



DUTCH  
SAFETY BOARD

# Quarterly Aviation Report

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# Q1 2023



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# Investigations

Within the Aviation sector, the Dutch Safety Board is required by law to investigate occurrences involving aircraft on or above Dutch territory. In addition, the Board has a statutory duty to investigate occurrences involving Dutch aircraft over open sea. Its investigations are conducted in accordance with the Safety Board Kingdom Act and 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. If a description of the events is sufficient to learn lessons, the Board does not conduct any further investigation.

The Board's activities are mainly aimed at preventing occurrences in the future or limiting their consequences. If any structural safety shortcomings are revealed, the Board may formulate recommendations. The Board's investigations explicitly exclude any culpability or liability aspects.



## Foreword

The Dutch Safety Board is paying increasing attention to drones. These aircraft are already regularly used to take pictures from the air or to inspect buildings and infrastructure. In the first quarter of 2023, the Board published its first separate report on a serious incident, a so-called fly-away, involving a drone.

The Dutch Safety Board would like to contribute to making drones safer, but is dependent on users and those involved for reporting serious incidents and accidents. It is therefore very important to report occurrences involving a drone to the Dutch Safety Board. In this way, the Dutch Safety Board can conduct investigations and disseminate the lessons learned within the drone community. In this way, the Dutch Safety Board improves the safety of drones and hopes to contribute to the safe and responsible use of this technology in the future.

Chris van Dam  
*Chairperson Dutch Safety Board*

# Safety investigation into accidents involving drones

## Unmanned aviation and the Dutch Safety Board

Unmanned aviation has developed rapidly over the past few years. Regular use is made of Unmanned Aircraft Systems or drones<sup>1</sup> for taking aerial photographs and for conducting inspections of buildings and the infrastructure. In the near future, experiments are expected to increase in number at local and regional level, for example for the delivery of goods by drone. These developments offer many opportunities, but also engender safety risks.

As is the case for occurrences involving manned aircraft, the Dutch Safety Board is authorized to investigate occurrences involving drones. In this work, the Dutch Safety Board is dependent on reports from drone users. Investigations into serious incidents and accidents involving drones are subject to obligations based on international standards and legislation and regulations. Similar obligations apply to reporting such incidents and accidents to the Dutch Safety Board.

## Report via telephone number 0800 6353 688

Anyone involved in an accident or serious incident involving a drone is required to report the occurrence to the Dutch Safety Board.<sup>2</sup> An accident is an occurrence resulting in a victim with serious injuries or a fatality, or whereby the drone suffers serious damage. A serious incident is an occurrence that almost results in an accident. Examples in the context of drones are: a near collision with another aircraft, defects affecting the (electrical) motors, disruptions to on-board systems (flight computer, compass, gyroscopes, etc.) or other

disruptions that make it more difficult to control the drone. Accidents and serious incidents must be reported as quickly as possible by telephone to the Dutch Safety Board.<sup>3</sup> Reports can be submitted at any time via telephone number 0800 6353 688.

## Investigation

Investigations into serious incidents and accidents are subject to obligations based on international legislation.<sup>4</sup> In the case of a seriously injured victim or a fatality and other serious incidents occurring in the higher risk categories<sup>5</sup>, the Dutch Safety Board is required to conduct an investigation. For all other occurrences, the Dutch Safety Board may decide to launch an investigation if there is an expectation that clear lessons can be learned. During the investigation, the Dutch Safety Board gathers information from a variety of sources. In certain cases, an investigation team may visit the site to conduct its investigation. Interviews are held with various stakeholders, including the pilot, and technical information about the drone can be requested from the manufacturer.

## Ongoing and completed investigations

The Dutch Safety Board has recently conducted a series of investigations into occurrences involving drones. In the Quarterly Aviation Report for the first quarter of 2021, for example, a report was published about a drone that crashed into the Waalhaven near Rotterdam, as a consequence of engine failure.<sup>6</sup>

1 The formal name employed by the Dutch Safety Board is Unmanned Aircraft System (UAS). Other names are Unmanned Aerial Vehicles (UAV) and Remotely Piloted Aircraft Systems (RPAS).

2 Regulation (EU) no. 996/2010, Article 9 (1). Consolidated version available at <https://eur-lex.europa.eu/eli/reg/2010/996/2018-09-11>.

3 Accidents and serious incidents must also be reported to the Human Environment and Transport Inspectorate (ILT). See: <https://www.ilent.nl/onderwerpen/voorvallen-luchtvaart>

4 Regulation (EU) no. 996/2010, Article 5.

5 In the categories Specific in the case of higher Specific Assurance and Integrity Level (SAIL) levels and the Certified category.

6 Dutch Safety Board, *Quarterly Aviation Report Q1 2021*, page 13, 2021. <https://www.onderzoeksraad.nl/en/page/19303/kwartalrapportage-luchtvaart-1e-kwartaal-2021>

In the third quarter of 2022, the Safety Board published in its Quarterly Aviation Report about a crash in Amsterdam due to the loss of control over the drone.<sup>7</sup>

In its report 'Fly-away after compass malfunction', the Safety Board published its first individual report about a serious incident involving a drone.<sup>8</sup>

<sup>7</sup> Dutch Safety Board, *Quarterly Aviation Report Q3 2022*, page 14, 2022. <https://www.onderzoeksraad.nl/en/page/21584/publicatie-kwartaalrapportage-luchtvaart-3e-2022>

<sup>8</sup> Dutch Safety Board, *Fly-away after compass malfunction*, 2023. [https://www.onderzoeksraad.nl/nl/media/attachment/2023/2/8/fly\\_away\\_after\\_compass\\_malfunction.pdf](https://www.onderzoeksraad.nl/nl/media/attachment/2023/2/8/fly_away_after_compass_malfunction.pdf)

## Safety investigation into accidents with drones



One of the observations in this report is that the *fly-away* was the consequence of a compass malfunction, which was the result of a pre-flight payload switch. In its report, the Dutch Safety Board issues a recommendation to the manufacturer of the drone to specify in the user manual and the safety instructions what actions should be taken in the event of control difficulties (e.g. when to switch to another flight mode) and when the compass needs to be calibrated. The Dutch Safety Board also issues a recommendation to the manufacturer of the drone to ensure that the safety investigation authorities and operators are given timely access to the information that they need in order to be able to conduct a thorough investigation into what went wrong.

