

ACCIDENT

Aircraft Type and Registration:	Pilatus Britten-Norman BN2B-21 Islander, G-CIAS	
No & Type of Engines:	2 Lycoming IO-540-K1B5 piston engines	
Year of Manufacture:	1982 (Serial no: 2162)	
Date & Time (UTC):	3 November 2013 at 1908 hrs	
Location:	Near Devil's Hole, approximately 2.5 nm north of Jersey Airport, Channel Islands	
Type of Flight:	Private (charitable search and rescue)	
Persons on Board:	Crew - 1	Passengers - 4 ¹
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Significant damage to wing, left main landing gear and forward fuselage; aircraft damaged beyond economic repair	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	65 years	
Commander's Flying Experience:	25,200 hours (of which 60 were on type) Last 90 days - 101 hours Last 28 days - 2 hours	
Information Source:	AAIB Field Investigation	

Synopsis

During a search and rescue flight at night in very poor weather conditions, one engine ceased producing power. During the subsequent diversion towards Jersey Airport the other engine also stopped. Despite the dark night and turbulent weather conditions, the pilot was able to reach the Jersey coast and make a forced landing, in which the aircraft suffered significant airframe damage.

The aircraft had operated a previous flight with the fuel system configured so that tip tank fuel was being supplied to the engines. The aircraft departed on the accident flight in the same configuration, and the engines stopped when the tip tank fuel became exhausted.

Background – the operator

G-CIAS was operated in a search-and-rescue operations (SAROPs) role by a voluntary organisation based in the Channel Islands and run by a Board of Trustees and an executive, with funding from private donations and the Channel Islands' governments. As such, the aircraft's flights were categorised as private.

Footnote

¹ Although the occupants of the aircraft, other than the pilot, were passengers under the relevant regulations, they were on board to assist in search and rescue operations; elsewhere in this report they are referred to as 'crew' or 'crew-members'.

The aircraft was routinely flown with a crew consisting of a pilot, in the front left-hand seat, an observer in the front right-hand seat, a search director seated at a workstation behind the pilot/front observer, and two further observers seated behind the search director's workstation.

History of the flight

At approximately 1830 hrs on 3 November 2013 the operator's duty pilot received a request that the aircraft should be despatched to carry out a search. The volunteer crew-members were alerted and made their way to the airport.

Weather conditions in the Channel Islands were poor, with a southerly wind gusting up to 41 kt, turbulence, rain, cloud below 1,000 ft aal, and visibility of 3 to 6 km².

On arrival at the aircraft's hangar, the crew was established, consisting of a pilot, search director, and three observers. They donned immersion suits and life jackets and prepared for flight. The search director obtained details of the search request, which was to search for two fishermen near Les Écréhous (a group of rocks in the English Channel approximately 5 nm north-east of the north-eastern corner of Jersey). Some evidence suggested the men were in a small dinghy; other information was that they were in the water. The men were reported to be alive and communicating by mobile telephone.

One crew-member carried out pre-flight preparations, although he did not check the fuel quantities or carry out a water drain check. When interviewed, he recalled having reported to the pilot that he had not checked the fuel.

The aircraft was then pulled out of its hangar and the search director explained the details of the search request to the pilot and other crew-members. Bearing in mind the weather, the fact that it was dark, and the fishermen's predicament, the pilot recognised the need for "a lot of urgency" about the task. In the context of the operation, he regarded the task as being routine, but the weather not so.

The pilot "walked round" the aircraft, though he did not carry out a formal pre-flight inspection; it was the organisation's custom to ensure that the aircraft was ready for flight at all times. The technical log showed that the aircraft was serviceable, with no deferred defects, and that the wing tanks contained 55 USG each side and the tip tanks, 18 USG each side. The search director recalled asking the pilot whether he was content to fly in the prevailing conditions, and that the pilot stated that he was willing to fly. The crew boarded the aircraft. The observer in the front right-hand seat had recently obtained a Private Pilot's Licence and this influenced the decision for him to be placed next to the pilot.

The pilot reported that he carried out a "fairly rapid" start, although the normal pre-departure sequence was interrupted while a problem with switch selections, affecting the functioning of the search equipment in the aircraft's cabin, was resolved. The pilot obtained clearance

Footnote

² Guernsey: 1900Z 18031G41KT 6000 RA FEW009 SCT014 BKN025 11/11 Q0993=;
Jersey: 1850Z 17028KT 5000 RA SCT008 BKN010 10/09 Q0996 TEMPO 3000 +RA BKN005=

from ATC to taxi, enter the runway, and take off when ready. He described that he carried out engine power checks during a brief back-track, checking the magnetos and propeller controls at 2,100 rpm, before carrying out pre-takeoff checks. He did not refer to the written checklists³ provided in the aircraft but executed a generic set of checks from memory.

