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Report A-036/2016

Accident involving a Piper PA-28-161 Warrior II aircraft, registration EC-JCI, at the Seville Airport (Seville, Spain) on 9 September 2016

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MINISTERIO DE FOMENTO

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Foreword

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident object of the investigation, and its probable causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) nº 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1., 4. and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report was originally issued in Spanish. This English translation is provided for information purposes only.

Contents

Abbreviations

° ' "	Sexagesimal degrees, minutes and seconds
° C	Degrees centigrade
ADF	Automatic direction-finding equipment
AEMET	National Weather Agency
AENA	Aeropuertos Españoles y Navegación Aérea
AESA	National Aviation Safety Agency
AIP	Aeronautical Information Publication
AMT	Aviation maintenance technician
APP	Approach control
ATA	Air Transport Association
ATS	Air traffic system
CAR	Civil Air Regulations
CECOA	Airport coordination center
CCTV	Closed-circuit television
COM/NAV	Navigation Communication System
dBA	Decibels
dm3	Cubic decimeters
DME	Distance measuring equipment
EASA	European Aviation Safety Agency
ELT	Emergency Locator Transmitter
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FFS	Firefighting service
ft	Feet
GESRED	Network management center
h	Hours
HP	Horsepower
ILS	Instrument landing system
IPC	Illustrated parts catalog
kg	Kilograms
km	Kilometers
km/h	Kilometers/hour
kt	Knots

l , l/h	Liters, liters/hour
LAPL	Light airplane pilot license
LEZL	ICAO code for Seville airport (Spain)
LT	Local time
m	Meters
Mhz	Megahertz
m/s	Meters/second
m^2	Meters/second squared
METAR	Aviation routine weather report
mm	Millimeters
N	North
PAPI	Precision approach path indicator
POH	Pilot operating handbook
P/N	Part number
PPL	Private pilot license
RPM	Revolutions per minute
RWY	Runway
S	South
SE	Southeast
SEP	Single-engine piston
S/N	Serial number
SPP	Runway and Apron Service
SW	Southwest
TORA	Takeoff run available
UTC	Coordinated universal time
VFR-VMC	Visual flight rules-Visual meteorological conditions
VHF	Very high frequency (30 to 300 MHz)
Vne	Never exceed speed
V_s	Stall speed
W	West
XPDR	Transponder

Synopsis

Owner and Operator:	Real Aeroclub de Sevilla
Aircraft:	Piper PA-28-161 Warrior II, registration: EC-JCI
Date and time of accident:	Friday 9/September/2016, 19:18 LT
Site of accident:	Seville Airport (Seville, Spain)
Persons onboard:	1 crew and 1 passenger - uninjured
Type of flight:	General aviation – Private
Phase of flight:	Taxi – Taxi to runway
Date of approval:	29/11/2017

Summary of event:

On Friday, 9 September 2016, a Piper PA-28-161 Warrior II aircraft, registration EC-JCI and S/N 28-8316044, was preparing to make a local flight, taking off from the Seville Airport, when, as it was taxiing on taxiway A-5 toward the runway 27 holding point, the pilot detected a loss of efficiency in the brakes, and the aircraft ended up outside the taxiway.

The brakes on the right main gear leg caught fire, which then spread to the right wing.

The firefighters quickly extinguished the fire, and neither the pilot nor the passenger were injured.

The investigation of the accident concluded that the aircraft veered off the taxiway due to the deficient operation of the brake system, caused by improper maintenance, which led to overheating of the brake assembly while taxiing, and then to a fire in the right landing gear leg and right wing.

This report contains several safety recommendations for AESA, the maintenance organization and the aircraft's manufacturer.

1. FACTUAL INFORMATION

1.1. History of the flight

On 9 September 2016 at around 19:18 local time, the pilot of a Piper PA-28-161 Warrior II aircraft, registration EC-JCI and owned by the Real Aeroclub de Sevilla, was preparing to go on a local VFR flight with one passenger onboard, departing from and landing at the Seville Airport (Seville).

After conducting the pre-flight inspection and the relevant checks at the airport's general aviation hangar, the pilot prepared to taxi on taxiway A-5 to the runway 27 holding point, as per the control tower's instructions. As he was completing the taxi route and neared the departure threshold, the pilot noticed that the brakes had lost their effectiveness, and he was unable to keep the aircraft from veering off the taxiway and into a cotton field. After seeing the presence of smoke, he declared an emergency and prepared to evacuate the aircraft. A short time later, the brakes on the right leg caught fire, which then spread to the right wing.

The tower, which was coordinating the emergency response, activated the firefighting service, which responded quickly to extinguish the fire. The pilot and passenger exited the aircraft under their own power and were not injured.

Photograph 1. Accident aircraft after taxiway excursion

The Airport Coordination Center oversaw the removal of the aircraft toward taxiway N-1, where it remained until the CIAIAC reported to the scene.

Then, after the relevant inspections of the aircraft, it was taken by the Real Aeroclub de Sevilla to an EASA Part-145 authorized maintenance center for repair.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				
None	1	1	2	
TOTAL	**1**	**1**	**2**	

1.3. Damage to aircraft

The fire, which started in the brakes on the right main gear leg and then spread to the right wing, caused significant damage to said components.

1.4. Other damage

There was no additional damage.

1.5. Personnel information

1.5.1. Pilot

The pilot, a 40-year old Spanish national, had the following licenses, issued by Spain's National Aviation Safety Agency (AESA):

- Private pilot license (PPL) since 19/12/2012, with the following rating:
  - SEP (single-engine piston) (land), valid until 31/12/2016.

The medical certificate was valid until 29/12/2017 for classes 2 and LAPL.

The pilot in command was using the aircraft as a member of the Real Aeroclub de Sevilla, which owned it.

According to information provided by the pilot, he had a total of 91.02 hours of experience flying single-engine piston aircraft, of which the last 20.07 hours had been on the same type as that involved in this event.

1.5.2. Maintenance Technicians

The two maintenance technicians who were directly involved in maintaining the accident aircraft worked at an EASA Part-145 and Subpart G and F authorized maintenance center.

- Aircraft maintenance technician no. 1 (AMT1): Part-66 aircraft maintenance license issued by AESA and valid until 07/02/2017. Mechanical category B1 and subcategory B1.1 for turbine airplanes, with limitations on ATAs 31 and 45 (ATA 31: Instrumentation systems, and ATA 45: Onboard maintenance systems).

He did not have any type ratings and was not issued certifying authority by the maintenance center.

- Aircraft maintenance technician no. 2 (AMT2): Part-66 aircraft maintenance license issued by AESA and valid until 18/02/2021. Mechanical category B1 and subcategories:

    - B1.1 for turbine airplanes with AIR TRACTOR AT-400/500/600 series (PWC PT6) and AT-800 series type ratings.

    - B1.2 for piston engines with complete Group 3 rating, with limitations for aircraft with structures made from wood or composite materials.

The maintenance center issued him certifying authority for the following airplanes:

- Subcategory B1.1: AIR TRACTOR AT-400/500/600/800 Series (PWC PT6)

- Subcategory B1.2:

- Cessna – multi-engine piston airplane – metal structure.
- Group – single-engine piston airplane – metal structure.
- Piper – PA-34 (Lycoming)

- Component authorization: Pratt & Whitney, PT6 Series engine, Lycoming and TCM piston series engines, Bendix and Slick magnetos, Marvel Schebler carburetors, piston engine starter and alternator.

1.6. Aircraft information

1.6.1. General information

The Piper PA-28-161 is a low-wing cantilever monoplane with a fixed tricycle landing gear with fairings on all the wheels and with hydraulic brakes. It has a semi-monocoque metallic structure.

It is a variant of the original Piper Cherokee with the power boosted to 160 HP and called Cherokee Warrior II. The models manufactured after 1982 (the accident airplane was manufactured in 1983) featured certain aerodynamic changes that increased its maximum takeoff weight and payload.

It is a single-engine airplane with four seats, including the pilot's seat, designed for flying in VFR/VMC conditions.

It has a LYCOMING O-320-D3G engine and a fixed-pitch two-blade Sensenich 74DM-6-0-60 propeller.

The aircraft's general characteristics, in compliance with the data sheet issued by the FAA, in type certificate data sheet no. 2A13 Rev. 49, of 6 January 2009, are as follows:

Structure:

- Wingspan: 10.66 m
- Length: 7.25 m
- Wing surface area: 15.1 m2
- Maximum height: 2.22 m
- Dry weight: 687.05 kg
- Maximum takeoff weight: 1055 kg

- Fuel capacity: 189.27 l

Performance:

- Climb speed: 3.4 m/s
- Never exceed speed (V_{ne}): 230 km/h
- Average cruise speed: 204 Km/h
- Stall speed (V_s): 89 km/h

Powerplant:

TEXTRON LYCOMING O-320-D3G piston engine with four cylinders, S/N L-15922-39A.

