THRUSH AIRCRAFT, INC.

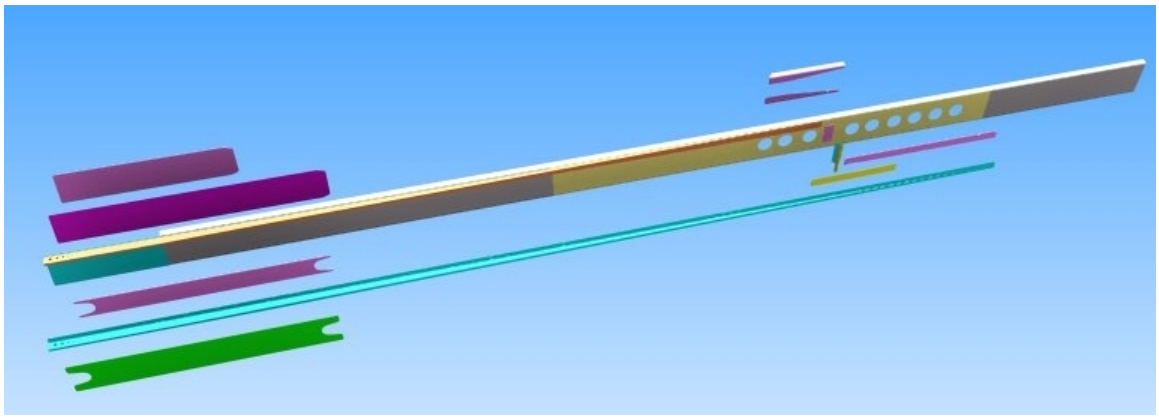
P.O. Box 3149 Albany, GA 31706-3149 Phone (229) 883-1440 Fax (229) 439-9790

CUSTOM KIT

No. CK-AG-40 Rev. A

Date: 12/8/06

WING SPAR UPGRADE



The wing spars of most early Thrush models are the subject of FAA Airworthiness Directives (most recently FAA AD 2006-07-15) which require periodic inspection of the lower wing spar caps at the splice block attach holes for fatigue cracks.

This Custom Kit is an acceptable way to replace the lower spar caps, but it does more than this for the aircraft owner. It brings the spars up to the best fatigue capability that is compatible with the existing wings. This upgrade includes not only the lower spar caps that have the first two splice holes cold expanded, but it also includes new inboard webs and doublers as well as the "big butterfly" and lower splice plate.

When a set of wings is rebuilt according to this Custom Kit, it will gain the initial inspection interval of a "Group 4" airplane while retaining the spar fatigue life of its current group. The inspection intervals between initial inspection and spar fatigue life limit will be the larger inspection intervals currently used for Group 4 and 5 airplanes. The upgraded wing will be as strong as or, in many cases, stronger than the original.

Note that this upgrade is for <u>both</u> wings. If the airplane has one relatively young spar cap and it is not replaced, the inspection intervals will be based on that spar, not the new one.

Any deviation from this Custom Kit not acceptable to the FAA makes the airplane ineligible for the "Group 4" initial and repetitive inspection intervals.

MODELS ELIGIBLE:

Aircraft eligible for this custom kit are those that are subject to AD 2006-07-15 and having lower spar caps P/N 20207-1, 20207-2, 20207-11, 20207-12, 20207-13 or 20207-14 installed (see note 5).

That is:

MODEL	SERIAL NUMBERS	GROUP
(1) S2R	5000R through 5100R, except 5010R, 5031R, 5038R, 5047R and 5085R	1
(2) S2R-G1	G1-101 through G1-106	1
(3) S2R-R1820	R1820-001 through R1820-035	1
(4) S2R-T15	T15-001 through T15-033	1
(5) S2R-T34	6000R through 6049R, T34-001 through T34-143, T34-145, T34-147 Through T34-167, T34-171, T34-180 and T34-181	1
(6) S2R-G10	G10-101 through G10-136, G10-138, G10-140 and G10-141	2
(7) S2R-G5	G5-101 through G5-105	2
(8) S2R-G6	G6-101 through G6-147	2
(9) S2RHG-T65	T65-002 through T65-018	2
(10) S2R-R1820	R1820-036	2
(11) S2R-T34	T34-144, T34-146, T34-168, T34-169, T34-172 through T34-179, T34-189 through T34-232 and T34-234	2
(12) S2R-T45	T45-001 through T45-014	2
(13) S2R-T65	T65-001 through T65-018	2
(14) 600 S2D	All serial numbers 600-1311D and up	3
(15) S2R	1380R, 1416R through 2592R, 3000R and 3002R	3
(16) S2R-R1340	R1340-001 through R1340-035	3
(17) S2R-R3S	R3S-001 through R3S-011	3
(18) S2R-T11	T11-001 through T11-005	3
(19) S2R-G1	G1-107, G1-108 and G1-109	4
(20) S2R-G10	G10-137, G10-139 and G10-142	4
(21) S2R-T34	T34-225, T34-236, T34-237 and T34-238	4
(22) S2R-G1	G1-110 through G1-115	5
(23) S2R-G10	G10-143 through G10-165	5
(24) S2R-G6	G6-148 through G6-155	5
(25) S2RHG-T34	T34HG-102	5
(26) S2R-T15	T15-034 through T15-040	5
(27) S2R-T34	T34-239 through T34-270	5
(28) S2R-T45	T45-015	5
(29) S2R	5010R, 5031R, 5038R, 5047R and 5085R	6

Note 1: The serial numbers of the model S2R-T15 airplanes could incorporate T15-xxx and T27-xxx (xxx is the variable for any of the serial numbers beginning with T15- and T27-). This CK applies to both of these serial number designations, as they are both S2R-T15 airplanes.

Note 2: The serial numbers of the model S2R-T34 airplanes could incorporate T34-xxx and T36-xxx, T41-xxx or T42-xxx (xxx is the variable for any of the serial numbers beginning with T34- and T36-, T41- and T42-). This CK applies to all of these serial number designations, as they are all S2R-T34 airplanes.

Note 3: Any Group 3 airplane that has been modified with a hopper of a capacity more than 410 gallons, a piston engine greater than 600 horsepower, or any gas turbine engine, makes the airplane a Group 1 airplane for the purposes of this CK.

Note 4: Group 6 airplanes were originally manufactured with turbine engines, but were converted to radial engines. They are now configured identical to Group 3 airplanes.

Note 5: The lower spar cap part number is stamped on the inboard end of the spar cap. The first four figures indicate the vendor who manufactured it and the year of manufacture. These four figures are followed by a dash and a number. This "dash number" corresponds to the "dash number" (last two or three places) of the part number. The first part of the part number is indicated, after a space, by a 7R or 7L. These indicate that the first five digits of the part number are 20207, either a right hand or left hand part. For example a stamp reading "TL94-2 7R" would indicate a 20207-2 spar cap, right hand, manufactured in 1994.

COMPLIANCE:

Compliance with this Custom Kit is optional.

BY WHOM WORK WILL BE ACCOMPLISHED:

Work must be performed by a FAA licensed A & P mechanic or foreign equivalent.

APPROVAL:

The technical content of this Custom Kit is FAA approved.

MAN HOURS:

Estimated man-hours for accomplishing the basic Custom Kit is 300 man hours.

SPECIAL TOOLS:

See "Repair" section, below

INSPECTION:

The aircraft will be returned to service by an A & P mechanic holding an FAA Inspection Authorization (IA) or foreign equivalent.

REPAIR INSTRUCTIONS:

1) Prepare the work area.

1.1) **Ideally, work should be done in a building having an even concrete floor.** At the very least the wings have to be protected from windy or gusty conditions.

1.2) **Study the Custom Kit work instructions and drawings** and be sure all the required tools and supplies are on-hand.

1.3) **This is not a one man job.** Installing some of the fasteners is impossible for a man alone, and the job will go more than twice as fast with a helper.

1.4) **SAFETY FIRST!** The wings must be securely supported while they are being worked on, and moving them other than with mobile stands is difficult and hazardous.

2) Remove the wings from the airplane.

2.1) **De-fuel the wing tanks and disconnect wing wiring and pitot-static system plumbing.** Cap the pitot-static lines and remove the flaps and ailerons from the wings prior to taking the wings off. Inspect the flaps and ailerons carefully, make any necessary repairs, and store for reuse.

2.2) **Unhook the fuel hoses from the wing tank outlets and vent lines** and cap off the lines.

2.3) **Detach the aileron push tubes from the idler arms in the fuselage.** Stuff rags around them where they come out of the wing root to keep them from moving.

2.4) **Remove the bolts attaching the aft spar inboard ends to the fuselage** and discard the fasteners.

2.5) **Support both wings at a minimum of two wing ribs each** on padded stands prior to removing the attach angle bolts.

2.5.1) While padded stands support the wings fine while they are being detached from the fuselage and each other, manually removing the wings from the airplane will require a minimum of eight people.

2.5.2) A much better means of holding the wings is with mobile stands. These allow the wing to be removed and installed with two people. They also greatly simplify the job of trial-mating the wings. Authorized Thrush Service Centers will have mobile wing stands.

2.6) **Remove the bolts through the attach angles at the vertical fuselage tubes** at fuselage station 25.438. Place wood shims between the lower spars and the lower fuselage longerons before removing these bolts.

2.7) **De-mate the two wings by removing the bolts that attach the top and bottom splice blocks** on both the upper and lower spar caps (24 bolts total), as well as those that attach the web splice “butterfly” plates to the wings. The

pump mount will also have to be removed. Carefully remove the splice blocks and plates. The upper splice blocks and the pump mount parts may be reused, but not the lower splice blocks and splice plates. The lower splice blocks and splice plates may be retained for possible use as templates, but they are not to be reinstalled on any wings. Clearly mark them as scrap and discard the used fasteners just removed from the wings.

