ACCIDENT

Aircraft Type and Registration:	Cessna 150M, N66778	
No & Type of Engines:	1 Continental O-200-A piston engine	
Year of Manufacture:	1974 (Serial no: 15076271)	
Date & Time (UTC):	18 July 2018 at 2017 hrs	
Location:	Terrance B. Lettsome International Airport, Beef Island, Tortola, British Virgin Islands	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	FAA Private Pilot Licence	
Commander's Age:	33	
Commander's Flying Experience:	343 hours (of which 17 were on type) Last 90 days - 19 hours Last 28 days - 17 hours	
Information Source:	AAIB Field Investigation	

Synopsis

N66778 was taking off from Beef Island, in the British Virgin Islands (BVI), on the sixth sector of a delivery trip from Florida to Argentina. After takeoff the aircraft was seen to fly along the length of the runway at slow speed in a nose-high attitude. It then turned left before entering a steep nose dive and hitting the sea.

The investigation concluded that the aircraft stalled during the left turn. No evidence of any mechanical failure was found.

The aircraft was likely to have been operating slightly above the Maximum Takeoff Weight and with the centre of gravity aft of the approved limit. Several items were not secured in the cabin which could have shifted aft during the takeoff roll moving the centre of gravity further aft. It is possible that this aft centre of gravity caused control difficulties resulting in the stall. Improvements in emergency communications on BVI have been made following the accident.

History of the flight

N66778 had recently been sold to a new owner in Argentina, having previously been based in Florida. The accident occurred whilst the aircraft was being delivered from Miami, Florida to Argentina. It was being delivered together with two Piper PA-38 Tomahawk aircraft. One of the pilots had previously made a similar delivery flight.

The three aircraft left Miami Opa Locka International Airport on 17 July 2018 and flew to Exuma International Airport in the Bahamas, then to Providenciales on the Turks and Caicos Island and finally to Puerto Plata in the Dominican Republic, where the three pilots spent the night. On 18 July 2018, the aircraft flew from Puerto Plata to Punta Cana, and then to Beef Island in the BVI (Figure 1).

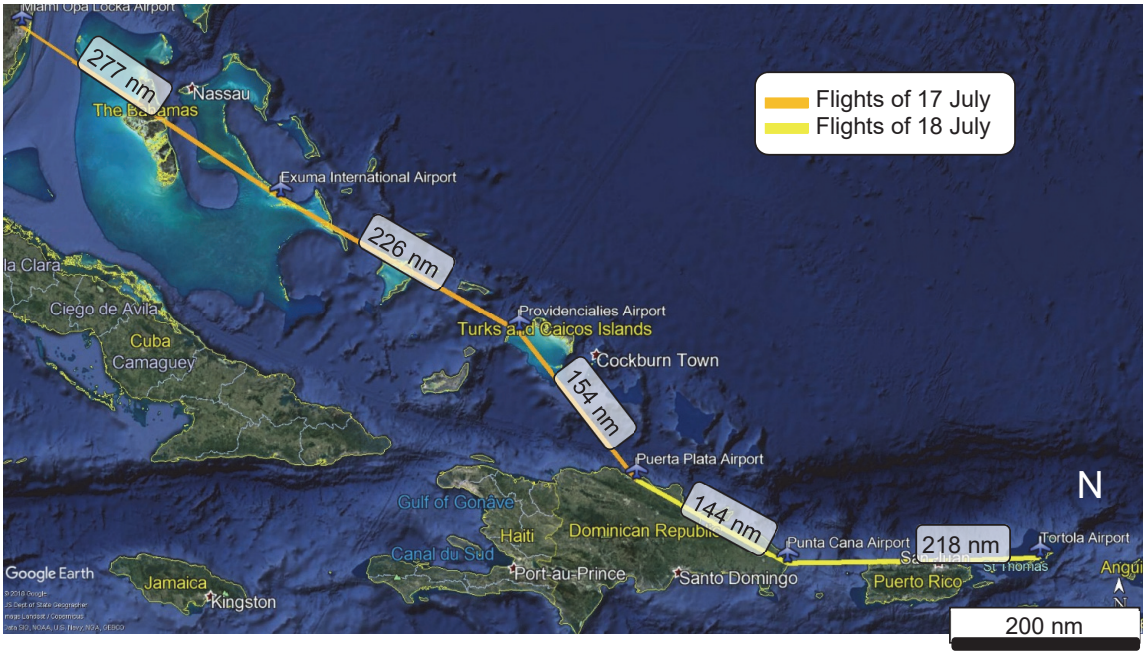

Figure 1

N66778 flights on 17 and 18 July 2018

The final sector of the day was planned from Beef Island to Pointe-à-Pitre in Guadeloupe. The accident occurred on takeoff from Beef Island. The same pilot flew N66778 solo on each sector from Miami; the aircraft and an auxiliary fuel tank, which had been fitted for the ferry flights, were fully refuelled prior to each flight.

