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COMISIÓN DE
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AVIACIÓN **C**IVIL

Report A-059/2006

Accident involving a PZL
M-18A DROMADER aircraft,
registration EC-FBI, operated
by AVIALSA, on 7 October 2006,
in the vicinity of Castellón
aerodrome



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DE ESPAÑA

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SUBSECRETARÍA

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DE ACCIDENTES E INCIDENTES
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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 event and its causes and consequences.

In accordance with the provisions of Law 21/2003 and pursuant to Annex 13 of the International Civil Aviation Convention, the investigation is of exclusively a technical nature, and its objective is not the assignment of blame or liability. The investigation was carried out without having necessarily used legal evidence procedures and with no other basic aim than preventing future accidents.

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.

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Abbreviations

00 °C	Degrees Celsius
E	East
h	Hours
LECN	Castellón Aerodrome (Spain)
m	Meter(s)
N	North
UTC	Coordinated universal time

Synopsis

Owner and operator: AVIALSA
Aircraft: PZL M-18A DROMADER, registration EC-FBI
Date and time of accident: Saturday, 07 October 2006; 12:50 local time¹
Place of accident: Vicinity of Castellón aerodrome
Persons ONboard and injuries: One pilot, fatal
Type of flight: Aerial work – Commercial – Agricultural

Date of approval:

Event summary

The aircraft took off from Castellón aerodrome, also known as Pinar del Grau aerodrome, on a fumigation flight. After a few seconds in the air, it impacted the ground between four single-family dwellings located some 150 m away from the aerodrome perimeter.

The accident occurred after the aircraft took off with the left elevator lock pin installed, which resulted in the elevators being left in the locked position, thus seriously compromising the controllability of the aircraft.

Two safety recommendations are issued with this report.

¹ All times in this report are local. To obtain UTC, subtract 2 hours.

1. FACTUAL INFORMATION

1.1. History of the flight

The aircraft, a PZL M-18A DROMADER, registration EC-FBI and operated by AVIALSA, took off on Saturday, 7 October 2006 at 12:50, from Castellón de la Plana aerodrome, also known as Pinar del Grau aerodrome, on a fumigation flight. It was the seventh flight of the day for the aircraft and the pilot. The weather conditions were adequate for the visual flight being conducted.

Upon completing the sixth flight, the pilot informed ground personnel that he would stop flying for the day because turbulent conditions were developing on the plot he was fumigating, on the leeward side of the mountain. He had provided this same information to the pilot of another aircraft who was taking part in the fumigation operation.

The pilot exited the airplane and started to prepare it for the two-day period of inactivity that lay ahead. The supervisor and coordinator of the fumigation activities, which were contracted by the Government of the Autonomous Community of Valencia with the company TRAGSA, spoke with the pilot to suggest that he works on another plot over flat ground, possibly free from turbulence, which the pilot agreed to do.

The aircraft was loaded with fumigant and started its takeoff on runway 18, and after a few seconds impacted the ground in the middle of four single-family dwellings located in a residential area of Castellón, approximately 150 m to the southwest of the aerodrome.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	1		1	
Serious				
Minor				Not applicable
None				Not applicable
TOTAL	1		1	

1.3. Damage to aircraft

The aircraft was destroyed in the impact.

1.4. Other damage

Damage of varying severity was sustained by the lots on which the four dwelling were built. The aircraft did not impact any of the houses directly and the damage was mainly limited to pools, fencing, trees and outdoor furniture at the dwellings.

1.5. Personnel information

The pilot, a 66-year old male, had a valid commercial airplane pilot's license and a Class 1 medical certificate valid until 23 December 2006. He was rated for agricultural and forest operations and for single-engine piston (land).

The pilot had some 20,000 total flight hours, of which 1,500 were on the aircraft type. He began piloting in the army, where he accumulated a total of 3,000 flight hours. The rest of his professional experience had taken place later and involved agricultural and forest activities. He had flown some 12,000 h in agricultural work and about 5,000 h in firefighting over the course of a 40-year professional career.

In the last 90 days, he had flown 77.34 h; in the last 30 days, 44.06 h; on the day of the accident 3.14 h, with a 12-hour rest period prior to the start of the activity on the day of the accident.

