

FINAL REPORT FATAL ACCIDENT 6Y-JWB  
TINSON PEN AERODROME 24 DECEMBER 2001

Submitted 21 January 2002 by  
Jamaica Civil Aviation Authority  
Flight Safety Division

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## **Final Report: Fatal Accident 6Y-JWB Cessna 150K on 24 December 2001**

### **Summary**

On December 24 2001 a Cessna 150 Registration 6Y-JWB operated by Wings Jamaica Limited took off from the Tinson Pen Aerodrome (located in Kingston, Jamaica) westward from runway 32 at 3:18 p.m. for local circuit training. The two-seat aircraft carried one flight instructor and one ab-initio student. After completing one circuit and landing the aircraft was seen to take off from the touch and go landing with its flaps extended. Attempts to raise the flaps using the flap switch were unsuccessful. The aircraft was seen to climb slowly to a low altitude and suddenly stall and spin to the left and impact the ground a few hundred feet off the end of the runway in a swampy area. As fire broke out the student pilot was able to extricate himself from the wreckage and, although injured with two broken ankles, was able to reach a nearby road and summon help. Attempts to extricate the instructor pilot who had his lower legs and feet trapped in the wreckage were unsuccessful and he perished in the post crash fire. The flaps were fully extended at impact and the engine was developing about 95% power. It is not known why the flaps did not retract and all physical evidence of wiring, fuse box, flap switch and flap motor was destroyed in the post crash fire. Credible eyewitness reports describe the aircraft initially climbing steeply, leveling off momentarily, then flying very slowly in a descent indicating that the aircraft was unable to accelerate and had insufficient altitude to descend to increase airspeed to a safe flying speed and this resulted in the inevitable stall.

### **The Pilots**

The instructor pilot received his student pilot license in January 1998, his private pilot license in November 1998, his commercial pilot license in August 2001 and his assistant flight instructor rating in September 2001. He had a grand total of 300 hours flight time including 95 hours as an assistant flight instructor. He had also qualified to solo flying on winch launched gliders. Most of his flight time was on Cessna 150, Cessna 172 and Cessna 182 aircraft. He had been the principal flight instructor for the student, having instructed for 16.8 hours of the student's 19 hours total time. He had instructed several other students. At the time of the accident he held a valid commercial pilot license rated for single engine aircraft, a valid assistant flight instructor rating and a valid, unrestricted medical certificate. He had not flown on the day prior to the accident and it was his first flight of the day when the accident occurred. He had flown 100 hours in the three months prior to the accident and 20 hours in the preceding 28 days. There was no evidence of fatigue as a factor. He received his last in-flight supervision during his instructor flight test on September 11 2001. He had previously flown in 6Y-JWB in early November.

The student pilot received his student pilot license in November 2001 and held a valid medical certificate. He had acquired a total of 19 hours since commencing flight training in September 2001, all on Cessna 150 aircraft. His last previous flight had been eleven days prior to the accident in a different Cessna 150. He had last flown in 6Y-JWB with his instructor in early November. There was no evidence of fatigue as a factor. He stated

that he had not done full flap stalls in training. This flight was to have been his "Tinson Pen check out", as he had not done touch and go landings at Tinson Pen in the past. (*Student pilot's statement is attached as: Exhibit 1.*)

### The Flight Training Unit

Wings Jamaica Limited has been in operation for about 40 years and for many years has been the only flight-training unit in Jamaica. The company is certified to conduct private and commercial license flight training and multi-engine rating, instrument rating, night rating and instructor rating training in single pilot, non-high performance single and multi-engine land aeroplanes under 5,700 kg MCTOW and is also certified to conduct on demand domestic public transport flights. Wings Jamaica Limited has adequate qualified staff, adequate management and organization structure and an adequate facility all based at the Tinson Pen Aerodrome. Wings employs a maintenance coordinator who is a qualified aircraft maintenance engineer. Its aircraft are maintained at an approved maintenance organization certified to perform maintenance on all of Wings aircraft and that is also based at the Tinson Pen Aerodrome. Wings Jamaica Limited's air operator certificate was renewed on December 22 2001. There was no evidence to indicate that the flight-training unit was a factor.

### The Weather

At the time of the accident the weather cloud ceiling and visibility was suitable for VMC training flights with winds being light westerly with occasional light showers. Weather was not a factor in the accident.