The pilots of the other two aircraft reported that the five sectors to Beef Island were uneventful, except they recalled N66778 was high on approach to Puerto Plata and that there was some confusion regarding the aircraft's altitude.

ATC reported that the landing in Beef Island appeared to be normal and the aircraft vacated at Taxiway D (Figure 2). After refuelling in Beef Island, the pilot of N66778 called for taxi at 2010 hrs (1610 hrs local) then taxied to holding point D, entered and backtracked Runway 07. The ATC controller reported that radio transmissions from N66778 were almost unreadable and several instructions were repeated.

The pilot of N66778 started his takeoff roll from the start of Runway 07. The pilot of another aircraft, who was holding on Taxiway C, reported seeing N66778's rear fuselage touch the runway as the aircraft rotated. He described seeing the aircraft then climb with slight oscillations in pitch. He reported that the aircraft was at approximately 50 ft when it passed Taxiway C and the flaps were up[1] (Figure 2).

Figure 2

Terrance B. Lettsome International Airport (Beef Island) showing the accident location

Other witnesses, including other pilots, saw the aircraft initially climb to approximately 100 to 200 ft. They then describe the aircraft flying along the remaining length of the runway at slow speed, in almost level flight and in a nose-high attitude. When the aircraft reached the far end of the runway it was seen to turn left. As the aircraft turned through approximately 90º the nose was seen to pitch up before the left wing dropped and the aircraft entered a steep dive. The aircraft was seen to hit the water in a steep nose-down attitude. The accident occurred at 2017 hrs.

Witnesses near the accident site reported they could hear the engine running throughout the flight and that it sounded "normal".

Two divers, who were in a small boat moored nearby, were the first to reach the accident site. However, realising they would need dive equipment to reach the pilot, returned to their

Footnote

[1] Flaps up takeoff is an approved takeoff technique in the Pilot's Operating Handbook.

main boat to collect equipment. By the time they returned to the accident site the Airport Fire Service had launched their boat and were on scene. The diver was able to reach the pilot and brought him to the surface but attempts to resuscitate him were unsuccessful. The diver confirmed the pilot was wearing a lap strap but no shoulder restraint.

The duty ATC officer attempted to request the services of the police, ambulance and VISAR[2] by calling 911. This was in accordance with the airport emergency plan. When contacted, the 911 operator is required to contact VISAR who will launch boats to attend any accident on water. However, they were initially unable to contact 911. VISAR were made aware of the accident via the US Coast guard who heard about the accident on the marine distress radio channel. VISAR launched two boats at 2032 hrs and 2043 hrs respectively which attended the scene. The BVIAA[3] also contacted their dive contractor who attended the scene to confirm there were no other occupants and to recover the wreckage.

Accident site

The aircraft had come to rest in approximately 5 m of water, 250 m north of the Runway 25 threshold (Figure 2). The wreckage was recovered to shore by local salvage personnel on the day of the accident; this was overseen by representatives of the BVIAA. It was raised to the surface using floatation bags before being pulled to the shore and loaded onto a truck by crane. The wreckage was moved to a secure location within the airport grounds where detailed examination of the wreckage could be carried out.

Recorded information

The pilot used a flight planning and navigation App on his mobile phone and tablet computer. This App normally records aircraft position, altitude and time, which can be uploaded to a cloud account once the flight has been completed. Both the phone and tablet computer were recovered from the wreckage, but due to the impact damage and exposure to the sea water no information could be recovered.

The flights that had been uploaded to the cloud on 17 and 18 July were recovered from the pilot's cloud account. Complete flight path data from the first four flights of the trip was available. Takeoff data from each of these was reviewed with nothing abnormal noted.

Only the last 42 minutes of the inbound flight to the BVI was available from the cloud account so the takeoff for this flight could not be examined. No recorded data was available for the accident flight from the cloud account.

