

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
IG - 152/CENIPA/2015

OCCURRENCE:	SERIOUS INCIDENT
AIRCRAFT:	PR-OHD
MODEL:	AW139
DATE:	16NOV2015



NOTICE

According to the Law nº 7565, dated 19 December 1986, the Aeronautical Accident Investigation and Prevention System – SIPAER – is responsible for the planning, guidance, coordination, and execution of the activities of investigation and prevention of aeronautical accidents.

The elaboration of this Final Report was conducted by taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document that reflects the result obtained by SIPAER regarding the circumstances that contributed or may have contributed to triggering this occurrence.

The document does not focus on quantifying the degree of contribution of the different factors, including the individual, psychosocial or organizational variables that conditioned the human performance and interacted to create a scenario favorable to the accident.

The exclusive objective of this work is to recommend the study and the adoption of provisions of preventative nature, and the decision as to whether they should be applied belongs to the President, Director, Chief, or the one corresponding to the highest level in the hierarchy of the organization to which they are being forwarded.

This Report does not resort to any proof production procedure for the determination of civil or criminal liability, and is in accordance with Appendix 2, Annex 13 to the 1944 Chicago Convention, which was incorporated into the Brazilian legal system by Decree nº 21713, dated 27 August 1946.

This Final Report has been made available to the ANAC and the DECEA so that the technical-scientific analyses of this investigation can be used as a source of data and information, aiming at identifying hazards and assessing risks, as set forth in the Brazilian Program for Civil Aviation Operational Safety (PSO-BR).

Thus, it is worth highlighting the importance of protecting the persons who provide information regarding an aeronautical accident. The utilization of this report for punitive purposes maculates the principle of “non-self-incrimination” derived from the “right to remain silent” sheltered by the Federal Constitution.

Consequently, the use of this report for any purpose other than that of preventing future accidents may induce erroneous interpretations and conclusions.

N.B.: This English version of the report has been written and published by the CENIPA with the intention of making it easier to be read by English speaking people. Taking into account the nuances of a foreign language, no matter how accurate this translation may be, readers are advised that the original Portuguese version is the work of reference.

SYNOPSIS

This is the Final Report of the 16NOV2015 serious incident with the AW139 aircraft model, registration PR-OHD. The serious incident was classified as “[FN-I] Fire/Smoke (Non-Impact) – Smoke in the Cabin”.

Moments before the engines were turned off, the pilots smelled burning and observed smoke in the cabin, which was extinguished after the batteries were cut off and disconnected.

It was found that the arrangement of cables on the top panel did not conform the approved design drawing specification issued by the design holder, creating conditions for sparks to induce fire in the system.

The aircraft had light damage.

All occupants left unharmed.

An Accredited Representative of the *Agenzia Nazionale per la Sicurezza del Volo* (ANSV) - Italy, (State of Design and Manufacture of the helicopter) was designated for participation in the investigation.

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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
ANSV	<i>Agenzia Nazionale per la Sicurezza del Volo</i>
CA	Airworthiness Certificate
CB	Circuit Breaker
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
EGPWS	Enhanced Ground Proximity Warning System
IFRH	Instrument Flight Rating - Helicopter
NSCA	Aeronautics Command System Standard
PIC	Pilot in Command
PLH	Airline Pilot License – Helicopter
PPH	Private Pilot License – Helicopter
SB	Service Bulletin
SBJR	ICAO Location Designator - Jacarepaguá Aerodrome - Roberto Marinho, Rio de Janeiro - RJ
SBME	ICAO Location Designator - Macaé Aerodrome - RJ
SIC	Second in Command
SIPAER	Aeronautical Accident Investigation and Prevention System
TCAS	Traffic Collision Avoidance System
TPX	Non-Regular Public Air Transport Aircraft Registration Category
UTC	Universal Time Coordinated

1. FACTUAL INFORMATION.

Aircraft	Model: AW-139 Registration: PR-OHD Manufacturer: Agusta Westland	Operator: OMNI Air Taxi S.A.
Occurrence	Date/time: 16NOV2015 - 1837 UTC Location: Jacarepaguá Aerodrome (SBJR) Lat. 22°59'15"S Long. 043°22'12"W Municipality – State: Rio de Janeiro – RJ	Type(s): “[FN-I] Fire/Smoke (Non-Impact)” Subtype(s): Smoke in the Cabin

1.1 History of the flight.

The aircraft took off from the Macaé Aerodrome (SBME) - RJ to the Jacarepaguá Aerodrome - Roberto Marinho Aerodrome (SBJR), Rio de Janeiro - RJ, at 1741 (UTC), for a transport flight, with two pilots and nine passengers on board.

