National Transportation Safety Board
Aviation Accident Final Report

Location:	Green Bay, Wisconsin	**Accident Number:**	CHI06FA110
Date & Time:	April 13, 2006, 10:22 Local	**Registration:**	N202LF
Aircraft:	Messerschmitt-Bolkow-Blohm BO 105LS A-3	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Flight test		

Analysis

The emergency medical helicopter impacted terrain following takeoff when it began spinning around its vertical axis to a height of approximately 200-300 feet and descended without directional control. The copilot's anti-torque control pedals were found in their full forward position with a safety wire installation that would provide for forward travel of the anti-torque pedals which was contrary to specifications cited in the field approval for the pedal cover. Aircraft logbook entries show that the cover was reinstalled following a company training and evaluation flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadequate preflight check of the flight controls prior to takeoff and the directional contol not possible by the pilot. Additional causes were the improper installation of the anti-torque pedal cover by company personnel which blocked the flight control system.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF

Findings
1. (C) FLIGHT CONTROL SYSTEM - BLOCKED(TOTAL)
2. (C) PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND
3. (C) MAINTENANCE,INSTALLATION - IMPROPER - COMPANY MAINTENANCE PERSONNEL
4. (C) DIRECTIONAL CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT

Findings
5. TERRAIN CONDITION - OPEN FIELD

Factual Information

HISTORY OF FLIGHT

On April 13, 2006, at 1022 central daylight time, a Messerschmitt-Bolkow-Blohm BO 105LS A-3, N202LF, operated by County Rescue Services, Inc., as an emergency medical service (EMS) helicopter, received substantial damage on impact with terrain following a reported loss of directional control during takeoff from the operator's heliport, GRBC Rescue Heliport, Green Bay, Wisconsin. Visual meteorological conditions prevailed at the time of the accident. The 14 CFR Part 91 flight was not operating on a flight plan. The pilot was fatally injured. The local flight was originating at the time of the accident.

The pilot was conducting a maintenance test flight to check the VOR receiver that had been recently installed on the helicopter. Witnesses reported that as the helicopter lifted off the dolly located on the helipad (107 feet by 75 feet, concrete), it started rotating around the helicopter's vertical axis. They stated that the helicopter reached an altitude of approximately 200-300 feet above ground while still rotating. The helicopter stopped spinning and started "a rapid descent". The witnesses stated that the helicopter was descending at a speed "far greater than was reasonably possible" for a normal landing. The witnesses reported the helicopter struck the ground in an upright position.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot was issued a commercial pilot certificate with airplane single-engine land and rotorcraft-helicopter ratings on June 18, 2004. The pilot also held an instrument rating for airplanes and helicopters. On June 30, 2005, the pilot was issued a second class medical certificate with the limitation "use corrective glasses all times".

According to the operator's accident report, the pilot had accumulated 3,074 hours of total flight time, with 2,900 hours in helicopters. The pilot had 85 hours in the accident helicopter model. The pilot had flown 48 hours in the previous 90 days and 16 hours in the previous 30 days. The pilot had flown 4 hours in the accident model in the previous 30 days. According to operator records, the pilot successfully completed a 14 CFR Part 135 checkride, administered by a company 14 CFR Part 135 check airman, on March 31, 2006.

AIRCRAFT INFORMATION

The helicopter was a Messerschmitt-Bolkow-Blohm BO 105LS A-3, serial number 2014, built in 1987. The helicopter was converted for use as an EMS helicopter and was capable of seating 4 people. It had a certified max gross weight of 5,732 lbs.

The helicopter was issued a standard airworthiness certificate on September 8, 1988, and was operated by County Rescue Services, Inc. The FAA issued the current aircraft registration certificate on September 21, 2000. The last approved airworthiness inspection program (AAIP) inspection was completed on March 22, 2006. The helicopter had a total service time of

4,823 hours at the time of the accident. A review of the airframe maintenance records found no history of unresolved operational issues.

The helicopter was equipped with two 500 shaft horsepower Allison/Rolls-Royce 250-C28C turbo shaft engines, serial numbers CAE 280089 and CAE 280056 for the #1 and #2 engines, respectively. The #1 and #2 engines had total service times of 4,707.1 and 4,695.1 hours, respectively, at the time of the accident. A review of the engine maintenance records found no history of unresolved operational issues.

