

Adopted: 12/3/90

Log # 2081



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

DEN-88 LA094

Date: December 20, 1990
In reply refer to: A-90-178 through
A-90-180

Honorable James B. Busey
Administrator
Federal Aviation Administration
Washington, D. C. 20591

On April 9, 1988, the pilot of an Agusta A109A helicopter, N335V, lost directional control during a final approach for landing at an airport in Sioux Falls, South Dakota. The helicopter, which was configured for emergency medical service (EMS) operation, was substantially damaged during a subsequent hard landing. The pilot and two passengers were not injured. ^{1/}

Post-accident examination of the helicopter's drive train indicated that the loss of directional control was caused by failure of the No. 3 tail rotor driveshaft support bearing due to lack of lubrication. The rotational damage to the tubular driveshaft in the area of the No. 3 bearing had caused the driveshaft to separate at the bearing journal resulting in a loss of directional control when collective pitch was applied to cushion the landing. The failed bearing, part No. (PN) 109-0424-01-3, had been developed by the helicopter manufacturer and was offered to Agusta A109A operators to relieve periodic inspection and 600-hour lubrication requirements on the bearing, PN 109-0424-01-1, originally installed. The inspection and lubrication requirements on the -01-1 bearing stemmed from a similar accident involving an Agusta A109A helicopter in Pittsburgh, Pennsylvania, in January 1981. After that accident, the Safety Board recommended that the Federal Aviation Administration require that revisions be made in the maintenance manual to require more stringent inspections of the support bearings and to establish a periodic lubrication interval. Airworthiness Directive (AD) 81-20-03, effective November 12, 1981, satisfied the intent of the recommendation by requiring daily visual inspections and a lubrication interval of 600 operating hours for the -01-1 bearing.

^{1/}For further information, see the attached NTSB Brief of Accident No. 220.

The PN 109-0424-01-3 bearings have no overhaul limit or periodic lubrication requirement. The Agusta Handbook of Maintenance Instructions (HMI) specifies a visual examination of the seven tail rotor driveshaft support bearings during the daily preflight inspections, with a more detailed visual examination of bearing condition at 1,800 operating hours. The review of maintenance records of N335V did not reveal the total operating time on the bearings installed because they are categorized as "on condition" replacement components. The operator reported that the bearings had accumulated about 1,675 hours at the time of the accident. Examination of the remaining six bearings revealed signs of overheating due to inadequate lubrication. Based on this information, the Safety Board believes that mandatory inspection criteria and a periodic lubrication interval should be established on all PN 109-0424-01-3 bearings to maintain the airworthiness of the Agusta A109A series helicopter.

The Agusta A109A helicopter is one of several turboshaft-powered helicopters with engine controls located in the cockpit on a center overhead panel; others have the controls on a pedestal between the pilots' seats. The Safety Board recognizes that after engines are started and the engine controls are placed in the "flight" position, no further engine control manipulation is required during normal flight operations. The accident circumstances show, however, that a single pilot will be faced with a difficult task in maintaining control of the helicopter if the necessary response to an in-flight emergency requires retarding the engine controls. The pilot of N335V reported that he recognized the need to remove engine power from the rotor system and enter autorotation but was hesitant to remove his hands from the cyclic or collective flight controls for fear of losing control. Although the loss of tail rotor thrust in this instance occurred at low airspeed and close to the ground, the helicopter would probably have sustained less damage during an autorotational landing attempt if the pilot had been able to successfully retard the engine controls. The Safety Board believes that, despite the infrequent need to perform such maneuvers, the FAA should evaluate during the certification process whether a single pilot is able to respond appropriately to an event, such as loss of tail rotor thrust, when the location of the engine control(s) requires the pilot to remove his or her hands from the flight controls in order to operate the engine control(s). Further, the Safety Board believes that the FAA should evaluate existing turboshaft helicopters, certified for single pilot operation, in the same context and take action as necessary.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

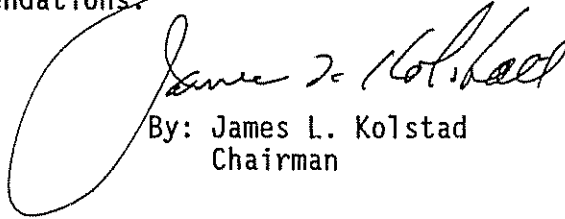
Issue an airworthiness directive to require a one-time inspection of all Agusta A109A series helicopter tail rotor drive shaft support bearings, PN 109-0424-01-3, for evidence of excessive wear, lack of lubrication, and overheating. Based on the results, establish a periodic inspection and lubrication interval for the support bearings. (Class II, Priority Action) (A-90-178)

Revise certification requirements to include an evaluation of turboshaft helicopters being considered for single pilot operation to ensure that the pilot is able to respond adequately

to in-flight emergencies such as loss of tail rotor thrust when engine power controls are located other than on the collective. (Class II, Priority Action (A-90-179)

Evaluate existing turboshaft helicopters certified for single pilot operation to ensure that the pilot is able to respond adequately to in-flight emergencies, such as loss of tail rotor thrust, when engine power controls are located other than on the collective and issue appropriate restrictions/limitations when conditions warrant it. (Class III, Longer Term Action)(A-90-180)

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, BURNETT, and HART, Members, concurred in these recommendations.



