

COMANDO DA AERONÁUTICA
CENTRO DE INVESTIGAÇÃO E PREVENÇÃO DE
ACIDENTES AERONÁUTICOS



FINAL REPORT
A - 132/CENIPA/2013

OCCURRENCE:	ACCIDENT
AIRCRAFT:	PR-KEX
MODEL:	G36
DATE:	19JUL2013



NOTICE

According to the Law n° 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 taking into account the contributing factors and hypotheses raised. The report is, therefore, a technical document which 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 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).

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 in the Brazilian legal system by virtue of the Decree n° 21713, dated 27 August 1946.

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 to 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 19JUL2013 accident with the G36 aircraft model, registration PR-KEX. The accident was classified as “[UNK] Unknown”.

During the journey between Engano Farm, Porto Murinho - MS, and Presidente Prudente - SP, the aircraft crashed into the ground in a rural area.

The aircraft was destroyed.

The pilot and the passenger suffered fatal injuries.

An Accredited Representative of the National Transportation Safety Board (NTSB) - USA, (State where the aircraft was manufactured) was designated for participation in the investigation.



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GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS

ANAC	Brazil's National Civil Aviation Agency
CA	Airworthiness Certificate
CENIPA	Aeronautical Accident Investigation and Prevention Center
CIV	Pilot's Flight Logbook
CMA	Aeronautical Medical Certificate
DECEA	Air Space Control Department
FAA	Federal Aviation Administration
IAM	Annual Maintenance Inspection
ICA	Command of Aeronautics' Instruction
IFR	Instrument Flight Rules
IFRA	Instrument Flight Rating - Airplane
IMC	Instrument Meteorological Conditions
INMET	National Institute of Meteorology
METAR	Meteorological Aerodrome Report
MNTE	Airplane Single Engine Land Rating
NSCA	Aeronautics Command System Standard
NTSB	National Transportation Safety Board (USA)
PIC	Pilot in Command
PPR	Private Pilot License – Airplane
SIPAER	Aeronautical Accident Investigation and Prevention System
TPP	Registration Category of Private Service - Aircraft
UR	Relative Humidity
UTC	Universal Time Coordinated
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VTI	Initial Technical Inspection

1. FACTUAL INFORMATION.

Aircraft	Model: G36	Operator: Private
	Registration: PR-KEX	
	Manufacturer: Hawker Beechcraft	
Occurrence	Date/time: 19JUL2013 - 1530 UTC	Type(s): "[UNK] Unknown"
	Location: Mestiça Farm	
	Lat. 21°18'42"S Long. 056°48'04"W	Subtype(s): Nil
	Municipality – State: Bonito – MS	

1.1 History of the flight.

The aircraft took off from an unregistered location, at Engano Farm, in Porto Murtinho - MS, to the Presidente Prudente Aerodrome (SBDN) - SP, in order to carry out a private transport of personnel, with a pilot and a passenger on board.

At around 1530 (UTC), the aircraft crashed into the ground and was then, partially consumed by fire.

The aircraft was destroyed.

The crewmember and the passenger suffered fatal injuries.



Figure 1 - Image of the aircraft after the occurrence.

1.2 Injuries to persons.

Injuries	Crew	Passengers	Others
Fatal	1	1	-
Serious	-	-	-
Minor	-	-	-
None	-	-	-

1.3 Damage to the aircraft.

The aircraft was destroyed.

1.4 Other damage.

None.

1.5 Personnel information.

1.5.1 Crew's flight experience.

Flight Hours	PIC
Total	Unknown
Total in the last 30 days	Unknown
Total in the last 24 hours	Unknown
In this type of aircraft	Unknown
In this type in the last 30 days	Unknown
In this type in the last 24 hours	Unknown

N.B.: The Investigation Team did not have access to the pilot's CIV as it was destroyed by fire after the impact.

The digital CIV was outdated.

Through interviews, information was obtained that the pilot had about 270 total flight hours.

1.5.2 Personnel training.

No information was found about the pilot training school.

His formation took place in 1997.

1.5.3 Category of licenses and validity of certificates.

The pilot had a PPR License and a valid MNTE Rating.

The pilot did not have the IFRA Rating.

The only records in the pilot's digital CIV were flights carried out on the 30th and 31st of MAR2013, approximately 4 months before the occurrence. On 30MAR2013, a retraining flight was carried out in a Cessna 152 aircraft and, on 31MAR2013, a local recheck flight was carried out, in the same aircraft, lasting one hour.

