Bundesstelle für
Flugunfalluntersuchung

German Federal Bureau of
Aircraft Accident Investigation

Investigation Report

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

Identification

Type of Occurrence:	Incident
Date:	13 March 2013
Location:	Nuremberg
Aircraft:	Transport aircraft
Manufacturer / Model:	Embraer / ERJ 170-100 LR
Injuries to Persons:	None
Damage:	Minor damage to aircraft
Other Damage:	None
Information Source:	Investigation by BFU
State File Number:	BFU TX001-13

Factual Information

History of the Flight

At approximately 10:45 hrs[1] after an uneventful flight, the airplane landed in Nuremberg with 77 passengers and 4 crew members on board. A few minutes later at the stand as the ground power unit was connected to the airplane a hissing sound was heard and the ground power unit disengaged itself. Electrical smell was noticeable in the cockpit and shortly afterwards smoke became visible. The Pilot in Command (PIC) instructed the ground crew to position the passenger stairs as quickly as possible. The passengers were asked to immediately disembark the airplane via the stairs.

Aircraft Information

The Embraer ERJ 170-100 LR with the manufacturer's serial number 17000009 is a twin-engine transport aircraft with a maximum take-off mass of 37,200 kg. The aircraft had a valid French certificate of registration and was operated by a French air operator.

External Power

The Alternating Current (AC) supplies the airplane with power while on the ground. The receptacle for the external power is located on the underside of the fuselage left of the nose landing gear. The AC power is routed through the aircraft plug to the external power alternating current contactor and provides the aircraft with power when the generators of the engines or the auxiliary power unit are not being utilized.

At the aircraft the cable lugs of the external power receptacle are covered by a plastic cap. This cap has openings with a size of about 10 mm in the upper side (fitting position).

Meteorological Information

At the time of the occurrence slight winds prevailed at Nuremberg Airport. The temperature was -2°C and the dewpoint was about -7°C.

[1] All times local, unless otherwise stated.

Flight Recorder

The airplane was equipped with two combined voice data recorders. The recorders were read out at the BFU. The French air accident investigation authority prepared a transcript of the sound file starting about one minute prior to the landing until the end of the recording after the airplane was shut down. The transcript shows that prior to the arrival at the stand there were no unusual incidents.

Findings at the Aircraft

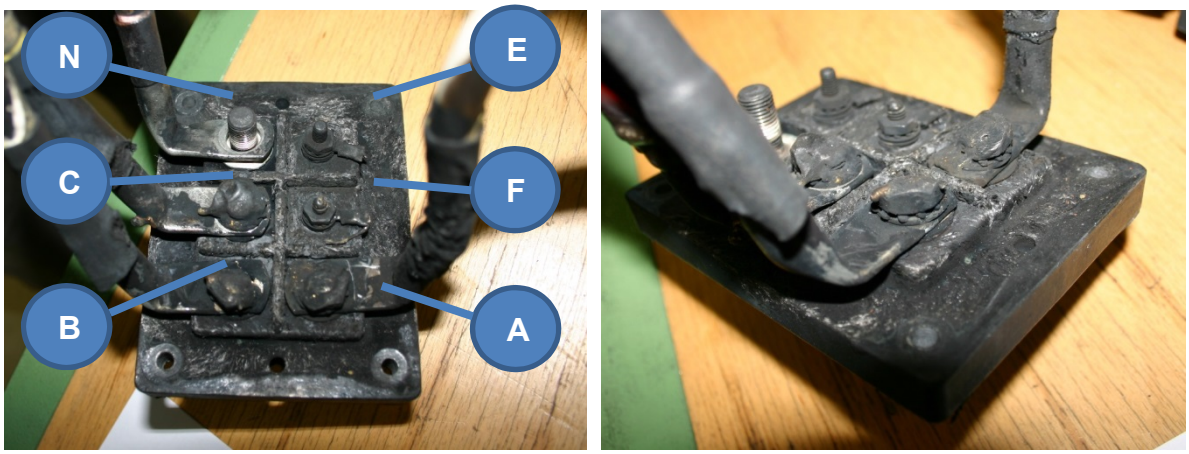
The outer area of the aircraft around the external power receptacle did not show any damage. The inside was covered by molten material, the connected cables and the circuit breakers located above were covered by soot. The wire bundles above the receptacle were covered by soot and the insulation of the pipes showed heat damage.

