No. 20

Air Transport (Charter) (C.1) Ltd., Dakota aircraft, G-AJVZ; crashed following take-off near Ringway Airport, Manchester on 27 March 1951, MCA Civil Aircraft Accident Report MCAP 96

Circumstances

The aircraft was operating a night newspaper service from Ringway Airport, England, to Nutts Corner Airport, Belfast. Following an erratic take-off in conditions of falling snow the aircraft swung to port and failed to gain height. One or both of the engines were heard to cut out a few times and the aircraft struck a tree about half a mile from the end of the runway, dived into the ground and was wrecked. Both pilots were killed.

Investigation and Evidence

Prior to departure the route forecast was carefully explained to the crew. It was made clear that a wide area of precipitation in the form of sleet and snow which lay to the North of Ringway was moving South and would be very near the airfield at the expected time of take-off. Freezing level in the vicinity of this front was expected to fall to 500/1,000 feet. It was pointed out that cloud on and to the North of the front would be frequently "solid" from 400 feet to 9,000-10,000 feet with moderate rime and risk of moderate clear ice at times. Screen temperatures and relative humidities were not asked for or given and it is not a statutory or an international requirement to show these on a route forecast.

The Captain supervised the loading of the aircraft and on its completion, removed the external locks which he placed inside the fuselage. The Captain did not request or take any action to clear snow from the wings. The aircraft taxied out to the threshold of the runway and the sound of the engines being run up was heard. The tower notified the Captain "You are clear to take-off. There is a slight risk of ice on the runway" which message was acknowledged.

For take-off the landing lights were switched on. The take-off run appeared to be normal but the aircraft did not become airborne until near the end of the 1,400-yard runway. It then swung to port and failed to gain height in the normal way. During this time one or both of its engines were heard to cut out momentarily several times. It then struck the top of a tree. The noise of the engines ceased and a second or so later came the sound of a crash. A witness who was close to the scene of the crash stated that it was then snowing heavily. No evidence of pre-crash mechanical failure was found, but the carburettor of each engine bore soot deposits suggestive of back-firing due to an incorrect mixture.

The carburettors fitted were the Bendix-Stromberg injection type. For fuel injection an "X" bar fuel discharge nozzle is employed. In this type neither the throttle nor the choke tubes are heated automatically. Each of these carburettors, however, was fitted with a heat control (to combat icing) in the form of an air scoop flap for selecting hot or cold air to the carburettor. This shutter was operated manually from the cockpit, the control being situated to the right of the throttle controls on the engine control pedestal. In addition, each carburettor was fitted with an electrically operated spraying device for injecting alcohol into the throat. Each carburetto was fitted with an intake screen and these screens were distorted in an almost identical manner. Normally the screens are almost flat and the distortion was strongly suggestive of icing or packing with frozen snow since under such a condition supercharger depression would tend to suck the screen inwards. Such icing-up of the screens would have the effect of upsetting the engine performance and causing serious loss of power. No external screens were fitted.

Owing to the extensive damage it was not possible to ascertain the position of the heat control flaps before the crash. The magneto master switch was found in the "OFF" position.

The Dakota Operating Manual issued by Air Transport (Charter) (C.1) Ltd., contained instructions for the operation of the heat controls and of the alcohol spray when the outside air temperature was below - 1° C. with, or without precipitation. No mention was made, however, that carburettor icing can take place at outside air temperatures above 0° C. in conditions of high relative humidity.

Attention was drawn to the fact that the atmospheric variables that have the greatest effect on induction system icing are air temperatures and relative humidity. Owing to the temperature drop in the induction system, ice may form in the carburettor or intake when the relative humidity approximates to 100 per cent and the outside air temperature is considerably above 32°F.

Icing becomes more severe when water exists in the form of rain, snow or sleet concurrently with the above conditions. The weather conditions obtaining at the time of take-off, i.e. air temperature 34.2° F., relative humidity 97 per cent and falling snow, were ideal for the rapid formation of ice in the carburettor and blockage by snow freezing on the carburettor intake screens.

It was further noted that when the carburettor heat control is in the hot air position, air is taken from a duct behind the cylinders into which snow cannot enter and the air is sufficiently hot to prevent ice formation although a slight loss of power may occur which must be taken into consideration for take-off.

Probable Cause

The probable cause of this accident was the inability of the aircraft to gain height shortly after becoming airborne, due to loss of engine power caused by ice formation in the carburettor intakes attributable to the Captain's failure to make use of the heat controls. An extended undercarriage and the presence of snow on the wings may have been contributory factors.

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