A number of investigations by the Dutch Safety Board have revealed that sensor failures and on-board system malfunctions have resulted in loss of control over the drone. An important lesson for drone pilots is that they need to check to what extent the selected flight mode can be used in the local conditions (e.g. wind speed, presence of high buildings and high-voltage power cables). Computer-stabilized flight modes are dependent on a number of different sensors and, as a consequence, on-board systems can be more susceptible to malfunctions, for example as a result of GPS multipath forming when flying between high buildings or due to the influence of the payload and other external equipment. Furthermore, the indications issued by the software about the status of the systems cannot always be blindly trusted.

At present, the Dutch Safety Board is investigating an occurrence involving a drone which resulted in a fly-away and crash in the centre of Amsterdam.<sup>9</sup>

## **Making drones safer**

The Dutch Safety Board is keen to contribute to making drones safer but in its efforts is dependent on users and other affected parties to report serious incidents and accidents. It is therefore essential that all occurrences involving a drone be reported to the Dutch Safety Board. In this way, the Safety Board can conduct investigations and distribute the lessons learned within the drone community. This will help improve the safety of drones and the Safety Board hopes it will contribute to the safe and responsible use of this technology, in the future.

### **Serious incidents and accidents involving drones can be reported by telephone 24/7 via 0800 6353 688**

*To increase the name awareness of the Dutch Safety Board within the drone community, to explain what the Dutch Safety Board does and to call upon the community to submit reports, the Dutch Safety Board has produced the information sheet, depicted in this article.*

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<sup>9</sup> Announced in Quarterly Aviation Report Q3 2022, see page 4 of <https://www.onderzoeksraad.nl/en/page/21584/publicatie-kwartaalrapportage-luchtvaart-3e-2022>

# Occurrences into which an investigation has been launched

## Touchdown before threshold, Airbus A330-300

Amsterdam Airport Schiphol, 12 January 2023

An Airbus A330-300 landed on Runway 22 at Amsterdam Airport Schiphol. The main landing gear of the aircraft touched down on the ground before the threshold of the runway and impacted some runway threshold lights. The aircraft sustained minor damage. The occupants were unharmed.

**Classification:** Serious incident

**Reference:** 2023005

- ▶ Tracks in the grass in front of the runway threshold. (Source: Dutch Aviation Police)





▲ The TBM 700 after the runway excursion. (Source: Dutch Aviation Police)

### Runway excursion, Socata TBM 700

Kempen Airport, 6 February 2023

Due to a technical problem the engine produced more power during landing than usual. As a consequence, the air speed during landing was higher than normal, whereupon the aircraft did not stop on the paved runway. It overran the runway and came to a stop in the grass. The aircraft suffered damage. The pilot was unharmed.

**Classification:** Accident

**Reference:** 2023008

### Overheated galley oven, Boeing 777-300

above Mediterranean Sea (France), 9 February 2023

In the aft galley an overheated oven produced a lot of smoke. The cabin crew managed to regain control over the situation. The aircraft returned to Schiphol.

**Classification:** Serious incident

**Reference:** 2023012



▲ The oven in the galley.

## Touchdown before threshold, Britten-Norman BN-2B-20 Islander

Juancho E. Yrausquin Airport, Saba, Caribbean Netherlands, 13 February 2023

During the landing on Saba, the aircraft collided with the rocks at the runway threshold, before reaching the runway, where it completed a hard landing. The aircraft suffered substantial damage to its right wing. The pilot, two passengers and a dog were able to leave the plane unharmed.

**Classification:** Accident

**Reference:** 2023036

## Fire after landing, APEX Aircraft DR 400/140 B

Rotterdam The Hague Airport, 28 February 2023

After landing during taxi, smoke and flames were visible near the left-hand main landing gear of the aircraft. The pilot brought the aircraft to a stop. Subsequently, the fire spread to the left-hand wing. A big part of the wing burnt down. The fire was extinguished by the airport fire brigade. The pilot escaped unhurt.

**Classification:** Accident

**Reference:** 2023024

▼ *The burnt left wing.*



## Occurrences abroad

This chapter contains announcements of investigations into occurrences abroad with Dutch involvement. Foreign authorities launched investigations into these occurrences.

### Battery fire, Comco Ikarus C42 FB80 Bravo Headcorn Aerodrome (United Kingdom), 8 December 2022

The Ikarus C42, a micro light aeroplane (MLA), with two persons on board returned to its departure airfield following a fire in the lithium (starter) battery.

*The Air Accidents Investigation Branch of the United Kingdom requested support from the Dutch Safety Board for their investigation of this occurrence, in March 2023, because the battery manufacturer is based in the Netherlands.*

**Classification:** Serious incident

**Reference:** 2023033

▼ Archive photo Ikarus C42. (Source: M. Hines)



### Cabin pressure occurrence, Fokker F28 Mk 0070

Port Moresby (Papua New Guinea), 20 February 2023

The crew of the Fokker 70, with 67 passengers and 4 crew members on board, decided to return to Jacksons International Airport, when it became clear that the weather near Mt. Hagen Airport, the scheduled destination, was unsuitable for approach and landing. The crew then broke off the approach to Runway 14L at Jacksons International Airport due to problems with the cabin pressure. Following the subsequent landing, it became clear that four passengers had suffered serious injuries and eighteen passengers had suffered minor injuries.

*The Accident Investigation Commission of Papua New Guinea launched an investigation following this occurrence. The Dutch Safety Board offered assistance since the aircraft was designed and manufactured in the Netherlands.*

**Classification:** Serious incident

**Reference:** 2023019



▲ Archive photo Fokker 70. (Source: N. Long)

### Asymmetric flaps, Boeing 737-800

Budapest Ferenc Liszt International Airport (Hungary),  
27 February 2023

During a flight from Timisoara Traian Vuia Airport (Romania) to Munich Airport (Germany), the crew issued an urgency call (PAN-PAN) due to asymmetric flaps. The aircraft subsequently diverted to Budapest Airport (Hungary) where it completed a safe landing.

