

Air Research Technology Inc.
Wing Extension and Spar Reinforcement Installation Guide #172
For Cessna 170, 172 and 175 models modified in accordance with
Transport Canada STC SA01-35
Issue 8, July 11, 2022

Qualified aviation maintenance personnel must perform the procedures documented herein. All workmanship must be in accordance with FAA AC 43.13-1B.

This document supplements drawings
R-1582-170-172-175 and SR100-170-172-175

REVISION AND DISTRIBUTION

When this document requires revision, it will be reissued in whole and the issue number will be increased. Air Research Technology Inc. provides copies of this document with its installation kits. This document is also available on line at:

<http://www.wingxstol.com/html/faq.html>

IMPORTANTANT NOTICE

**A CONFORMITY INSPECTION OF THE WINGS IS MANDATORY
PRIOR TO INSTALLATION OF the Wing-X STOL modification**

Wing extensions add to the structural load and increase bending moments of the wing structure. Original factory wings have been tested and these additional loads are addressed with the introduction of our spar reinforcement design. Prior to installing our wing extension and spar reinforcement It is mandatory to inspect your wing(s) to ensure that the structure conforms to original Cessna design. Any repairs approved or otherwise to the forward or aft spar will negate the possibility of installing wing extensions and our spar reinforcement.

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COMPATIBILITY WITH OTHER INSTALLED MODIFICATIONS

Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the modified product.

This installation is compatible with the following FAA STOL STCs or combinations thereof:

Bush: SA0371SW, SA2851SW, SA2852SW, SA2853SW
Horton: SA910CE, SA948CE, SA989CE, SA2213CE, SA2551CE
Sierra/Robertson: SA499NW, SA1677SW, SA1689WE
Sportsman: SA2100WE, SA2256WE

Compatibility has not been demonstrated for any wing tip fairings that extend the wing span, excluding nav lights, beyond 36 ft 6 in.

The installation is compatible powerplant STCs that increase power. When such STC also increases the maximum gross weight of the aircraft, that gross weight shall supersede the gross weight herein, subject to the provision that compatibility has not been demonstrated for any powerplant STC that increases the gross weight above 2550 lbs.

This installation is compatible with the following Float STCs:

Aerocet: SA02400AK
Aqua: SA1168SO, SA665CE
Baumann: SA00795CH, SA01815CH
CAP: SA62-7, SA62-8
Kenmore/Edo: SA1191NW, SA584NW
Pee-Kay: SA358NW, SA365NW, SA602AL, SA603AL, SA1000EA
Wipline: SA00804CH, SA00674CH, SA00900CH

Compatibility has not been demonstrated with any seaplane configuration in excess of 2550 lbs.

TOOLS REQUIRED

- 2 metal straight edges approx. 72" or 50' feet of fine string.
- Hole finder or transfer tool (optional)
- Standard sheet metal tooling including clecos.
- Countersink bit (100 °) and drill bits.
- Standard riveting equipment.
- Metal clamping tools (2 or 3)
- Materials & documents required for installation are included in kit.
- Kit includes all hardware and parts as listed on shipping checklist

IMPORTANT NOTE ABOUT THE JIG SET RIVET

Your *Wing Extensions* have been assembled by the manufacturer in an assembly jig with one (1) jig set rivet 3/32" situated inboard which holds the trailing edge skins in place. It is not normally required to remove the JIG SET Rivet until step #10, however on some aircraft it may become necessary to remove this rivet in the early stages of the installation procedure in order to adjust more accurately the airfoil alignment and washout.

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Part I – INSTALLING THE *Wing Extensions*

1) Wing tip lighting and other electrical connections

- Remove the plastic wing tip and disconnect the wires to the navigation and strobe lights.
- If applicable, remove strobe light power supply and attachment bracket from rib at station 208.00 and reposition onto the wing extension
- Extend existing wiring, use supplied wire #M22759/ 16-18-9 and connectors #320559

2) Preparing the wing for fitting

- Remove the plastic wing tip and check the existing wing to make sure there is no top or bottom skin extending past the wing rib at wing station 208.00. If necessary cut away or file away all excess aluminum until top and bottom wing skins are flush with the outboard edge (vertical wall) of the existing center rib at wing station 208.00
- A clean, flush surface is required to allow for a tight fitting of the *Wing Extension* skirt onto the wing. Therefore, remove all “brazier or universal head rivets” found along the outboard two (2) inches of the wing extremity, replace these fasteners with flush head rivets.
- When inspecting the interior of the Cessna 170,172 and 175 outboard wings in the area where the forward and aft spar terminate you will note that the top and bottom of these spars extend and overlap the rib cap (lip of the rib) and terminate at the vertical wall of the center rib at station 208.00. The other 2 stringers terminate differently and end approx. 1/16” to 1/8” short of the rib lip of station 208.00 looking further inboard note that 4 stringers terminate at the more inboard section of the wing at station 190.00 this is how a normal 170,172,175 wing assembly should look . Please note that on heavier Cessna models such as the 180,182,185 these 4 stringers extend to station 208.00.
- Because of past wing repairs or rebuilds some wing assemblies may look different. If any of the 2 stringers terminate greater than ½” short of the rib cap (rib lip) of station 208.00 it may be necessary to splice the stringer in order to make it longer prepare to splice stringer using methods as depicted in the Cessna Service Manual for series 100 aircraft.
- The supplied MS21061L08 anchor nuts are used to secure your *Wing Extension* onto the wing. It is important that they be installed at strong points and positioned through the spar and or stringers as indicated in figure 5 page 31 or in Detail " A" of Drawing # R1582-180-182-185 For future positioning of the anchor nut plates (step #8), drill out existing rivets at end of each stringer and spar.

