**ACCIDENT**

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|---|---|
| **Aircraft Type and Registration:** | Britten-Norman BN2A-26 Islander, VP-MON, |
| **No & Type of Engines:** | 2 Lycoming O-540-E4C5 piston engines |
| **Year of Manufacture:** | 1969 (Serial no: 082) |
| **Location:** | V C Bird International Airport, Antigua (TAPA) |
| **Date & Time (UTC):** | 7 October 2012 at 2010 hrs (UTC), 1610 hrs (local) |
| **Type of Flight:** | Commercial Air Transport (Passenger) |
| **Persons on Board:** | Crew - 1 Passengers - 3 |
| **Injuries:** | Crew - 1 (Fatal) Passengers - 2 (Fatal) 1 (Serious) |
| **Nature of Damage:** | Aircraft destroyed |
| **Commander's Licence:** | Commercial Pilot's Licence |
| **Commander's Age:** | 31 years |
| **Commander's Flying Experience:** | Total - not known<br>Last 28 days - 25 hours<br>Last 24 hours - 0.5 hours |
| **Information Source:** | East Caribbean Civil Aviation Authority (ECCAA) Accident Investigation |

**Synopsis**

The aircraft crashed shortly after takeoff. Water was present in the fuel system feeding the right-hand engine, which was not producing power at impact.

This Special Bulletin, issued by the AAIB, contains information on the progress of the investigation and focuses on the fuel suction filter assemblies. One Safety Recommendation is made.

The investigation continues.

**Status of the investigation**

The ECCAA was informed of the accident immediately and began an investigation under the Antigua Civil Aviation Regulations 2004. In accordance with established international arrangements, the Air Accidents Investigation Branch (AAIB) of the United Kingdom, representing the State of Design and Manufacture of the aircraft, and (through its registration in a British Overseas Territory) the State of Registry and the State of the Operator, appointed an Accredited Representative to participate in the investigation. The AAIB Accredited Representative is supported by an AAIB Advisor.

This Special Bulletin contains facts which have been determined up to the time of issue. It is published to inform the aviation industry and the public of the general circumstances of accidents and serious incidents and should be regarded as tentative and subject to alteration or correction if additional evidence becomes available.

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The aircraft manufacturer was informed of the accident. Air Safety Support International (ASSI)[1], which performs regulatory oversight of the aircraft operator, was also informed.

Initial investigative activity focussed on examination of the aircraft wreckage and accident site, gathering of evidence from witnesses, and examination of technical records.

After the accident, the European Aviation Safety Agency (EASA) issued an Airworthiness Directive (AD)[2], which requires operators of Britten-Norman Islander and Trislander aircraft to determine if the aircraft they operate are equipped with the correct standard of fuel cap appropriate to the type of fuel receptacle, or filler neck, on the wing upper surfaces. Until such time as the correct caps are fitted, a water contamination check is required to be conducted before every flight. This includes checking the tank drains, the gascolators, and tip tanks if installed.

## History of the flight

The aircraft, which had flown earlier during the day, was on a commercial air transport (passenger) flight from V C Bird International Airport, Antigua, to John A Osborne Airport, Montserrat, with the pilot and three passengers aboard. Weather conditions at the time of departure were good, although convective clouds and heavy rain showers had passed over the airport while the aircraft was parked before flight. Approximately 40 mm of rain fell at the airport during this period. There was no evidence that a water drain check was carried out on the aircraft following the rainfall.

Shortly after takeoff, the aircraft yawed and rolled to the right, descending rapidly and apparently out of control. It impacted the ground within the airport perimeter, right wingtip first and steeply banked to the right, at low forward speed. Ground marks and damage to the wingtips and nose indicated that the aircraft cart-wheeled before coming to rest erect. The fuselage forward of the wings was destroyed; there was comparatively less damage to the rear part of the aircraft.

The pilot and two passengers, both of whom were seated in the forward part of the cabin, were fatally injured. Another passenger, seated in the rear-most row of seats[3], was seriously injured and taken to hospital for treatment.

## Additional information

Examination of the wreckage found that the right-hand engine was not producing power at the time of impact, and the fuel system feeding that engine contained significant quantities of water. The right-hand fuel filler cap was of a design that was incompatible with the filler neck. Tests showed that the cap, installed in the neck, could allow water to pass into the fuel tank, for example if the aircraft were parked during periods of rain. The EASA AD referred to above addressed this incompatibility.