*The Hungarian Transportation Safety Bureau launched an investigation following this occurrence. The Dutch Safety Board offered its assistance because the captain of the aircraft was a Dutch national.*

**Classification:** Incident

**Reference:** 2023025

### Short remaining runway length during takeoff, Boeing 737-700

Airport Nürnberg (Germany), 11 March 2023

When the Boeing 737 operated by a Dutch airline took off from the runway, the remaining runway length proved insufficient. To calculate engine thrust to be selected during takeoff, the crew had assumed the entire runway length, but had instead joined the runway via an intersection, and started their take-off run from that point.

*The German Federal Bureau of Aircraft Accident Investigation (BFU) launched an investigation following this occurrence. The Dutch Safety Board offered its assistance.*

**Classification:** Serious incident

**Reference:** 2023038

# Published reports

## Fly-away after compass malfunction

11 April 2020

### The occurrence

On 11 April 2020 the crew of PH-5MV, consisting of the pilot, the payload operator and two observers intended to perform a crowd observation and crowd control mission in the Zuiderpark, The Hague. The flight was performed with a DJI Inspire 2 Unmanned Aircraft System (UAS)<sup>10</sup> with a camera payload. Shortly after take-off, during post take-off checks, the pilot lost control over the aircraft. Roughly 30 minutes later the crew was notified that witnesses had found the Unmanned Aircraft (UA) crashed on the sidewalk of a street in The Hague and reported it to the police. Following the crash, the operator initiated a safety investigation. Additionally, the Dutch Safety Board decided to conduct an investigation due to the potential for damage and injury to third parties.

### Loss of control: compass malfunction as result of different payload

As part of the investigation, the Safety Board analysed the flight data obtained from the Inspire 2. This analysis revealed that shortly after take-off, the UA did not consistently respond to the pilot's Remote Controller (RC) input. This inconsistency mainly occurred in roll and pitch. The investigation showed that, at the same time, the Inspire 2 registered multiple compass faults. This, along with a deviation of the compass angle from the angle of the GPS-track, indicated that a compass malfunction contributed to the unexpected UA response.

Further investigation showed that on the flight prior to the incident flight, a loudspeaker payload was used. This payload, with its own (electromagnetic) characteristics and

manufactured by a third-party, differed from the camera payload on the incident flight. During preparation of the incident flight, the DJI GO 4 app<sup>11</sup> did not show a compass calibration warning on the main screen and therefore the pilots did not recalibrate the compass. As a result, the flight was conducted with an incorrectly calibrated compass, ultimately rendering the UA uncontrollable.

### Cause of the crash

After the loss of control, a fly-away occurred. While the pilot tried to regain control, the UA flew over a line of trees, blocking the line-of-sight between the RC and the UA, after which the connection with it was lost. Thereafter, the UA flew uncontrolled over the city of The Hague. After about 18 minutes of flight, the UA initiated an automated landing sequence due to low battery voltage, but was unable to complete it. The aircraft hovered until insufficient power was left and subsequently crashed in an urban area on a sidewalk. The crash remained without consequences to third parties, but given the mass and size of the UA, a collision with a person could have led to serious consequences.

### Lessons learned: compass calibration, flight mode selection and the safe use of payload

The operator did not have procedures for compass calibration in relation to payload changes and relied on indications from the DJI GO 4 app. By doing so, the operator complied with the UAS manufacturer's recommendation, which stresses to only calibrate the compass when indicated by the software. This investigation shows that the DJI GO 4 app is not able to detect an incorrectly calibrated compass in

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<sup>10</sup> UAS typically consist of a ground station or remote controller and an unmanned aircraft.

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<sup>11</sup> DJI GO 4 is an application on a mobile device to control the unmanned aircraft.

all cases. Therefore, it is advisable to manually start a compass calibration after a payload change, to prevent an unwanted compass offset that may lead to a loss of control.

After the loss of control, the pilot switched to the Return-To-Home (RTH) flight mode. This was in line with the operator's procedures and the UAS manufacturer's guidelines. However, the RTH flight mode also depends on the compass. Therefore, in some cases switching to the A(ttitude)-mode should be given priority because it eliminates the dependence on the compass. Switching to A-mode is advisable if the crew is unsure whether there is a compass malfunction because RTH still works when flying in A-mode.

Legally, under national regulations, it is not allowed to fly with payload other than the payload that was assessed to obtain the special certificate of airworthiness (S-BvL). The operator and payload developer were unaware of this requirement. As a result, no S-BvL-assessment was done for the loudspeaker payload. The manufacturer of the loudspeaker payload indicated that the product was tested for a limited number of conditions before it was made available to the customer. It is important that risks associated with using payload are considered by the user in advance. As this is not always possible, it remains important for users to be particularly observant when using different payloads.

During the course of this investigation, the operator has made a number of changes to its own operation, incorporating the lessons learned from the incident.

The manufacturer of the loudspeaker payload did test for interference during development, but not extensively. There was no coordination between the UAS and payload manufacturers, which is an important prerequisite for the development of payloads that can be used safely



▲ DJI Inspire 2 UAS (Source: djicdn.com)

### Support to safety investigations by the manufacturer

Despite multiple requests, the manufacturer of the UAS did not provide the Dutch Safety Board with all the information needed for the investigation. Therefore some aspects (e.g. why the failure condition in the compass could exist) could not be investigated and the investigation is partly inconclusive. Part of the information about the technical cause is known only because the operator has invested a great deal in finding the possible cause of the fly-away. Not all operators have the resources to contract third-party expertise for such investigations.

In order to learn from accidents and incidents involving UAS, it would be recommendable for all parties involved, among which manufacturers, to share the information needed for the investigation as much as possible. Also participating in safety investigations would improve the way all involved parties can learn from accidents and incidents, and subsequent investigations such as the one laid out in this report. All in all, in order to improve flight safety, the engagement of all parties involved is essential to learn from accidents and incidents.

