



National Transportation Safety Board Aviation Accident Final Report

Location:	Scottsdale, AZ	Accident Number:	LAX04LA254
Date & Time:	07/01/2004, 1500 MST	Registration:	N513TS
Aircraft:	Eurocopter AS-350-B2	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	2 Minor

Flight Conducted Under: Part 91: General Aviation - Flight Test

Analysis

While performing a maintenance check flight, the collective down lock engaged, which resulted in an uncontrolled descent and collision with terrain. The pilot and a mechanic were to fly a maintenance flight check of the engine and perform a rotor track and balance. He entered a descent at approximately 1,200 feet above ground level (agl) and prepared to level off at approximately 700 feet agl. When he tried to pull up on the collective, the collective would not move and was observed latched by the collective down lock. He and the mechanic tried to unlatch the collective from the down lock, but they did not have enough time before he had to flare the helicopter for landing. With the collective stuck in flat pitch, they landed hard and with forward speed. The flight crew evacuated the helicopter once it had come to rest. An ensuing post accident fire destroyed the helicopter. A new after market avionics control panel had been installed and the collective down lock, which is secured to the panel, was adjusted prior to the flight. The down lock attaches to the lower section of avionics panel. When the collective is lowered to the lower pitch stop the clearance between the collective and the down lock is about 0.16 inches. The down lock is a flexible plate that is free to vibrate with the helicopter's normal rhythms. In the original factory installation, the clearance between the down lock and the collective is 0.3 inches. This is the second known accident where the collective lock has inadvertently engaged in flight with this particular after market avionics panel installed. The manufacturer of the aftermarket avionics panel provided installation information indicating that maintenance personnel must bend the collective locking plate such that the locking plate will spring away from the collective lock button. Examination of the accident aircraft's locking plate indicated that the locking plate bend was likely reversed, allowing the locking plate to spring toward the lock button.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Inadvertent in-flight engagement of the collective down lock, which resulted in an uncontrolled descent and ground impact. The collective down lock engagement was caused by the improper installation and/or adjustment of the collective locking system, which reduced the clearance between the locking plate and the collective control. A factor was the pilot's decision to embark

on a maintenance test flight after encountering difficulty disengaging the collective lock release during previous hover tests.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: DESCENT

Findings

1. (C) ROTORCRAFT FLIGHT CONTROL, COLLECTIVE CONTROL - LOCKED
2. (C) MAINTENANCE, INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

3. (C) REMEDIAL ACTION - NOT POSSIBLE - PILOT IN COMMAND

Factual Information

On July 1, 2004, at 1500 mountain standard time, a Eurocopter AS-350-B2, N513TS, collided with terrain 8 miles northwest of Scottsdale Airport, Arizona, while performing a maintenance check flight. Westcor Aviation, Inc., was operating the helicopter under the provisions of 14 CFR Part 91. The commercial pilot and a mechanic crewman received minor injuries, and the helicopter was destroyed. Visual meteorological conditions prevailed, and a flight plan had not been filed. The maintenance test flight originated at Scottsdale Airport.

The pilot reported in the Pilot/Operator Accident Report that they were performing a maintenance flight to check the engine and performing a rotor track and balance. He entered a descent at 2,700 feet mean sea level (msl) (approximately 1200 feet above ground level (agl)), and prepared to level off at 2,200 feet msl (approximately 700 feet agl). When he tried to pull up on the collective, the collective would not move. It was observed by the mechanic-crewman that the collective lock had engaged. He and the crewman tried to unlatch the collective from the down lock, but they did not have enough time before he had to flare the helicopter for landing. With the collective stuck in flat pitch, they landed hard and with forward speed. The flight crew evacuated the helicopter once it had come to rest. An ensuing post accident fire destroyed the helicopter.

