Aviation Investigation Final Report

Location:	Vinton, Iowa	**Accident Number:**	CEN18LA278
Date & Time:	July 17, 2018, 13:45 Local	**Registration:**	N5553X
Aircraft:	Aero Commander S2R	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot stated that on final approach, he slowed the airplane for landing. When the airplane crossed the end of the runway, he reduced the throttle back, but the airplane would not slow, so he executed a go-around. During the go-around, the engine lost partial power and would not respond to the pilot's throttle inputs. The pilot then executed a forced landing in a cornfield, and the airplane sustained substantial damage to the fuselage and empennage.

Examination of the throttle control system revealed that the interlocking teeth mechanisms between the carburetor lever stop assembly and the throttle control lever were worn and lost integrity to interconnect. The teeth on the lever stop assembly were severely worn. Thus, it is likely that during the accident flight, when the pilot actuated the throttle control lever, the throttle control system failed when the worn-down teeth on the lever stop would not engage the teeth on the mating throttle control lever. This caused a loss of the throttle lever input, which allowed the engine to enter a low rpm condition. The material examination also noted a mismatch in hardness of the associated parts; although the hardness values were typical for the respective part compositions and microstructures, the mismatch in hardness lent itself to higher wear rates. A review of the airplane's maintenance records revealed that the carburetor had been removed for overhaul and reinstalled 135 hours before the accident. It is likely that maintenance personnel reinstalled the worn parts without thoroughly inspecting them.

Probable Cause and Findings

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

Loss of throttle control input due to a failure in the throttle control system. Contributing to the accident was the inadequate inspection and reinstallation of worn parts by maintenance personnel.

Findings

Aircraft	Fuel control/carburetor - Fatigue/wear/corrosion
Personnel issues	Repair - Maintenance personnel

Factual Information

History of Flight

Approach	Loss of engine power (partial) (Defining event)

On July 17, 2018, about 1345 central daylight time, an Aero Commander S2R airplane, N5553X, was substantially damaged when it was involved in an accident near Vinton, Iowa. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

The pilot stated he departed about 1254 from Vinton Veterans Memorial Airpark (VTI), Vinton, Iowa, with a load of fungicide. He sprayed two fields and had emptied all the fungicide in the airplane's hopper. He reported that the takeoff, flight to and from the fields, and flight while spraying the fields were uneventful. He then headed back to VTI for a straight-in approach for runway 9. At 1/2 mile out on short final, he slowed the airplane for landing, and when the airplane crossed the end of the runway, he reduced the throttle back to the normal landing position. After a couple of seconds, the pilot realized the airplane was not slowing down. He then reduced the throttle back more, and the engine rpms did not drop. At that point, the airplane was almost halfway down the runway, and the pilot decided to go around. The pilot stated that he advanced the throttle, the airspeed increased, and he proceeded to go around. The pilot flew the pattern back around and was almost abeam the landing threshold when he had to increase the throttle to maintain engine rpms. He stated that when he turned to final, he reduced power "just a little bit" and the engine lost "most" of its power. The pilot stated he pushed the throttle full forward and moved it back and forward again with no response from the engine. The pilot chose to conduct a forced landing in a sandy cornfield to the right of the approach end of runway 9, and the airplane sustained substantial damage to the fuselage and empennage.

Examination of the throttle control system revealed that teeth on the carburetor lever stop assembly and throttle control lever were worn out and no longer interconnected (see Figure 1); the lever stop assembly teeth were noted to be severely worn. When the throttle control lever was actuated, the worn-down teeth of the mating parts would glide over each other with no respective response from the carburetor lever stop assembly. The castellated hex retaining nut was found properly cotter pinned. Upon removal of the cotter pin, the nut could not be tightened to the next accessible castellation. The lever stop assembly roll pin was tight and had to be removed with a drift punch. Both levers fit tight on the throttle shaft. A logbook review indicated that a carburetor overhaul and installation was completed 135 hours before the accident. The associated parts were removed and sent to the National Transportation Safety Board Materials Laboratory for further examination, which revealed that the lever stop assembly had a composition consistent with aluminum alloy, while the composition of the throttle control lever was carbon steel. The hardness of the steel throttle control lever averaged

52 HRA and the hardness of the aluminum lever stop averaged 34 HRA; these data were typical for the respective part compositions and microstructures.

