



State of Israel
Ministry of Transport and Road Safety
Aviation Incidents and Accidents Investigation

Safety Investigation Report
(Final Report)

Accident File No. 62-15

- UNCONTROLLED TAXI INTO DRAIN DITCH -

Date	20.6.2015
Aircraft (Aztec)	PA-23F
Registration mark	4X-CID
Place of Accident	Samos Airport

For safety purposes only

The Investigations conducted by the Israeli Investigation Office (IAIAI) are in accordance with Annex 13 to the ICAO Convention on International Civil Aviation, and the Israeli Aviation Law 2011, chapter 7, and its respective Aviation regulations.

The sole objective of the investigation of an accident or incident under these Regulations is the prevention of future accidents and incidents. It is not the purpose of such an investigation to apportion blame or liability.

Accordingly, it is not appropriate that AIAI reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

This report has been translated to the English language for other parties' convenience, and should adhere to the Original report in the Hebrew language - In any case of abstruseness or miss-understanding,

Summary of the incident

On Saturday 20.6.2015 at around 10:00, during preparation for takeoff after starting up the engine in the parking bay at Samos Airport, a Piper Aztec began slowly moving forwards without the pilot noticing. The pilot's attempt to brake, came too late, and was unsuccessful - the aircraft fell into a rainwater drainage channel located between the parking area and the area separating the runway. As a result of this, the aircraft was damaged beyond repair, although those inside it escaped uninjured.

The pilot reported the incident immediately to the Chief Investigator in Israel, who, in collaboration with his Greek counterpart, began an investigation into the incident. The Greek investigation authority handed over responsibility for the investigation to the Israeli Chief Investigator some days after the accident.



The aircraft inside the drain ditch

1. Factual information

1.1 The history of the flight

Background

On Friday, 19.6.2015, six general aviation aircraft, departed for Don Hoz Airport (LLSD) in Israel to the International Airport of the island of Samos (LGSM) in Greece, within the framework of a "fly-in" to Bulgaria, Rumania and Hungary organized by the Israeli Association of General Aviation.

The aircraft which took part in the fly-in were:

☒ Piper Aztec, registration: 4X- CID. The occupants in plane consisted of a pilot in command (hereinafter: "**the pilot**"), a passenger, holding a pilot license, but did not hold a twin-engine rating (hereinafter: "**the passenger**"), and an additional female passenger.

Comment: The two pilots in question were members of the Association's Committee and had been in charge of the "fly-in".

☒ Beechcraft Sierra, Registration: 4X-AIJ: consist of a pilot and female passenger.

☒ Cessna 172, Registration: 4X- CHL: consist of 2 pilots.

☒ Cessna 172, Registration: 4X- CWP: consist of 2 pilots.

☒ Texan Ultralight: consist of 2 pilots.

☒ Sting Ultralight: consist of 2 pilots.

The two pilots directing the fly-in on behalf of the Israeli Association of General Aviation, flew in the aircraft that was involved in the occurrence (4X-CID), one which they chose on the eve of the group's departure, after a malfunction was discovered in its predecessor aircraft, the one which they had originally planned to operate in the fly-in.

On Friday, all the aircraft landed in Samos, the Aztec after a direct flight and the others after refueling in the isle of Rhodes. After landing, the Aztec aircraft was parked in an area between runway connection lanes C and D, perpendicular to the edge of the taxiway, to the north of the runway, while along the opposite side, three meters from the edge of the runway, stretched a rainwater drainage channel. During the evening, a briefing was held regarding continuation of the flights in the next day, with destination airport the Burgas Airport, LBBG, in Bulgaria.

The flight

During the morning hours of Saturday, 20.6.2015, those taking part in the fly-in arrived at Samos Airport. At around 10:00 h, the crew of the Aztec aircraft (the pilot and the passenger) carried out the daily inspection of the aircraft consist of its drainage systems, fuel, oil and components. It should be pointed out, that engine oil was added to the right engine tank, which doused the right wheel. After the inspections had been completed, the female passenger entered the aircraft and sat in the right hand seat of the middle row, followed by the pilot in command, who sat in left seat in the front raw and the passenger who sat to right one in the front raw.