Following loss of power on one of the two engines on an Islander aircraft, the failed engine's propeller should be feathered to reduce the drag produced. Following successful feathering, continued flight should be possible. Examination of the right-hand propeller showed that it was not in the feathered position. A subsequent bench test of the propeller control unit found that it functioned satisfactorily. This together with the as-found position of the propeller controls suggested that no attempt was made to feather the propeller.

**Footnote**

[1] ASSI is a wholly-owned, not-for-profit, subsidiary of the United Kingdom Civil Aviation Authority (UK CAA).

[2] AD No.: 2012-0270, 20 December 2012.

[3] The Islander may be fitted with up to five rows of two seats. VP-MON was fitted with only the forward four rows.

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**Fuel system description**

The fuel system on this aircraft type consists of an integral tank within each wing such that it is normally operated in a tank-to-engine configuration, although there is provision for cross-feeding. Refuelling is achieved via a filler cap on each wing upper surface. Each tank is fitted with a sump on the wing underside, with holes in the tank floor that allow fuel to flow into it. Each sump is semicircular in lateral section and is approximately 18 inches long and 3 inches in radius. The sump forms the lowest part of the tank and contains a water drain plug and a fuel drain valve. Fuel is drawn into the engine fuel feed line at the back of the sump via a coarse-mesh suction filter. It then passes through two electric boost pumps, each equipped with a nylon mesh filter, before being fed to a gascolator in the nacelle and thence to the carburettor.

**Fuel suction filters and Modification NB/M/350**

Figure 1 shows the aircraft fuel tank installation and the detail of a modification to the fuel suction filter assembly.

This modification, Mod NB/M/350, mounted the suction filter 8.5 in forward of the sealing plate, on the end of a tube, and raised the filter from 1.05 in to 2.25 in above the bottom of the sump. The modification, issued in 1968, was intended to provide increased protection from water contamination of the fuel. Water, if present, collects at the bottom of the sump and tends to move aft during takeoff and climb. The modified filter is more likely to remain above the water level, as represented in Figure 2.

The modification was not routinely installed on new build aircraft until aircraft Construction Number 091. The investigation has not established how many of the earlier aircraft had been modified. The fuel tank sumps of VP-MON (Construction Number was 082) had not been modified.

**Previous accident**

On 2 August 1984, a Britten-Norman BN-2A-6 Islander, registration N589SA, suffered an engine failure and crashed into the ocean shortly after takeoff from Vieques, Puerto Rico. All on board were fatally injured. The United States National Transportation Safety Board (NTSB)'s investigation[4] determined that the probable cause of the accident was:

> *'…the failure of the pilot to execute the emergency engine-out procedure properly shortly after takeoff following a loss of power in the left engine because of water in the airplane's fuel system and the failure…..to remove excess water known to be in the airport's in-ground fuel tank before conducting fuelling operations. The pilot's failure to execute the engine-out procedure properly was due to his inexperience in multi-engine airplanes.'*

The NTSB stated that the water contamination check had either not been conducted, was conducted too soon after refuelling, or was made with the aircraft not in a level attitude. The report noted the potential of Modification NB/M/350 to provide improved protection against loss of engine power due to water contamination and recommended that the Federal Aviation Administration:

> *'Issue an Airworthiness Directive applicable to Pilatus Britten-Norman BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk 111 model airplanes requiring the incorporation of Britten Norman modification NB/M/350 to provide increased protection from fuel contamination.'*

**Footnote**

[4] NTSB Report Reference: NTSB/AAR-85/08.