*The Dutch Safety Board published the report<sup>12</sup> on 8 February 2023.*

<sup>12</sup> <https://www.onderzoeksraad.nl/en/page/16763/fly-away-na-kompasverstoring>

## Loss of control after opening of canopy

near Kornhorn, 13 February 2021

On 13 February 2021, at approximately 15.00 hours, the Aerospool Dynamic WT9, a microlight aircraft, registered PH-4E7, departed from Drachten Airport for a local VFR flight. The pilot was the only occupant. Near Kornhorn the aircraft lost altitude and impacted the ground. Shortly thereafter the aircraft caught fire. The pilot was fatally injured and the aircraft was destroyed as a result of the crash and the post-impact fire.

The investigation revealed that the canopy opened during the flight, followed by a pitch down movement of the aircraft. The pilot lost control and was unable to recover from the subsequent rapid descent during to the relatively short time before impacting the ground. Why the pilot was unable to recover remains unknown.

Due to extensive damage, only a limited technical investigation of the aircraft wreckage was possible. This investigation did not reveal any technical abnormalities that could have been a contributing factor to the cause of the accident. It is most likely that the canopy was not properly closed before the aircraft took off.

Pre-existent cardiac abnormalities were found with the autopsy. A relationship with the cause of the accident could not be determined. There are no indications that the loss of control was caused by a physical problem.

Further investigation revealed that inadvertent opening of the canopy during flight with this type of aircraft had occurred at least twelve times in the past. After the manufacturer knew of the possibility of the canopy not being closed properly, he issued a Mandatory Service Bulletin in 2008 requiring a change in the Pilot's Operating Handbook. This change addressed emergency procedures to be followed by the pilot in case of inadvertent opening of the canopy during various phases of flight.

Additionally, the manufacturer issued a Recommended Service Bulletin in 2019 to install a canopy lock with safety latch and sensor to prevent unintentional opening of the canopy. This new canopy lock would indicate the insufficient plug-in of the main latch by means of a yellow check light in the cockpit. It would also hold the main latch – and therefore the canopy closed – after the plug-out from the canopy lock socket. The accident aircraft did not have this new and recommended lock and check light installed.

When the aircraft was purchased in 2009, the Pilot's Operating Handbook did not contain the changed information as required in the Mandatory Service Bulletin of 2008. The flying club, holder of the aircraft, was not aware of the Mandatory Service Bulletin. Holders themselves are responsible for checking the manufacturer's website regularly. The recommendation to install a new lock with safety latch and sensor was considered unnecessary by the flying club. Regular maintenance and inspection of the aircraft and its documentation did not bring to light that the required incorporation of the mandatory service bulletin in the pilot's operating handbook had not taken place. A previous canopy incident with this aircraft encountered by a member of the flying club did not lead to a raise in awareness due to unclear safety practices within the club and the lack of robust safety reporting. At that time the tasks and responsibilities, especially in the areas of maintenance, instruction and safety, within the flying club were not adequately assigned.

Microlight aircraft (MLA) are not certified in accordance with international standards and airworthiness requirements, but must comply with national requirements. The responsibility for MLA-oversight rests with the national Civil Aviation Authorities (CAA). Oversight and monitoring compliance with the regulations for MLA is delegated to the Dutch Human Environment and Transport Inspectorate (ILT, Inspectie Leefomgeving en Transport) as part of the CAA.



▲ Cockpit Aerospool Dynamic WT9.

This oversight and monitoring is virtually non-existent. The issue and renewal of a Special Certificate of Airworthiness is an administrative procedure based on self-declaration. Therefore, the safety level of MLA depends almost exclusively on the holders and pilots of these MLA. Active oversight will only be carried out if ILT finds reason to do so. Risk assessment for MLA is optional, according to ILT the risk is assumed to be low.

In response to a recommendation of the Dutch Safety Board in June 2020, the Minister of Infrastructure and Water Management responded that oversight of MLA has not been a priority for the Dutch CAA in the past. The Minister stated that ILT will evaluate whether reassessment of the MLA risk is required and that the oversight program will be looked at in order to capture issues in the MLA sector. Despite these commitments, there have been little or no improvements on the oversight of MLA by ILT.

To increase the safety of MLA flying, in particular with Dynamic WT9 aircraft, the Dutch Safety Board therefore makes the following recommendations:

*To the manufacturer Aerospool:*

1. To make the installation of the canopy lock with safety latch and sensor mandatory for all Dynamic WT9 aircraft.

*To the minister of Infrastructure and Water Management:*

2. Make organizations involved in MLA flying, holders and pilots of MLA aware that they are largely responsible for the safety of MLA flying themselves and that this requires compliance with the regulations and an active fulfillment of this responsibility.

*The Dutch Safety Board published the report<sup>13</sup> on 16 February 2023.*

<sup>13</sup> <https://www.onderzoeksraad.nl/en/page/18324/loss-of-control-after-opening-of-canopy-near-kornhorn>

# Occurrences investigated

## Emergency landing due to smoke in cockpit, Cessna 550 Citation II, PH-SVZ

20 NM northeast of Groningen Airport Eelde, 16 April 2021

### History of flight

The Cessna 550 Citation II, registered as PH-SVZ, departed from Teuge International Airport and flew to an area northeast of the province Groningen, the Netherlands, for an aerial photography survey flight at FL 058. There were two pilots onboard the aircraft. The flight was formally conducted as a single pilot operation.<sup>14</sup>

Based upon the air safety report (ASR) of the operator, at approximately 20 NM northeast of Groningen Airport Eelde (EHGG), the crew suddenly heard a bang and felt a vibration. It immediately checked the engine instruments which reportedly showed normal indications. Within seconds smoke entered the cockpit from over the dashboard.

The crew subsequently donned its oxygen masks, switched the microphone to the oxygen mask, set 7700 on the transponder and declared an emergency (Mayday call) to air traffic control. Thereafter, the pilots disconnected the autopilot, started a shallow descent by retarding the power levers and turned towards Groningen Airport Eelde for an immediate landing.

In the ASR the crew mentioned that while descending, approximately 2 – 3 minutes after it had heard the bang, the red LO OIL PRESS warning light<sup>15</sup> of the left engine illuminated. Both the ASR and initial information of the crew did not reveal the engine oil pressure when the warning light was observed.

