

**NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY
Arlington, Texas 76011**

November 14, 2008 and November 25, 2008

Summary of Component Examination

DFW08FA062

ACCIDENT

Location: South Padre Island, Texas

Date/Time: 2/05/2008 2054 CST

Aircraft A: N911VA, Eurocopter France AS350B2 S/N 2588

Note: The accident aircraft was equipped with three main rotor hydraulic servo controls. The left lateral, fore/aft, and right lateral servo are installed in a vertical position and are connected via rod end bearings to the main rotor mast casing (fixed point) and swashplate. The helicopter can be controlled without hydraulic servos, however, the servo controls provide hydraulic boost to allow the pilot to fly the helicopter precisely and effortlessly.

External Examination:

An external examination of the three main rotor hydraulic servos was conducted at Air Salvage of Dallas, Lancaster, Texas, on Friday, November 14, 2008. Persons present for the exam were Tom Latson, NTSB IIC, and Joe Syslo and Lindsay Cunningham from American Eurocopter.

Left lateral main rotor hydraulic servo, Samm/Goodrich P/N 5083, S/N 363:

- Lower rod end bearing to piston rod attachment hardware was in place.
- Piston rod was extended approximately four inches from the lower lock nut to the piston rod gasket.
- Electrovalve was still connected.
- The tapered end remained attached to the servo body assembly.
- One tapered end to servo body assembly attachment bolt was displaced, but remained attached by lock wire connected to the adjacent bolt.
- The accumulator was attached to the servo body assembly.



Fore/aft main rotor hydraulic servo, Dunlop P/N AC67246, S/N EAV015:

- Lower rod end bearing to piston rod attachment hardware was in place.
- Piston rod was extended approximately two and a half inches from the lower lock nut to the piston rod gasket.
- Electrovalve had separated.
- Extension piece was cracked and separated from the servo body assembly, with its attachment bolts still connected to servo body assembly.
- The accumulator was attached to the servo body assembly and was dented.



Right lateral main rotor hydraulic servo, Dunlop P/N AC67244, S/N CB215:

- Lower rod end bearing to piston rod attachment hardware was in place.
- Piston rod was extended approximately three and three-eighths inches from the lower lock nut to the piston rod gasket.
- Electrovalve was still connected.
- Extension piece remained attached to servo body assembly with external vertical scoring.
- The upper portion of the control input rod was present and attached to the lever assembly.
- The accumulator was attached to the servo body assembly.



Teardown:

A teardown examination of the three main rotor hydraulic servos was conducted at Hawker Pacific Aerospace, Sun Valley, California, on 25 November 2008. Persons present for the exam were Tom Latson (NTSB IIC), Lindsay Cunningham (American Eurocopter Accident Investigator).

- The accumulator with fluid lines and electrovalves if present, were removed from the respective servos.
- Upper and lower rod end bearings were removed.

Left lateral main rotor hydraulic servo, Samm/Goodrich P/N 5083, S/N 363:

- After initial photos the servo was disassembled.
- The piston head with seal was intact.
- The upper and lower bearings moved freely up and down the piston rod to the bend.
- No binding was observed on the lever assembly.
- The slide valve of the distribution assembly was free to move.
- Spring action on the bypass valve was noted.
- No vertical scoring was observed within the tapered end liner.

Fore/aft main rotor hydraulic servo, Dunlop P/N AC67246, S/N EAV015:

- The extension piece was found separated from the servo body assembly, which allowed contaminants to enter servo (see above notes from external exam).
- Corrosion, sand, and contaminants were noted throughout the servo assembly.
- After initial photos the servo was disassembled.
- The piston head with sealing ring was found intact; wiping ring exhibited compression damage, likely due to impact.
- The upper and lower bearings moved freely up and down the corroded piston rod to the bent areas.
- The inner and outer seals of both bearings were found intact.
- No binding was observed on the lever assembly.
- The slide valve of the distribution assembly was free to move.
- Corrosion and sand were observed within the extension piece and spool assembly of the servo valve assembly.
- Spring action on the plunger lock was noted.
- The inner surface of the servo body assembly exhibited corrosion and pitting.
- No vertical scoring was observed within the extension piece or servo body assembly.

Right lateral main rotor hydraulic servo, Dunlop P/N AC67244, S/N CB215:

- After initial photos the servo was disassembled.
- The piston head with sealing ring was found intact; wiping ring was in place and exhibited compression impact damage.
- The upper and lower bearings moved freely up and down the piston rod to the bent areas of the piston rod.
- The seals of both inner bearings and outer sealing ring of upper bearing were found intact.
- Damage was observed to the outer sealing ring of the lower bearing.
- No binding was observed on the lever assembly.
- The slide valve of the distribution assembly was free to move.
- Spring action on the bypass valve was noted.
- Corrosion and sand were observed within the extension piece and spool assembly of the servo valve assembly.
- No vertical scoring was observed within the extension piece or inner servo body assembly.