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3) Preparing the *Wing Extension*

- On all early model airplanes built prior to 1973, LEFT AND RIGHT *Wing Extensions* have a symmetrical airfoil and appear to look identical but they are not. Decals are affixed to the center rib section of each symmetrical shape *Wing Extension* and identify them as LEFT (LH) or RIGHT (RH).
- Remove plastic wing tip and place it on workbench. Fit the plastic wing tip over the wing-extension. In order to fit the *Wing Extension* into the plastic wing tip, trim away excess metal at the outboard trailing edge corner of the *Wing Extension*. A tight fit is desirable. Do not trim off too much.
- With the wing tip fitted firmly in position, mark a small line at top and bottom of *Wing Extension* skin to coincide with the inboard trailing edge of the plastic wing tip. This line will be used later in step #11 when trimming the trailing edge.
- Remove the plastic wing tip from the *Wing Extension*. Final installation of the plastic tip will be in step 14.

4) Preliminary fitting and alignment of the wing extension

NOTE

Remember every wing is slightly different and on sight adjustments will be necessary to ensure correct alignment in all geometric planes.

Wrap the wing extension around the existing wing the inboard trailing edge of the *Wing Extension* assembly will temporarily envelope the outboard section of the ailerons, this is normal and the overlap will be marked for cutout at a later time (see "aileron cut out" step #10).

It is not recommended to line up the leading edge of the extension with the leading edge of the wing. With the *Wing Extension* enveloped over the existing wing extremity apply pressure inboard toward the fuselage in order to position the extension stringers up against the wall of the Cessna end rib at station 208.00. This rib was positioned during wing assembly by Cessna and should be straight allowing the new wing extension to easily align with the rest of Cessna the wing.

If the original Cessna rib at station 208.00 has been replaced or the wing repaired without the use of a precise Cessna wing jig then the wing extension may not align correctly with the rest of the wing using the method above. ... Not to worry if this occurs the wing extension skirt is more than wide enough for you to move it outboard up to 3/8 inch. Move the extension away from the rib at station 208 and proceed with alignment using straight edges (see step 5).

Once the extension is in the approximate correct position and appears aligned with the wing we suggest that you step back 25 to 30 feet behind the wing and to visually insure alignment with the wing. Raise or lower the outboard trailing edge of the extension in order to fine tune the alignment process. Remember if the extensions are out of alignment the aircraft may not fly wings level.

CAUTION

DO NOT USE THE AILERON TRAILING EDGE TO VISUALLY ALIGN THE EXTENSION TRAILING EDGE. FOR BEST RESULTS USE MINOR CORRECTIONS TO LINE UP THE OVERALL WING TRAILING EDGE AND UPPER WING SKIN WITH THE EXTENSION

So as not to permanently damage your new kit, we suggest the use of speed tape or a strong style duct tape or any other method to temporarily fix and tightly wrap the extension around the wing and maintain alignment. Make all adjustments at this time before beginning to mark the strap position onto the wing or to cut out or drill holes in the wing extension.

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5) Dihedral alignment along the FWD and AFT spar.

Use 2 straight edges 96" long or a length of string (approx. 50' cut as desired)

Using the rivet rows of the main spar on the top of the wing as a guide take a straight edge (min.72") and firmly set it to the top wing skin using duct tape.

Line it up along the top spar rivets and extended it from station 154.00 all the way out to the extremity of the *Wing Extension at station 226* . It is preferable to use 2 straight edges on the top of the wing rather than alternating position of a single straight edge. Align only the top of the wing, if the top of the wing is aligned with the extension then the bottom will automatically fall into place.

Temporarily position the Extension (wrapped around the wing) then raise and lower it so as to achieve an even gap along the forward spar straight edge and the top of the wing extension skin. An even gap should insure proper dihedral alignment of the forward spar portion of the wing extension.

Repeat this step using a second straight edge running just forward of the aft spar (called the secondary or auxiliary spar). This time there should be no gap as the straight edge should lie evenly atop the wing skin and extension skin along its entire length. This method will normally insure correct dihedral alignment of the aft section of the wing extension.

Please note that some wings due to past damage and repair history may require further alignment this is done visually by standing back approx. 25 to 30 feet behind the wing and optically aligning the extension by raising or lowering the outboard trailing edge in order to align as much as possible with the existing wing trailing edge.

CAUTION

DO NOT USE THE AILERON TRAILING EDGE TO VISUALLY ALIGN THE EXTENSION TRAILING EDGE. FOR BEST RESULTS USE MINOR CORRECTIONS TO LINE UP THE OVERALL WING TRAILING EDGE AND UPPER WING SKIN WITH THE EXTENSION

Leading edge alignment (sweep back)

Note that it is not normally necessary to align the leading edge of the wing extension with the existing wing. If the extension is positioned as per instruction the leading edges will be positioned as per the information below

Camber lift airfoil NACA 2412 (post 1973)

The leading edge of this airfoil design sweeps back in a straight line from wing station 100.00 all the way out to the tip. This can be confirmed by using a 96" straight edge (min. 72") running it from the leading edge of the wing at station 100.00 outboard to the leading edge of the wing extension. Optionally you can tape a string along the L/E extending from just past the strut at wing station 100.00 to the end of the extension at wing station 226.00. Use spacers to clear the thickness of the skirt strap, and the *Wing Extension* leading edge should align closely with the wing.

Symmetrical airfoil NACA 0012 (pre-1973)

On all stock Cessna wings built before 1973, the leading edge sweeps back a discernible amount from wing station 190 to 208. **NO ATTEMPT SHOULD BE MADE TO ALIGN THE LEADING EDGE ON EARLY MODEL WINGS.** The wing extension when correctly positioned does not follow this sweep back and its leading edge will appear to sweep forward this is normal. If you care to verify this forward sweep we suggest to extend a string along the leading edge, tape it down at wing station 100.00 and at station 190 and again at the most outboard end of the wing extension leading edge called wing station 226.00. You will see a noticeable gap between the wing leading edge and the string at station 208 (see fig.6)

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6) Marking position of the skirt

With *Wing Extension* perfectly aligned and temporarily held tightly in position, use a washable ink marker and trace out a line marking the position of the outer edge of the wing extension skirt onto top, bottom and leading edge wing surface. Now that the position of the skirt is marked onto the around the surface of the wing you can now decide on which rivets can be drilled out and used for future positioning of the nut plates. Remember that any holes in the skirt must always maintain a minimum edge distance of at least 3/8 inches so choose carefully which rivets must be removed.

