November 1, 2016

Cessna 182
NEW Skybolt SK2003-42A Gen IV Platemount Conversion Kit

CLoc® SK40S5 Series Fasteners

Please Read these instructions before you remove the cowling. There is an important step prior to removing the cowling that will save you a lot of time and aggravation.

The Skybolt developed Conversion Kits primary purpose is to remove a light duty fastener system and install a proven heavy duty fastener system. Our kits and the installation process go further than just replacing fasteners; we are correcting issues with most cowlings to improve the design and lower maintenance costs.

We recommend viewing our test flight video to better understand what is going on under the hood with the shock mounts. www.youtube.com/embed/de9hrCiv5iA Go to Skybolt.com under "Videos".

When Cessna developed the cowling mount system for the C150, C172, C177, and some C182 airframes, they apparently took into consideration that the mounts could fail and the cowling could come in contact with the prop spinner. On some models, they installed a snubber (the same J7444 mount used around the firewall) at the nose of the lower cowling. What was designed to prevent a problem in some cases is the problem. The front of the engine tends to rest on this snubber mount. As the engine has considerable movement from startup to flight and back to the shutdown, engines can and do place forces on the cowling, particularly the C172, particularly but not limited to the C172 with O360 engines.

It is not uncommon for fleet operators to install the SK203 Kits on multiple airframes and have one airframe destroy

the rubber firewall mounts on a routine basis. In conjunction with the Embry Riddle maintenance department, we developed certain theories to support this. The theory that stands out is engine inclination. A smart level can determine this angle quite easily. On a C172, the upper door frame is a leveling datum on the same degree as the leveling screws on the fuselage. Compare this angle with that of the engine case as shown. If this angle is more than 5 degrees; if the engine mounts are worn out or not installed properly, the airplane is going to destroy the rubber cowling mounts unless the mounts have a large degree of flex such as the J7444-42 or the Skybolt SK2003-42A. The SK2003-42A is engineered for the worse case that we have encountered and we test 100% of our mounts in the shear flex motion. The flight test we conducted was on a well maintained C172S model with a 2 degree down engine sag. The test demonstrated how much shear movement the cowling mounts are subjected to. Imagine if this were a 5 degree sag or a 5 degree sag with a firm landing. What we also discovered was the amount of downward moment the engine has on the nose snubber during takeoff and climb.

By installing this conversion kit, we want to address and fix these problems.

Forward – Skybolt allows 6-1/2 to 8 Hours labor for this Installation…we have the right tools and experience. Some aircraft of the same model are easy conversions (6-7 hours); some are not (10 hours). Allow time for required paperwork (Form 337 submitted with STC and proper logbook entry).

Procedurally, do not remove your cowling, then start reading instructions as all of the following steps are out of sequence and the project will take longer than required. Our experience suggests the following sequence:

1) Use the SK203-TEM1 alignment procedure to establish a baseline to refer back to with the cowling removed.
2) Remove only the Top Cowling and follow the Steps 1 thru 8. This establishes early on some options to consider when the Lower Cowling is removed and SK2003-42A Platemounts are installed. Not following this sequence could require removing platemounts in order to modify (SK2003-AW4 CamWashers) to fix alignment problems. This sequence also is designed to minimize how many times you must position the Lower Cowling (difficult and time consuming) attempting to align fastener holes, paint stripes, or nose to spinner alignment. Working with the Upper Cowling first gives an established baseline to work from.

The Cessna 182 Cowling only converts the firewall mounts and fasteners as the sides use the 4000 Series Camloc. This kit changes the steel 40S5 Camlocs on the sides to stainless SK40S5S CLoc® and converts the firewall from steel 27S3 Camlocs to stainless SK40S5S CLoc®. It presents the least problems of all cowlings. Fastener alignment, however, can be improved. This conversion kit is not only designed to provide better fasteners, it is designed to correct any fastener alignment problems.