The flight proceeded normally to the destination, but, after landing, before the engines were cut off, and with the aircraft already parked, the pilots smelled burning and observed smoke in the cabin, which was extinguished after the engines were cut off and the disconnection of the batteries.

The aircraft had light damage.

All occupants left unharmed.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	2	9	-

1.3 Damage to the aircraft.

The aircraft had minor damage, restricted to the cabin's upper panel wirings.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

	Flight Hours	
	PIC	SIC
Total	3.445:12	3.447:08
Total in the last 30 days	65:28	66:25
Total in the last 24 hours	05:24	05:24
In this type of aircraft	861:08	556:40
In this type in the last 30 days	65:28	66:25
In this type in the last 24 hours	05:24	05:24

N.B.: The data relating to the flown hours were obtained through the pilots' CIV.

1.5.2 Personnel training.

The PIC took the PPH course at the *Nacional Escola de Pilotagem* - RJ, in 2005.

The SIC took the PPH course at ABC Fly - SP, in 2001.

1.5.3 Category of licenses and validity of certificates.

The PIC had the PLH License and had valid A139 type aircraft (which included the AW139 model) and IFRH Ratings.

The SIC had a PLH License and had valid A139 type aircraft and IFRH Ratings.

1.5.4 Qualification and flight experience.

The pilots were qualified and had experience in the kind of flight.

1.5.5 Validity of medical certificate.

The pilots had valid CMAs.

1.6 Aircraft information.

The aircraft, serial number 41306, was manufactured by Agustawestland Philadelphia Corporation (AWPC) production facility in 2013 and was registered in the TPX Category..

The aircraft CA was valid.

The airframe and engine logbook records were updated.

1.7 Meteorological information.

Nil.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

Nil.

1.11 Flight recorders.

Nil.

1.12 Wreckage and impact information.

Nil.

1.13 Medical and pathological information.

1.13.1 Medical aspects.

No evidence was found that problems of physiological nature could have affected the flight crew performance.

1.13.2 Ergonomic information.

Nil.

1.13.3 Psychological aspects.

No evidence was found that problems of physiological nature or incapacitation could have affected the flight crew's performance.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

Nil.

1.16 Tests and research.

The crew identified that the smoke in the cabin was coming from the upper electrical panel of the Circuit Breakers, more precisely from one of the fixing screws of a fiber coating, in the central area of this panel.

After parking, the pilots cut off the engines and the entire electrical part of the aircraft with the assistance of ground maintenance personnel.

During an inspection to identify the source of the problem, it was observed that two electrical wirings (one from the EGPWS and the other from the TCAS) were rubbing against the aforementioned screw, causing a short circuit and an overheating in the screw, and also in the fiber where it was attached, generating smoke inside the cabin.

The images in Figure 1 indicate the location of the screw; the arrangement of the wiring (as it was inside the panel) and its hole; the point where there was friction, and the screw inside the top electrical panel. The screw without insulating and protective coating stands out.