2.7.1) Scrap parts that potentially may be used as a pattern or template should be painted an obvious color, such as red, so that it is not mistaken for good parts. Once their potential usefulness as a pattern or template is past, and no later than the completion of the project, scrap parts should also be mutilated so that they are physically unusable.

2.8) With the wings detached from the fuselage and each other, they can be removed from the aircraft by moving sideways. This will be quite difficult if the mobile wing stands do not roll sideways. It can be accomplished by manpower, but will require no fewer than eight people.

2.8.1) The wing serial numbers should be established at this point. This is normally stamped into the front face of the main spar web, near the inboard end inboard of the forward doubler. Some wings also have an I.D. plate mounted to the trailing edge rib at the outboard end of the aileron bay. If neither of these locations shows a serial number, and the wing serial numbers cannot be positively established from aircraft records, new serial numbers must be assigned. Contact the Q.C. Manager at Thrush Aircraft, Inc., (229) 883-1440 ext. 229, to obtain a new serial numbers.

2.8.2) The part numbers given in following sections **3)** through **8)** assume the left wing is modified first. See **9)** if the right wing is modified first.

3) Dismantle the wing main spar. The owner/operator will be tempted to reuse parts removed, as they may appear to be the same. DO NOT REUSE PARTS unless instructed to do so. Parts listed on drawing 94417 and mentioned in these instructions by part number are new parts, and must be used for the upgrade. Keep in mind that we are dealing with a fatigue problem. The entire spar is subject to fatigue. Even though the lower spar cap has proved to be most sensitive to fatigue, these other parts should be replaced at the same time to ensure good fatigue life.

3.1) Support the individual wings upside down in a position which allows convenient work on the main spar lower cap. Supports must be secure, as considerable force will be applied to the wing in the course of upgrading the spar.

3.1.1) Prior to turning the wing upside down, you will want to drill off the row of rivets attaching the leading edge skin to the upper spar web flange.

3.1.1.1) There is a trick to drilling off rivets without messing up the rivet hole. See Figure 3.1.1.1) below. Centering the drill on the rivet head is very important, of course, and the dimple helps (see view A). Nonetheless, there is no way to be absolutely centered every time. Therefore, use a drill that is

at least 1/32" undersize for the rivet you are drilling. View B shows how an undersized drill allows being a bit off-center without harming the hole. Remember, do not drill beyond the rivet head. Stop drilling when you are through the head, and you will have a little material still keeping the rivet head attached to the shank. A pin punch in the hole, aimed in the right direction and given a slight tap, will remove the rivet head (see view C). The shank will still be in the hole, but can be punched out with the pin punch (see view D). With experience, you will be able to remove most rivets by simply taping the shank after drilling the head, instead of the above two-step process. Done properly, the rivet hole is not disturbed, and can be re-used without clean-up and over-sizing.

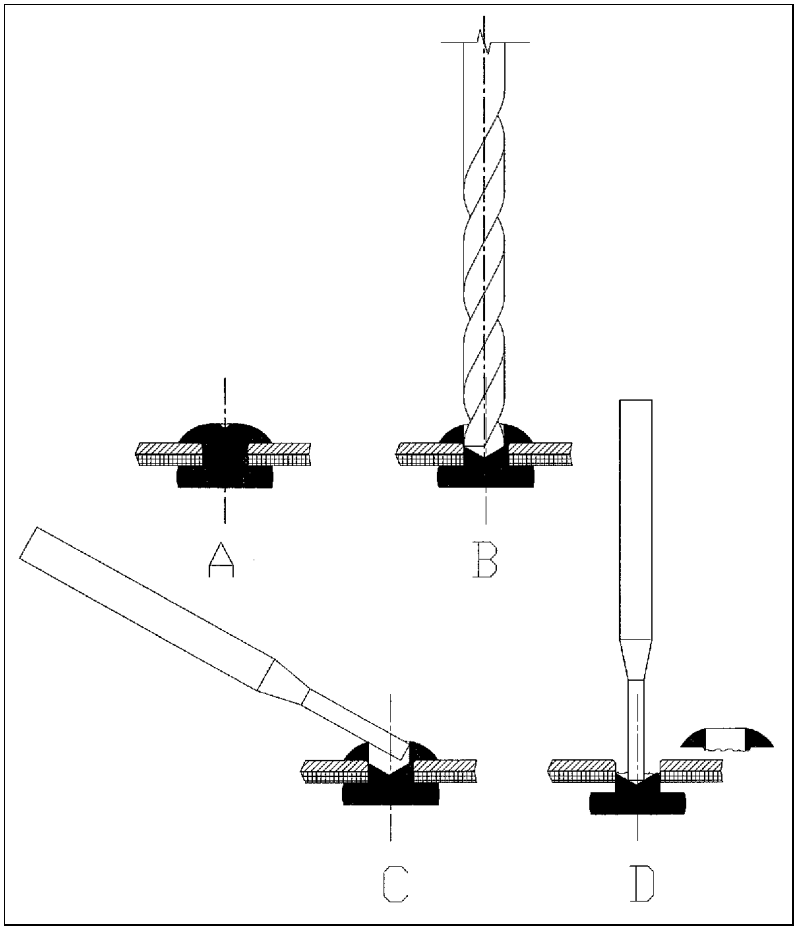


Figure 3.1.1.1): Rivet Removal Process

3.1.2) ESK-714, supplied with this Custom Kit, is a template of the wing upper surface contour. These may be used to make 3 or 4 supports per wing. Pad the contact surface with carpet scraps, foam rubber or other soft material. Mount these supports to saw horses or other stands available locally. Note that the wing has 1 1/2º of wash-out, and the work stands should be positioned to retain it. This means that, when the wing is upside down, the aft spar at WS 238, just outboard the aileron, is one inch lower than the main spar, when the aft and main spars at WS 27, the wing root, are at the same height. Carefully

adjust the wing supports to retain this wing twist before doing any disassembly of the wings.

3.1.3) Transferring the wing from the mobile stand to the work stand will require extra help. Remove the LE stop from the mobile stand and slide the wing nose 6" to 12" over the inboard work stand, then lower the mobile stand until the wing rests on the work stand. Have one person stay there to be sure the nose stays on the work stand while several others lift the wing tip off the mobile stand and roll the wing onto its back in the work stand. Position the wing so that the supports are on ribs and so that the spars align with the alignment arrows.

3.2) Remove the leading edge skins from the wing by drilling off the rivet heads at the ribs and main spar flange. Inspect all wing LE ribs and skins and repair as necessary per AC 43.13-1B. If any parts need replacing, order them through your local authorized Thrush Service Center.

3.2.1) If your wing has boom hanger rails on the bottom, some rivets holding the leading edge skins on may be hidden under their front edge. In this case, drill out the first six rivets through the hanger and rib so the rail can be moved enough to get to the hidden rivet.

3.2.2) If the airplane's wing leading edges are in rough shape and need rebuilding, the whole leading edge can be removed by drilling off the rivet heads at the main spar flange and removing the bolts or rivets attaching the leading edge ribs to the main spar web. If the wing leading edge skins have exhibited cracking problems, it is probably because they are the thinner skins used on early aircraft. Now would be a good time to replace them with new, thicker, skins. Contact your local authorized Thrush Service Center for part prices and availability.

3.2.3) If any holes in the LE rib flanges or main spar web flanges are damaged, measure them and note the maximum dimension next to the corresponding hole in the LE skin.

3.3) Remove the inboard forward and aft spar web doublers and filler. The first eight leading edge ribs will need to be removed, and the first four main ribs will have to be detached from the spar web. Record the doubler's relative positions on them and measure and record their thicknesses. Retain them for possible use as templates, <u>but they are not to be reinstalled on any main spar</u>. Clearly mark them as scrap.

3.3.1) The inboard lower wing skin panel that goes to W.S. 103 will need to be detached and peeled back the in order to remove the stiffener angles and pry the aft doublers apart so they can be removed. Fuel tank integrity has now been compromised and it will be of utmost importance to reseal the tank carefully when reassembling the wing.

3.3.2) Because the Thrush fuel tank is a "wet wing", parts in the fuel tank area are assembled with a layer of fuel proof sealer between them. They are essentially glued together. Disassembling them will take patience and finesse. Parts literally have to be pried apart. Special tools, made of aluminum, will be

needed to disassemble these parts. Drawings ESK 715 shows a couple of tools that work well in this application. These tools may be driven with a rivet gun when necessary.

3.3.3) If any holes in the spar web are damaged, measure them and note the maximum dimension next to the corresponding hole in the inner-most aft doubler just removed. Similarly, note any damaged rib flange holes next to the corresponding hole in the lower wing skin.

3.4) Inspect fuel tank skin, ribs, attach angles and spar web stiffeners and repair as necessary per AC 43.13-1B. If any parts need replacing, order them through your local authorized Thrush Service Center.

3.5) Remove the old lower spar cap from the main spar.

3.5.1) Fasteners attaching the lower spar cap flange to the main spar web must be removed over the entire length of the spar cap. This will require the removal of "Huck" bolts, which have swaged-on retainers. These are best removed with a "Huck" cutter. A rivet gun with a chisel end will also work. Discard the "Huck" pins removed.

3.5.2) Tie-down points and jack points are to be retained. If the lower spar caps being replaced are the shorter 191" caps, the old jack point will not work with the new lower spar cap. See paragraph 5.1.2.2). A few older airplanes may not have the jack points currently located at W.S. 120. They can be installed rather easily while this upgrade is underway, if desired. Order P/N 20275-7 and drawing 20275.

