# National Transportation Safety Board
# Aviation Accident Final Report

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| **Location:** | Peachtree City, GA | **Accident Number:** | MIA08LA156 |
| **Date & Time:** | 08/01/2008, 1450 EDT | **Registration:** | N227RD |
| **Aircraft:** | DIAMOND DA-20-C1 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Loss of engine power (partial) | **Injuries:** | 2 Minor |
| **Flight Conducted Under:** | Part 91: General Aviation - Flight Test | | |

## Analysis

Maintenance was performed to the airplane's rudder system and the operator requested a test flight. During the test flight the pilot noted no discrepancies with the airplane until the downwind to base turn; the engine would not produce full power. The pilot elected to perform a forced landing in an open field prior to the runway to avoid impacting trees that were in the flight path to the threshold. The terrain was full of debris, resulting in substantial damage to the airplane. The wreckage examination revealed no discrepancies with the airplane's flight control systems. The examination discovered that a check valve from the engine mechanical fuel pump return hose line back to the fuel tank was installed incorrectly (backwards). The engine was test run with the check valve installed both correctly and incorrectly. During both test phases, the engine accelerated normally without any hesitation or interruption in power. No discrepancies were noted that would have prevented the engine from producing power for normal flight operations.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power for undetermined reasons.

### Findings

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| **Environmental issues** | Rough terrain - Contributed to outcome |
| **Not determined** | Not determined - Unknown/Not determined (Cause) |

## Factual Information

On August 1, 2008, at 1450 eastern daylight time, a Diamond DA-20-C1, N227RD, incurred substantial damage during a forced landing following a partial loss of engine power, near the Peachtree City Airport-Falcon Field (FFC), Atlanta, Georgia. The certificated private pilot and the passenger received minor injuries. Visual meteorological conditions prevailed and no flight plan was filed. The airplane was operated by Falcon Aviation Academy, under the provisions of Title 14 Code of Federal Regulations Part 91 as a local maintenance test flight.

The airplane's rudder cables were scheduled for replacement as required by the manufacturer maintenance program. The airplane's fuel tank was removed to gain access to the cables. The cables were replaced and the fuel tank was installed. All of the required functional test and leak checks were completed as required in the maintenance manual; with no discrepancies noted. The operator's maintenance representative wanted to have the airplane flown in the airport traffic pattern once to ensure the airplane's rudder system was working properly before putting it back into service for the academy.

The pilot stated that he was requested to conduct the post maintenance test flight by the operator's representative. The pilot did not observe any deficiencies with the airplane during the preflight inspection. The fuel gage reading coincided with the dip stick reading of half a tank during the fuel check. There were no abnormalities noted during the start up, taxi, and pre-takeoff run up. The airplane's climb rate was 700 to 800 feet per minute after the takeoff. The throttle was maintained at full takeoff power during the upwind, crosswind, and the left downwind. Once the airplane was 45 degrees abeam to the approach end of the landing runway, the pilot reduced the engine power to a setting of 1,500 rpm. He extended the downwind an additional 1/2 -mile due to other traffic in the pattern. While turning for base, the pilot felt a little more power was needed to make the runway. By this time, he had started the descent from pattern traffic altitude of 1,000 feet above ground level and was about 1 1/2 miles away from runway 31. As he advanced the throttle, he noted the engine did not respond and observed the tachometer was indicating 800 rpm. He applied full power and the engine did not advance in rpm as he turned for final. The pilot did not recall at what altitude he was at but was aware the airplane was not going to reach the runway and elected to make a force landing in an open field. During the landing roll the airplane encountered cut tree debris, separating the empennage and engine from the fuselage before coming to a stop. The pilot and the passenger exited the airplane without assistance.

At the time of the accident the pilot had a total flight time of 237 hours, which 60 of those hours were in the accident make and model airplane. The airplane had a total time of 2,807 hours at the time of the accident. The IO-240-B Teledyne Continental Motor engine had 547 hours since major overhaul and a total time in service of 2,538 hours.

