Aviation Safety Investigation Report 199800353

Cessna Aircraft Company 310Q

08 February 1998

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NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at www.atsb.gov.au.

199800353	Occurrence Type:	Accident
16km S Crookwell, (ALA)		
NSW	Inv Category:	4
Sunday 08 February 1998		
1220 hours	Time Zone	ESuT
None		
er: Cessna Aircraft Compan 310Q VH-WHI Non-commercial Practic Substantial Scone NSW 1100 ESuT Canberra ACT	y Serial Number:	310Q1021
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Crew Details:

	Hours on		
Role	Class of Licence	Type Hou	rs Total
Pilot-In-Command	ATPL 1st Class	19.6	9426

Approved for Release: Friday, August 21, 1998

The pilot had planned a solo training flight from Canberra to Scone, returning to Canberra via Goulburn the next day. The aircraft departed Canberra with full fuel tanks and continued to Scone without incident, where it remained overnight. The pilot reported that on the return flight the main fuel tanks were used for takeoff, and the auxiliary tanks were selected after the aircraft was established on the departure route. Approximately 50 minutes later, when the right auxiliary tank indicated almost empty, the right main tank was selected. However, as the left auxiliary tank still indicated some 10 to 12 gallons, feed to the left engine from that tank was continued. A short time later, just prior to commencing descent from 9,000 ft into Goulburn, the left engine lost power. The throttles on both engines were retarded for descent and the left main tank was selected to supply fuel to the left engine. The left throttle was advanced some time later but there was no response from the engine.

The pilot reported that his troubleshooting checks consisted of checking that the fuel selectors were on the main tanks, the mixtures were full rich, the ignition was on and that the auxiliary fuel pumps were selected to LOW. The left throttle was again advanced but there was still no response from the engine. The checks were then repeated, but with the auxiliary fuel pumps selected to HIGH. Again there was no response from the engine. The same checks were performed on both engines but neither engine responded when the throttles were advanced. Both mixture controls were moved to idle cut-off for about 30 seconds. Full rich mixture was then selected, but the engines still failed to respond.

As the aircraft was now at a low height, the pilot concentrated on finding a suitable forced-landing site. Just prior to landing on an open field, he had to manoeuvre the aircraft to avoid a wire and a ditch which lay across the intended approach path. The aircraft subsequently landed heavily, sustaining substantial damage. The pilot evacuated the aircraft without injury.

The investigation determined that although the main tanks had been ruptured in the accident, sufficient fuel would have been available for continued operation of the engines. However, an inspection of the aircraft found there was no HIGH auxiliary fuel pump switch position, as reported by the pilot. The three switch positions available were LOW, which runs the auxiliary fuel pump continuously at low pressure, a centre OFF position, and an up position, placarded ON. In the ON position, the pump runs continuously at low pressure until low fuel pressure is sensed by the engine fuel pressure switch. This could occur due to an engine-driven fuel pump failure, or running a fuel tank empty. The pump then automatically runs at high pressure, and is retained in that mode by a latching relay. If a fuel tank is allowed to run dry, and fuel supply to the engine is restored by selecting an alternate tank, the engine will then be supplied with an excessive amount of fuel, resulting in a loss of engine power due to over-fuelling. To correct that condition, the auxiliary fuel pump switch must be moved to OFF to unlock the latching relay. The flight manual instructions for the fuel system are to select the auxiliary fuel pumps to ON for takeoff and landing, and to use full rich mixture and auxiliary fuel pumps on LOW when changing fuel tanks.

Further investigation determined that the right engine fuel pressure switch had a very high electrical resistance after activation. Consequently, electrical current was able to flow in the latching circuit and lock the system to high flow mode when selected to the ON position.

The left engine initially lost power due to fuel exhaustion of the left auxiliary tank. When the main tank was selected, and the auxiliary fuel pump switch was moved to ON, the pump mode changed to HIGH and the latching relay engaged. The consequent over-fuelling condition prevented the left engine from being restarted The right engine stopped from a similar over-fuelling condition when the right auxiliary fuel pump was selected to ON during troubleshooting.

In 1988, the aircraft manufacturer issued Service Bulletin MEB 88-3, which modified the auxiliary fuel pump system and operation because of reported failures of engine fuel pressure switches. The modification included changing the auxiliary fuel pump ON placard to read HIGH. The service bulletin was applicable to all 300/400 series aircraft. However, the modification was not mandatory in Australia and resulted in aircraft in the Australian fleet having differing operational specifications. Service Bulletin MEB 88-3 had not been incorporated on this aircraft. Modified aircraft have appropriate cockpit placarding and flight manual instructions, but the pilot's operating handbooks do not include the amended instructions. This leads to a misunderstanding of systems operation between different aircraft.

The pilot's response to the engine failure was not in accordance with the manufacturer's checklist.

SAFETY ACTION

The Bureau of Air Safety Investigation is currently investigating a perceived safety deficiency identified as a result of this occurrence. The deficiency relates to a misunderstanding of operational procedures on Cessna 300/400 series aircraft as a result of the optional modification state of the auxiliary fuel system (incorporation of Cessna Service Bulletin MEB 88-3).

Any recommendation issued as a result of this investigation will be published in the Bureau's Quarterly Safety Deficiency Report.