Aviation Investigation Final Report

Location:	Beloit, Kansas	**Accident Number:**	CEN18LA230
Date & Time:	June 18, 2018, 12:30 Local	**Registration:**	N756SW
Aircraft:	Cessna TR182	**Aircraft Damage:**	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was practicing takeoffs and landings in the airport traffic pattern when the left main landing gear (MLG) failed to extend. He cycled the gear, but the left MLG still would not extend. He then attempted to manually extend the gear without success. The pilot subsequently executed an emergency landing on the turf runway.

During recovery of the airplane, one of the left brake caliper's back plate bolts was found backed out. Scrape marks were present on the fuselage skin, consistent with contact from the extended back plate bolt. The MLG extension/retraction system and the emergency extension system both performed normally during postaccident examination.

An annual inspection had been completed 6 days before the accident, and the airplane had accumulated a total of 3.2 hours since then. The mechanic that performed the inspection reported that the brake calipers were removed at that time and that the bolts had not been secured with safety wire after they were re-installed.

Given the evidence, it is likely that the mechanic did not properly torque the left brake caliper back plate bolt after he re-installed it during the annual inspection, which allowed it to back out and led to the subsequent failure of the left MLG to extend. Although safety wire would have prevented the bolt from backing out, the airframe manufacturer's service manual was not consistent about whether to use safety wire. Regardless, the bolt would not have backed out if it had been tightened within the specified torque.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The mechanic's failure to properly torque one of the left brake caliper's back plate attachment bolts while re-installing it during the annual inspection, which resulted in the left main landing gear not extending before landing.

Findings

Aircraft	Landing gear brakes system - Incorrect service/maintenance
Personnel issues	Scheduled/routine maintenance - Maintenance personnel
Organizational issues	Adequacy of policy/proc - Manufacturer

Factual Information

History of Flight

Approach-VFR pattern downwind	Sys/Comp malf/fail (non-power) (Defining event)
Landing	Landing gear not configured
Landing	Off-field or emergency landing
Landing	Abnormal runway contact
After landing	Collision with terr/obj (non-CFIT)

On June 18, 2018, about 1230 central daylight time, a Cessna TR182 airplane, N756SW, was substantially damaged during an emergency landing on runway 22 (2,381 ft by 110 ft, turf) at the Moritz Memorial Airport (K61), Beloit, Kansas. The pilot was not injured. The airplane was registered to and operated by the pilot as a Title 14 Code of Federal Regulations Part 91 personal flight. Day visual meteorological conditions prevailed. The flight was not operated on a flight plan. The local flight originated from K61 about 1140.

The pilot reported that he was conducting takeoffs and landings in the traffic pattern when the left main landing gear failed to extend. He had not experienced any problems with the landing gear prior to that point during the flight. He remained in the traffic pattern and cycled the landing gear but the left main landing gear would not extend. He also attempted to use the manual gear extension without success. He decided to execute an emergency landing on the turf runway.

The left horizontal stabilizer and elevator contacted the ground during the emergency landing resulting in substantial damage to the airplane.

The airplane was recovered from the accident site by the owner/pilot and a local mechanic. The mechanic had recently completed an annual inspection on the airplane. During recovery, they noted that one of the brake caliper attachment bolts had backed out about 3 or 4 turns, which caused the bolt to protrude about 1/4-inch. It appeared that the protruding bolt had caught on the fuselage skin at the perimeter of the wheel well causing the left main landing gear to remain retracted. The left brake caliper and wheel assembly was removed to facilitate recovery.

A postaccident examination conducted by a Federal Aviation Administration inspector did not reveal any anomalies with respect to the normal landing gear extension/retraction system, or with the emergency extension system. The inspector noted that about 1/2-inch of clearance existed between the wheel well opening and the brake caliper back plate bolts when the landing gear was retracted. The fuselage skin exhibited scrape marks in the vicinity of the back plate bolt when the landing gear was retracted. The inspector noted that the bolts on the right brake caliper back plate were not safety wired at the time of the examination.

The airplane maintenance records noted that an annual inspection was completed on June 12, 2018; 6 days before the accident. A total of 3.2 hours had accumulated since the inspection. The entry indicated

testing of the landing gear extension/retraction and emergency extension systems were completed. The mechanic informed the inspector that the brake calipers were removed during the annual inspection and that the bolts had not been secured with safety wire after they were re-installed.

The Cessna TR182 service manual noted, in figure 5.10, that the brake caliper back plate bolts should be torqued to 100 – 110 in-lbs and safety wired. In section 5-169, Brake Installation, the service manual stated that the back plate bolts should be torqued to 110 – 120 in-lbs. The use of safety wire was not mentioned in section 5-169.

Pilot Information

Certificate:	Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	BasicMed With waivers/limitations	**Last FAA Medical Exam:**	May 26, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 28, 2017
Flight Time:	716 hours (Total, all aircraft), 399 hours (Total, this make and model), 716 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 4 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N756SW
Model/Series:	TR182 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1979	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	R18201148
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 12, 2018 Annual	**Certified Max Gross Wt.:**	3100 lbs
Time Since Last Inspection:	3 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3661.6 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-540-L3C5D
Registered Owner:		**Rated Power:**	235 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CNK,1487 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	11:55 Local	**Direction from Accident Site:**	78°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	18 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.94 inches Hg	**Temperature/Dew Point:**	33°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Beloit, KS (K61)	**Type of Flight Plan Filed:**	None
Destination:	Beloit, KS (K61)	**Type of Clearance:**	None
Departure Time:	11:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Moritz Memorial K61	**Runway Surface Type:**	Grass/turf
Airport Elevation:	1416 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	22	**IFR Approach:**	None
Runway Length/Width:	2381 ft / 110 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:**	39.471111,-98.12889(est)

Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	Bobby Warren; FAA Flight Standards; Wichita, KS
Original Publish Date:	February 5, 2019
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97514