Examination of the helicopter maintenance logbook revealed that the helicopter's factory avionics console was replaced with a Geneva P132 avionics console on June 7, 2004. On July 1, 2004, the Eurocopter 12-year major inspection was entered as complied with. One of the items entered in the logbook for the major inspection was a check of the collective lock, and the installation of a new collective lock button. The collective lock consists of an aluminum metal button that protrudes from the end of the collective grip and an 8-inch (approximately) sprung steel strap or flexible lock plate is attached to the either the cockpit deck or the avionics console depending on how the helicopter is equipped. The flexible lock plate is aligned in parallel with the vertical travel of the collective end. The flexible plate has a circular hole in the upper end that fits over the protruding collective lock button. The pilot locks the collective down by pushing it slightly past the lower pitch stop and pulling the flexible plate over the collective lock button. The collective is held in place by its natural upward force towards the lower pitch stop position and a groove in the collective button that the flexible lock plate engages. The pilot disengages the lock by pushing down on the collective slightly and the flexible plate springs itself forward away from the collective lock button. When the flexible lock plate is not engaged (i.e., normal flight conditions) it is free to vibrate about its base attachment point with the rhythms of the helicopter. A rubber plug placed in the middle of the flexible plate is meant to dampen out vibrations when in contact with the avionics panel.

Section 3.3, adjustment of the "LOW PITCH" lock plate, in the Eurocopter Maintenance Manual, the collective lock is to be adjusted such that when the collective is at the lower pitch stop, with no further downward force on the collective by the pilot, the collective lock button is set 1 mm short of being aligned to engage the flexible lock plate. On the Geneva avionics panel, two setscrews in the base of the plate adjust the flexible lock plate vertically for alignment.

The clearance between the collective and the flexible plate when the collective is at the lower pitch stop was measured in an exemplar helicopter with a factory avionics panel installed. The measurement was approximately 0.3 inches between the end of the collective lock button and the flexible lock strap. Geneva provided documents that depicted the clearance between the

collective lock button and the flexible lock plate with a Geneva avionics panel installed as 0.16 inches.

ADDITIONAL INFORMATION

National Transportation Safety Board investigators have identified a second occurrence of an AS350 with the Geneva avionics panel installation where the collective lock engaged in flight, which resulted in an accident. Special Airworthiness Information Bulletin SW-05-20 was issued on December 2, 2004, recommending inspection of the collective lock rigging.

Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	36, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane; Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Helicopter; Instrument Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	10/01/2003
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	06/01/2004
Flight Time:	6200 hours (Total, all aircraft), 2000 hours (Total, this make and model), 6000 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	Registration:	N513TS
Model/Series:	AS-350-B2	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	2664
Landing Gear Type:	Skid	Seats:	6
Date/Type of Last Inspection:	07/01/2004, 100 Hour	Certified Max Gross Wt.:	4961 lbs
Time Since Last Inspection:	0.3 Hours	Engines:	1 Turbo Shaft
Airframe Total Time:	2252 Hours as of last inspection	Engine Manufacturer:	Turbomeca
ELT:	Installed	Engine Model/Series:	Arriel 1D1
Registered Owner:	Westcore Aviation Inc	Rated Power:	732 hp
Operator:	Westcore Aviation Inc	Operating Certificate(s) Held:	None
Operator Does Business As:		Operator Designator Code:	EKLR

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KSDL, 1510 ft msl	Distance from Accident Site:	7 Nautical Miles
Observation Time:	1453 MST	Direction from Accident Site:	110°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	160°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.96 inches Hg	Temperature/Dew Point:	36° C / 8° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Scottsdale, AZ (KSDL)	Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	None
Departure Time:	1330 MDT	Type of Airspace:	

Airport Information

Airport:	Scottsdale (KSDL)	Runway Surface Type:	Dirt
Airport Elevation:	1510 ft	Runway Surface Condition:	Dry
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced Landing

Wreckage and Impact Information

Crew Injuries:	2 Minor	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Minor	Latitude, Longitude:	33.700556, -111.941944

Administrative Information

Investigator In Charge (IIC):	Van S McKenny	Report Date:	12/20/2005
Additional Participating Persons:	Larry Perkins; Federal Aviation Administration; Scottsdale, AZ Joseph Syslo; American Eurocopter Corp; Grand Prairie, TX Mathew Rigsby; Federal Aviation Administration; Grand Prairie, TX Harry Darting; Federal Aviation Administration; Scottsdale, AZ		
Publish Date:	10/01/2009		
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 pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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