### The Aircraft

Cessna 150K Registration 6Y-JWB MSN 15071744 was built in 1970. It had 5584 hours on the airframe at its last 50 hour inspection completed on December 21 2001 and held a valid certificate of airworthiness issued on July 18 2001. A newly overhauled propeller had been installed on December 20 2001 and had been flight checked serviceable. The engine had 1108.2 hours TTSO at the 50-hour inspection on December 20 2001. Later, on the same day, December 20 2001, a flight instructor carried out a maintenance test flight on the aircraft following the propeller change and during the test flight experienced an in-flight incident in which the flaps failed to retract from the fully extended position after a touch and go landing (*see flap diagrams: Exhibit 2*). He was able to continue the flight and return for a landing with full flap extended and made an entry in the technical logbook that read "*Flap retraction not working*". The fault was repaired as an "*Open circuit at motor micro-switch repaired and fuse replaced*". The aircraft was again test flown and the flap operation was found to be satisfactory following this repair. A lug connector had come off the motor micro-switch and shorted out the circuit: this caused the fuse to blow and resulted in the pilots' inability to control the flap position (*see flap control drawing: Exhibit 3*). At the time of the flight on December 24 there were apparently no known defects in the technical log that would affect the aircraft airworthiness, however, the technical logbook original copy was destroyed in the post

crash fire. There were no other significant defects noted in the history of the aircraft since it was imported and all inspections and Airworthiness Directives had been accomplished at or before the mandatory times.

### The Maintenance Facility

The maintenance facility is a certified approved maintenance organization that is authorized to provide repair to non-pressurized piston engine aircraft under 5,700kg MCTOW. It employs adequate staff, has adequate equipment and facilities and had renewed its certificate on November 2 2001. It was authorized to conduct contract maintenance for Wings Jamaica Limited aircraft. It had completed maintenance on the flap fuse and connector at the flap micro-switch a few days before the incident and the aircraft had been satisfactorily test flown following that repair. There was no evidence to indicate that the maintenance facility was a factor.

### Aircraft Maintenance

The maintenance on the aircraft was supervised and certified by a qualified and licensed aircraft maintenance engineer type rated on all Cessna single engine aircraft. The duplicate inspection following the flap repair had been properly certified and inspected. Although the record keeping procedures used by the personnel at the facility could be improved there was no evidence to indicate that aircraft maintenance performance was a factor.

### The Aerodrome

Tinson Pen Aerodrome is a public aerodrome that is certified for day and night VFR operations and is used by aircraft up to DHC-8 and Westwind Astrajet size and performance. It has displaced runway thresholds at both ends, the east end being affected by some man made obstacles and objects of natural growth (trees), and the west end being affected by a busy city road and some light standards. The obstacles reduce the runway available for touch and go landings in either direction and although there is adequate distance for all small aircraft under normal operations there is little margin for error if aircraft performance is less than optimal. Trees at the east end of the runway have grown up and do not meet the obstacle free approach surface required by aerodrome standards. This results in aircraft landing from the east not having the optimal approach to the runway displaced threshold as the trees are higher than the required height and aircraft taking off toward the east requiring a steeper climb gradient to get over the trees.

### The Flight

The student arrived at the training unit earlier than the instructor and when the instructor finally arrived the student proceeded to the aircraft to carry out pre-flight checks and was joined by the instructor before start up. The student stated that no pre-flight briefing was given to him before the flight commenced. The student was flying when the aircraft took off at 2018 UTC, completed one circuit, carried out a touch and go landing using full flap

on Runway 32 at Tinson Pen Aerodrome and became airborne again within the normal confines of the runway. The student stated that while on the runway he raised the flap control to the up position, applied full power and locked the throttle control, tracked the runway centerline and assumed a climb attitude as the aircraft became airborne (*see Cessna 150 Owner's Manual excerpt on flap operation: Exhibit 4*). The student stated that the aircraft was not climbing normally and appeared very sluggish in performance but he did not realize or recognize that the flaps had not retracted nor that he may have been at a higher than normal pitch attitude. He glanced at the airspeed indicator as the aircraft gained a little altitude and stated that it read less than 40 mph at which he said he thought he had a pitot problem (airspeed indication problem). At this point the instructor reportedly said, "it's the flaps" and operated the flap switch and took control from the student. The aircraft was seen to level off momentarily at about 100 feet, descend slightly as if it was going to re-land and then fly westward very slowly in a very shallow descent for a few seconds across the road west of the airport. Several observers, including pilots on the ground and an aerodrome flight information service officer who is also a student pilot all noticed that the flaps were still down as 6Y-JWB became airborne and they did not see flaps retract at all. During the climb the Tinson Pen aerodrome flight information officer made two rapid calls on the flight frequency "Whisky Bravo your flaps Whisky Bravo your flaps". No response was received from the aircraft. After the last radio call the aircraft had crossed the road west of the aerodrome and its nose was observed to pitch up as it slowly and then more rapidly rolled to the left in a nose down attitude. It completed about one-half of a turn and impacted the ground in a nose down attitude. Smoke was seen following the impact. The student stated that he tried to get out and could not, realized he was being held by his seatbelt, unfastened the belt and was able to extricate himself from the wreckage. He saw the instructor, face down, silent and motionless and believed him to be dead. He heard the fire begin to crackle and went for help. His description of his recollection of the events immediately following the crash was "blurred" after the impact.