According to the Aircraft Flight Manual (AFM) checklist, for an Eng LO OIL PRESS light, depending on the engine oil pressure, engine power of the affected engine should be reduced or the engine should be shut down, followed by a landing as soon as practical.

The crew stated that because of the approach towards Runway 23 and the presence of smoke in the cockpit, it decided to continue for an immediate landing. Reportedly, the pilot flying reduced power of the left engine to flight idle at about 4 to 5 NM prior to landing and smoke started to disappear. Once landed, the crew stopped the aircraft on the runway and shut down the left engine, set the parking brake and opened the door for fresh air. After a first inspection, without any indication of fire, the crew taxied the aircraft to the parking spot whilst escorted by the fire-brigade.

### Data recorders

The aircraft was not equipped with an area mike in the cockpit and no parameters of the aircraft and engines were recorded that could have been used to reconstruct the flight. An FDR and CVR were not required.

### History of the left engine

The aircraft Certificate of Registry and the Certificate of Airworthiness (CoA) were both issued on 25 September 2015. The Airworthiness Review Certificate (ARC) was issued on 22 September 2020 and valid till 24 September 2021.

<sup>14</sup> An additional pilot assisted to relieve the workload of the pilot flying for flight and survey tasks.

<sup>15</sup> The engine oil indicating description and operation in the aircraft maintenance manual (chapter 79-30-00) shows that there is no oil quantity indication in the cockpit.

▼ Overview flight cycles and hours of engine PC-E 71354, based on information of the maintenance organization.

	Total time (hours)	Total cycles	Time since overhaul (hours)	Cycles since overhaul
07 September 2015 Airworthiness review <sup>16</sup> doc.	8,789.9	6,248	unknown	unknown
29 June 2016 Repair shop	8,990.2	6,335	1,997.2	1,298
16 April 2021 Engine failure	9,836.4	6,702	2,843.4	1,665

The operator bought the aircraft from a Swedish owner. On 25 September 2015, when it was registered as PH-SVZ (Dutch), the relevant left engine, a Pratt & Whitney JT15D-4 engine with serial number PC-E 71354 was in place. Due to foreign object damage (FOD) to the engine caused by a bird strike, it was removed from the aircraft. On 29 June 2016 the engine arrived at a repair shop. On 3 November 2016 the engine was re-installed on the aircraft.

### Technical investigation

Following the event and engine failure, a visual inspection at EHGG of the left engine showed no evidence of FOD in the fan air inlet. When rotating the fan by hand, a slight abrasive sound was heard and, when hands off, the rotation slowed down quickly. The engine oil dipstick showed no oil level.

Since the operator has no system for trend monitoring, no data was available to analyze engine parameters or aircraft systems. Maintenance documentation showed a complaint<sup>17</sup>

of the left engine LO oil press warning light. The abnormal behavior of the warning light as reported in October 2020 could not be related to the engine failure during the event flight on 16 April 2021. Reportedly, the complaint did not re-occur after replacing the LO oil pressure switch. The performed maintenance on the engine was in compliance with the requirements.

### Engine teardown Investigation

In April 2021 the engine was removed for further investigation. It was shipped to the Pratt & Whitney Canada Service facility at Bridgeport (West Virginia, United States of America) for an engine teardown.<sup>18</sup> The FAA, under the direction of the National Transportation Safety Board and Pratt & Whitney Canada Corp., under the direction of the Transportation Safety Board of Canada, assisted in this by carrying out the teardown works and assessing the damage.

<sup>16</sup> The operator, being the new owner, had to show an Airworthiness review of the aircraft to the responsible CAA-NL by means of an acceptance report.

<sup>17</sup> The complaint originated from October 2020: the engine oil light illuminated with delay when battery power was applied to the electrical system and after engine shutdown. Corrective action was carried out in December 2020.

<sup>18</sup> The engine teardown was accomplished on 19 and 20 January 2022, resulting in an Initial Findings Summary report, marked on 25 January 2022.



▲ Archive photo of PH-SVZ. (Source: C. Schmitt)

The Initial Findings Summary report revealed blade tips rubbing damage and the front inner bypass duct rear flange was fractured at numerous locations. Oil wetness and partially burnt oil contamination were found in the turbine section. Metallic particulate were found in the engine oil filter housing and remnants of bearing #3 in the accessory gearbox. The bearing #3 air seal was damaged and all roller elements and the cage of the #3 bearing were liberated from their respective positions and blocking the scavenge port. Both jets of the bearing oil nozzle were unobstructed and the oil pump was capable of manual rotation, but during the engine tear down it appeared that components were stuck together when trying to disassemble them.

The FAA inspector, who witnessed the engine teardown, noted that the engine had not been overhauled during the last shop visit when it was disassembled due to FOD inspection. The original bearings remained installed and according to Pratt & Whitney no pre-emptive requirements<sup>19</sup> exist to replace them for engines undergoing FOD repair. The main line bearings, specifically bearing #3, had been visually inspected (for pitting, corrosion, et cetera) prior to re-assembly.

### Laboratory analysis of the failed engine bearing

On the 1 February 2023, Pratt and Whitney Canada issued its engine/component investigation report, which – in addition to the Initial Findings Summary report – included more factual engine teardown details and in particular elaborate an in-depth bearing materials laboratory analysis.

Along with the evidence of the engine investigation, it suggests that distress of the bearing #3 was the initiating event causing secondary damage to its air/oil seals and disruptions in the engine oil scavenge and pressure systems. This likely resulted in engine oil being expelled both internally and externally.

Evidence found on the roller bearing #3 components indicated a load - consistent with engine thrust – that is considered to be a main contributing factor to the distress on the bearing. The exact reason for this abnormal load on this bearing could not be established with certainty. The bearing #3 components were found to meet material drawing specifications.

<sup>19</sup> As per JT15D-4 manual, light overhaul procedures for FOD conditions inspection.

