TRINIDAD AND TOBAGO CIVIL AVIATION AUTHORITY

FINAL INVESTIGATION REPORT
OF ACCIDENT INVOLVING 9Y-TJU
NEAR PIARCO INTERNATIONAL AIRPORT
ON OCTOBER 19, 2021

GOVERNMENT OF TRINIDAD AND TOBAGO
MINISTRY OF WORKS AND TRANSPORT
TRINIDAD AND TOBAGO CIVIL AVIAITON AUTHORITY
PIARCO TRINIDAD

TITLE

9Y-TJU Crash Landing during Student Pilot Training

Figure 1: Crashed aircraft on the bank of the Oropune RIver.
Source: TTPS Air Support Unit, 2021

SYNOPSIS

On October 19, 2021 at approximately 9:47 local time, 9Y-TJU, a Diamond Aircraft (DA-40, light single engine aircraft) operated by Aerial World Services Limited (AWSL) landed short of the airfield approximately one (1) mile north-west of the threshold to Piarco International Airport, Runway 10. The result was a hull loss and minor injuries to the two souls on board. ***(See Figure 1.)***

The single-engine light aircraft was being operated for the purpose of student pilot training under Visual Flight Rules (VFR) in Visual Meteorological Conditions (VMC). While conducting takeoffs and landings and on a left downwind leg, it was reported that the aircraft engine did not respond to throttle inputs. The investigation found that the Instructor took control of the aircraft, turned towards the runway and upon concluding that there was insufficient altitude to reach the runway, took the decision to execute an emergency landing in the agricultural land north-west of the runway threshold. Upon touching down, the aircraft hit the southern bank of the Oropune River and came to rest on the northern bank of the river. During this impact, the aircraft sustained severe damage while the Instructor and Student received minor injuries.

A team from the Trinidad and Tobago Civil Aviation Authority instituted an investigation into this accident on the day of occurrence. The primary purpose of the investigation was to determine what caused the lack of response from the engine when the controls were advanced. Once determined, recommendations were made to implement mitigating actions that would prevent similar occurrences in the future.

In accordance with Annex 13 to the *Convention on International Civil Aviation*, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the prevention of accidents and incidents.

All times used in the report are Local times which are four (4) hours behind Greenwich Mean Time during the summer months.

FACTUAL INFORMATION

The following facts were gathered from the report submitted by the Operator, written reports, interviews and review of the transmissions between Air Traffic Control (ATC) and 9Y-TJU:

- Date and Time of Accident: October 19, 2021 @ 09:47L.
- Registered Operator: Aerial World Services Ltd. (AWSL).
- Purpose of Flight: Student Pilot training.
- Souls on Board: Two (2) Flight Instructor and Student
- The aircraft was flown to Piarco International Airport to conduct student pilot training in take offs and landings (Touch-and-Gos).
- The accident happened after the first touch-and-go had been completed.
- The first attempt by the investigation team to inspect the aircraft was thwarted by weather conditions which rendered the aircraft inaccessible.
- The aircraft was inspected the following day (October 20th) after it had been removed from the river bank but before it was placed on the truck for relocation to the AWSL hangar.
- The aircraft was again inspected on October 21st at the AWSL hangar.

HISTORY OF THE FLIGHT

- The flight originated from the Aerial World Services Ltd. facility located in Camden, Couva.
- The airfield at Camden, Couva is not approved for Students to execute takeoffs or landings. Hence, student pilot training in takeoffs and landings is carried out at Piarco International Airport, approximately ten (10) miles north of Camden.
- The aircraft was airborne for approximately thirty-two (32) minutes consisting of; the flight from Camden to Piarco, one touch and go, a crosswind leg and to the end of the downwind leg.

- The aircraft landed short of the airfield approximately one mile north-west of the threshold to runway 10 at Piarco International Airport. ***(See Figure 2.)***
- The aircraft, operated by the Instructor, completed one (1) flight previous to the accident. There was no indication of engine trouble during that previous flight and up to the time of the accident.

Figure 2: Map showing the Crash Site.

