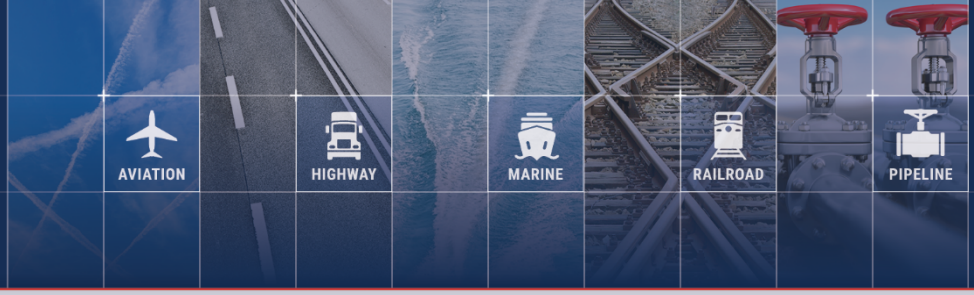


# Aviation Investigation Final Report

| | | | |
|---|---|---|---|
| **Location:** | TRACY, California | **Accident Number:** | LAX98FA208 |
| **Date & Time:** | June 29, 1998, 20:00 Local | **Registration:** | N76JF |
| **Aircraft:** | Frandsen MIDGET MUSTANG MM-1 | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The experimental airplane was on climbout following a touch-and-go landing. During the climb, the engine began sputtering and lost power. The airplane leveled off momentarily and then began a steep left turn back toward the runway. During the turn, the airplane descended and collided with a power line. The engine had lost power in flight on several prior occasions. The airplane was not equipped with a fuel boost pump or an engine-driven fuel pump. The fuel tank was mounted in the fuselage, immediately forward of the instrument panel with no accumulator tank. The headspace between the fuel tank and the carburetor was reduced whenever the airplane's pitch attitude increased. A minimum of 0.5 pounds of fuel pressure at the carburetor inlet is required for operation of the engine. The minimum flow volume required for engine operation is not specified. The tank had a single, under wing vent line. Dirt and a piece of plastic were found lodged in the 90-degree elbow of the fuel tank vent line at the point where the line enters the tank. The dirt had formed a ball and was located on the tank side of the piece of plastic. The fuel tank was also equipped with a vented fuel cap that was found in place; however, the vent hole in the cap had been covered with gray silicon sealant.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: inadequate maintenance/inspection by the owner/pilot that resulted in an obstructed fuel vent system and a subsequent loss of engine power during takeoff.

## Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) FUEL SYSTEM,VENT - OBSTRUCTED
2. (C) FUEL SYSTEM,CAP - OBSTRUCTED
3. (C) MAINTENANCE,INSPECTION - INADEQUATE - OWNER/PILOT MECHANIC
4. (C) FLUID,FUEL - STARVATION
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Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF
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Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Findings
5. OBJECT - WIRE,TRANSMISSION
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Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - RESIDENTIAL AREA

## Factual Information

HISTORY OF FLIGHT

On June 29, 1998, at 2000 hours Pacific daylight time, an experimental Frandsen Midget Mustang MM-1, N76JF, lost engine power and struck a utility line after making a touch-and-go landing at the Tracy Municipal airport in Tracy, California. The aircraft was destroyed and the certificated private pilot, the sole occupant, sustained fatal injuries. The aircraft was being operated as a personal flight by the owner/pilot under the provisions of 14 CFR Part 91 at the time of the accident. The flight had originated from the Tracy Municipal airport earlier that evening; however, the actual departure time could not be established. Visual meteorological conditions prevailed at the accident site and no flight plan was filed.

A witness to the accident reported that the pilot was on his initial climbout at 200 to 300 feet agl, after making a touch-and-go landing on runway 07. During the climb, the engine began sputtering and then quit. The aircraft leveled off momentarily and then began a steep left turn back toward the runway. During the turn the aircraft's nose dropped, and the aircraft disappeared from view behind some trees.

Runway 07 utilizes left traffic. There was no other known traffic in the pattern at the time of the accident.