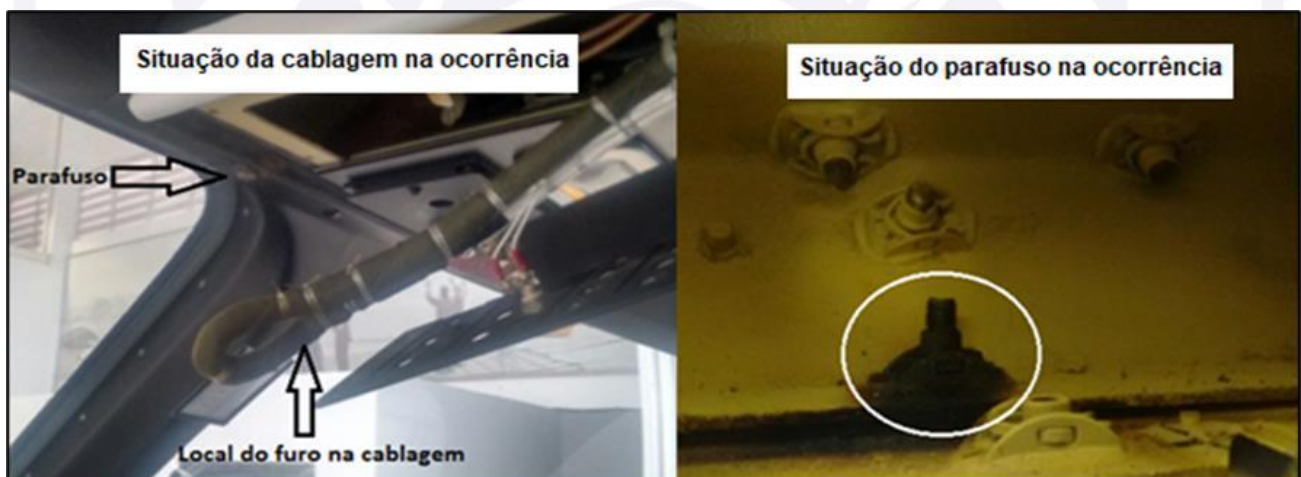


Figure 1 - Situation of the wiring and the screw in the event.

In Figure 2, you can see highlighted, the overheating marks, and the hole in the wiring caused by friction between the aforementioned parts.



Figure 2 - Overheating marks and hole in the wiring.

After research carried out by the engineering sector of the operating company, it was found that the electrical cables were arranged inside the upper panel of the CBs in a random way. It was found that the arrangement of cables on the top panel, as produced by AWPC, did not conform the approved design drawing specification issued by the design holder.

The operator inspected all aircraft of this model in its fleet and confirmed that this condition was the same on all of them. In each of the aircraft, the wiring was arranged in a different way.

The arrangement of cables on the top panel, as produced by AWPC, did not conform the approved design drawing specification issued by the design holder, creating the conditions for other occurrences of this nature to happen.

With that, the operator submitted the situation to Agusta Westland, which issued a series of guidelines through letters (Letter PSEAW139/2015/42459/148730 and Letter PSEAW139/2017/59112/191973), determining the inspection in all the aircraft and the adoption of a series of procedures for the correction of possible failures, such as: repositioning and tying the cables; in some cases, wiring replacement and tying to adjust their length to the housing in the CB panel; and application of sealant to the nuts and screws that have the possibility of friction with these wirings, inside the CB panel. The suggested modifications can be seen in the images shown in Figure 3, below:

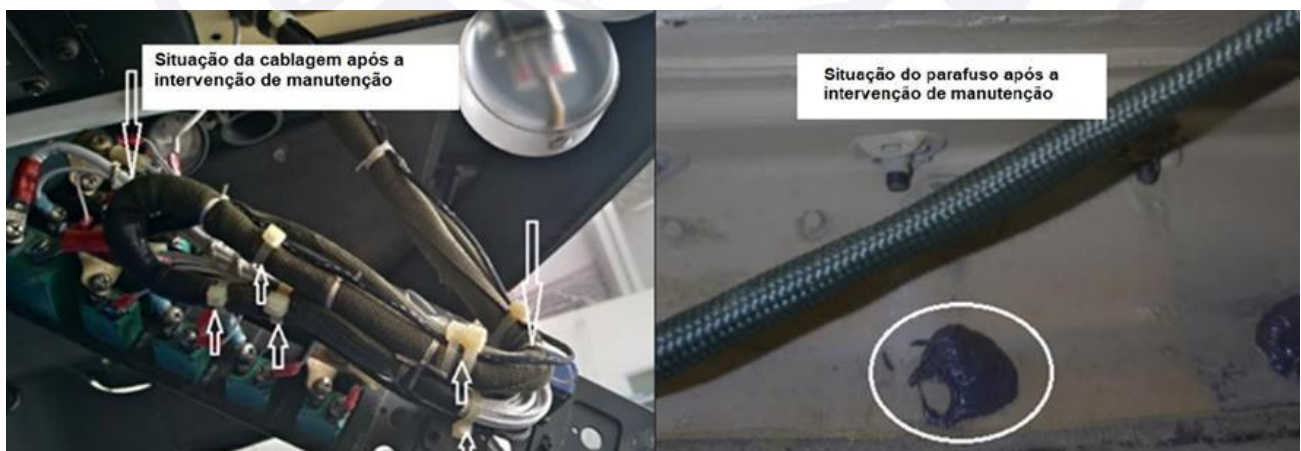


Figure 3 - View of the wiring (with new bends and anchoring points) and of the screw after the maintenance intervention.

The sequence of images in Figure 3 demonstrates the layout of the cabling after the maintenance intervention, with the indication of the new tying and bending points in the cabling, as well as the new screw on the inside, properly coated with insulating material.

There was no task foreseen in the aircraft maintenance program to check the condition of the wiring, nuts, and screws inside the upper electrical panel of the CBs. The repairs were performed following the maintenance manual and letters issued by the manufacturer, requiring the repositioning of the cables.

The aircraft manufacturer also issued a Service Bulletin 139-375 of 29JAN2019, implementing the inspection and installation procedures to be adopted to further minimise the probability that similar situation could occur resulting in an equivalent end-effect. Such procedures are described in item 5 of this report - Corrective or Preventive Actions Taken.

The operator performed all the actions recommended by the manufacturer, which proved to be effective in preventing the occurrence of new episodes of this nature.

1.17 Organizational and management information.

Nil.

1.18 Operational information.

It was a personal transport flight between Macaé and Jacarepaguá, both cities in Rio de Janeiro.

All the crewmembers` actions were carried out without any kind of abnormality.

At the end of the flight, during the engine shutdown, the crew noticed the smell of burning and smoke inside the cabin.

All smoke suppression procedures were performed as established in the aircraft checklist.

1.19 Additional information.

Nil.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

The Investigation Team verified that there was no contribution from the crew's performance to this occurrence, as well as from the meteorological conditions.

During the analysis and research, it was found that the place where the smoke and the burning smell originated came from the upper panel of the CBs.

When analyzing the condition of the wiring and other components in this area, it was found that two wirings were in contact with a screw, which did not have any protection to avoid friction, causing a small hole and the consequent electrical contact between different wirings.

As a result, there was a short circuit and overheating of the place, causing the production of smoke and the characteristic smell of burnt material.

It was found that the arrangement of cables on the top panel, as produced by AWPC, did not conform the approved design drawing specification issued by the design holder.

When researching the other aircraft in the fleet, the operator found the same situation, that is, there was a possibility that the same event could occur in other situations.

These episodes demonstrated that there was a latent condition for occurrences of this type. Depending on the circumstances of the flight, the consequences could have been much more serious.

Therefore, it was concluded that the aircraft manufacturing quality escape (misalignment of the production drawings of AWPC plant which were not aligned to the latest revisions available) contributed to the occurrence due to the inadequacy of the wiring positioning, which induced undue contact between the wirings and the screw causing a short circuit and overheating of the wiring.

After Agusta Westland was informed of the situation, letters PSEAW139/2015/42459/148730 and PSEAW139/2017/59112/191973 were issued, guiding the inspection of all aircraft and the adoption of a series of procedures to correct possible failures, such as the repositioning and tying of the wirings, or their replacement to adjust their length to the housing in the CBs panel. Also, the application of sealant to the nuts and screws with the possibility of friction with these wirings, inside the panel.

The aircraft manufacturer also issued SB 139-375 of 29 JAN 2019, detailing under Part II, for the specified helicopters serial number assembled at the production facilities where the cables were wrongly installed, the relevant inspections and procedures to be adopted on the auxiliary CB panel in order to further minimise the probability that similar situation could occur resulting in an equivalent end-effect.