7) Position the holes and install nut plates MS21061L08

For positioning refer to guide on next page

Installing the nut plates

Use a #40 drill (3/32") or smaller to drill out existing rivets along the spar and stringer for future positioning of the nut plate. DO NOT enlarge the drill holes beyond 3/32" for now .The smaller 3/32" hole will allow for more accurate transferring of the hole position onto the skirt. Try to position your holes in such a way as to maintain alignment if possible. Remember that these holes will be used for the machine screws that will hold the wing extensions onto the wing therefore a straight line is desirable.

- Use existing rivet holes when possible or drill new ones if required. Insure anchor nut plate rivets are in line as much as possible and do not interfere with existing rivets along the spar or stringer.
- You can now proceed with installing the nut plates. Use of following supplied rivets is approved to fasten the nut plates along the top and bottom of the wing: Solid rivet MS20426AD3-3 & AD3-5 , Pull-Thru rivet MS20605AD3W4 or CR9116-3-4. Because the nut plate rivet is non-structural use of pop rivet 3/32" #A34A is also approved.
- For esthetic purposes, additional anchor nut plates may be installed forward of the main spar to insure tight fitting of the wing extension around the leading edge.

NOTE

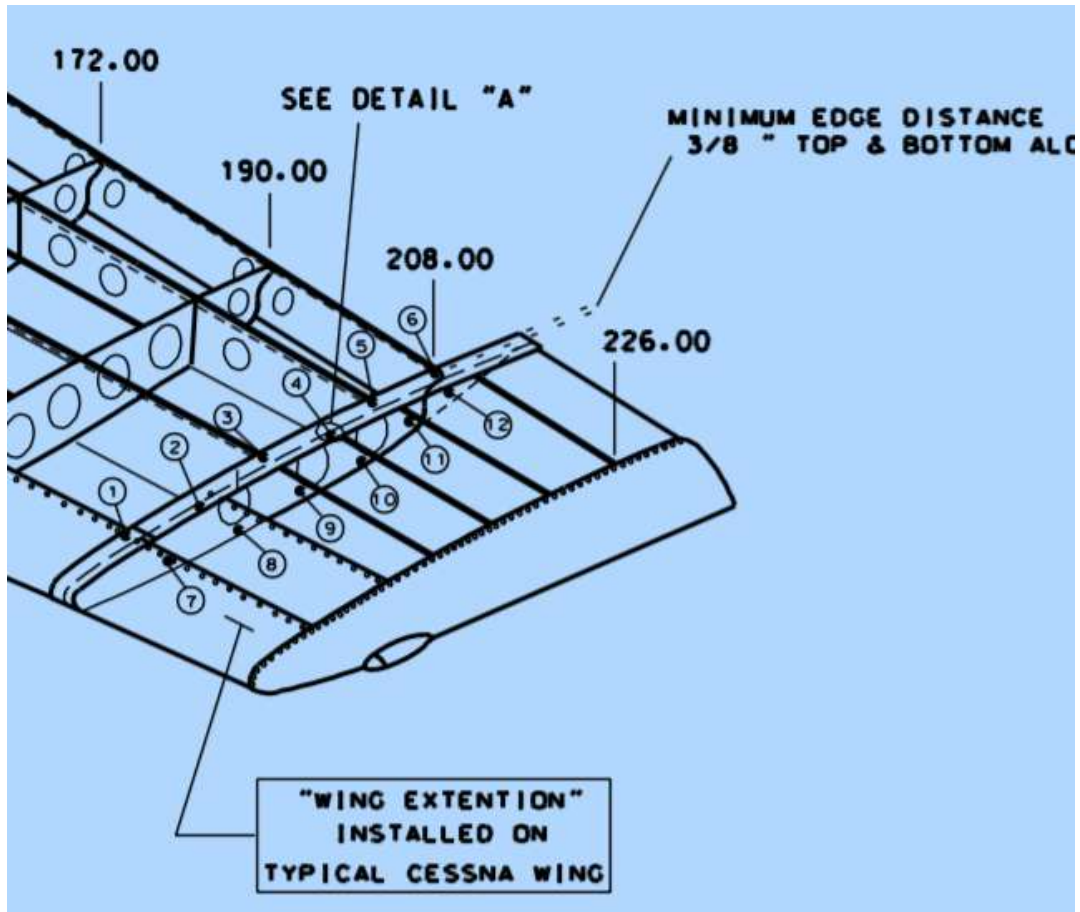
Every wing is different and will require some on site adjustment to ensure that the anchor nuts are positioned accurately. The anchor nuts are used to hold your *Wing Extension* in place and must be installed at strong points through the spar and stringers in order to transfer the load evenly into the wing. Remember to maintain a minimum edge distance of 3/8 inches along the *Wing Extension* skirt.

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NUTPLATE POSITIONING FOR THE CESSNA 170,172,175

NOTE ; On the Cessna 170,172 ,172 series airplanes There are no stringers extending to the end rib at station 208.00 for positions indicated below as 2 , 4 , 8 and 10 In these areas only installing nut plates thru the rib flange is permitted but must be positioned as per instructions below. If possible try to use original plastic wing tip screw holes and install supplied nut plates in these positions this will insure structural



GUIDE FOR POSITIONING NUT PLATES ON TOP & BOTTOM OF WING

1. Center of main spar cap inboard of rib flange
2. Position approx. 7" AFT of main spar centered thru rib flange or use nearest original wing tip screw hole to install nut plate
3. Position thru skin and stringer inboard of rib flange
4. Position approx. 17.75" aft of main spar or use original wing tip screw hole to install nut plate
5. Position nut plate thru skin and stringer inboard of rib flange
6. Position nut plate thru the auxiliary or aft spar top cap inboard of the rib flange
7. Position nut plate thru center spar cap inboard of rib flange
8. Position 6" AFT of main spar thru center of rib flange or use nearest original wing tip screw hole to install nut plate
9. Position thru skin and stringer inboard of rib flange
10. Position approx. 17.75" aft of main spar or use original wing tip screw hole to install nut plate
11. Position nut plate thru the auxiliary or aft spar bottom cap inboard of the rib flange

