



National Transportation Safety Board Aviation Accident Final Report

Location:	HAMILTON, MT	Accident Number:	SEA98LA118
Date & Time:	07/02/1998, 1149 MDT	Registration:	N900CS
Aircraft:	Dassault MYSTERE FALCON 900	Aircraft Damage:	Substantial
Defining Event:		Injuries:	9 None
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot reported that, after a normal approach and touchdown, he applied the brakes and thrust reversers. He stated that as the aircraft slowed to 60 to 70 knots, it veered to the right and exited the side of the runway. The pilot regained directional control after the aircraft exited the runway. Before the aircraft came to a stop, the right wing collided with the VASI lights for the opposite runway. Skid marks leading to the exit point on the runway, indicated that the right-side tire marks displayed heavier braking action than on the left side. Post-accident testing performed on the anti-skid generators revealed that the left-side inboard and outboard generators failed the manufacturer's specifications. The right-side inboard and outboard generators passed all manufacturers specifications. The left-side generators were disassembled. The inspection did not reveal any anomalies. A slight difference in the brush wear between the brush fittings was noted between the two generators. A short circuit between two adjacent collectors was found in the outboard generator rotor fitting. The manufacturer's representative reported that the short circuit was not due to a failure within a cell of the rotor, but was likely due to contamination present between the two collectors.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Partial failure of the anti-skid brake system due to contamination.

Findings

Occurrence #1: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings

1. (C) LANDING GEAR,ANTI-SKID BRAKE SYSTEM - CONTAMINATION
2. (C) LANDING GEAR,ANTI-SKID BRAKE SYSTEM - FAILURE,PARTIAL
3. OBJECT - VASI LIGHT/SYSTEM

Factual Information

On July 2, 1998, at 1149 mountain daylight time, a Dassault Mystere Falcon 900, N900CS, registered to Charles Schwab and Company, operated by TAG Aviation USA as a 14 CFR Part 91 personal flight, veered off the side of the runway at Hamilton, Montana, and collided with VASI lights during the landing roll. Visual meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed. The aircraft was substantially damaged. The two airline transport pilots, the one flight attendant and the six passengers were not injured. The flight had departed from San Francisco, California, about one-hour and forty minutes prior to the accident.

The pilot reported that a normal visual approach was accomplished to runway 34. The pilot stated that the aircraft touched down about 200 feet from the threshold. In one written statement, the pilot reported that a normal rollout with braking and thrust reverse application occurred, while in another statement the pilot reported that a rollout with heavier than normal braking and thrust reverse application occurred. The pilot stated that, as the aircraft slowed to approximately 60 to 70 knots, the aircraft veered to the right and exited the side of the runway. The pilot stated that directional control was regained after the aircraft exited the runway. Before the aircraft came to a stop, the right wing collided with the VASI lights for runway 16, damaging the leading edge high-lift device and the extended flap.

The pilot reported that the pre-landing checklist items were accomplished. One of the checklist items is to push-to-test the anti-skid system. The pilot reported no warning malfunctions.

The Cockpit Voice Recorder was read-out by the National Transportation Safety Board, Office of Research and Engineering, Vehicle Recorders Division. The recording verifies that the checklist procedures were accomplished prior to touchdown.

Skid marks leading to the exit point on the runway indicate that the right-side tire marks displayed heavier braking action than the left-side tire marks. After the right-side high-lift device was replaced, the aircraft was flown to the operator's maintenance facility. The operator's mechanic reported that a functional test of the anti-skid system was found "okay" in accordance with the Falcon 900 Maintenance Manual procedures. Brake pressure was also okay. The anti-skid generators were functionally tested. The test found that the number 1 (left side outboard) tested with a low voltage output. Numbers two and four (left inboard and right outboard) tested with a high voltage output. Number three (right outboard) tested within normal voltage range, but high in accordance with the Falcon maintenance manual specifications.