No recorded radar data was available due to limitations of the low-level coverage. Recorded radio transmissions were provided which have been used to help recreate the history of flight.

Footnote

[2] Virgin Island Search and Rescue – a volunteer search and rescue service.
[3] British Virgin Island Airport Authority.

Aircraft information

The Cessna 150M is a two-seat, high wing monoplane with conventional controls. The passenger compartment has room for two occupants seated side by side with an area behind the seats for storage. It is powered by a naturally aspirated, air cooled, horizontally opposed four-cylinder engine driving a two-bladed, fixed pitch propeller. Fuel is gravity fed to the engine from two 13 USG integral wing tanks. The wing tank vents and outlets are linked and therefore fuel is drawn from both tanks simultaneously, allowing the tanks to maintain equal levels.

N66778 (pictured in Figure 3) held a valid Export Certificate of Airworthiness (ECofA) issued by the FAA on 13 February 2018. When the ECofA was issued, the aircraft had accumulated 2,556.1 flying hours, as had both the engine and propeller. The aircraft and engine log books were not recovered during the investigation, so an accurate indication of the aircraft accumulated hours at the time of the accident could not be determined. The ECofA referred to three major repairs and alterations, these were for the installation of wingtip fairings, a voltage controller and tinted sun visors. There were no records made available to the investigation indicating the approval of fitment of any other repairs, alterations or additions.

Figure 3

N66778 prior to the accident (image used with permission)

Aircraft examination

The aircraft had been recovered to an area of grass within the airport grounds (Figure 4). The rear fuselage structure had separated from the front fuselage aft of the seats and was only connected by control cables. Significant leading edge crumpling on the right wing

was consistent with the aircraft striking the water at a near vertical attitude, right wing first. Hydrostatic forces were sufficient to rupture the lower surface of the right wing as it struck the water.

Figure 4

N66778 after recovery

The primary control surfaces and control runs were all examined and confirmed to have been intact prior to the accident. The elevator trim control was intact; but it was not possible to determine the trim position due to disruption in the cockpit. The elevator trim tab was neutrally positioned suggesting the trim position was not excessive.

The right-wing flap was up and left-wing flap was down. The synchronisation cable connecting the left and right flaps had snapped at the left-wing root. Examination of this cable indicated that it had failed in overload and was consistent with the impact. The right flap was fixed and remained connected to the flap actuator which was in the retracted position. The flap position was therefore determined to have been UP at the time of the accident.

The cabin area was severely disrupted, however the instrument panel remained largely intact. The engine controls were found as follows: mixture RICH, carb heat COLD, throttle at idle, the key was in and selected to BOTH magnetos. Due to the disruption and possibility of movement during wreckage recovery, it was not possible to determine if these were the control positions at the time of impact.

Auxiliary fuel tank

An auxiliary fuel tank was recovered with the wreckage (Figure 5). It was of rubberised fabric construction and was fitted with an electric pump to allow transfer of its contents to the aircraft's integral fuel tanks during flight.