Characteristics:

- Four stroke, four horizontally opposed cylinders and dual ignition system (magnetos)
- Air-cooled cylinders
- Maximum power: 160 HP
- Rated speed: 2,700 rpm

Propeller:

- Sensenich 74DM-6-0-60, made with 2025 forged aluminum:
  - Tractor, two blades, fixed pitch
  - Power range: 125 to 165 HP
  - Diameter: 1.9 m

Fuel:

- Type of fuel authorized and used: AVGAS 100LL
- The aircraft has two tanks, one per wing, with a total capacity of 189.27 liters.

Landing gear

The landing gear is a fixed, tricycle-type gear with fairings on all the wheels and hydraulic brakes.

The arrangement of the fairings on the landing gear wheels on the accident aircraft is shown in photographs 2 and 3.

Photographs 2 and 3: Landing gear fairings

According to the Piper IPC, the exploded view of the fairings on the Piper PA-28-161 Warrior II is as follows:

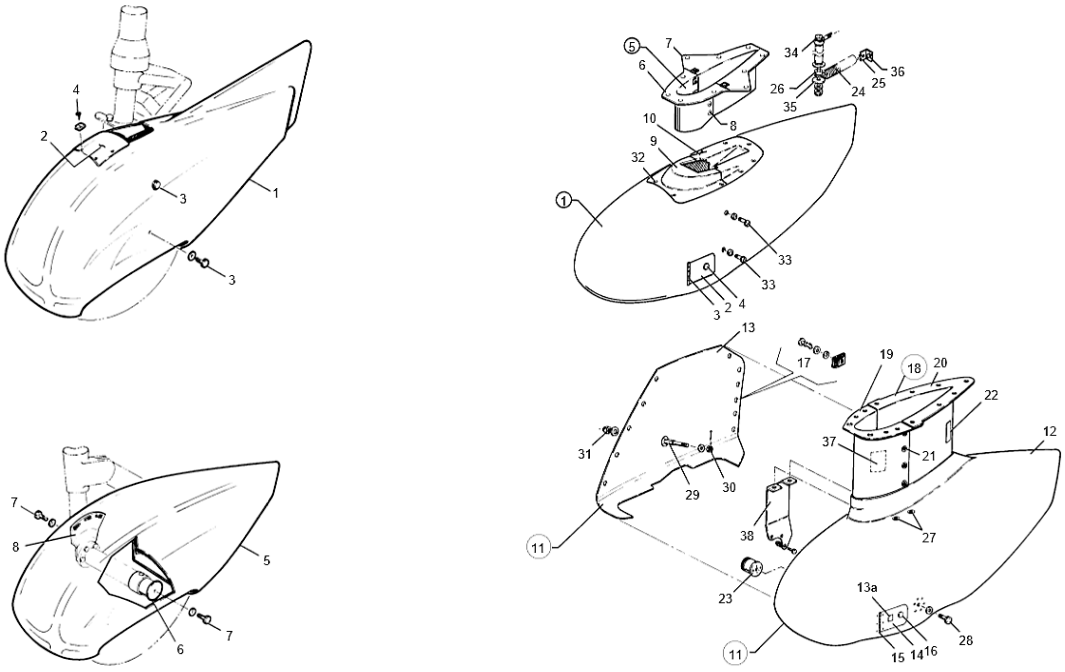


Figure 1. Diagram of landing gear fairing in the IPC

Each main gear wheel has disc brakes that are hydraulically actuated. Each brake is connected via a hydraulic line to a master cylinder connected to each of the pilot's directional pedals.

The hydraulic system that actuates the brake system uses MIL-H-5606 hydraulic fluid (petroleum based), whose fire point is 230° C. This fluid is used in the struts, the hydraulic system in general and in the brakes.

The types of brakes that must be used, as per the aircraft manufacturer, are Cleveland 30-55. Both main gear wheels have independently actuated brakes.

Pressing the top of the right rudder pedal actuates the brake on the right main leg, and pressing the top of the left rudder pedal actuates the brake on the left main leg.

Directional control on the ground while taxiing is achieved using the nose gear by actuating the rudder pedals, such that stepping on the right pedal turns the nose wheel right and stepping on the left pedal turns the nose wheel left. The nose wheel can turn a maximum of 10° to either side from its central position.

1.6.2. Maintenance record

This aircraft was built in 1983 with serial number 28-8316044. It was maintained by an EASA authorized Part-145 maintenance center. Its scope, as authorized by the AESA, included doing the 50, 100, 500 and 1000 hour checks and special item inspections, as well as implementing approved modifications and replacing components, in aircraft in the PIPER PA-28 series, as well as other aircraft.

At the time of the accident the aircraft had a total of 11,819 hours 39 minutes of flight time, and the engine had 2,608 hours 53 minutes of run time. The last flight record entry made before the accident was for a flight departing from and landing at the Seville Airport on 04/09/2016, which lasted a total of 2 hours 6 minutes.

The flight log recorded that the next inspection of the aircraft was scheduled for 11,844.35 hours, at which time the next 100-h inspection was due.

The maintenance program in effect authorized by Spain's National Aviation Safety Agency was PM-PA28-JCI Ed. 1 Rev. 4 from 15/02/2016.

The last inspections of the aircraft are as summarized in the table below:

DATE/ REV. PM	SCHEDULED INSPECTION(*)	INSPEC-TION TYPE	AIR-PLANE HOURS	ENGINE HOURS	WORK ORDER	TASKS
04/05/16 REV.4	50 H at 11.794 H	50 H	11.794	2.583	P053-16JCI	AIRPLANE: 50-h and special items: E30.1, E30.2, E90 and E4M ENGINE: M50, LUB-50. OTHER: filter and oil change

18/02/16 REV.4	50 H at 11.794 H	Extra due to installation of windshield and fuel pump	11.769	2.556	P017-16JCI	Extra due to installation of windshield and fuel pump
20/10/15 REV.3	50 H at 11.794 H	50-h 100-h ANNUAL	11.744	2.531	P114-15JCI	AIRPLANE: 50-h, 100-h / ANNUAL and special items: E30.1, E30.2, E90, E4M, E1 Y.2/ E500.4, E20Y, PE B.33, PE C.11, PE D.2, PE D.20 and PE E.6. ENGINE: M50 and M100, LUB-50 and LUB-100.
30/04/15 REV.3	50 H at 11.775 H	INSPEC-TION DUE TO IMPACT	11.731	2.519	P043-15JCI	Inspection of both wings due to impact on lower surface of left wing. No structural repairs needed.

06/03/15 REV.3	50 H at 11.760 H	50 H	11.725	2.512	P012-15JCI	AIRPLANE: 50-h and special items: E30.1, E30.2, E90 and E4M ENGINE: M50, LUB-50. OTHER: filter and oil change, ELT battery change
15/10/14 REV. 2	50 H at 11.728 H	50-h 100-h ANNUAL	11.710	2.497	P089-14JCI	AIRPLANE: 50-h, 100-h / ANNUAL and special items: E500.4, E30.1, E30.2, E90, E4M, E400, E1 Y.2/ E2Y.1, E2Y.2, PE B.32, PE B.33, PE C.11, PE D.2, PE D.20 and PE E.6. ENGINE: M50 and M100, M400, LUB-50 and LUB-100.

Figure 2. Last maintenance inspections of aircraft prior to the event

(*) Scheduled maintenance inspection recorded in the aircraft log book.

1.6.2.1. Aircraft

The last scheduled maintenance inspection carried out prior to the event was a 50-h check conducted on 04/05/2016, with 11,794 flight hours on the aircraft. It was done as per the maintenance schedule approved by AESA, ref.: PM-PA28-JCI Ed.1 Rev.4 dated 15/02/2016.

This inspection was conducted as per work order number P053-16JCI. In addition

to the 50-h inspection, special items were also reviewed, as indicated in Figure 1, though none were applicable to the landing gear system related to this event. The only parts that were replaced involved the engine inspection (oil filter, oil and three screws).

The 50-h inspection carried out involved 61 items, which entailed checking various components and systems in the propeller, engine, fuselage and empennage, wing, landing gear, airplane controls, cockpit and indicators. Specifically, the items checked associated with the landing gear, of interest to this investigation, were logged as having been inspected in their entirety. The corresponding tasks were logged as completed and signed by the technician indicated in Section 1.5.2 as AMT1.These specific tasks were as follows:

- Check of operation of struts and for any signs of fluid leaks.
- Check of tire pressure.
- Inspection of brake blocks and discs: working condition and wear.
- Lubrication of landing gear components, as detailed in the lubrication letter in the aircraft's Maintenance Manual. In the case of 50-h inspections, the main and nose gear struts would only be lubricated if required during the inspection. This task is not shown in the maintenance records as required.