The electrical utility company informed investigators that, during its descent, the aircraft had severed a single utility line.

PERSONNEL INFORMATION

The pilot, an automotive machinist, lived and worked in a rented hanger on the airport. He had been issued his private pilot certificate on October 21, 1973. His records were last updated on May 5, 1994, when he obtained his most recent medical certificate. At that time, he had no limitations or waivers, and reported a total flight time of 650 hours. The pilot's logbook was not located. The Federal Aviation Administration coordinator reported that the pilot had a biennial flight review (BFR); however, the date it was accomplished and the make and model aircraft used are unknown.

AIRCRAFT INFROMATION

The aircraft was issued an airworthiness certificate on August 28, 1980. Since that time it has flown a total of 239.9 hours, according to the aircraft logbook and the recording tachometer. It had flown 10.9 hours in the last 11 months.

There was no ELT found in the wreckage, and there was no aircraft logbook entry showing an ELT battery replacement due date.

The son of the pilot reported to Safety Board investigators that he had been told, by acquaintances of his father, that the engine had quit in flight on three prior occasions. On those occasions; however, the pilot had had enough altitude remaining to enable him to successfully restart the engine in the air. He said, as a result of those engine failures, his father had disassembled and inspected the engine.

The aircraft was not equipped with a fuel boost pump or an engine-driven fuel pump. The 15-gallon capacity fuel tank was mounted in the fuselage, immediately forward of the instrument panel. There was no accumulator tank. The headspace between the fuel tank and the carburetor is reduced whenever the aircraft's pitch attitude increases. The engine manufacturer reported that a minimum of 0.5 pounds of fuel pressure at the carburetor inlet is required for operation of the O-320 engine. This requirement is referenced in Teledyne Lycoming Operator's Manual 60297-16, section 3, item 10, "Operating Conditions." The manual does not specify the minimum flow volume required for engine operation.

Safety Board investigators found four metal containers in the aircraft hangar containing fuel that had the appearance and smell of auto gas. The fuel vendor on the field reported that the pilot did not have a fuel account at the airport. He also told Safety Board investigators that he did not remember ever servicing the aircraft with aviation fuel. There was no indication found that the aircraft's engine had been modified for use with auto gas.

WRECKAGE AND IMPACT INFORMATION

The aircraft came to rest on a cement slab in a gravel parking lot about 0.25 miles from the departure end of runway 07. The aircraft was found on a magnetic heading of 143 degrees when referenced from the leading edge of the main wings. The lowest line of three electrical transmission lines strung between two wooden poles showed evidence of having been spliced. The height of the spliced wire was approximately 30 feet. The direction from the splice in the utility line to the aircraft was 55 degrees. The angle from the utility line to the aircraft was about 50 degrees when referenced from a level horizon. The leading edge of the right wing exhibited a near vertical cut about 1.5 feet inboard from the wing tip.

The wreckage was upright; however, the aft and forward fuselage sections were partially separated from the fuselage center section. The right flap was in the retracted position while the left flap was partially extended. The manual flap linkage was separated from the handle. There was no flap indicator. The right aileron was separated from the wing, while the left aileron was partially separated from the wing as well. The left wing tip was separated from the wing. Both main landing gear were crushed and collapsed beneath the aircraft.

Control continuity was examined from the cockpit to the associated control surfaces. Due to the extent of damage, complete continuity could not be positively established.

The fuselage fuel tank was ruptured with no trapped or residual fuel found. The fuel quantity sight gauge had trapped fuel indicating 6 gallons. The fuel selector was in the 90-degree "off" position. The position was verified by attempting to blow into the fuel port, and then by disassembly with visual confirmation.

The tank had a single, under wing vent line. Dirt and a piece of plastic were found lodged in the 90-degree elbow of the fuel tank vent line at the point at which the line enters the tank. The dirt had formed a ball and was located on the tank side of the piece of plastic.

The fuel tank was also equipped with a vented fuel cap that was found in place; however, the vent hole in the cap had been covered with gray silicon sealant. Similar sealant was also found on other tank fittings, including the vent line segments.