His fellow pilots on the operations, who had been working with the accident pilot for a month (the last week out of the Castellón base and at another base before that), reported that in the preceding days he had looked all right and fairly upbeat. They did not think he was on any medications and they noted that he was highly motivated to fly. As for his character, they mentioned that he became easily upset when arguing.

1.6. Aircraft information

The aircraft had a restricted certificate of airworthiness, number 3159, valid until 30 June 2007 and, according to available information, had been maintained in keeping with its authorized maintenance schedule .

The control surfaces, rudders and ailerons on this type of aircraft can be blocked by means of external pins or bolts which are placed in fittings provided by the manufacturer. The controls must be blocked overnight or when the aircraft is parked outside for extended periods of time so that the uncontrolled movement of these surfaces caused by the wind does not damage them. The pins have flags attached to make them more visible.

1.7. Meteorological information

The information compiled at the aerodrome revealed that on the day of the accident, there were no clouds and winds were weak or calm, with midday temperatures of around 23 °C.

1.8. Aids to navigation

Not applicable.

1.9. Communications

The aircraft was equipped with a radio transceiver for communicating with other aircraft and with airport offices and facilities, such as those installations intended for use by firefighting pilots.

The operating company services responsible for loading fuel and fumigation products onto the aircraft do not normally need to communicate with airborne aircraft and therefore did not have radio equipment.

On the flight prior to the event, the pilot of the accident aircraft asked the pilot of another aircraft, (who was part of the same fumigation campaign and operated out of the same aerodrome but who was working on another plot), to tell the ground support personnel in charge of preparing the product to be distributed to the two aircraft not to prepare any more product for him since he was not going to continue working that day.

1.10. Aerodrome information

The aerodrome of Castellón de la Plana (LECN) is an uncontrolled aerodrome. The reference point is at coordinates 40° 00' 01" N and 000° 01' 32" E and its elevation is 5 feet. It has two runways, one of them natural terrain in a 03/21 designation and measuring 850 × 50 m, and the other asphalt in an 18/36 designation and measuring 900 × 30 m, which is the one normally used for fumigation operations.

The aerodrome is surrounded by urban areas of the city of Castellón. Runway 18/36 runs almost parallel to the coastline, which is some 150 m to the east.

The service and parking facilities for the operator's fumigation aircraft are in a separate area of the aerodrome, away from the tower and other offices.



Figure 1. Aerial view of impact site

1.11. Flight recorders

The aircraft was not equipped with flight recording equipment as this was not required by relevant aviation regulations.

1.12. Wreckage and impact information

The aircraft crashed violently into the ground at a point located between four single-family dwellings some 150 m away from the aerodrome perimeter and to the right of the extension of runway 18. The aircraft impacted the fencing around the lot, support buildings and two contiguous pools, without affecting the main structure of the houses, which were some 10 m high. There was slight damage to the surrounding trees.

The debris field was confined to a circle of some dozen meters in diameter around the main wreckage. There was practically no movement of the aircraft along the ground after the impact.

The airplane's attitude at the time of contact with the ground was estimated at 45° pitch and at 60° bank, in a steep turn to the right. The aircraft lost its structural integrity on impact. The forward fuselage and wings were completely destroyed. The empennage preserved its shape to a certain degree and the pin that immobilizes the left elevator was found installed in the left horizontal stabilizer (Figure 2). The pin did not have its warning flag attached.



Figure 2. Pin installed in the left elevator

1.13. Medical and pathological information

Not considered relevant.

1.14. Fire

After the impact a low intensity fire broke out in both fuel tanks, which was quickly extinguished by the firefighters who responded to the accident site.

1.15. Survival aspects

The pilot had his seatbelt and harness fastened, but was not wearing a helmet. The attaching elements seemed to be in good condition, though they broke at three points near the buckles which were used to adjust them; specifically, the segments corresponding to the two shoulder harnesses and the right part of the seatbelt were torn.

Seatbelts were checked every 100 flying hours, as per maintenance instructions of the manufacturer. Records showed that the seatbelts in the plane were new and were assembled in the last annual overhaul, carried out between February and March 2006.

Given the violence and characteristics of the accident, it was practically impossible for the crewmember to survive.

