

**SERIOUS INCIDENT**

<b>Aircraft Type and Registration:</b>	Convair CV-580, N151FL	
<b>No &amp; Type of Engines:</b>	2 Allison D13D CV-340-580STC turboprop engines	
<b>Year of Manufacture:</b>	1953 (Serial no: 51)	
<b>Date &amp; Time (UTC):</b>	27 January 2015 at 1718 hrs	
<b>Location:</b>	Owen Roberts International Airport, Cayman Islands	
<b>Type of Flight:</b>	Commercial Air Transport (Cargo)	
<b>Persons on Board:</b>	Crew - 2	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	None	
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence	
<b>Commander's Age:</b>	34 years	
<b>Commander's Flying Experience:</b>	5,584 hours (of which 4,759 were on type) Last 90 days - 161 hours Last 28 days - 39 hours	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot	

**Synopsis**

The aircraft was approaching the airport on Grand Cayman when the crew noticed that the hydraulic system fluid contents were low. They delayed landing until the appropriate crew drills had been actioned. However, during the latter stages of the landing roll, the crew sensed a lack of brake retardation, directional control was lost and the aircraft left the right side of the runway onto the grass. There was no consequential damage.

**History of the flight**

As the aircraft approached Owen Roberts International Airport, the crew noticed that the hydraulic fluid contents were abnormally low. They advised Air Traffic Control that they would postpone the landing until they had completed the checklist for hydraulic fluid loss. Flaps could only be partially lowered and the landing gear was extended by free-fall.

On completion of the checklist, they checked that all the landing gears were down and locked and subsequently landed normally on Runway 26. The wind was from 320° at 8 kt gusting 12 kt. During the final stages of the landing roll, the crew sensed a lack of braking and no response from the nosewheel steering. They lost directional control and could not prevent the aircraft from leaving the paved surface to the right. It came to a halt on the grass some 150 ft from the centreline, approximately at right angles to the runway heading. There was no damage to the aircraft or injuries to the crew.

## Hydraulic system description

A single Engine Driven Pump (EDP) or a backup AC electrical pump is used to pressurise the Main hydraulic system to power various services including flaps, brakes, nosewheel steering and landing gear retraction/extension. In the event of Main system failure (and to provide ground hydraulic power when the engines are not running) a DC electrical auxiliary pump can be used to pressurise the system.

In the event that a leak develops in the system, and the reservoir empties such that the main system no longer functions, operation of the AUX HYD PUMP switch starts the DC pump and operation of a Bypass selector isolates all components except the brakes, flaps and main entry door. The auxiliary system uses the last 2.5 US gallons of the reservoir and supplies sufficient fluid for one full flap extension and 15 normal brake applications. The aircraft's Flight Manual cautions against running the DC pump for more than 5 minutes due to possible overheating issues.

There is also an hydraulic accumulator which, when the Bypass selector is operated, supplies hydraulic pressure only to the brakes.

A further high-pressure air bottle can be used to release the landing gear uplocks to allow gear free fall and, if necessary, supply air pressure to operate the brakes in an emergency. Pressure sufficient for about eight brake applications is available with a fully charged bottle.

The company's checklist for HYDRAULIC FLUID/PRESSURE LOSS includes the following actions for 'IF FLUID LEVEL LOW OR DROPPING':

Bypass .....Up  
 AC Hydraulic Pump.....Off  
 DC Hydraulic Pump.....As required

It also contains the following warning:

*'Use of the DC pump can deplete the reserve hydraulic fluid supply'*

## Investigation

Upon examination, it was found that the right main landing gear actuator was leaking, which was the reason for the loss of hydraulic fluid. Operation of the Bypass selector in accordance with the checklist meant that nosewheel steering was no longer available and probably the remaining hydraulic fluid was exhausted by the partially successful attempt to lower the flaps. This left only the hydraulic accumulator and the emergency pneumatic pressure bottle to operate the brakes. However, it was found that a valve forming part of the anti-skid control box was defective. It was reported that this defect had the effect of inhibiting operation of the brakes when either the accumulator or emergency pneumatic systems were used to operate them.