The outside of the external power receptacle Photo: BFU

The inside of the external power receptacle Photo: BFU

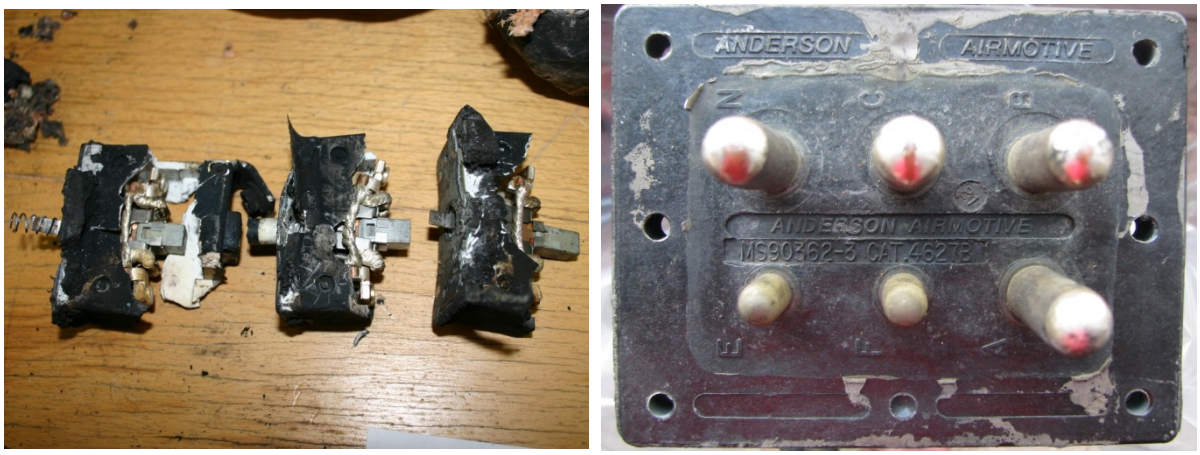
Area above the external power receptacle Photo: BFU

The individual parts of the external power receptacle (P/N MS90362-3) were removed and examined in more detail. It was determined that the pins, the cable clips and the screw nuts of the receptacle A, B and C for the alternating current phases were molten on the sides facing each other.



Inside of the receptacle Photos: BFU

The three circuit breakers showed heat damage. The housing was fractured. The insides of the housings did not show any traces of heat or high current.
The insulation panels of the fuselage above the receptacle showed heat damages.
The pins of the receptacle did not show any visible damages.



Automatic circuit breakers (overview) and the outside of the receptacle Photos: BFU

Fire

There were no other damages besides the heat damages described above. No traces of open fire were visible.

Additional Information

Ground Power Unit

The ground power unit was tested by the airport workshop. No deficiencies were found. The reason the unit was checked was, among other things, that the unit disengaged itself due to the error message "generator short circuit". According to the unit handbook the reason for this message is a short circuit detected by the power monitor. Since the unit worked properly during the test, the examiner came to the conclusion that the short circuit was caused inside the aircraft.

Fleet Check by the Operator

The operator had the external power receptacles of all the Embraer jets operated by the operator visually inspected. The caps were opened and it was checked whether there were any foreign objects present. 25 airplanes were examined. In 13 cases metal pieces were found. These pieces were metal chips, washers, bolts, and the like.

The operator and the BFU, respectively, informed EASA and the aircraft type certificate holder of the findings.

Safety Recommendations

Actions by the Operator in the Role as Type Certificate Holder

On 30 September 2015, the aircraft manufacturer issued the Service Bulletin SB170-24-0057 which describes how the openings on the upper side of the external power receptacle covers can be closed to prevent short circuits by foreign objects.

Based on these actions the BFU has abstained from issuing a safety recommendation concerning this matter.

Comments to the Report

In accordance with EU VO 996/2010 and ICAO Annex 13 the Draft Report was sent to parties involved in the investigation for commenting. The comments of the French safety investigation authority were not considered for the Final Report and will therefore be appended.

Investigator in charge:	Kostrzewa
Field investigation:	Kostrzewa, Berndt
Braunschweig	8 December 2015

The BFU received the following comments from the French safety investigation authority BEA.

BEA

Technical aspects of the event:

The information given by the company about the design of the internal cover of the power receptacle and their experience of previous cases of foreign objects found inside is mentioned in the draft report.

The BEA would suggest describing more in detail the design of the internal cover of the ground power receptacle and its design deficiencies in term of FOD's.

The BEA would therefore suggest a Safety Recommendation aimed at improving the design to reduce the risks related to foreign objects falling inside the internal cover of the ground power receptacle.

Systemic aspects of the event:

The draft report does not mention that the CVR recording showed that the crew had difficulties contacting the ground personnel. . When the pilots tried to get in contact with the ground staff, the GPU operator was no longer around and the stair driver apparently did not quickly understand the urgency of the situation. The report does not mention if the stair driver and more generally the ground personnel had a sufficient level in English.

This made the decision to evacuate more difficult to take, as the actual situation around the aircraft was not properly reported to the crew.

The procedures of Regional require a systematic use of headsets by the ground personnel to contact the crew upon arrival at the stand. This was not performed by the ground staff and this is not mentioned in the draft report. It is not known through the report if the ground staff at Nürnberg airport is trained about company procedures and standard practices.

The certification of ground handling companies implies the observance of some standard procedures. In the ISAGO Standards Manual (May 2010) Section 6 – Aircraft Ground Movement, it is stated that the communication with the crew upon arrival of the aircraft is necessary.

Consequently, the BEA suggests that the draft report provides a more detailed description of these systemic factors that could lead to Safety Recommendations toward the Nürnberg airport operator and its subcontractors in terms of:

- ground-cockpit communication procedures upon aircraft arrival;
- ground personnel trainings.

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 - FlUUG*) 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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