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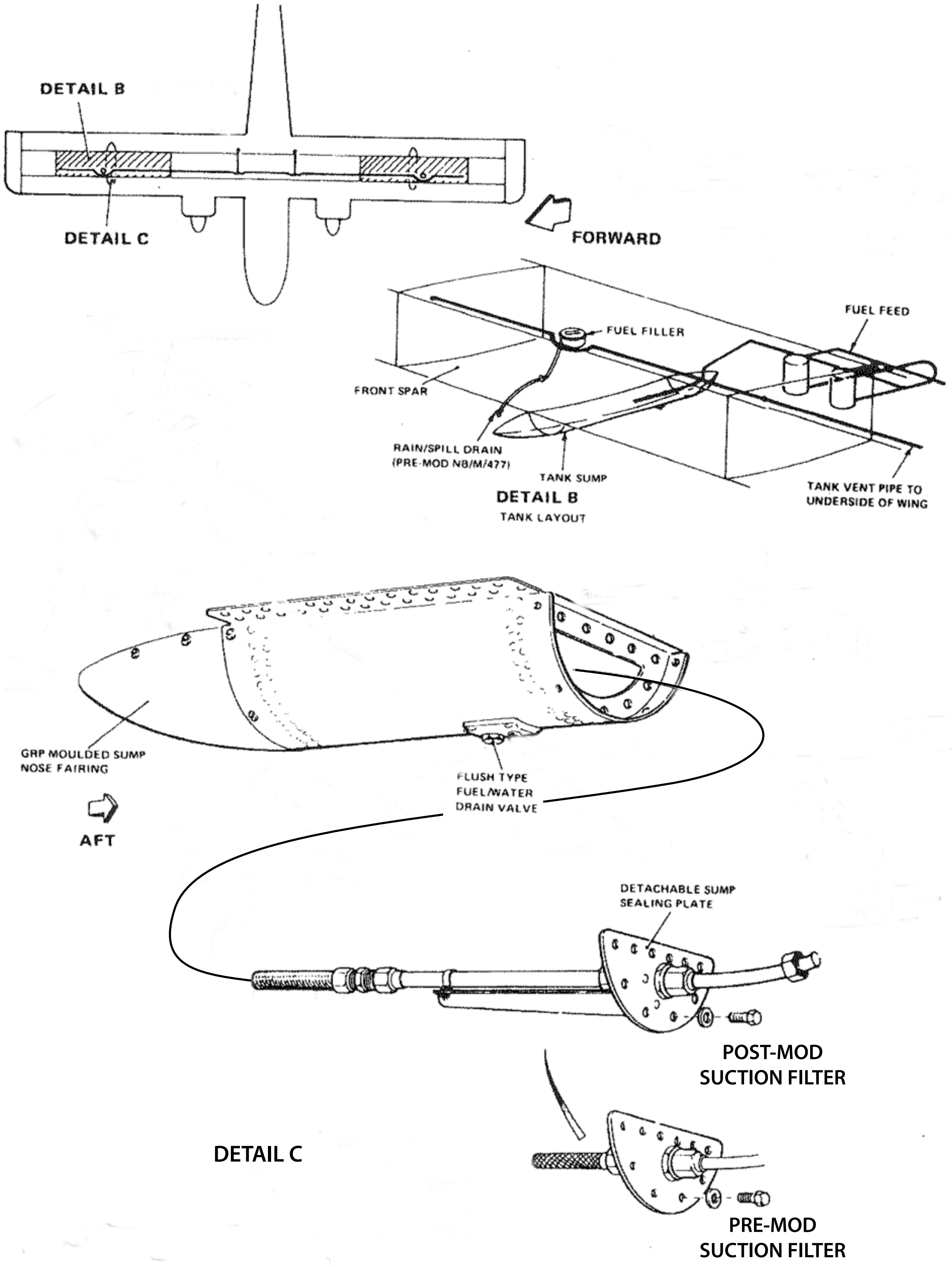
DETAIL B
DETAIL C
FORWARD
FUEL FEED
FUEL FILLER
FRONT SPAR
RAIN/SPILL DRAIN
(PRE-MOD NB/M/477)
TANK SUMP
DETAIL B
TANK LAYOUT
TANK VENT PIPE TO
UNDERSIDE OF WING
GRP MOULDED SUMP
NOSE FAIRING
AFT
FLUSH TYPE
FUEL/WATER
DRAIN VALVE
DETACHABLE SUMP
SEALING PLATE
POST-MOD
SUCTION FILTER
DETAIL C
PRE-MOD
SUCTION FILTER

