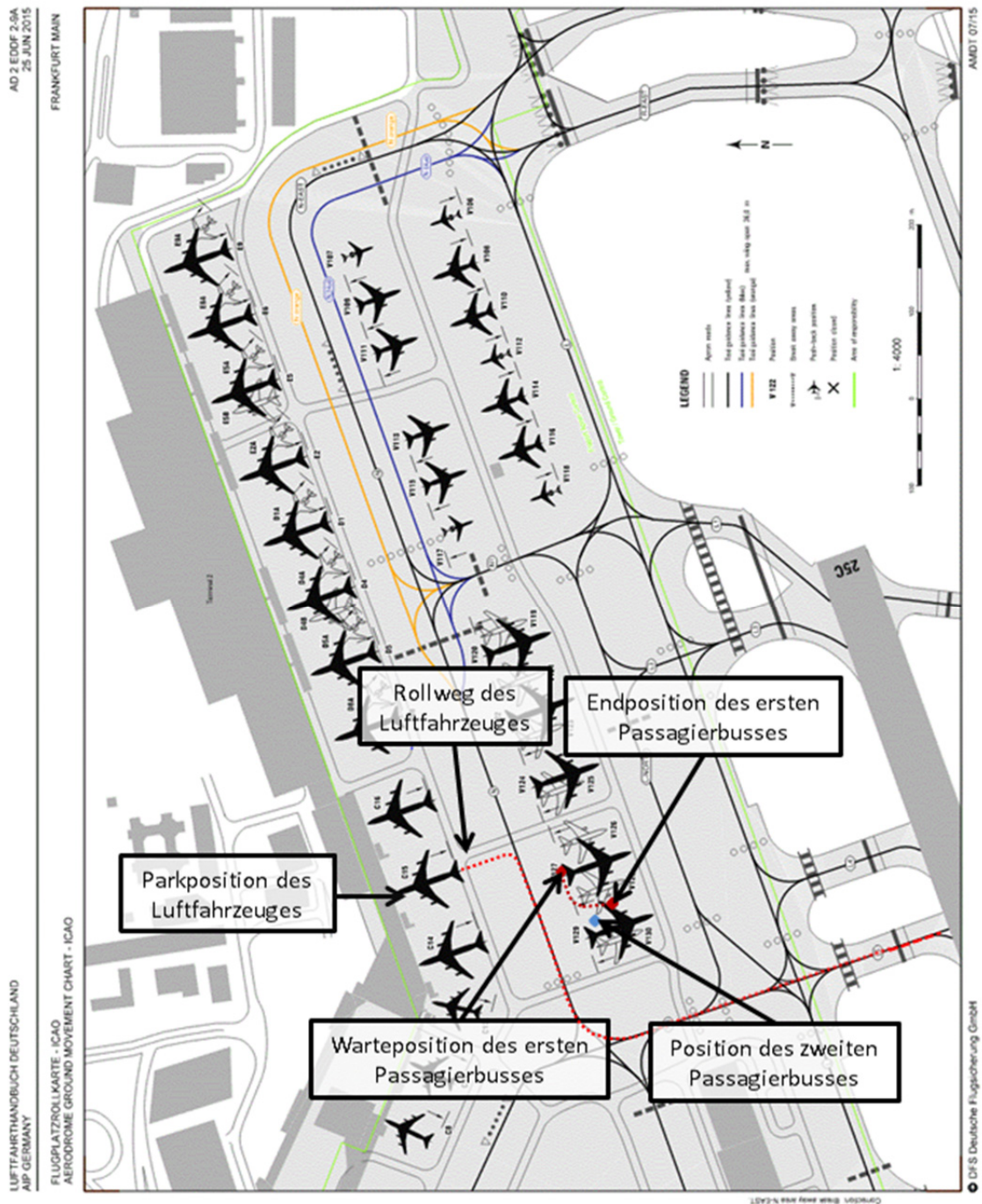
FDR data graph

Aerodrome ground movement chart of Frankfurt Airport



FDR data graph

Source: BFU



Aerodrome around movement chart

Source:

This investigation was conducted in accordance with the regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft (*Flugunfall-Untersuchungs-Gesetz - FIUUG*) of 26 August 1998.

The sole objective of the investigation is to prevent future accidents and incidents. The investigation does not seek to ascertain blame or apportion legal liability for any claims that may arise.

This document is a translation of the German Investigation Report. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

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