3.5.3) Retain the old lower spar cap for use as a drill template, <u>but it is not to be reinstalled on any main spar</u>. Clearly mark it as scrap.

3.5.4) If any of the fastener holes in the spar web get damaged during this process, measure them and note the maximum dimension next to the corresponding hole in the old spar cap.

3.5.5) Carefully inspect the main spar web ("C" channel) for cracks and repair or replace as necessary.

3.6) Residual sealer on wing structure not being replaced needs to be removed to ensure a good re-seal when the wings are reassembled. Do not use a steel chisel or putty knife for this purpose, as the aluminum parts are easily gouged. An aluminum scraper, such as shown on ESK 715, can be used to get thick layers off. The remainder should be removed with acetone and a stiff bristle brush. Keep the work area well ventilated when working with acetone.

3.7) Older wings have a continuous spar web all the way to the wing centerline. This web must be cut off at wing station 26.413, as measured from the inboard end of the web (wing centerline), and removed. You can use your new 20220-5 as a template to mark where to cut the spar web. See drawing 94417 sht. 1. Retain the cut-off portion of the spar web for possible use as a drill template, but clearly mark it as scrap.

3.6.1) To avoid damaging the upper spar cap when cutting the web, remove a few fasteners in the area and insert a thin piece of steel between the spar cap and the web. The cut edge of the web must be deburred.

3.6.2) Newer wings already have a separate steel inboard spar web, from wing station 26.413 to the wing centerline. Retain it for possible use as a drill template, but it will be replaced with a new one. Clearly mark it as scrap.

4) Transfer the hole patterns from the old parts to the new.

4.1) Transfer the hole pattern from the old lower spar cap to the new one.

4.1.1) This is done by transferring the hole pattern from the old spar cap to a template first. A 20' long bar of aluminum or steel, 1/8" thick and 2 to 2 ½ inches wide, works well. Angle iron and aluminum has also been used successfully. See Figure 4.1.1).

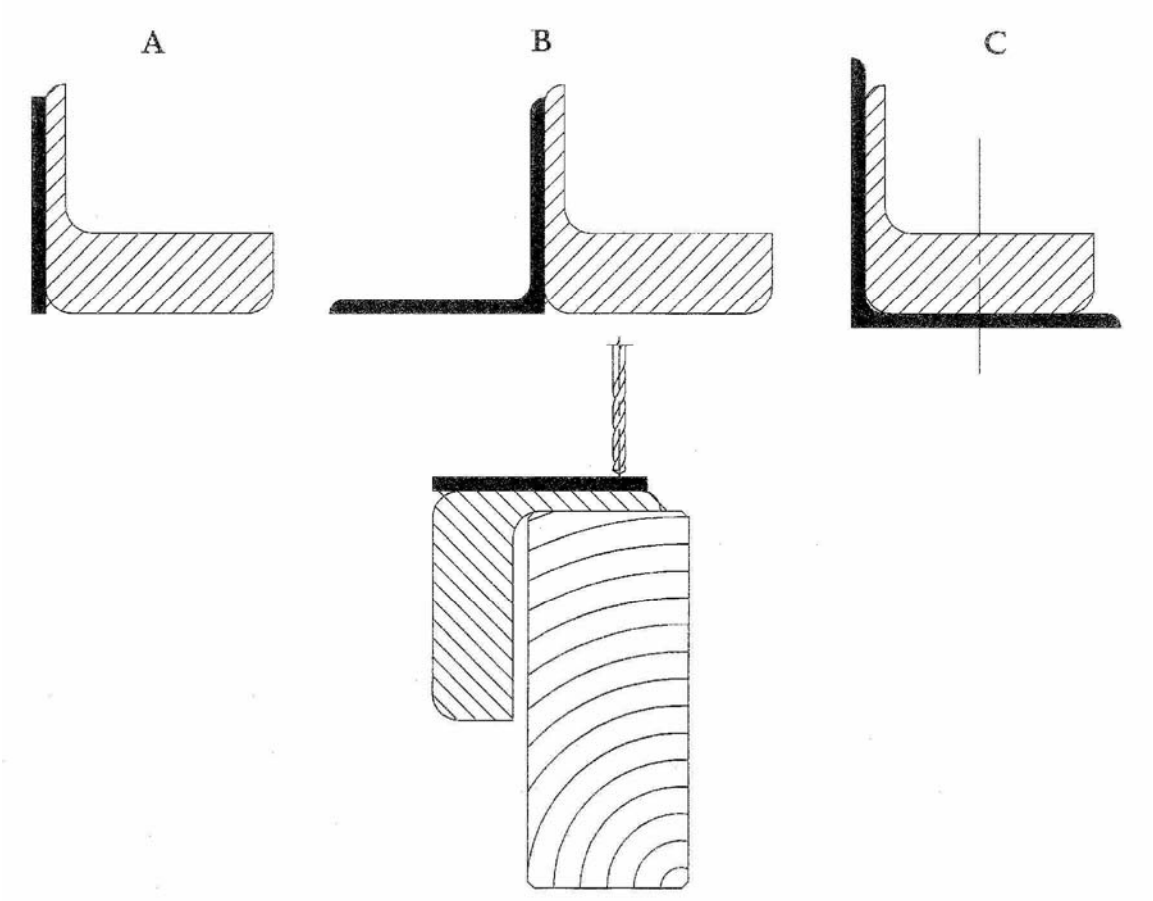


Figure 4.1.1): Spar Cap Flange Drill Template Options

4.1.2) More accurately located holes can be had by transfer punching each hole before drilling it.

4.1.3) Holes marked on the old spar cap as having been damaged during the removal process should be drilled out to the next larger standard fastener size. If this is

not large enough to fix the damage the mechanic must determine, based on AC 43.13-1B, what the best course of action is.

4.1.4) Use the template thus created to locate the holes in the new lower spar cap. See drawing 94417 sht. 1.

4.1.4.1) Figure 4.1.1 shows some possible templates for transferring the holes from the old spar cap to the new one. With any of them, it is critical to establish the location of the inboard end of the spar cap. A scribe line is sufficient. If type C is used, drill through the second (5/16") hole in the old spar cap to positively locate the spar cap. If using type A or B, be very careful to align the bottom edge of the spar cap and the template. Type C can only be used if the corners of the cap are radiused, as shown. A single piece of angle can serve as a type B or C template for both left and right caps, but it must be at least 2 ½ x 2 ½.

4.1.4.2) Whatever type of template used, it is critical that the holes be drilled using a drill press. This presents a challenge in keeping the spar cap and template level, because the spar cap is tapered. The best thing to use is a large drill vise. Resting the lower face of the spar cap web on a section of 2 x 4 and drilling into it works well, but a helper is needed to steady the spar cap. Either way, stands will have to be used to support the overhanging portions of the spar cap and template.

4.2) Transfer the hole pattern from the old aft doubler to the new 22503-9 aft doubler.

4.2.1) The old aft doubler is the one that was in direct contact with the aft side of the spar web (inside the "C" section). It is 65 ½" long on the lower edge, 9 ½" tall, 1/16" thick, and could be made of either aluminum or steel.

4.2.2) If it is useable, align the old aft doubler over the new 22503-9 aft doubler and transfer the hole pattern. A few (≤ 10) oversize holes in the old spar web can be ignored. Rather than oversizing them, it is better to put the proper size hole in the template. If there are more than 10 oversize holes, oversize any that attaches the spar caps first, to the next larger standard fastener size. If this is not large enough to fix the damage the mechanic must determine, based on AC 43.13-1B, what the best course of action is..

4.2.2.1) **CAUTION:** If the splice plate removed to de-mate the wings was the small "butterfly", carefully examine the hole pattern on the lower spar cap flange between the last outboard small "butterfly" ¼" hole and the wing attach angle holes. Compare this hole pattern (both ¼" and 3/16") to that shown on drawing 94417 sht. 1. Better yet, position the new butterfly over the hole pattern and trace them onto it. If the pattern is close to that shown on 94417 (within a hole diameter) and provides a minimum of .30" edge distance on the new 20211-9 "big butterfly", it may be re-used. If minimum edge distance is not available on a hole, move the hole on the template so that it has this minimum edge distance.

4.2.2.2) More accurately located holes can be had by transfer punching each hole before drilling it.

4.2.3) If the old aft doubler is too damaged in removal for use as a template, the next one aft of it or a forward doubler will have to be used. Both of these alternatives may be shorter than the old aft doubler, and therefore not have all the holes needed.

4.2.3.1) In the case where a shorter doubler must be used as a template, the spar web itself must also be used. Transfer the holes in the short old doubler to 22503-9 first, then position 22503-9 on the back side of the spar web. Use the holes just transferred from the short old doubler to align 22503-9 on the aft spar web, being sure that the end of the 22503-9 is at W.S. 65.5 and that it is parallel to the spar web top and bottom. Transfer the rest of the holes from the wing spar web to 22503-9.

4.2.4) Deburr the holes in 22503-9 when finished drilling.

4.3) Transfer the hole pattern from 22503-9 to the rest of the doublers.

4.3.1) 22503-9 should now have the desired hole pattern for the inboard wing spar, and can be used as a drill template for the whole stack-up. The first step is to align all of the parts.