Before you begin the project, become familiar with the following recommendations or warnings –

1) Before you remove the cowling – Read section on SK203-TEM1 Alignment Template, Page 3.

2) Camloc or CLoc© Studs - Forcing or over-torquing studs will allow the stud pin to loosen and fail. Forcing means that the stud is too short for the application or the insert is incorrectly adjusted. No returns accepted on over torqued studs (Studs with loose or missing pins). This is plainly indicated by galled heads on the stud as a result of attempting to force the stud to lock.

Cessna issued Service Bulletin SB98-53-02 for newer 172 R & S airplanes on December 31, 1998 to address the root of the problem with shock-mounted cowlings. (Applies to all shock-mounted cowlings). This 29 page service bulletin describes an exhaustive procedure to align cowl mounts and assumes approximately 18 hours to accomplish. Skybolt has developed an alternate procedure that is simple and consumes very little time to properly align mounts with the corresponding fastener hole in the cowling. Step 1 in this manual will describe how to check for mount alignment. The fix to alignment problems is explained in Step 18.

INSTALLATION

Converting Camloc 27S3 Fasteners to CLoc® SK40S5 Series Fasteners

SKYBOLT SK2003-42A Mounts

PLEASE NOTE: The most important points you must adhere to in converting your aircraft are:
(1) Reading these instructions will save installation time and costly mistakes.
(2) Never drill any holes referenced with a standard drill bit. You must use a step drill or risk damage to the airframe or cowling.
(3) The biggest problem we encounter is a lack of understanding on how a CLoc® series stud works. These are not Dzus® studs where the bigger the screwdriver the better. CLoc® series Studs require very little torque to lock. Over torquing simply ruins the stud by loosening the pin. Readjust inserts to allow stud to lock with minimum effort.

There are three segments of the cowling we refer to in these instructions:

(A) The firewall support brackets
(B) The lower cowling containing the firewall studs and the side receptacle mounts.
(C) The upper cowling containing both firewall and side studs.

ADVANTAGES TO CLoc® SK40S5 Series studs:
(1) The strongest, most durable panel fastener.

SKYBOLT SK203 Series Kits are designed to convert the firewall to CLoc® SK40S5 Series fasteners and replace the steel Camlocs used along the sides.

Tools Required: 3/8 Drill Motor
Small Open End wrench (11/32)
UNIBIT-1 Step drill
SK-4P3 Pliers
SK-T26 Grommet Retainer Installation Tool
Optional Drill Jig – 1-1/4" Hole Saw and ¾" Hole Saw

Before you begin –

Take a close look at your cowling before removal.

Note its positioning relative to the prop spinner. If the cowling appears to not align with the spinner bulkhead or is not centered, repositioning of shims and mounts can correct this problem.

Also note clearances between the aft cowling skin and the fuselage skin. The allowable gap is 0.03 inch to 0.25 inch, with 0.12 inch preferred, except within 5.0 inches above and below the static port where the allowable gap is 0.06 inch to 0.13 inch. With this installation, it is simple to correct a side fastener alignment problem by a shim adjustment when you install the new SK2003-42A mounts, and positioning adjustment (alignment) of the mount to correspond with fastener hole in the cowling and or centering of the nose of the cowl.

Note paint stripes and paint lines.

Note any difficulty of fasteners aligning with respective holes.

To do this conversion correctly, we will address all of these issues.

Many cowlings are difficult to install because of unaligned side holes and fasteners, especially the rear most fasteners. A shim adjustment (firewall platemounts) can cure this problem easily. If your cowling has no problems with skin clearance or side fasteners, thus shim adjustments are not necessary, the next step is to note any adjustments required to center the nose of the cowling relative to the spinner. If shim adjustments are required, mount alignment will become more of a two-step process involving both the upper and lower cowling. By moving the mounts forward or rearward, the nose cowling can be adjusted. The second step will be to adjust firewall mounts in order to center the fastener hole with the corresponding mount. With the SK2003-AW4 washers, this adjustment is very easy.

