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Airworthiness Directive  
# 118

WING SPAR MODIFICATION  
FOR AC OF TYPE  
S-16 SHEKARI

October 9, 2000

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## 1.0 General information and Affected AC:

### GENERAL INFORMATION:

Service testing at our S-16 prototype AC showed at a routine inspection elongation of boltholes in 4 finger lugs of main spar center section.

In the interest of safety the design of the junction of both main spars is changed.

Existing main spars can be relatively easy altered to the new design.

Rans Inc. provides all parts and special tools to perform this alteration free of charge.

### AFFECTED AC:

Affected are all S-16 AC produced with 4-finger lug assembly in center section of wing main spar.

**Following the procedures and changing to the new style lugs as outlined in this manual is mandatory for all owners of these AC in the interest of flight safety.**

## 2.0 parts and tools required:

### 3.0

The following is a list of parts and tools supplied in this kit:

Item	Part number	Description	Qty.	
1	KPWI0337	Wing upper lug left	1	
2	KPWI0338	Wing upper lug right	1	
3	KPWI0339	Wing lower lug left	1	
4	KPWI0340	Wing lower lug right	1	
5	KPWI0342	Wing root stiffener	4	
6	AN 9-27A	Bolt	2	
7	NAS6203-50X	Bolt	16	
8	NAS6203-48X	Bolt	24	
9	AN3-5A	Bolt	12	
10	AN960-10L	Thin Washer	12	
11	AN960-10	Thick Washer	56	
12	AN960-916	Thin Washer	8	
13	MS21083N9	Shear nut	2	
14	AN365-1032	Tensile nut	52	
15		Hand reamer 13/64"	1	
16		Drill bit #7	1	

Item number refers to drawing on page 11.

TAKE INVENTORY: You must complete an inventory within 30 days after receiving

The following tools or supplies are furthermore needed to perform alteration and are not supplied with this kit:

- Electric Hand Drill
- Tap Wrench
- Fine File
- Lubricating oil
- Light Hammer
- Flash light
- Several wood blocks
- Sand paper

### 3.0 Precautions and Preparations:

#### PRECAUTIONS:

The tasks to perform the design change are relatively easy to do and require only average shop skills.

All parts are precision manufactured and should fit easy together.

The 4 new lugs you received are machined to close tolerance from higher strength material and stress relieved after machining.

Take special care of these lugs during all time. Do not drop, dent, scratch or harm in any other way. This is very important.

Your upper and lower lugs are matched as pairs and the center holes are reamed to precise fit the two main bolts supplied with your kit. Do not damage holes or main bolts in any way. **Make sure the bolt stays with related lugs.**

The bolts holding your new lugs in your spars (now 10 for each lug instead of 6) are close tolerance high strength bolts special made. Be care full not to harm in any way.

We suggest placing all parts on soft and clean material at all time.

Further we suggest to lay out foam or other soft padding on the floor under your direct work area to avoid sudden design changes caused through impact on hard floor.

Follow the sequence as outlined in this manual, work clean and apply common sense.

#### PREPARATIONS:

Take the wings off from your AC if already installed. It is comfortable to have both wings on sawhorses for this job, but some thing else will work, if free access to center section of each wing spar is provided.

## 4.0 Assembly procedure:

### 4.1 Removal of old wing lug assembly:

1. Remove all nuts from attach bolts of wing lug assembly (12 each spar). Carefully remove bolts. Use punch to drive out bolts and drop of oil if needed.

2. Remove all lugs, spacer and shims – everything hold by the 12 bolts in each spar.

Note:

Save removed 3/16 bolts and modify 10 of these bolts to alignment pins as shown in Figure 1. We used a disk sander to do this.

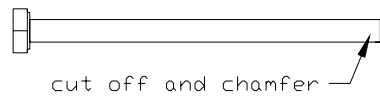
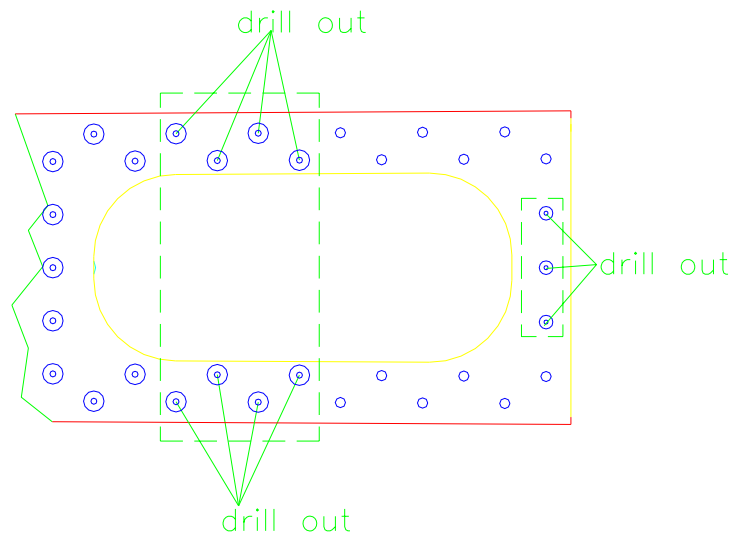