Following an unremarkable takeoff, in the strong crosswind⁴, the pilot corrected for drift and established a climb towards a cruising altitude of 900 ft. When interviewed, he described the conditions as being “awful” and “ghastly”, with turbulence from the cliffs contributing to occasional activation of the stall warner, even though the speed was “probably 100 plus knots”⁵. At 900 ft, the aircraft was “in the bottom” of the cloud, which was unhelpful for the observers, so the pilot descended the aircraft to cruise at 500 or 600 ft, flying by reference to the artificial horizon, and making constant control inputs to maintain straight and level flight. He stated that, although he would normally have begun checking fuel flow, mixture settings, etc, shortly after establishing in the cruise, he found that the conditions required him to devote his full attention to flying the aircraft.

As the aircraft passed north abeam the western end of Jersey, the rain and low cloud continued and the turbulence worsened. The pilot gained sight of red obstacle lights on a television mast on the north side of the island but had few other visual references.

The pilot noticed a change in an engine note. He immediately “reached down to put the hot air on” which made little difference; the observer recalled that the pilot checked that the mixtures were fully rich at this time. The right-hand engine rpm then began surging. The pilot made a quick check of the engine instruments, before applying full throttle on both engines, setting both propellers to maximum rpm and beginning a climb. The observer noticed that the fuel pressure gauge for the right-hand engine was “going up and down” but did not mention this to the pilot; the pilot did not see the gauge indication fluctuating.

Around this time the pilot switched the electric fuel pumps on.

The pilot turned the aircraft towards Jersey and made a MAYDAY call to ATC; the search director made a similar call on the appropriate maritime frequency. These calls were acknowledged, and a life boat, on its way to Les Écréhous, altered course towards the aircraft’s position. Although the pilot was “amazed” at how few lights he could see on the ground, he perceived what he thought was the runway at Jersey Airport, and flew towards it. The aircraft reached approximately 1,100 ft amsl.

The right-hand engine then stopped. The pilot carried out the shut-down checks, feathering the propeller as he did so. The aircraft carried on tracking towards Jersey Airport, descending towards the north side of the island.

Footnote

³ See section ‘Checklists and pre-take-off checks’.

⁴ The wind reported by ATC for the takeoff was 180/28 kt; the maximum demonstrated crosswind for the Islander is 30 kt.

⁵ The stall speed published in the flight manual for the aircraft at the operating weight and with flaps UP is 50 KIAS.

Some moments later, the left-hand engine's rpm began to fluctuate briefly before it also stopped. The pilot later recalled being "fairly certain" that he "was trying to change tanks" but acknowledged that he could not recall events with certainty. He trimmed the aircraft for a glide, still heading towards the airport at Jersey, but with very limited visual references outside the cockpit. The crew-members prepared the cabin for a ditching or off-airport landing; the observers in the rear-most seats considered how they might deploy the aircraft's life raft (stored behind their seats) should a ditching occur.

The pilot's next recollection was that the automated decision height voice call-out activated (he had selected it to announce at 200 ft radio height). He switched the landing lights on and maintained a "reasonable speed" in anticipation of landing or ditching. One crew-member recalled the pilot calling "brace, brace, brace", while another recalled being instructed to tighten seat belts and brace. No brace position had been set out in the operations manual, or rehearsed in training, and the responses of the crew-members to this instruction varied.

The pilot glimpsed something green in front of the aircraft, and flared for landing. The aircraft touched down and decelerated, sliding downhill and passing through a hedge. With the aircraft now sliding somewhat sideways, it came to a halt when its nose lodged against a tree, with significant airframe damage.

The pilot made various cockpit selections safe and all the occupants vacated the aircraft, with some difficulty. The search director became entangled in his headset lead as he egressed but freed himself. The front seat occupants experienced difficulty because their door could not be opened. They climbed over the search director's desk and vacated the aircraft via the door adjacent to the search director's position (the rear-row observers simultaneously opened the pilot's door from the outside). The pilot and crew made their way to nearby habitation where they were subsequently assessed by an ambulance crew; none were injured.

The search director returned to the aircraft with fire-fighters, to ensure that pyrotechnics and the self-inflating life raft on board the aircraft did not pose a hazard.

In his very frank account of the flight, the pilot acknowledged that a decision to turn back soon after departure would have been justified by the weather conditions. He added that before the engine power changed, his workload was already very high, on account of the task and conditions.

