Aviation Investigation Final Report

Location:	Sutter, California	**Accident Number:**	WPR19LA137
Date & Time:	May 5, 2019, 10:06 Local	**Registration:**	N3630D
Aircraft:	Grumman G164	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

Shortly after the pilot transitioned from climb to cruise flight, the engine power suddenly decreased to idle power without any control inputs from the pilot. He attempted to cycle the throttle to restore power but was unsuccessful. The pilot jettisoned the fertilizer payload he was carrying and initiated a forced landing to a nearby dirt road. The airplane impacted the ground short of the road and collided with trees before it came to rest, substantially damaging the wings and fuselage. The engine continued to run at idle power after the airplane came to rest.

Examination of the airplane found that an interconnect linkage between the fuel control unit (FCU) and propeller governor had separated from its mount and the bolt, nut, spacer and cotter pin normally used to secure the FCU interconnect rod to the FCU actuating lever were missing. Additionally, the cam designed to adjust the FCU and propeller governor conditions simultaneously through cockpit control inputs had fractured. This fracture was the result of overstress and likely occurred after the interconnect linkage separated.

Based on the design of the FCU, it is likely that the loss of power occurred when the FCU interconnect linkage disconnected in flight, which caused the FCU to revert to its idle power condition. The engine examination revealed no further anomalies, and the pilot reported that the engine continued to function on idle power after the airplane came to rest. As maintenance records indicated that the FCU intermediate linkage had recently been removed, it is likely that maintenance personnel disconnected the interconnect rod for easier access to the FCU. However, as the securing hardware was not recovered, the actual circumstances that led to the separation of the bolt, nut, and washer from the FCU could not be determined.

Probable Cause and Findings

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

A loss of engine power due to the in-flight separation of the fuel control unit interconnect rod for reasons that could not be determined due to lack of available evidence.

Findings

Aircraft	(general) - Failure
Aircraft	Fasteners - Not specified
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute-cruise	Powerplant sys/comp malf/fail (Defining event)
Enroute-cruise	Loss of engine power (total)
Landing	Collision with terr/obj (non-CFIT)

On May 5, 2019, at 1006 Pacific daylight time, a Schweizer Aircraft Corporation G-164B airplane, N3630D, was substantially damaged when it was involved in an accident near Sutter, California. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

According to the pilot, after completing 17 takeoffs that day, he departed the gravel runway to the south with about 45 gallons of Jet-A fuel and about 2,500 lbs of fertilizer onboard. He climbed to a cruise altitude of about 500 ft above ground level and set the power to 36 lbs of torque and the propeller to 2,000 rpm. Fifteen seconds after he established cruise flight and about 1 minute into the flight, the engine speed reduced to idle power without any control inputs from the pilot, and the airplane immediately began to descend. After an unsuccessful attempt to add power by advancing the throttle, the pilot jettisoned the load of fertilizer and initiated a forced landing to a nearby road. The airplane landed short of the road and impacted a group of prune trees before it came to rest. According to the pilot, the engine continued to run at idle power (about 52% Ng) after the airplane came to rest.

A review of photographs furnished by the operator revealed substantial damage to the wings and fuselage.

A detailed examination of the engine supervised by the National Transportation Safety Board (NTSB) investigator-in-charge revealed that the fuel control unit (FCU) interconnect rod was disconnected at the FCU actuating lever and the connection hardware was not recovered. The examination further showed that the reversing cam had fractured. The engine did not display any preimpact mechanical anomalies.

The airplane was powered by a Pratt & Whitney PT6A-34AG turboprop engine operated by three levers: a power lever, a fuel lever (condition lever), and a propeller lever. The power lever is used to control compressor speed and propeller pitch in beta and reverse. Power lever movements are transmitted from the cockpit to the FCU, which controls fuel flow to the engine. From the power idle to full reverse positions, the power lever can increase compressor speed and change the propeller blade angle into reverse pitch. The fuel lever delivers fuel to the combustion chamber in coordination with the lever position. The propeller lever controls propeller speed and allows the pilot to feather the propeller on the ground or during flight if necessary.