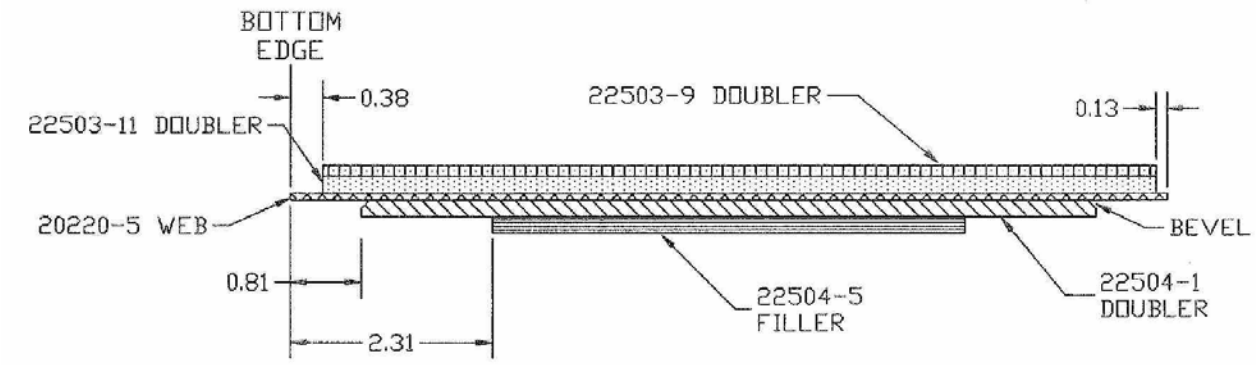


Figure 4.3.1) Spar Web Stack-Up <u>For Drilling Only</u>

4.3.1.1) Normally 22503-11 would be on top, and beneath it would be 22503-9, as shown in Figure 7.1). For purposes of transferring the holes to all the doublers, however, 22503-9 will have to be on top, with 22503-11 beneath it, aligned at the top, bottom and inboard edges. Third in the stack-up is 20220-5. Its inboard edge aligns with the inboard edge of 22503-11, but the bottom edge should stick down below 22503-11 by 3/8". The top edge of 20220-5 should stick up above 22503-11 by 1/8". The 22504-1 doubler is beneath the 20220-5. The lower edge of 22504-1 is parallel to and 13/16" (.813) above the lower edge of 20220-5. The inboard end of 22504-1 is 8 5/16" outboard of the inboard edge of 20220-5. <u>Note</u> that the beveled long edges of 22504-1 should face the top of the stack. Finally, the 22504-5 filler is on the bottom of the stack, with its lower edge parallel to and 2 5/16" above the lower edge of 20220-5 (1 ½" above the lower edge of 22504-1). See Figure 4.3.1) for the appropriate doubler stack-up for drilling.

4.3.2) With these five parts stacked and aligned as described above, slide a .080 thick piece of scrap aluminum between 22503-11 and 22504-1 outboard of 20220-5, and a .190 thick piece of scrap aluminum between22503-9 and this .080 spacer outboard of 22503-11, and then firmly clamp the stack-up together with "C" clamps.

4.3.3) Drill the holes from 22503-9 through this entire stack-up on a drill press. The "C" clamps may have to be shifted around to get to all the holes, but keep the stack-up firmly clamped together at all times. Do not free-hand drill these holes!

4.3.4) With all holes drilled, dismantle the stack-up and deburr all of the holes.

5) Install the new lower spar cap.

5.1) Position the new 20207-15 lower spar cap and temporarily fasten in a few places. Some misalignment problems may have occurred during the hole transfer process. If a fastener will not fit in a slightly misaligned hole, these holes may be drilled out to the next standard fastener size.

5.2) As a double check of the proper spar cap position, check the distance between the top of the upper spar cap and the bottom of the lower spar cap, at the inboard end. It should be 10" ±1/32", measured perpendicular to the spar caps. Also, the inboard ¾" bolt holes of the top and bottom spar caps should align with each other. Check this by sliding a very long ¾" bolt or a ¾" rod up through the top spar cap bolt hole. It should go through the new lower spar cap bolt hole. If it doesn't, move the new lower spar cap in or out slightly to gain this alignment, and slide the bolt/rod through. Finally, move the spar cap back to realign it with the spar cap flange fastener holes. The "binding" of the bolt thus produced should not be enough to prevent its removal. Remove the ¾" bolt or rod.

5.2.1) If the airplane had the old 191" spar caps, the hole pattern from WS 191 to WS 232 must be added for the new lower spar cap. Use drill template ESK 717-1 or -2 to add these new holes. First, however, position the ESK 717 -1 or -2 from WS 191 to 232 and trace the hole pattern onto the spar web. Note and relocate any holes that are too close to existing holes so they are at least 2 diameters apart. Existing stiffener and attach angle holes in the outer spar web should also be transferred to the lower spar cap unless they would fall in the thickened portion.

5.2.2) Airplanes with 191" spar caps and square wing tips will need to also effectively extend their upper spar caps by installing 22524-1 strap & 22524-5 splice strap per drawing 94417, sht. 2 (see Figure 5.2.1). These parts must be ordered, as they are not part of the basic CK-AG-40 kit.

5.2.2.1) The hole pattern of the -1 strap, outboard of WS 191, is used as a drill jig for additional fastener holes in the spar web. The hole patterns in the -5 (left) splice strap are likewise used as a drill jig to drill new fastener holes through the new 22524-1 strap and the spar web. Position the straps individually and trace the hole pattern to be sure no holes have insufficient

edge distance (2 diameters). The existing hole pattern in the upper outboard spar web is also transferred back through the 22524-1 & -5 straps.

5.2.2.2) The previous jack point will not reinstall over the new lower spar cap. A 20224-29 Jack Point and 20224-8 spacer will need to be ordered for each wing and installed in place of the old jack point. See 5.5)

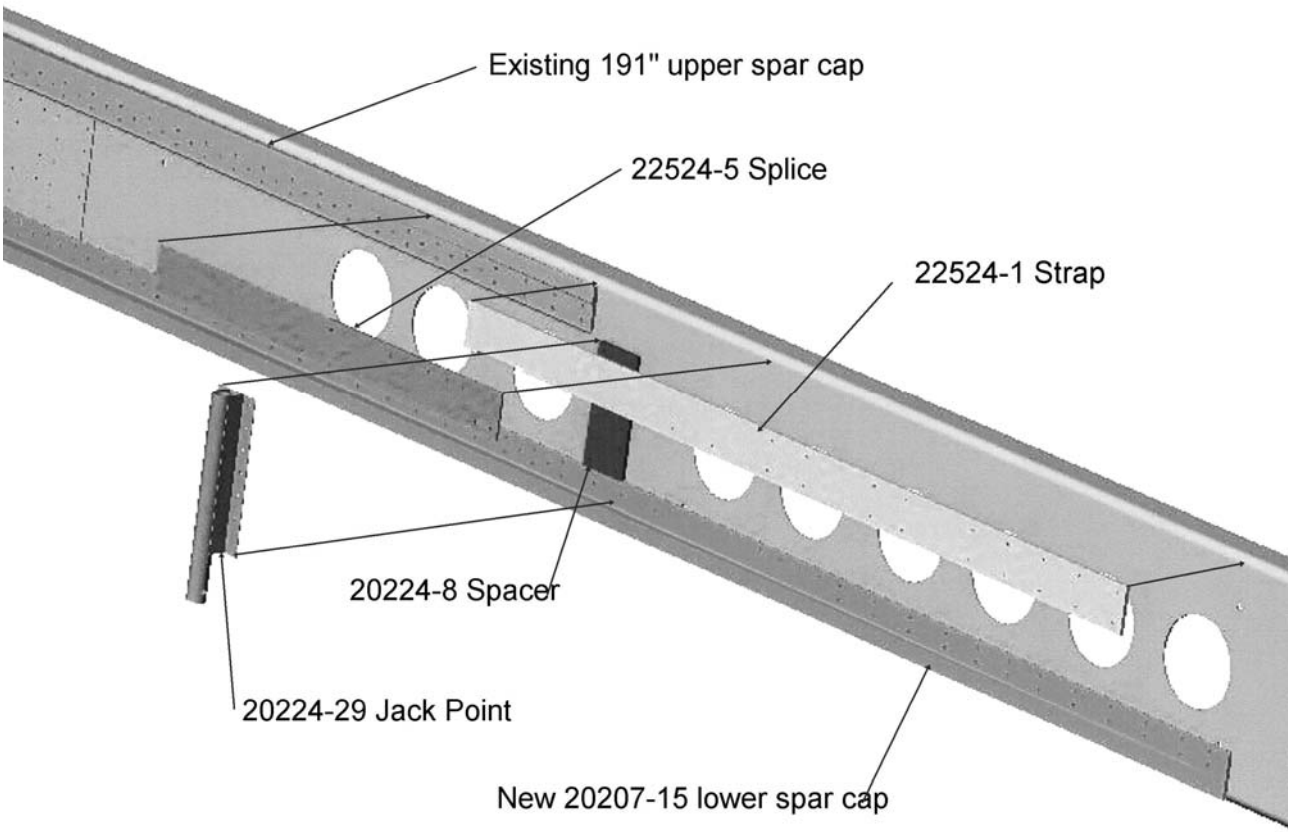
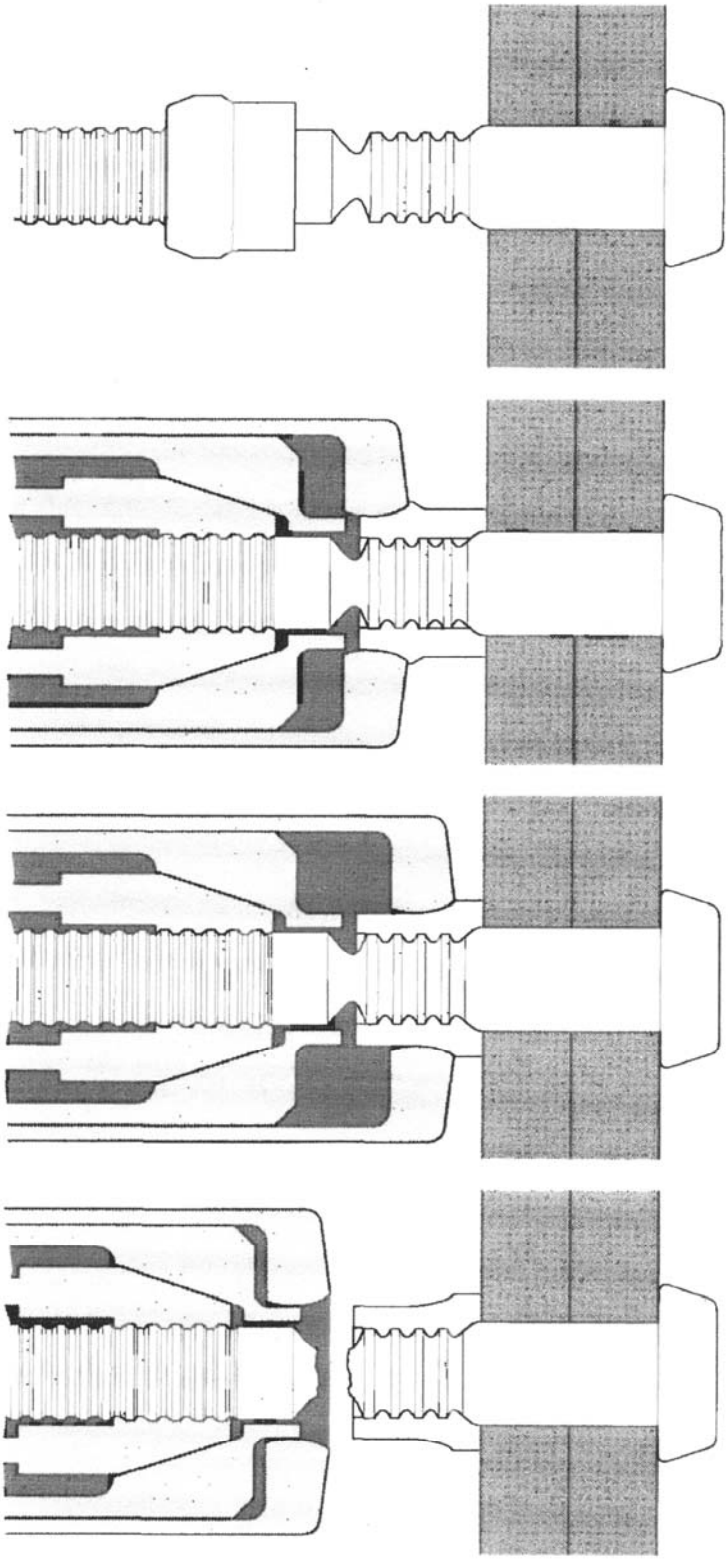