Recorded information

The aircraft position and Mode C altitude (± 50 ft) were recovered from radar recordings provided by Ports of Jersey Air Traffic Control (Figure 1). The first radar recording was at 18:51:42 hrs as G-CIAS departed Guernsey Airport. At 19:03:19 hrs G-CIAS was located just over 6.3 nm from Jersey Airport at approximately 500 ft amsl when it began a right-hand turn towards Jersey, climbing to approximately 1,100 ft amsl over the next 1 min 40 sec. At 19:05:36 hrs, when 1.2 nm from the coast, the altitude began to reduce until 19:07:52 hrs when the final radar return recorded the aircraft at a position approximately 200 ft from the first ground mark at the accident site.

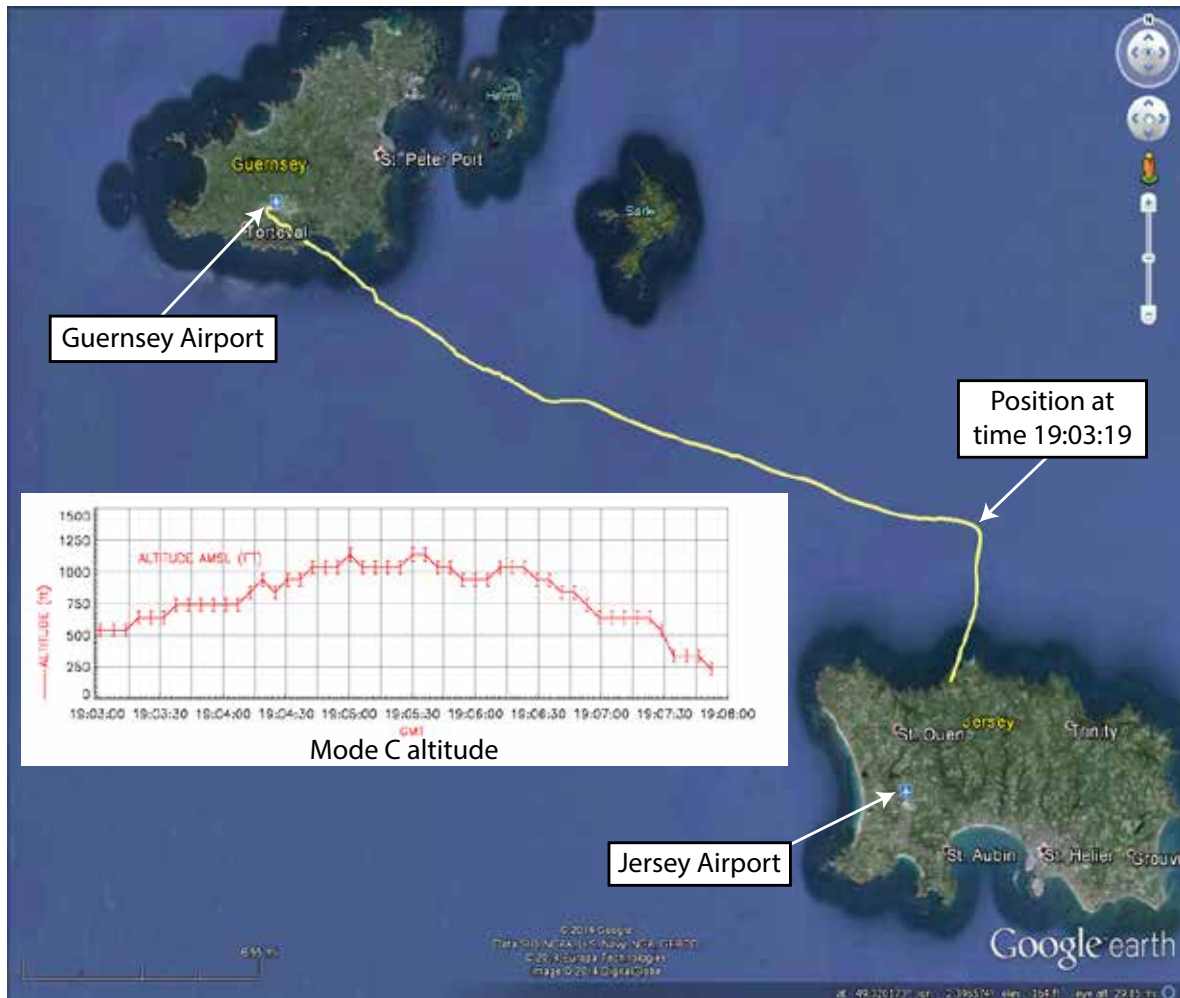


Figure 1

G-CIAS radar position and Mode C altitude

Flights and refuelling prior to the accident flight

Flight on 26 October

The aircraft flew on a training exercise on 26 October 2013 lasting 1 hr 20 min with a different pilot. The technical log showed that the flight departed with 55 USG in each main tank and 18 USG in each tip tank. After flight, 163 litres of fuel were uplifted to restore the pre-departure quantity. The pilot on this flight recalled that the entire flight was conducted with main tank fuel feeding the engines. The fuel tank quantities were not checked visually before or after flight and a written note of fuel quantities was not kept in flight (it was not usual for the pilots of G-CIAS to make notes when flying).

Flight on 2 November

The accident pilot flew a training exercise in G-CIAS on 2 November 2013, to maintain recency and to provide an opportunity for the other crew-members to rehearse their procedures. Following a normal departure, the aircraft flew to the Roches Douvre, a reef situated between Île-de-Bréhat and Guernsey, dropped some smoke floats, and carried out

some observer training, before returning for a normal landing at Guernsey. The duration of the flight was 55 minutes.

After arrival, the pilot called the refuelling company, and recalled that he instructed them to refill only the main tanks. The pilot carried out paperwork in the hangar while the refuelling took place, but did see the fuel tanker drive away; a large digital display on the tanker showed 20 litres of fuel delivered. Considering the duration of the training flight, this struck the pilot as being a smaller figure than he had anticipated, and he telephoned the refueller to query it. The refueller confirmed that he had delivered only 20 litres.