The penultimate scheduled check before the event, a 100-h inspection, was conducted as per work order number P114-15JCI on 20/10/2015 with 11,744 flight hours on the aircraft; that is, 75 flight hours prior to the event and 50 flight hours before the last inspection.

In addition to the inspection items specified for these checks in the maintenance program, other components were replaced, including those identified by the maintenance organization as "flexible fuselage hoses". According to the aircraft's IPC, these correspond to P/N 63901-17 and related parts, and in reality are the hydraulic fluid lines for the brakes on the main landing gear wheels. These components were replaced as per FAA Authorized Release Certificate Form-8130 no. 9112 of 01/10/2015 in response to a list of discrepancies.

1.6.2.2. Engine

As for the engine, its log book shows that is was purchased used with a total of 2,128 hours on 02/05/2008, at which time it was overhauled by replacing those parts deemed necessary, after which the relevant return to service certificate was

issued.

The last two maintenance inspections of the engine were done with 2,556 and 2,583 hours, the latter as part of a scheduled 50-h inspection.

1.6.2.3. Propeller

The propeller was overhauled on 05/10/2011 by a Part-145 maintenance organization, which issued the authorized release certificate (EASA form 1) without indicating the component's flight hours.

1.6.2.4. Other

The aircraft had a weight and balance sheet dated 18/11/10 that was issued by the authorized maintenance center.

1.6.3. Airworthiness

The aircraft, with serial number 28-8316044 and registration EC-JCI, as per the National Aviation Safety Agency's registry of active registrations, was registered on 15/11/2004 with registration number 7090. The registration certificate indicated that the aircraft was normally parked at the Seville Airport.

According to the aircraft log book, its current owner is the Real Aeroclub de Sevilla, which purchased it on 07/02/2007.

The aircraft had Certificate of Airworthiness no. 5684, issued by the National Aviation Safety Agency on 6 February 2014, listing it as a Normal Category airplane, as well as an airworthiness review certificate issued by the authorized maintenance center on 08/03/2016, with 11,770 flight hours on the aircraft, and valid until 07/03/2017.

The aircraft had the following additional authorizations:

- Acceptable flyover noise levels during takeoff (72.9 dBA), issued on 29/09/2010 by AESA, number 5684.

- Aircraft station license, issued by AESA on 11/04/2014, which included the following equipment; COM/NAV 1 (VHF), COM/NAV 2 (VHF), DME, ADF, XPDR, RADIO BEACONS and ELT.

The aircraft had an accident insurance policy that was valid until 28/02/2017.

1.7. Meteorological information

1.7.1. General situation

According to information provided by AEMET, there were generally clear skies throughout the country. No significant events of any type were recorded at the Seville Airport on the evening of 9 September 2016.

1.7.2. Situation in the area of the accident

AEMET confirmed that local conditions at the airport were stable, with a gentle breeze from the SW (varying from S and SW).

The skies were clear.

The METAR provided by ENAIRE for 09/09/2016 for 17:04 UTC was as follows:

- METAR LEZL 091700Z 21010KT 170V250 CAVOK 30/11 Q1014 NOSIG

1.8. Aids to navigation

The flight was planned under VFR.

1.9. Communications

Due to the type of event, no ATS communications are available. In its daily log, the ATS issued information on the event and details on what had happened as obtained from the controllers' accounts, which is included in Section 1.16.1.2.

1.10. Aerodrome information

The Seville Airport (LEZL), also called San Pablo Airport, is located in the south of Spain, 10 km northeast of the city of Seville, between the Seville and Rinconada city limits, at geographic coordinates 37° 25' 04.80" North, and 5° 53' 35.18" West.

Run by Aena, it has one asphalt runway in a 09/27 orientation with a TORA length of 3362 m and a width of 45 m. It is at an elevation of 34 meters above sea level. The runway has an ILS/DME CAT I precision approach for low-visibility approaches and a PAPI 3° system for visual approaches.

It has an assigned frequency of 118.100 MHz.

According to the Aeronautical Information Publication (AIP), the airport has a taxiway that is 23 m wide, and 28 m wide at holding point HP4. On either side of the taxiway is an asphalt strip that is 11.5 m wide.

The general taxi procedures state that when runway 09 is in use, the taxi route from the General Aviation stand both when taxiing in and out must be from access gate G1.

Photograph 4. Seville Airport

1.11. Flight recorders

The aircraft was not equipped with a flight data recorder or a cockpit voice recorder, as this aircraft type is not required by the aeronautical regulation in effect to have these recorders.

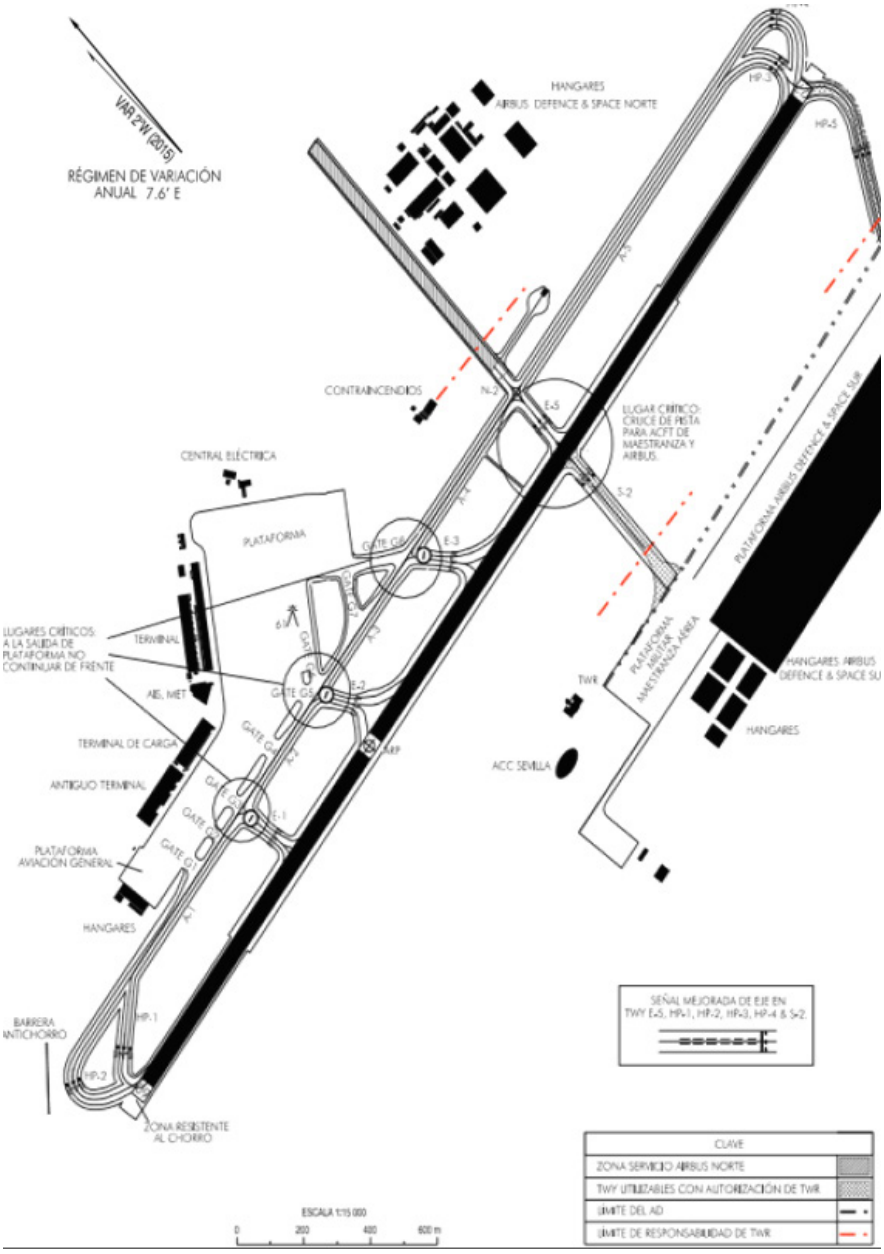


Figure 3. Aerodrome ground movement chart

1.12. Damage to accident aircraft

The geographic coordinates of the location outside the taxi area where the aircraft came to a stop are 37° 25' 13.3" N, 5° 52' 30.2" W.

No tracks or debris from the aircraft of significance to the investigation were found along taxiway A-5, which was being used by the aircraft in the minutes prior to the event.

On the paved side strip to the left, where the aircraft veered off the taxiway, a mark

left by hydraulic fluid was found ("point 1" in the diagram in Figure 4). Two curved parallel marks were then identified, which were blackened in the paved area (point 2), probably from the landing gear, marking the path taken by the aircraft to the stopping point.

Photograph 5. Accident site

Some 11 m away from the hydraulic fluid mark, and continuing along the path marked on the asphalt, in the middle of some weeds, burned debris from the landing gear fairing were found (point 3). Also identified were further remains of burned fibers and fairings at points 4 (20 m away from point 3) and 5 (14.80 m from point 4). These points were in the cotton field on the other side of the dirt track, where the aircraft eventually came to a stop.