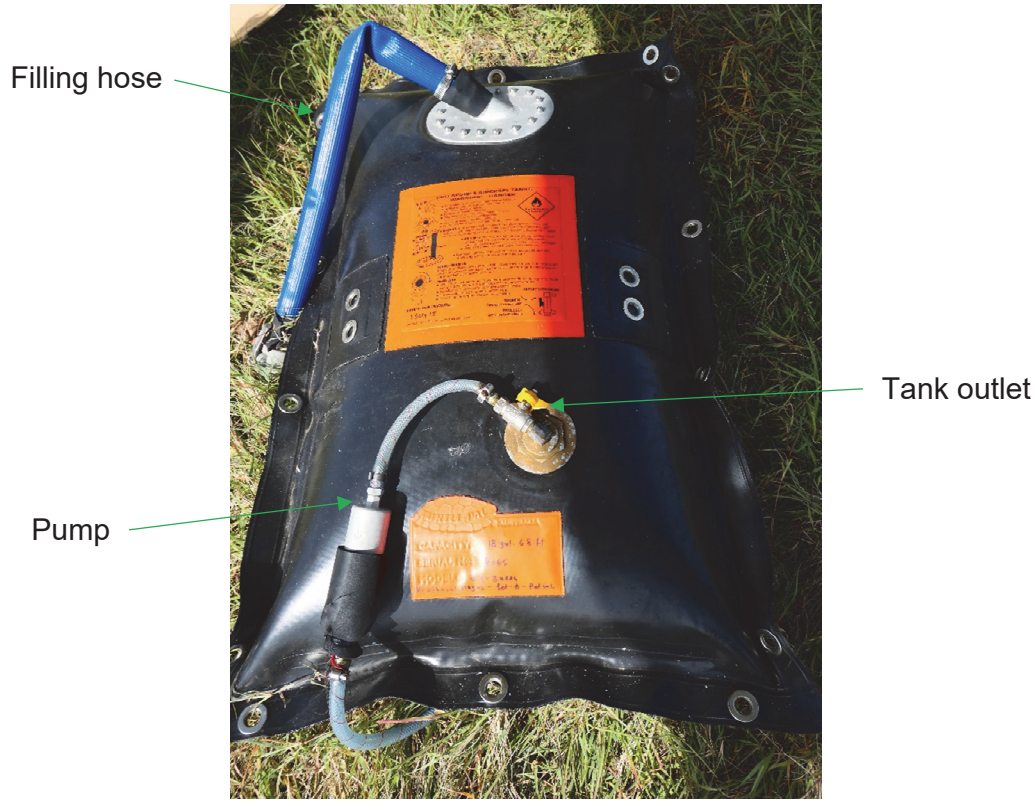

Figure 5
Auxiliary fuel tank

The pump outlet was connected to an inline filter which in turn was connected to tubing that ran under the left door sill, up the left door forward pillar, through the left cockpit air vent and out of the air scoop on the leading edge of the left wing. The tube then ran from the leading edge to an elbow union connected to a modified over wing fuel tank cap (Figure 6). The tubing was still in position, however during the accident the auxiliary tank became dislodged from its original location, becoming disconnected at the fuel filter outlet.

The electrically powered transfer pump was connected to the aircraft's electrical system using automotive type crimp connectors. A control box with a toggle switch, which activated the pump, was found within the cockpit. A length of Velcro-like loop tape was fixed to the underside of the control box with a similar sized piece of hook tape located on the centre of the left control yoke. It is possible that the control box was fixed to the left control yoke, however this cannot be confirmed. The control box was connected to the aircraft with a wire which passed underneath the instrument panel and connected to the aircraft 12 V supply. A wire then led from the control box to the transfer pump.

Figure 6

Routing of auxiliary fuel tank tubing over leading edge of the left wing into the left fuel tank

The weight of the tank when filled with fuel to its rated capacity of 68 litres (18 USG) should be 124.6 lbs; however, the tank on N66778 was found to weigh 137.6 lbs. This equated to containing approximately 76 litres (20 USG) of fuel. The auxiliary tank manufacturer advised that although the tank can be filled to 80 litres it is only rated to 68 litres to allow for expansion and shock loading in the event of an accident. The guidance leaflet provided with the auxiliary tank states *'Only fill to the lesser rated capacity and the maximum allowed by weight & balance data or specific operational approval'.* The outlet valve was found to be open, so the possibility of water entering the tank or fuel leaking from the tank whilst it was submerged was considered. When the tank was recovered, no fuel leaked from the tank and it was concluded that it was unlikely that the contents of the tank had changed since the accident.

The pilots of the other aircraft flying with N66778 identified that the tank had been positioned in the storage location to the rear of the pilot's seat and was orientated so its long edge was along the length of the compartment. Examination of the cabin area did not identify any evidence of the tank being secured into the aircraft. A tank carry bag[4] was located within the aircraft. It was found to contain webbing ties supplied with the tank to secure it to the aircraft; however, their condition suggested they had never been used. The floor of the luggage compartment was carpeted. This would not have provided any significant friction to restrain the tank during aircraft manoeuvring.

Footnote

[4] The bag in which an empty auxiliary tank could be rolled and stored.

For FAA registered aircraft alterations such as the installation of an auxiliary tank should have been approved via an FAA Form 337. A Form 337 associated with this alteration was not received by the FAA.

Propeller and engine

The propeller was intact, with one of the blades exhibiting a slight rearward bend. The engine was also intact, with no evidence of casing rupture. The cylinders, when inspected through the spark plug ports, showed signs of salt water ingestion consistent with the engine operating at the time of impact with water.