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8) Transferring holes onto the skirt strap

- Now that the anchor nut plates are installed and accurately aligned and the minimum edge distance has been maintained the future screw holes can be transferred onto the wing extension skirt with the use of a 3/32" hole finder.
- Before marking and drilling the skirt strap, fix the *Wing Extension* in place at the leading edge. You should pull it back tightly and use speed tape to secure the extension temporarily in place, or, if you wish, use the original wing tip screw holes found in the wing at this position, there should be one on the top L/E and one on the bottom L/E. Use these screws to temporarily secure the *Wing Extension* in place. This will assure a tight fit around the contour of the leading edge cuff prior to positioning of the nut plate anchoring holes.
- If you do not have a hole finder another acceptable method of hole transfer is thru the use of 3 intersecting lines. Begin at the center of each nut plate screw hole and make a series of three 12" long lines radiating outward toward the fuselage. All lines should be approx. 30° to 45° apart and must intersect precisely over the center of the 3/32 hole. When the wing extension is temporarily positioned and accurately aligned as per part 5,6 and 7 above a portion of the 3 lines drawn on the wing surface will remain visible. Using a ruler extending those 3 lines onto the skirt again will accurately position your screw hole relative to the nut plate screw hole below.
- Use a #40 drill bit and drill through the skirt at the marked locations, remember to install a cleco into each drill hole to insure no movement or misalignment of the *Wing Extension*. Insure that the skirt is fit tightly around the wing while moving from front (leading edge) then bottom leading edge and alternate from Top to Bottom of the skirt moving gradually towards the back or trailing edge of the skirt
- Verify final alignment of the *Wing Extension* for dihedral, sweep back and wash out. Minor adjustments can be made by removing the appropriate clecos then re-drilling using a #30 drill bit all the time while holding the *Wing Extension* firmly in the correct aligned position. Removal of the JIG SET RIVET may be required at this time in order to avoid possible warping of the top and bottom skins.
- Finish with a #20 drill bit and enlarge the drill holes for anchor nuts.
- Install the *Wing Extension* to the wing using supplied machine screws (AN525-832R8). Then mark for cutting and trimming see part 10 and 11. On final installation tighten the screws to 7-15 in.lb.

9) The aileron cutout

- Mark and gradually cutout the excess metal overlapping the aileron. BEWARE not to trim off too much material. The final result should give you a clearance of approximately 1/2" between the aileron and *Wing Extension* inner edge this should coincide with the edge of the rib web.
- Carefully file or dress out the area to attain a smooth edge, if require remove the JIG SET RIVET.

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10) Trimming the trailing edge

- Temporarily install the plastic wing tip. It may be necessary to trim the trailing edge outboard corner of the *Wing Extension* with a file to permit a proper tight fit into the plastic wing tip.
- With the plastic wing tip fitted firmly in position, use a straight edge and mark a line on the top and bottom skins extending from the outboard trailing edge of the aileron to the trailing edge of the plastic wing tip. Refer to line scribed in step #3.
- Following the scribed line along the top and bottom skins of the *Wing Extension* trailing edge, carefully cut off all the excess material.
- Remove the plastic wing tip.

11) The trailing edge stiffener P/N 1582-7

Two trailing edge stiffeners are provided in every kit. Insert the stiffener in between the *Wing Extension* trailing edge skins. Adjust the stiffener by cutting to proper length then clamp the newly reinforced trailing edge skins together with the stiffener sandwiched in the middle.

CAUTION

Watch for induced warping of the airfoil on the top and bottom skins of the *Wing Extension*. This could be caused by misalignment of the trailing edge airfoil. BE SURE ADDRESS THIS PROBLEM BEFORE RIVETING STIFFENER INTO PLACE.

- When airfoil symmetry is assured, use clamps to tighten firmly along the trailing edge then drill & install 3/32" rivets through the skins and stiffener at 1-inch intervals along the trailing edge.
- The skin is thicker along the reinforced skirt strap, if necessary, install (3 to 5) additional rivets in the area of the skirt strap trailing edge.
- To attain a smooth finish along the trailing edge of the *Wing Extension*, file clean all metal edges.

12) Completing the installation

If required, reinstall the strobe light power supply and bracket to the new end rib then connect the wires and test for proper function.

13) Positioning of the forward nut plates in the nose rib

Your *Wing Extensions* do not have pre-drilled holes or anchor nuts installed in the top section of the leading edge nose rib. Securing your plastic wing tip in place will require on site fitting of the forward anchor nut(s) which are positioned along the top and bottom of each nose rib as required.

- Using your existing plastic wing tip as a guide, mark the top most forward screw holes onto your new *Wing Extension*, then drill out and install the anchor or Tinnerman nut(s) as required. Some aircraft equipped with leading edge STOL kits may require 2 or more screws top and bottom in order to fasten the plastic wing tip securely in place.
- Once the hole(s) are positioned, fasten the anchor nuts with either Pull-Thru , pop-rivets or solid rivets, as this is non-structural all methods are approved. Use fasteners of the type and number supplied or use Tinnerman nut(s).
- When using Tinnerman nut(s), pre-drill the hole then remove the rivet binding the top leading edge skin to the nose rib and insert a Tinnerman as required.