Bits of melted aluminum were found at point 6 (8.60 m away from point 5). Parts of a burned brake caliper and other melted materials from the brake assembly were found at point 7, and finally, at point 8 (5.40 m away from point 6), where the aircraft came to a stop, the last remains of burned fairing fibers were found.

No fuel was found at any point along the aircraft's path.

As for damage to the aircraft itself, it was identified at the location where the aircraft was taken once the FFS extinguished the fire. It was towed to asphalted deadway N-1, where it was parked and properly marked off.

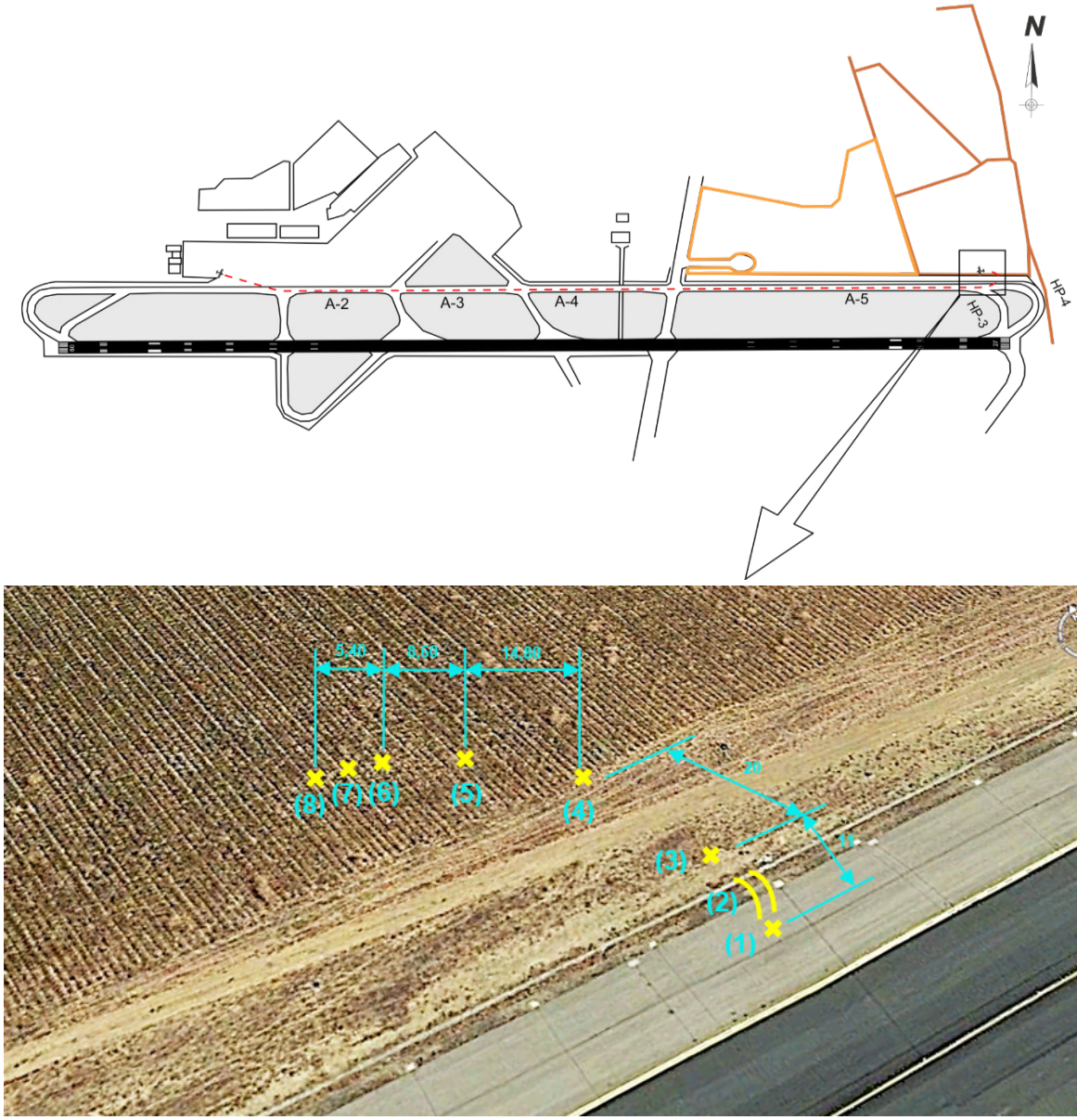


Figure 4. Locations of debris/marks left by accident

The main damage to the aircraft was located as indicated below:

- Right landing gear leg, fairing, wheel, tire and hydraulic fluid lines, burned and rendered completely useless. Photographs 6 and 7.

- Right wing: skin on the wing burned and destroyed, revealing a large hole in the lower surface and a fracture/perforation in the upper surface. Photographs 8 and 9.

The rest of the aircraft's structure and characteristics were intact and exhibited no apparent damage.

Photograph 6

Photograph 7

Photograph 8

Photograph 9

1.13. Medical and pathological information

The pilot and passenger were uninjured and exited the aircraft under their own power.

1.14. Fire

The aircraft was taxiing on taxiway A-5 near HP3 when, according to the pilot's statement, he smelled a strong burning odor after attempting to actuate the brakes. The aircraft then veered off the taxiway, which is when he saw the fire in the landing gear and the wing on the right side. He and the passenger exited the aircraft under their own power.

Seconds before the aircraft stopped outside the taxi area, controllers in the Control Tower saw the smoke. They immediately alerted the airport's Firefighting Service (FFS), which was dispatched to the scene of the fire within one minute.

They reported that the pilot and passenger were walking on the track adjacent to the taxiway and confirmed that they did not need medical assistance. Upon reaching the aircraft, they saw that the landing gear and wing on the right side were on fire. They quickly extinguished the fire, since it had not spread to other areas of the airplane and it was easy to access the fire. Clearing the smoke from the cockpit and cooling it took longer, however, in order to ensure that the fire did not reflash. The potential hazard posed by the area where the aircraft was located, a cotton field outside the airport's runway area, and the high ambient temperature, required firefighters to ensure that the fire was under control.

The firefighters checked the area and confirmed that hydraulic fluid had spilled on the taxiway, but not fuel.

Once the relevant authorizations were obtained, the firefighters moved the aircraft to a secure zone away from the service areas.

1.15. Survival aspects

After noticing the fire on the right side of the airplane, the pilot and passenger started the emergency procedure by informing the control tower, which immediately dispatched the FFS. They exited the aircraft under their own power and were uninjured.

While proceeding to the site, the firefighters found them walking along the side road, confirmed they did not need medical assistance and picked them up off the road.

1.16. Tests and research

1.16.1. Statements

1.16.1.1. Pilot's statement

On the day of the accident, the pilot gave a verbal account of the event to the manager of the Real Aeroclub de Sevilla, later corroborated in writing, describing the details as indicated below:

He received the order from the control tower to taxi to runway 27 and hold at HP4. He started taxiing as instructed after refueling the aircraft and doing the associated check of the airplane. He checked the brakes and steering, which were working correctly. The airplane was taxiing without problems and he accelerated until he

reached HP3 on the taxiway, when the pilot began to decelerate by using the throttle lever and the brakes, when, according to his statement, he noticed a strong burning odor. He stated that the brakes were not working and he was unable to steer the airplane using the pedals. He stated that he was unable to control it and that he veered off the taxi area toward the field. He initiated the emergency procedure, notifying the tower and securing the cockpit. He immediately saw fire in both the right-side landing gear and wing.

The pilot and passenger exited the airplane and waited for the quick response of the airport's firefighters.

1.16.1.2. Statements from the controllers

According to the statement from the controller on watch, he cleared aircraft EC-JCI to taxi while attending to other traffic. When he looked toward the taxiway, he saw that the light airplane had veered off and he asked the pilot if he needed assistance. The pilot said he did, so the controller contacted the FFS, without pressing the alarm button, to report the situation in case their assistance was needed. From the tower he then noticed smoke coming out of the airplane and pressed the alarm button. The firefighters immediately proceeded to the location where the aircraft had come to a stop. In the meantime, the controller on watch asked the support controller, who was in the break area, to help him handle the emergency.

The support controller stated that he was notified after the alarm was already declared. He saw smoke in the aircraft and oversaw the actions of the firefighters and the removal of the pilot and passenger from the taxiway.

1.16.1.3. Statements from FFS personnel

The firefighting squad consisted of a chief and four firefighters. They were informed of the situation directly by the control tower, which reported that an airplane had veered off the taxiway and was trailing smoke. Given the proximity of the FFS station to the accident site, they responded in less than one minute, quickly extinguishing the burning landing gear and wing. They noticed that hydraulic fluid had spilled on the taxiway.