The engine was removed from the aircraft and returned to the AAIB's facilities in the UK for a full strip examination with an engineer from the engine manufacturer present. Other than a seized exhaust valve on the No 4 cylinder, which was determined to have corroded in this position due to salt water immersion, there were no issues identified that could have affected the engine power

Fuel

The aircraft had been fully fuelled from the airport fuel supply prior to the accident flight. Witnesses described that a fuel additive, Marvel Mystery Oil, had been added to the fuel at this time. Samples of the fluid within the aircraft main tanks were taken; however, as the tanks had been immersed in salt water it was not viable to determine the quality of the fuel being delivered to the engine. The engine manufacturer's Standard Practices Maintenance Manual states that:

> *'With the exception of the use of isopropyl alcohol or diethylene glycol monomethyl ether (DiEGME) compound, we do not recommend the use of additives or concentrates in any of our aircraft engines.'*

Other aircraft had refuelled from the same source on the day of the accident with no reported issues with the fuel quality.

Pathology

The post-mortem report stated the cause of death was *'multiple blunt trauma to* [the] *body as a result of* [an] *airplane crash'*. A contributory cause was *'cerebral haemorrhage'*.

Survivability

The aircraft struck the water in a near vertical attitude. The pilot was not wearing his shoulder harness and suffered a major head injury in the impact. It could not be determined if the pilot would have survived the impact if he had been wearing his shoulder harness.

Weight and balance

The aircraft weight and balance schedule, issued in 2003, was recovered from the aircraft. The aircraft was fully refuelled prior to the flight. The wing fuel tanks contain 22.5 USG of usable fuel. The auxiliary fuel tank, located in the aft cabin, weighed 137.6 lbs.

The aircraft also contained a suitcase, life raft, emergency marine kit, machete, five one-quart engine oil bottles and the pilot's personal effects. Witnesses report the aircraft also contained a crate of water bottles, a box of food and a bottle of fuel additive, although none of these were recovered. None of these items were secured. Witnesses report that, on previous flights, the suitcase had been on the passenger seat and that the water, food, oil and fuel were behind the seats, however, it could not be confirmed where they were located during the accident flight. The life raft was found in the right footwell.

A weight and balance calculation was made during the investigation (Table 1). It has been assumed that each item was located in the most forward plausible location based on the witness reports from previous flights. However, it is possible that these items where located further aft or had moved during the flight.

ITEM	WEIGHT (lbs)	ARM (inches)	MOMENT/1,000 (lbs/inch)
Empty Weight	1,100.4		37.83
Engine Oil	11.0		-0.10
Wing Fuel Tanks	137.0		5.70
Pilot	199.0	39	7.76
Auxiliary Fuel Tank (behind seat)	137.6	71.9	9.89
Suitcase (on front seat)	28.6	39 *	1.12
5x Oil Cans	15.0	84 *	1.26
Life Raft	20.3	25 *	0.51
Water	6.2	64 *	0.40
Personnel Effects plus emergency marine kits, machete & documents	10.0	39 *	0.39
TOTAL	**1,665.1**	**38.89**	**64.75**

Table 1

N66778 Weight and Balance Calculation
('*' location not certain, most forward plausible location assumed)

The Maximum Takeoff Weight for the Cessna 150M is 1,600 lbs. The calculation for N66778 was 4% above the maximum weight. The centre of gravity limits at Maximum Takeoff Weight for the Cessna 150M are 32.8 to 37.5 inches. The calculation for the centre of gravity position for N66778 was at least 1.39 inches beyond the aft limit. If some items had been loaded further aft or if items moved during the takeoff the centre of gravity could have been even further aft.

The baggage area behind the pilot's seat is divided into two areas for weight and balance calculations. The maximum load for the front area is 120 lbs, the maximum load for the aft area is 40 lbs, but the maximum total load for the whole baggage area is 120 lbs (Figure 7). Based on the witness reports that the auxiliary fuel tank, oil cans and the crate of water were stored behind the pilot's seat, N66778 had at least 158.8 lbs of weight in the baggage area.