The pilot concluded that, rather than the main fuel tanks being somewhat less than full prior to the training flight as usual, they had perhaps been full, and in replenishing them only to the customary slightly-less-than-full state, the delivery of 20 litres made sense. The pilot acknowledged during interview that he “never physically checked” the fuel level in the tip tanks.

The pilot believed that the tip tanks were routinely kept “nearly full” with a quantity of 18 USG in each, and that the aircraft would be left in its hangar with the main tanks selected. His habit, which he believed to be in line with other pilots’ procedures, was to take off with the main tanks selected, until approximately three hours into a flight, and then to feed fuel from the tip tanks. He commented that it was rare for flights of this duration to take place and therefore the tip tanks were seldom used.

The pilot stated that the usual fuel burn for the aircraft was between 12 USG per engine per hour in normal flying and 14 USG per engine per hour at higher speed. Given the comparatively low altitude (typically at or below 2,000 ft) of most SAROPs flying, he preferred not to lean the mixture aggressively. Fuel flow meters were used to judge mixture leaning, although the aircraft was fitted with EGT gauges.

Examination of the aircraft and wreckage site

The nose of the aircraft had struck the base of a tree that marked the boundary of a sloping field. The damage was consistent with the nose striking the tree at a relatively low speed, probably around 10 kt. Figure 2 shows a general view of the wreckage site.

The left main gear leg had been distorted aft at its mounting in the wing. The propeller blades on the left engine showed signs of having been rotating whilst striking the ground but, due to the rearward deflection of the propeller blade tips, showed little signs of power. There was some rotational scoring on the spinner hub from a damaged piece of engine cowling. The propeller on the right engine had been feathered.

There were ground marks covering 140 m from the brow of the hill down to where the aircraft had come to rest that were made by the landing gear, and approximately 20 m from the aircraft there was a wider ground mark followed by a series of regularly-spaced slash marks. The left main gear had been distorted rearward and made the large ground mark, and the left propeller blades, which were rotating, caused the slash marks. It was estimated from the slash marks that the rotational speed of the left engine was well below 1,000 rpm.