### The Accident Scene

The aircraft wreckage showed minimal spreading, indicative of a near vertical descent in a spin about 45 to 60 degrees nose down. It struck between hummocks of muddy ground, aligned on a heading of about 130 degrees i.e. almost a 180 degree turn from the original direction of flight. It appeared to have struck some nearby small trees and bushes with the left wingtip first. This was followed by ground impact of the nose gear that was bent backwards almost parallel with the bottom of the engine casing and to the right after striking a hummock. The main gear struck the same hummock as the nose gear and was torn off and rotated backwards. The engine gearbox front section and propeller were buried in soft mud and the engine was bent downward in its mounts. The right wing had impact damage to the leading edge.

The tail section had separated from the fuselage and was attached to it only by the control cables (*figure 1*).

The right wing, inboard of the aileron was completely burnt away. The right fuel tank had ruptured and was found lying close to the battery housing. The left wing was separated from the fuselage at a point just inboard of the left fuel tank, with the strut separated at the fuselage junction and still attached to the wing (*figure 2*).

The entire cabin of the aircraft was almost completely consumed by the fire. Little or no trace remained of the instrument panel and its installed switches, circuit breakers, fuses and instruments.

The engine was almost completely buried in the soft, muddy ground (*figure 3*). The propeller was found still attached to the engine with one blade bent slightly rearward and bore evidence of impact damage while rotating. One of the few instruments recovered was the tachometer and its needle was found frozen in a position that would indicate that the engine impacted the ground while turning at approximately 2300 rpm (*figure 4*).

The flap screw-jack assembly was found in the wreckage with the motor almost completely burned off. The jackscrew was in the fully extended position indicating that the flaps were also fully extended at the time of impact (*figure 5*). The flap selector switch was not found.

The instructor's remains were found lying across the cockpit from right to left with his feet under the remains of the panel where they were apparently trapped between the cockpit floor and the bottom of the instrument panel as the floor was forced up from the impact. He was reported to have been conversing with one would be rescuer as the post crash fire commenced in earnest and the cause of his death was massive burns.

The Tinson Pen Aerodrome Crash Fire Rescue team were first on the scene but could not get their equipment close enough to the crash site located about 50-75 yards from the Portmore road over a deep ditch and across the intervening swampy ground. The Ports Authority fire truck that was equipped with enough water hose to reach the site eventually joined them. The fire was prevented from spreading into the nearby bushes and eventually the application of water was possible to cool the wreckage allowing access.

There were a number of comments made by bystanders at the scene concerning the firefighter actions when they did arrive on the scene, mostly concerning the slowness of application of water. Not many persons understood that water should not be added to a fuel fire, as it would help it to spread. Dry chemical or foam would have been useful, however this was not available as only a long water hose was on the fire truck. In any case, the arrival of the fire truck was after the fire had commenced and was too late to prevent the loss of life as the fire began right after the crash and was in full flame a few minutes following the impact.

### Analysis

Both pilots were fit to fly, the weather was suitable, the aircraft was airworthy. The student stated that all required pre-flight checks were completed and this would have

included lowering and raising the flaps to inspect the mechanism and to check for normal operation. The checklist provided by the flight training unit confirmed that flaps are checked during the pre-flight check and that they are raised in the after start check. There is a cable indicator for flap position but it is more usual practice for pilots to look out at the wing to confirm their position.

The aircraft would not accelerate and climb normally if the flaps did not retract. It would be in a high drag configuration and would require substantial engine power to overcome the additional drag of full flap. On takeoff, if the aircraft was trimmed for the approach, it would tend to nose up rapidly on power application and would require a forward force on the controls to climb at a shallower attitude to compensate for the changed wing shape and to overcome the increased drag from the flaps being fully extended.

A flap fault occurred, for unknown reasons, in that the flaps did not retract when selected up on the control switch. This could not be confirmed due to disappearance of all fuses, the flap control and the flap motor in the fire. Such causes could be an electrical fault at the switch or elsewhere, electrical failure, mechanical fault (wiring loose) burned out fuse, or motor seizure. Only the flap jackscrew remained as evidence that the flaps had not retracted. The flap jackscrew was examined and it did operate after the accident and showed no evidence of binding.

At that early stage of training no student would be likely to recognize the fault immediately unless a visual check was made of the flaps during the touch and go roll after they were selected up.

If the take off and climb with full flap extended was carried out using the attitude references for normal climb this would also result in the nose of the aircraft being too high to permit acceleration to a speed at which continued flight could be successfully maintained. The student noted that the airspeed was less than 40 mph when he glanced at the indicator.