Figure 5.2.1): Exploded View of Upper Spar Cap Strap and Jack Point Installation. (View looking aft and inboard near end of left spar)

5.2.3) If the owner operator wants to remove his old tapered wing tips and install extended wing tips, per CK-AG-23, this would be an ideal time to do so.

5.3) Install fasteners from the end of the spar cap to just outboard of the fuel tank, but no further inboard than WS 72.25. (Spar cap fasteners are called out on sheets 1 & 2 of drawing 94417 and cross referenced in the fastener tables thereon.) WS 72.25 will be in the fuel tank, unless fuel tanks are 52 gallon tanks, and fasteners in the fuel tank must be installed wet with fuel proof sealer per MIL-S-8802. See paragraphs 5.4) thru 5.4.4).

5.3.1) The predominant fastener call-out at the spar cap webs on drawing 94417 is for "Huck" bolts. These require a special gun to install, which not everyone has. <u>If that is the case, buy, rent or borrow one.</u>



1. The pin is inserted from one side of the work surface through the prepared hole. The collar is placed over the pintail.

2. The Huck installation tool with nose assembly is placed over the pintail.

3. Chuck jaws, housed in the nose assembly, grip the pintail grooves. The installation tool trigger is depressed, actuating the tool pull piston. The tool pull piston and chuck jaws move rearward; pulling the pin into the hole, seating the head, and eliminating the gap between work surfaces. The nose assembly outer sleeve, housing a swage die, moves forward toward the work surface, swaging the collar material into the pin's locking grooves. This provides a permanent lock between the pin and collar.

4. When collar swaging is complete, the tool continues to pull until the pin breaks (at a predetermined force) at the breakneck. The tool trigger is released and the nose assembly with tool is pushed off the installed fastener, completing the installation cycle.

This entire installation sequence occurs in less than two seconds.

Figure 5.3.1) "Huck" Bolt Installation Procedure

5.3.1.1) In addition to your local tool supplier, possible sources of Huck tools are:

Huck International, Inc.
Aerospace Fastener Division
800-421-1459
www.alcoa.com, then aerospace to fastening systems to lockbolt fastening systems to NAS lockbolts to NAS tension lockbolts to alloy steel to installation tools

Fastening Systems International
(800) 344-2393
www.fsirivet.com, then product lines to Huck to Huck Aerospace Tool Catalog

U.S. Air Tool Co.
(800) 645-8180
www.usatco.com

The Huck Model 115 and the FSI Model D-100 are inexpensive manual installation tools. The Huck Model 244 is a better tool if you have air available. The FSI PT-4000H is a rechargeable portable tool if air is not available. All of these will require a nose piece that accepts the NAS 1466 lockbolt.

5.3.1.2) Figure 5.3.1) illustrates the "Huck" bolt installation procedure. The specified pin is installed wet (with fuel proof sealer to MIL-S-8802 if in the fuel tank; with primer otherwise) in the fastener hole. Notice the relationship of the grooves to the material and the fracture neck to the top of the collar. This will tell you whether or not the pin length is appropriate.

With the proper length pin installed, slip the collar (all collars should be gold colored) all the way down. Place the installation tool over the pin and all the way down to the collar. Seat the manufactured head of the pin firmly prior to activating the installation tool. When the pin stem breaks, the collar is completely swaged onto the grooves of the pin. Figure 5.3.1) shows this swaged collar shape.

5.3.2) Fastener lengths are called out to the best information available, but should be double checked before installation. "Huck" bolts must be installed such that a minimum of 3 grooves are fully engaged. If the pin sticks out too far, an AN 960 washer, regular or thin, may be used under the collar to get this engagement. Otherwise the next longer pin must be used.

5.3.3) Drawing 94417 lists NAS 1100 series bolts as alternates to the "Huck" bolts, if there is absolutely no way to obtain the use of a "Huck" gun. These have

the disadvantage of adding about 5# per wing. Also, like any other bolt, they need to be inspected at least visually during the annual inspection.

5.3.3.1) These bolts should be installed wet (with fuel proof sealer to MIL-S-8802 if in the fuel tank, with primer otherwise) with an AN 960 washer, regular or thin, under the nut. Proper bolt installation will result in a minimum of 1 full thread protruding beyond the nut, with a maximum of 3. An additional AN 960 washer may be used under the bolt head to achieve this proper fit. Otherwise the next longer bolt must be used.

5.4) Instructions for sealing integral wing fuel tanks.

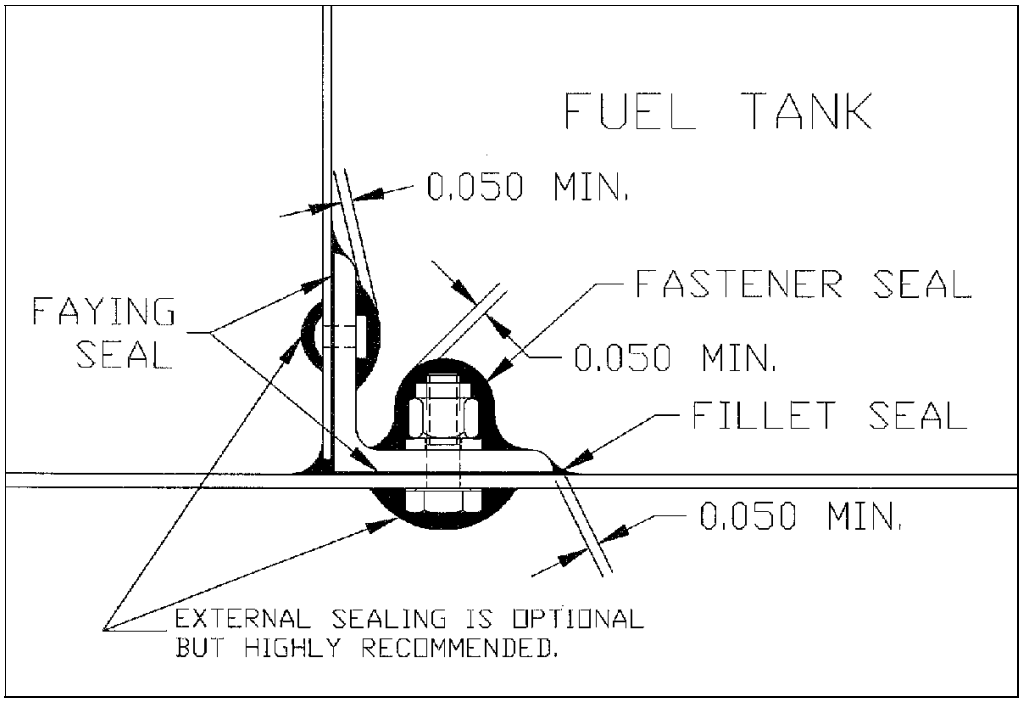


Figure 5.4): Fuel Tank Sealing Illustration

5.4.1) The material used to seal integral fuel tanks must meet the requirements of MIL-S-8802. Drawing 94417 lists a number of different manufacturers of this type material. If you haven't worked with this material before, understand that it is a two-part mixture that must be mixed properly, according to the manufacturer's instructions. It is available with working life of from ½ hour to 4 hours, and you generally want to give yourself as much working life as possible. It also comes in two consistencies, "A" being thin enough to paint on, and "B" being thicker and requiring spreading on.

