

No. 29

Eastern Provincial Airways, DHC-3 "Otter", CF-MEX, made a forced landing near Søndre Strømfjord, Greenland on 29 August 1961. Report dated August 1962 released by the Directorate of Civil Aviation, Denmark.

Circumstances

Nine minutes after taking-off on a charter flight from Søndre Strømfjord, Greenland to Egedesminde, Greenland, the aircraft experienced a fuel leak which was followed by a severe fire. An immediate forced landing became necessary. In spite of the severe circumstances the pilot succeeded in bringing the aircraft down on a small lake about 11 NM northeast of Søndre Strømfjord and landed it on the shore where it eventually was completely destroyed by fire. The pilot suffered severe burns during the approach and landing and later fatal burns from being trapped under the left float of the aircraft, which was in flames. The mechanic, who was occupying the co-pilot's seat, suffered burns to his left leg. The four passengers were not injured.

Investigation and EvidenceThe Aircraft

Its certificate of airworthiness was valid until April 1962. It had flown 750 hours since new, including 15 hours since the last periodic check.

Loading and Centre of Gravity Position

The aircraft's all-up weight at take-off was about 7 980 lb. The approved maximum all-up weight is 7 967 lb. At the time of the accident the aircraft's weight was about 7 950 lb.

No centre of gravity calculations were made, and no balance sheet was prepared. Under normal loading conditions which existed in this case, it is virtually impossible to exceed the approved centre of gravity limitations. Thus, there was

no reason to suspect that the aircraft's centre of gravity position was not within the prescribed limits.

The Pilot

He held a valid Canadian commercial pilot's licence and had flown a total of 4 000 hours, including 1 500 on the DHC-3.

Reconstruction of the flight

The aircraft departed Søndre Strømfjord on a VFR flight at 1814 hours GMT carrying 2 crew, 4 passengers and some cargo. While taking-off the pilot advised the tower that his HF communications equipment was temporarily unserviceable. This discrepancy was soon rectified by the mechanic and five minutes after take-off the equipment was reported to be operating normally.

Four minutes later, during climb, the pilot observed the fuel pressure had dropped to 2 psi. He levelled off, called the mechanic's attention to the malfunction and switched on the fuel booster pump. Immediately a strong smell of fuel was experienced in the cockpit, and the mechanic shut off the booster pump. The pilot changed course back to the point of departure and advised on HF that he was returning to Søndre Strømfjord due to a gas leak, that the aircraft was 8 - 10 miles north of the beacon and stated that he would call when down. This was the last transmission from the aircraft. A few seconds later smoke appeared in the cockpit, and the mechanic saw clear fire through an opening in the control pedestal leading to the compartment below the cockpit floor. The fire warning system was never observed to operate. The engine was shut down at an altitude of about 3 000 ft.

The fire extinguisher was operated, and descent was immediately initiated.

During the descent the cockpit rapidly filled with smoke and flames were blazing through the rudder push rod funnels between the pilot's feet. In order to maintain forward visibility, he opened the left-hand cockpit door and leaned out. During the final part of the descent and during the landing he could not remain in his seat due to the intense fire around his legs and arms, but he succeeded in bringing the aircraft safely onto the lake while standing outside the cockpit. When the aircraft hit the beach the pilot was thrown forward onto the turf where he was pinned beneath the left float. The mechanic and the four passengers attempted unsuccessfully to free the pilot, for fifteen minutes after the landing. Then the fuel tank ignited and it was not until forty-five minutes later, when the aircraft disintegrated, that the pilot could be removed from his position under the float.

Damage to the aircraft was very extensive due to the intense fire which followed the ignition of the fuel tank.

The Wreckage Inspection

During the detailed inspection of the wreckage a bronze plug, relatively undamaged by fire and obviously a drain plug missing from the carburettor pressure chamber was found in the bottom of the engine cowling underneath the corresponding threaded bore in the carburettor. No traces of locking wire were found. In view of the condition of this plug and the corresponding bore in the carburettor housing as compared with a similar plug in the same housing, it may be safely assumed that the said plug was not in its proper place when the fire took place in the engine accessories compartment. However, it must have been in place during engine run-up as otherwise fuel would have been observed running from the cowling.

The investigation by the manufacturer led to the removal of the plug in

question during engine operation reduces the fuel pressure to 1-3/4 psi.

It can thus be concluded that the fuel pressure drop and consequent heavy fuel leak experienced on this flight occurred when the already loose plug fell from its bore.

No records on the maintenance of the aircraft were available, because the log books were destroyed with the aircraft.

Maintenance work was carried out on the cabin heater system of the aircraft the day before the accident, but, according to the mechanic, the carburettor drain plug was not touched during this operation. Therefore, it may be assumed that the safety wire was omitted during the last overhaul of the engine and this discrepancy was not detected by those in charge of the routine maintenance.

Main fuel filter

Improper installation of the filter element results in deformation of the element and in fuel leakage. The deformation of the fuel filter element of CF-MEX as found might indicate that it had been improperly installed, or it may have been caused by the heat to which the filter was obviously exposed.

It can, therefore, be concluded that CF-MEX developed a severe fuel leak in front of the firewall and possibly a moderate fuel leak in the compartment beneath the cockpit.

Source of ignition

It was not possible to point out a definite source of ignition.

The fire may have been started forward of the firewall, the engine accessories compartment displaying several possible sources of ignition and a more than sufficient supply of combustion air, coming from the generator cooling tube.

The fire warning system may have been inoperative at the time of the fire. The fact that the system did not give warning cannot be considered proof that no fire occurred forward of the firewall. The appearance of the firewall indicated that a blazing fire had existed forward of it. This fire could not have continued when the aircraft was on the ground as at this time the engine was stationary, and the booster pump was switched off. Consequently, fuel was not fed to the carburettor, not even by gravity.

According to the manufacturer, once started, the burning fuel could proceed aft and enter the compartment below the cockpit where the fire would continue and fuel, possibly leaking from the fuel filter, would be ignited.

The possibility of the fire originating in the compartment below the cockpit

was evaluated but appears to be rather remote as the fuel booster pump, which must be considered the only probable source of ignition, is sealed.

When the aircraft came to rest on the ground the fuel supply to the engine stopped, but the considerable amount of fuel which at that time undoubtedly was in the belly of the aircraft, continued burning, burned through the oil lines, set the oil on fire and eventually reached the fuel tanks.

Probable Cause

The accident was caused by an in-flight fire, initiated and sustained by a severe fuel leak. The fuel leak was caused by the locking of a carburettor drain plug being omitted, thus permitting the plug to unscrew.