The following sequence of events is hypothesized from the eyewitness report by a commercial pilot (*diagram, figure 6*) who saw the events from the side: by the time the instructor realized there was a significant fault with the flaps and had taken control from the student at about 100 feet he tried to regain some airspeed by descending. He realized it was too late to re-land the aircraft safely as it had now proceeded too close to the end of the runway to land without running over the end of the pavement, through the wire perimeter fence and into the traffic on the road. He was forced to continue to fly over the busy road at the west end of the aerodrome and over the streetlight poles in the vicinity. As a result of continuing to try to keep the altitude level to cross the obstacles the airspeed decayed so much that the aircraft became too far behind the power curve to accelerate on engine power alone without making an additional descent. There was insufficient altitude to descend for additional airspeed. Any attempt to maintain level flight or even a slight descent from this point onward would inevitably result in a power on stall. The instructor may have been trying to fly straight ahead over the brush and swamp on the west side of the road in an attempt to find a suitable forced landing area

while the aircraft was still under some control. The aircraft was seen to fly straight ahead in a very shallow descent until it stalled.

It is normal procedure to select flap up and to check correct flap operation during a touch and go landing. The take off should be aborted if the flaps do not retract.

### Conclusions

This was an almost classic departure stall accident. This was caused by taking off with full flap extended, the aircraft over-rotating due to flap and trim position and initially climbing at a too high pitch attitude. This resulted in excessive airspeed loss, followed by flight in a near stalled condition during which the airspeed continued to decay until the inevitable stall and spin into the ground occurred.

1. Standard instructional practice was not followed in that no pre-flight briefing was given to the student pilot.
2. This was a preventable accident: if the flaps been checked by either pilot while the aircraft was still on the runway during the touch and go roll the takeoff might have been aborted.
3. The engine was operating normally , developing climb power, or greater, at impact.
4. The flaps were fully extended at impact.
5. There was no evidence that the student or the instructor checked the flap operation on the touch and go roll prior to becoming airborne.
6. There was no evidence of primary control or structural failure.
7. The maintenance contractor entries in the technical logbook and worksheet describing the flap repair from a previous day were not consistent, i.e. a poor record keeping practice.
8. There was no evidence of improper repair to the previous flap fault.
9. The aircraft should have been able to fly after the flaps were left down.
10. By the time the instructor took control the speed had decayed too much to allow the aircraft to remain in flight for more than a few moments.
11. The accident was survivable in terms of the impact.
12. The fatality resulted from fire.
13. The student received facial and hand lacerations and two broken ankles but received no burn injuries.
14. Tinson Pen aerodrome has obstacles at both ends of the runway making it unsuitable for touch and go solo training.
15. Weather was not a factor in this accident.
16. Fatigue was not a factor in this accident.
17. Alcohol and/or substance abuse was not a factor in this accident.
18. The inexperience of both the student and the flight instructor were factors in this accident.
19. Distance from the road and swampy ground hampered the arrival of fire fighting equipment.
20. The fire-fighting equipment available at the crash site was not adequate to suppress the fuel fire.

21. It is uncertain whether different fire fighting equipment would have prevented the casualty due to the rapid and intense fire that followed the crash.

### Recommendations

1. Solo ab-initio student pilot touch and go training should not be permitted at Tinson Pen aerodrome.
2. The flight-training unit should ensure all students receive a pre-flight briefing.
3. The flight-training unit should ensure that all instructors and students are aware that a visual confirmation of Cessna 150 flap operation should be made on all touch and go landings before takeoff is initiated.
4. The flight training unit should ensure that full flap stalls and power on stalls are carried out as part of its pre-solo training syllabus.
5. The flight-training unit should ensure that slow flight in all flight configurations is carried out as part of its pre-solo training syllabus.
6. The flight-training unit should ensure that its instructor training and student training programs place appropriate stress on the departure stall awareness portion of the syllabus.
7. Tinson Pen checkouts should only be carried out by full flight instructors.
8. The flight-training unit should increase its supervision and monitoring of new instructors to ensure that all required components of training are being carried out at appropriate times in the syllabus and should encourage use of checklist at all stages of flight.
9. The contract maintenance organization should ensure that higher standards of record keeping are followed.
10. The flight training unit maintenance coordinator should ensure that substandard record keeping on the part of its maintenance contractor is not accepted.
11. The Civil Aviation Authority should monitor the flight training unit and maintenance organization to ensure that these recommendations are followed.
12. The Tinson Pen aerodrome operator should make efforts to ensure that the number of man-made obstacles affecting declared distances are minimized and objects of natural growth are controlled by cutting or removal on a regular basis.
13. The aerodrome operator should consider equipping its response vehicle with suitable portable extinguishers capable of suppressing fuel, hydraulic fluid and electrical fires.