By: James L. Kolstad
Chairman

Brief of Accident

File No. - 220 4/09/88 SIOUX FALLS, SD A/C Reg. No. N33SV Time (Lcl) - 1215 CDT

---Basic Information---

Type Operating Certificate-ON-DEMAND AIR TAXI
Type of Operation -POSITIONING
Flight Conducted Under -14 CFR 91
Accident Occurred During -LANDING

Aircraft Damage
SUBSTANTIAL
Fire
NONE

Injuries
Fatal Serious Minor None
0 0 0 0
0 0 0 0

---Aircraft Information---

Make/Model - AGUSTA A109A
Landing Gear - TRICYCLE-RETRACTABLE
Max Gross Wt - 9800
No. of Seats - 4

End Make/Model - ALLISON 250-C20B
Number Engines - 2
Engine Type - TURBOSHAFI
Rated Power - 420 HP

ELT Installed/Activated - YES/NO
Stall Warning System - NO

---Environment/Operations Information---

Weather Data
WX Briefing - NO RECORD OF BRIEFING
Method - N/A
Completeness - N/A
Basic Weather - VMC
Wind Dir/Speed- 350/023 KTS
Visibility - 15.0 SM
Lowest Sky/Clouds - CLEAR
Lowest Ceiling - NONE
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
SIOUX FALLS, SD
Destination
LOCAL

Airport Proximity
ON AIRPORT

Airport Data
JOE FOSS FIELD
Runway Ident - UNK/NR
Runway Lth/Mid - UNK/NR
Runway Surface - ASPHALT
Runway Status - DRY

ATC/Airspace
Type of Flight Plan - NONE
Type of Clearance - NONE
Type Apch/Lnds - STRAIGHT-IN

---Personnel Information---

Pilot-In-Command
Certificate(s)/Rating(s)
COMMERCIAL, ATP
SE LAND-HE LAND
HELICOPTER

Age - 44
Biennial Flight Review
Current - YES
Months Since - 1
Aircraft Type - C-401

Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
Flight Time (Hours)
Total - 13615
Make/Model - 120
Instrument - 305
Multi-Eng - 450
Last 24 Hrs - 2
Last 30 Days - UNK/NR
Last 90 Days - 50
Rotorcraft - 13150

Instrument Rating(s) - AIRPLANE, HELICOPTER

---Narrative---

THE ATP FLT AND HIS TWO EMS CREWMEMBERS WERE REPOSITIONING TO REFUEL AT THE LOCAL ARPT. ON APRCH THE FLT HEARD A LOUD SNAP AND EXPERIENCED AN UNCOMMANDED RIGHT YAW. THE HELICOPTER TOUCHED DOWN ON ONE LANDING WHEEL. THE YAW CONTINUED AND THE LEFT LANDING GEAR COLLAPSED. A POST ACCIDENT INSPECTION REVEALED EVIDENCE THAT THE NUMBER THREE HANGAR BEARING HAD FAILED FROM LACK OF LUBRICATION AND SEPARATED THE TAIL ROTOR DRIVE SHAFT AT THE BEARING RACE. ALL OTHER HANGAR BEARINGS SHOWED EVIDENCE OF LACK OF LUBRICATION. THE THROTTLE IS LOCATED ON AN OVERHEAD PANEL ABOVE THE PILOT'S HEAD. DURING THE EMERGENCY, BOTH THE PILOT'S HANDS WERE OCCUPIED WITH THE COLLECTIVE AND THE CYCLIC CONTROLS.

Brief of Accident (Continued)

File No. - 220

4/09/88

SIOUX FALLS, SD

A/C Reg. No. N335V

Time (Lcl) - 1215 CDT

Occurrence #1 AIRFRAME/COMPONENT/SYSTEM FAILURE/HALFJUNCTION
Phase of Operation APPROACH - VFR PATTERN - FINAL APPROACH

Findings(s)
1. ROTOR DRIVE SYSTEM, TAIL ROTOR DRIVE SHAFT BEARING - DISINTEGRATED
2. ROTOR DRIVE SYSTEM, TAIL ROTOR DRIVE SHAFT - SHEARED
3. MAINTENANCE, LUBRICATION - NOT PERFORMED - COMPANY MAINTENANCE PSNL

Occurrence #2 LOSS OF CONTROL - IN FLIGHT
Phase of Operation LANDING - FLARE/TOUCHDOWN

Findings(s)
4. DIRECTIONAL CONTROL - NOT POSSIBLE -

Occurrence #3 MAIN GEAR COLLAPSED
Phase of Operation LANDING - FLARE/TOUCHDOWN

Findings(s)
5. LANDING GEAR, MAIN GEAR ATTACHMENT - OVERLOAD

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are findings(s) 1, 2, 3