Considering that the pilot did not use to enter the hours flown in the digital CIV and that the physical CIV was burned, it was not possible to determine the total hours flown from its revalidation to the date of the accident.

The passenger, who was sitting on the right seat, had a PPR License, but his MNTE Rating had expired in July 1989.

1.5.4 Qualification and flight experience.

Due to the destruction of the physical CIV and the fact that the digital CIV is outdated, it was not possible to say if the pilot was qualified, nor if he had recent experience.

According to information obtained in interviews, it was found that the pilot was an agricultural farmer and routinely piloted, having the plane as his main means of transport.

1.5.5 Validity of medical certificate.

The pilot had a valid CMA.

1.6 Aircraft information.

The aircraft, serial number E-3654, was manufactured by Hawker Beechcraft in 2006 and was enrolled in the TPP Category.

The aircraft had a valid CA.

The airframe, engine, and propeller logbooks were inside the aircraft and were consumed by fire. Thus, it was not possible to verify if the technical records were updated.

According to the information obtained by the Investigation Team, the last inspection of the aircraft was the IAM, carried out on 22OCT2012 by the Maintenance Organization *Marília de Aviação* LTD., in Marília - SP, with the aircraft being, at the time, with 401 hours and 48 minutes total.

1.7 Meteorological information.

The meteorological information, present at the time of the occurrence, was estimated through the analysis of the data available at the meteorological station A758 of the INMET, located in the city of Jardim - MS, 43 NM away from the place of occurrence.

Data	Hora (UTC)	Temp. Min. (C)	Umi. Max. (%)	Pto Orvalho Max. (C)	Vel. Vento (m/s)	Dir. Vento (m/s)
19/07/2013	1300	22,2	83	19,7	1,2	195
19/07/2013	1400	20,4	89	19,6	2,8	217
19/07/2013	1500	19,3	91	18,8	3,2	213
19/07/2013	1600	19,4	85	17,3	1,8	203

Figure 2 - Meteorological data from the INMET station A758 (Jardim - MS).

What was observed in the above data is consistent with the conditions reported by observers close to the place of the occurrence, who reported having “mist” or “fog” in the previous days and on the date of the occurrence, approximately in that time range.

The data highlighted in Figure 2 indicate that the maximum Relative Humidity recorded in the time range in which the occurrence happened was 91%. The maximum difference, recorded by the station, between the air temperatures and the dew point was 0.5°C, which also occurred in this time range. Such conditions are considered conducive to fog formation.

According to the FAA Advisory Circular 00-6B (2016), which dealt with aeronautical meteorology, fog occurs when air temperatures and dew point temperatures become identical or approached. The same publication reported that such a phenomenon hardly occurs when the difference between temperatures is greater than 2°C.

It should also be noted that the station mentioned did not register rain on the day of the accident, nor on the day before or after.

Furthermore, the occurrence took place in a region close to mountainous elevations, which also favor the formation of fog.

For comparison purposes, data from the days adjacent to the occurrence were extracted, including those from the day of the field action, in which the photo shown in Figure 3 was recorded, at a time close to the occurrence of the previous day.



Figure 3 - Presence of fog in the region of the occurrence on 20JUL2013, at 01:00 pm (local).

As observed, the humidity recorded by the station on the day after the occurrence was identical to that of the previous day, especially concerning the RH and the differences between the minimum temperature and that of the dew point. The gradient between air and dew point temperatures was also less than 1°C. The confluence of such data with the photographic records made allows us to conclude that, in fact, there was fog when the occurrence took place.

In addition to the high humidity conditions, it is worth mentioning the proximity of the place of occurrence to the *Serra da Bodoquena*, whose peaks reach about 2,500 feet in the surroundings of the route traveled by the aircraft. The presence of mountainous elevations can also favor the formation of orographic fog, through an adiabatic cooling process of air masses with high humidity, as seen in Figure 4.

