

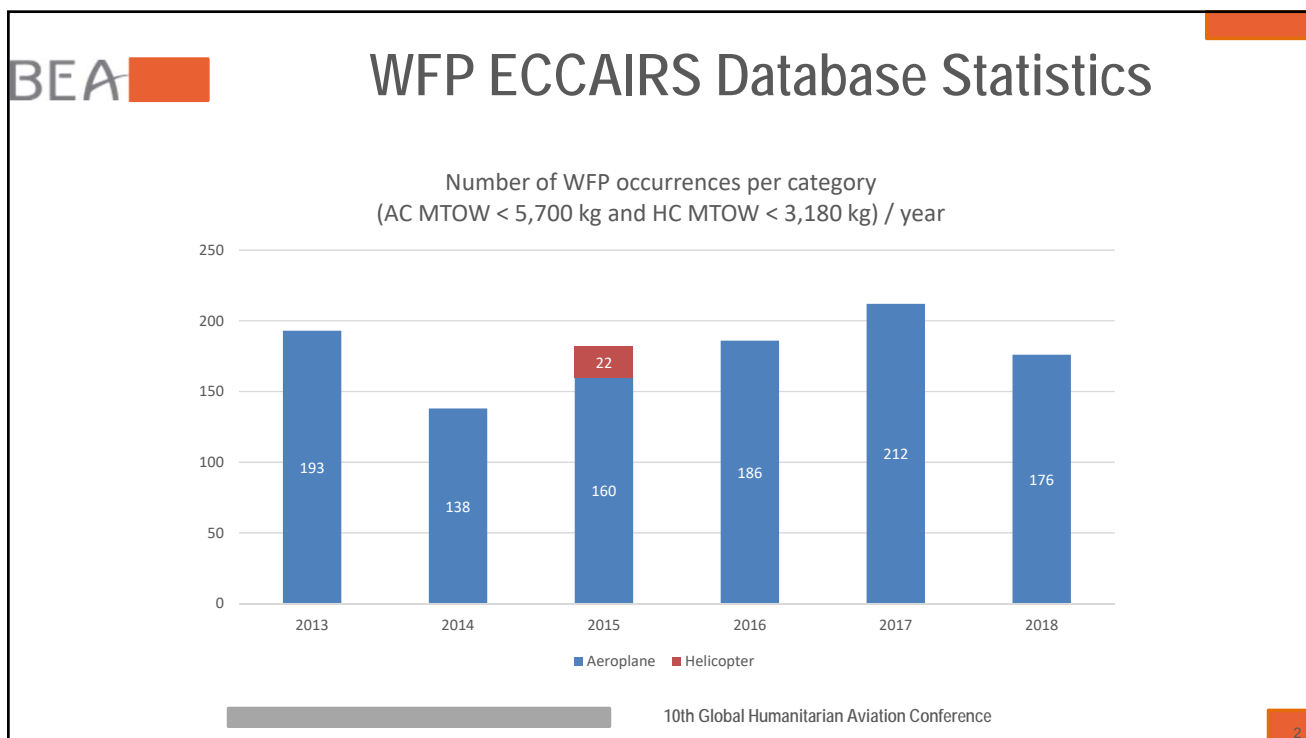


BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile

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Foreseen Safety Strides with Lightweight Flight Recorders on Humanitarian Aviation

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Available Lightweight Flight Recorders

- Robust (compliant with specs ED-155)
- Lightweight
- Dozens of parameters
- Audio
- Image



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Image Recording Analysis

The cockpit view shows a pilot's perspective with various instruments labeled: Roll, Airspeed, Altitude, Altimeter, Temp, Press, Turb Coordinator, Pitch, Bank, and Vertical Speed. The pilot is holding a clipboard and a pen, and another person is holding a map. A 'Cyclic Stick' is also labeled.



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Examples of Cost of Installation

| Installation type | Retrofit analog aircraft | Forward fit with bus | Forward fit with bus |
|------------------------|--------------------------|--------------------------|-------------------------------|
| Recorder | 9 000 € single unit | 6 700 € single unit | 10 000 € single unit |
| Associated equipment | | | |
| Acquisition system | Included | 800 € | Airframe develop ¹ |
| Analogue aircraft | | | |
| Microphone | | | |
| Camera | Included | 4 500 € | 1 000 € |
| Labour | 3 days (3 x 8 h) 1 man | 1 day (8 h) - 1 man | 1 day (8 h) - 1 man |
| Certification | 2 000 € for first record | 2 000 € for first record | 2 000 € for first record |
| Test flight | 800 € for first record | 800 € for first record | 800 € for first record |
| Total | | | |
| Parameters/Audio | 11 800 € + labour cost | 10 000 € + labour cost | 12 800 € + labour cost |
| Image/Parameters/Audio | | 14 500 € + labour cost | 13 800 € + labour cost |

ICAO Standards



- All turbine-engines in Commercial Air Transport ops
 - A/C MTOW < 5,700 kg with TC after 01/01/2016 and
 - H/C 2,250 kg < MTOW < 3,180 kg with TC after 01/01/2018
- Shall install
 - A lightweight or a flight data recorder or an
 - Image recorder capable of recording flight path and speed parameters displayed to the pilot(s)
- Recommended for new built after 01/01/2016 or 2018



Accident Cessna Caravan (1/2)

- 8 fatalities on 19 November 2005 at Stupino (Russia)
- Ivolga-Avia Cessna 208B Grand Caravan registered P4-OIN
- Classification: Loss of control in icing conditions
- Russian regulations required the Caravan to carry both cockpit voice and flight data recorders
- Thanks to the flight recorders, investigators have been able to piece together the final moments of the flight

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Accident Cessna Caravan (2/2)

- In icing conditions, pitch attitude was about 9° nose-up and airspeed was 102 knots when the airplane stalled
- The stall-warning system did not activate before the stall occurred
- Investigators urged restrictions on Cessna 208 icing operations
- It would have been impossible to understand this issue without the flight data recordings

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Accident AS350 (1/2)

- 3 fatalities on 30 March 2013 in Alaska (USA)
- DPS AS350 B3 helicopter registered N911AA
- Crash following encounter with instrument meteorological conditions after departure from remote landing site
- The helicopter was equipped with an image recording system designed to also record two-tracks audio, position, altitude, and groundspeed information

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Accident AS350 (2/2)

- According to images recovered from the helicopter's onboard Appareo Systems Vision 1000, as the helicopter completed a 360° turn, the pilot caged the attitude indicator.
- After this, the helicopter entered a series of erratic turns, climbs, and descents and crashed.
- It would have been impossible to understand the causes of the accident without the image recording.

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Benefits of Flight Recorder Installation

- Flight recorders will make it possible to:
- Analyse data to help maintenance issues thus reducing downtime/cost
- Collect/analyse data more frequently
- Better identify/capture undesirable events/trends
- Give situational information and help explain events
- Improve safety

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The logo for BEA (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile) features the letters 'BEA' in a bold, sans-serif font, followed by a solid orange square.

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Thanks for your attention

