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Mooney Cowling Kit Instructions.doc

Mooney® Cowling Replacement Kits

Rev 001 June 7, 2011

Figure 1

Mooney cowling present some unique challenges because of (a) fiberglass and (b) and in the case of M20J 201 Series, the use of Camloc® 2700 Series Fasteners along the cowling sides. The Camloc® 2700 Series Fastener is a great product….just not in this kind of application.

The Skybolt CLoc® SK28S3 Series Fastener replaces the Camloc® 27S3 steel fastener.

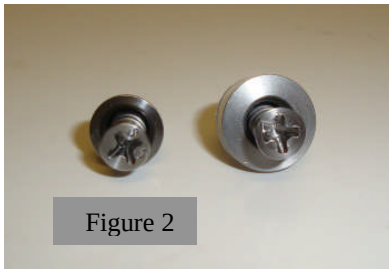


Figure 2

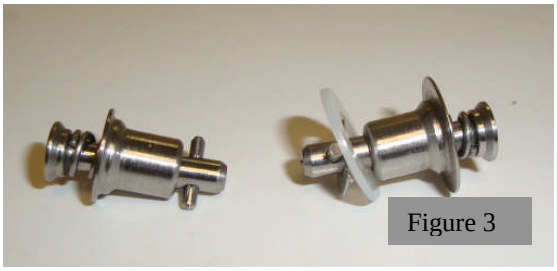


Figure 3

The difference is in the cup flange area; the CLoc® SK28S3 uses a larger cup flange that not only looks nicer, it functions much nicer by reducing the concentrated load.

With age and hours, even the better Mooney cowling holes are worn and enlarged. This affects the ability to retain the SK40S5 Series studs and the SK28S3 Series studs. There are clever ways of curing this problem before having to fill and re-drill holes.

For SK40S5 Series studs, the standard Camloc R4G retainer may not retain the fastener-grommet assembly if the holes are too worn. There are three fixes:

(1) Use the heavier and wider R4T retainer. This fix will probably take care of most hole issues. The disadvantage to the R4T retainer is removal.
(2) Use Skybolt SK-R560 Backing Grommets. These grommet "fillers" basically fill the hole and allow the standard R4G retainer to function properly. You may have to bore the hole to .560 (9/16) to use this backing grommet.
(3) Fill the hole(s) and re-drill. The trick here is to drill the new hole in the exact same location so that the stud aligns with the receptacle.


Figure 4

For SK28S3 Series studs, in this configuration, the 2600-SW retainer is required versus the preferred 2600-LW retainer. The LW is preferred because it is easier to install and has a larger surface area. But the LW retainer will not allow the fastener to "retract" when unlocked. Thus, with a heavy, stiff, and curved fiberglass cowling, the studs protrude excessively and make installing the upper cowling almost impossible.

The 2600-SW retainer is designed to allow the stud to "retract" enough that the protrusion side is minimal and you stand a much better chance of installing the upper cowling (along the sides especially).

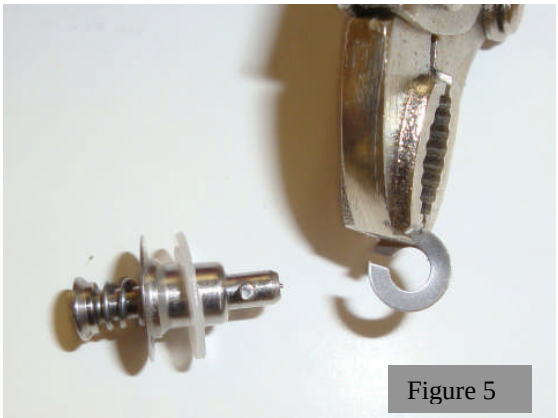


Figure 5

To install 2600-SW Retainers, simply bend open as shown. (Obviously, the installation of the retainer is after the stud has been properly fitted to the hole; is installed; and this example, the Nylon backup washer is installed.)

