Aviation Investigation Final Report

Location:	Greeley, Colorado	**Accident Number:**	DEN01LA089
Date & Time:	April 25, 2001, 10:00 Local	**Registration:**	N666TC
Aircraft:	Cessna 140A	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot made a conventional, full-stall landing. Upon touch down, the right main landing gear failed. The airplane skidded to a halt, buckling the fuselage and landing gear box, and damaging the wing spar. Metallurgical examiunation disclosed cracks had initiated in one of two holes used to attach the step assembly to the landing gear spring. Chevron (or beach) marks on the fractured surface pointed back to the crack initiation site, and were consistent with fatigue cracking. The adjacent area was characterized by dimples, indicating the final breakage was due to a ductile fracture under overload.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: total failure of the right main landing gear spring due to fatigue.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
1. (C) LANDING GEAR,MAIN GEAR SPRING - FAILURE,TOTAL
2. (C) LANDING GEAR,MAIN GEAR SPRING - FATIGUE

Factual Information

On April 25, 2001, approximately 1000 mountain daylight time, a Cessna 140A, N666TC, was substantially damaged when the right main landing gear failed during landing at the Greeley-Weld County Airport, Greeley, Colorado. The recreational pilot, the sole occupant aboard, was not injured. Visual meteorological conditions prevailed, and no flight plan had been filed for the personal flight being conducted under Title 14 CFR Part 91. The flight originated at Hudson, Colorado, approximately 0915.

The following is based on a telephone interview with the pilot and the accident report he later submitted. The purpose of the flight was to practice pattern work accuracy and takeoffs and landings. The pilot made two low approaches to the runway at Greeley. On the third approach, he decided to make a landing. A full stall conventional landing was made. The right main landing gear broke on touch down and the airplane skidded to a halt. The fuselage and landing gear box were buckled, and the wing spar was damaged.

Both fractured ends of the main landing gear were cut away and sent to the Cessna Aircraft Company's Material and Process (M&P) Engineering Department, where they were metallurgically examined. The following is based on Cessna's M&P report:

The landing gear was made of 6150M steel, and microstructure examination disclosed it had a hardness and tensile strength that met Cessna's engineering specifications. Decarburization, approximately 0.015 inches in depth, was noted near the top surface of the landing gear. There was also deformation and roughening on the inside surface, consistent with shot-peening, also required by engineering specifications. Two holes, 3/16" in diameter, and two bolts and nuts were used to attach the step assembly to the landing gear spring. The bolts were not damaged. Florescent magnetic particle inspection revealed cracks had initiated at the top end of the lower hole. No cracking was observed at the inside end of the hole. The M&P report concluded that the landing gear spring cracked through the upper hole. Chevron (or beach) marks on the fractured surface pointed back to the crack initiation site, and were consistent with fatigue cracking. The fracture features were similar to quasi-cleavage, and faint crack arrest lines were observed. The fatigue region was very small, approximately 0.075 inches in depth. The adjacent area was characterized by dimples, indicating the final breakage was due to a ductile fracture under overload.

Pilot Information

Certificate:	Recreational	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 17, 2001
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 1, 2001
Flight Time:	131 hours (Total, all aircraft), 67 hours (Total, this make and model), 30 hours (Pilot In Command, all aircraft), 21 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N666TC
Model/Series:	140A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	15399
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	June 15, 2000 Annual	**Certified Max Gross Wt.:**	1500 lbs
Time Since Last Inspection:	56 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	8243 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	C-90-12F
Registered Owner:	Gregory W. Lair	**Rated Power:**	90 Horsepower
Operator:	George Lair	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GXY,4658 ft msl	**Distance from Accident Site:**	
Observation Time:	09:55 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	0 knots / 0 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.31 inches Hg	**Temperature/Dew Point:**	10°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hudson, CO (18V)	**Type of Flight Plan Filed:**	None
Destination:	Greeley, CO (GXY)	**Type of Clearance:**	None
Departure Time:	09:15 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	Greeley-Weld County GXY	**Runway Surface Type:**	Asphalt
Airport Elevation:	4658 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	6200 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	40.44057,-104.669219(est)

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	Thomas A Sciacca; FAA Flight Standards District Office; Denver, CO
Original Publish Date:	February 20, 2002
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=52127