When the helicopter was converted to EMS use, the left front seat was reversed and the anti-torque control pedals in front of the seat are covered with a box. The original installation was performed on December 9, 1988, through a field approval by the FAA's Flight Standards Service and documented in Major Repair and Alteration (FAA Form 337) form. The FAA Form 337 states, in part:

> "Temporary removal of the covers shall be performed by a licensed airframe mechanic with a logbook entry only."

WRECKAGE AND IMPACT INFORMATION

The helicopter wreckage came to rest upright in a field adjacent to the operator's heliport. There were no ground scars near the point of impact. Three of the four main rotor blades remained attached to the main rotor head. The tail boom remained attached to the fuselage.

At left front (co-pilot) seat position, a box was found covering the anti-torque control pedals with a placard on the cover in red letters on a white background that stated: "Caution! The pedals must be in the full aft position for cover installation." Upon removal of the cover, the anti-torque control pedals were found to be in their full forward position and the safety wire was installed backwards. The forward travel of the left anti-torque control pedal was limited by a flange on the inside of the cover. The forward travel of the left pedal before contacting the internal flange was approximately 1.25 inches.

TESTS AND RESEARCH

On March 30, 2006, two entries were made in the aircraft logbook regarding the co-pilot anti-torque control pedal cover. The two entries stated:

> "3-30-06 ACTT 4,821.5 Installed dual controls I/A/W CRS Training Manual"
> "3-30-06 ACTT 4,823.3 Removed dual controls IAW CRS Tr Man"

The first entry was signed by the operator's director of operations and the second entry was signed by the operator's chief pilot, both of whom had received the training necessary to install and remove the anti-torque control pedal cover in accordance with company operation specifications and training requirements. The cover had been removed for a dual pilot training and evaluation session prior to the accident flight. The accident flight was the first flight after the co-pilot anti-torque control pedal cover had been re-installed.

According to the FAA Form 337, the adjustable anti-torque control pedals are required to be in their full aft position before the cover is installed. The anti-torque control pedal cover is also required to have the placard "Caution! The pedals must be in the full aft position for cover installation" written in white letters on a red background.

According to the helicopter manufacturer's representative, there are two drag screws on both pilot and co-pilot pedal assemblies that are required to be adjusted to "no play" between the end of the screws and the floor plate. The screws on both pedal assemblies were not adjusted to "no play" and the measured distance from the screws to the floor was approximately 0.025 inch.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Brown County Medical Examiner.

The FAA Civil Aeromedical Institute prepared a Final Forensic Toxicology Accident Report. The report was negative for all substances tested.

ADDITIONAL INFORMATION

A Special Airworthiness Information Bulletin, SW-06-65, was issued following the accident.

The parties to the investigation were the FAA, American Eurocopter LLC, Rolls-Royce, and County Rescue Services Inc. The Transportation Safety Board of Canada provided an accredited representative to the investigation.

The aircraft wreckage was released to a representative of the owner.

Pilot Information

Certificate:	Commercial	**Age:**	46,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 1, 2006
Flight Time:	3074 hours (Total, all aircraft), 85 hours (Total, this make and model), 2030 hours (Pilot In Command, all aircraft), 48 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Messerschmitt-Bolkow-Blohm	**Registration:**	N202LF
Model/Series:	BO 105LS A-3	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2014
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	March 1, 2006 AAIP	**Certified Max Gross Wt.:**	5732 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo shaft
Airframe Total Time:	4823 Hrs at time of accident	**Engine Manufacturer:**	Allison/Rolls-Royce
ELT:	Installed, not activated	**Engine Model/Series:**	250-C28C
Registered Owner:		**Rated Power:**	500 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	B65A

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	4WN7,640 ft msl	**Distance from Accident Site:**	
Observation Time:	10:21 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.04 inches Hg	**Temperature/Dew Point:**	18°C / 5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Green Bay, WI (4WN7)	**Type of Flight Plan Filed:**	Company VFR
Destination:	(4WN7)	**Type of Clearance:**	None
Departure Time:	10:21 Local	**Type of Airspace:**	

Airport Information

Airport:	County Rescue Services Helipor 4WN7	**Runway Surface Type:**	Concrete
Airport Elevation:	640 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	H1	**IFR Approach:**	None
Runway Length/Width:	107 ft / 75 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	44.471389,-87.994445

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Dennis C Grimslid; FAA - Milwaukee FSDO; Milwaukee, WI George E Miller; County Rescue Services, Inc.; Green Bay, WI Rick Thorpe; Rolls-Royce; Indianapolis, IN J A Syslo; American Eurocopter, LLC; Grand Prairie, TX
Original Publish Date:	January 31, 2008
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=63492

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.