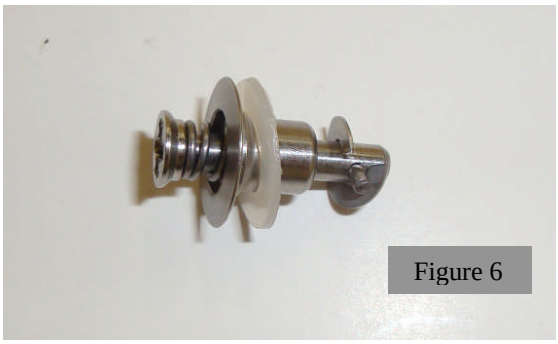
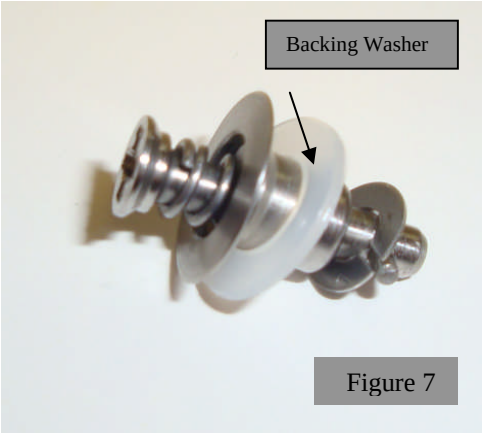
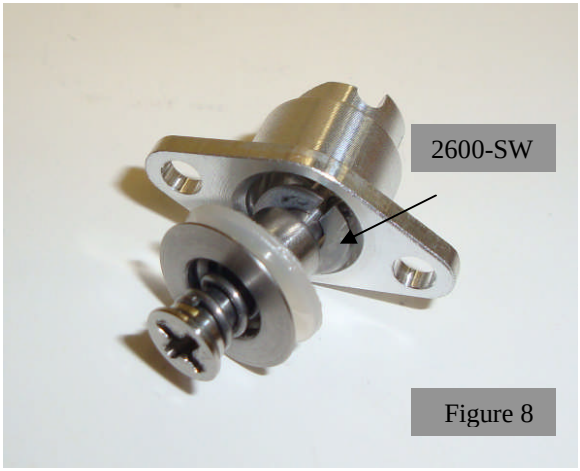


Figure 6

With the stud installed into the cowling hole; backup washer installed; twist the 2600-SW Retainer around the stud crosspin.



Bend the retainer back to the flat and locked position.



Now note the design feature of the 2600-SW Retainer. It must fit into the inner diameter of the receptacle. Thus, to function properly, the OD of the retainer is limited to the ID of the receptacle.

This creates some restrictions on how this retainer is used.

Note that the bottom portion of the cup on any Camloc® or CLoc® 2700 Series fastener and any CLoc® 2800 Series fastener has a bump that measures .310 (5/16) wide by .060 deep. In order for the stud to fit flush in the panel, the panel hole must be dimpled or countersunk for this bump. Normally, to dimple a hole, you would drill a .213 hole, then dimple it with a 100 degree die; thus the hole is opened to approximately .250 ID. In this case, the 2600-SW retainer OD is .316, therefore, the retainer is more than adequate to retain the stud in a typical .250 OD hole.

If the panel is drilled with no provision for countersink or dimple, to properly clear the cup bump, you must drill the hole to a minimum of .310 (5/16). The .316 +/- OD dimension of the 2600-SW retainer will not retain the stud. A typical (Mooney) worn hole is probably at or in excess of .310 and the 2600-SW retainer will not work. Remember, for a stiff Mooney cowling, particularly in the frontal area, the option for the wider 2600-LW retainer is not a good option.

The next best option, prior to filling holes and re-drilling, is to use a sized Nylon washer as a backup washer, then install the 2600-SW. This option works very well with one major consideration: It adds a dash number (length) to every stud that must use a backing washer. It would be too easy to look at the Mooney parts manual and determine stud lengths for each hole. Because the grip tolerance of any Camloc® or CLoc® stud is .030 of an inch (.076mm), no parts manual on the planet depict the proper stud lengths; the manufacturing tolerances of any fiberglass cowling is +/- 1 foot; cowlings age and deform over time, thus eating into +/- .030 quite easily. Thus, each cowling hole must be fitted. For the CLoc® 40S5 Series, by design, the studs can be interchanged easily with the 4P3 pliers, without removing the cowling. Not so with the CLoc® SK28S3 Series Fastener. First, they must be fitted for a proper lock without forcing the stud. Then the cowling must be removed and the retainers installed. Normally, with no backing washer, this is not an issue because the 2600-SW washer does not increase the panel thickness, or

grip requirement. Remember, the 2600-SW retainer fits inside of the receptacle. But the backing washer adds approximately .030 to the panel thickness (grip) requirement; thus one stud dash number longer is required.

For any cowling with worn holes that uses the 2000 Series studs (Camloc® or CLoc®), first check that the proper stud is installed in each hole; is properly locked; not too tight; basically heads flush with the flange surface. Keep swapping stud lengths until you can achieve this goal.