After they were organized in their seats, the pilot asked the passenger to assist in managing the two-way radio communication. The passenger asked the control tower for "startup" permission, and after permission was received, the pilot started up the aircraft's engines, firstly and unsuccessfully the right engine, then the left engine; after the left engine was ignited and running, he went back and started the right engine. After engine ignition, the aircraft's tachometer gave a reading of between 1,200 and 1,400 rpm. The pilot reduced the RPM of the engines to 1,000. The process of starting the engines and reducing the RPM was carried out while the pilot was pressing on the aircraft's pedals, to obtain a full stand still.

Immediately after start-up, the passenger asked for permission to taxi. At the same time, while waiting for approval by the aerodrome tower, the pilot began carrying out the "after startup checklist" while the passenger was focused on examining the documents for the planned flight. While thus engaged, the passenger felt that the aircraft was moving; he raised his eyes, and noticed that it was edging towards the drainage channel; at this point the aircraft was still on the asphalt about two meters away from the edge of the runway. The passenger yelled out to the pilot "you're moving, you're moving" and saw that the pilot was desperately trying to force breaking actions in order to halt the airplane.

The pilot, while carrying out the after startup checklist, raised his eyes from the checklist manual, and noticed, that the aircraft was moving and at the same time heard the passenger calling out "you're moving, you're moving".

According to his version of events, he was then approximately one meter from the edge of the runway and he increased to maximum the pressure on the brake pedals (in his words, he "stood on the brakes"), however the aircraft continued

moving slowly in the direction of the grass verge bordering the asphalt (hereinafter: "**the grass**"), momentarily halted, resumed moving and slowly fell into the drainage channel through which the previous evening's rainfall was flowing.

The impact of the fall was hardly felt inside the cabin. Immediately after the aircraft fell into the channel, the pilot closed the fuel valves and shutoff the power, while the passenger shut off the mixture control levers. The passenger unsuccessfully tried to open the only door of the aircraft which was located to his right. A fireman from the Airport's fire unit, tried to assist from outside, however, the fireman and the passenger were pulling in opposite directions and this coupled with the fact that a slight twist had been caused to the door, prevented them from opening it. An Israeli member of the fly-in, who was a mechanic by profession, and who also rushed to the scene, suggested that they escape through the emergency exit hatch. The passenger, who was unfamiliar with it, struggled to open the emergency hatch, which was located behind the pilot's seat in the middle row, however, guided by the mechanic outside and the pilot, he eventually succeeded in doing so. The female passenger was the first to evacuate the aircraft, followed by the passenger and lastly the pilot.

The pilot in command immediately telephoned the Israeli Chief Investigator to report the incident, who then spoke right away with his Greek counterpart and coordinated the investigation with him.

The investigation was launched simultaneously by the Greek and Israeli investigation authorities, although subsequently, after the aircraft had undergone a technical examination, the Greek investigation authority transferred the responsibility for investigating the accident to the Israeli Chief Investigator Office.

The investigation report combines incorporates findings, photographs and details that were forwarded to the Office of the Chief Investigator by his Greek counterpart.

1.2 Those who were involved in the incident

The pilot in command (hereinafter: "**the pilot**")

- ☒ 57 years old.
- ☒ Holds a private pilot license to fly single and multi-piston engine aircraft.
- ☒ 1,600 hours of general flying experience.
- ☒ 60 hours of experience flying the model of aircraft that was involved in the incident (it was his second flight on the aircraft itself).
- ☒ Holds a valid medical certificate.
- ☒ Periodic competency level test - valid.

The passenger-pilot (hereinafter: "**the passenger**")

- ☒ 52 years old.
- ☒ Holds a private pilot license for single-engine aircraft.
- ☒ 470 hours of general flying experience.
- ☒ Single-engine competency level check test - valid.