DAMAGE TO THE AIRCRAFT

- The hull of the aircraft sustained significant damage including but not limited to main undercarriage dislocation, nose gear broken off at attachment points and almost complete separation of the tail from the aircraft. ***(See Figure3.)***

Figure 3: An image of the crashed aircraft, 9Y-TJU.
Source: TTCAA Safety Regulation Division, 2021

PERSONNEL INFORMATION

- Drug and Alcohol tests were administered to both the Instructor and Student and all results were negative.
- The Instructor had a Trinidad and Tobago Commercial Pilot's License with a Flight Instructor Rating and Type Rating on the ATR42/72. His medical was current with his Class 1 valid until 18 April 2022 and his Class 2 valid until 18 April 2026.
- The Instructor had eight hundred and fourteen (814) hours as an Instructor, more than five hundred (500+) of which had been on the Diamond DA-40.
- The Student had a Trinidad and Tobago Student Pilot's License SL04952 that was scheduled to expire on January 21st 2024.

- The Student had approximately twenty-one (21) hours on the Diamond DA-40.
- Aircraft maintenance records indicate that the Engineer had been maintaining the aircraft since 2013.
- In his interview, the Engineer stated that he tracked the time of the airframe and the aircraft's components.

AIRCRAFT INFORMATION

- Aircraft type: Diamond DA-40.
- The Diamond DA-40 is an Austrian designed four-seat, single-engine, light aircraft constructed from composite materials. It utilizes a low-wing cantilever monoplane design and has a fixed tricycle landing gear.
- Aircraft registration: 9Y-TJU.
- 9Y-TJU was manufactured in Canada.
- Year of manufacture: 2004.
- Airframe Serial Number: 40.402.
- Total Airframe Time: 5997.2 Hours
- Engine and Propeller installed: April 30, 2021
- Engine Make and Model: Lycoming, model number IO-360-MIA.
- Engine Serial Number: L-34907-51E.
- Propeller Serial No.: CH39125B.
- Propeller Time Since Overhaul (TSO): 248 Hrs.
- The aircraft has engine throttle control, mixture control and propeller pitch control.
- A review of the aircraft's maintenance records by a TTCAA Airworthiness Inspector found all work to be recorded satisfactorily and properly certified.
- On May 24, 2021, the engine cut off while exiting the runway at Piarco International. At that time, the engine idle was adjusted from 750 to 800 RPM.
- The aircraft operated without reported engine-related defects for two hundred and twenty one and a half (221.5) hours from the Incident on May 24, 2021 up to the accident on October 19, 2021.

METEOROLOGICAL INFORMATION

- At Piarco the weather was reported as:
  - Wind at Runway 10: Calm.
  - Clouds: Few at 1800 feet.
  - Visibility: 10+.
  - Outside Air Temperature: 28/24°C.
  - The weather between Camden and Piarco would have been similar.

COMMUNICATIONS

Transcript of audio between 9Y-TJU and Air Traffic Control:

- 09:37:37 9Y-TJU (Student) - Piarco tower, Niner Yankee Juliet Uniform estimating India one zero one four for Piarco for touch and goes.
- 09:37:46 ATC - Niner Juliet Uniform, Piarco Tower, good morning. ATIS India one zero one four, continue joining on a one mile final for runway one zero.
- 09:37:54 9Y-TJU (Student) - India one zero one four, one mile final Niner Juliet Uniform.
- 09:41:15 ATC - Niner Juliet Uniform, wind calm, runway one zero, clear touch and go.
- 09:41:20 9Y-TJU (Student) - Copy wind, clear touch and go, Niner Juliet Uniform.
- 09:44:59 9Y-TJU (Student) - Piarco tower, Niner Yankee Juliet Uniform left downwind.
- 09:45:03 ATC - Niner Juliet Uniform Piarco tower, wind calm, runway one zero, clear touch and go.
- 09:45:08 9Y-TJU (Student) - Clear touch and go runway one zero Niner Yankee Juliet Uniform.
- 09:46:42 9Y-TJU (Instructor) - Ah Piarco tower, Niner Yankee Tango Juliet Uniform mayday, mayday, mayday. Ah, we may not make it to the field so we may put it off to the field just to the north-west of Piarco.
- 09:46:58 ATC - Niner Juliet Uniform, do you require assistance?
- 09:47:01 9Y-TJU (Instructor) - Affirm, affirm
- 09:47:02 ATC - Roger. Is it that your engine…?
- 09:47:34 ATC - Niner Juliet Uniform Piarco tower
- 09:47:51 ATC - Niner Juliet Uniform Piarco tower
- 09:51:21 ATC - Niner Juliet Uniform Piarco tower