Clearing the smoke from the cockpit and cooling was more complicated due to the high ambient temperature. They found the pilot and passenger, who had exited the aircraft under their own power, on the dirt path along the taxiway.

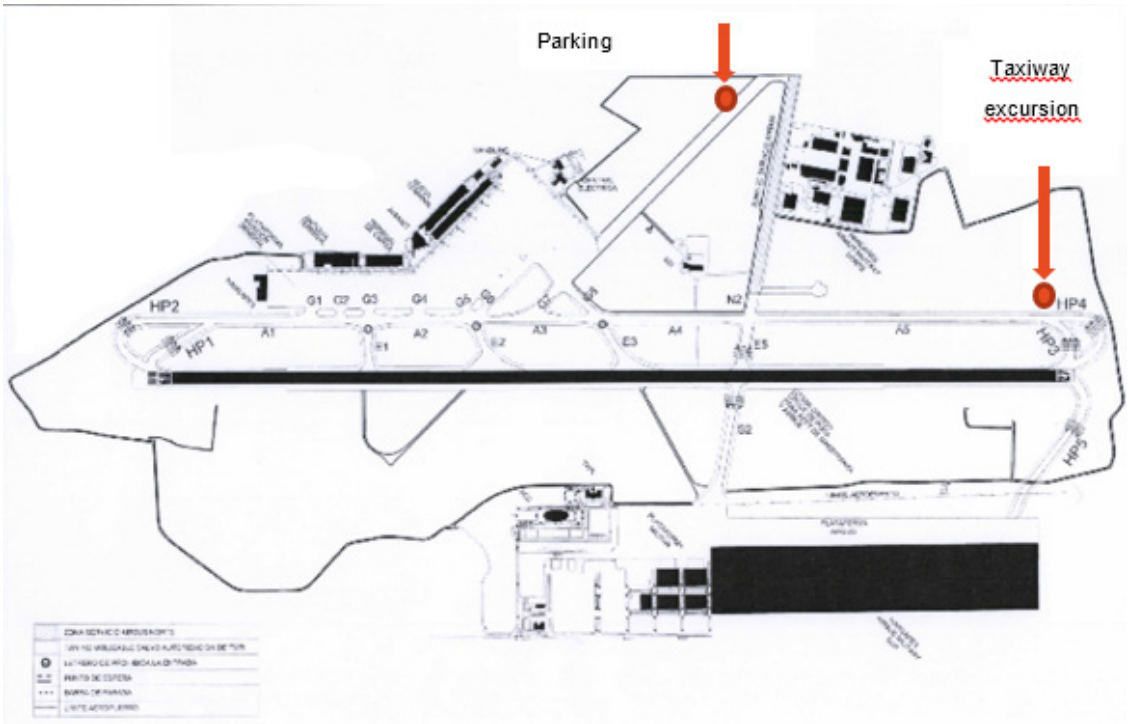
1.16.2. Relevant reports/communications

1.16.2.1. Reports from the airport operator

AENA, as the airport operator, through the Operations Department, was notified by CECOA (Airport Coordination Center) of a taxiway excursion by a light aircraft due to the loss of brakes. The airplane was within the 30-m safety margin on the edge of taxiway A-5 near HP3/HP4 (left edge).

CECOA personnel joined the FFS convoy that was proceeding to the accident site to fight the fire. They removed the occupants from the area. They had stated that they smelled something burning while taxiing and that they saw the smoke once they reached the holding point.

They checked the area for debris or marks but did not find any.



The FFS proceeded to tow the aircraft to taxiway N-1 before checking the area again and marking off the airplane.

1.16.2.2. ATS log

In its log for 09/09/16, the ATS (FERRONATS) reported that at 17:15, aircraft EC-JCI, a PA28 with a VFR flight plan from LEZL to LEZL, while taxiing to the runway 27

holding point, reported that it had veered off taxiway A-5 due to a problem with the brakes. CECOA was informed so that it could notify the FFS in preparation to tow the aircraft if needed. A few minutes later, smoke was seen issuing from the aircraft. The alarm button was pressed and the FFS, alerted on the frequency of the situation, reported to the scene.

The CECOA and APP were also informed. The taxiway remained operational during the incident, and the FFS, Civil Guard and "follow-me" car vehicles were clear of the area by 17:58.

The FFS started to tow the aircraft at 18:50, and the taxiway was reported clear to the CECOA at 19:44.

1.16.2.3. Report by CECOA

At 17:17, the CECOA heard the pilot of EC-JCI inform the tower on the radio that he had veered off taxiway A-5 toward the safety island.

Two minutes later, the controller pressed the alarm button upon seeing smoke issue from the light airplane and notified the FFS. The CECOA notified the marshaller to proceed to the site and report. The airplane was confirmed to have veered off A-5 away from the runway at a location near the runway 27 holding point. At 17:21, it was reported that the FFS had put out the fire. Emergency channel 1 was activated to report the situation to all interested parties. GESRED was informed and, at 17:30, the CIAIAC. The duty manager terminated the alarm at 17:44 and, at 19:30, with the consent of the CIAIAC, the airplane was moved to taxiway N-1, where it was parked.

An unscheduled check of the taxiway revealed nothing unusual.

The operations coordinator reported that the light airplane belongs to the Aeroclub de Sevilla, and that it was planning to go on a local flight. There were two occupants onboard, who were uninjured. It was reported that the airplane had lost control due to a brake failure, and that it turned left to the safety island. Though operations should be unaffected, the controller, as a precaution, initially decided to change the runway in use from 27 to 09. The small fire that broke out in the aircraft caused damaged to one wing, which was perforated, and to one of the wheels, which was burned.

1.16.2.4. Report from duty manager

At 17:18 UTC, the CECOA informed the manager that a light aircraft had veered

off the taxiway as it was going to the RWY27 holding point. The Tower pressed the acoustic alarm upon seeing smoke in the aircraft, which was identified as EC-JCI, from the Aeroclub de Sevilla. The FFS reported to the site and SPP was notified. A Local Alarm was declared on channel 1. The CCTV cameras showed that the airplane was off the A5 taxiway on the opposite side of the runway near HP3.

The tower was contacted to assess operability and the runway in use was changed to 09.

The Fire Chief confirmed that both occupants were uninjured and reported that a small fire broke out that burned through the wing, spilling fuel. The fire was quickly extinguished and the FFS, which remained on the scene a while longer to ensure it did not reflash. The aircraft was reported to be outside the safety zone.

The Fire Chief confirmed that the occupants did not need medical assistance and that there was no risk of a reflash. He requested instructions on removing the aircraft. The CIAIAC was informed, awaiting authorization. The Civil Guard was asked to cordon off the area so that no one could access the aircraft or any potential evidence.

The duty manager proceeded to the area and confirmed that the aircraft was approximately 30 m away from to the edge of the taxiway.

The CIAIAC authorized the light aircraft to be moved once photographs were taken. The aircraft was moved to an area that is inaccessible to members of the Aeroclub. The FFS was asked to move the aircraft, which was taken to N-1. The accident site was cordoned off until it could be inspected by the CIAIAC.

The aircraft was parked on the asphalted deadway and the perimeter marked with cones. The taxi area was checked and verified to be clear.

1.16.2.5. Information from the manufacturer on performing its checklists

As concerns the difficulty accessing the brake blocks on the landing gear in order to conduct a visual inspection, in keeping with the checklists provided by the aircraft manufacturer in the POH, the manufacturer refers to the applicable POH indicating:

"This Pilot's Operating Handbook is designed for maximum utilization as an operating guide for the pilot. It includes the material required to be furnished to the pilot by the FAR/CAR. It also contains supplemental data supplied by the airplane manufacturer.

This handbook is not designed as a substitute for adequate and competent flight instruction, knowledge of current airworthiness directives, applicable federal air regulations or advisory circulars. It is not intended to be a guide for basic flight instruction or a training manual and should not be used for operational purposes unless kept in a current status."

1.16.3. Tests / Inspections

Considering the actions described by the pilot, as well as the statements from airport personnel, controllers, firefighters, etc., an initial visual inspection of the aircraft was performed on taxiway N-1, to which it had been moved.

Several components and accessories on the landing gear and brake system deemed to be of interest to the investigation and that could be related to the accident were removed.

A detailed inspection of the aircraft's structure as a whole, control surfaces and engine did not reveal anything out of the ordinary or noteworthy that could have affected the event. The systems exhibited continuity.

The fuel tank had not been damaged by the fire and was full and not leaking.

The petcock on the bottom of the right wing was sealing properly, unlike the one on the left wing, which was dripping some water.

In the area of the right wing where the fire had burned through, the electric cabling was stripped, exposing the copper wire.

No inoperative components were found in the cockpit either. Particular attention was paid to the gauges, controls and pedals of the brake and steering systems. The parking brake was not set. All of the system worked properly, showing no signs of being jammed.