The anti-skid generators underwent further testing and subsequent tear-down inspection. The tachometer generators are manufactured by Messier-Hispano-Bugatti. The Component Maintenance Manual description and operation states "The tachometer generator, intended to measure the speed of rotation of a wheel, generates a voltage proportional to the latter." The manual further states, "This unit is a rotating assembly whose wound rotor moves in the magnetic field of the stator fitted with permanent magnets. The induced electromotive force is proportional to the speed of rotation of the rotor. Voltage is rectified by two brush assemblies rubbing against a seven-blade commutator and is delivered by the two output wires."

Testing revealed that the left-side inboard and outboard generators failed the manufacturer's specifications. The right-side inboard and outboard passed all manufacturers specifications.

The two left-side generators were torn down. During the inspection, it was found that no particular anomalies were noted. A slight difference in the brush wear between the brush fittings was noted between the two generators. A short circuit between two adjacent collectors was found in the outboard generator rotor fitting. The manufacturer's representative reported that the short circuit was not due to a failure within a cell of the rotor, but was likely due to contamination present between the two collectors.

The Falcon 900 Maintenance Manual states that, "in the event of any problem related to the operation of the anti-skid system, or if a wheel has blocked during braking, check the tachometer-generators so as to check the voltage values in relation to the tachometer-generator rpm."

The manual also states that when replacing tires, functionally test the tachometer generator. The manual describes the functional test procedures.

The maintenance records indicate that the last functional tests were performed:

1. Right main gear inboard tachometer generator - December 5, 1995. Approximately 824 hours had been accumulated since the last test.
2. Right main gear outboard tachometer generator - July 21, 1995. Approximately 987 hours had been accumulated since the last test.
3. Left main gear inboard tachometer generator - August 1, 1994. Approximately 1,394 hours had been accumulated since the last test.
4. Left main gear outboard tachometer generator - August 9, 1995. Approximately 954 hours had been accumulated since the last test.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	42, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last Medical Exam:	04/01/1998
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:	9316 hours (Total, all aircraft), 780 hours (Total, this make and model), 7172 hours (Pilot In Command, all aircraft), 78 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Dassault	Registration:	N900CS
Model/Series:	MYSTERE FALCON 900 MYSTERE FA	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	104
Landing Gear Type:	Retractable - Tricycle	Seats:	15
Date/Type of Last Inspection:	03/07/1998, Continuous Airworthiness	Certified Max Gross Wt.:	46500 lbs
Time Since Last Inspection:	83 Hours	Engines:	3 Turbo Fan
Airframe Total Time:	3119 Hours	Engine Manufacturer:	Airesearch
ELT:	Installed, not activated	Engine Model/Series:	TFE-731-5B
Registered Owner:	CHARLES SCHWAB & CO.	Rated Power:	4700 lbs
Operator:	TAG AVIATION USA	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Observation Time:	0000
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear / 0 ft agl	Temperature/Dew Point:	18° C
Lowest Ceiling:	None / 0 ft agl	Visibility	50 Miles
Wind Speed/Gusts, Direction:	8 knots, Variable	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	SAN FRANCISCO, CA (SFO)	Type of Flight Plan Filed:	IFR
Destination:		Type of Clearance:	IFR
Departure Time:	0912 PDT	Type of Airspace:	Class E

Airport Information

Airport:	RAVALLI CO. (655)	Runway Surface Type:	Asphalt
Airport Elevation:	3638 ft	Runway Surface Condition:	Dry
Runway Used:	34	IFR Approach:	None
Runway Length/Width:	4200 ft / 75 ft	VFR Approach/Landing:	Traffic Pattern

Wreckage and Impact Information

Crew Injuries:	3 None	Aircraft Damage:	Substantial
Passenger Injuries:	6 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	9 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	DEBRA J ECKROTE	Adopted Date:	02/16/2001
Additional Participating Persons:	JAMES KIRBY; HELENA, MT		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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