



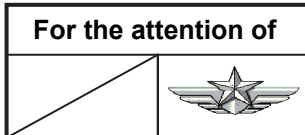
# **ATTACHMENT 1**

**AIRWORTHINESS GROUP CHAIRMAN'S FACTUAL REPORT**

**NTSB No. CEN15MA290**

**Airbus Helicopters Safety Information Notice No. 2776-S-29 (4 Pages)**

# SAFETY INFORMATION NOTICE

**SUBJECT: HYDRAULIC POWER**
**Information about the Dual Hydraulic System**


AIRCRAFT CONCERNED	Version(s)	
	Civil	Military
AS350	B3	
AS550		C3
AS355	F, F1, F2, N, NP	
AS555		AF, AN, SN, UF, UN

Airbus Helicopters has become aware of at least two events possibly involving pilots taking off without any hydraulic assistance on the tail rotor (yaw load compensator discharged and yaw servo hydraulic switch on the collective in the “OFF” (aft) position).

Investigations concerning these two events are being conducted by the applicable governmental investigative authority, but based on information known at this time, it appears that during the run-up (pre-takeoff) hydraulic checks, the pilot most likely omitted the step to restore hydraulic system pressure to the yaw servo and accumulator by returning the collective-mounted yaw servo hydraulic switch to the “ON” (forward) position prior to takeoff. Omission of this step will result in a complete lack of hydraulic boost to the tail rotor system, because prior to this check, the yaw load compensator has been discharged to verify proper operation of the HYD/ACCU Test switch and valve. This situation could be perceived by the pilot as a tail rotor control failure (jamming) due to the increased load required to move the pedals. If not quickly identified and corrected, this situation could lead to a loss of control of the helicopter.

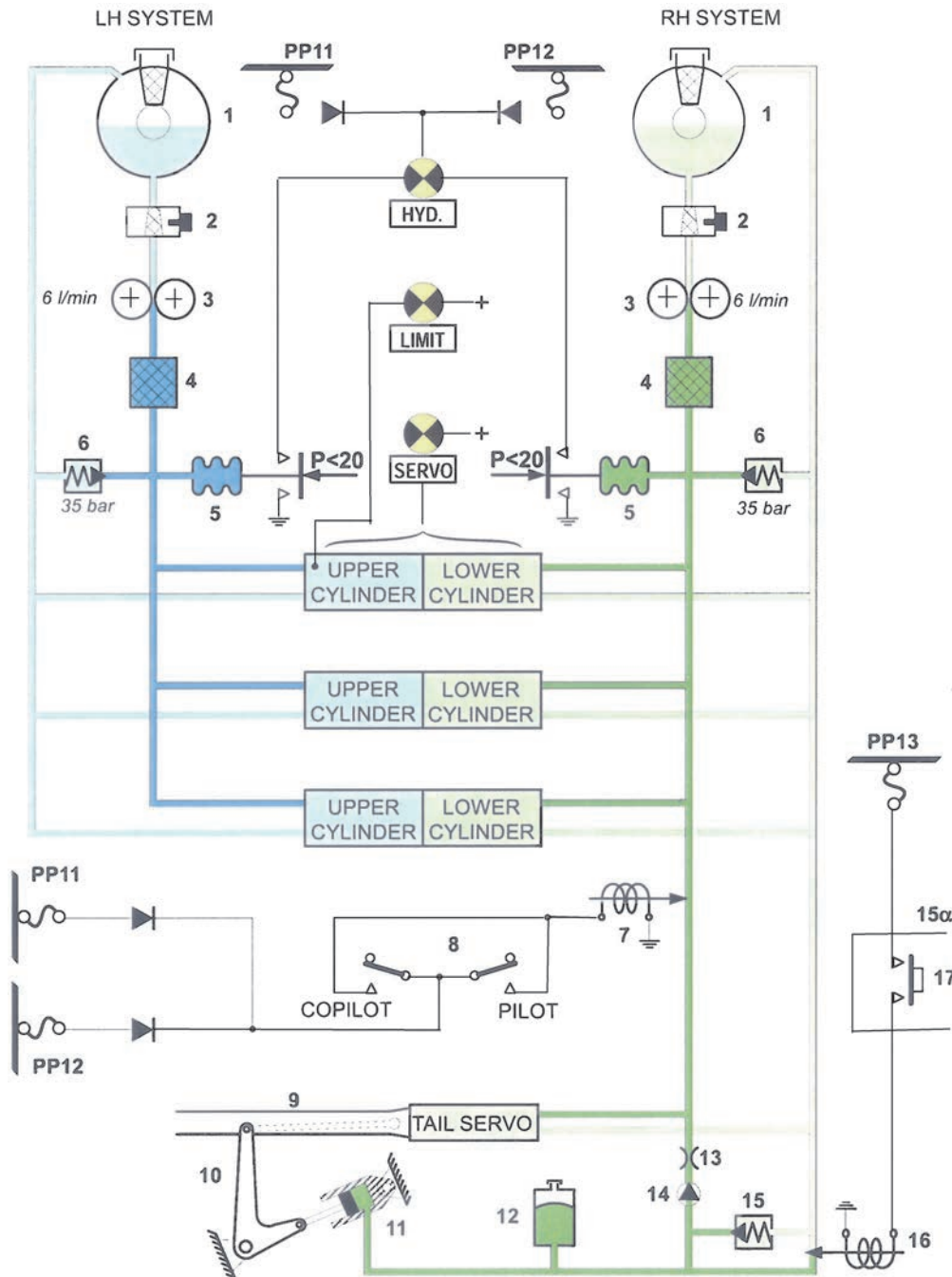
The purpose of this Safety Information Notice is to remind pilots of procedural and indication differences that exist for the run-up hydraulic checks for the dual hydraulic system as compared to the single hydraulic system.