Based on the above account, the Dutch Safety Board concludes that

- At first smoke penetrating the cabin and cockpit caused an emergency condition which forced the crew to use oxygen masks and to land as soon as possible. Additionally, a few minutes later during the diversion a left engine low oil warning was observed.
- As for the LO OIL PRESSURE warning light which illuminated, without recorded engine oil pressure data it could not be analysed whether keeping the engine running (with reduced power) was in compliance with the checklist.
- Engine oil being expelled in the engine caused smoke in the cockpit via the air conditioning and pressurization system of the cabin.<sup>20</sup> The smoke was the result of a failure in the engine, initiated by the distress of a bearing. The loss of engine oil resulted from secondary internal damage to the engine.

**Classification:** *Serious incident*

**Reference:** *2021027*

### **Airprox, Piper Aircraft Corporation PA-18-135, PH-WDR and Reims Aviation S.A. F172P, PH-AVB**

International Airport Teuge, 28 April 2022

Aboard PH-WDR, a Piper Aircraft Corporation PA-18-135, a pilot and an instructor were practicing circuits at International Airport Teuge. After the eighth touch-and-go, the Piper climbed to 500 feet and made a climbing right turn to follow the circuit. Just before that, PH-AVB, a Reims Aviation S.A. F172P with only one pilot on board, made a go-around. When both aircraft made a right turn to follow the circuit, they came close to each other. Both aircraft then continued their flight without further reported details.

*The Dutch Safety Board has not further investigated this occurrence.*

**Classification:** *Serious incident*

**Reference:** *2022127*

<sup>20</sup> Engine bleed air from the high pressure compressor is used for air conditioning and cabin pressurization.

## Near miss of fence, PZL-Bielsko SZD-51-1 'Junior', PH-876

International Airport Teuge, 17 May 2022

The trainee pilot of PH-876, a Bielsko SZD-51-1 'Junior', was ready for a winch launch from grass Runway 26 at Teuge International Airport. The start section of this grass runway strip is narrow. The glider was positioned in the right-hand row, placing it slightly to the north of the 'normal' winch path. The winch was operated by a trainee winch operator and an instructor. After the winch launch had started, the aircraft shifted to the right. The pilot attempted to correct this movement by fully turning the rudder to the left. However, this failed to prevent the movement. The glider then narrowly missed a fence located parallel to the northern side of the grass runway strip. The remainder of the winch launch was completed without further event.

The trainee pilot declared that at the start of the winch launch, the glider slowly built up speed, and this caused it to shift to the right. The pilot then indicated that due to his lack of experience, he was unsure whether to continue the winch launch or to break off the launch, by uncoupling. In his opinion, uncoupling the aircraft would have placed the aircraft even closer to the fence.

The gliding club analysed the occurrence and reached the conclusion that the combination of windless weather and the rigid application of the so-called '4-second rule' for winch operators<sup>21</sup> resulted in the slow build-up of speed by the glider. Because the aircraft shifted to the right, the separation to the fence was reduced, resulting in a dangerous situation.

**Classification:** *Serious incident*

**Reference:** 2022046

<sup>21</sup> 'Winch operators can contribute to a safe winch launch by ensuring that the acceleration from stationary to the intended winch speed takes around four seconds. Calculations have shown that this ensures that acceleration is not so great that a pilot is unable to manage excessive rotation speed' (Safety instruction KNVvL - Gliding Division, the winch launch, April 2017).

## Takeoff with unconnected ailerons, Glasflügel Standard Libelle 201 B, PH-1656

Hilversum Airfield, 11 June 2022

Together with a friend, the pilot removed the glider, a Glasflügel Standard Libelle 201 B from the trailer, for pre-flight assembly. After they had connected the wings, the pilot was asked by others to move the Libelle, to clear space to allow them to assemble their own glider. After the pilot and the friend had moved the Libelle, they went to the canteen. When they returned, they moved the Libelle to the runway, awaiting an aerotow. The towing aircraft was already waiting. The pilot of the towing aircraft indicated that he could immediately offer the glider an aerotow. The pilot of the Libelle strapped on his parachute and climbed aboard. He carried out the pre-flight checks which included operating the airbrakes and checking the flight controls. Everything felt normal. However, the pilot did not conduct a visual check to determine whether the ailerons were actually moving when the stick was moved. The towing cable was then connected and the pilot gave a thumb's up signal to the wing walker to indicate that he was ready for takeoff.

During the takeoff roll, the left wing tip moved slowly towards to ground, causing the Libelle to take up a position slightly off-line behind the towing aircraft. The towing combination cleared the ground and quickly rose to a height of between 50 and 70 metres. The Libelle then slowly continued to roll to the right. Despite the pilot of the Libelle operating the ailerons, the rolling motion was not corrected, and the glider remained suspended behind the towing aircraft at a sharp banking angle. The pilot released the towing cable, to avoid a worse outcome. At that point, the banking angle of the Libelle approached 90 degrees, the nose tipped downwards and the speed started to increase rapidly. In response, the pilot applied full rudder, which slowly reduced the banking angle, until the aircraft adopted an almost horizontal attitude.

By applying the elevator, the pilot was able to reduce the speed of descent. By this point, the glider had turned through 180 degrees, and was now flying downwind, in the opposite direction to the direction of takeoff. When the aircraft was positioned above the airfield at low altitude, the pilot fully opened the airbrakes and the Libelle touched the ground, with the wings almost horizontal. The pilot remained unharmed and the Libelle suffered no damage during the landing.

The pilot realized that during the rigging of the glider, he had forgotten to connect the ailerons. The pilot had more than 20 years' experience on another type of glider, on which during wing assembly, the ailerons are automatically connected. This was his third flight with this Libelle. He also identified as contributing factors to the occurrence his distraction during the rigging of the glider and the perceived pressure to take off quickly because the towing aircraft was immediately available. As a consequence, he had carried out no daily inspection or a precise pre-flight inspection.