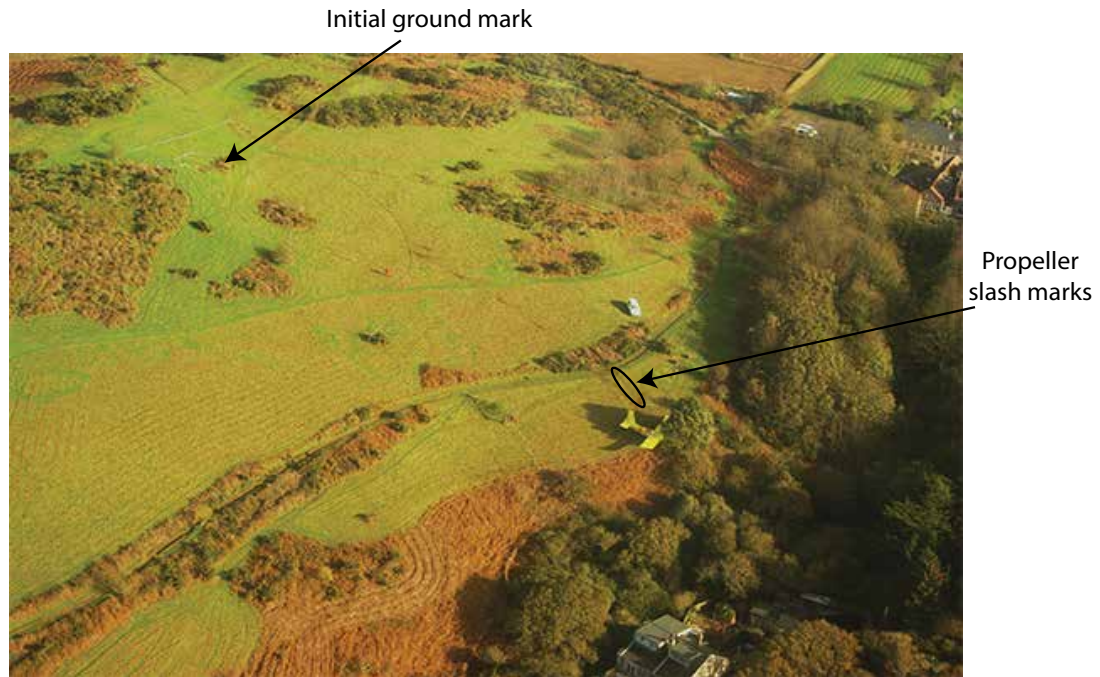


Figure 2

General view of the wreckage site

There was significant distortion of the main wing box and some fuel was dripping slowly from both main wing tanks. Fuel samples were taken from both main tanks and from both gascolators. With the aircraft on level ground the fuel quantity in the tanks was measured using dip sticks. Making allowances for the some loss of fuel due to the leaks and for the fuel samples taken, both main fuel tanks were almost full when the aircraft landed. Both tip tanks were empty. The fuel pipes closest to the engines were removed and only very small samples of fuel were recovered, consistent with both engines being starved of fuel.

The fuel tank selector switches in the cockpit were both found in the 'tip tank' position. The fuel tank indication switches were both found in the position that would dim the tank selection indicator lights. Figure 3 shows the tank selector switches and gauges.

Mounted beneath the main engine controls for throttle, rpm and mixture, were two levers marked CARB HEAT. The lever for the left engine was found in the CARB HEAT fully ON position and for the right engine it was in the CARB HEAT OFF position.

Aircraft information

The aircraft was built in 1987 and was modified in 1993 for its role with the operator. It carried aviation and maritime communication equipment, search radar, and infra-red and video cameras, as well as smoke flares, lights and loudhailers, and an air-droppable dinghy.

The aircraft was powered by two fuel-injected Lycoming IO-540 piston engines. Being fuel-injected, this type of engine does not have carburettor heat but does have a selectable alternative air supply. As noted above, the levers controlling the selectable alternative air supply had retained their CARB HEAT marking.