**Note:** For the AS350 B3e, this information is relevant for the POST MOD 07.5606 configuration (hydraulic circuit equipped with the yaw load compensator). All AS350 B3e helicopters should now embody this modification.

**DUAL HYDRAULIC CIRCUIT:**

The diagram below shows the schematic design of the dual hydraulic circuit of an AS350 B3e and the associated Flight Manual pre-takeoff check for the PRE MOD 07.4622 design and PRE MOD [ACCU TST] push button (see “Airbus Helicopters improvements for the dual hydraulic circuit” in the last chapter of this Safety Information Notice).

The explanations and comments given below are also applicable to the AS355/AS555 (all versions except E and NP). **The AS355-NP hydraulic system incorporates dedicated amber caution light for each hydraulic circuit ("HYD1" and "HYD2") but like on AS350Be dual hydraulic, the caution light "HYD2" on AS355-NP does not light on when yaw servo hydraulic switch on collective is activated.**



**Supplement 23-9 of the Flight Manual (PMV) related to the pre-takeoff "RUN UP CHECK" for the dual hydraulic circuit:**

**Hydraulic checks (with explanation)**

1) Servo distributors seizure check:

- [SERVO TST].....PRESS: “SERVO”.

The purpose of this check is to verify correct operation of the distributor valve seizure warning system when the “SERVO TST” push button is activated on the control pedestal console. The amber “SERVO” caution light should illuminate on the CWP.

2) Yaw servo hydraulic check:

- Yaw servo hydraulic switch (Collective).....OFF, yaw pedal loads should remain low (yaw load compensator effect).

This check is performed to verify correct operation of the solenoid valve (reference 7) which closes the tail rotor hydraulic circuit when the yaw servo hydraulic switch on the collective is activated. The activation of this switch isolates the tail rotor servocontrol, but the yaw load compensator should remain boosted by the hydraulic pressure remaining between the check valve (reference 14) and the solenoid valve (reference 16), which is closed.

In this case, because there is no complete loss of pressure inside the RH hydraulic circuit, no “HYDR” caution is provided to the pilot on the CWP.

- [ACCU TST].....ON, check that loads are felt on the yaw pedals.

The purpose of this check is to verify correct operation of the solenoid valve (reference 16) when the (ACCU TST) push button (reference 17) is activated. When activated, the hydraulic pressure inside the yaw load compensator is released and the yaw load compensator will no longer provide load assistance. The “HYDR” caution on the CWP will not illuminate but the light on the “ACCU TEST” push button will illuminate.

- [ACCU TST]\*\*.....RESET in OFF position.

This action closes the solenoid valve (reference 16) but does not recharge the yaw load compensator as the yaw servo hydraulic switch is still in the OFF position. No “HYDR” caution will illuminate on the CWP, but the light on the “ACCU TEST” push button will extinguish.

- Yaw servo hydraulic switch (Collective).....ON, check that no loads are felt on the yaw pedals.

Setting the yaw servo hydraulic switch to the ON (guarded) position will restore hydraulic pressure within the yaw hydraulic circuit. The action to check that no loads are felt on the yaw pedals is to confirm the restoration of hydraulic pressure to the yaw hydraulic circuit and to verify correct operation of the solenoid valve (reference 7).

\*\*\* On the AS 350 B3 Arriel 2B and Arriel 2B1 equipped with dual hydraulic, the reset of the [ACCU TST] is requested **after** setting the yaw servo hydraulic switch back to “ON”; however, this different sequence has no effect on the hydraulic circuit operation.

**IMPORTANT:** In summary, the “HYDR” caution on the CWP **WILL NOT** illuminate if the yaw servo isolation and/or “ACCU TEST” switches are not in their correct positions for takeoff and normal flight. Therefore, as always, strict compliance with the pre-takeoff checklist is critical to ensure that switches and push buttons are in their correct positions prior to takeoff. **Failure to do so could result in a perceived tail rotor control failure (jamming) as explained in this Safety Information Notice.**

**Airbus Helicopters improvements for the dual hydraulic circuit:**

To inform the pilot of the yaw servo hydraulic switch being in the “OFF” position on the collective, Airbus Helicopters has developed modification 07.4622 which incorporates dedicated amber “HYDR” caution lights for each hydraulic circuit (“HYDR1” and “HYDR2”) on the CWP and which integrates a flashing mode on the “HYDR 2” when the yaw servo hydraulic switch (reference 8) is activated (“OFF” position), isolating the yaw hydraulic circuit through the solenoid valve (reference 7). This modification has been incorporated on the new aircraft production line (refer to the RIC or CWP) and will be introduced via a Service Bulletin to retrofit aircraft already in operation.

To help mitigate the possibility of leaving the [ACCU TST] push button in the “ON” position (currently, the push button lights up when activated but there is no “HYDR” caution on the CWP), Airbus Helicopters is working on a future modification to replace the two stable positions [ACCU TST] push button by a stable/momentary position [ACCU TST] push button similar to the design of the [CRANK] push button.