National Transportation Safety Board
Aviation Accident Final Report

Location:	ROMULUS, MI	**Accident Number:**	CHI96LA082
Date & Time:	01/24/1996, 1018 EST	**Registration:**	N191MC
Aircraft:	Dassault DA-10	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	8 None
Flight Conducted Under:	Part 91: General Aviation - Executive/Corporate		

Analysis

The pilot reported getting an unsafe indication on the right main landing gear when the landing gear was lowered. The crew recycled the landing gear and got the same unsafe indication. The crew retracted the gear and diverted to Detroit. On arrival, the crew performed the 'landing gear abnormal extension checklist,' but the unsafe indication remained. The air traffic control tower reported that the gear appeared normal. During the landing, the right main landing gear retracted. The airplane slid sideways, striking a runway marker as it departed the runway, and came to rest in a field. Examination revealed that the right landing gear downlock mechanism could be overcome with physical force. Examination of the right landing gear actuator revealed that one of the six shims which separate the spacers and help guide the safety lock switch was out of position and lying on top of the lock assembly.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the right landing gear locking mechanism.

Findings

Occurrence #1: GEAR RETRACTION ON GROUND
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
1. (C) LANDING GEAR,GEAR LOCKING MECHANISM - FAILURE,PARTIAL

Occurrence #2: LOSS OF CONTROL - ON GROUND/WATER
Phase of Operation: LANDING - ROLL

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings
2. OBJECT - AIRPORT SIGN/MARKER
3. OBJECT - OTHER

Factual Information

On January 24, 1996, at 1018 eastern standard time (est), a Dassault-Breguet DA-10, operated by an airline transport pilot, sustained substantial damage when on landing at Detroit Metropolitan Airport, at Romulus, Michigan, the airplane's right landing gear collapsed. The airplane subsequently departed the runway and struck a runway remaining marker and runway visual range measuring equipment. Instrument conditions prevailed at the time of the accident. The flight was being conducted under 14 CFR Part 91. An IFR flight plan was on file. No injuries were reported by the two pilots and six passengers on board. The flight originated at North Philadelphia, Pennsylvania, at 0825 est, and was en route to Flint, Michigan.

In his written statement, the pilot reported getting an unsafe indication on the right main landing gear when the landing gear was lowered on approach into Flint, Michigan. The crew noted good hydraulic pressure and recycled the landing gear. The indications were the same; green lights on the left main landing gear and nose gear, and red lights on the right main landing gear and in the landing gear handle. The crew retracted the gear and received vectors to Detroit Metropolitan Airport. At Detroit, the pilot "requested runway 3R due to winds. This would allow for touchdown on the left main first." Prior to the approach, the crew tried one more normal extension, and received the same unsafe indication on the right main landing gear. The crew accomplished the "landing gear abnormal extension checklist." The red light for the right main landing gear remained illuminated and the light in the gear handle went out. The crew extended the flaps and got the landing gear warning horn. The pilot flew the airplane over the air traffic control tower for a visual inspection. The tower reported that the landing gear appeared normal. The crew completed the before landing checklist and set up for a landing on runway 3R. The airplane touched down on the left main landing gear first, and then the nose gear. When the right main landing gear touched down, it collapsed. The pilot kept the airplane on runway centerline "until rudder effectiveness was lost. At that point, the airplane began to slide to the right. It departed the runway sliding sideways until coming to a stop."

The Federal Aviation Administration (FAA) inspector who examined the wreckage reported finding the airplane resting in the field on top of the runway visual range measuring equipment, approximately 750 feet east of the runway and just south of "F" taxiway. The airplane's right wing showed scraping and impact damage to leading and trailing edge flaps, and wingtip. The right landing gear was collapsed under the right wing. A sixteen inch long and eight inch wide gash was found in the left side of the fuselage just forward of the left wing root, running from the wing root laterally underneath the fuselage. Paint transfer samples from the gash matched paint corresponding to the damaged 5000 foot runway remaining marker, which was in the airplane's path when it departed the runway. The gash, approximately seven to eight inches deep, penetrated the airplane's outer skin, underlying support structure and the inner passenger cabin wall. Flight control continuity was confirmed. Hydraulic and electrical systems were inspected and revealed no anomalies. No anomalies were found in the engines or engine controls.

Inspection of the right landing gear assembly revealed that the landing gear downlock mechanism could be overcome with physical force. The right landing gear actuator was removed and retained.

Testing, teardown and examination of the right main landing gear drag strut actuator was

accomplished by the FAA on February 2, 1996, at Aero Precision Repair and Overhaul (APRO), in Deerfield Beach, Florida. During initial testing, it was noted that the actuator would extend and retract, but would not lock. Teardown and examination of the actuator revealed that one of the six shims which separate the spacers and help guide the safety lock switch, was out of position and lying on top of the lock assembly. The shim was put back in place, and the actuator was reassembled and tested. The actuator performed properly.

Pilot Information

Certificate:	Airline Transport	**Age:**	46, 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):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	06/12/1995
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	11163 hours (Total, all aircraft), 1330 hours (Total, this make and model), 895 hours (Pilot In Command, all aircraft), 78 hours (Last 90 days, all aircraft), 31 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Dassault	**Registration:**	N191MC
Model/Series:	DA-10 DA-10	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	30
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	08/23/1995, Unknown	**Certified Max Gross Wt.:**	18740 lbs
Time Since Last Inspection:	187 Hours	**Engines:**	2 Turbo Fan
Airframe Total Time:	9829 Hours	**Engine Manufacturer:**	Garrett
ELT:	Not installed	**Engine Model/Series:**	TFE 731-2-1C
Registered Owner:	MASCO CORPORATION	**Rated Power:**	3250 lbs
Operator:	MASCO CORPORATION	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	DTW, 640 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	1027 EST	**Direction from Accident Site:**	290°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Overcast / 1300 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	17 knots / 26 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	310°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	-3°C / -7°C
Precipitation and Obscuration:			
Departure Point:	N. PHILADELPHIA, PA (PNE)	**Type of Flight Plan Filed:**	IFR
Destination:	FLINT, MI (FNT)	**Type of Clearance:**	IFR
Departure Time:	0825 EST	**Type of Airspace:**	Class B

Airport Information

Airport:	DETROIT METROPOLITAN (DTW)	**Runway Surface Type:**	Concrete
Airport Elevation:	640 ft	**Runway Surface Condition:**	Dry
Runway Used:	3R	**IFR Approach:**	
Runway Length/Width:	10000 ft / 150 ft	**VFR Approach/Landing:**	Full Stop; Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	6 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	8 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	DAVID C BOWLING	**Report Date:**	05/09/1996
Additional Participating Persons:	KEN WONG; BELLEVILLE, MI BRUCE J HILL; FT. LAUDERDALE, FL RUDY BIOLETTI; DEERFIELD BEACH, FL JOHN LAGERBERG; COLUMBUS, OH		
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.ntsb.gov/pubdms/.		