Comment: Both pilots have an instrument rating which was not renewed.

The female passenger (hereinafter: "**the female passenger**")

- ☒ 22 years old.
- ☒ The daughter of the pilot.

1.3 The Aircraft

- ☒ Manufacturer: PIPER.
- ☒ Model: Aztec PA-23.
- ☒ Year of manufacture: 1979.
- ☒ Twin piston-engine aircraft, 6 seats, used for training, commercial flights and leasing.
- ☒ Airworthiness certificate issued on 26.3.2015, valid until 25.03.2016.
- ☒ The aircraft has one entrance and exit door on the front right side adjacent to the copilot's seat, and one emergency exit, in the middle row, on the left side of the aircraft.

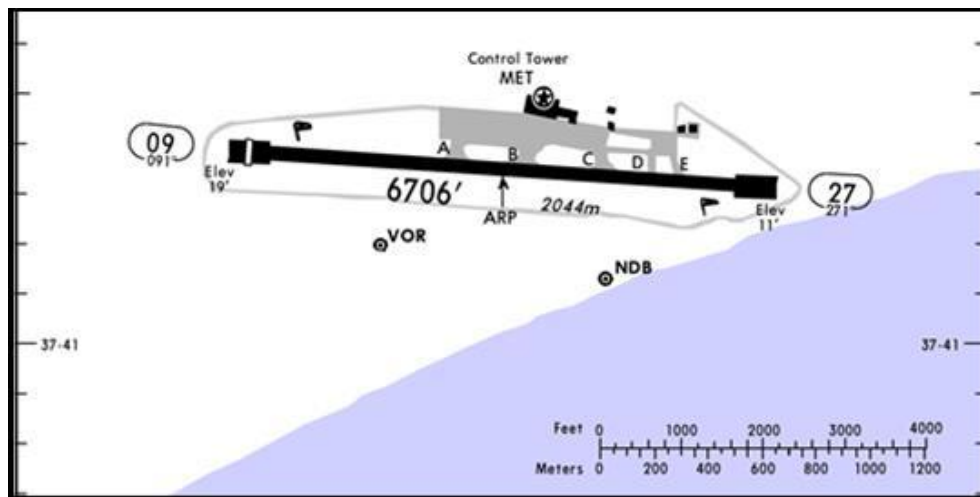
1.4 Weather conditions

- ☒ Weather conditions: Fair.
- ☒ Visibility: Good, over 10 kilometers.
- ☒ Wind: Coming from a north- northeasterly direction, velocity of 8 knots.
- ☒ Temperature - 24 degrees Celsius.

Comment: On the eve of the accident it had rained at the Airport and in Samos.

1.5 Samos Airport

- ☒ The Samos International Airport “Aristarchos” is located in the southeastern part of the island of Samos.
- ☒ The airport has a single runway (09-27), 2,044 meters in length.
- ☒ The airport elevation 20 feet ASL.



The pilot, in compliance with the instructions which he had received, parked the aircraft on the edge of an unmarked asphalt area connecting the Hellenic Air Force Fire Brigade Apron with the Civil Aviation Apron, between runway connection lane ‘TWY C’ and runway connection lane ‘TWY D’ in a perpendicular way with its nose facing south.

The site of the accident is located in the eastern section of the Samos International Airport, containing a paved area that extends between connection taxiway C and D. In the northern section is an unpaved zone, beyond, which extends a paved zone facilitating the parking of ground handling equipment. In the north-east is the main terminal building with the airport tower. The southern section, contains a rainwater drainage channel, separated from the asphalt by a 3 meter wide grass verge. To the south of the drainage channel, is an unpaved area which extends the strip and then the main runway.



1.6 Findings at the accident site

The used parking area

The used parking area is an asphalt paved area which is unmarked and connected the Civil Aviation Apron with the Fire Brigade Aircraft Apron and during the summer high load traffic months is used as parking for general aviation light aircrafts. The paved section of the area, from north to south, is 24 meters long, beyond which extends 3 meters of weeds adjoining the drainage channel.