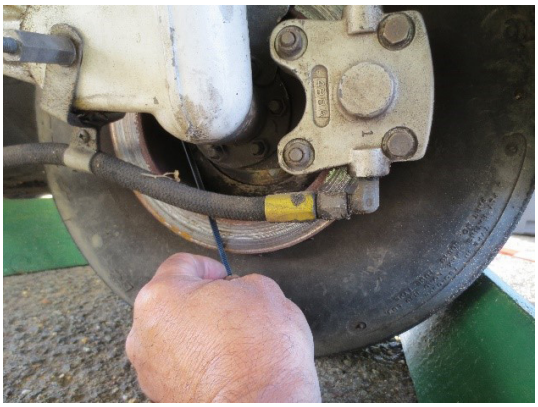
1.16.3.1. Nose wheel steering system

The engine cover was removed and a detailed inspection of the nose wheel steering system was carried out. To do this, the airplane's tail was lowered and the rotation, motion and stops of the system were checked. They worked properly.

1.16.3.2. Brake system

The fairing was removed from the left landing gear leg. The brake system was carefully inspected and the brake assembly was disassembled in order to check the condition of the blocks and disc. Both were in poor condition. The blocks had crystallized and the brake disc was warped and insufficiently flat.

Photograph 10. Shoes, blocks and friction material on left wheel brakes



Photograph 11. Brake disc on left wheel

Due to the poor condition of the right landing gear leg, the airplane was lifted on jacks in order to inspect the right wing. All of the components on the right landing gear were disassembled. The brake disc and blocks were in poor condition. The disc was warped and exhibited some concavity. There were also numerous concentric marks and grooves on the braking surface. The blocks were burned and the friction surfaces were thin and crystallized (carburization).

Photograph 12. Brake disc on right wheel

Photograph 13. Shoes, blocks and friction material on right wheel brakes

The hydraulic fluid line was loose, having been ripped from the brake assembly. The protective sleeve was completely melted, exposing the metallic mesh inside. Of the two straps fastening this line, the top one was broken and the bottom one was melted.

The landing gear cover and fairing were melted, and the top and bottom surfaces of the wing closest to the gear were also burned and the sheet metal was melted.

1.17 Organizational and management information

Not applicable.

1.18. Additional information

No es de aplicación.

1.19. Técnicas de investigación útiles o eficaces

Not applicable.

2. ANALYSIS

2.1. Analysis of the weather conditions

The weather conditions present in the area of the Seville Airport at around the time of the event (17:00 UTC) were suitable for flying. There is no record of any unexpected adverse conditions present that influenced the accident.

Of all the information provided by AEMET, only the high temperatures recorded, around 30° C, may have contributed to facilitating the conditions for the fire to exist.

2.2. Analysis of the taxi operation

According to the pilot's statement, as the only factual event of the preliminary phase of the accident in question, he did the relevant pre-flight check and refueled the aircraft. He verified that the brakes and directional gyros were working correctly. He started taxiing from the general aviation apron to runway 27, holding at HP4, after receiving the corresponding clearance from the tower, following the instructions received.

The airplane was taxiing correctly and accelerating. Upon reaching HP3, in preparation to maneuver to the threshold, the pilot reduced the speed by braking and reducing the throttle setting. At that point he smelled a strong burning odor and, as he stated, the brakes did not work and he was unable to control the airplane's direction. The aircraft departed the taxi area and came to a stop on an adjacent field left of the taxiway.

In light of the various statements from airport personnel and the pilot, it is likely that the taxiway excursion took place as the pilot was attempting to brake the airplane and turn, realized that the brakes were not working, and was unable to control the aircraft's direction.

The sequence of events in the final phase of the taxi was probably as follows:

1. Brake pedal pressure to turn toward HP4
2. Strong burning odor detected
3. Brakes do not work
4. Loss of directional control of the aircraft
5. Taxiway excursion to the left
6. Aircraft stops

7. Smoke issues
8. Pilot commences emergency procedure
9. Fire starts
10. Occupants evacuate aircraft and FFS extinguishes fire

Before starting the taxi phase, the pilot stated that he did the pre-flight checklist. This list, according to Chapter 4, Normal Procedures, Section 4.5, of the version of the POH (Pilot Operating Handbook) published on 20 November 1981 by Piper, specifies the need to check the brake blocks, among other landing gear components. Section 4.9 of this same handbook expands on the information in this checklist, providing details of the operations to carry out. Specifically, the following information is provided concerning the pre-flight check of the brakes:

> Next, a complete check of the landing gear. Check the main gear shock struts for proper inflation. There should be 4.50 inches of strut exposure under a normal static load. The nose gear should be checked for 3.25 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

This section explicitly states that the pilot's inspection of the brake system involves visually inspecting the brake blocks to check them for wear or damage.

The manufacturer does not detail in the POH how to do the checks of each component and/or system, or if a special tool or device has to be used in order to carry out an effective inspection.

The tires also have to be checked for cuts and wear and to ensure proper inflation.

The POH likewise indicates that the pilot's pre-flight check must ensure, as part of the full inspection of the landing gear, that both the main (4.5" under normal static load) and nose (3.25") gear struts are correctly calibrated.

The pilot stated that he did the pre-flight check without identifying any problems.

The pilot also stated that he did the normal taxi procedure as per the aircraft's POH, which includes, among other actions, checking the operation of the brakes and steering. This check is contained in Section 4.17, the text of which is as follows:

> **4.17 TAXIING**
>
> Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the propeller back blast and taxi areas are clear.
>
> Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. While taxiing, make slight turns to ascertain the effectiveness of the steering.

The POH also states that power should be applied slowly until the recommended taxi speed is reached, which for this type of aircraft is approximately 5 km/h. Once at this speed, proper operation would entail using the throttle to control the speed, and avoiding using the brakes, especially on long taxi routes.

In this case, the taxi route on taxiway A-5 from the general aviation apron to HP4 is about 3,000 m long with an upward gradient of 0.2%. Given these conditions, the taxi speed should be maintained by using the throttle lever; however, the condition of the brakes indicated sustained high temperatures, probably resulting from excessive use while taxiing.

The condition of the brake blocks is easily checked on this type of aircraft from a maintenance standpoint, and the remains analyzed exhibited too much wear to have resulted exclusively from this final operation. From this it may be inferred that the pilot did not notice the bad condition of the brakes during the pre-flight check or the taxi phase, nor did the maintenance personnel during the scheduled inspections. This conclusion is further analyzed in the sections below.

2.3. Analysis of brake performance

The basic operation of the brakes entails converting the kinetic energy of motion into thermal energy through friction. This therefore generates a large amount of heat in the components in the brake system, which is designed to withstand this increase in temperature during normal operations. For them to work correctly, however, it is essential that they be properly adjusted and periodically inspected and maintained. This ability to absorb heat decreases if the system is not working properly or if there are worn or damaged components.

In light of the route taken by the aircraft during its taxiway excursion, as indicated by the tracks and the debris found, the pilot, when applying the brakes to reduce the speed and turn right, lost directional control, turning to the left.

Since when the operation of the steering system was inspected on the ground, both as a whole and in particular the pedals and nose wheel, no evidence of a malfunction was found, or of any apparent damage that could have made the system fail, it may be assumed that the steering system was working properly and that the excursion was not due to a loss of directional control caused by the directional control system on the ground.

Based on this evidence, the possible causes for the taxiway excursion include the following:

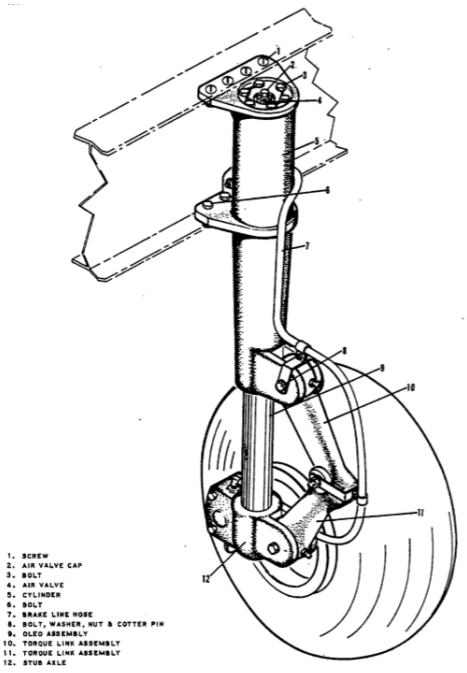


Figure 5. Main components of the main gear leg

1. Improper operation with excessive use of the brakes instead of using the throttle lever during the long taxi route, and improper inputs made to the pedals by not providing steering controls, but using them exclusively to apply the brakes, could have caused the brakes to overheat excessively. As a result, the turn to the left, in the opposite direction to that desired by the pilot, as per his statement, could have been due to unbalanced braking of the main gear wheels. This means that the brake system was more effective braking the left wheel than the right, which probably did not brake, thus causing the aircraft to turn left. The wheel on this side would have braked, which resulted in the undesired taxiway excursion of the aircraft to the left. Based on the evidence gathered during the inspection of the wreckage, the brake system on both main gear wheels was verified to be in very bad condition, indicative of clearly deficient maintenance. The right-hand system in particular showed significant wear of the brake blocks, and obvious damage to the disc. Even if these components had been replaced during the last scheduled maintenance checks, something for which there is no evidence, these problems should have been identified during the pre-flight inspections on subsequent flights, at least during the taxi checks, since the position of the landing gear fairing makes it difficult for the pilot to easily conduct a specific visual check of the brake blocks without using a tool, such as a lighted mirror or the like. Such a determination would have entailed replacing these components.