The throttle and mixture cables were connected to the carburetor. Both controls were found in the forward position and showed evidence of impact damage. A fuel sample was obtained from the fuel line that was connected to the carburetor. The sample was clear and colorless and was free of any visible particulate matter. Kolor-Kut water finding paste was used to check the sample for water with negative results.

The carburetor was separated from the engine-mounting flange. The airbox was crushed and displaced from its mounted position; however, there was no foreign material or evidence of blockage. There was fuel remaining in the carburetor bowl. When the accelerator pump plunger was activated by hand, it produced a stream of fuel from the discharge tube in the carburetor throat. Kolor-Kut water finding paste was used to check for water in the bowl with negative results. The fuel had the coloration and odor consistent with auto gas. The carburetor was equipped with metal floats. There was no evidence of the floats chaffing or rubbing on the sides of the bowl. The floats showed no evidence of leakage. The float hinge was in place with no evidence of looseness or binding. The one-piece venturi was in place with no evidence of looseness. The carburetor inlet screen and the fuel strainer were clean and unblocked.

The engine remained attached to the airframe by the engine mount. There was evidence of damage to the lower forward section of the engine. The exhaust system was crushed aft. There were cracks at the juncture of the aluminum piping that had been welded to the steel exhaust flanges. The exhaust system was found free of any obstructions.

The engine case itself was fractured. The Lycoming factory data plate was attached at the engine oil sump. The engine had a serial number stamped on 1/2 of the case; however, a matching number was not found on the opposite half of the case.

The two-bladed, wooden, fixed pitch propeller remained attached to the propeller flange at the front of the engine crankshaft. The blades were splintered and bent aft about 40 degrees from their rotational plane. There were no identifying marks on the propeller itself. Attempts to

rotate the crankshaft by hand initially were not successful. Closer examination of the damage to the front of the case led investigators to suspect that the crankshaft had shifted forward. In order to determine whether the crankshaft was "pinched," investigators progressively loosened the thru bolts and the case half bolts so as to relieve the potential stress on the crankshaft. This method proved successful and the crankshaft was hand rotated.

Mechanical continuity was established through the valve drive train, rotating group and accessory section. The proper order of movement was also observed. Expected lift action was observed at each rocker assembly with the exception of the intake rockers at the No. 3 and 4 cylinder positions. These rockers appeared limited in their travel ability. Lubrication that was free of visible contaminants was observed at each rocker assembly. Thumb compression in the proper order was established at all four cylinders. The oil suction screen was examined and was found to be clean and uncontaminated.

Prior to further disassembly, the magneto to engine timing was checked utilizing a magneto syncro-phaser and the crankshaft mounted flywheel assembly. The left magneto was found attached to its mounting pad and connected to the top spark plugs of cylinders No. 2 and 4, and to the bottom plugs of cylinders No. 1 and 3. The impulse coupler was heard clicking intermittently during hand rotation of the crankshaft. The engine to magneto timing was observed at 24 degrees bottom-top dead center (BTDC) of the No. 1 cylinder. After removing the magneto, it was observed to produce a spark at all four leads during hand rotation. The magneto internal timing was checked by the engine manufacturer's representative and found to be within the manufacturer's specifications. The impulse coupler drive was found to be intact and properly saftied.

The right magneto was found attached to its mounting pad and connected to the bottom spark plugs of cylinders No. 2 and 4 and to the top plugs of cylinders 1 and 3. The impulse coupling was heard clicking intermittently during hand rotation of the crankshaft. The magneto to engine timing was observed at 23 degrees BTDC of the No. 1 cylinder. After removing the magneto, it was observed to produce a spark at all 4 leads during hand rotation. The magneto internal timing was checked by the engine manufacturer's representative and found to be within the manufacturer's specifications. The impulse coupler drive was found to be intact and properly saftied.

The ignition harness was severed at several locations; however, it remained attached to both magnetos and all spark plugs. The spark plugs, both top and bottom, were removed and examined. None exhibited any mechanical damage to the electrodes. The electrodes appeared dark and sooty. According to the Champion Spark Plug Check-A-Plug chart AV-27, the plugs showed coloration consistent with a rich air-fuel mixture. In addition, the No. 1 bottom plug was oil soaked.