5.4.2) When working with this sealer, cleanliness is mandatory. Something as simple as a fingerprint or a piece of lint can result in a fuel tank leak down the road. Rule one is to get all the cutting, drilling, grinding, etc. out of the way before you start trying to seal. Having to add a hole after sealing has begun is a recipe for a leak. Deburr all holes and edges and clean out all shavings. Since the tanks have had fuel in them already, the entire tank should be

cleaned thoroughly with acetone, MEK, toluene or other oil-free solvent. If the front part of the tank where the work is being done is all that is cleaned, contamination will get into your work area. Clean the entire tank thoroughly.

5.4.2.1) Begin at the top and work down. Do not use shop rags, as they are dyed and the dye will contaminate. Use clean white cotton rags or, even better, cheesecloth. Do not dip the wiping rag in the solvent, as you are liable to contaminate the whole lot. Use a dispenser. Wearing latex gloves will keep hand oils off the rags and thus off the work area. Do not let the solvent dry before wiping it off with a clean dry rag. Change both cleaning and drying rags frequently. Once the entire tank is clean, re-clean the immediate work area. If the work isn't finished in the same day, re-clean the work area the next day before starting work.

5.4.3) With the work area immaculately clean, assembly work can begin. Refer to Figure 5.4) for illustration and terminology.

5.4.3.1) Faying seals involve a layer of "B" sealant between mating surfaces. Sealant is spread on both mating surfaces before joining. If working on mating surfaces that are pried apart, use a pressure applicator to be sure sealant gets all the way between the mating surfaces where they are still attached. When the fasteners are tightened, starting at one end and working to the other, the faying sealant is squeezed out along the edges. If a small bead does not squeeze out, not enough sealant was used. Ideally the faying seal should end up .015" or about 1/64" thick.

5.4.3.2) Fasteners are always installed wet. That is, their shanks and under the head is coated with "B" sealant prior to installation. After installation, some sealant will have squeezed out around the ends. Smooth this out and add more to completely seal the fastener ends as shown in Figure 5.4). Use a tool or a latex gloved finger for smoothing, not a bare finger. Do not try to clean up excess sealant with solvent.

5.4.3.3) Fillet seals are continuous lines of sealant along the joints between two parts. The bead squeezed out from the faying seal is a good start, and may be sufficient when formed into a fillet. If the bead material is not enough to get the coverage thickness specified in Figure 5.4), add more "B" sealant. Use a tool or a latex gloved finger for smoothing, not a bare finger. Do not try to clean up excess sealant with solvent.

5.4.4) When fastener installation is complete and faying, fastener and fillet seals are in place, coat the entire area with a brush coat of "A" sealant. The "B" sealant need not be fully cured before this top coat is applied.

5.5) If the airplane originally had 191" spar caps, the old tie down/outboard jack point will not reinstall over the new spar cap. A 20224-29 jack point assembly with a 20224-8 spacer must be installed in its place. These must be ordered, as they are not part of the basic CK-AG-40 kit. Ref. Figure 5.2.1) and drawing 94417 sht. 2 for installation illustration. Note that several holes that previously attached the jack point are now under the spar cap "bulb", and should be left open. Use fastener holes that go through the cap web only.

For these airplanes the skin opening for the jack point tube will have to be extended ½" forward. This can be done with a nibbler or rotary file, creating an oblong opening the same width and end radius as existing but lengthened forward ½". Deburr the skin edge when finished and install a new 10129-005 doubler over it.

5.5.1) Airplanes with 191" spar caps had doubler angles (20213-1 & 20214-1) installed on the aft side of the spar web from about WS 186 to almost WS 208. These doubler angles are to be reinstalled, using new fastener locations and leaving fastener holes open per drawing 94417 sht. 2.

6) Modify wing ribs as necessary.

6.1) Because of differences in the doubler stack-up between the original spar and this upgraded spar, some of the inboard ribs may need to be modified.

6.2) The doublers that you removed in step 3.3) will be needed to determine if modifications are necessary. Use them to determine the total thickness of the forward stack-up and the aft stack-up.

6.2.1) The upgraded spar <u>forward</u> stack-up is .190" (not counting the .190" aluminum filler), and the <u>aft</u> stack-up is .315". If existing stack-ups differ from this, some ribs will need to be modified to compensate. The most probable scenarios are as follows:

6.2.1.1) On older wings especially, the aft stack-up may have been thinner by 1/16", meaning that the first four main ribs may need to be shortened 1/16" for the new stack to fit. Keep in mind that the 22503-9 .125" thick doubler extends to the first 4 main ribs, while the additional 22503-11 .190" thick doubler only extends to the first 2 main ribs. The main ribs are attached to attach angles that had to be removed in order to remove the old aft doublers, and these attach angles will be further aft when reinstalled. The front edges of the rib webs will therefore have to be trimmed back, meaning the old attach hole pattern cannot be used. New fastener locations will have to be chosen in the attach angles so that they are 2 diameters minimum from any edge and any other hole. The same number and size of fasteners must be used, and the old fastener holes can be left open. 4 ea. 20226-5 attach angles are included in the kit for those cases where the old attach angles just cannot be made to work.

6.2.1.2) Some newer Thrushes have thicker stack-ups forward of the spar web, starting just inboard of the wing attach angles (sometimes referred to as shear dumps). These are not part of the wing spar upgrade because .585" thick AISI 4130 steel webs are more than adequate to transfer the wing lift to the fuselage. This change will, however, leave the LE rib aft flanges as much as .315 short on the inboard four LE ribs, and .190" short on the next one, on some airplanes. Thrush provides, as part of this Custom Kit, attach angles for these ribs (22516-3). For older airplanes that had aft flanges on the LE ribs, these flanges should be trimmed off, the attach angles should be attached to the spar forward face, and the rib webs attached to the attach

angles. If the LE ribs were already attached to angles, the new ones will be needed because they are longer. See drawing 94417 sht. 1, Section C-C for illustration.

7) Install the new inboard spar web doublers

7.1) With the LE and main rib lengths adjusted as necessary, the new spar web doublers can be installed. It is suggested that these doublers be fit checked first so that any damaged or slightly misaligned holes can be opened up to the next standard fastener size, if necessary. If this is not large enough to fix the damage the mechanic must determine, based on AC 43.13-1B, what the best course of action is. See Figure 7.1) for proper doubler placement.

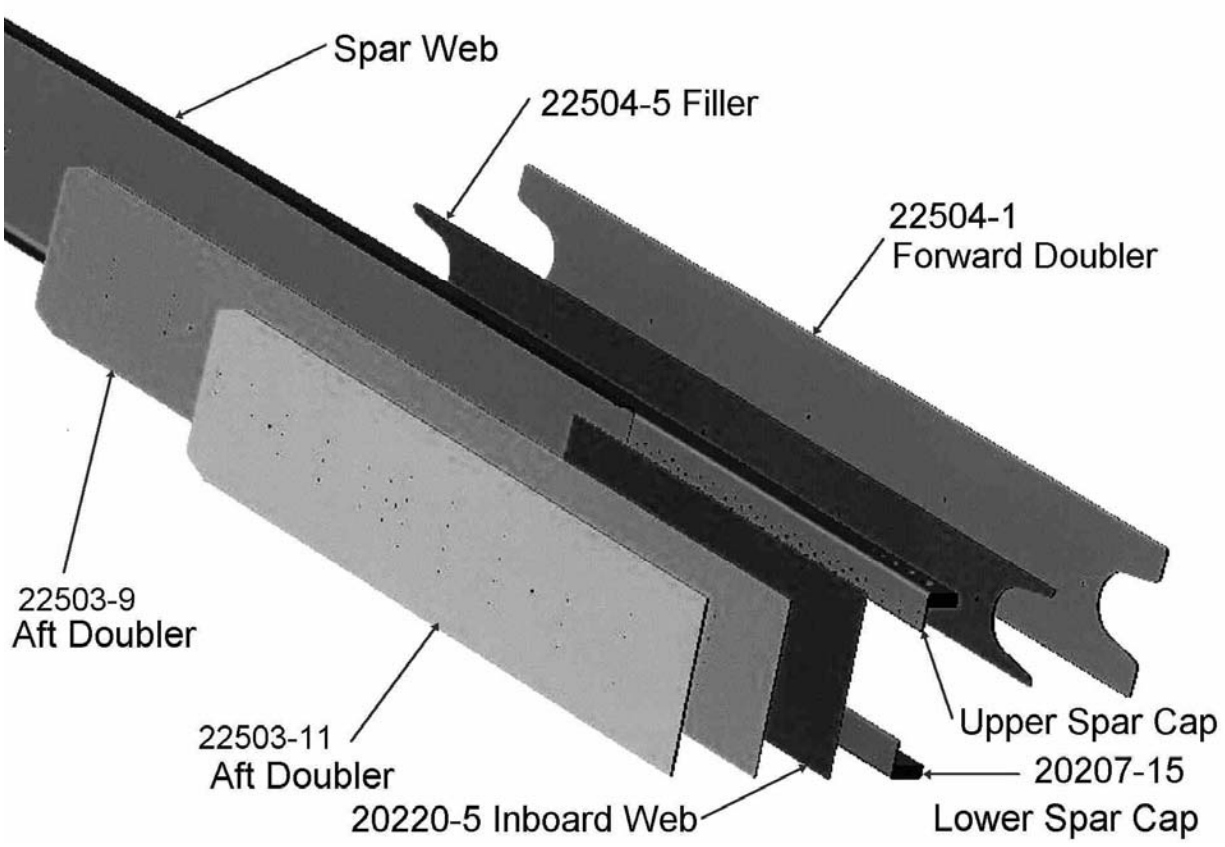


Figure 7.1): Exploded View of New Spar Inboard Web and Doublers
(View looking forward at inboard end of left spar)

7.1.1) The .125 thick steel 22503-9 aft doubler goes immediately behind the existing spar web. The shorter .190 thick steel 22503-11 doubler goes immediately behind the 22503-9. These doublers are the forward side of the fuel tank and therefore must be installed with a thin layer of fuel proof sealer meeting MIL-S-8802 between each other and between the 22503-9 and the spar web (faying seals). Likewise, the fasteners must be installed wet with this same sealer. See paragraphs 5.4) thru 5.4.4).