Figure –1-alignment pins

### 4.2 Preparation of spar for new lugs:

The lugs will be hold each by 10 bolts instead of 6 bolts.

This makes it necessary to drill 16 3/16 steel rivets and 6 1/8 aluminum rivets out (per spar).



Refer to Figure 2.

Figure –2- Rivets to drill out (both sides)

1. Drill required rivets out.

Use the following procedure to do this:

Start on the root work in tip direction and do one rivet at the time.

Always insert short 3/16 bolt secured with nut in open hole next to rivet you are going to drill out. This will clamp all parts together and help to avoid bending of inner spar cap doubler when driving out rivet.

- Punch mandrel out of first rivet (small pin or other rivet will work)
- Use # 11 drill to drill just through head of rivet.
- Insert pin and break rivet head off.
- Care fully drive remaining rivet part out with pin and light hammer

Use the same method for the next rivet and all other rivets – do not forget to insert bolt secured with nut in hole next to rivet.

2. Clean inside of spar out, make sure there are no metal shavings between the parts of your spar caps.
3. Mark one spar with 3 finger lugs and one with 2 finger lugs. This will help to make sure you insert the lugs in the spar they are fitted to.

Note:

The two finger lugs go in one wing and the three finger lugs in the other wing.  
It is not important in which wing you have the two or three finger lugs.

### 4.3 Preparation of new lugs:

The lugs are ready, except you have to make sure they fit in your spar caps. Due to slight dimensional variations in spar cap extrusions it is possible that you have to do some sanding to be able to slide the lugs in.

Add slight film of oil to lug flange and slide lug in spar. Refer to figure –3- for orientation.

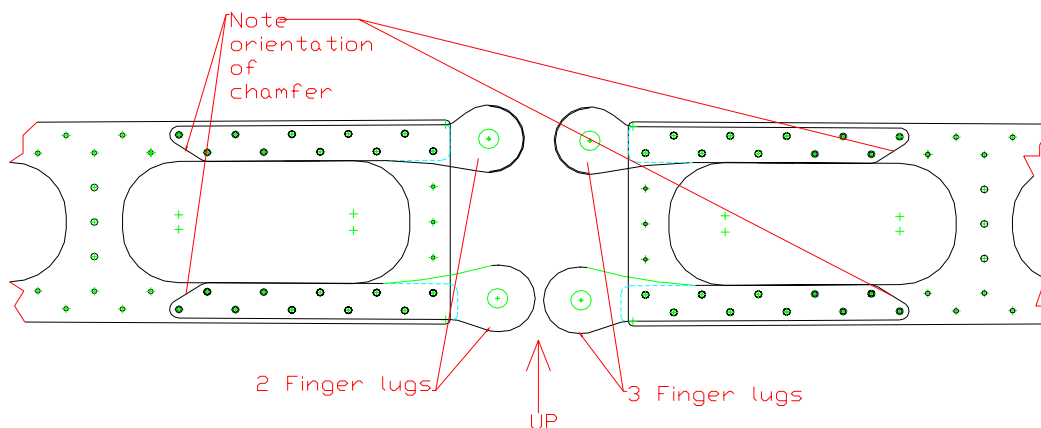


Figure –3- Lug orientation

The lug fits ok if you can drive it in with light strikes from block of wood. Do not use hammer. If a lug does not fit, you will have to sand its flange down.

It is important to remove about the same amount of material from both sides.  
It is also important not to harm the surface of the fingers on the 3 finger lugs. Note figure 4.