The operator complied with all the actions recommended by the manufacturer, which proved to be effective in preventing the occurrence of new episodes of this nature.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilots had valid CMAs;
- b) the pilots had valid A139 type aircraft (which included the AW-139 model) and IFRH Ratings;
- c) the pilots were qualified and had experience in the type of flight;
- d) the aircraft had a valid CA;
- e) the airframe and engine logbook records were updated;
- f) during the engine shutdown, the pilots smelled burning and observed smoke in the cabin;
- g) the smoke in the cabin came from the upper electrical panel;
- h) the pilots cut off the engines and the entire electrical part of the aircraft, with the assistance of the ground maintenance team;
- i) it was found that two electrical cables, one from the EGPWS and the other from the TCAS, were rubbing against a panel fixing screw;
- j) there was a short circuit and overheating in the screw and in the fiber where it was fixed, generating smoke inside the cabin;
- k) the electrical cables were randomly arranged inside the upper panel of the CBs;
- l) the other AW139 aircraft of this operator were inspected, and the same problem was observed in all of them;
- m) there was no task foreseen in the aircraft maintenance program for checking the condition of the wirings, nuts, and screws inside the upper electrical panel of the CBs;

- n) the manufacturer (Agusta Westland) issued letters to the operator, standardizing a series of actions aimed at correcting the problem;
- o) The aircraft manufacturer also issued SB 139-375 of 29 JAN 2019, detailing under Part II, for the specified helicopters serial number assembled at the production facilities where the cables were wrongly installed, the relevant inspections and procedures to be adopted on the auxiliary CB panel in order to further minimise the probability that similar situation could occur resulting in an equivalent end-effect;
- p) the aircraft had minor damage; and
- q) all occupants left unharmed.

3.2 Contributing factors.

- Support systems – a contributor.

There was misalignment of the production drawings of AWPC plant which were not updated to the latest revisions available for the accommodation of electrical cables in the upper panel of the CBs nor for tying inside the aforementioned panel, creating the conditions for other occurrences of this nature to happen. This fact allowed identifying an affected helicopter SS/NN batch.

- Design – a contributor.

The arrangement of the wiring on the upper panel, induced undue contact between the wirings and the screw.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation made intending to prevent accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident. In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies.

In consonance with Law n°7565/1986, recommendations are made solely for the benefit of the air activity operational safety, and shall be treated as established in the NSCA 3-13 “Protocols for the Investigation of Civil Aviation Aeronautical Occurrences conducted by the Brazilian State”.

The corrective actions taken were considered adequate to mitigate the contributing factors.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

Agusta Westland issued a series of guidelines through letters PSEAW139/2015/42459/148730 and PSEAW139/2017/59112/191973, guiding the inspection of all aircraft and the adoption of a series of procedures for the correction of possible failures, such as: repositioning and tying the wiring; in some cases, wiring replacement to adjust its length to the housing in the CBs panel; and application of sealant to the nuts and screws with the possibility of friction with these wirings, inside the CBs panel.

The aircraft manufacturer also issued SB 139-375 of 29 JAN 2019, detailing under Part II, for the specified helicopters serial number assembled at the production facilities where the cables were wrongly installed, the relevant inspections and procedures to be adopted on the auxiliary CB panel in order to further minimise the probability that similar situation could occur resulting in an equivalent end-effect.

Below are the main actions performed by the operator in compliance with Agusta Westland's guidelines:

- visual inspection of the upper electrical panel to identify possible signs of friction between wirings and screws;
- replacement of cables, adjusting their length to the space inside the CBs panel;
- repositioning and re-tying of some wiring to avoid friction against nuts and screws inside the CBs panel;
- sealing and isolation of all critical points with the possibility of friction between wirings, screws, and nuts; and
- insertion of periodic inspections in the aircraft maintenance program to check the condition of the wirings, nuts, and screws inside the CBs panels.

On April 26th, 2023.