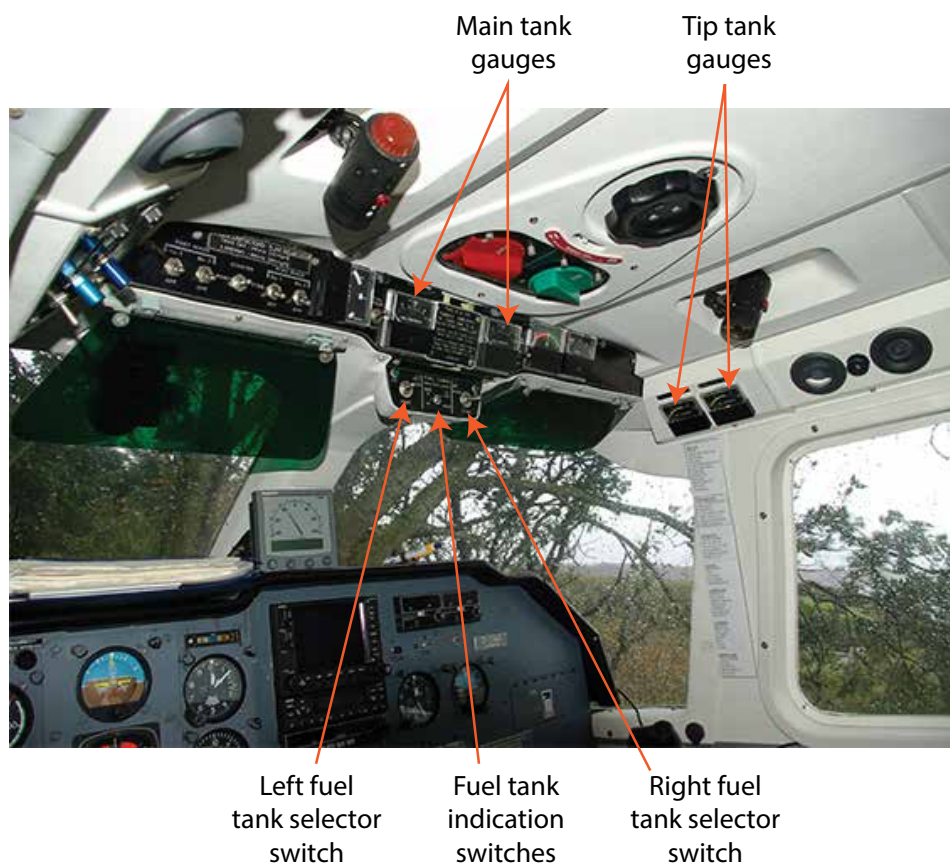


Figure 3

Image of the cockpit showing gauges and fuel tank switches

The aircraft had two main fuel tanks and two tip tanks, with switches in the cockpit to select the fuel supply to the engines from either the main or tip tanks. There were two further switches associated with the fuel system; these served two purposes, depending on which tanks were selected to feed the engines. With the main tanks selected, it disabled the lights which indicated tank selection. With the tip tanks selected, it dimmed the lights which showed that the tip tanks were in use.

It was noted that the fuel selectors for the engines and main fuel tanks were prominent, and the main fuel tank quantity gauges were conveniently sited above the top of the centre windscreen pillar (Figure 3). However, the tip/main tank switches were much smaller and located away from the main fuel selectors, remote from the tip tank quantity gauges which were themselves on the right-hand passenger service unit, above the right-hand cockpit window.

Restraint harnesses

The front row occupants and the search director were provided with three-point harnesses incorporating lap straps and a shoulder strap, the rear row occupants were only provided with a lap-strap.

Fuelling procedures

The aircraft was routinely hangared ready to fly, with each main tank filled slightly below full, and each tip tank containing fuel, but not full. Records showed that the main tank quantity was routinely recorded as 55 USG, and the tip tank, 18 USG. It was normal for refuelling to be carried out immediately after each flight, except during the night when refuelling would require the call-out of personnel. In that case, the aircraft would be parked outside its hangar, and would be refuelled prior to departure, should a further flight be necessary.

Flight manual supplements

A supplement to the aircraft's flight manual detailed the procedures, limitations and information for operation of Islanders with tip tanks.

The '*Normal Operating Procedures*' section stated:

'before take-off, check the functioning of the electrically actuated fuel cocks by selecting from main tanks to tip tanks and returning to main tanks, checking that the appropriate indicator lights illuminate. Select the appropriate tank for take-off and again check that the position lights are correctly illuminated.'

This was not reflected in the operator's checklists.

Technical log

A technical log was kept for the aircraft. It included a section on each sector record page, intended to be completed after the flight recorded on the previous page, detailing the fuel on board the aircraft when parked. This would enable a pilot to see that sufficient fuel was on board for a SAROPS flight, without having to check the fuel tanks with a dip-stick. Although fuel uplifted was noted in the technical log, the distribution of the uplift (left-hand or right-hand and main or tip tanks) was not recorded.

Checklists and pre-takeoff checks

The pilot stated that he did not use a written checklist during pre-start checks, but did look "to see where everything is set". He used a generic pre-takeoff checklist based upon British military flying procedures, which he executed from memory. It included a check of 'fuel', during which the pilot recalled checking the main fuel tank contents on the fuel gauges but not the gauges for the tip tanks, and checking that the electric fuel boost pumps were ON. He did not recall checking the positions of the tip tank selector switches.

There were three checklists in the aircraft: one attached to the right-hand cockpit window pillar; one on an A4 card, and one on A5 sheets in a display booklet. The checks detailed in these lists differed and some included items which others did not.

Carburettor icing

The pilot stated that, during the accident flight, he selected the "carburettor heat" as an instinctive reaction to a sign of engine trouble. He commented that he had never experienced carburettor icing in G-CIAS.