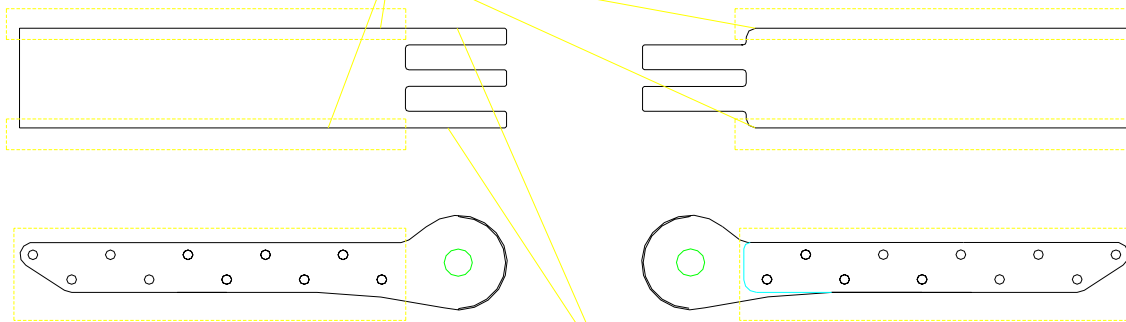
This is easier as than it sounds. You can use a belt or disk sander with a fine grit or just use a piece of sand paper glued or taped to a flat work surface. Then slide the lug with equal pressure over the sandpaper. That's the way I did it and it works.

Distribute your pressure even when you sand and flip lug around to sand both sides.

Use fine sandpaper to smooth surfaces (400-600 grit wet dry works fine), clean lug with solvent, rinse with water, dry, lubricate and perform test fit.

Repeat this until desired tight fit is reached.

Sand these areas for fit if needed



care full - in this area remove as little material as possible

Figure -4- Areas to sand

After final fit is achieved you are going to install your lugs. Make sure they are absolutely clean. Care fully drive lugs in position until the first hole (root) lines up with holes in spar cap. Use wood block as shown in figure 5 to help with alignment.

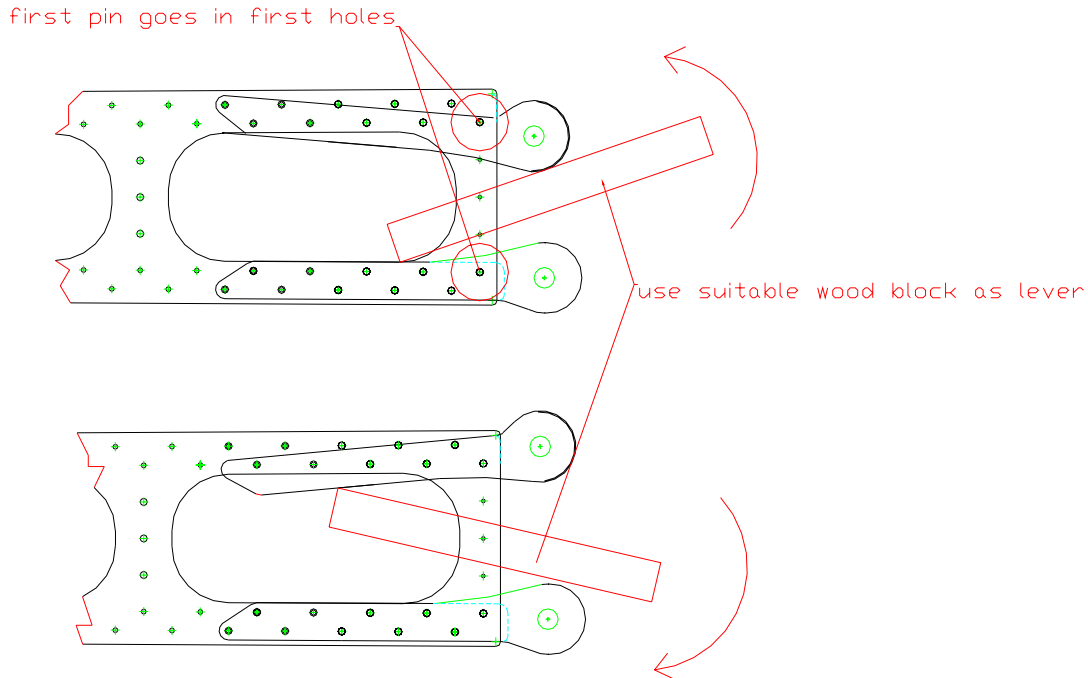


Figure -5- Alignment of lugs

Drive alignment pin (lubricated) through wing root stiffener and in first hole at root end. Check alignment and adjust if needed until all holes line up. A light held against the back will make misalignment easy visible. Drive more pins in to lock position (switch direction on every other pin). We used 5 per lug. Repeat this procedure for other lug.

The bolts supplied with your kit are oversize bolts. This means you will have to drill and ream through each of the 10 holes per lug.

**To do this the lugs need to be in the spar. You drill and ream through spar cap and lug together.**

Note:

At the first 4 holes top and bottom you will ream through the steel root stiffener plate and the spar lug assembly. Make sure you have plates on both sides and the plates are marked so you will be able to put them in the same position.