AERODROME INFORMATION

- Piarco International Airport is an international airport serving the island of Trinidad.
- The airport has two runways (010 and 028) which are ten thousand five hundred feet (10,500 ft) long and sit at fifty-eight (58) feet above sea level. ***(See Figure4.)***
- Radio Navigational Aids include Piarco VOR/DME and Piarco NDB.
- Visual Aids include Approach Lighting, Runway edge, Runway end, Runway centre line, Runway touchdown zone, Stop bars and taxi holding positions, Precision Approach Path Indicator (PAPI) and Illuminated sign markers.
- The flight originated from AWSL's base at Camden, Couva.
- The runway at Camden is three thousand (3,000) feet long and is similarly oriented to the runway at Piarco International.
- AWSL shares the runway with Briko Air Services Ltd.
- Other nearby aviation entities that may use the runway from time to time are: National Helicopter Services Ltd. (NHSL) and the Aviation Campus of the University of Trinidad and Tobago.

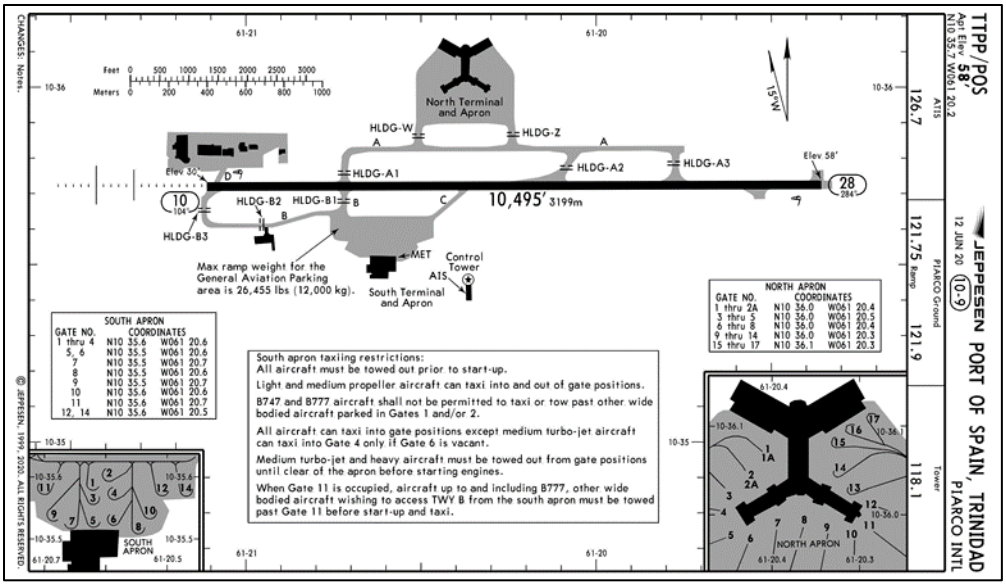

Figure 4: Jeppesen Chart of the Piarco Aerodrome.

Source: Jeppesen, 2020

TESTS AND RESEARCH

- On April 1st 2022, the aircraft engine was shipped to Airmark Overhaul, Inc. in Fort Lauderdale, U.S.A. Airmark's FAA approved Air Agency Certificate number is JL4R288M.
- Airmark Overhaul Inc. has F.A.A. Repair Station approval for Powerplant, Accessory (2-21-80) and Limited Non Destructive Testing (08-11-97).
- The engine teardown report received on May 5, 2022 included Engine Condition Report, Magnetic Particle Inspection, NDT Inspection Record and Crank Shaft Inspection Report.
- Of key interest to the T.T.C.A.A. was the fuel servo mounted on the engine.
- The fuel servo was removed and sent to Precision Airmotive LLC located in Arlington, Washington, U.S.A.
- Precision Airmotive's analysis indicated that the fuel servo passed the flow sheet requirements. However, they confirmed the idle mixture was set high.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

- Aerial World Services Ltd. is an aviation training organisation currently providing flight training for individuals desirous of attaining a TTCAA issued Private Pilot's License and up to a Commercial Pilot's License.
- They had three (3) Diamond Aircraft; Two (2) DA-40 four-seat light twin aircraft (9Y-TJU and 9Y-TJW) and one (1) DA-20 two-seat version (9Y-TJX).
- AWSL was approved by the TTCAA to function as an Approved Training Organisation in December 2012.
- AWSL operates out of its hangar located in Camden, Couva, Trinidad and Tobago. The runway at this location is shared with another flight school, Briko Air Services Ltd.