The rainwa



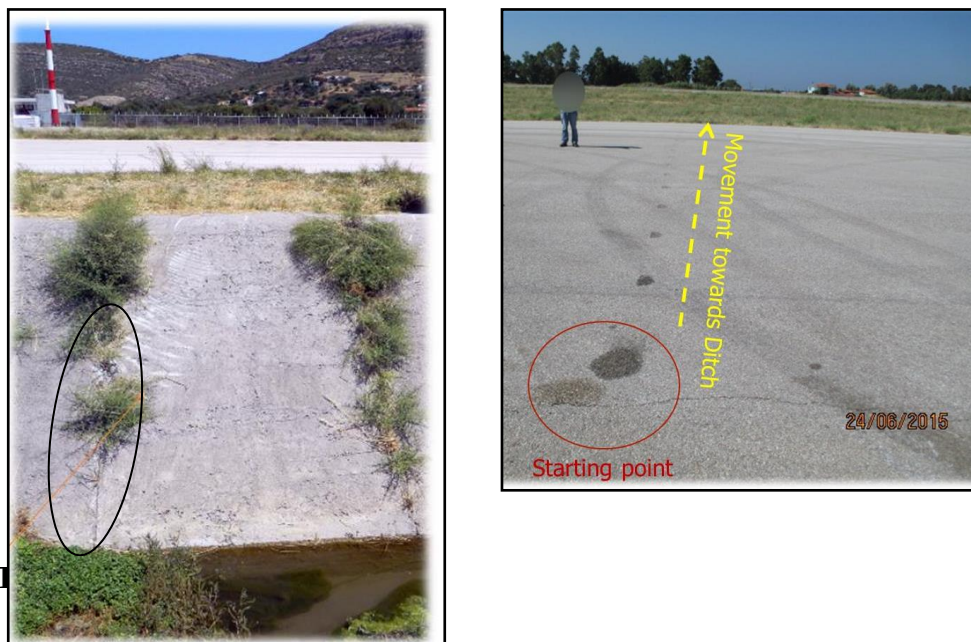
The width of the upper section of the drainage channel, is 6.7 meters wide and its lower section, 2.45 meters. It is approximately 3.4 meters deep, and at its base runs a stream of water approximately 30 centimeters in height. The channel is lined with concrete, and the upper section of the verge of the channel, is approximately half a meter wide.



The course along which the aircraft moved

On the surface of the paved area from the place where the aircraft was parked, to the place where it fell into the channel, are engine oil marks, made by the tire of the right wheel during the aircraft movement, which was doused with engine oil and was spotted during the preflight inspections. The marks charted precisely the route along which the aircraft progressed.

On the northern wall of the drainage channel (the point where the aircraft fell into it), are notch marks which were made by the right propeller of the aircraft, indicating a slow rotation speed.



The damage which the aircraft sustained, was actually so severe, that it was not economically viable to repair it and so the aircraft was considered as destroyed.

The main damage:

- ✓ The wings of the aircraft, especially the left wing.
- ✓ The propeller blades, especially those of the left engine.
- ✓ The nose of the aircraft.
- ✓ Minor structural deformities.

An investigator from the Greek investigation authority, together with a mechanic from the aircraft's inspection institute, who took part in the investigation at the request of the Israeli Chief Investigator, and in coordination with his Greek counterpart, inspected the aircraft, with the emphasis on the brakes system, and found no technical malfunction which could account for the accident, including in the brake system, which was found to be in good working order. The only noticeable was poor parking brake action in the left hand wheel but satisfactory on the other one.



2. Analysis

General

When the aircraft crew were first questioned, the pilot stated, that it seems, that when he began carrying out the after startup checklist and concentrating on the cabin, he eased up slightly on the brake pedals, causing the aircraft to move forward. When he noticed, that the aircraft was moving, he tried to brake forcefully, without success. His feeling was that the brake response of the aircraft was not optimal, and did not match the intensity of the pressure, which he had applied to the brake pedals.