This is the general recommended procedure:

Start at the first hole at the root.

1. Remove pin.
2. Drill through hole with supplied # 7 (.201) drill bit. Make sure you drill with even pressure and hold drill straight.
3. Blow through hole to remove shavings.

4. Ream through hole with supplied 13/64 reamer (.203). To do this you can use a tape wrench and turn reamer clockwise only by hand or you can use the reamer in an electric hand drill. Make sure the reamer is straight at start point and you ream all the way through.
5. Blow through hole to remove shavings.
6. Drive bolt through with wood block, temporary add washers and nut and tighten. This will help to clamp parts together
7. Remove shavings from reamer.

Repeat this procedure for the second hole and all other holes.

Note:

It is not necessary to insert a bolt in each hole at this time. Have a bolt in each third or fourth hole. This will be sufficient.

Now you have to drill the three holes (each side) at the root to # 11. Refer to figure -6-. Use the holes in root stiffener (steel plate) as drill guide. To avoid getting shavings between the .020

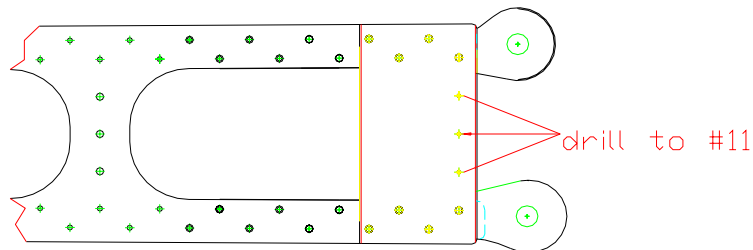


Figure -6-

shear web and the side plate clamp all pieces tight together when you drill. A wood block inserted in the root end Of the spar will do perfect.

If desired apply thin coat of zinc chromate primer to lugs for corrosion protection.

#### 4.4 Preparation of spar for wing attach:

Check everything. Make sure every hole is reamed to size and the inside of your spar is clean and free from shavings.

Remove all bolts and plates except for the last bolt in each lug (use correct length, Insert bolts from back of spar). Rotate lugs around these bolts as shown in figure 7.

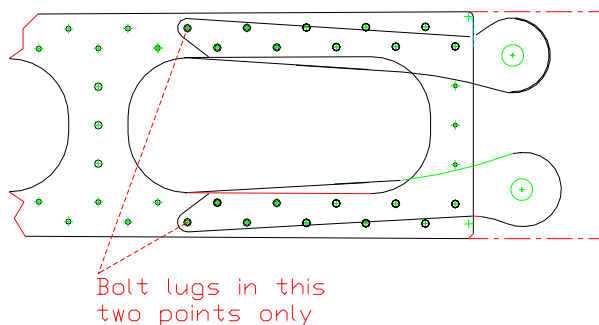


Figure -7-

This is necessary to clear tubes in fuselage

## 4.5 Wing attach:

**For wing attach refer to your kit assembly manual.**

But her are some general comments:

Have something handy to support the wing. Slide the wing spar through opening in fuselage, only far enough to have lugs inside the fuselage. Have the wing rest on some support so you can work on lugs.

Rotate lugs in position, check alignment and bolt lug- plate -spar assembly together as shown.

Note:

Insert bolts from the back of spar. You have bolts with two different lengths. The longer bolts are used at the spar stiffener plates only.

**Do not tighten nuts at this time. This will be done after center bolts are inserted.**

Repeat procedure for other wing.

You need 2 helpers to attach your wings. Place one on each wing tip. Insert outer bolts (at fuselage side) first.

You might have the helpers move the wingtips up and down to help the wing lugs slide together, use some lubrication. Make sure you position the rudder cables inside the lugs and you clear the center stringer on the fuselage floor.

After you have installed both outer bolts, the two inner or main bolts have to be inserted.

You start with one, it does not matter which one (top or bottom). Have the helpers move the wing tips care fully up and down until you see one set of holes aligned. Use a light and look through hole to check alignment. If you use a pin to align the holes you have to be very care full not to damage the hole. We do not recommend the use of a pin.

Insert bolt and drive trough.

Have the helpers move the wing tips up and down again until second bolt holes line up and insert bolt.

Tighten the two nuts until washers don't turn any more and then tighten about 1/8 turn more.

Now tighten nuts on all other bolts.

To tighten do not turn bolts- turn nuts.

Torque bolts by hand but do not over torque. It is easy to strip a 3/16 nut.

Make sure you have all your controls hooked up and everything inspected before you fly.

Thanks for your effort in this matter.