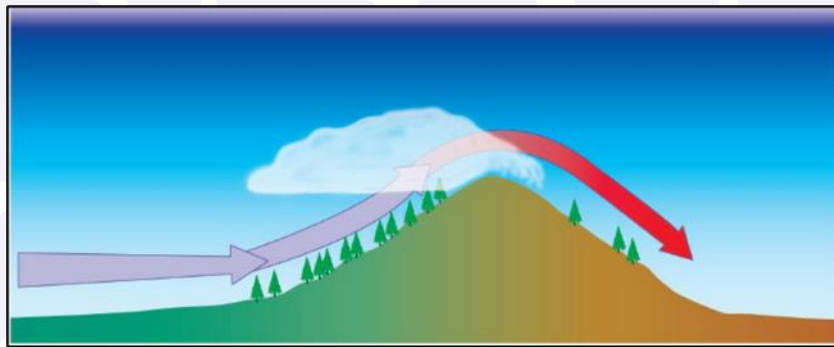


Figure 4 - Orographic fog formation near mountainous regions. Source: Lester, 2013.

1.8 Aids to navigation.

Nil.

1.9 Communications.

Nil.

1.10 Aerodrome information.

The occurrence took place out of the Aerodrome.

1.11 Flight recorders.

Neither required nor installed.

1.12 Wreckage and impact information.

The impact occurred in an open area at Mestiça Farm, Bonito - MS. There was no separation of parts of the aircraft in flight and all the wreckage was practically concentrated.

The right main landing gear, of the retractable type, was broken and located close to the rest of the wreckage, as shown in Figure 5.

The flaps were lowered, but it was not possible to determine whether they were lowered intentionally or by impact with the ground.

The propeller blades had characteristics of low RPM impact damage and the wings were leveled, as shown in Figures 6 and 7.

The degree of destruction and carbonization of the aircraft prevented the verification of equipment and instruments.



Figure 5 - Broken right main landing gear.



Figure 6 - Propeller damage.



Figure 7 - Front view of the aircraft, with leveled wings.

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.

The pilot was 50 years old. In addition to helping in the administration of the family farms, he worked in the agricultural activity and used the plane as his main means of transport, with some regularity, always on business.

The pilot was described, by close people and colleagues, as being calm and without known addictions. In good health, he did not drink, smoke, and exercise daily.

Family members reported that he was satisfied with his job, working happily, and did not perceive him to be fatigued or even overloaded with his activities. Thus, the interviewees did not believe that the overload had influenced the occurrence.

The pilot had spent the week before the accident in the region of the state of Mato Grosso do Sul, near Porto Murtinho, at Engano Farm, one of his properties. At the time of the accident, he was returning home to Presidente Prudente, in the company of a childhood friend and also a rancher, who accompanied him on the trip.

On the morning of the accident, the pilot was warned by his wife and an employee of his company, through telephone contacts, that the weather was bad in the city of Presidente Prudente and region. According to reports, it rained and thundered a lot.

However, the manager of Engano Farm commented that the weather was fine on the way out.

It was reported that the pilot had a habit of returning home on Fridays and was looking forward to spending the weekend at his residence.

It was found that the accident site was close to the *Serra da Bodoquena* region, in which the pilot already had the habit of flying over, as it was part of his usual route. However, he always made a flyover before traveling, in order to assess the weather and see if he could see the *Serra*. The family members believe that the PIC made this flyover to check the weather and thought it would be possible to pass through the *Serra da Bodoquena* and return to Presidente Prudente, as usual.

All interviewees, family members, and friends had already flown with the crewmember on other occasions and reported that they had never witnessed any flight in adverse weather conditions.

Respondents stated that they never witnessed or knew of any emergency or breakdown during all the years he flew.

Interviewees said they did not believe that the pilot would have entered adverse weather conditions on purpose because he always used to return or switch destinations in these cases. For them, the pilot would have been surprised by the rapid degradation of weather conditions and, when trying to land, was not successful in the maneuver.

The pilot was not in the habit of consulting the weather through the internet, preferring to make phone calls to acquaintances in the region he would fly over to obtain information. In addition, it was reported that the pilot was careful with the amount of fuel in the aircraft, not performing flights without first checking the levels of the tanks.

All interviewees considered him experienced. They reported that the pilot was used to flying in the region. However, it is unknown if he took any other courses besides private pilot training.

The family owned a Bonanza model aircraft since the 1970s, and in 2011 they purchased a newer plane. When the pilot started flying this plane, he did train flights in the company of another pilot in the family to adapt to the Bonanza. After he acquired practice, he began to fly alone. It was also found that, in the same way, when acquiring a new plane, he did not take any specific course of the aircraft model, learning in-flight practice, in the company of other pilots.

The pilot did not perform instrument flights since he did not have a license for this type of activity.