Previous similar events

Three previous events with BN2 Islander aircraft, with notable similarities to the G-CIAS accident, were identified:

G-BDNP at St Andrew, Guernsey, Channel Islands, on 18 September 1981

The AAIB reported (Bulletin 15/1981) that the cause of the accident was:

'...the Commander's mismanagement of the aircraft's fuel system in that both engines failed through fuel starvation because the usable contents of the tip tanks, which were feeding the engines, became exhausted when there was ample fuel remaining in the aircraft's main tanks. Contributory factors were the operator's procedures, inadequacies in the check lists, and the position of the fuel selector panel and switch levers in relation to the pilot's eyes.'

The report included Safety Recommendations on the fuel selection and indicating system.

G-BBRP at Netheravon Aerodrome, Wiltshire, on 20 February 1982

The AAIB report (Bulletin 4/1982) explained that prior to the accident flight, another pilot had flown the aircraft and left the tip tanks selected to feed fuel to the engines. This went unnoticed by the G-BBRP accident pilot. One engine ceased producing power shortly after takeoff, and the second engine may also have suffered loss of power. This report also included Safety Recommendations on the fuel selection system. As these recommendations were made in the early 1980s, it is not apparent what actions were taken in response to them.

A report prepared by a UK CAA airworthiness surveyor based in Antigua on an accident in 2002 to a BN2 Islander, N616GL, concluded that the aircraft suffered fuel exhaustion following a departure with the tip tanks selected to supply fuel to the engines. Safety Recommendations were made concerning maintenance arrangements and operational documentation.

Management organisation

Evolution of the operation

Until 1983, if it appeared that benefit would be gained from aerial searching around the Channel Islands, available members of the local flying club were asked to use their various light aircraft to search and to report any casualties via air traffic control. In 1983 a group of aviators identified that a more organised approach might be of benefit, and the owner of a six-seat twin-engine piston aircraft, a Piper Aztec, made it available for the search role, when it was not otherwise in use. A charity was established, run by a board of trustees and an executive, with volunteers trained to operate the aircraft; its funding came from the Channel Islands' governments and public donations. The aircraft was gradually equipped for the search role, and in due course, it became available exclusively to the organisation. In 1993, the organisation acquired the Islander aircraft, which was equipped for searching and had an air-droppable dinghy. As noted earlier, the aircraft was flown as a Private operation, there being no requirement for the operator to hold an Air Operator's Certificate.

Investigation

During the investigation of the accident to G-CIAS, the AAIB conducted a series of interviews with senior pilots and managers within the Channel Islands Air Search organisation. Although it was clear that the management team included individuals with relevant experience in search-and-rescue operations, and commercial air transport, a number of areas of weakness were identified within the organisation's operational procedures and practices:

- a visual inspection of fuel tanks was routine before each flight, but although dip-sticks were provided, it was not routine to use them to measure quantities
- no operational flight plan or log was kept and it was not usual for pilots to make written notes in the course of a flight, for example to maintain a log of fuel used and remaining
- pilots were not required to use a written checklist and checks carried out from memory were acceptable
- the checklists provided did not reflect operational procedures detailed in the flight manual
- no brace position had been established for pilots or observers on board the aircraft, although training had been carried out with regard to normal and emergency exits
- there was awareness of the flight manual supplement concerning tip tank use but the detailed information in the supplement, including the description of symptoms of fuel starvation, and the operational procedures to be carried out before each flight, were not well known
- there was limited awareness of the previous accident involving tip tank selection in an Islander aircraft in the Channel Islands in 1981

Analysis

Technical investigation

The inspection of the aircraft at the accident site, combined with the crew accounts gathered early in the AAIB accident investigation, indicated that no mechanical or electrical defect had been a factor in the accident. The evidence indicated that the fuel supply to the right-hand engine, and then the left-hand engine, had become exhausted in flight and the engines ceased producing power approximately 15 minutes after the aircraft became airborne.

The accident flight

The pilot's and crew-members' accounts of the flight concurred in presenting a picture of a very dark and turbulent night. Against this backdrop, the search request, which they sought to fulfil, appeared to have great importance and urgency. They were all aware that the lives of the fishermen, for whom they were to search, could depend upon their success in locating them and directing lifeboats to their rescue⁶.

Footnote

⁶ The fishermen were located and taken to safety later that night by a Coastguard helicopter from Lee-on-Solent.

The pressing nature of the task no doubt influenced the rapid sequence of events before take off, though this reflected the operator's normal practice, which sought to have the aircraft always ready to fly with the minimum pre-flight activity.