The investigation team focused on the reasons for the late attempt to brake, the possibility of a malfunction in the brakes, an examination of the effect of the handbrake on the performance of the aircraft's brakes, examining the contribution of environmental influences to the onset of the accident, the performance of the crew and its familiarity with the aircraft.

A further point which arose in relation to this accident, and many others which preceded it, is defining the function of pilots who are considered to be "passengers", are in close proximity to the pilot and have access to the aircraft's systems, with the emphasis on those holding a pilot license, but who have no defined role in flying the aircraft.

2.1 The brake system

The pilot already took responsibility in his first report about the occurrence of the accident, and stated explicitly, that the movement of the aircraft, which he had been unaware of, was caused because he had eased the pressure on the brake pedals after starting up the engines and preparing for taxing. However, his feeling was, that when he tried at the last minute to brake, the aircraft did not respond. The two passengers who had been with the pilot stated, that it seemed to them that during "the excursion itself", he had tried to brake forcefully. This being the case, the investigators decided to examine the performance of the aircraft's brake system in order to rule it out as a possible contributor to the accident.

The aircraft's brakes were tested after the incident by the Greek investigator and by a mechanic from the Israeli inspection institute, who was sent by the Chief Investigator, and they were found to be in good working order.

The aircraft's brakes are operated via pedals in the cockpit. The system is a dual system, which means that the brakes may be operated from either the front left or front right seat.

The aircraft is equipped with a handbrake, which is operated through a handle, which is located in the cockpit beneath the left side of the instrument panel. The warning sign regarding the effect of the handbrake on the aircraft's brake system, is located beneath the handbrake handle, in the cockpit of the aircraft and states 'NO BRAKING WILL OCCUR IF AIRCRAFT BRAKES ARE APPLIED WHILE PARKING BRAKE HANDLE IS PULLED AND HELD'.



During the investigation, the possibility was raised, that the handbrake system may have been partially responsible for the accident.

However, during the examination, it became clear, that pulling on the handbrake completely, neutralizes the aircraft's brakes, and an attempt to brake using the pedals would not succeed.

According to the aircraft's instruction manuals, in order to operate and/or neutralize the handbrake system, it is necessary to press on the brake pedals, and pull on the handle. A test that was performed by the investigation team, on an identical aircraft to the one which was involved in the accident, found, that even without pressing on the brake pedals, the act of pulling the handle of the handbrake completely neutralized the brake system operated by the aircraft's pedals.

The conclusion reached in the investigation, was that the braking system, had operated properly, and that a malfunction in it, had not been a factor in undermining the pilot's attempt to brake. The "improvement" in the brakes' performance, actually began when the aircraft's front wheels ran over the concrete edge of the drainage channel, and the aircraft's progress was slowed, however, the fall of the nose wheel after it passed the edge of the channel was decisive, and the aircraft collapsed. The very fact that an "improvement" was experienced strengthens the conclusion that the braking system had been in good working order.

2.2 The occurrence of the accident

After starting the aircraft's engines and beginning to go through the preflight routine, and while the passenger was reviewing the fly-in pamphlets, the pilot

unwittingly, eased off the pressure on the brake pedals, and the aircraft began moving slowly forward from its parking position, perpendicular to the runway, in the direction of the drainage channel.

The female passenger, who was sitting at the back looking outside, noticed that the aircraft was moving forward, but thought that this was the start of the journey. It should be noted, that from where the female passenger was sitting, she could not see what was going on in front of the aircraft, and therefore, did not sense immediately that something untoward was happening. In a simulation that was carried out with her, it was found, that the period of time from when the aircraft began moving to the moment it fell, lasted around 8-10 seconds.

According to this calculation the aircraft would have been moving at an average speed of approximately three meters per second (the asphalt available was 21 meters wide until the drainage channel). The pilot noticed that the aircraft was moving forward, when according to his estimation it was about half a meter from the grass verge, before the drainage channel, at which point he instantly tried to brake, and forcefully.