Step 1 – (1/2 Hour)

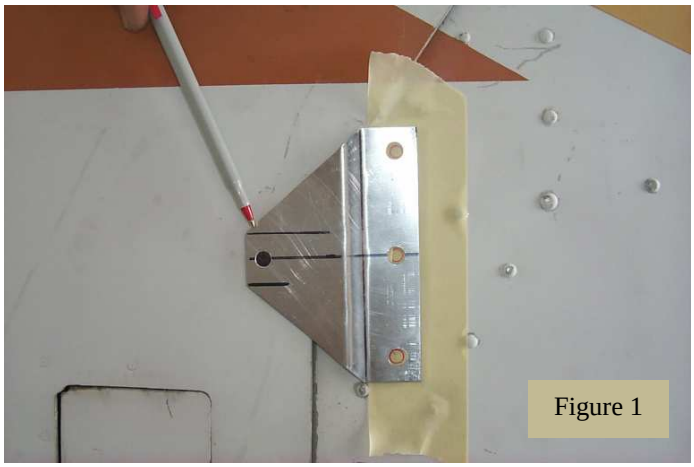

Figure 1

Place 8" strips of 1" masking tape behind the rivet line on the boot cowl adjacent to each stud as noted in picture. Sight template over each stud and mark holes onto tape. This important step will greatly enhance the alignment of each SK2003 mount at each location.

Close-up of template placed over stud and holes marked for alignment after cowling removed

Now, when you remove the cowling, it is easy to determine the mount position relative to the cowling hole for each

location. If the template determines that a mount is over 3/16" from the center, the use of SK2003-AW4 Cam Washers are an easy fix to re-locate the new mounts.

Figure 2

This is all too common on many Cessna cowling mounts. Without the SK203-TEM1, it would be difficult to tell just how much each mount is off from its respective cowling hole. To move a mount far enough to center (as in this case), this mount will need to be modified for SK2003-AW4 Camwashers.

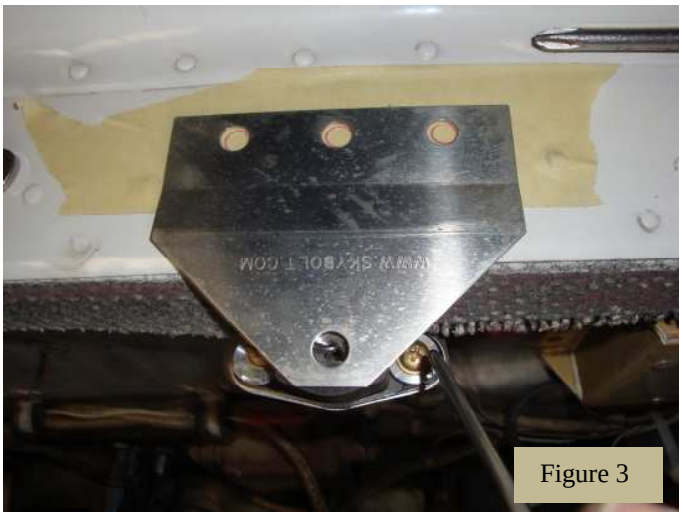

Figure 3

With camwashers installed, simply dial the washer to move the mount until centered with the template. It is that simple!

We will discuss the camwashers later on page 8.

Step 2 - Remove Upper Cowling (Leave Lower Cowling in place).

Step 3 – (1/2 Hour) Remove Upper Firewall Platemounts

Note the number of shims at each location and mark this on the firewall bracket. Plan to add or subtract shims to achieve clearances stated in Step 1. Now, remove all old mounts.

Step 4 – (1/2 Hour) Install New SK2003-42A Platemounts

Install new SK2003-42A Mounts at upper firewall locations with hardware supplied in kit. With the SK203-TEM1 template, check that each mount is centered as described above. If mounts are not centered within 1/4 of an inch, the SK2003-AW4 Camwashers must be considered.