A wreckage examination was conducted with the airplane's airframe and engine manufacturer, along with a representative from the operator; with Federal Aviation Administration oversight. No discrepancies were noted with the airplane's flight control system that would have prevented normal operation. The examination discovered that a check valve from the engine mechanical fuel pump return hose line back to the fuel tank was install incorrectly (the arrow stamped on the valve, indicating the flow was backwards) to the fuel tank. The check valve was not removed during the removal and installation of the fuel tank, rather the hose itself was removed. The condition of the check valve was consistent with it being installed at time of the

airplane's assembly. The check valve has no time replacement requirements as per the airframe manufacturer. The airplane's maintenance manual instructions for removing and installing the fuel tank does not have a step to check to insure the check valve is installed correctly. The check valve was removed and retained with the engine to be examined at Teledyne Continental Motors, Inc (TCM) facility.

The engine was examined and test run at the TCM facility with National Transportation Safety Board oversight. Two test runs were conducted, one with the check valve installed correctly and the other with the check valve installed backwards. There were minimal parameter deviations during the tests. During both test phases, the engine accelerated normally without any hesitation or interruption in power. No discrepancies were noted that would have prevented the engine from producing power for normal flight operations.

## History of Flight

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| **Approach-VFR pattern base** | Loss of engine power (partial) (Defining event) |
| **Emergency descent** | Off-field or emergency landing |
| **Landing-landing roll** | Collision with terr/obj (non-CFIT) |

## Pilot Information

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| **Certificate:** | Private | **Age:** | 25, Male |
| **Airplane Rating(s):** | Single-engine Land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | Seatbelt, Shoulder harness |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 3 With Waivers/Limitations | **Last Medical Exam:** | 08/30/2007 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | 12/17/2007 |
| **Flight Time:** | 238 hours (Total, all aircraft), 59 hours (Total, this make and model) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Manufacturer:** | DIAMOND | **Registration:** | N227RD |
| **Model/Series:** | DA-20-C1 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | No |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | C0009 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 2 |
| **Date/Type of Last Inspection:** | 06/16/2008, 100 Hour | **Certified Max Gross Wt.:** | 1765 lbs |
| **Time Since Last Inspection:** | 57 Hours | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 2807 Hours | **Engine Manufacturer:** | Teledyne Continental Motors |
| **ELT:** | C91A installed, activated, did not aid in locating accident | **Engine Model/Series:** | IO-240-B |
| **Registered Owner:** | DA2009 LLC | **Rated Power:** | 125 hp |
| **Operator:** | Falcon Aviation Academy | **Air Carrier Operating Certificate:** | None |

## Meteorological Information and Flight Plan

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| **Observation Facility, Elevation:** | FFC, 808 ft msl | **Observation Time:** | 1453 EDT |
| **Distance from Accident Site:** | 1 Nautical Miles | **Condition of Light:** | Day |
| **Direction from Accident Site:** | 360° | **Conditions at Accident Site:** | Visual Conditions |
| **Lowest Cloud Condition:** | Few / 2400 ft agl | **Temperature/Dew Point:** | 28°C / 22°C |
| **Lowest Ceiling:** | Broken / 3100 ft agl | **Visibility** | 10 Miles |
| **Wind Speed/Gusts, Direction:** | Light and Variable, 290° | **Visibility (RVR):** | |
| **Altimeter Setting:** | 29.96 inches Hg | **Visibility (RVV):** | |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Peachtree City, GA (FFC) | **Type of Flight Plan Filed:** | None |
| **Destination:** | Peachtree City, GA (FFC) | **Type of Clearance:** | None |
| **Departure Time:** | 1445 EDT | **Type of Airspace:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Minor | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | 1 Minor | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Minor | | |

## Administrative Information

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| **Investigator In Charge (IIC):** | Jose Obregon | **Adopted Date:** | 05/06/2010 |
| **Additional Participating Persons:** | Richard Curtis; FSDO/FAA; Atlanta, GA<br>Chris Lang; Teledyne Continental Motors, Inc; Mobile, AL<br>Angel Colon; Falcon Aviation Academy; Atlanta, GA<br>Kevin Bruce; Diamond Aircraft Industries, Inc; Ontario, Canada, | | |
| **Publish Date:** | 05/06/2010 | | |
| **Investigation Docket:** | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/. | | |

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