The average response time needed for a person to identify a "threat" is around 0.75 seconds. Therefore, the aircraft had moved approximately two meters before the action taken by the pilot in pressing on the brakes had any effect. During this space of time, the front wheels of the aircraft were already on the grass verge. Since the grass was moist/wet from the rain, which had fallen the night before, the friction coefficient was low and it took longer to brake on it, than would have been the case had the grass been dry.

The aircraft continued to slowly move forward, and upon its front wheels crossing from the grass verge to the flat concrete surface marking the start of the drainage channel (the edge of the drainage channel), the braking of the aircraft intensified, but the nose of the aircraft and the wheel beneath it, had already passed over the edge of the drainage ditch, and the aircraft began to slowly descend downwards into the drainage channel.

The aircraft was halted by the facing wall of the drainage channel, while its engines were running at 1,000 RPM.

2.3 The performance of the pilot

The pilot had accumulated approximately 1,600 hours of flying time, 500 of them on twin-engine aircraft, and around 60 on the same model of aircraft that was

involved in the incident. The pilot had flown the actual airplane, involved in the accident only once, about three weeks before the accident, while flying from Israel to Cyprus.

According to the original plan, the pilot was supposed to have flown a different aircraft, however, on the day before the accident, it was found to have a malfunction on the planned airplane, and so, he asked to hire, and received, the aircraft which was involved in the accident.

The pilot started up the engines of the aircraft while pressing on the brake pedals, following which he stabilized the engines at 1,000 RPM, and set about going through the routine preflight checks. In order to do so, he began reading through the after startup – checklists, without raising his head to look outside.

The pilot, did not put on the handbrake, while he was going through the preflight checks, and was completely unaware that it existed, but at the same time reduced pressure on the brake pedals, unaware to the fact that the aircraft had begun moving forward.

The aircraft began to slowly cross the paved asphalt area, without the pilot noticing its progress. Approximately eight to ten seconds from the time the aircraft began moving, the pilot heard the passenger shout "you're moving, you're moving". At the same instant, instinctively or in response to the shouting of the passenger, the pilot raised his head from the after startup checklist, and noticed, that the aircraft was approximately half a meter from the grass verge which preceded the drainage channel.

The pilot tried to stop the aircraft by "standing on the brakes", however, it continued its slow advance, passed over the grass verge, onto the concrete threshold of the drainage channel, slowed down somewhat, almost to a standstill, but continued to descend slowly into the channel, because the nose had fallen down.

Throughout the entire brief episode, during which the pilot tried to bring the aircraft to a halt, he did not reduce the power of the engines by lowering the throttle levers, and both of them remained running at 1,000 RPM.

The pilot estimated that the fall had been very low energy, and was not worried by the possibility of fire or a critical emergency situation. Immediately after the aircraft fell into the drainage channel, the pilot focused on closing the fuel valves and shutting down the engines, and it actually took a number of seconds before

he understood that the passenger was struggling to open the emergency exit hatch, after having failed to open the door of the aircraft.

The bottom line is, the pilot for a brief period of time was lacked of situational awareness, coupled with an involuntary relaxation of pressure on the brake pedals, while most of his attention and vision was focused "within the cabin" dealing with checklists.

2.4 The performance of the passenger-pilot

The passenger held a private pilot license for single engine aircraft, and did not serve as a pilot in the fly-in. However, he was asked to manage the two-way radio communication, and took part in directing the fly-in. The passenger was not acquainted with the aircraft before the flight. After the engines were ignited, the passenger focused his attention on reviewing the fly-in pamphlets, and failed to notice, that the aircraft had started moving forward. Several seconds later, he raised his head, noticed that the aircraft was moving, and had reached approximately one and a half meters before the grass verge and shouted to the pilot "you're moving, you're moving".