Step 5 – (1/4 Hour) Remove old 27S3 studs from Upper Cowling firewall holes - Drill Upper Cowl firewall mount fastener holes to 15/32 (the next to last step on the Unibit-1 drill).

Step 6 - (1/4 Hour) Install Grommets –


Figure 4

Install the grommets and retainers with the SK-T26 tool. Push the R4G retainer onto the tapered shank close to the end, then use the hand tool to insert the ring onto the grommet. Check that the retainer is properly seated.

Step 7 – Install CLoc® Studs in Firewall holes of Top Cowling with SK-4P3 Pliers.

Step 8 – Position Upper Cowling. Lock firewall studs and note any changes to the alignment of the side fasteners Even though the firewall studs are not adjusted, this step will determine the decision to use SK2003-AW4 CamWashers for the Lower Cowling Mounts. You now have a good baseline to work with the Lower Cowling. Remove Upper Cowling.

Step 9 - Remove Upper Cowling

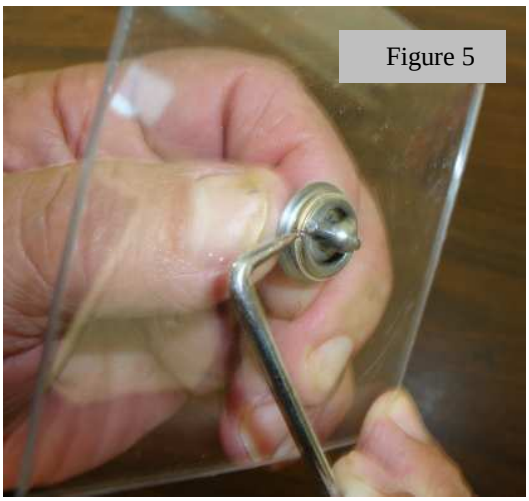
Figure 5

Step 10 – (1/2 Hour) Upper Cowling – Note the mix of stud lengths along the sides prior to removal. Replace all side grommets and fasteners with new CLoc® Fasteners. The best technique to remove old grommet retainers is to use a right angle pick. Turn the retainer so as the split is facing upward; place some tension on the stud/grommet; use a quick "snapping motion" against the radial axis (like you are pulling of the retainer split. You should be able to easily pop one end of the retainer over the grommet lip and remove. Install new retainers as described in Step 6, and studs as described in Step 7.

Step 11 – Remove Lower Cowling

Step 12 – (1/2 Hour) Lower Firewall - Remove Old Firewall Platemounts as noted in Step 3.

Step 13 – (1/2 Hour) Install New SK2003-42A Platemounts

Install new SK2003-42A Mounts at all lower firewall locations with hardware supplied in kit. With the SK203-TEM1 template, check that each mount is centered as described above. If mounts are not centered within 1/4 of an inch, the SK2003-AW4 Camwashers must be considered.


Figure 6

The C182 has a separate angled bracket adjacent to the cowl flaps. Mount the SK2003-42A in the same manner as all other locations.

Step 14 – (1/4 Hour) Remove old 27S3 studs from firewall holes. With Unibit-1, drill Lower Cowl firewall mount fastener holes to 15/32 (the next to last step on the Unibit-1 drill).

Step 15– (1/4 Hour) Install Grommets in Lower Cowling firewall as described in Step 6.

Step 16 – Install 2ea CLoc® Studs in upper firewall holes in Lower Cowling with SK-4P3 Pliers. (Leave the other studs out for the initial phase).

Step 17 – (1/2 Hour) Position Lower Cowling and fasten two upper fasteners to hold cowling in place. Be certain that rear doubler is properly positioned on mounts.