7.1.2) The .190 thick aluminum 22504-5 filler goes immediately in front of the spar web, between the spar cap flanges, and the .190 thick steel 22504-1 forward doubler goes immediately in front of it. They need not have sealer between them, but there needs to be sealer between the filler and the forward side of the spar web. Note that the beveled edges of the 22504-1 go aft, to provide clearance at the spar cap flange radii. Refer to Figure 7.1) for an illustration of the correct placement of these doublers.

7.1.3) Fuel proof sealer per MIL-S-8002 must be placed between the aft flange of the new lower spar cap and the forward face of the spar web before fastening the spar caps, web and doubler together. Also, spar web stiffeners and rib attach angles must have a layer of sealer between them and the doublers as they are reinstalled to the spar web. <u>All fasteners must be installed wet within the fuel tank area.</u> See paragraphs 5.4) thru 5.4.4).

7.1.4) Fasteners should be installed from outboard to inboard, starting where step 5.3) ended. Slow curing fuel proof sealer per MIL-S-8802 should be used for this operation to provide as much time to install fasteners as possible. It should be obvious, however, that one must be well organized and have sufficient help in order to successfully get everything in place, properly sealed, and fasteners installed prior to the sealant setting up. Review paragraphs 5.4) through 5.4.4) before attempting to install the new spar web doublers.

7.2) To make it easier to install the doublers and lower spar cap in the fuel tank area, plan on installing the fasteners inboard of the wing root later. Once all the fasteners are installed in the fuel tank, immediately go back and remove or spread the excess sealer that has squeezed out from between the aft doublers. Then run a generous fillet of fuel proof sealant per MIL-S-8802 along all joints and corners of the main spar. If the top wing skin was disturbed anywhere, fillets of sealer should also be applied to the spar and ribs where the top wing skin attaches and extend far enough aft in the tank to cover any joints that could possibly have been broken during the work done thus far.

7.3) The wing spar can now be completed inboard of the wing root, WS 26.0, <u>except for</u> the 20211-9 "big butterfly" and 20211-11 lower splice plate. <u>Do not</u> install any fasteners where the 20211-9 "big butterfly" goes. Also, be sure the 20220-5 inboard web is between the 22503-9 doubler and the 22504-5 filler. Again fasteners, as specified in drawing 94417 sht. 1, should be installed from outboard to inboard.

7.4) If only the eight inboard LE ribs were removed, they can be reinstalled now. The attach angles will have to be attached to the forward face of the spar, with the fasteners being installed wet with fuel proof sealant per MIL-S-8802. The ribs are then attached to the attach angles. Use a long straight-edge to ensure that these ribs are aligned with the existing ones.

8) Close up the wing.

8.1) **With the wing spar upgrade complete, the wing skins can be reattached.** A layer of fuel proof sealant meeting MIL-S-8802 should be placed between the main rib flanges and lower skin in the fuel tank, as well as between the skin and the lower spar surface, and the fasteners should be shot wet. Fuel tank access covers in the top wing skin will have to be removed to buck the rivets. Damaged fastener holes can be opened up one standard fastener size if necessary. If this is not large enough to fix the damage the mechanic must determine, based on AC 43.13-1B, what the best course of action is.

It is easier to buck the lower skin rivets if the wing is in a vertical orientation, leading edge down. A leading edge stand can be made by tracing around a nose rib, + ¼", on ¾" plywood, cutting it out and padding it, and attaching this "cradle" to a saw horse. The wing is set in the cradle near the wing tip, and the inboard end of the spar is rested on another saw horse. Moving the wing to this stand is awkward, so you need plenty of manpower or a sling and lift. **Caution:** The wing should not be placed in this position without the bottom wing skin being riveted in place.

8.1.1) The newly installed spar cap and doublers should be primed with a primer specified on drawing 94417. After this is thoroughly dry, run a bead of fuel proof sealer, per MIL-S-8002, along the joint of the spar cap flange and spar web, to keep out corrosives. Also run a bead along the edges of the doublers where they meet.

8.1.2) Fasteners used to reassemble the wings which are not specifically called out in this custom kit shall be the same type as removed, but new. Refer to AC 43.13-1B for acceptable substitutes.

8.2) **The leading edge skins can now be reinstalled.** Fasteners that penetrate the fuel tank, such as those along the spar flanges, must be shot wet, using a fuel proof sealant meeting MIL-S-8802. Damaged fastener holes can be opened up one standard fastener size if necessary. If this is not large enough to fix the damage the mechanic must determine, based on AC 43.13-1B, what the best course of action is.

8.2.1) If the entire leading edges were removed and rebuilt separately, they should be reinstalled at this time.

8.3) **Apply a fillet of fuel proof sealer per MIL-S-8802 to all external skin lap edges** to prevent corrosives from getting between the skins.

8.4) The wing needs to be right side up, so that the fuel tank sealing can be completed, and the mobile wing stand can be used for this. Fuel proof sealer meeting MIL-S-8802 must be applied to all corners and joints on the bottom skin that were opened for this upgrade, to well aft of where the bottom skin was peeled back, to prevent fuel leaks. Also, heads of new fasteners inside the fuel tank must be coated with fuel proof sealant. A final brush coat of "A" type fuel proof sealant meeting MIL-S-8802 should be applied to all sealed joints and fasteners. New 20361-1 fuel tank access cover gaskets are supplied with the kit.

After the sealant has had adequate time to cure, and before putting fuel in the tanks, they should be pressure tested to make sure there are no leaks. A copy of Thrush Process Specification 525-26 is supplied as part of this kit as guidance for pressure testing of fuel tanks. Note that with a water manometer a pressure regulator is not essential, but be very careful to pressurize the wing slowly, so as not to over-pressurize it.

9) The right wing spar is upgraded the same as the first, by following steps 2) through 8) above. The new lower right spar cap is P/N 20207-16, and if the upper spar cap must be extended, you will need a 22524-6 splice strap

10) Trial mate the wings.

10.1) Prior to trying to install the wings on the airplane, it is <u>mandatory</u> to trial mate the wings. It is at this stage that the 20211-9 "big butterfly" and splice plate, 20211-9 and 20211-11, are final fitted. Also, any fit problems can be resolved with easy access, rather than within the confines of the fuselage. Refer to drawing 94417 sht. 3 during this step.

10.1.1) The two wings must be positioned on individual stands at their 3 1/2º dihedral angle so that the two spars butt up against each other and are perfectly aligned. The mobile stands depicted in ESK 713 make adjusting the wings to the proper orientation an easy process. Install the splice blocks on both the upper spar cap and the lower spar cap.

10.1.1.1) Start these installations by positioning the 20260-1 upper splice block over the upper spar cap joint and observing the hole alignment. Adjust the relative positions of the spars as well as the wing angles of incidence and dihedral angles until the top splice block appears to be well lined up with all holes in both spar caps. It may be necessary to remove some material from the spar cap inboard ends and/or web inboard end in order to gain this alignment. This may be accomplished by grinding a maximum of .04" of material off.

10.1.1.2) Coat the shanks of two ¾" bolts with anti-seize compound, being careful not to get any on the threads. "Motor honey" may also be used for this purpose. Install a MS20002C12 washer under the bolt head, being careful that the chamfer of the washer hole is facing the bolt head. Slip these bolts into the inboard most holes in the splice block and push down until the shanks engage the block. Tap both bolts down into the top splice block until the threads emerge through the bottom sides of the spar caps. Readjust the relative wing positions as necessary so that all remaining bolt holes again appear to line up. Place the 20260-2 lower splice block over the threaded ends of the ¾" bolts and tap the bolts down all the way.

CAUTION!

A leather or rubber mallet should be used to tap bolts into place. If excessive force is necessary to seat the bolts, it indicates that the splice block and spar cap are not properly aligned. Remove the bolt and recheck and readjust alignment. Using excessive force to seat the bolts may result in scoring of the bolt hole bore, creating a stress concentration point and possibly leading to early fatigue failure. A drift pin in an adjacent hole at this point may help ensure alignment. Do not use the drift pin before this to force alignment.

10.1.1.3) If it is even suspected that any anti-seize compound has gotten on the threads, clean the threads thoroughly with acetone. Install the washers and nuts per drawing 94417 sht. 3 on the ¾" bolts finger tight. Repeat this installation process for the rest of the bolts.

10.1.1.4) Place the 20260-13 upper spar splice block on top of the lower spar cap and observe the hole alignment. Adjust the relative positions of the spars as well as the wing angles of incidence and dihedral angles until the top splice block appears to be well lined up with all holes in both lower spar caps. It may be necessary to remove some material from the inboard end of the new lower spar cap and/or the 20220-5 web plate in order to gain this alignment. This may be accomplished by grinding a maximum of .04" of material off.