At the start of the flying day and following each assembly of a glider, a daily inspection is carried out. Part of that inspection is to check the ailerons which includes observing whether one aileron is in the neutral position, when the other aileron is placed in the neutral position. A check must also be carried out of whether the ailerons are well connected, without excessive play. It is advisable to have the inspection carried out, uninterrupted, by a person other than the person who assembled the aircraft. In this way, the risk of the ailerons not being connected or not being connected correctly is minimized. In addition, prior to every flight, the pre-flight inspection is carried out, which includes an inspection of the controls. The accurate completion of the daily inspection and pre-flight inspection are of vital importance for aviation safety.<sup>22</sup>

This report is based on the statements of the pilot and the Dutch Safety Board conducted no further investigation. The occurrence was only reported to the Dutch Safety Board in January 2023. It is important, and also a legal requirement, to report accidents and serious incidents - such as situations where control of an aircraft is seriously impaired - to the Dutch Safety Board without delay, so that a safety investigation can be carried out.

**Classification:** *Serious incident*

**Reference:** *2023007*

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<sup>22</sup> <https://www.easa.europa.eu/en/newsroom-and-events/news/sunny-swift-conscientious-rigging>

## Flap control lever unintentionally released, Schempp-Hirth Nimbus-3T, D-KJUN

Terlet glider airfield, 4 September 2022

At around 16.00 hours, after making a cross-country flight, the pilot decided to land at Terlet glider airfield. At an altitude of 350 metres, he selected the flaps in the landing position (L) to pre-set the trim lever to the desired landing position. Well before the glider approached the starting point of the circuit, the pilot set the flaps to position +2. Once on final, the pilot put the flaps back in the landing position and opened the air brakes. A few seconds later, the flap control lever moved unintentionally out of the landing position and stopped in the -1 detent.<sup>23</sup> As a result, the flaps moved to a negative position. The glider then quickly lost height. The pilot responded by putting the flap control lever back in the landing position and pulling the glider's nose up; the air brakes remained open. However, the glider ended up in the trees and was severely damaged. The pilot was unharmed.

Inspection of the flap handle mechanism showed that the pawl on the flap handle showed wear and that a notch had formed. This allowed the pawl to release from the detent plate, when forces on the flaps increased after the pilot had opened the air brakes.

The fact that wear can occur on the pawl was known to Schempp-Hirth, the manufacturer of the glider. In December 2011, Schempp-Hirth therefore issued a technical note which also applied to the Nimbus-3T.<sup>24</sup> It stated that during maintenance, the maintenance information<sup>25</sup> for the flap



▲ Seven detents for the flap control lever.

<sup>23</sup> The Nimbus 3T has seven detents for the flap control lever, namely L, +2, +1, 0, -1, -2 and S.

<sup>24</sup> Schempp-Hirth Flugzeugbau GmbH Kirchheim/Teck, *Technical Note No. Gen-2*, December 2011.

<sup>25</sup> Schempp-Hirth Flugzeugbau GmbH Kirchheim/Teck, *Wartungsinformation SHK-M-01-11 zu Wölbklappensteuerungen von Schempp-Hirth Segelflugzeugen und Motorseglern*, September 2013.

control SHK-M-01-11 must be noted. This information must also be appended to the service instructions. The maintenance information stated, among other things, that in addition to the detent plate, the pawl on the flap handle must also be checked for wear, that it must have a rectangular cross-section and the edges must not be excessively rounded. It contained a picture of a badly worn pawl in which also a notch had formed, along with the text that this example has come a long way above the wear limit that would have required a repair.

The pilot purchased the Nimbus 3T together with a partner in April 2022 and since then had made approximately 20 flights with it himself. His partner had previously experienced the flap control lever coming loose during flight; that was en route at a higher altitude. The owners had taken no action in response to this event.

The glider had a valid Airworthiness Review Certificate (ARC) that had been issued in Germany on 4 March 2022. The 2011 Technical Note Gen-2 was not included in the overview<sup>26</sup>, including airworthiness directives and technical notes, applicable to the glider and also not in its maintenance program. The relevant technical note was not included in the annual ARC inspections of the glider. This allowed the wear to continue unnoticed, resulting in a notch in the pawl, which caused the pawl, and subsequently the flap control lever, to release from the detent plate. As a result, the flaps moved out of the landing position into a negative position and the glider lost lift in a critical phase of flight.

The Dutch Safety Board has not further investigated this occurrence.

**Classification:** Accident

**Reference:** 2022129



▲ The pawl, with a notch in it, which is part of the flap control lever.

<sup>26</sup> LTA/TM-Übersicht.

## Injury due to severe turbulence, Boeing 737-900, PH-BXT

en route (Montenegro), 9 September 2022

On 9 September 2022, a Dutch registered Boeing 737-900 was en route from Ben Gurion Airport in Israel to Amsterdam Airport Schiphol. During the flight at FL360, in Montenegro airspace, the aircraft experienced slight turbulence. The aircraft's weather radar issued no turbulence indications. The pilots had already switched on the signal for the passengers to fasten their seatbelts. While the cabin crew were checking whether all passengers were correctly fastened in, the aircraft suddenly experienced severe turbulence causing it to move violently. The flight crew immediately instructed all cabin crew to sit down. Before the cabin crew were able to take up their seats, one member of the cabin crew, who was located in the back of the pantry, was thrown heavily to the floor as a consequence of the turbulence. As a result, the member of the cabin crew suffered a bleeding head injury and subsequently experienced pain in a shoulder and arm. The purser administered first aid. After landing at Amsterdam Airport Schiphol, the wounded member of the cabin crew was taken to hospital for further treatment and examination.

Because the incident occurred in Montenegro airspace, Montenegro authorities were informed. They indicated that they would not be launching an investigation into the occurrence.

**Classification:** *Serious incident*

**Reference:** *2022139*

## Collision with runway lighting, Alexander Schleicher, ASK 21, PH-1345

Deelen Air Base, 16 October 2022

The ASK 21, a two-seater glider, took off for a teaching flight from Terlet glider airfield. The instructor sat in the back seat, and the trainee in the front seat. The flight was scheduled to end at Deelen Air Base, where the instructor would carry out the landing.

After a flight of around 12 minutes, the instructor landed the aircraft on the paved Runway 19 at the air base. During the landing runout, the instructor steered the glider to the left towards a golf cart that was positioned ready on the taxiway at the first intersection (seen from the landing direction) to tow the aircraft to the hangar. As the left-hand wing started to lower, the instructor attempted to keep the wings horizontal. However, by this stage the aircraft's speed was so low that the ailerons had become insufficiently effective to halt the rolling motion. The left-hand wing collided with two runway lights and suffered damage. The light that was hit first broke off. Both occupants remained unharmed.

