WILLS WING TECHNICAL BULLETIN

Bulletin #: TB980716 Inspection and Pre-flight of Locknut Assemblies Date: 07/16/98

Background:

Two pilots have reported locknut assemblies falling off in the last 3 weeks. Both reports involved Ultrasport 166s and the affected assembly was the bottom noseplate front wire anchor.. The first pilot discovered the keyhole anchor collar loose in the glider bag. The second pilot had the front wires fall off during the inital take-off roll of an aero-tow. Fortunately, he was not injured. Although both of these incidents involved relatively new 166s, this service advisory applies to all models.

Wills Wing uses four different types of locknuts – clinch nuts, flex lock nuts, nylock nuts and low profile nylock nuts. The most common type on current models is the clinch nut which is the nut shown in the illustrations below. To achieve their locking effect, clinch nuts are deformed in the manufacturing process (two of the flats on the nut are punched inwards) causing them to be too small to fit on the bolt. As they are installed, the bolt stretches the nut elastically, which provides the "clinch" or locking effect. Nylock nuts use a nylon insert which is too small for the bolt to pass through, and which is deformed by the bolt as it is installed producing a similar effect. Flex lock nuts are split at the top in a star like pattern, and flex outwards as the bolt is threaded into this portion, gripping the bolt in the process. All three locking mechanisms provide about 6 to 9 inch pounds torque of locking effect on initial installation on a ¼" bolt. On nylock type nuts, however, the deformation on the nylon locking insert is largely plastic, (permanent), and therefore the nylock loses much of its locking ability after a small number of installations and removals. (The nylock falls off to ½ of its original locking torque after only three installations and removals.) Clinch nuts and flex lock nuts deform almost completely elastically, and therefore retain more of their locking power through multiple uses.

The table below summarizes some of the differences in installation of the different types of nuts. All data in the table, and all references to tightening torque, refer to ¼ nuts, and all numbers are approximate, +/- ½ turn.

	Clinch nut	Flex lock	Nylock	Low profile nylock
Number of turns to thread on until locking effect begins	3 turns	2 ¾ turns	4 ¾ turns	1 ¾ turns
Number of turns after locking effect to obtain one minimum full thread exposed	1 ½ turns	2 ½ turns	3 ½ turns	3 ½ turns

Inspection and Service Requirement:

Inspect every locknut assembly on the glider. Verify that each bolt has at least one complete untapered thread exposed past the edge of the nut (see diagram 1).

The resistance to turning provided by the locking feature of the nut during installation equates to about 2 lbs of force at the end of a four inch long wrench. Elastic compression of the parts which the bolt and nut are securing may as much as double this force as the nut reaches full tightness. If you need to exert more torque than this, you are over-tightening the nut. If you cannot achieve the minimum one full thread and .036" of engagement as indicated without over-tightening the nut, you must do one of the following:

1. Remove washers, or substitute thin washers for thick washers.
2. Use a flat file to reduce the height of the heads of aluminum bushings to 1/16" (.063") above the tube.
3. Replace the bolt with a longer bolt.

The "one full thread / .036 inches" criterion is to be used to inspect existing bolt installations. When re-assembling a lock nut onto a bolt, there is an additional criterion which must also be met, in addition to the one full thread requirement – you must have a minimum of one full turn of the nut after the locking feature of the nut engages (after the installation torque reaches at least 6 inch lbs.) If either of these criteria is not met, you must replace the nut and / or the bolt, or alter the assembly configuration until you can achieve both.

In order to help us monitor the extent of this problem, when an assembly situation is found that does not comply with these requirements and requires some change to the configuration in order to comply, please report the details to us.

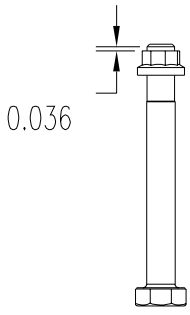


Diagram 1
Nut should have 1 full thread engagement beyond untapered portion of bolt shank. Dimension shown corresponds to 1/4-28 thread.

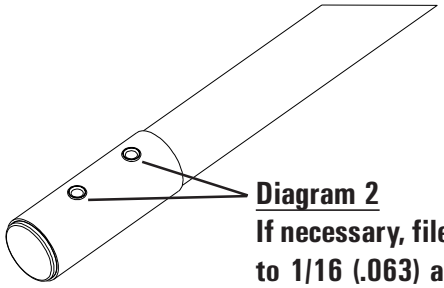


Diagram 2
If necessary, file bushing heads to 1/16 (.063) above tube