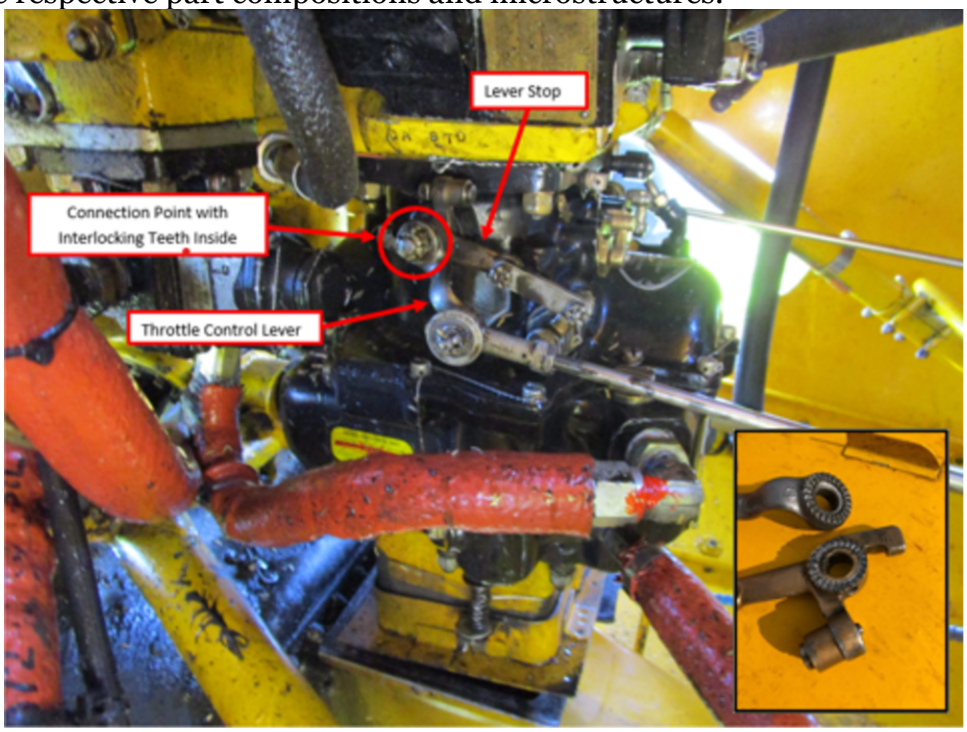

Figure 1: Diagram of Throttle Control Lever and Lever Stop from Accident Airplane with Inset Photo of Worn Teeth

The carburetor was removed for examination and bench testing. The carburetor passed the bench test, and no anomalies were found that would have precluded normal operation.

Pilot Information

Certificate:	Commercial	**Age:**	49,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	May 30, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	April 4, 2018
Flight Time:	1141 hours (Total, all aircraft), 201 hours (Total, this make and model), 1139 hours (Pilot In Command, all aircraft), 45 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Commander	**Registration:**	N5553X
Model/Series:	S2R	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	1753R
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	May 12, 2018 Condition	**Certified Max Gross Wt.:**	6000 lbs
Time Since Last Inspection:	92 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	15680 Hrs as of last inspection	**Engine Manufacturer:**	Pratt and Whitney
ELT:	Not installed	**Engine Model/Series:**	R-1340-S3H1-G
Registered Owner:		**Rated Power:**	600 Horsepower
Operator:		**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KVTI,845 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	13:35 Local	**Direction from Accident Site:**	92°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	29°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Vinton, IA (KVTI)	**Type of Flight Plan Filed:**	None
Destination:	Vinton, IA	**Type of Clearance:**	None
Departure Time:	12:54 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Vinton Veterans Memorial Airport KVTI	**Runway Surface Type:**	Concrete
Airport Elevation:	842 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	09	**IFR Approach:**	None
Runway Length/Width:	4000 ft / 70 ft	**VFR Approach/Landing:**	Go around

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:**	42.21934,-92.03833(est)

Administrative Information

Investigator In Charge (IIC):	Liedler, Courtney		
Additional Participating Persons:	Michael Newhall; FAA; Des Moines, IA		
Original Publish Date:	October 15, 2021	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97815		