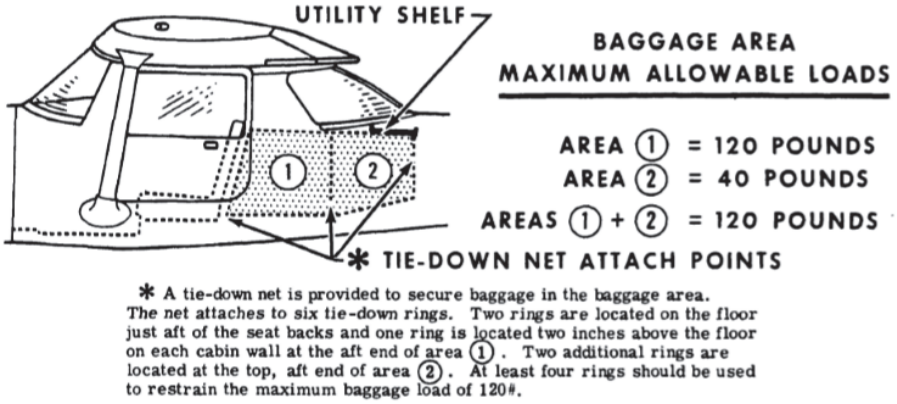

Figure 7

Baggage Loading Restriction

It is not possible to establish if the pilot completed a weight and balance calculation prior to the accident flight or any of the previous flights from Miami. Witnesses reported that the aircraft had carried the same items since it left Miami.

Meteorology

The METAR at Terrance B. Lettsome International Airport issued by air traffic control 17 minutes before the accident recorded surface wind from 100° at 10 kt, visibility 10 statute miles, cloud scattered at 1,900 ft, temperature 32°C, dew point 24°C and sea level pressure of 30.02 inches. There had been no significant change in the weather since the aircraft landed at Beef Island.

The tower controller reported the surface wind as 100° at 9 kt when clearing N66778 for takeoff.

Witnesses report the weather conditions as a "normal Caribbean day, lights winds with a few gusts".

Airfield information

Terrance B. Lettsome International Airport is located on Beef Island at the eastern end of Tortola in the BVI. The airport has a single 30 m (100 ft) wide asphalt Runway orientated 07/25. Runway 07 has a takeoff distance available of 1,506 m (4,940 ft). There are hills around the runway, with the highest peak within 10 nm at 1,263 ft.

The distance from the start of Runway 07 to Taxiway C, where the aircraft was observed to pass 50 ft, is approximately 2,200 ft.

All VFR aircraft departing Runway 07 are required not to commence any turn until reaching or passing 1,000 ft agl. Circuits are conducted to the south of the airfield.

The airport has a Category 5[5] Rescue and Fire Fighting Service. The Airport Fire Service has a rescue boat which is stored on a trailer at the airport fire station. The boat can be launched from jetties at either end of the runway in the event of an emergency. In the event of an emergency on water the airport emergency plan requires the duty air traffic control officer to contact 911 and request the operator to contact VISAR. VISAR have rescue boats located at Tortola and Virgin Gorda which are able to respond in the event of an emergency on the water.

Pilot information

The pilot held a valid FAA Private Pilot's Licence with an 'Airplane Single Engine Land' rating and an 'Instrument Rating'. His last bi-annual flight review was completed on 10 August 2016. He passed his Instrument Rating skills test on 28 March 2018.

The pilot's logbook records that he had completed 329.9 flying hours prior to starting this trip. Prior to July 2018 all his flying experience was on Cessna 172 aircraft. Before commencing the delivery trip, the pilot flew N66778 on three occasions totalling 4.4 hours. The pilot's next of kin reported that he was building flying hours with a view to obtaining his Commercial Pilot's Licence.

The two pilots flying the other delivery aircraft reported concerns regarding the accident pilot's approach into Puerto Plata. They reported that he was high on approach and incorrectly reported his altitude to ATC. They also reported that he was having problems with his radio. ATC in Beef Island reported problems communicating with the pilot of N66778. It is not known if the reports concerning the approach to Puerto Plata were caused by the radio problems.

The pilot had flown for 9.6 hours on 17 July and had already flown for 3.5 hours on 18 July prior to the accident flight. Long distance flying in small aircraft without an autopilot can be tiring, particularly if the pilot is not experienced at long range flying. Before the start of this trip the longest flying day the pilot had completed was 4.8 hours. It is possible that the pilot was suffering from fatigue[6], although there is no evidence to confirm this hypothesis.

Medical

The pilot held a valid FAA Class 3 medical which was issued on 17 January 2018[7]. His next of kin reported that the pilot was in good health prior to the trip.