The starter was securely attached to the mounting flange with the electrical connections secure at each post. The alternator was securely attached; however, the mounting flange showed impact damage. The electrical connections were secure at each post.

The engine was further disassembled and examined. All four cylinder assemblies were removed from the crankcase. There was no evidence of internal damage to any of the assemblies. The valve assemblies were secure with no visible evidence of damage or malfunction. There was no evidence of valve to piston face to contact. The piston rings were unbroken and properly configured. The accessory case was removed and the accessory gears and oil pump were exposed for examination. The gears were undamaged and the oil pump was free to rotate. Visual mechanical continuity was established for the crankshaft, connecting rods, and camshaft. There was no evidence of discoloration or heat distress on the crankshaft or rod journals.

The No. 3 and 4 intake valves that had previously appeared to have limited travel compared to their rockers were further examined. Upon closer inspection, the camshaft at the shared lobe revealed evidence of spalling and metal wear. The cam lobe was worn down about 0.125 inches when compared to the dimensions of the remaining lobes. Spalling was also observed at the corresponding tappets. The remaining cam lobes showed some evidence of spalling as well.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted on June 30, 1998, by the Office of the Sheriff-Coroner of San Joaquin County, with specimens retained for toxicological examination. The toxicological test results were negative for alcohol and all screened drug substances.

ADDITIONAL INFORMATION

The aircraft was released to Dennis James of Plain Parts, Pleasant Grove, California, a representative of the registered owner's estate on September 16, 1999.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 59,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Front |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | Yes |
| **Medical Certification:** | Class 3 Expired | **Last FAA Medical Exam:** | May 19, 1994 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 660 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

| | | | |
|---|---|---|---|
| **Aircraft Make:** | Frandsen | **Registration:** | N76JF |
| **Model/Series:** | MIDGET MUSTANG MM-1 MIDGET MUS | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | Yes |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | 786 |
| **Landing Gear Type:** | Tailwheel | **Seats:** | 1 |
| **Date/Type of Last Inspection:** | July 21, 1997 Annual | **Certified Max Gross Wt.:** | 900 lbs |
| **Time Since Last Inspection:** | 11 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 253 Hrs | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Not installed | **Engine Model/Series:** | O-320-A3B |
| **Registered Owner:** | DAVID LEE CRUSE | **Rated Power:** | 150 Horsepower |
| **Operator:** | | **Operating Certificate(s) Held:** | None |
| **Operator Does Business As:** | | **Operator Designator Code:** | |

## Meteorological Information and Flight Plan

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|---|---|---|---|
| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Dusk |
| **Observation Facility, Elevation:** | SCK ,30 ft msl | **Distance from Accident Site:** | 16 Nautical Miles |
| **Observation Time:** | 19:56 Local | **Direction from Accident Site:** | 23° |
| **Lowest Cloud Condition:** | Clear | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 11 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 270° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29 inches Hg | **Temperature/Dew Point:** | 22°C / 13°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | (TCY ) | **Type of Flight Plan Filed:** | None |
| **Destination:** | | **Type of Clearance:** | None |
| **Departure Time:** | 00:00 Local | **Type of Airspace:** | Class E |

## Airport Information

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|---|---|---|---|
| **Airport:** | TRACY MUNICIPAL TCY | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 193 ft msl | **Runway Surface Condition:** | Dry |
| **Runway Used:** | 7 | **IFR Approach:** | None |
| **Runway Length/Width:** | 3438 ft / 100 ft | **VFR Approach/Landing:** | Forced landing;Touch and go |

## Wreckage and Impact Information

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|---|---|---|---|
| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 37.729862,-121.419754(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Crispin, Robert |
| **Additional Participating Persons:** | RAY E MURPHY; OAKLAND , CA<br>MARK W PLATT; VAN NUYS , CA |
| **Original Publish Date:** | June 22, 2000 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=29956 |