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Tailplane Torque Tubes

A report was received recently of a case where the TP6 outer sleeve within the tailplane (the one where the retaining pip-pin goes through) had become disbonded and was free to migrate spanwise. The reason for TP6 coming loose was attributed to excessive play between the torque tube TP4 and the tailplane drive TP12. The excessive play here resulted in the torque tube driving the tailplane via the pip-pin and TP6, a task it was not designed for, and so the bond between TP6 and the tailplane rib was sheared.

This situation in itself is not dangerous, as the correct component (TP12) will resume its function of driving the tailplane, albeit with a certain amount of play.

Where TP6 has become loose it will no longer act to retain the tailplane spanwise, resulting in the wall of the pip-pin cavity and pip-pin head itself acting to prevent the tailplane moving outboard. The tailplane would have to move more than 15 mm (5/8") before the pins in TP12 would be near disengagement from the bushes in the tailplane's root rib, an amount not possible if the pip-pin cavity is made in accordance with the manual.

There are three issues, which need attention.

1. Prevention of TP6 disbond.
2. Removal of play between TP12 and the torque tube TP4.
3. Rebonding TP6 in place if necessary.

1. If play between TP12 and the torque tube already exists then there is the possibility that TP6 will be caused to disbond from the tailplane due to rotational loads through the pip-pin. To ensure that the pip-pin is not loaded, the hole it passes through in the TORQUE TUBE ONLY may be slotted in the radial sense only.

   The hole should not be elongated any more than ½ mm (0.020") in either direction. This amount would cater for a total movement of more than 30 mm (1¼") when measured at the tailplane trailing edge. However, it is advisable that a maximum of 13 mm (½") of play is allowed before it should be corrected.

2. To establish if or how much play there is between the TP12s and TP4, first remove both retaining pip-pins from the tailplanes. Holding one tailplane secure, try to rotate the other. Some differential movement is to be expected due to flexibility in the system, so look for movement associated with a 'clunk' (the feel of play at the assembling pins). Also look at the pip-pin holes while you move the tailplane. Any relative movement between the TP6 and TP4 torque tube will confirm play at the pins securing TP12.

   To eliminate play between the torque tube and TP12 various techniques have been considered. The use of any type of pin which puts a compressive load across the torque tube, such as a tapered pin and nut, has been rejected due to the proximity of the bearing and the likelihood of causing excessive friction. An oversized pin and hole will suffice in removing any play that there might be and no sophisticated equipment is needed to do the work.

   There has been a discussion, on the Internet, about using Loctite to bond TP12 to TP4. Although this may solve the symptom it doesn't solve the cause and may present you with a bigger problem in the future.

3. The only way to get sufficient access to TP6, if it is necessary to rebond it in place, is to cut into the skin of the tailplane on one side of the outboard rib. If you need to carry out a repair please contact the factory for details.

Propellers

One thing which tends to be ignored, or at least not enough importance placed upon, is the balance of the propeller and spinner. Often, any vibration is accepted as the norm and only those with excessive vibration will go to the trouble of balancing the propeller. Most people would be surprised just what a difference balancing even a slightly vibrating propeller can make.

Apart from the vibration felt by the occupants, other things should be considered. For example, the laminar flow over the wings can be affected by vibration resulting in a less efficient aircraft. Delicate items such as cockpit instruments and even the oil pressure sender can be damaged if subjected to vibration over a long enough period.

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