Footnote

5 ICAO Annex 14 defines the RFF category based on the largest aircraft that operates into the airport. Category 5 is for aircraft with an overall length 24 m - 28 m.

6 Federal Aviation Administration – '*Fatigue in Aviation*', available https://www.faa.gov/pilots/safety/pilotsafetybrochures/media/Fatigue_Aviation.pdf (accessed 5 December 2018)

7 FAA Class 3 Medical is valid for 60 months from the date of issue.

Other information

Stall Speed

The Cessna 150M owner's manual quotes the aircraft stall speed with flap UP and power off to be 55 mph (48 kt). N66778 was operating above the maximum weight which would increase the stall speed, but the aft centre of gravity would reduce the stall speed. It is not possible to quantify if the combined effect would be an increase or decrease in the stall speed.

N66778 had a fuel pipe positioned over the leading edge of the left wing. This pipe would disturb the airflow over the left wing and could affect the stall speed of the aircraft. If the aircraft stalled in balanced flight it is possible that this modification would cause the left wing to stall first resulting in a wing drop to the left.

When the aircraft is being flown at a slow speed, below the minimum drag speed, the total drag increases as the speed decreases. The slower the aircraft flies the more power is required to maintain speed in level flight. In this regime, the aircraft is speed unstable because a decrease in speed will cause a further decrease in speed without pilot intervention.

Aircraft Handling with Aft Centre of Gravity

N66778 was likely to have been operating with the centre of gravity aft of the aircraft's approved limit. The aircraft manufacturer does not have any test data to confirm how the aircraft would behave in this condition. However, as the centre of gravity moves aft the aircraft would be less stable in pitch and the control forces would become lighter. As the centre of gravity moves further aft the aircraft's response to small control movements would become larger and the aircraft would become difficult to fly. If the centre of gravity is moved sufficiently aft the aircraft would become unstable in pitch.

Analysis

Airframe and engine

Examination of the aircraft and engine did not identify any pre-existing issues which could have caused the accident, in particular there was no evidence of any mechanical issue with the flight controls. The auxiliary fuel tank which had been fitted to extend the range of the aircraft for the delivery flight, had not been installed in accordance with approved FAA standards. There were no measures to secure the tank within the airframe and there was no evidence that procedures to maintain aircraft weight and balance within limits were in place.

Fuel additive

Reports were received that a fuel additive was added to the fuel when the aircraft was refuelled, however, an analysis of the fuel being provided to the engine could not be carried out. Although the engine manufacturer's advice is not to use fuel additives, the aircraft had been flown on five previous legs without any reported issues with the additive used for all of these flights. This suggests that the use of a fuel additive did not cause a loss in engine power on the accident flight.

Accident flight

The witnesses' descriptions of the accident are consistent with the aircraft experiencing an aerodynamic stall whilst attempting to turn left at the north-eastern end of the runway. Prior to the stall the aircraft was observed flying along the remaining length of the runway, maintaining low speed and a nose-high attitude, before commencing the left turn.

The pilot had recorded over 300 flying hours mostly on Cessna aircraft and had passed his Instrument Rating in March 2018. It is unlikely that a pilot with this experience would intentionally fly the aircraft at a low speed, with a nose-up attitude near to the ground. Under normal conditions a pilot would be able to lower the pitch attitude and accelerate, however, this did not occur. This suggests that the pilot was having difficulty controlling the aircraft.

It was not possible to precisely calculate the weight and centre of gravity for the aircraft however it was very likely to have been operating above the Maximum Takeoff Weight and with the centre of gravity beyond the aft limit. It is possible that this caused the control difficulty. One of the other pilots, who was waiting at holding point C, described seeing the aircraft strike its rear fuselage on the runway as the aircraft became airborne and then climb with slight pitch oscillations. It is possible that when the pilot rotated for takeoff, the lighter control forces due to the aft centre of gravity position, caused the aircraft to over-rotate resulting in the tail striking the runway. The aircraft's nose-high attitude and slight pitch oscillations could have been caused by reduced pitch stability.

The witnesses then describe the aircraft in almost level flight and with a nose-high attitude. A possible explanation is that the aircraft pitch stability had reduced significantly making it difficult to control. However, this would require the centre of gravity to be significantly aft.

Witnesses report that the aircraft was carrying the same items as the previous sectors. However, it is possible that the aircraft was loaded differently on the accident flight moving the centre of gravity further aft than the previous sectors. Many of the items in the cabin were not secured, so it is also possible that some may have moved during the takeoff which could have shifted the centre of gravity further aft. The observed tail scrape also could have triggered items to move aft in the cabin.