Note 3 things: (1) Do the cowling paint stripes line up. (2) Is the cowling in line with the spinner? (3) Look through each grommet hole to determine if mounts are aligned with holes. Placing the Upper Cowling into position will also determine how close the horizontal split is a proper fit. It is more of the norm that 2-3 mounts do not align with the grommet holes; that the paint stripe is not aligned; and the horizontal split is ¼ inch or more from an ideal fit. You can force anything up to a point, but the beauty of this installation is that we can fix all of these problems with shims and/or the SK2003-AW4 Camwashers.

Note: If by chance your cowling holes all align; the paint stripes align; and the horizontal split holes all align, skip to step 20. This is a rare occurrence.

If the lower cowling must be shifted up (typically), consider removing shims except for the Skybolt shim included to be used with the new mounts. If shim elimination is not an option, plan on using AW5 Camwashers on multiple locations on either side of the lower cowling. By "dialing" the Camwashers full up for multiple mounts, the cowling can be shifted up considerably without the cowling skin touching the aircraft skin. Approximately .030 clearance can be considered a minimum. You may find that only one side needs a shift.

----------If Required----------

Step 18 – (1 Hour) To modify SK2003-42A Mounts - If Required

Typically, three or four mounts may require movement greater than 1/4 of an inch. Modify as many SK2003 mounts as required by drilling mounting holes to 7/16 inch with a Unibit-1 bit. Deburr holes and check that the SK2003-AW4 washers insert properly.

Figure 7

Drill mount holes to 7/16" with Unibit-1 drill

Figure 8

Modified SK2003 Platemount installed with SK2003-AW4 Cam Washers.

Simple Drill Jig -

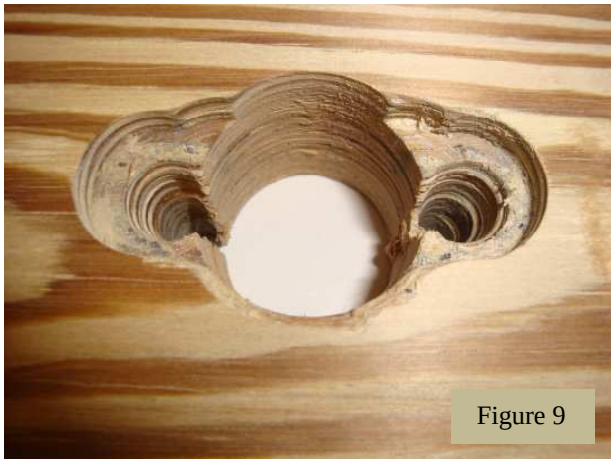

Figure 9

Use a small 2x4 as a drill fixture. Trace a platemount onto the wood surface. Mark the mount center and the center for each mounting hole. Drill the center all the way through the board with a 1-1/4" hole saw. For the "ears", only plan to drill the mounting holes ¼" deep. Any deeper and a typical drill press with a Unibit-1 will use up its full stroke prior to the 7/16 step. Use a ¾" hole saw for the ears. Carefully notch the wall between the large and small holes so that the mount fits nicely into the drill jig.

Place the mount into the drill jig and drill each mounting hole up to the 7/16" step of a Unibit-1 Stepdrill. Only start the 7/16" step less than ½ way through the metal and stop. Flip the mount and finish the 7/16" step from the back side so as to prevent a burr.

The SK2003-AW4 Cam Washers are slotted so as the mounts can be mounted in a centered position. (Previous versions had no center positioning). By moving the mount within the slot, centering may be possible. For additional movement, simply rotate the washers to a desired center or shift. Once the desired center or shift is located, tighten screws and you are done. Unlike the Cessna Service Bulletin SB98-53-02, this modification is easy, accurate, and involves no drilling of the airframe brackets or relocation of brackets.

Note – Camwashers "dialed" full up to shift this Lower Cowl up to the paint line and to align side fasteners. The 3 lower mounts on the right side have all been modified for the SK2003-AW4 Camwashers, full up bias. The left side of this cowling did not need this shift for alignment

Step 19 – (1 Hour) Re-install modified SK2003-42A Mounts. "Dial" the Camwashers to the desired offset to achieve alignment goals.