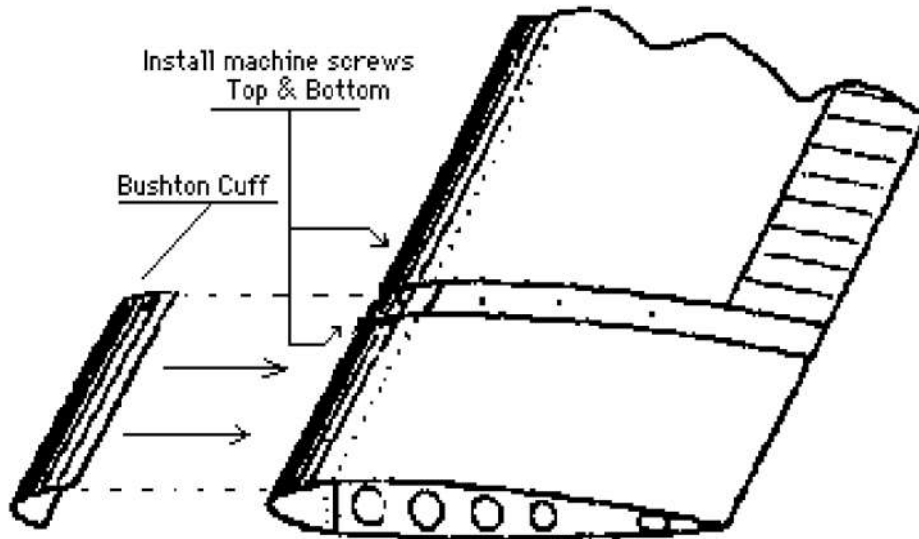
You can now install the original plastic wing tip onto the *Wing Extension*.

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14) Various STOL kit L/E devices require BUSHTON CUFF” P/N 1582A-10

As an option , you can order an enhancement cuff P/N 1582A-10 to fit over your new *Wing Extension* leading edge and skirt strap. The optional “ BUSHTON CUFF” is STC approved and manufactured to closely match the existing leading edge airfoil design of the most popular STOL kits, this optional cuff is longer and wider than required therefore some refitting and trimming may be necessary.

- Insert optional Bushton cuff under the existing leading edge device and it should take the shape of the existing STOL leading edge cuff .
- Some plastic wing tips are designed to have the L/E cuff inserted into the wing tip, if this is the case you can reinstall your plastic wingtip and use it as guide. Position the optional cuff enhancement into the tip thereby assuring a nice fit and the required shape should fall into place.
- If this method is not available to you. Follow the existing lines of contour and sweep back to match as much as possible the existing leading cuff shape.
- Trim the optional cuff to the desired size, paint and install using approved fasteners and in order to keep your wing extensions removable, remember to use machine screws where indicated.



- 1) To install, follow contour of existing STOL kit leading edge and rivet along the same lines.
- 2) To allow for easy removal of WingExtension, install machine screws where indicated.

The BUSHTON CUFF P/N 1582A-10

Part II - INSTALLING THE WING SPAR REINFORCEMENTS

CONFORMITY INSPECTION OF BOTH WINGS IS MANDATORY PRIOR TO INSTALLATION OF the Wing-X STOL spar reinforcement

Wing extensions increase the structural load of the wing because of increased bending moments. These loads are addressed with the introduction of our spar reinforcement. Prior to installing our wing extension modification, it is mandatory to inspect your wing(s) to ensure that the structure conforms to original Cessna design. Any repairs approved or otherwise to the forward or aft spar will negate the possibility of installing the wing extensions and our spar reinforcement.

CAUTION

Metal fatigue and or cracks may occur on high time Cessna aircraft. They are normally found along the center rib channel and top wing skin situated along the upper spar cap extending from wing station 124.00 to 196.00. During the initial installation procedure, all deficiencies can be readily spotted when viewed through the newly installed inspection holes. In order to maintain the structural integrity of the wing assembly, any defects such as corrosion or fatigue cracks found in the wing assembly must be repaired immediately. Suitable repair procedures can be found by referencing Section 17 of the appropriate Cessna Service Manual.

15) Wing spar reinforcement Installation

- The latest revision drawings are supplied with each kit, always install the wing reinforcements using the most current drawings or contact the manufacturer for the latest issue. Refer to drawing R1582-170-172-175 and drawing SR100-170-172-175
- Remove existing rivets along the upper spar cap extending approximately from wing station 125.00 to 160.00. You will be doubling the number of rivets along this section of the upper spar cap. By adding one rivet between each existing rivet in order to obtain an approximate 1" inch pitch. These 5/32" rivets are supplied with your kit. Be sure to use correct fastener length, refer to the P/N # and dash number appropriate to the thickness of the wing station area to be riveted. See drawing for details.

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16) Inspection cover assembly P/N 1582A-11

Installation of additional inspection holes may be required on the underside of the wing in order to provide access for the bucking bar while riveting the doubler and packer straps into place. A total of four (4) Inspection cover assemblies are supplied in each kit. Refer to Figure 7 for access hole installations instructions.

17) Preparing the area for the reinforcement straps

Our specially designed spar reinforcement will be installed along the upper spar cap stretching from station 127.00 to station 160.00. The reinforcing straps supplied (Doubler & Packer) are each 0.125" thick. Because of the combined thickness a small area of the center ribs situated at wing station 136.00 and 154.00 will need to be filed out or notched out to allow for passage of the strap(s).

- Cut out a small portion of the upper forward center rib at station 136.00 and rib at station 154.00. See drawing for detailed view.
- Use a Dremel tool or other type high speed rotary cutter to provide a smooth cut-away (approx. ¼") then file all surfaces to a smooth finish.
- Identify the area on the top of the wing along the upper spar cap from station 127.00 to station 160.00. Carefully drill out remove all existing rivets holding the wing skin to the upper spar cap.
- Deburr, clean up and remove all excess material to allow for proper positioning of the reinforcement straps

18) Installing the packer P/N 2024T3 (24" X 1.5" X 0.125")

The Cessna spar assembly has a strap called a "bulb plate" that is 0.125" thick this strap terminates at wing station 136.00 and can easily be identified by a noticeable bulb or bulge along its forward leading edge hence the name "bulb plate". It is here that the spar splice will begin. When positioned correctly the packer should extend all the way out and terminate at wing station 160.00.