It was found that the pilot took pleasure in piloting, but he began to fly out of necessity, as he had different properties and that made it easier to move between them. He also believed that it was safer to fly than to travel by car.

In addition, the pilot was described by most of the interviewees as having a conservative profile, not performing stunts or maneuvers in disagreement with the manuals and safety guidelines. However, some pilots in the region reported that, in recent times, the pilot had started to fly at low altitudes.

The passenger was a friend of the pilot, he was 52 years old and was described by the interviewees as being a lively person and loved by everyone. According to family members, in the last year, he was experiencing a moment of satisfaction and personal pride. He had been a pilot but did not renew his license and did not fly.

1.14 Fire.

The fire spread after the impact and part of the aircraft's fuselage was consumed by the flames.

The combustion took place by the residual fuel of the aircraft, lubricating oils, and parts of it. The ignition source possibly originated as a result of the strong friction between the engine components at the moment of impact with the ground.

When the team of investigators arrived, the fire had already been brought under control by the farm's employees.

1.15 Survival aspects.

There were no survivors.

1.16 Tests and research.

Nil.

1.17 Organizational and management information.

Nil.

1.18 Operational information.

No flight plan was presented. The take-off and landing locations were obtained through the testimony of family members.

The pilot was not qualified for flights under IMC.

No fuel bill was found and, as the route flown, cruise levels, and loads on board the aircraft were not known, the fuel consumption calculation could not be performed. As a result, it was not possible to certify whether the aircraft had adequate weight and balance.

The last take-off record of the aircraft was obtained from the administration of the SBDN Aerodrome. The control stated that the PR-KEX took off from the Aerodrome at 02:14 pm (local time) on 14JUL2013 (Sunday) and with only the pilot on board. According to the report of an employee of the hangar where the aircraft was staying in Presidente Prudente, there was no fuel supply before the take-off.

According to reports from people who had already accompanied the PR-KEX pilot on the leg between Presidente Prudente and Engano Farm, in the municipality of Porto Murinho - MS, the estimated flight time was two hours.

1.19 Additional information.

The aircraft was acquired in the United States and the transfer to Brazil was accompanied by the pilot who owned the PR-KEX. Upon arrival, an operational test flight for VTI was carried out on 11OCT2011.

Regarding the preparation of the flight of the occurrence, the letters "A" and letter "C", of item 3.4.2.2, of the topic "Flight planning" of ICA 100-12 - Air Rules stated that:

3.4.2.2 The information necessary for the flight mentioned in 3.4.2.1 must include, at least, a careful assessment of the following aspects:

a) weather conditions (reports and updated weather forecasts) of the Aerodromes involved and the route to be flown;

[...]

c) alternative planning in case it is not possible to complete the flight.

1.20 Useful or effective investigation techniques.

Nil.

2. ANALYSIS.

It was a private flight, with a pilot and a passenger on board.

During the analysis of the wreckage, it was possible to verify that the passenger was sitting in the chair on the right. Despite having the PPR License, he had his MNTE Rating expired in July 1989. It was not possible to determine whether the passenger influenced the decisions of the aircraft pilot.

According to reports, the pilot used to return home on Fridays, in order to spend the weekend with his family. This preference may have influenced the pilot's situational awareness, leading him to be less judicious with important factors for flight safety due to the high motivation to return.

The pilot did not usually consult the aeronautical meteorological reports available on the internet. He was used to calling acquaintances in the destination region to see how the conditions were.

Therefore, it is likely that, on the day of the occurrence, the pilot did not consult the weather reports before the flight or, if he did, he chose to takeoff with the expectation of improving the weather en route. In addition, the flight planning may not have considered an alternative if there were no conditions to proceed to the destination.

This information, had it been consulted, could suggest that, at any time, the flight conditions on the route could degrade and pass to IMC. This situation would force the pilot to change the flight level, proceed to another Aerodrome or return to the place of departure since he was not qualified and did not have the necessary experience for this type of flight.

With regard to aircraft maintenance, it was not possible to analyze the documentation, as they were on board and were consumed by fire.

Impact marks on the propeller blades indicated that the collision occurred with the engine at low RPM. The right main landing gear was broken during the aircraft's impact with the ground, which indicated that, possibly, the landing gears were down. The flaps were also lowered, and it was not possible to say if they were commanded intentionally or by the force of the impact with the ground.