Figure 10

Step 20 – (1/2 Hour) Position Lower Cowling as described in Step 17. Position the Upper Cowling. Install one or two SK40S5S fasteners in Upper Cowl firewall holes and lock. (Note: If studs appear to be tight or not lock, do not force to lock. A longer stud is required).


Figure 11

Now note 3 things: Are the same alignment items as described above resolved? Hopefully, considerable progress has been made. The horizontal split holes should be close to center, hopefully, at center. If alignment is still a problem, additional Camwashers may be the only answer.

Final Step – Inspect engine compartment for tools. Reconnect Cowl Flaps. Reconnect landing light wires if applicable.

Platemount Configured Aircraft

Aircraft	Note	Year	Models	Serial Numbers	Screw Cowlings	Platemount Cowlings
C150	A	59-66	150A-F	17001-17999, 5901-64532	6,527	
C150	1	67 On	150G-M	64533 thru 79405		14,872
A150	1	70-77	150K-M	A150001 thru A150734		734
C172	A	56-66	172, A-G	28000-54892 plus Reims SN	27,279	
C172	1	67-81	172H-P	54893 thru 75034		21,186
C172	2	82-83	172P	75035 thru 76079		200
C172	2	83	172Q	75869 thru 76079		200
C172	3	84-86	172PII & Q	76080 thru 76673		593
C172	4	77-81	172XP,XPII	2000 thru 3454		1,454
C172	5	96-On	172 R&S			300
C175	A	58-62	175, Skylark	55001 thru 57119	2,119	
C177	1	71-78	177 A-B Classic	0001 thru 1366		2,752
C177RG	1	71-78	177RG,RGII	0001 thru 1366		1,366
C180	A	53-60	180, A-C	30002-33000, 50105-50911	3,804	
C182	A	56-60	182, Skylane	33000 thru 53007	4,105	
C182	5	73-86	182P-RB	61426 thru 68542		7,116
					43,834	50,773

Note	Configuration
A	Screw Cowling
(1)	Lord-Southco
(2)	Lord-Southco FW & Sides, Camloc 4002 Nose
(3)	Lord-Camloc 27S3 FW & Sides, Camloc 4002 Nose
(4)	Lord-Southco FW, Camloc 4002 Top Center, Nose & Sides
(5)	Lord-Camloc 27S3 FW, Camloc 4002 Sides

Weight & Balance Considerations for Conversion

Aircraft	Original Fasteners	Skybolt Fasteners
C150	.160g/.35lb	.385g/.85lb
C172	.210g/.46lb	.525g/1.15lb
C177	.215g/.48lb	.520g/1.15lb
C182	.170g/.37lb	.385g/.85lb

Proper Installation of this modification is important. Equally important is proper documentation.

Before returning your aircraft to service, you must accomplish 3 important steps:

1) Send Email to Skybolt to receive a copy of this STC, authorization to use the STC, and accepted language to file Form 337 with the FAA
2) Prepare and file Form 337 with the FAA. Note: as this is an STC'd installation, Form 337 is filed after the conversion is complete and no further acknowledgement from the FAA is required. But it must be filed for the aircraft to be returned to service.
3) Make a logbook entry that the kit was installed as per the Skybolt Instructions (Rev number/Date).

By contacting Skybolt (dbowers@skybolt.com or abraun@skybolt.com) this allows us to log and track the airframe that has been converted. If we have a revision to our kit or any issues with any component of the kit, we will have a method to contact the owner with important details.

Please provide the following:

1) N Number of the aircraft

2) Model and Serial Number of Aircraft

3) Kit Serial Number

4) Date of Purchase

5) From whom Purchased

6) Date of Installation

7) Approximate hours on engine and/or engine mounts