The aircraft was observed to turn to the left at the north-eastern end of the runway. The pilot's intended route was slightly right of the takeoff track. The most likely explanation for the left turn is that the pilot was attempting to return to the airport. Normal circuit direction at the airport is to the right, however, it is possible the pilot was not aware of this or he considered a left turn to be a safer option.

When the aircraft commenced a turn, in level flight, the stall speed would have increased. The fuel pipe running over the leading edge of the left wing might also have increased the stall speed. The aircraft was also seen to 'pitch up' during the turn which would cause the airspeed to decrease. The aircraft's speed instability at these low speeds would cause the speed to further reduce. These effects are likely to have combined to cause the stall during the turn.

It is likely that centre of gravity position was a factor in this accident; CAA Safety Sense Leaflet 9 – '*Weight and Balance*'[8] highlights the importance of accurate weight and balance calculations.

Decision to fly

The pilot had agreed to undertake a delivery flight from Miami to Argentina with two other pilots, one of whom had flown a similar route before. Decisions made prior to the flight from Miami were therefore likely to affect the subsequent flights. No evidence was found of a weight and balance calculation completed by the pilot. All the pilot's previous flying experience was on the Cessna 172 aircraft which has a higher Maximum Takeoff Weight and a wider centre of gravity range. It is possible that the pilot was not aware of the more restrictive limitations of the Cessna 150.

The aircraft contained an auxiliary fuel tank which had not been installed to any approved FAA standards for repairs or modifications. This installation included a tube that ran over the wing leading edge to the fuel filler cap; the pilot's pre-flight checks could have been an opportunity to question the installation.

The pilot had been having difficulty with the radio on the previous sector and his radio transmissions were almost unreadable on the accident flight prior to takeoff. However, the pilot did not appear to take any action to resolve the radio problems before continuing with the flight.

There are several possible reasons why the pilot decided to continue with the flight despite these issues. The pilot was building his flying hours with a view to obtaining his Commercial Pilot's Licence. This delivery trip was an opportunity to obtain additional flying hours with limited cost. It is likely this was a strong influence when deciding to undertake the flights. The pilot was also flying the route with two other pilots who were flying other aircraft, one of those pilots had flown this route previously. When operating in groups people may be more likely to accept risks, and it is possible that this affected the pilot's decision to fly the aircraft.

The pilot had completed over 13 hours of flying in the two days prior to the accident. It is possible that the pilot was suffering from fatigue and this may have reduced his ability to manage the flight, particularly if the aircraft handle characteristics were not as expected.

CAA Safety Sense Leaflet 23 – '*Pilots – It's your decision!*'[9] discusses these and other issues that can affect a pilot's decision to fly.

Survivability

The pilot was not wearing his shoulder harness. It could not be determined if the pilot would have survived the accident if he had been wearing his full harness.

Footnote

[8] http://publicapps.caa.co.uk/docs/33/20130121SSL09.pdf (accessed 25 March 2019).
[9] http://publicapps.caa.co.uk/docs/33/20130121SSL23.pdf (accessed 25 March 2019).

The airport rescue boat arrived at the accident site within a few minutes of the accident. With the assistance of divers who were nearby, they were able to recover the pilot from the aircraft. There was initially some difficulty alerting VISAR although they were notified by the US coastguard.

Conclusion

The aircraft stalled, during a left turn, shortly after taking off from Runway 07. No evidence was found of any pre-existing defect with the aircraft or engine which would explain the accident.

The aircraft was likely to have been operating slightly above the Maximum Takeoff Weight and with the centre of gravity aft of the approved limit. Several items were not secured in the cabin which could have shifted aft during the takeoff roll moving the centre of gravity even further aft. It is possible that this aft centre of gravity caused control difficulties resulting in the stall.

The accident highlights the importance of the pilot in command of any aircraft ensuring their aircraft operates within weight and balance limits and that all items in the aircraft are secured.

The pilot had completed over 13 hours of flying in the two days prior to the accident and it is possible that fatigue was a contributing factor in this accident.

Safety action

As a result of this accident the BVIAA has taken action to ensure that VISAR can now be contacted directly by ATC if they cannot be alerted via the 911 operator.

Published 20 June 2019.