10.1.1.5) Repeat steps 10.1.1.1) and 10.1.1.4) for the lower spar cap, except that the lower splice blocks are 20260-13 & -14.

10.1.2) Progressively tighten all (upper and lower spar caps) splice block nuts to half of the torque prescribed by drawing 94417. Using a feeler gauge, measure any gaps between the splice blocks and the spar caps. Mark any gaps greater than .005" on the front edge of the spar cap. These marks should indicate the position of the gap and the amount of gap at each end. Gaps greater than .015" will require fabrication of tapered aluminum shims.

10.1.3) On the 20211-9 "big butterfly", mark the center of the radius on all four "wing tips". Using these marks as guides, position the butterfly over the hole pattern on the mated spars' aft side. An alternative alignment scheme is to draw 1 1/4" diameter circles around the end fastener holes for each "wing tip" and align the "wing tips" with these circles.

Place the 20211-11 lower splice plate over the lower wings of the 20211-9 "big butterfly", carefully centered at the wing centerline. Clamp the butterfly and splice plate in place with "C" clamps. Drill the ¼" and 3/16" attach holes in the 20211-9 "big butterfly" using the holes in the spar web as drill guides. A portable drill press held to the 20220-5 inboard web magnetically should be used, as over ½" of steel is being drilled. A .190 thick steel spacer can be used over the inboard web where necessary to help reach the spar cap web fasteners. If no portable drill press is available, a drill guide to assure a reasonably vertical hole must be used.

Notice that the 3/16" fasteners now go all the way through the 20211-9 "big butterfly" and 20211-11 lower splice plate, rather than just going through the doublers. This helps the 20211-9 and 20211-11 pick up more of the load from spar cap and reduces the stress on it, potentially extending fatigue life.

10.1.3.1) If the wings originally had the small "butterfly" splice plate, the last five outboard ¼" holes for the 20211-9 "big butterfly" should use existing #10 huck bolt locations. You will need to trace these hole locations onto the 20211-9 "big butterfly" to be sure they are positioned acceptably (ref. drawing 94417 sht. 3). If they are located OK, you will just be drilling them out to .250-.254".

10.2) The wings are ready for installation. Remove the 20211-9 "big butterfly", 20211-11 lower splice plate, all splice block bolts and nuts, and the splice blocks. Thoroughly clean the nuts and bolts with acetone. Run an acetone soaked rag through the bolt holes in the spar caps. Deburr all newly drilled holes.

IMPORTANT!

After removal and cleaning of all of the splice block bolts, their shanks should be inspected for scoring. Similarly, splice block and spar cap hole bores should be inspected for scoring. Any scoring must be polished out, as it acts as a stress concentration point and could lead to early fatigue failure.

10.3) It is highly recommended that the areas of the wing that have been broken open during this upgrade process be re-finished, in order to prevent corrosion. Now would be the appropriate time in this process to paint the wings.

11) Reinstall the wings.

11.1) The wings are best inserted into the fuselage from either side when they are supported by mobile wing stands. They remain in the basic correct orientation for re-mating in the fuselage. If such mobile supports are not available, fixed supports similar to saw horses but sized to hold the wings at the proper height, angle of incidence and dihedral angle may be used. In this case, however, the wings must be placed on the supports manually, which requires no less than 8 people.

11.2) With the wings inserted into the fuselage, spars butted together and with the correct dihedral angle of 3 1/2º, reinstall the 20211-9 "big butterfly" and lower splice plate using the 24 flush fasteners near the centerline. Tighten these fasteners per drawing 94417 now, as they will not be accessible after the splice blocks are installed.

11.3) Reinstall the upper and lower spar cap splice blocks per steps. 10.1.1.1 through 10.1.1.5.

11.3.1) The only difference is that shims will be installed where it was determined during the trial mate that they would be needed. Liquid shim as recommended

on drawing 94417 may be used for gaps of .015" or less. Gaps greater than this will require tapered shims fabricated out of aluminum plus liquid shim where the gap is too small for the fabricated aluminum shim.

11.3.2) Be sure to install the 20240-1 tube over the upper 20239-4 tube nut assembly on the inboard (3/4") bolts prior to installing the lower 20239-4 tube nut assembly. The tube cannot be installed once the second tube nut is in place.

11.3.3) With all bolts installed with nuts finger tight, and with shims in place, tighten nuts just until torque increases noticeably and liquid shim is squeezed out of the gaps. Wipe off excess liquid shim and let it cure for 24 hours before torqueing the nuts to the final specified values.

11.3.4) Install the rest of the 20211-9 "big butterfly" and 20211-11 lower splice plate fasteners as specified by drawing 94417. Tighten all wing splice fasteners to specified values.

11.4) The wings must now be properly positioned for attachment to the fuselage. Again, this is made much easier if the wings are supported on mobile wing stands.

11.4.1) Move the wings aft and trailing edge up until the aft spar inboard ends can be slid down into the fuselage attach points at fuselage station 62.375. Insert AN7-21A bolts, with AN960-716 washer under the head, through the attach fitting and secure with another washer and an MS21044N7 nut.

11.4.2) Place a ½" spacer block between the lower main spar cap and lower fuselage longeron. This assures the proper wing angle of incidence. Position the wing centerline exactly in the center of the fuselage. This is best determined by measuring from the splice joint bottom center to the inside edges of the lower longerons. This distance should be the same for both sides.

11.4.3) Position a 20243-1 attach angle on the inboard side of the vertical tube with the 4 holes through it. The 2 ½" flange should be fore and aft, with the 1 ½" flange pointing inboard. Position it vertically so that both the top and bottom holes through the fuselage tube are at least 3/8" from the top or bottom of the attach angle. These 4 holes should fall approximately in the center of the fore and aft attach angle leg. Check to see that none of the 6 attach holes through the spar web are closer than ½" to the top or bottom of the angle. These six holes should fall approximately in the center of the lateral leg of the attach angle. If there is any doubt as to having the required minimum fastener edge distance of twice the fastener diameter, trace the holes onto the attach angle and remove it to be sure. When the inboard attach angle is correctly positioned, clamp it to the spar web and transfer punch the 6 holes from the spar web and the 4 holes from the fuselage tube. Remove the attach angles and drill the holes just located out to the proper size. Deburr all holes.

11.4.4) In the same manner, locate and drill the 20243-3 outboard wing attach angles. Attach the inboard and outboard attach angles to the wing spar web and the fuselage attach tube using the fasteners specified on drawing 94417 sht. 3.

11.4.5) With splice block bolts properly torqued, position and drill the 20240-1 tubes and tube nuts, then install locking bolts. See Section E-E on sht. 3 of drawing 94417. Reinstall the pump mount.

12) Complete the airplane reassembly.

12.1) If the above instructions and drawing 94417 have been followed scrupulously, all that remains is to reinstall and re-rig the flaps and ailerons, reattach the wing tanks to the fuel system, reattach electrical wiring and pitot-static system plumbing, reinstall the wing-root fairings, and do a complete functional ground-check of the airplane, including a pitot-static system check. Obviously this requires the removal of all caps, shims and blocks installed during the disassembly process.

12.2) Install a new wing identification plate, 94417-3, on the exposed face of the wing trailing edge rib just outboard of the aileron. Do not remove the existing wing I.D. plate. If the old wing identification plate is missing or illegible, the wing serial number is metal stamped on the forward side of the old spar web just inboard of the forward doubler, near the inboard end. Metal stamp or vibra-etch the following information onto the -3 plate before installating it with "pop" rivets.

S/N:	The wing serial number
CERT #:	The certificate number of the mechanic or repair station that did the work
ON:	the date the work was completed
AT:	the total hours on the wing. That will be the same as the airplane hours only if the wings are the same as the airplane was built with.

12.3) The weight of the upgraded wings <u>will be</u> different than the original wings. For most older airplanes they will be heavier, but for a few newer airplanes they will be lighter. It will be necessary to re-weigh the complete airplane to reestablish its empty weight and center of gravity. Record this new information in the aircraft log book.

12.4) If additional work was performed on the airplane during this down period, it too will have to be properly completed, and associated airframe and system components properly reinstalled.

12.5) Prior to conducting a maintenance test flight, this modification must be recorded in the airplane log books as shown on the following page. An FAA letter authorizing CK-AG-40 as an alternative means of compliance with AD 2006-07-15 was included with the kit. It must be kept with the aircraft's records so long as this is the latest AD on Thrush wing spars.

12.6) With the completion of this modification, round up all scrap parts and mutilate them so that it is physically impossible to re-use them again.

PARTS LIST (Parts are available through your local authorized Thrush Service Center).

See drawing 94417 for the parts list for Custom Kit CK-AG-40. Basic kit parts are included in the purchase price of this Custom Kit.

RECORD OF COMPLIANCE:

Make appropriate entry in aircraft records as follows:

Custom Kit CK-AG-40 Rev. A dated 12/8/06, Wing Spar Upgrade, was complied with by:

_____ on _____.
name certificate # date

at _____ hours total airframe time in service. Wings upgraded are Left, Serial Number _____ and Right, Serial Number _____. The new aircraft empty weight is_____ pounds, located _____ inches aft of the wing leading edge.

Approved for return to service by:

_____ on _____.
name certificate # date

NOTE: before this airplane can use a Group 4 airplane initial and repetitive inspection intervals, for purposes of compliance with AD 2006-07-15 (or subsequent ADs), a photocopy of the above log book entry must be sent to:

Thrush Aircraft, Inc.
Attn: QC Manager
P.O. Box 3149
Albany, GA 31706-3149
FAX: (229) 436-4856

Your Thrush Aircraft, Inc. 1 year parts warranty will be good only if a copy of your log book entry is on file.