# Aviation Investigation Final Report

| | | | |
|---|---|---|---|
| **Location:** | Alamo, Nevada | **Accident Number:** | LAX08LA008 |
| **Date & Time:** | October 9, 2007, 12:44 Local | **Registration:** | N9612M |
| **Aircraft:** | Mooney M20F | **Aircraft Damage:** | Substantial |
| **Defining Event:** | | **Injuries:** | 2 None |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot reported that before departing for the cross-country flight, he added 1 quart of oil to the engine, for a total of 7 quarts. About an 1 hour 30 minutes into the flight, he noticed a rise in oil temperature. The pilot opened the cowl flaps and increased the mixture. This resulted in a drop in exhaust gas temperature (EGT). The oil temperature continued to rise; however, the oil pressure indicated a low reading. The pilot declared an emergency, and prepared to land on a dirt road. The pilot reported that the engine was backfiring before it suddenly stopped (froze). Once the engine quit, the airplane rolled sharply to the right. The pilot was able to correct back to level flight and landed in a sagebrush field close to a road, which resulted in substantial damage to the wings. Examination of the wreckage revealed a hole in the crankcase above and below the number 4 cylinder. An attempt was made to manually rotate the crankshaft; however, only partial rotation was possible about 8 inches in either direction. The examination also revealed no oil on the outside of the airplane or on the cowl. Investigators drained the oil out of the oil sump for a total of 0.75 to 1.25 quarts of oil. Along with the oil, portions of crankcase, lifter, piston, and connecting rod material were in the oil sump. The oil filter was opened and contained metallic debris throughout the filament and in the can. All of the cylinders exhibited internal mechanical damage, as well as thermal damage to the number 4 connecting rod journal. The number 2 piston compression ring remained in its ring land, but had broken into several pieces. Extensive oil coking signatures were noted around the circumference of the number 2 piston at the ring land, which is consistent with oil burn.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Failure of the number 2 cylinder piston compression ring, which resulted in oil exhaustion and

a catastrophic internal engine failure.

## Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Findings
1. (C) ENGINE ASSEMBLY,RING - FRACTURED
2. (C) FLUID,OIL - EXHAUSTION
3. ENGINE ASSEMBLY - FAILURE
---

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING
---

Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: LANDING - ROLL

Findings
4. TERRAIN CONDITION - HIGH VEGETATION

## Factual Information

HISTORY OF FLIGHT

On October 9, 2007, about 1244 Pacific daylight time, a Mooney M20F, N9612M, made a forced landing following a loss of engine power near Alamo, Nevada. The pilot/owner operated the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a personal cross-country flight. The airplane sustained substantial damage with structural damage to the wings. The private pilot and one passenger were not injured. The flight departed the Gooding Municipal Airport (GNG), Gooding, Idaho, about 1100 mountain daylight time (MDT), en route to the North Las Vegas Airport (VGT), Las Vegas, Nevada. Visual meteorological conditions prevailed and a visual flight rules (VFR) flight plan had been filed.

According to the Federal Aviation Administration (FAA), at 1220 a controller from Nellis Air Force Base radar identified the airplane, and was providing flight following services when the event occurred. At 1225, the pilot stated that the engine was losing power, and he was having a hard time maintaining altitude. At 1237, the Nellis controller lost radar and radio contact. Shortly thereafter, an airplane was sent out to find the accident airplane. The search airplane located, and then watched, as the accident airplane made a gear up landing on the desert floor.

The pilot reported that he had flown the airplane for 3.2 hours the day before the accident. He had departed for that flight to GNG with 6.5 quarts of oil. The next day he refueled at GNG with 44.7 gallons of fuel for a total of 64 gallons of fuel, and added 1 quart of oil to the engine for a total of 7 quarts of oil. He departed, and there were no problems experienced with the flight until they reached the Alamo area; about 2 hours into the flight. A few minutes before contacting Nellis, the pilot switched the fuel selector from the left tank to the right tank position. About 15 minutes later, the pilot observed the oil temperature gauge rise to about 200 degrees. He opened the cowl flaps and increased the mixture control, which dropped the exhaust gas temperature (EGT) by about 200 degrees. The oil temperature continued to rise for the next 2 minutes and the pilot declared an emergency with the Nellis controller. The pilot requested vectors to the nearest airport, but then determined that Alamo (Alamo Landing Field Airport), the closest airport, could not be reached. He prepared for a forced landing on a dirt road. The pilot observed the oil pressure needle to be well below the green arc. The propeller pitch went flat and the engine revolutions per minute (rpm) indicated 2,800 rpm's, which was the highest indication the pilot had ever seen on the rpm gauge.

The pilot stated that the engine began to backfire. When the airplane was about 500 feet above the ground, the engine froze and the airplane rolled sharply to the right. The pilot landed the airplane gear up in a sagebrush field, during which the airplane encountered a bush and sustained structural damage to the wing.

