eurocopter
an EADS Company

Direction technique Support
Accident Investigation Unit

Marignane le 28th February 2003
STXSA n° 132/03/NY

Accident involving AS 350B2 N852HW
Laboratory Investigation Report

1/ SUBJECT

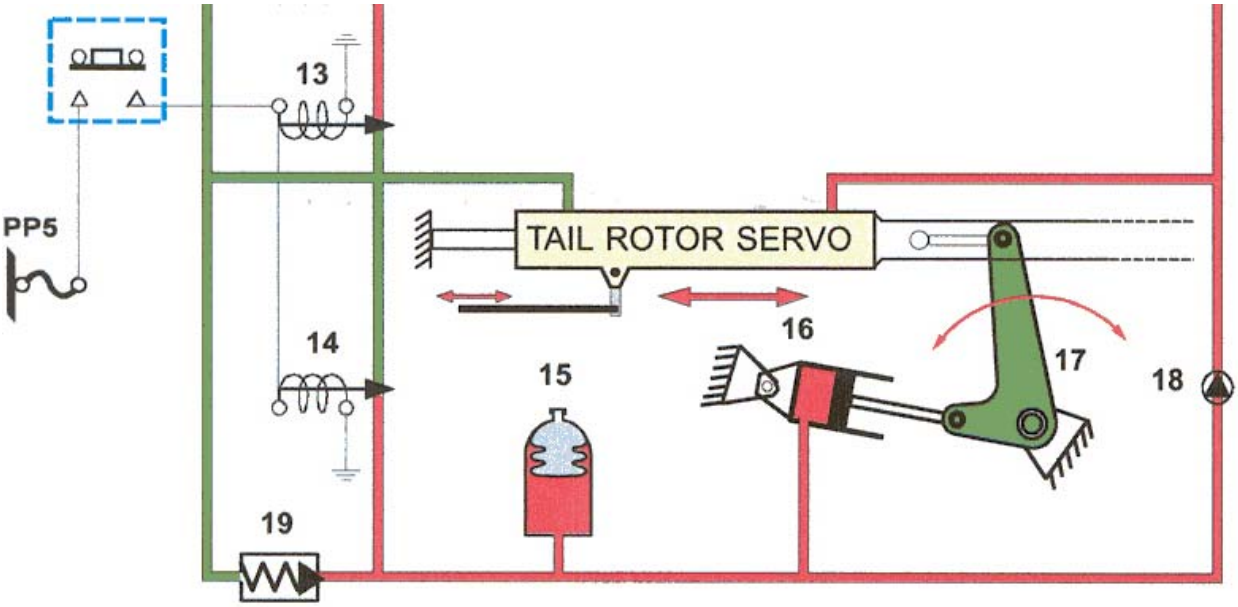
Tests of hydraulic pump HPI and tail rotor load compensator

2/ ATTENDANTS

MM	Philippe ROBLIN	Ministère des transport, B.E.A
	Yves NICOLAS	Eurocopter Accident Investigation Manager
	Jean Louis ZANGRIO	Eurocopter Hydraulic specialist

3/ CONCLUSIONS

The HPI hydraulic pump test meets the parameters requirements
Compensator actuator accumulator was deflated. Tests have evidenced lack of sealing on the diaphragm between the nitrogen chamber and the oil. But it is important to note that the tail rotor load compensator system itself was able to keep oil pressure. Indeed, there is no leak between the non return valve (18), solenoid valve (14) and pressure relief valve (19)
We remind that, before each flight, the accumulator is tested.



4/ INVESTIGATION PROGRAM

Hydraulic pump: Manufacturer H.P.I
Eurocopter p/n:704A34310006
Manufacturer p/n:A5026780
S/N: 10764665

1) Magnetic plug inspection: nothing
2) Removal and installation of the bench connectors
3) Driving shaft splines OK
4) Manual rotation of the shaft; OK, free rotation
5) Functional test: speed 6000 RPM, Fuel flow 6,2l/mn for a output pressure of 11,7bars.
With an output pressure set at 40 bars (regulator valve setting) the flow has to be between 5,7 and 6,6 l/min for a n oil temperature of 50°C: we got 6,2l/mn at 25,4°C and 43° (temp of 50°C has not been reached but the stable flow at the 2 different temperatures evidence a good functioning of the pump..

Load compensator

Manufacturer: Eurocopter
P/N 355A 75 1370 03

1) Accumulator pressure check: no pressure
2) Actuator piston is set a mid travel through a tooling.
3) The accumulator is inflated at a nitrogen pressure of 15 bars at 20°C
4) A pressure gage is connected to the inflation valve to follow up permanently the pressure reading

5) Check of sealing of the system (non return valve (18), solenoid valve (14) and pressure relief valve (19)--

The load compensator id fed with a 40 bars oil pressure read on the pressure gage. Then, the input pressure is cancelled and the input connector is removed. -----→ no leaks evidenced.

6) Check of electrovalve
   Fed electrovalve with electrical current. The flow has to appear through return opening and the accumulator pressure has to go down up to the accumulator inflating pressure
   -----→ the pressure drop immediately to 0 bars ; by feeding with nitrigen the inflating valve confirming the abscence of sealing of the nitrogen chamber .

7) Check of pressure relief valve setting

   Fed the system to 40 Bars, then increase gradually the pressure to get the valve opening; the flow has to go and stop for a pressure between 49,6 bars and 60,7 bars.
   ----→ result 60 bars

8) Manual check of the actuator without any pressure-----→ no problem to move

9) Check of compensator ability to maintain the pressure

Inflation of the compensator with 40 bars of nitrogen-----→ check after 12hours---→ OK

Y. NICOLAS
Accident Investigation Manager

PHOTOS