During engine operation, a reversing cam and FCU actuating lever coordinate inputs from the three cockpit controls with the FCU and propeller governor. The FCU interconnect rod joins the FCU to the propeller governor through the actuating lever and reversing cam (see figure 1). According to the engine

manufacturer, if the interconnect is disconnected during flight, the FCU arm, which moves the spring-loaded compressor speed scheduling cam within the FCU, will rotate counterclockwise under spring tension and bring the operating condition of the FCU back to idle power automatically (see figure 2). The FCU arm will remain at idle as long as the interconnect rod is separated. A bolt, nut, spacer, and cotter pin are normally used to secure the FCU interconnect rod to the FCU actuating lever.

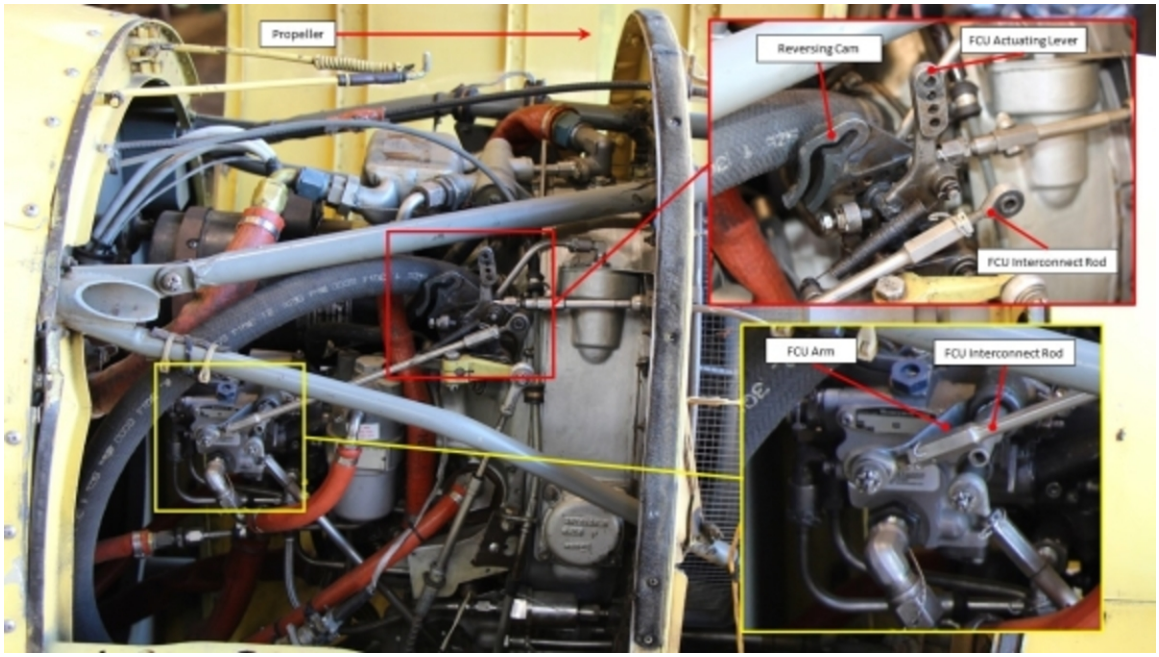

Figure 1: Fuel control unit connections

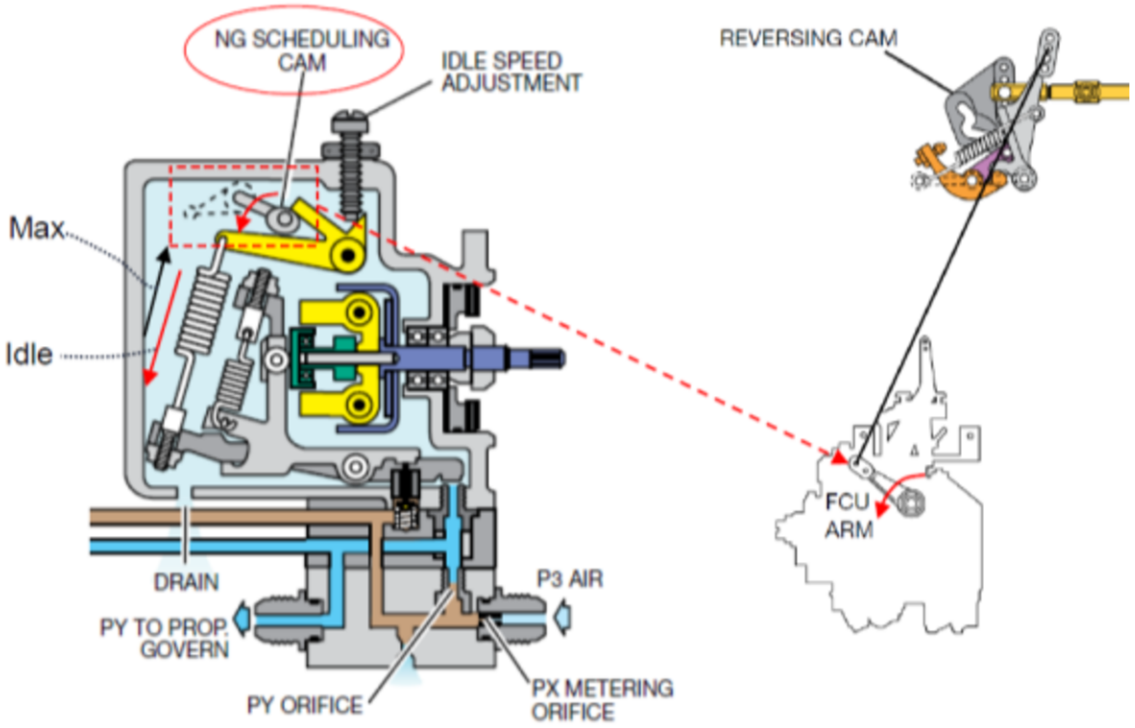

Figure 2: Fuel Control Unit Schematic

Review of the airplane's maintenance records revealed that the engine was removed from another airplane and installed in the accident airplane on May 14, 2014. Records showed that the FCU was repaired on May 22, 2017, and again on March 20, 2019. The director of maintenance reported that his mechanic would have disconnected the interconnect rod at the FCU arm and may have removed the interconnect linkage at the actuating arm during the last service for easier access to the FCU.

A NTSB material laboratory examination revealed that the reversing cam fracture faces exhibited a texture consistent with overstress and displayed no evidence of fatigue cracking. The FCU interconnect rod showed no evidence of corrosion or mechanical damage.

Pilot Information

Certificate:	Commercial	**Age:**	29,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	February 27, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 5, 2019
Flight Time:	5409.7 hours (Total, all aircraft), 4213.3 hours (Total, this make and model), 5359.6 hours (Pilot In Command, all aircraft), 103 hours (Last 90 days, all aircraft), 85 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Grumman	**Registration:**	N3630D
Model/Series:	G164 B	**Aircraft Category:**	Airplane
Year of Manufacture:	1984	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	756B
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	March 20, 2019 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	55 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	13561 Hrs as of last inspection	**Engine Manufacturer:**	Pratt and Whitney
ELT:	Not installed	**Engine Model/Series:**	PT6-34AG
Registered Owner:		**Rated Power:**	750 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:	KMYV,62 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	129°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.81 inches Hg	**Temperature/Dew Point:**	16°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Robbins, CA (PRIV)	**Type of Flight Plan Filed:**	None
Destination:	Robbins, CA (PRIV)	**Type of Clearance:**	None
Departure Time:	10:05 Local	**Type of Airspace:**	Class G

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:**	39.189445,-121.70861

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen		
Additional Participating Persons:	Brian Allen; Federal Aviation Administration; Sacramento, CA		
Original Publish Date:	May 3, 2022	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99398		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.