Aviation Investigation Final Report

Location:	Florence, South Carolina	**Accident Number:**	ERA18LA215
Date & Time:	August 9, 2018, 13:12 Local	**Registration:**	N1693R
Aircraft:	Cessna R182	**Aircraft Damage:**	Substantial
Defining Event:	Electrical system malf/failure	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Before departure on the personal flight, the private pilot reported that the engine had to be started using an auxiliary power supply because the battery was dead; however, he did not determine the reason for the dead battery. After the engine was started, he reported normal electrical system indications. About 10 minutes into the 20-minute flight, the pilot noticed that the electric fuel gauges were reading zero and the ammeter was showing a discharge. He did not consult or comply with emergency procedures from the pilot's operating handbook (POH) for a discharging ammeter and continued to his destination, where he attempted to extend the landing gear using the normal system; however, there was no down-and-locked indication. He confirmed visually that the nose landing gear was down and locked; he performed a fly-by of the air traffic control tower, was informed that the landing gear appeared to be down, and returned for landing. After touchdown, both main landing gear collapsed, the airplane began to veer to the left, and the left wing and horizontal stabilizer contacted the runway. The airplane came to rest in the grass off the left side of the runway. Postaccident examination and operational testing of the normal and emergency landing gear extension and indicating systems revealed no evidence of preimpact failure or malfunction that would have precluded normal operation. Had the pilot shed unnecessary electrical load per the POH when he first noticed the discharging state or pumped the landing gear down using the emergency gear extension mechanism, it is likely that the landing gear would have extended and locked into position. The reason for the electrical system failure was not investigated.

Probable Cause and Findings

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

The pilot's failure to comply with emergency procedures in the pilot's operating handbook, resulting in the collapse of the main landing gear during landing. Contributing to the accident was the pilot's failure to address the low battery voltage before departure.

Findings

Aircraft	(general) - Malfunction
Personnel issues	Decision making/judgment - Pilot
Not determined	(general) - Unknown/Not determined
Aircraft	(general) - Malfunction
Personnel issues	Lack of action - Pilot
Aircraft	(general) - Incorrect use/operation

Factual Information

History of Flight

Standing-engine(s) start-up	Electrical system malf/failure
Enroute-cruise	Electrical system malf/failure (Defining event)
Approach-VFR pattern downwind	Miscellaneous/other
Landing-flare/touchdown	Landing gear collapse
Landing-landing roll	Dragged wing/rotor/float/other
Landing-landing roll	Runway excursion

On August 9, 2018, about 1312 eastern daylight time, a Cessna R182, N1693R, was substantially damaged when its main landing gear collapsed during the landing roll at the Florence Regional Airport (FLO), Florence, South Carolina. The private pilot was not injured. The airplane was owned and operated by a flying club, under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight that originated about 20 minutes earlier from a private airstrip near Andrews, South Carolina.

The pilot stated that before departure, he performed a preflight inspection of the airplane using a copy of the checklist from the airplane's Pilot's Operating Handbook (POH). After the completion of the inspection he attempted to start the engine but could not because the battery was dead. A portable electrical power supply was required to start the engine. After the engine was started, he checked all gauges and reported normal indications, including the alternator, which was working. The ammeter indicated zero or a "hair to the right of zero" after the engine was started. Prior to departure he did not have a mechanic troubleshoot the reason for the dead battery.

The pilot further stated that after takeoff, he proceeded towards FLO, and about 10 minutes into the flight while flying at 2,500 feet mean sea level, and in communication with Florence Approach Control, he noted the fuel gauges were indicating zero and the ammeter was showing a discharge, or 3/16 to the left of zero. He did not consult, nor did he perform any emergency procedures from the POH pertaining to electrical system fault. He continued to FLO, lowered the landing gear by selecting the landing gear lever to the "GEAR DOWN" position and was cleared to land. Though he visually observed that the nose landing gear was extended, there was no indication from the single light on the instrument panel that all landing gears were down and locked. The pilot raised the landing gear selector handle then lowered it again, but again there was no landing gear down indication from the single light. He performed a flyby of the FLO air traffic control tower and was advised that the landing gear appeared to be down. He entered the downwind leg of the airport traffic pattern for runway 27 which he extended due to an inbound airplane, and at that time the tower controller asked him his intentions, but he was unable to reply because the airplane had lost all electrical power.

He turned onto the base and final legs of the airport traffic pattern for runway 27, and performed a shallow approach, touching down first on the main landing gear. During the landing roll about 500 to

1,000 feet down the runway, the main landing gear collapsed, the airplane began to veer to the left, and the left wing and horizontal stabilizer contacted the runway. The airplane came to rest in the grass off the left side of the runway near the intersection of runway 09/27 and 01/19.

According to personnel involved in recovery of the airplane, inspection of the cockpit prior to recovery revealed the landing gear selector was in the down position and the emergency extension handle was not extended. The airplane was raised from the runway and the right main landing gear was extended and locked by hand, while the left main landing gear was hand pumped into the down and locked position. Prior to lowering, the airplane's battery was turned on and there was insufficient voltage to power the airplane's electrical system. The airplane was then towed to the ramp.

Examination of the airplane was performed following recovery by a Federal Aviation Administration inspector. The examination revealed the battery voltage was 11V. The battery was then charged. The airplane was placed on jacks and jacked up, and with the battery connected it was indicating 24.11V. The master switch was turned on, and the gear green down and lock light was illuminated. The landing gear system was first exercised by electrically cycling the gear up, down, then up again. The aural horn was heard during the transition and functioned normally, and the amber gear up and lock light was illuminated when the gear was in the up position. Using the emergency procedures checklist found in the POH, under the emergency procedures section 3, paragraph 3.8, the master switch was turned off to simulate an electrical failure. The gear handle was put into the down position, the landing gear then fell with the force of gravity and were hand pumped into the down and locked position using the emergency hand pump. The master switch was then turned back on and the gear down and lock light was verified as being illuminated. The airplane was then removed from the jacks. No determination was made as to the reason for the electrical failure.

According to the Pilot's Operating Handbook, the procedures to perform when the ammeter shows discharge include:
1. Alternator -- OFF
2. Nonessential Radio/Electrical Equipment – OFF
3. Flight –TERMINATE as soon as practical

Pilot Information

Certificate:	Private	**Age:**	56,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 23, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 21, 2018
Flight Time:	376 hours (Total, all aircraft), 90 hours (Total, this make and model), 256 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1693R
Model/Series:	R182	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	R18200518
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	February 10, 2018 Annual	**Certified Max Gross Wt.:**	3100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	3997.6 Hrs	**Engine Manufacturer:**	Lycoming
ELT:		**Engine Model/Series:**	O-540-J3C5D
Registered Owner:	On file	**Rated Power:**	250 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:	KFLO,147 ft msl	**Distance from Accident Site:**	
Observation Time:	12:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	31°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Andrews, SC (PHH)	**Type of Flight Plan Filed:**	None
Destination:	Florence, SC (FLO)	**Type of Clearance:**	None
Departure Time:	12:52 Local	**Type of Airspace:**	

Airport Information

Airport:	Florence Regional KFLO	**Runway Surface Type:**	Asphalt
Airport Elevation:	147 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	6502 ft / 150 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:**	34.186111,-79.723609(est)

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Marjorie V Jake; FAA/FSDO; West Columbia, SC
Original Publish Date:	September 27, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98053