- Position the tapered end of the 24" packer strap outboard and extend it up along the upper spar cap and through the newly completed center rib notches.
- Butt the packer strap up against the bulb plate remember to allow a minimum end gap of 0.032" (recommended for expansion)
- Using existing rivet holes, mark and drill holes in the packer
- Use clecos to temporarily fix the packer in position along the spar cap

19) Installing the doubler p/n 2024T3 (18" X 1.1875" X 0.125")

The 18" reinforcement strap called the doubler is tapered at both ends and should be positioned over the bulb plate against the bulb and centered over the splice at wing station (136.00) as depicted in the drawing. With both the packer and doubler straps held firmly in position with clecos drill the holes to the correct size for the fasteners to be used. Fasten the spar assembly and reinforcement together use counter sink rivets or mushroom head rivets as appropriate.

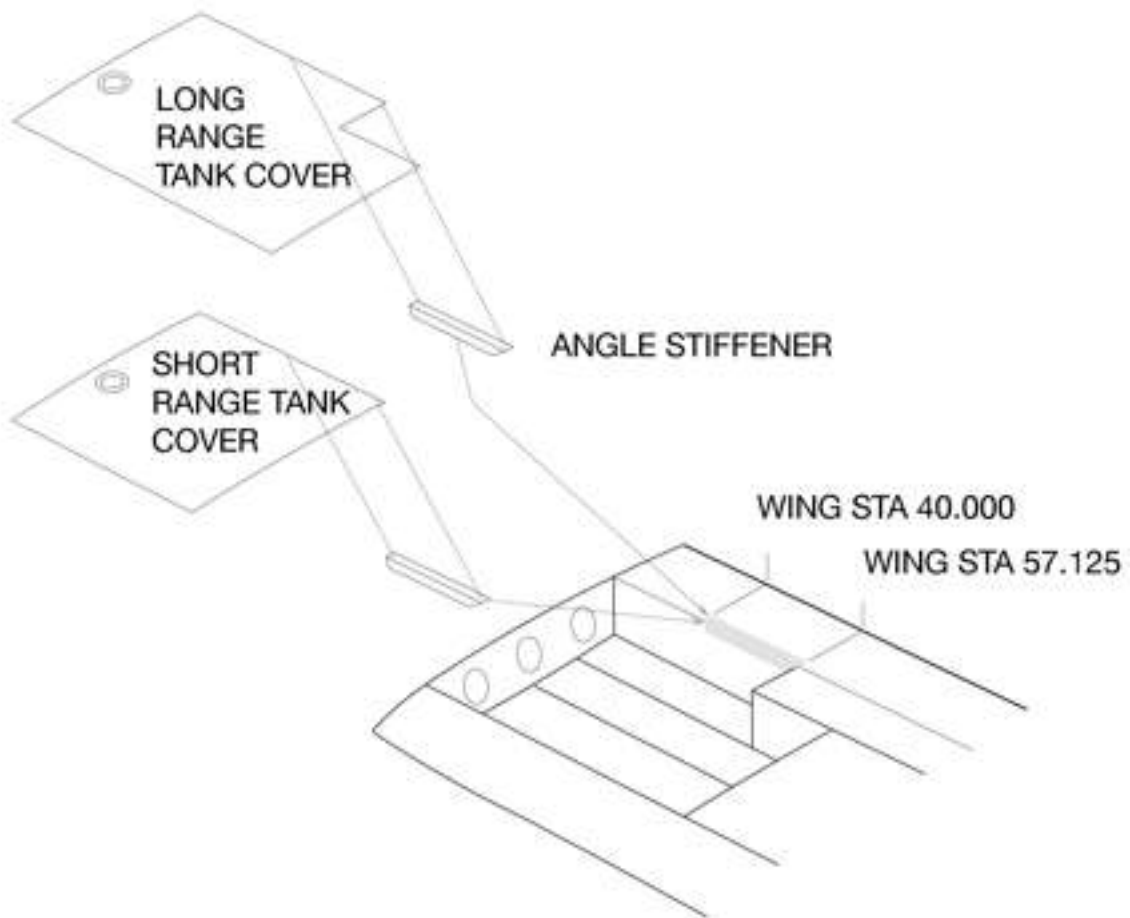
- Use 5/32" rivets P/N MS20426AD5-11 or P/N MS20470AD5-11 at 1" pitch from station 127.00 to 145.00 approx.
- Use 5/32" rivets MS20426AD5-9 or MS20470AD5-9 at 1" pitch from approx. wing station 145.00 to wing station 160.00.

20) Installing the AFT upper spar cap angle stiffener P/N 17025-40//57

CAUTION

DO NOT INSTALL on wing assemblies incorporating Integral Fuel Cell “wet wing”.
Reference serial no. 17274010 and ON or serial no. F17202040 and ON.

THIS INSTALLATION IS MANDATORY only on wing assemblies incorporating standard and long-range fuel tanks.



- Remove #8 screws that attach the fuel tank well cover assembly to the Aft Upper Spar Cap.

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- With the required screws removed, lift the aft section of the fuel tank well cover and position the angle stiffener as indicated in the drawing. Angle Stiffener should be positioned approximately from wing station 40.000 to 57.125
- With angle stiffener is in position, use existing holes in the fuel tank well cover assembly to mark the angle stiffener for drilling.
- Remove the angle stiffener, position in a drill press and drill the holes as marked so as to receive number #8 machine screws
- Reposition the angle stiffener along the upper spar cap under of the fuel tank well cover assembly as indicated in drawing.
- Reinstall tank well cover using new screws MS27039-0808 (supplied with kit). Tighten all screws (7-15 in.lb.).