Taking into account this information and considering the attitude of the aircraft at the moment of impact (with leveled wings), there are indications that the pilot had landing intentions. In this case, the degraded weather conditions, with fog in the area of the occurrence, may have impaired visibility to the point of causing the pilot to crash into the ground, in an attempt to make a precautionary landing.

Considering the characteristics of the wreckage, especially about the integrity of the wings, two hypotheses were considered to explain the dynamics of the accident: a possible loss of powertrain performance followed by an unsuccessful emergency landing attempt; or the attempt to make a precautionary landing due to deteriorating weather conditions en route.

Concerning meteorological conditions, the data extracted from the INMET's A758 station, located in Jardim - MS, showed the presence of fog in the surroundings of the region where the accident occurred. Furthermore, even in the case of the following day, the photos taken during the field action, in the time range close to that in which the occurrence was recorded, showed the presence of dense fog, with the conditions recorded by the meteorological station similar to those of the previous day.

In addition to the high humidity conditions, it is worth mentioning the proximity of the place of occurrence to the *Serra da Bodoquena*, whose peaks reach about 2,500 feet in the surroundings of the route traveled by the aircraft. The presence of mountainous elevations can also favor the formation of orographic fog, through an adiabatic cooling process of air masses with high humidity.

Although it is not possible to estimate the extent of the fog verified or the maximum altitude reached by it, its presence in the region of the occurrence is relevant for the understanding of the accident.

First, because of the possibility that the aircraft inadvertently entered IMC and the pilot decided to make an emergency landing.

Second, because it was not possible to rule out the possibility of powertrain failure. If the pilot faced an emergency that made the emergency landing necessary, the presence of fog may have contributed to the worsening of the severity of the occurrence since it would make it impossible or difficult to select and approach a suitable field.

The perception that the fog may have aggravated the consequences of an eventual emergency landing is based on the availability of open areas in the region where the aircraft was overflying, which would make a forced landing possible with minor consequences if the pilot kept visual references.

3. CONCLUSIONS.

3.1 Facts.

- a) the pilot had a valid CMA;
- b) the pilot had a valid MNTE Rating;
- c) it was not possible to verify if the pilot was qualified or if he had recent experience;
- d) the pilot did not have an IFR Rating;
- e) the aircraft had a valid CA;

- f) it was not possible to confirm whether the aircraft was within the weight and balance limits;
- g) it was not possible to verify whether the airframe, engine, and propeller logbook records were updated;
- h) the weather conditions were not favorable for the visual flight;
- i) during the journey from Engano Farm to Presidente Prudente, the aircraft crashed into the ground;
- j) the aircraft was destroyed; and
- k) both occupants suffered fatal injuries.

3.2 Contributing factors.

- **Attitude – undetermined.**

The pilot did not usually check the weather reports before the flight took place. Had he carried out the verification, the pilot would have obtained information regarding the forecast of meteorological degradation in the region on the day of the occurrence. Thus, failure to carry out these checks may have contributed to wrong decision-making.

- **Adverse meteorological conditions – a contributor.**

There was fog in an extensive area in the vicinity and in the time range in which the accident occurred. Such fog contributed to the reduction of visibility, leading to the outcome of the occurrence.

- **Motivation – undetermined.**

According to the interviews, the pilot used to return home on Fridays. Thus, it is possible that the desire to spend the weekend with his family has contributed to the decision to take the flight without adequate time to analyze the risks involved in the activity.

- **Perception – undetermined.**

Despite the information, he received from two sources before takeoff, about the weather conditions in Presidente Prudente, inaccurate perception of the pilot about the real weather condition on the route and at the destination allowed him to proceed with the flight. The prevailing conditions encountered may have compromised the level of situational awareness and thus led the aircraft to an operating condition below safe minimums.

- **Flight planning – a contributor.**

A better planning and detailed study of the meteorological conditions, before the take-off, would indicate that the route to Presidente Prudente was degraded and could undergo significant changes.

- **Decision-making process – undetermined.**

The pilot may not have adequately analyzed the possible alternatives in the face of meteorological changes on the route, to the point where conditions may have become impeding for VFR flight, causing him to fly, possibly at certain times, under IMC conditions for which he was not enabled.

4. SAFETY RECOMMENDATION.

A proposal of an accident investigation authority based on information derived from an investigation, made with the intention of preventing 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 the 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”.

None.

5. CORRECTIVE OR PREVENTATIVE ACTION ALREADY TAKEN.

None.

On May 27th, 2022. _____

