

Tech Talk
March 21, 2013
Mod 78 Spar to Aileron
Crosslink Rod and Forward Socket Clearance Issues

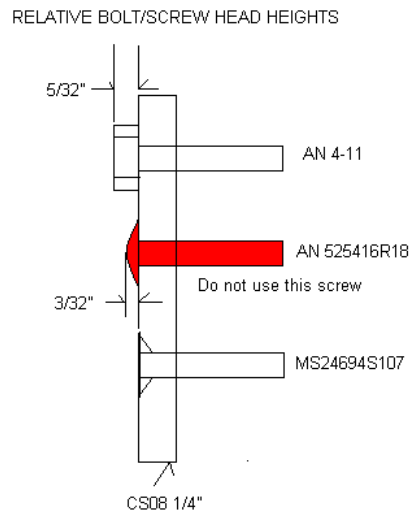
In the Mod 78 Tech Talk article we indicated the prudent builder would check for fit and possible interference points prior to starting. No matter how careful one is, there is still the possibility for some interference issues due to the layup process and wing fit. This Tech Talk Article addresses two of the most common issues after Mod 78 wing fit. Aileron cross link arm bolt head to spar clearance and the front socket clearance.

The interference problems between the mod 78 modified wing spars and the AN4-11 bolt heads of the CS08s is a bit tedious.

In our Mod 78 installations in the shop, even with careful width control on the spar bid layups, we have experienced unacceptable clearance or contact between the bolt heads of the CS08 to the spar due to builder variances. If the cockpit module was installed slightly askew, or the builder moved his bearings and supports for his aileron CS08 arms forward of the three inches just a bit, or the tapes around the CS14 and module at the fuselage spar hole had a lot of flox, or the CS08 arms were not bent sufficiently (most are consistent but can be as far off as 1/8 inch from one another) then we will typically have a clearance issue of about 1/16 to 1/8 inch that builders will call us on...

It is clear that the AN4 style head at 5/32nds inch head height needs to be addressed. The casual observer would consider use of an AN 525416R18 washer head screw in place of the AN4-11. The 525 washer head is lower by about 1/16 inch, but the head is not designed for pull tension and is unacceptable. The alternative is to use a countersunk structural screw such as the MS24694S107. The 100 degree countersink is quite strong and since the CS08 is 1/4 inch thick, the use of this screw would be a good work around. The CS08 is tempered aluminum is quite tough. Also, it is impossible to use existing countersink tools to do the job in place. We have devised an adaption for our close quarter drill head to allow use of a 1/4 inch by 100 degree countersink to get a true flat and precise fit. This is expensive and not for the amateur.

See picture below:



In the event there is a clearance problems using the AN4-11 bolts remove the CS08 and countersink the CS08 for the MS24694S107 countersunk screws. Removal of the CS08 would involve the following:

Note the clearance of the CS08 to the CS10 Pitch Torque Tube. The clearance between the AN4-11 bolts and tank should be noted as well as the required movement of the CS08 for clearance of the new spars before starting.

Using standard practices, remove the aileron bell crank quick disconnects, cross link tube and the CS 10 Pitch Torque Tube.

Using close quarter ratcheting angle head screw drivers and wrenches, remove the CS 08 from the CS07.

Simply make from aluminum 1 inch tube (as used in the aileron lateral push rods) a spacer for a tight angle drill. Be sure to make your spacer absolutely square.

We recommend either of the following tight angle drills: (ATS 90° Air Driven ANGLE DRILL Part # 12-01422 or a tight drill kit such as 90 DEGREE ANGLE DRILL KIT Part # 12-00883 which attaches to your air or electric drill). The bit to use is a countersink bit such as a Micro Stop bit ¼ inch pilot ½ inch diameter, p/n 12-00947. All are available through Aircraft Spruce or any aircraft tool supplier.

This is a very tight area and clearance for hands and tools is nearly impossible for some.

The drill pilot will keep your drilling relatively straight, but to get the countersink dead square, some sort of stop is essential. A micro stop mini will not work in most cases.

Check the countersink for proper depth. Do not over countersink. Install the MS24694S107 structural screws. Reassemble the cross rod and enjoy the extra clearance.

One side benefit is the spar doesn't get hung up on the bolt heads after this mod.



As can be seen in the photo above, clearance is tight but the spacer keeps the head flat against the aluminum and the pilot of the bit does the rest of the work.

An alternative method to remove the CS07 follows:

Using a hole saw on low speed with pilot bit set to only penetrate into the aircraft the thickness of the skin, and being careful not to hit the controls, cut a 4 inch diameter hole in the lower fuselage skin below the CS 06,07,08s. The glass in this area is very thin so it will go quickly. If a hole saw or confidence is not at hand, use a Dremel thin cutoff wheel, and slowly cut out the hole to clear.

Sand the hole blank and around the hole to remove the paint and filler to at least two inches around the hole for surface prep required to close back the skin later on.

Access to the area is sufficient now to use normal hand tools to remove the bolts securing the aileron cross link rod, quick disconnects and the CS08 to the CS 07.

To countersink for the MS24694S107 Machine Screws use a proper Microstop and suitable 100 degree countersink tool and normal practices.

Reattach the CS08 to the CS07 temporarily and check for clearances.

If all clearances and full control throw is achieved, reattach the CS08 to CS07, aileron cross link arm and quick disconnects.

To repair the holes use a standard patching procedure noting the following:

Place the blank in the hole and temporarily tack in place using tape or dabs of 5 minute epoxy attached to a stirring stick to keep the blank in alignment. Once the dabs of 5 minute have dried, floc the hole gap and apply one layer of bid glass to the inside of the aircraft avoiding any glue getting on the bearing and overlapping the inner surface by 1.5 inches (except over the bearing). After cure, remove the stick/tape used to hold the blank in place and cover with two layers of bid overlapping the outer surface by 1.5 inches.

Finally there is the matter of the front wing pin support.

This is a long awaited improvement to the front wing lift socket. It is substantially stronger and will be stiffer and incorporates a bearing, similar to the flap bearing, to allow for pin alignment during rigging if you didn't quite get things straight drilling and threading in your lift pins. The new socket is now slightly shorter than the existing socket to allow for clearance issues and for the new pin with a machined flange for wrenching it on. See pin photo:



On a new build, the sockets should be straight forward to install. On a previously rigged aircraft, carefully mark around the new socket and remove paint and filler for a good bonding surface. In our experience, the left socket is nearly butted right against the root rib. If the cockpit module was installed askew or for other reasons, we have seen the left forward socket filed down to clear the rib for proper wing sweep alignment, so there may be fit problems using the new pin. To accommodate this, the new socket is shorter than the previous model. However the new pin flange may still be a problem. See the photo below:



If you find yourself with the problem above and are concerned with clearance, remember that the additional root glass layups will fill this void between the root and pin flange. However, if clearance is still tight between the root and socket, contact tech support and we will supply a non flanged pin.

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