1.16. Tests and research

1.16.1. Findings and inspections

Several eyewitnesses of the flight who were at the aerodrome facilities and who possess a knowledge of aviation agreed in stating that the aircraft was in uncontrolled flight from the moment the wheels left the ground.

The pins for the ailerons and rudder were found during an inspection of the premises near the parking location where the gear for securing and immobilizing the aircraft, along with the pins and chocks, are stored. The pins for the left and right elevators were not found, however.

The condition of the pins found, both for the accident aircraft and for others, varied greatly. Some pins were new, while others were very worn. In fact, it was noted that some pins did not have a flag.

1.17. Organizational and management information

1.17.1. Work organization at the fumigation activity

The fumigation flights had been contracted by the Government of the Autonomous Community of Valencia with TRAGSA. Taking part in the campaign was this aircraft from AVIALSA which, along with other operators, was engaged in a temporary joint venture subcontracted by TRAGSA.

The work was organized according to TRAGSA directives by a coordinator or supervisor. At the start of each workday the pilots met with the coordinator for assignment of the parcels or lots to be fumigated and to specify the amount of fumigation product in liters to be sprayed. The airplane loads were decided by the pilots. There was usually no pressure regarding the workload or the completion of tasks, nor in terms of the spraying altitude. The specific problems related to TRAGSA that were mentioned by some of the accident pilot's fellows involved the exact location and identification of the parcels to be fumigated.

Flights usually took place, weather permitting, from Monday to Friday. The Saturday on which the accident occurred was being used to make up for lost time, since the following Monday was a holiday. The flight activity started at eight and lasted some two hours until the midday break. During those two hours the airplanes landed every 20-40 minutes to reload fumigant, a process which lasted around seven minutes and during which the pilots stayed onboard. After the midday break, another period of activity was started in the afternoon lasting another two hours approximately.

At the end of the day, once the fumigant tanks were cleaned out and the fuel tanks were topped off, the aircraft was parked until the next day of operation.

As for the direct organization of flight operations, conversations with operations personnel revealed that, in general, the pilots were very familiar with the area of plots.

1.17.2. Aircraft operator procedures

The tasks carried out by the ground support personnel at the aircraft operating bases were not defined in writing in the operator's procedures. In practice, the flight control pins were removed by the pilot, or by the ground support personnel under the pilot's supervision, during the pre-flight inspection before the day's first flight. During stops to top off the fumigant, the pins were not installed, the tasks being limited to checking oil and fuel levels. After the last flight of the day, the ground support personnel installed the lock pins for the control surfaces as directed by the pilot and under his supervision.

The control surface lock pins and wheel chocks were stored near the parking locations while the aircraft was in flight.

The operator provided its PZL-M18A DROMADER pilots with checklists that contained all the items included in the original lists found in the manufacturer's Flight Manual, but written more clearly. The takeoff checklist includes 28 items, of which number 25 consists of checking the controls free and clear:

CONTROLS FREE CHECK

1.18. Additional information

None.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

The presence in the wreckage of the pin used to immobilize the left elevator while on the ground shows that the accident occurred as the result of a blocked elevator on the aircraft. Since the pin used to immobilize the right elevator was not found in the storage location where the pins are usually kept when removed from the aircraft, it is suspected that the right elevator pin was also installed, even though it was not found among the wreckage. In any case, since both elevators work together, installing just one pin would suffice to prevent all motion of both control surfaces. It is very difficult to believe that the pilot could manage to control the airplane with the elevator controls blocked.

The airplane's 45° pitch and 60° bank attitude at the time of impact, along with the violence of the crash, the absence of drag marks and the small debris field all indicate that the airplane lost control and fell in a near-vertical path.

The flight was initiated, therefore, with the pins installed, which implies that the pre-flight inspection was not performed and that the movement of the stick within the cockpit was not verified clear.

The oversight in removing the pins which had been installed and the omission of the pre-flight checks around the airplane and inside the cockpit at the start of the flight could, in principle, be the result of a potential state of physical fatigue on the part of the pilot or of psychological stress.