An FAA inspector responded to the accident site, and noted that the airplane came to rest upright on its belly and the propeller was in the feathered position. They visually inspected the airplane and did not remove the cowl, and found no oil on the outside of the airplane. The inspector was able to manually move the propeller about 8 inches in either direction.

TESTS AND RESEARCH

The airplane was inspected by a National Transportation Safety Board investigator. A visual examination revealed a small hole in the crankcase above the number 4 cylinder. There was no evidence of oil observed on the cowling or airframe. Partial rotation of the propeller via the crankshaft was obtained. The throttle, mixture, and propeller control lines remained attached and secure in their normal positions. The Safety Board investigator drained about 0.50 to 0.75 quarts of oil from the oil sump. The investigator removed the engine from the airframe and disassembled it.

Both magnetos remained secured at their respective mounting pads. Manual rotation of both magnetos produced spark at their respective posts. The starter remained attached and rotated freely by hand. The investigator removed the spark plugs. When compared to the Champion Check-A-Plug comparison card, the top and bottom spark plugs exhibited worn to worn-out normal signatures. The top and bottom one, three, and four spark plugs exhibited light gray deposits within the electrode area. The top and bottom number two spark plugs were black in color within the electrode area.

The oil pump drive shaft rotated freely by hand, and exhibited scoring on the internal cavity. The investigator noted about .25 to .50 quarts of oil remaining inside the oil sump. Debris, including portions of crankcase, lifter, piston, and connecting rod material, was observed in the oil sump.

The Safety Board investigator noted that the oil filter remained attached to the oil filter adapter and was secure with the safety wire intact. The oil filter was removed and cut open. Metallic debris was noted throughout the internal oil filter element.

The camshaft remained intact and exhibited some mechanical damage. The crankshaft was intact and undamaged. The crankcase exhibited internal mechanical damage within all cylinder bays. The most extensive damage was observed around all four quadrants of the number four cylinder bay. The investigator observed a hole in the crankcase above the number four cylinder, and another hole below the cylinder extruding into the oil sump area. The numbers 3 and 4 cylinders were not removed due to damage of the cylinder skirts. The number 4 connecting rod separated at the rod yoke, with the connecting rod cap remnants, bolts, and nuts located in the engine and oil sump. The number 4 connecting rod journal also exhibited thermal damage.

The investigator removed the number one and two cylinders and pistons, both of which exhibited mechanical damage. The number 1 and 2 piston rings remained intact and moved

freely within their respective ring lands. The number 2 piston compression ring remained in its respective ring land, but had fragmented into multiple pieces. There was no notable damage to the number 2 ring land, and the oil control ring was bound within its respective ring land. The investigator noted extensive oil coking signatures around the circumference of the number 2 piston in the area of the ring land.

## Pilot Information

| | | | |
|---|---|---|---|
| **Certificate:** | Commercial; Flight instructor | **Age:** | 61,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | Glider | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane single-engine | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 Without waivers/limitations | **Last FAA Medical Exam:** | September 1, 2007 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | September 1, 2007 |
| **Flight Time:** | 1300 hours (Total, all aircraft), 210 hours (Total, this make and model), 1300 hours (Pilot In Command, all aircraft), 50 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Mooney | **Registration:** | N9612M |
| **Model/Series:** | M20F | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 670189 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 4 |
| **Date/Type of Last Inspection:** | March 1, 2007 Annual | **Certified Max Gross Wt.:** | 2740 lbs |
| **Time Since Last Inspection:** | 100 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 4399 Hrs as of last inspection | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | IO-360-A1A |
| **Registered Owner:** | Daniel F. Miller | **Rated Power:** | 200 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

| | | | |
|---|---|---|---|
| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | VGT,2205 ft msl | **Distance from Accident Site:** | 63 Nautical Miles |
| **Observation Time:** | 12:53 Local | **Direction from Accident Site:** | 171° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 4 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 160° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.96 inches Hg | **Temperature/Dew Point:** | 26°C / -6°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | GOODING, ID (GNG ) | **Type of Flight Plan Filed:** | VFR |
| **Destination:** | LAS VEGAS, NV (VGT ) | **Type of Clearance:** | VFR flight following |
| **Departure Time:** | 11:00 Local | **Type of Airspace:** | |

## Wreckage and Impact Information

| | | | |
|---|---|---|---|
| **Crew Injuries:** | 1 None | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | 1 None | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 None | **Latitude, Longitude:** | 37.253334,-115.103332 |

## Administrative Information

| | |
|---|---|
| **Investigator In Charge (IIC):** | Cornejo, Tealeye |
| **Additional Participating Persons:** | Ron Williams; Federal Aviation Administration; Las Vegas, NV |
| **Original Publish Date:** | September 26, 2008 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=66893 |