The considerable wear and evidence of overheating evidenced by the brake blocks is not the result of a few hours of flight time, meaning their poor condition should have been detected prior to this event, at least by the maintenance personnel and at any rate by the pilot while taxiing.

2. Since a strong burning odor resulted when applying the brakes, due to their inability to absorb the high temperature reached, and considering their bad condition and the loss of braking efficiency, the pilot could have reacted automatically by not continuing with the taxi operation and vacating the taxiway by diverting to the adjacent field. Though his statement does not indicate this intention, it could have been a snap decision that he did not detail after the event. This would be consistent

with the fact that the directional system was working correctly and that the brake system was defective.

3. As concerns the hydraulic system used to actuate the brakes, the system relies on petroleum-based hydraulic fluid (MIL-H-5606). Presumably it worked correctly until the supply line in the right wheel detached. This is supported by the traces of hydraulic fluid found on the track next to the taxiway, in the direction of motion of the aircraft. In addition, the intermittent marks left by the burning line, which left melted coating material on the asphalt, indicate that it presumably detached due to overheating in the area when the bottom attachment strap, which was found melted, came loose. The top strap, which was found broken, probably came loose during the sharp turn off the taxiway.

4. The melted fairing material from the right wheel (with signs of overheating from the inside out), along with the melted (not broken) tire, the burned shoes and disc, as well as the loss of coating material from the hydraulic line, which was also melted, all indicate that the fire started inside the fairing, probably due to overheating of the brake assembly.

2.4. Analysis of the maintenance of the aircraft's brake system

The maintenance of the aircraft during the last six inspections analyzed was done before the number of hours specified in the approved maintenance program. Except in the case of a structural impact of the wing, which required a repair, and the installation of a new windshield and an electric fuel pump, the early inspection of the remaining items, sometimes by as much as 31 hours for a 50-hour inspection, is not justified and is indicative of a certain disarray in the scheduling with no apparent justification.

The last scheduled maintenance check was on 04/05/2016, with 11,794 hours on the aircraft, four months prior to the accident, when the aircraft had 11,819 hours, meaning it had only flown 25 hours since the check.

The maintenance requirements for these disc brake systems involve regularly checking for any damage, for wear of the brake blocks and of the discs. Therefore, in the worst case scenario, the visual inspection should have been performed 25 hours before the accident, during the scheduled inspection, as was recorded. The condition of the materials analyzed indicates continued use in bad conditions, and these components should have been replaced earlier.

If worn or damaged parts are identified during an inspection, they must be replaced in order to keep the aircraft airworthy, followed by a check to verify their operation.

The check is carried out while the aircraft is taxiing. The braking action on each main gear wheel must be the same if equal pressure is applied to each pedal. The pedals must be firm, not mushy or spongy, when depressed. When the pressure is released from the pedal, the brake must release with no sign of resistance.

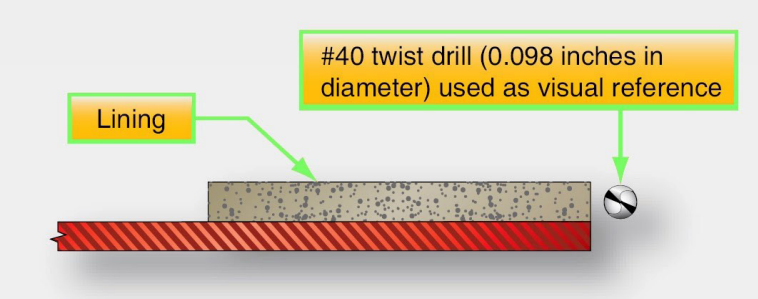


Figure 6. Thickness check of friction lining

On this aircraft, a Piper PA-28-161, the manufacturer specifies the use of Cleveland brakes. The wear of the friction lining on these brakes can be measured directly by the pilot or by the maintenance technician, since part of the lining is accessible. On the accident aircraft, the brakes were indeed of this brand, but the position of the fairing on the landing gear wheels did not allow the pilot to carry out this measurement easily, despite being included in the manufacturer's POH as part of the pre-flight check.

Verifying the minimum thickness of the lining is simple, and can be done by making sure that said thickness is at least the same as that of a #40 twist drill, or 2.489 mm (0.0980"). If the thickness is close to this value, the block must be replaced.

The wear on both brake blocks was evident, as was their poor condition. The block material was crystallized. This damage leads to poor, inefficient braking. Specifically, the crystallization of the friction lining causes the damage found on the brake discs, though this damage is only caused by the prolonged use of the blocks in bad condition. The overheating identified in the components can also only be produced through prolonged use, and should at least have been detected during the scheduled maintenance inspections, if not during the pre-flight checks while taxiing.

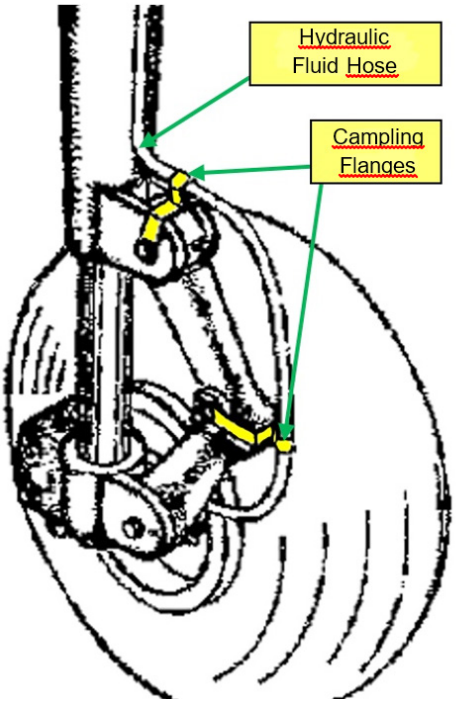


Figure 7. Attachment of hydraulic fluid line.

The hydraulic line that was found detached, and whose coating had melted,

probably came loose when it detached from its connection to the shoes due to overheating, which expanded the material at the attachment point. The remains of the straps used to attach the line to the leg were found. The top one was broken and the bottom one melted. When the bottom strap detached due to the high temperature, the top one could have broken by the force exerted by the loose line while taxiing. This component, however, had been replaced during a recent scheduled maintenance inspection, and its improper attachment during some maintenance activity could also have been the cause behind the detachment.

2.5. Analysis of the fire

The marks from the maneuver indicate ineffective and unbalanced braking on both landing gear wheels, as well as the correct operation of the steering system.

The fire that broke out on the right side, wing and landing gear, shows the result of the high temperatures reached in the brake area, inside the right wheel fairing, and its subsequent ignition.

According to the accounts collected, the heating was identified when a strong burning odor was detected upon applying the brakes, and the fire broke out once the aircraft had come to a stop.

In light of these two parameters, high temperatures and ignition, as causing the fire in the right wing and landing gear, the following observations may be made:

a) The high ambient temperature was influential:

On the day of the event, the temperature in Seville was 31° C from 14:00 to 16:30, according to METAR information. At the time of the accident, the recorded temperature was 30° C.

These ambient temperatures could have affected the heating in the aircraft, and particularly in areas subjected to friction.

b) The taxi route was rather long, some 3,000 m, with a slight uphill. The pilot stated that he accelerated the aircraft until he reached HP4. Since the gradient of the taxiway was very low (0.2%), accelerating the aircraft would entail a constant increase in speed, and therefore the need to use the brakes in order to maintain a suitable taxi speed. The long taxi route, and in particular the repeated use of the brakes to maintain the taxi speed, could have contributed to increasing the temperature in the landing gear.

c) The bad condition of the friction lining on the brake blocks and discs, due to improper maintenance, impeded the normal dissipation of the heat, as would take place in an efficient system. This resulted in overheating of the brake assemblies, which contributed to raising their temperature, and thus to sparking the fire.

d) The parking brake was verified to be working correctly. The lever was not stuck. Therefore, the braking actions may be regarded as having resulted solely from the pressure exerted on the pedals.

e) The remains of the damaged tire did not show signs of a blowout, but rather of gradual heating resulting from the high sustained temperatures in the area. There were no signs of a fuel leak, and thus the possibility that fuel caused the fire can be ruled out.

f) The intermittent marks on the track next to the taxiway left by melted plastic debris, 1 to 2 cm wide, along with the observations made during the inspection of the aircraft, in which the hydraulic fluid hose leading to the brake system for the right wheel was found loose and without its coating, provide an interpretation for the debris found on the asphalt. The intermittent contact between the loose hydraulic line and the asphalt while taxiing would have left traces of coating material due to overheating of the system. The high temperatures inside the wheel fairing made it possible for the protective material on the line, as well as the fairing itself, to melt.