Physical fatigue, however, could not be objectively considered as a contributing factor since, even though the pilot was flying on a Saturday, the sixth consecutive workday, he had flown for only 3:14 hours on that day, having rested sufficiently beforehand and also at midday on the day of the accident, and having been in good condition according to eyewitness accounts.

The possibility that labor pressure and tension of an inordinate nature could have played a role can also be ruled out. The routine participation by pilots in the organization of fumigation assignments and the absence of evidence regarding possible heated arguments in this case also make any hypothesis about the pilot's psychological state unlikely. It is impossible to guarantee, however, that the pilot's morale was unaffected by the change of plans involved in the resumption of activities at a time when he assumed the last day of the workweek to be over, and that said state of mind could have influenced him during the checks.

The pilot's determination to interrupt his workday was motivated, in light of the testimonies provided, by wind and turbulence conditions present over the parcel from which he had just returned. This assumption was corroborated by the fact that he agreed to re-start work in another parcel only after conversations with the company representative.

The pilot finished the previous flight with the clear intent of concluding his workday, as he reported by radio to his fellow pilot and to ground personnel after landing. Once on the ground he steered the aircraft to its usual parking spot for the night. The pilot descended from the airplane and either he or the ground support personnel, under the pilot's instructions, started to install the pins that are used to block the flight surfaces so they are not damaged by the wind during the night. The normal workload assignments corroborate this assessment.

During the normal work routine of takeoffs and landings, the pins were not installed during the brief stops to refuel and take on fumigant, and thus they were not verified removed. During the conversations held to decide whether to continue with the work, it is probable that the pilot, engrossed in the decision of whether or not to work on the new plot and in how to avoid interfering with the other pilot who was already spraying there, forgot that the pins were installed.

There is a potential danger whenever a process is interrupted, such as that of securing an airplane in this case, of having taken actions that are incompatible with a subsequent decision to resume the flight activity. A root cause of this accident is the interruption of the preparation of the aircraft for its period of inactivity before the next workday, resulting from the resumption of operations, which was unexpected by the pilot, and after which the daily pre-flight checks should have been done once more. Various accident investigation commissions and civil aviation authorities have published findings, after studying and analyzing multiple accidents and incidents, emphasizing how errors made by crews regarding the skipping of checklist items, or even omitting them altogether, are practically independent of the crew's experience. Although it cannot be categorically stated, it is even more common for such oversights to happen with experienced crews. As a result, a general recommendation is issued to prevent such risks.

The left elevator pin did not have a flag, as was verified following the accident. While it may have been lost during the brief flight, the presence of other pins without their corresponding flags on this and other aircraft of the fleet leads one to suspect that those installed on the aircraft possibly did not have them, which contributed to the presence of the pins not being noticed on the airplane prior to takeoff. A recommendation to maintain the pins in good working order is issued as a result of these findings.

3. CONCLUSION

3.1. Findings

The pilot had valid license, ratings and medical certificate for the task he was performing. His physical condition was adequate for the work assigned and it is not believed that he was subjected to any undue pressure to continue working or to overcome any potential misgivings which may have led him to finish the workday ahead of time.

The aircraft was in good condition and was maintained in accordance with approved procedures.

3.2. Causes

The cause of the accident was the installation in the left elevator of the pin used to immobilize said component while on the ground. The lack of motion of the elevators made the aircraft practically uncontrollable.

Finding among the wreckage the pin installed in the left elevator was evidence that the free and clear check of the controls was not completed before starting the takeoff run.

A contributing factor was the pilot's change of intentions, which went from considering the day as concluded after landing, to the eventual decision to resume flight operations on another parcel, and the subsequent interruption of tasks intended to immobilize the aircraft.

4. SAFETY RECOMMENDATIONS

REC 24/09. It is recommended that AVIALSA maintain in good working condition the lock pins for the flight controls and the flags used to clearly signal their presence and installation.

REC 25/09. It is recommended that EASA, as regards aerial work operators involved in single-pilot activities and so as to emphasize the need to be aware of the intrinsic risks resulting from the interruption of pre-flight processes or normal checks, ensure that the operational procedures include those mechanisms intended to guarantee that the processes and checks to be conducted by crews prior to takeoff, and which are suspended at any point, are restarted from a safe point prior to the interruption.