**Figure 1**

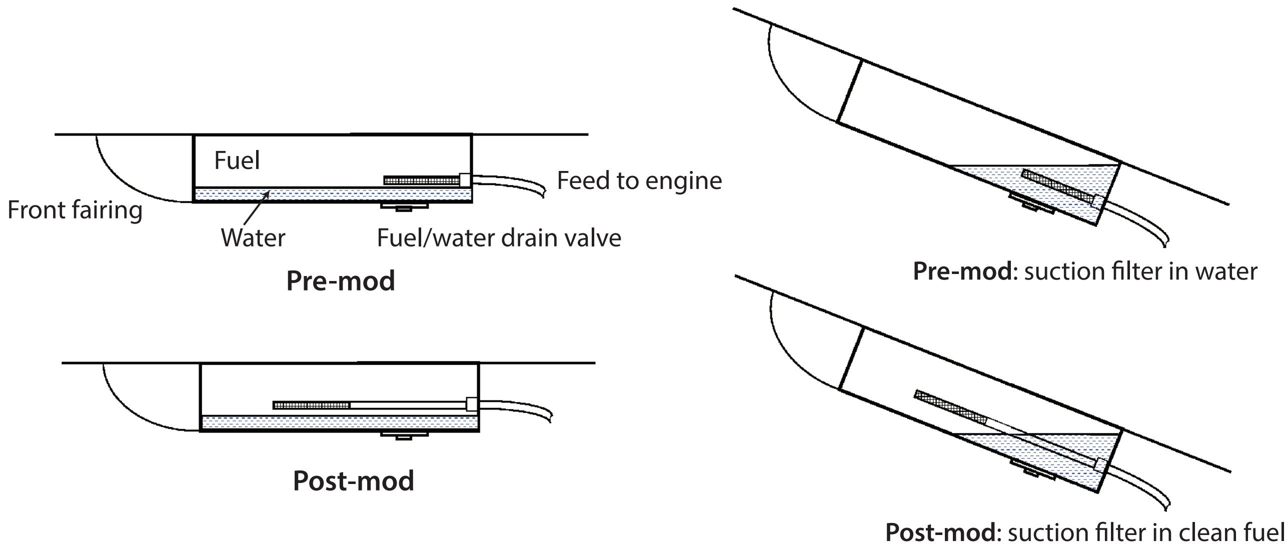


**Figure 2**

The FAA response included the following:

> *'The modification NB/M/350 was introduced at the factory at the request* [of the] *Australian government. There are about 68 airplanes flying without the modification, 15 of which may be in the U.S. In view of the satisfactory worldwide experience with these airplanes, the CAA-UK is of the opinion that, although modification NB/M/350 might be thought to yield enhanced protection, the evidence indicates that the required sump capacity is adequate if water drain checks are performed. A review of the CAA-UK mandatory occurrence reports data, the FAA's service difficulty reports, and accident/incident reports has revealed no evidence of incidents due to water in the fuel other than the subject accident.'*

The investigation found that an engine had lost power as a result of water contamination of the bulk fuel supply where the aircraft had refuelled. However the key similarity with the circumstances of the accident to VP-MON was that the water in the fuel tank sumps probably entered the engine fuel supply lines when the aircraft rotated into the takeoff attitude.

Both N589SA and VP-MON had the same pre-modification fuel suction filters, which drew fuel from the rear of the fuel sump. The modified design appears to offer improved tolerance to water in the fuel tank sump.

**Safety Recommendation**

Examination of VP-MON indicated that the right hand engine was not producing power at the time of impact and that the fuel system feeding that engine contained significant quantities of water. The investigation determined that the pre-modification fuel suction filter assembly was less tolerant to water in the fuel sump than the post-modification design during takeoff and climb. The investigation of a previous fatal accident to the same aircraft type identified similar causal factors.

The modified suction filter offers an improved tolerance to water in the fuel tank sumps, and therefore the following Safety Recommendation is made:

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**Safety Recommendation 2013-014**

It is recommended that the European Aviation Safety Agency takes action to require that Britten-Norman Islander aircraft are equipped with fuel suction filter assemblies which minimise the likelihood of any water present in the fuel tank sumps being fed to the engines.

*Published 4 July 2013*

AAIB investigations are conducted in accordance with Annex 13 to the ICAO Convention on International Civil Aviation, EU Regulation No 996/2010 and The Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 1996.

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 inappropriate that AAIB 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.

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