# Aviation Investigation Final Report

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| **Location:** | Hilo, Hawaii | **Accident Number:** | LAX06LA236 |
| **Date & Time:** | July 18, 2006, 15:05 Local | **Registration:** | N6111A |
| **Aircraft:** | Hammack Air Command Elite | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | | **Injuries:** | 1 Serious |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The gyrocopter collided with terrain following an in-flight separation of a control system rod. While making a right turn about 500 feet above ground level (agl), the pilot experienced a loss of control and the gyrocopter continued to roll to the right. The pilot attempted to regain control by correcting for the increasing rate of turn and descent of the gyrocopter, but he was not able to. He attempted to perform a forced landing and subsequently collided with terrain adjacent to the destination airport. The gyrocopter was constructed by and regularly maintained by the pilot. A post accident examination of the wreckage revealed that a bolt attaching a control rod in the cyclic system was missing. The bolt and its respective nut were never located. The gyrocopter manual states that during a preflight inspection, the pilot should verify the integrity of the nylon locking nut by twisting it in a counterclockwise direction. If the nut moves during this check, it should be replaced before the gyrocopter is flown.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: an in-flight separation of a control rod joint assembly, which resulted in the pilot's loss of control. The underlying reason for the separation could not be determined.

### Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING

Findings
1. (C) ROTORCRAFT FLIGHT CONTROL,GYROCOPTER ROTOR CTL ARM - SEPARATION
2. (C) MISCELLANEOUS,BOLT/NUT/FASTENER/CLAMP/SPRING - MISSING
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Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings
3. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND
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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
4. TERRAIN CONDITION - GROUND

## Factual Information

On July 18, 2006, at 1505 Hawaiian standard time, an amateur-built Hammack Air Command Elite gyrocopter, N6111A, collided with terrain after the pilot experienced a loss of control near Hilo International Airport, Hilo, Hawaii. The pilot/owner was operating the gyrocopter under the provisions of 14 CFR Part 91. The commercial pilot, the sole occupant, was seriously injured; the gyrocopter was destroyed. The personal local flight departed from Hilo about 10 minutes prior to the mishap. Visual meteorological conditions prevailed and a flight plan had not been filed.

During a telephone interview with a National Transportation Safety Board investigator, the pilot stated that he departed runway 03. He continued toward the coastline and planned to return back to the airport to perform touch-and-go practice takeoffs and landings. After making an intended shallow right turn (toward the east) inland, while about 500 above ground level (agl), he attempted to maneuver the gyrocopter back to level flight and arrest the turn. The gyrocopter continued to turn and began a shallow descent.

The pilot further stated that the gyrocopter increased the rate of turn and continued to lose altitude. At 100 feet agl he realized that a forced landing was imminent. The aircraft collided with terrain about 15 feet from the main road Kalanianaole, located north of the airport.

The pilot constructed the gyrocopter and performed the maintenance on it regularly. He believed a pushrod had separated in the gyrocopter's controls. Over 2 to 3 years, the pilot had amassed 53 flight hours in the gyrocopter.

A Federal Aviation Administration (FAA) inspector examined the wreckage several weeks after the accident occurred. He stated that a bolt attaching a control rod in the cyclic system was missing. He was unable to locate the bolt or its respective nut.

A representative from Air Command International, Inc., the kit manufacturer, reviewed photographs taken by the FAA of the gyrocopter wreckage. He stated the separated piece appeared to be the heim joint (rod end) of the control tubes for the joystick (akin to a cyclic control). The representative reported that the heim joint was designed to be held in place by a nylon-locking (Nylock) nut and bolt system using a AN4-14A bolt, two AN4 washers, and a AN3625-428A ¼-inch lock nut. He noted that all the aforementioned hardware is included with the kit.

The representative further stated that the Nylock nut ensured a secure joint assembly upon proper fastening. He opined that the Nylock nut was not installed properly at the heim joint of the accident gyrocopter.

The Air Command International, Inc. Commander Elite Single-Place Assembly Manual (provided with the gyrocopter kit purchase) contains a section regarding the installation of hardware. It states that that the Nylock nuts comprise a nylon insert that locks the nut onto the threads of the bolt, preventing the nut from loosening. It adds that the Nylock nuts can be used more than once and still ensure a proper lock. The manual specifies that during a preflight inspection, the pilot should verify the integrity of the nut by twisting it in a counterclockwise direction. If the nut moves during this check, it should be replaced before the gyrocopter is flown. The manual additionally gives the bolt torque specification of 30 to 50 inch-pounds.

## Pilot Information

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| **Certificate:** | Commercial; Flight instructor | **Age:** | 71,Male |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Single |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | No |
| **Instructor Rating(s):** | Airplane single-engine; Instrument airplane | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 2 | **Last FAA Medical Exam:** | November 1, 2004 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | August 1, 2005 |
| **Flight Time:** | 2413 hours (Total, all aircraft), 53 hours (Total, this make and model), 2092 hours (Pilot In Command, all aircraft), 5 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Hammack | **Registration:** | N6111A |
| **Model/Series:** | Air Command Elite | **Aircraft Category:** | Gyroplane |
| **Year of Manufacture:** | | **Amateur Built:** | Yes |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | 1 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 1 |
| **Date/Type of Last Inspection:** | Annual | **Certified Max Gross Wt.:** | 650 lbs |
| **Time Since Last Inspection:** | 20 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 65 Hrs at time of accident | **Engine Manufacturer:** | Rotax |
| **ELT:** | Not installed | **Engine Model/Series:** | 532 |
| **Registered Owner:** | On file | **Rated Power:** | 65 Horsepower |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | PHTO,38 ft msl | **Distance from Accident Site:** | 1 Nautical Miles |
| **Observation Time:** | 14:53 Local | **Direction from Accident Site:** | 180° |
| **Lowest Cloud Condition:** | Few / 2500 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 9 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 40° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.03 inches Hg | **Temperature/Dew Point:** | 29°C / 21°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Hilo, HI (PHTO) | **Type of Flight Plan Filed:** | None |
| **Destination:** | (PHTO) | **Type of Clearance:** | VFR |
| **Departure Time:** | 14:55 Local | **Type of Airspace:** | |

## Airport Information

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| **Airport:** | Hilo International Airport PHTO | **Runway Surface Type:** | |
| **Airport Elevation:** | 38 ft msl | **Runway Surface Condition:** | |
| **Runway Used:** | | **IFR Approach:** | Unknown |
| **Runway Length/Width:** | | **VFR Approach/Landing:** | Forced landing;Touch and go;Traffic pattern |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Serious | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Serious | **Latitude, Longitude:** | 19.690149,-155.080032(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Keliher, Zoe |
| **Additional Participating Persons:** | Dave Lusk; Federal Aviation Administration; Honolulu, HI |
| **Original Publish Date:** | April 25, 2007 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=64148 |