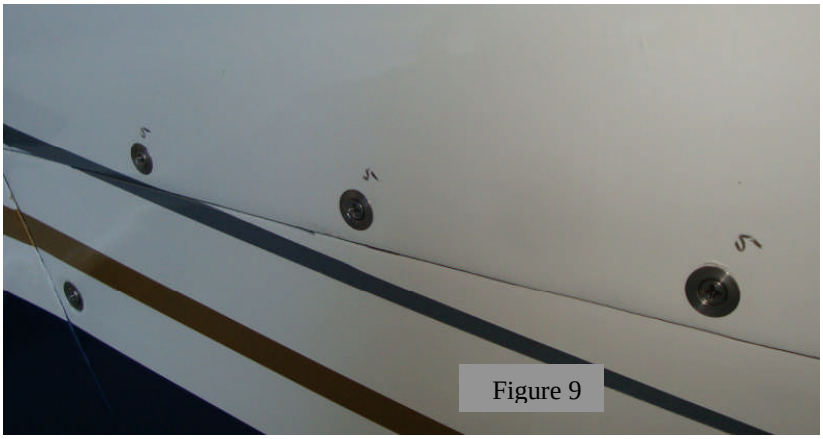


Figure 9

Note the small number mark on the head of each stud. Assuming you will be using the backup washers at every location (assuming every hole is excessively worn), add one dash number to the noted stud and mark the number with a grease pencil on the cowling. Remember, when we unlock the studs and remove the upper cowling, most of these studs are going to fall out and you will not know which stud came from which hole.

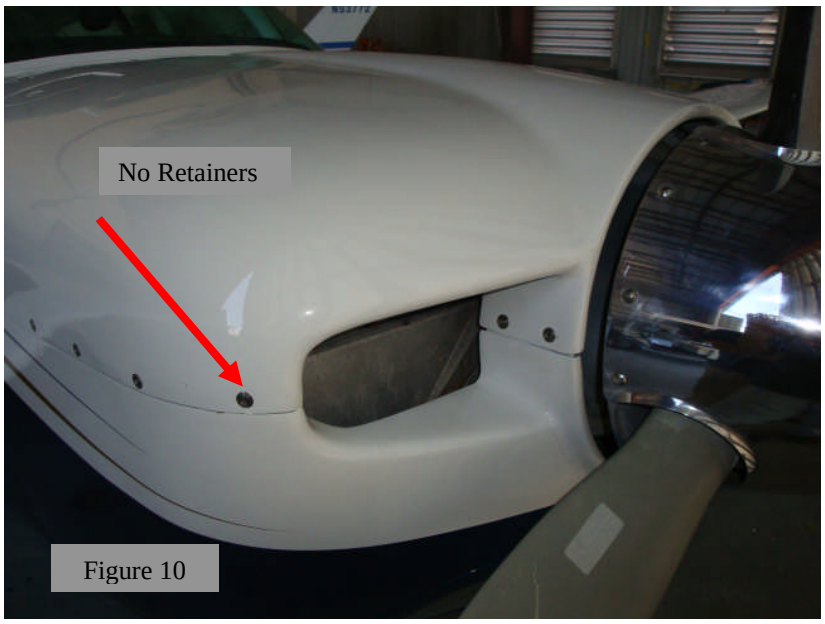


Figure 10

An exception to the traditional retainer rule involves the forward most side holes as noted. There is so little clearance at this location when positioning the upper cowling, life becomes easier by just pulling these two studs (one on each side) completely out. Same might be true with the 4 studs used behind the spinner (2 on each side). You will find, however, this section can be positioned with the retainers (studs slightly protruding) installed. Furthermore, the two rear studs (one on each side) have a bad tendency of falling into the voids of the lower cowling. I chose to retain these studs for that reason.

Once all the firewall studs have been fitted; all the side studs have been fitted (and noted in the case of the SK28S3 Series), remove the cowling. Install the proper length stud into each hole; slide the backing washer on; bend open the 2600-SW retainers; twist around the stud crosspin; and bend back to a nice flat configuration. Re-install the upper cowling and check that all fasteners are properly locked. You may find, depending on the locking sequence, one or two studs

may appear to be too tight. For the SK40S5 Series studs, simply exchange them for a longer stud using the 4P3 pliers. For the SK28S3 Series studs, you must remove the cowling; remove the retainer; then install a longer stud; and re-install the washer/retainer.

One last reminder: Camloc® studs have very little tolerance for over torquing. You can certainly exert enough force to lock a tight stud (too short for the hole). But in doing so, if it is a Camloc® part, particularly stainless, you will experience a failure at the crosspin due to the deformation of the crosspin hole. At Skybolt, we fought this problem for years (selling the original Camloc® part) until we began our in-house manufacturing of our CLoc® brand fastener. Although it may look the same, it is not. The CLoc® design adds approximately .003 to the stud shank at the cross hole. This certainly sounds easy but in certain manufacturing techniques, it is not. Better worded, it adds significantly to the cost of manufacturing. Our techniques lent themselves to this easy fix and our torque failure problem disappeared with the exception of the complete and obvious "wrenching" of the fastener in some lame attempt to lock it. This is always apparent with head galling. Believe it or not, the larger and heavier duty 4000 Series are the worst prone for excessive torque. If it takes more than 4-5 inch pounds to lock any Camloc® stud, it will eventually fail in most circumstances. The CLoc® stud is designed for 4-7 inch pounds; but will take considerably more excessive torque without failure. The moral of the story is to take your time and insure that all the studs are properly fitted. This kit is designed to include a small selection of longer studs.