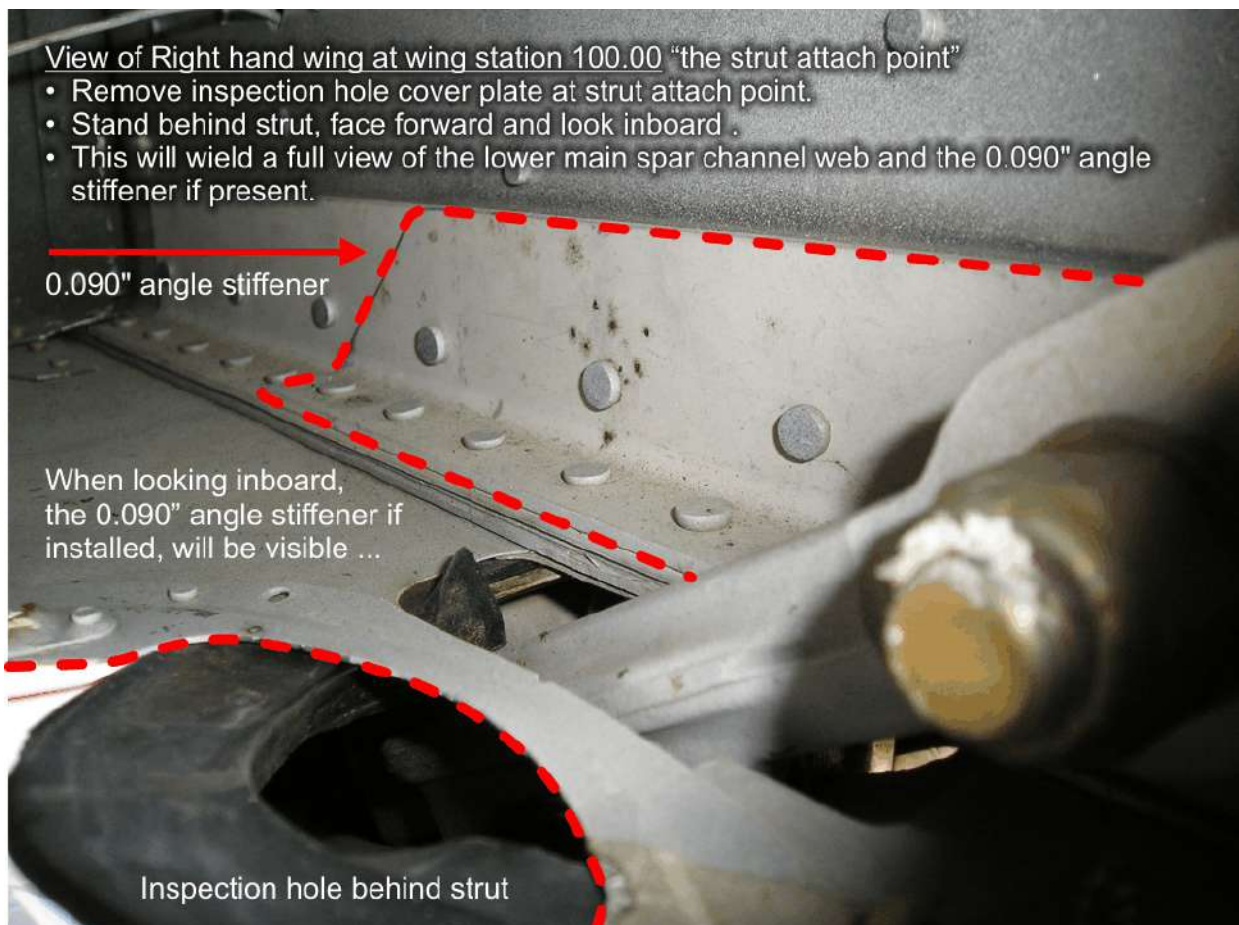
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Part III – INSPECTION FOR PRESENCE OF MAIN SPAR ANGLE STIFFENER

Caution This procedure is NOT REQUIRED on wing assemblies incorporating Integral Fuel Cell “wet wing” Reference serial no. 17274010 and ON or serial no. F17202040 and ON.

- 1) Inspect the area along the lower main spar cap from Station 90 outboard to Station 110, and determine if the factory angle stiffener is present.
- 2) Both wings, left and right must be inspected individually.
- 3) Open the inspection hole situated on the underside of the wing, aft of the spar, closest to where the strut connects to the wing. Using a flashlight and a mirror, by visual inspection, ascertain if the subject wing has the “angle stiffener” installed along the lower spar cap between Wing Station 90 and 110 (approximately). Refer to picture below to assist in identification of the “angle stiffener”.
- 4) If the “angle stiffener” is present, no further action is required.
- 5) The installation of the Stainless Steel Strap in accordance with Part IV is MANDATORY on all wings that do not incorporate the factory installed “angle stiffener”



Part IV – INSTALLATION OF STAINLESS STEEL STRAP

WARNING

Qualified aviation maintenance personnel must perform the procedures documented herein. All workmanship must be in accordance with FAA AC 43.13-1B.

- Each wing must be inspected individually to ascertain the presence of the angle stiffener
 - Stainless steel straps must be installed on wings without “angle stiffener”
 - installation of the stainless steel strap when required is critical to maintain structural integrity of the wing.
 - DO NOT INSTALL the Stainless Steel Strap if the “angle stiffener” is present. The cherry max rivets supplied will be too short for this combination and structural integrity will be compromised
 - If angle stiffener is present in both wings proceed immediately to Part V
- 1) On the underside of the wing, along the spar identify and mark the center of the rib flange of the rib at wing station 100.00
 - 2) To provide room for installing the strap the strut must be removed at the wing junction. Cradle the wing securely and remove the strut fork connection bolt where it attaches to the main spar.
 - 3) Carefully drill out and remove all existing rivets approximately. 8” inboard and 8” outboard of the mark made in step 1. **Caution** do not to enlarge drill holes beyond tolerance or severe spar damage may occur.
 - 4) Precisely mark the center of the stainless steel strap using a felt marker.
 - 5) Slide the stainless steel strap under the leading edge wing skins and up against the under wing skin along the spar channel and then center the stainless steel strap on the mark made at step 1. Note that both extremities of the 16” stainless steel strap have been tapered for your convenience. If the strap is set up to tightly against an existing rivet on the underside of the spar cap, the strap may be too long and should be shortened. Shorten the strap by grinding it down (a maximum of 0.50 “) in order to relieve stress load on the lower leading edge skin. On occasion, due to the proximity of other rivets, the extremities of the s/s strap may cause undesirable stress on the underside wing leading edge skins. If this occurs, remove rivet(s) in affected area and reinstall using locally fabricated aluminum shims in order to create a more gentle taper at the extremity of the stainless steel strap. (Refer to figure 4 for more details on positioning of the stainless steel strap.)
 - 6) The stainless steel strap when properly positioned is usually completely covered by the leading edge wing skins and on some early model Cessna’s it may remain visible along the aft edge. When the correct position is established, accurately mark the drill hole positions on the stainless steel strap, the existing L/E wing skin holes can be used as a guide. Remove the stainless steel strap and proceed to step 8.

