Aviation Investigation Final Report

Location:	Chemehuevi Valley, California	**Accident Number:**	WPR22LA093
Date & Time:	February 7, 2022, 16:00 Local	**Registration:**	N6496L
Aircraft:	Cessna 152	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control on ground	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

During the takeoff roll, after reaching rotation speed, the student pilot pulled back on the yoke but the airplane did not rotate. He verified the flight instruments and tried again, and although the nose pitched up slightly the airplane did not rotate. He released back pressure on the yoke and realized that the airplane had veered to the left of the runway. The airplane departed the runway and collided with a small tree. The flight was the first time the pilot had flown solo, having just received an endorsement from his flight instructor earlier in the day.

Postaccident examination did not reveal any anomalies with the pitch control system, and both the flaps and elevator trim were set appropriately for takeoff. The rudder cables exhibited significant preexisting wear in the area of the aft rudder pulleys, and the left cable had separated in that area. Metallurgical examination determined that about half of the left cable wire strands had failed before the accident due to wear, but the cable was likely still strong enough to operate the rudder. Therefore, the separation of the left rudder cable likely occurred at impact when the nose wheel, which was connected to the rudder cables, struck terrain, and the remaining intact wire strands of the weakened rudder cable failed in overload. Further, it is unlikely that the deteriorated rudder cables contributed to the accident as the pitch control issues described by the pilot did not indicate a rudder control problem.

The extent of wear and the caked and old grease in the pulleys indicated the cables had not been examined or serviced recently, even though the annual inspection was performed 3 months earlier.

Probable Cause and Findings

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

The student pilot’s loss of directional control during takeoff.

Findings

Personnel issues	Aircraft control - Student/instructed pilot
Aircraft	Directional control - Not attained/maintained
Aircraft	Rudder control system - Fatigue/wear/corrosion
Aircraft	Rudder control system - Inadequate inspection

Factual Information

History of Flight

Takeoff	Loss of control on ground (Defining event)
Takeoff	Runway excursion
Takeoff	Collision with terr/obj (non-CFIT)

On February 7, 2022, about 1600 Pacific standard time, a Cessna 152, N6496L, was substantially damaged when it was involved in an accident at Chemehuevi Valley Airport, Chemehuevi Valley, California. The student pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* instructional flight.

The flight was the first time the student had flown solo, having just received an endorsement from his flight instructor earlier in the day. He stated that during the first solo landing, the airplane experienced a pronounced nose wheel shimmy after touchdown. He exited the runway and communicated the event to his flight instructor, who told him it was likely a result of excessive braking after touchdown. He then departed and performed a series of uneventful takeoffs and landings while remaining in the traffic pattern. He stated that during his fifth takeoff, which was part of a touch-and-go landing, after reaching rotation speed, he pulled back on the yoke, but the airplane did not rotate. He verified the flight instruments and tried again, and although the nose pitched up slightly, the airplane did not rotate. He released back pressure on the yoke and realized that during the takeoff attempt, the airplane had veered to the left of the runway. The airplane departed the runway and collided with a small tree.

The airplane damage was generally limited to the left wing, which had folded down at the root, and the nosewheel, which remained partially attached to the firewall but had bent aft. Examination did not reveal any anomalies with the pitch control system. The elevator trim was set to the takeoff position, and the flaps were in the fully retracted (zero flaps) position.

The left nosewheel steering control rod was bent, and the eyebolts for both steering rods had broken away from the nosewheel trunnion. The shimmy damper remained attached to its steering arm and had also broken away from the trunnion. The separation surfaces of the control rods and shimmy damper exhibited damage consistent with overload.

The right rudder cable was continuous from the foot pedal assembly to the control surface, and the left cable had separated around the aft pulley in the tailcone. Examination of both cables revealed significant wear and wire fractures at the points where the cables passed around the aft pulleys. Both pulleys were free and could be spun easily by hand.

The cables were nominally 1/8-inch diameter, 7 by 19 wire construction, grade 304 stainless steel, which according to Textron Aviation had a breaking strength of 1,760 pounds.

The damaged sections of both cables were sent to the National Transportation Safety Board Materials Laboratory for analysis. Examination of the right rudder cable revealed that its diameter, which was nominally 0.132 inches through most of its length, had worn down to between 0.105 inch to 0.117 inch in the region that passed over the aft pulley. Multiple worn and broken wires were identified within this region.

Examination of the separated portions of left rudder cable revealed that it had fully fractured in the region around the aft pulley. Approximately 52% of the wires exhibited wear with about 43% of the wires exhibiting material loss through the full diameter of the wire due to wear. The balance of the wires fractured in overstress across the full wire diameter.

A visual inspection of the right and left aft pulleys showed that the grooves in the pulleys exhibited deposits and remnants of dried or degraded grease. No fresh grease was present. The airplane's most recent annual inspection was completed 3 months before the accident.

Pilot Information

Certificate:	Student	**Age:**	37,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	December 8, 2021
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 7, 2022
Flight Time:	22.9 hours (Total, all aircraft), 22.2 hours (Total, this make and model), 1.7 hours (Pilot In Command, all aircraft), 22.9 hours (Last 90 days, all aircraft), 22.2 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N6496L
Model/Series:	152	**Aircraft Category:**	Airplane
Year of Manufacture:	1980	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	15284420
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	November 6, 2021 Annual	**Certified Max Gross Wt.:**	1670 lbs
Time Since Last Inspection:	89 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	15308.2 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-235-L2C
Registered Owner:	On file	**Rated Power:**	110
Operator:	Mach 6	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KHII,783 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	16:15 Local	**Direction from Accident Site:**	55°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.26 inches Hg	**Temperature/Dew Point:**	22°C / -15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lake Havasu City, AZ (HII)	**Type of Flight Plan Filed:**	None
Destination:	Chemehuevi Valley, CA	**Type of Clearance:**	None
Departure Time:	15:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	CHEMEHUEVI VALLEY 49X	**Runway Surface Type:**	Asphalt
Airport Elevation:	638 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	34	**IFR Approach:**	None
Runway Length/Width:	5000 ft / 75 ft	**VFR Approach/Landing:**	Touch and go

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	34.528889,-114.43197(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Gavin McCune; FAA FSDO; Riverside, CA
Original Publish Date:	July 6, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=104616