The passenger, who was, as aforesaid, a pilot by profession, did not himself attempt to stop the aircraft, despite its dual pedals, steering and braking system, nor try to reduce engine power by lowering the throttle levers. Immediately after the aircraft fell into the channel, the passenger closed the mixture control levers, and unsuccessfully tried to open the door of the aircraft, which was located next to him. The passenger was totally unaware of the existence of the emergency exit hatch on the row behind him.

The passenger displayed complete openness, when questioned, and expressed remorse both for not having interfered by stopping the movement of the aircraft immediately after noticing its uncontrolled movement and for not having known about the emergency hatch inside the aircraft, and he recommended increasing his colleagues' awareness regarding this matter.

The investigation team, did not find that the specific passenger should be held accountable for the occurrence of the accident, although it did see fit, to point out, that as a pilot he would have had the "authority" to act in order to save the aircraft, and those inside it, as the situation so required. The case under investigation was borderline in this respect, however, had the passenger tried to stop the aircraft

moving by himself, fractions of a second before the flight, the accident could have been prevented.

2.5 The role of crewmembers who have access to the aircraft's systems

The issue of the role of aircrew members who are not serving in an official capacity during a flight, has been discussed in relation to a number of incidents in the past, in which the interference or non-interference of a pilot, who had no role on the flight, contributed to, or prevented the incident.

In the present case, the passenger, who was in charge of operating the two-way radio, was the first person who noticed the movement of the aircraft while the checks were being carried out. The passenger, whose rating did not qualify him to fly the aircraft, shouted to the pilot that the aircraft was moving, however, he did not attempt to operate the brakes himself or to reduce the engine power by lowering the throttles.

While as a rule, the undesirability of a person who is not qualified to do so, interfering in the operation of an aircraft is beyond doubt, consideration should be given, to discussing subjects connected to this matter, such as the giving of a preliminary briefing by the pilot, advising the person sitting next to him, when and how to interfere, guidance regarding the procedure for opening the door, familiarity with the aircraft's emergency exit hatches, the location of the lifeboats, fire extinguishers, etc.

3. Conclusions

- 3.1 The accident is classified as a personal, aircrew responsibility, involving the pilot in command.** It was caused primarily by a reduction of pressure on the brake pedals, while the aircraft's engines were running, and the pilot was engaged inside the cabin, going through the preflight checklist, without noticing the uncontrolled movement of the aircraft.
- 3.2 The two pilots who were sitting at the crew seats (front), did not notice that the aircraft was moving forward, until it was too late,** resulting in a belated attempt by the pilot in command to contain the situation.
- 3.3 The pilot's in command response, upon identifying the accident, was instinctive and not optimal** - While the pilot did press forcefully on the brake pedals, he did not alter the position of the throttles, which remained at 1,000 RPM, so that in fact he had to counter the thrust being provided by the engines. Lowering the throttles, would have helped the attempt to brake and reduced the damage to the engines.
- 3.4 The accident was not attributable to a technical malfunction, including in particular the braking system.** The moist grass verge reduced friction with the wheels of the aircraft, and impaired the effectiveness of the braking action.
- 3.5 The two passengers had not been properly briefed before the flight and did not know the location of the emergency exit hatch.** As a result of this, after the passenger had failed to open the door of the aircraft, precious time elapsed until they succeeded, with the help of a person outside, in locating the emergency exit hatch.

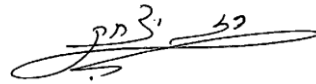
4. Recommendations

- 4.1** To consider the continuation of enrichment programs and educational evenings amongst members of the Association, on subjects such as: situational awareness, familiarity with a new aircraft, preflight briefing of passengers and the role of pilots who do not have a rating for the aircraft but who are in a position to take the helm.

Responsibility: Chairman of the General Aviation Association

Recommended implementation date: 1.11.2015

Kind regards,

A handwritten signature in black ink, appearing to be 'Raz Itzhak' with a stylized flourish at the end.

Raz Itzhak (Razchik), Adv.
Chief Investigator

Date: 17.9.2015

Ref: 15534415