ANALYSIS

- Both Instructor and Student recalled unsuccessfully attempting to increase the engine power.
- An inspection of the wreckage was carried out and the operation of the throttle cable was confirmed as the mechanism at the engine matched the movements of the throttle lever in the cockpit.
- Another possible cause of an un-responsive engine may have been a malfunctioning throttle servo.
- The aircraft had no indication of power control issues prior to the accident so the crew had no indication of possible problems.
- The instructor handled the emergency as per Aircraft Flight Manual, Emergency Procedures. Some consideration was given to the fact that he did not retract the flaps. Theoretically, retracting the flaps would have decreased the drag allowing the aircraft to glide further and possibly reach the runway. However, as explained by the Instructor, he was concerned about touching down short of the runway and hitting the approach lights.
- The choice of field for the emergency landing was appropriate and landing in the direction of the ploughed furrows was correct.
- The presence of the river was not observed and consequentially, the riverbank was not catered for. Striking the riverbank was the major factor causing the damage to the aircraft and the minor injuries.
- Service Bulletin No. RSB 40-013 dated August 27, 2003 requires the replacement of throttle cables with part number 45.0340/1 for DA-40s with Serial Numbers 40.0006 up to and including 40.079, 40.081, 40.082 and 40.083. Service Bulletin was not applicable to 9Y-TJU.
- Service Information Letter RS-67 describes detailed procedures for inspecting and setting idle speed and mixture settings on engines fitted with RSA Fuel Injection Systems.

CONCLUSION

- The loss of engine control was unexpected.
- When the crew determined that the engine was not responding to throttle inputs there was limited time and altitude to respond to the emergency.
- The Instructor correctly took control of the aircraft.
- Given the crisis, the decision to land the aircraft before the threshold was at the pilot's discretion and cannot be faulted.
- The choice of landing area and the direction of landing was adequate.
- A review of the aircraft's maintenance documents showed all maintenance of the aircraft had been well documented and properly certified.
- The Engineer had over thirty (30) years experience maintaining General Aviation type aircraft.
- Relatively free movement of the throttle mechanism, as seen during the post-accident inspection of the aircraft, implies that the throttle cable was functioning normally.

- Definitive cause of the throttle non-responsiveness remains unknown.
- The Instructor's Commercial Pilot's License (CPL) privileges and his Instructor Rating were initially revoked by the TTCAA. His CPL was reinstated when it was confirmed that the aircraft had a technical problem.
- In an effort to determine what caused the non-responsiveness of the engine to throttle inputs, contact was made with officials of the National Transport Safety Board as well as the Canadian Transportation Safety Board for guidance on a facility to which to send the engine for inspection. These attempts were unsuccessful.

FINDINGS

- The instructor could have done more to conserve altitude by retracting the flaps.
- The instructor did not shut down the aircraft after the accident i.e. battery master, ignition, fuel. This could have led to a fire. This should be instinctive for a pilot.
- The instructor made a steep left turn to land the aircraft. A steep turn could have stalled the aircraft.

PROBABLE CAUSES

- The throttle cable was stuck at the time the Instructor and Student attempted to increase the engine power.
- The adjustment of the engine idle on May 24, 2021 was high. Inconclusively, this may have had some negative impact on the idle performance of the engine.

SAFETY RECOMMENDATIONS

1. Ensure Service Bulletin No. RSB 40-013 is incorporated, as required, on any DA-40 operating in Trinidad and Tobago.
2. Ensure Precision Airmotive Corporation Service Information Letter SIL-RS-67 procedures are applied to aircraft fitted with RSA Fuel Injection Systems.
3. The Instructor must receive refresher training and a re-test before his Instructor Rating can be re-instated.
4. Increased TTCAA surveillance of AWSL's Quality Assurance particularly with respect to Maintenance.