The instructor declared that he had steered to the left during the landing runout in order to free up the runway more quickly, for the next aircraft due to land, and in order to approach the parked golf cart more closely.

The safety team at the gliding club in question investigated the occurrence and shared its investigation findings with the Dutch Safety Board. The investigation report includes a recommendation to the instructor group to regularly pay attention to the subject of 'steering following landing' in field briefings, and in particular the steerability of a glider at low speed.

**Classification:** *Accident*

**Reference:** *2022164*

## Aircraft damaged by ground handling vehicle, Boeing 737-800, PH-HXJ

Rotterdam The Hague Airport, 2 January 2023

At around 21.40 hours, following landing, the Boeing 737-800 was stood on apron B2 at Rotterdam The Hague Airport. The passengers had disembarked from the aircraft but the crew were still on board.

One of the vehicles from the ground handling company reversed towards the aircraft, in order to empty the aircraft's toilet tank. During the reversing manoeuvre, the driver stopped after hearing a series of unusual beeps. After consulting with his employer, the driver carefully continued reversing. During this manoeuvre, the platform on the back of the vehicle started to rise, of its own accord. As a consequence, a section of the railing around the platform punched a hole in the fuselage of the aircraft.<sup>27</sup>

The platform can only be operated from outside the vehicle. Besides the driver, who was sat in the cab, no one was in the vicinity of the vehicle. Following a technical investigation of the vehicle and the platform by the ground handling company, together with the manufacturer, no cause was discovered for the spontaneous rising of the platform.

*The Dutch Safety Board has not further investigated this occurrence.*

**Classification:** Accident

**Reference:** 2023001



▲ The platform and the damaged aircraft fuselage.  
(Source: Rotterdam The Hague Airport)

<sup>27</sup> Because the crew were still on board the aircraft, and given the nature of the damage, pursuant to the applicable definitions, this was identified as an aviation accident.

## Collapsed nosewheel during landing, TL-3000 Sirius, PH-4F9

Hoogeveen Airport, 25 February 2023

The pilot and sole occupant of the aircraft was conducting a flight from Stadskanaal airfield to Hoogeveen airfield. The pilot stated that after completing a normal landing on Runway 09, with a crosswind from the left, he felt the aircraft pull to the left, during the rollout. He was unable to correct this movement. The nosewheel leg subsequently bent to the left and backwards, causing the nose of the aircraft to slump, at which point the propeller came into contact with the ground. The aircraft subsequently came to a sudden stop. The pilot was unharmed.

As a result of the accident, the aircraft suffered damage to the nosewheel leg, the propeller, the right wing tip and the wheel housings of the main landing gear.

In the past there have been three accidents involving a TL-3000 Sirius in the Netherlands (in 2019, 2020 and 2021). All these accidents were characterized by the failure of the nose landing gear during landing.<sup>28</sup>

The aircraft manufacturer TL-ULTRALIGHT s.r.o. emphasized that the nose landing gear strength meets airworthiness requirements for micro light airplanes with a maximum take-off mass before 600 kg.<sup>29</sup>

*The Dutch Safety Board has not further investigated this occurrence.*

**Classification:** Accident

**Reference:** 2023024



▲ Bent nosewheel leg. (Source: pilot)

<sup>28</sup> Dutch Safety Board, *Quarterly Aviation Report Q3 2021*, page 18, 2021.

<sup>29</sup> As described in UL2 and LTF-UL.

## Nosewheel broken off during landing, Aero Sp.z o.o AT-3 R100, PH-ZVA

Lelystad Airport, 5 March 2023

The pilot, the only occupant of the PH-ZVA, an AT-3, was training circuits at Lelystad Airport. Runway 23 was in use. The wind was blowing from 300 degrees at a speed of 8 knots. The first three touch-and-go landings were completed without reported incident. During the fourth landing, the aircraft bounced high, at which point the pilot lowered the nose of the aircraft in order to bring the aircraft back under control. When the aircraft came into contact with the runway for the second time, the nosewheel broke off. The aircraft then slid over the runway, until it came to a standstill.

The tips of the propeller blades had also broken off. The pilot was unharmed.

*The Dutch Safety Board has not further investigated this occurrence.*

**Classification:** Accident

**Reference:** 2023027

▼ *The AT-3 following the landing. (Source: pilot)*





## Colofon

This is a publication of the Dutch Safety Board. This report is published in the Dutch and English languages. If there is a difference in interpretation between the Dutch and English versions, the Dutch text will prevail.

June 2023

### Photos

Photos in this edition, not provided with a source, are owned by the Dutch Safety Board.

## The Dutch Safety Board in three questions

### 1. What does the Dutch Safety Board do?

Living safely, working safely, safety. It seems obvious, but safety cannot be guaranteed. Despite all knowledge and technology, serious accidents happen and disasters sometimes occur. By carrying out investigations and drawing lessons from them, safety can be improved. In the Netherlands the Dutch Safety Board investigates incidents, safety issues and unsafe situations which develop gradually. The objective of these investigations is to improve safety, to learn and to issue recommendations to parties involved.

### 2. What is the Dutch Safety Board?

The Dutch Safety Board is independent of the Dutch government and other parties and decides for itself which occurrences and topics will be investigated.

The Dutch Safety Board is entitled to carry out investigations in virtually all areas. In addition to incidents in aviation, on the railways, in shipping and in the (petro-)chemical industry, the Board also investigates occurrences in the construction sector and healthcare, for example, as well as military incidents involving the armed forces.

### 3. Wie werken er bij de Onderzoeksraad voor Veiligheid?

The Board consists of permanent board members; the Chairperson is Chris van Dam. The board members are the public face of the Dutch Safety Board. They have extensive knowledge of safety issues.

They also have extensive administrative and social experience in various roles. For specialist knowledge, the Board members can enlist the assistance of the associate members of the Board. The Safety Board's bureau has around 80 staff, two-thirds of whom are investigators.



Visit the website for more information [www.safetyboard.nl](http://www.safetyboard.nl).