No. 3540-I-00

Information Notice

SUBJECT: GENERAL

Fenestron versus Conventional Tail Rotor (CTR) for helicopters equipped with a main rotor rotating counterclockwise when seen from above

For the attention of	

AIRCRAFT CONCERNED	Version(s)	
	Civil	Military
BO105	C (C23, CB, CB-4, CB-5), D (DB, DBS, DB-4, DBS-4, DBS-5), S (CS, CBS, CBS-4, CBS-5), LS A-3	CBS-5 KLH, E-4
MBB-BK117	A-1, A-3, A-4, B-1, B-2, C-1, C-2, C-2e, D-2, D-2m, D-3, D-3m	D-2m, D-3m
EC135	T1, T2, T2+, T3, P1, P2, P2+, P3, EC635 T1, EC635 T2+, EC635 T3, EC635 P2+, EC635 P3, T3H, P3H, EC635 T3H, EC635 P3H	–

Background

Unanticipated yaw on helicopters equipped with a main rotor rotating counterclockwise when seen from above was addressed in Safety Information Notice No. 3298-S-00. It explains how it occurs, why pilots can then feel the anti-torque device to be poorly effective, and provides recommendations to avoid entering this phenomenon or recover if it starts. This behavior can be seen on any single rotor helicopter, regardless of the anti-torque design.

Associated with Safety Information Notice No. 3298-S-00, this Information Notice supersedes the previous Service Letter No. 1692-67-04 related to the reminder on the yaw axis control for all helicopters in certain flight conditions, and indicates some specific characteristics of the Fenestron that must be remembered, especially when transitioning from a helicopter equipped with a conventional tail rotor (CTR).

Airbus Helicopters reminds operators that the Fenestron provides increased safety in ground and flight operations. The Fenestron structure protects people from contacting the Fenestron on the ground and prevents loss of control due to tail rotor strikes in flight.

Shape of the thrust vs. pedal position curve

Figure 1 shows how the thrust varies with the pedal position on a Fenestron and on a conventional tail rotor in hover conditions.

More negative thrust is required at 100% pedal position with a Fenestron to counterbalance the larger fin lateral lift in autorotation.

The change of slope in the vicinity of zero thrust is more pronounced on the Fenestron curve than on the CTR curve.

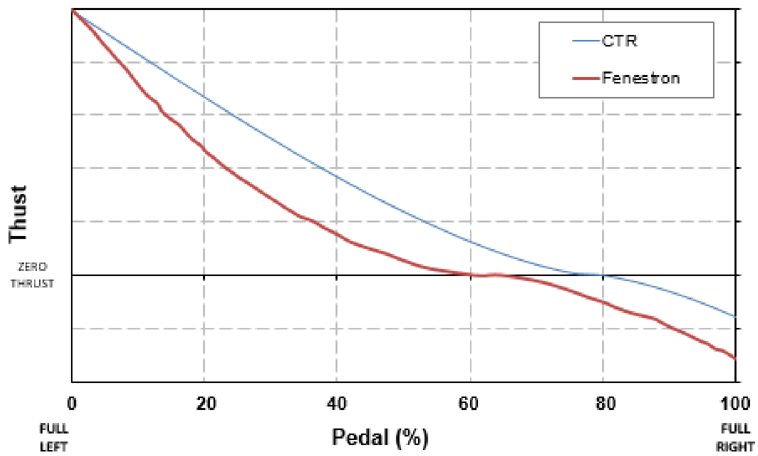

Figure 1: Comparison of Fenestron and CTR in hover

The CTR curve is more linear. The effect of a control input is almost constant in the whole pedal range, while it significantly varies for the Fenestron. The slope, and thus the perceived efficiency of the control, is much larger when coming close to full left pedal stop.

Pedal change between hover and cruise flight

Any helicopter equipped with a Fenestron has a large fin that ensures with less drag the anti-torque in high speed flight. With a Fenestron the pedal thus needs to be brought back to the zero thrust position in cruise.

There is a similar effect on conventional tail rotors. Due to its design, the fin has also some incidence and unloads the tail rotor. However, this is usually much weaker than in the case of a Fenestron, as shown in **Figure 2**.

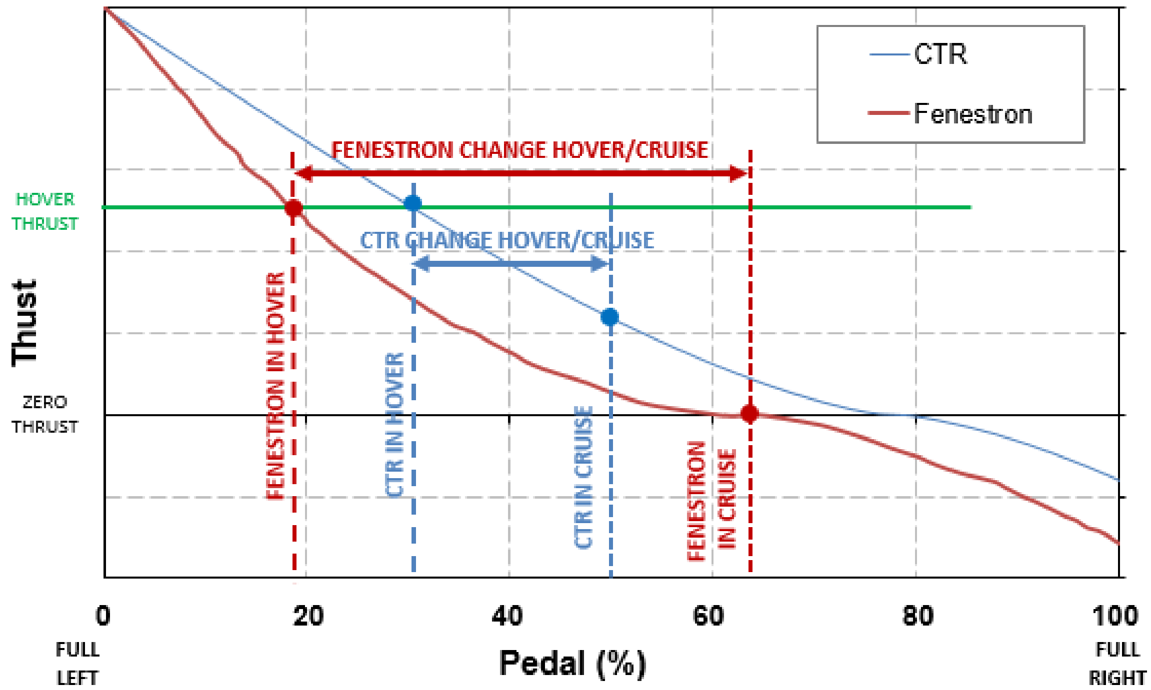

Figure 2: Pedal position change between hover and cruise: comparison of Fenestron and CTR
(to keep the figure simple, pedal positions in cruise are plotted on the hover thrust vs. pedal curve)

The same thrust is required in hover, regardless of the anti-torque device. However, there is more left pedal on a Fenestron due to the differences highlighted in the previous part. The pedal position in cruise is more right with a Fenestron that is at zero thrust than with a CTR that is only partially unloaded.

Transitioning from cruise to hover flight on a helicopter equipped with a Fenestron requires adding more left pedal than with a conventional tail rotor.