Based on these findings, the hydraulic fluid line apparently detached approximately as the airplane reached HP3, when the pilot braked in order to proceed to HP4, which is exactly when he realized that the brakes were not working.

The traces of hydraulic fluid on the adjacent track indicate that the fluid was leaking before the final braking attempt, meaning the right brake must have failed earlier.

As already noted, the brake system on this airplane type is actuated hydraulically at each main gear leg by means of a hydraulic line that is connected to a hydraulic cylinder at the pedals. Therefore, the loss of hydraulic fluid is consistent with the pilot's description of the loss of braking efficiency. In reality, it is likely that the right brake failed and that the left brake lost effectiveness, which made the aircraft turn to its left. The braking inputs made earlier were probably not fully effective, judging by the poor condition of the brakes, but it was when the brake input was strongest, at the right turn, when the pilot noticed they had failed.

g) The burning odor that the pilot smelled at point HP3 is consistent with the overheating of the brake system. The generation of smoke is likewise consistent

with hydraulic fluid leaking on overheated surfaces on the wheel and brakes, and with the wheel fairing catching fire and partly melting.

h) As the hydraulic fluid line was contacting the asphalt, and in conjunction with the high temperatures in the brake system and wheel, a spark could have been created that triggered the fire in the area. As it overheated, the line lost its outer coating, leaving the metallic mesh exposed, which is more prone to sparking due to impact. The spark could also have originated from the friction that caused the high temperatures in the brakes, initiating combustion that way instead.

i) The hydraulic fluid could also have spontaneously combusted when it leaked out the loose hydraulic line and came in contact with the overheated brake system. The synthetic materials in the friction lining of the brakes could have started to burn due to the high temperatures, and the hydraulic fluid was just another component feeding the fire, or the fire may have started in the fluid itself. The fire point of this fluid is 230° C, and considering how the bottom strap used to attach the hydraulic line was melted, it is obvious that these and higher temperatures were reached.

Excess grease in the wheel bearings following sloppy maintenance has also been the cause in other events of fires due to contact with overheated brake parts. In this case, the condition of the wreckage did not allow the investigators to determine for sure if grease played a role in the fire.

j) Tire rubber does not spontaneously combust, it simply melts; therefore, the rubber is not likely to have been the source of the spontaneous combustion.

Once the fire inside the wheel fairing, in the area of the brake system, was burning, it spread to the fairing itself and to the underside of the right wing.

2.6. Analysis of the handling of the emergency procedure

Once the aircraft stopped in a cotton field, 30 m away from the taxiway, the pilot stated that he started the emergency procedure by notifying the tower. He indicated that he was unable to control the aircraft. He secured the cabin, as per procedure, and immediately saw the fire in the right landing gear and wing.

He and his passenger evacuated the aircraft and walked away on the dirt track. The firefighters reported to the site and extinguished the fire.

In the statement from the controller on duty, he indicated that when he looked toward the taxiway, he saw a light aircraft that had veered off the taxiway. He

called the pilot to ask if he needed assistance, to which the pilot replied yes, so he notified the FFS but without signaling the alarm until a short time later, when he saw smoke issuing from the aircraft. From then on, the firefighters acted immediately to extinguish the fire and to move the occupants away from the taxiway area.

The airport coordination center contacted the pilot, who stated that while taxiing, he smelled a strong burning odor and that while passing HP3, he saw smoke issuing from the right side and lost control of the aircraft.

The emergency was handled properly. The pilot followed the established procedure, the controllers activated the alarm correctly, the airport's operations coordination department handled the situation effectively and the FFS reacted quickly to put out the fire.

3. CONCLUSIONS

3.1. Findings

- The aircraft's pilot had a valid private pilot license (PPL) with a SEP (land) rating.

- The pilot had a valid class-2 and LAPL medical certificate.

- The pilot had a total of 91.02 flight hours, of which just 20.07 had been flown on the accident aircraft.

- The aircraft was owned by the Real Aeroclub de Sevilla, of which the pilot was a member.

- The aircraft was maintained by a Part-145 and Subpart G and F maintenance center authorized by AESA and with a valid certificate.

- Maintenance technician AMT1, who performed the maintenance tasks, had a valid license with a rating for maintaining turbine airplanes. He did not have certifying authority and was limited in some ATAs, but he was not rated to maintain piston airplanes.

- Maintenance technician AMT2, who certified the maintenance tasks, had a valid license.

- The aircraft had a valid certificate of airworthiness.

- The aircraft was constructed in 1983 and had logged 11,819 hours and 39 minutes.

- The last scheduled maintenance check was conducted on 04/05/2016, with 11,794 hours on the aircraft, four months prior to the accident, by which time the aircraft had 11,819 hours.

- Weather conditions were not limiting for visual flight, and the temperatures in the area were high.

- An analysis of the aircraft's wreckage did not reveal the presence of a fault or malfunction in the steering control system.

- The investigation revealed that the taxi operation involved excessive use of

the brakes instead of the throttle.

- Hydraulic fluid residue was found on the side road through which the aircraft departed the taxi area.

- The investigation ruled out that the fire broke out as the result of a fuel spill, since the fuel tank was full and intact.

- The investigation showed that the fire that affected the landing gear and the right wing started in the brake assembly of the wheel, first inside the fairing and then propagating to the rest of the gear leg, wheel and wing. The fire started due to the inefficiency of the braking system and to overheating, a consequence of the bad condition of the components.

- The specific position of the fairing on the main gear wheels made it difficult to visually inspect the condition of the brake blocks.

- The wear of the brake assemblies should have been detected during the scheduled maintenance checks, meaning said checks were not properly performed.

- The manufacturer's POH does not give detailed instructions for the pilot's pre-flight check that allow for a visual inspection of the brake blocks in landing gears with fairings like the one installed on the accident aircraft.

- In terms of meet the check list requirements, the aircraft manufacturer refers to applicable POH, although this manual doesn't detail how to proceed in case of the installed wheel fairings don't allow to visual inspections.

- The taxi route from the general aviation apron to the holding point assigned to the aircraft is long, about 3,000 m.

- The pilot and passenger were not injured and were able to exit the aircraft under their own power.

- The fire was extinguished by the airport's FFS.

3.2. Causes/Contributing factors

The aircraft's taxiway excursion was caused by the faulty operation of the brake

system, which was due to improper maintenance and to the excessive use of the brake pedals during the taxi operation. Specifically, the brake discs and blocks were in very bad condition and should have been replaced earlier.

The unbalanced braking caused the aircraft to turn left and veer off the taxiway.

The high temperatures reached in the badly worn brake assembly originated a fire, which spread to the right wing and its associated landing gear.

The following factors contributed to the accident that caused the taxiway excursion: the pilot's little experience in operating this type of aircraft; the deficient inspection by maintenance personnel, who, in at least the last scheduled inspection, should have detected the bad condition of the brake assembly; and the problems posed by the main gear fairing, which made it difficult to conduct an effective pre-flight inspection.

The following factors are deemed to have contributed to the high and prolonged heating of the brake area, which caused the fire:

- the long taxi route,
- the highly worn condition of the brake system due to inadequate maintenance,
- the hydraulic fluid spilled via the broken hydraulic line, and
- the high ambient temperature at the time of the event.

4. SAFETY RECOMMENDATIONS

REC 046/17: It is recommended that AESA adopt the necessary measures to mitigate the risk associated with the improper maintenance detected in the investigation, since the oversight provided and the inspection conducted did not prevent events that affected air safety from occurring.

REC 047/17: It is recommended that Aeronáutica Delgado, S.L., adopt the necessary measures to mitigate the risk associated with the improper maintenance detected in the investigation, since the oversight provided and the quality system in effect did not prevent events that affected air safety from occurring

REC 074/17: It is recommended that Piper Aircraft, Inc. in those cases in which the fairing on the landing gear legs of aircraft prevents checking the condition of the brake system, revise the maintenance manual and adequate it by providing instructions for conducting the corresponding maintenance task included in the applicable maintenance inspection program.

REC 075/17: It is recommended that Piper Aircraft, Inc. in those cases in which the fairing on the landing gear legs of aircraft prevents checking the condition of the brake system, revise the pre-flight checklists in the POH and in other applicable aircraft manuals by providing instructions for conducting the corresponding inspections to check the condition of the brake system and ensure that operational safety is not jeopardized.