Fuel use and recording

Analysis of the technical log and fuel on board the aircraft after the accident indicates that the training flight on November 2013 took place with the tip tanks supplying fuel to the engines. It was not possible to determine when, or by whom, the tip tanks were selected.

Following this training flight, the accident pilot noticed that the fuel uplift was less than he expected, and he queried it with the refueller. However, being mindful of the custom of leaving the main tanks somewhat less than full, his conclusion that the main tanks had been completely full before the flight, but had been replenished only to the less-than-full state, made sense of the uplift figure.

An evaluation, during the training flight, of the fuel quantity on board could have identified that tip tank fuel was being supplied to the engines. A written check, comparing expected fuel quantities with gauge indications, might also have identified the unusual configuration of the fuel system.

An inspection of fuel quantities (on the gauges or using the dipstick) - or detailed analysis in the technical log of quantities in each fuel tank and quantities delivered into each tank, rather than simply the total delivered - could have identified before the accident flight that the tip tanks were selected to supply the engines but contained little fuel.

It is possible that the problem with the switch selections for the search equipment may have disrupted the pilot's checks. Conversely, the discovery of one cockpit switch in an unusual position might have been a good prompt for a thorough review of all switch selections, and this could have identified that the tip tanks were selected.

Compliance with the flight manual supplement requirement to check the functioning of the tip tank fuel system would have provided an opportunity to verify the correct configuration before takeoff. However, this procedure had not been incorporated into the checklists provided in G-CIAS, and pilots were not expected to use the written checklists.

Actions during the flight

The weather conditions after takeoff were very demanding, with turbulence and limited visibility increasing the pilot's workload. Although the pilot later acknowledged that a return to land would have been justified, such a decision would have been made bearing in mind the possible consequences for the safety of the fishermen.

The pilot's reaction to the change in engine note, selecting alternate air, could have corrected a problem with the engine's air supply, although the controls were incorrectly labelled as CARB HEAT. His check that the mixture was fully rich, and in selecting the electric fuel pumps on, sought to assure the supply of fuel but was not followed by a check of the configuration of the fuel system or an attempt to select an alternative fuel source for the engine. Such

a check would have enabled a supply to be restored, not only to the failed engine, but the other engine too.

With one engine failing, the pilot's decision to gain height and turn towards Jersey began the sequence of events which concluded with a successful forced landing in extraordinary conditions. Although the pilot was "fairly certain" that he tried to change fuel tanks, around the time that the second engine stopped, the time available to re-establish power was very limited.

The pilot's response to the automatic voice call-out, switching the landing lights on and anticipating a landing or ditching, may have been crucial to his reaction when he glimpsed the ground and flared. The aircraft's trajectory, towards one of the very few areas on the north side of Jersey where a survivable landing might be attempted, and close to cliffs and other terrain where impact might well not have been survivable, was largely a result of good fortune. However, the forced landing itself was achieved and the aircraft, although significantly damaged, remained intact and those on board were uninjured.

Cockpit layout

The locations of the fuel controls and tank quantity gauges were examined. Although the main fuel selectors and main tank gauges were located centrally in the cockpit, the tip tank selector switches were smaller and not co-located with the respective quantity gauges. The dimming function of the tip tanks indicators further complicated the presentation of fuel supply information to the pilot. In the operation of G-CIAS, the typical search duration and main tank capacities, meant that the tip tanks were seldom used. These factors may have led to some complacency with regard to the configuration of the fuel system.

Management factors

As described earlier in this report, the evolution of the operating organisation had been from an operation by individual pilots using their private aircraft on a voluntary basis, to a well-supported public charity operating an aircraft with sophisticated search systems, essentially as a public service.

Much public service aviation, such as police and helicopter emergency medical services, is operated by commercial organisations, which in the United Kingdom hold Air Operator's Certificates. These organisations must demonstrate their continuous fitness to hold their certificates to the regulator⁷.

An appropriately robust set of procedures, supported by effective training and oversight from the operational management, may have ensured the correct configuration of the fuel system before departure, and prevented the loss of power. A similar approach to crew safety (for example with regard to brace positions and cabin equipment) may also have improved the probability of a benign outcome in similar emergency situations.

Footnote

⁷ The UK CAA

Safety action

The aviation regulator in the Channel Islands has held discussions with the operator of G-CIAS and set out a number of requirements concerning operational procedures, oversight of flying operations and safety management, with which the operator must comply before resuming flying.

In September 2014 the aviation regulator confirmed to the operator that, having reviewed the documentation submitted, he was satisfied that it was appropriate to issue permission to operate. This permission would be granted for a period from October 2014 to April 2015, with a review of the new processes during that time.