



# Aviation Investigation Final Report

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<b>Location:</b>	Addison, Texas	<b>Accident Number:</b>	CEN23LA062
<b>Date &amp; Time:</b>	December 12, 2022, 20:05 Local	<b>Registration:</b>	N231GZ
<b>Aircraft:</b>	MOONEY AIRCRAFT CORP. M20K	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	2 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The airplane lost all engine power during a precision instrument approach for landing to the destination airport. After the pilot was unsuccessful in attempting to restart the engine, he performed an off-airport landing to a road, during which the airplane struck a pole and a postcrash fire ensued. There was substantial damage to the wings and fuselage.

Postaccident examination revealed that about 12 of the camshaft gear teeth were fractured due to fatigue cracking. The airplane engine’s camshaft gear part numbers were affected by the engine manufacturer’s service bulletin (SB) for camshaft gear tooth fracture or cracks of the teeth. The SB called for the replacement of the camshaft gear with a newer model. The intent of the SB was to eliminate the possibility of camshaft gear tooth fracture, resulting in power loss or in-flight shutdown; compliance with the SB is not mandatory for Part 91 operations. Based upon the camshaft gear part numbers, the SB was not complied with but likely would have addressed the fatigue failure of the camshaft gear teeth.

The maintenance records for the airplane were destroyed in the postimpact fire and could not be examined.

## Probable Cause and Findings

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

The fatigue failure of the engine's camshaft gear teeth which resulted in a loss of all engine power. Contributing to the accident was the non-compliance with the engine manufacturer's recommended service bulletin.

## Findings

<b>Aircraft</b>	Recip engine power section - Failure
<b>Aircraft</b>	(general) - Not serviced/maintained
<b>Aircraft</b>	Scheduled maint checks - Not serviced/maintained

## Factual Information

### History of Flight

<b>Approach-IFR final approach</b>	Loss of engine power (total) (Defining event)
<b>Approach-IFR final approach</b>	Attempted remediation/recovery
<b>Landing</b>	Off-field or emergency landing
<b>Landing</b>	Collision with terr/obj (non-CFIT)
<b>Post-impact</b>	Fire/smoke (post-impact)

On December 12, 2022, about 2005 central standard time, a Mooney M20K, N231GZ, was substantially damaged when it was involved in an accident near Addison, Texas. The pilot and passenger were seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The flight originated at the Abilene Regional Airport (ABI) in Abilene, Texas, and was enroute to Addison Airport (ADS) in Addison, Texas. The pilot reported being vectored for an instrument landing system approach to runway 16 at ADS when the engine lost all power and the propeller automatically feathered. He stated that, after an unsuccessful attempt to restart the engine, he aligned the airplane with a road for a forced landing. During the approach to the road, the airplane impacted a power pole, which resulted in substantial damage to the wings and fuselage. A postimpact fire ensued.

During a postaccident examination, 12 of the camshaft gear teeth were found either broken or missing. Six of the gear teeth were found in the oil sump. The aircraft owner reported that the maintenance logbooks were in the airplane at the time of the accident and were burned, so a review of engine maintenance could not be performed.

In 2005 Continental Motors issued critical service bulletin (SB) CSB05-8C; in 2018, that SB was superseded by CSB05-8D. The SB pertained to certain camshaft gear part numbers on certain engines, including the TSIO-520-NB17N and the camshaft gear (part number 655516) installed on the accident airplane. The SB stated that during the airplane's next 100 hour or annual inspection, the camshaft gear should be replaced with the newer model, part number 656818, which increased the camshaft gear face circumference by .060 inches to prevent the possibility of camshaft gear tooth failure. At the time of the accident, the accident airplane still had the old camshaft gear installed. Although compliance with the SB is not mandatory for Part 91 operations, laboratory analysis confirmed that the gear teeth fractured due to fatigue cracks, which were consistent with the description from the SB.

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	60, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Lap only
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	September 1, 2017
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	May 21, 2021
<b>Flight Time:</b>	2400 hours (Total, all aircraft), 2000 hours (Total, this make and model)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	MOONEY AIRCRAFT CORP.	<b>Registration:</b>	N231GZ
<b>Model/Series:</b>	M20K	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1980	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	25-0253
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	Unknown	<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>		<b>Engine Manufacturer:</b>	Continental Motors
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	TSIO-520-NB17N
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	310 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Night
<b>Observation Facility, Elevation:</b>	KADS,644 ft msl	<b>Distance from Accident Site:</b>	2 Nautical Miles
<b>Observation Time:</b>	20:05 Local	<b>Direction from Accident Site:</b>	360°
<b>Lowest Cloud Condition:</b>	Unknown	<b>Visibility</b>	2 miles
<b>Lowest Ceiling:</b>	Overcast / 400 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	13 knots / 18 knots	<b>Turbulence Type Forecast/Actual:</b>	None / Unknown
<b>Wind Direction:</b>	120°	<b>Turbulence Severity Forecast/Actual:</b>	Unknown / Unknown
<b>Altimeter Setting:</b>	2984 inches Hg	<b>Temperature/Dew Point:</b>	17°C / 15°C
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Abilene, TX (KABI)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Addison , TX (KADS)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class D

## Airport Information

<b>Airport:</b>	Addison Airport KADS	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	645 ft msl	<b>Runway Surface Condition:</b>	Wet
<b>Runway Used:</b>		<b>IFR Approach:</b>	ILS
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Serious	<b>Aircraft Fire:</b>	On-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Serious	<b>Latitude, Longitude:</b>	32.9685,-96.8364(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Otterstrom, Kevin
<b>Additional Participating Persons:</b>	Jimmy Staggs; FAA / FSDO; Irving , TX
<b>Original Publish Date:</b>	April 18, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=106448">https://data.ntsb.gov/Docket?ProjectID=106448</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).