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INSTALLATION OF STAINLESS STEEL STRAP (continued)

NOTE

The number of holes to be drilled may vary with different aircraft however (7) rivets on each side of the center of the strap is the minimum required in order to obtain the desired structural strength at the spar splice. The hole positions, as marked may not align perfectly down the longitudinal center of the Stainless Steel strap. This is normal because the strut fork may prevent centering; however, a rivet edge distance of 2D or 0.375" must be maintained along the length of the strap. If 2D edge distance cannot be maintained, contact Air Research Technology for instructions.

CAUTION

Care must be taken while drilling in order to avoid contact with the strut attach fitting inside the wing. DO NOT SUBSTITUTE the universal head Cherry MAX rivets or the Stainless Steel Strap. These parts are shear strength specific and critical to maintaining adequate strength at the wing spar splice. USE ONLY fasteners and materials supplied or referenced herein. If a stainless steel strap is damaged during installation, obtain a new one from the manufacturer.

- 7) Use a drill press and a 3/32" bit, precisely drill out the holes as required.
- 8) Verifying that the holes align precisely along the spar and return to the drill press and enlarge the holes in the stainless steel strap to #10.
- 9) Deburr the stainless steel strap and position it over the leading edge wing skins and up against the under wing skin along the spar channel and center the strap as in Step 5.
- 10) Through the entire thickness of the spar channel including all the skins, use (2) clecos of the correct size and secure the stainless steel strap tightly into position using the holes at each extremity of the strap.
- 11) Using the Stainless Steel strap as a guide, drill through the combined thickness along the spar using #10 drill . Repeat this until all of the holes have been enlarged.

CAUTION

Do not enlarge the drill holes beyond tolerance or severe spar damage may occur.

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INSTALLATION OF STAINLESS STEEL STRAP (continued)

- 12) When all the holes have been drilled to the correct size, remove and deburr the strap. Deburring should be sufficient to only remove the burrs, do not chamfer the rivet holes. Clean out all the metal filings in and around the spar for preparation of final installation.
- 13) Permanently install the Stainless Steel strap using CR3213-6-6 universal head CherryMAX rivets. At the center of the strap, where the wing skins overlap, install (1) rivet CR3213-6-7 universal head CherryMAX rivet. This longer rivet will allow for the additional thickness at the joint due to leading edge skins overlapping at this point as well as the additional thickness of the center rib at this position. DO NOT SUBSTITUTE rivets for any other type.
- 14) Reinstall the strut to the wing, on occasion the tubular structure of the strut may touch one of the heads of the newly installed CherryMAX rivets preventing the strut fork to seat correctly. When this occurs, it is permissible to smoothly file out that portion of the tubular strut to clear the rivet head.
- 15) Repeat instruction steps (1 thru 14) for both wings.

INFORMATION CONCERNING DISSIMILAR METAL CORROSION:

(Reference MIL-STD-171)

- Stainless Steel 301 1/2 hard (-0.5 V standard galvanic potential)
- 2024 T3 aluminum alloy at (-0.6 V standard galvanic potential)

Conclusion, the difference in galvanic potential is negligible, there is no risk of dissimilar metal corrosion.

PART V - PLACARDS, DOCUMENTATION FORMS AND REPORTS

- The placards shown in Figure 8 must be installed in full view of the pilot.
- For Cessna models R172K, 172RG, 172R and 172S the airspeed indicator must be range marked in accordance with Part VII of this document.
- The incorporation of this modification requires completion of a Transport Canada Major Repair or Major Modification Report (STD 571 Appendix L).
- In the U.S.A. Federal Aviation Administration Form 337 must be completed.
- When completing the necessary documentation refer to the STC number.
- Make the necessary installation and certification entries in the aircraft logs.
- Revise the Weight and Balance and aircraft equipment list in accordance with the information listed in Part VI.
- Place the Flight / Operating Manual Supplement No. 172 in the aircraft. Ensure that the pages in Sections 5 and 6 of this document refer to the applicable aircraft model and that all other Section 5 and 6 pages referring to other models have been discarded.
- This modification should be released subject to satisfactory test flight confirming that the aircraft flies wings level.

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PART VI - W & B INFORMATION

Item	Weight (lbs)	Arm (in)	Moment (lb.in.)
<i>WingExtensions</i> LH + RH	16.0	52.0	832
Doublers Packers Angle Stiffeners	1.0	36.0	36
Stainless Straps (if required)	1.0	36.0	36

PART VII – AIRSPEED INDICATOR RANGE MARKING

NOTE

THIS SECTION APPLIES TO R172K, 172RG, 172R and 172S ONLY.

With the *Wing Extensions* installed Vne is reduced to 160 KIAS (184 Mph). On these models the airspeed indicator must be marked with a radial red line at 160 KIAS.

The instrument must be marked by one of the following methods (Refer to FAA AC 20-88A paragraph 5b):

- 1) Directly on the instrument face by an appropriately rated instrument shop.
- 2) On the cover glass of the instrument, provided the readability of the instrument is not compromised. The line must extend onto the instrument bezel so that correct alignment of the cover glass with the face of the dial is maintained, and any rotation of the cover glass is apparent. Use instrument marking decals (Aircraft Spruce p/n 10-03905 or equivalent) for this purpose.

Apply a label to the case of the modified instrument indicating that the instrument has been modified in accordance with this STC.

This label should state “Modified per TCCA STC SA01-35” In addition, the label should identify the name of the shop performing the modification, and the date of modification.

Figures

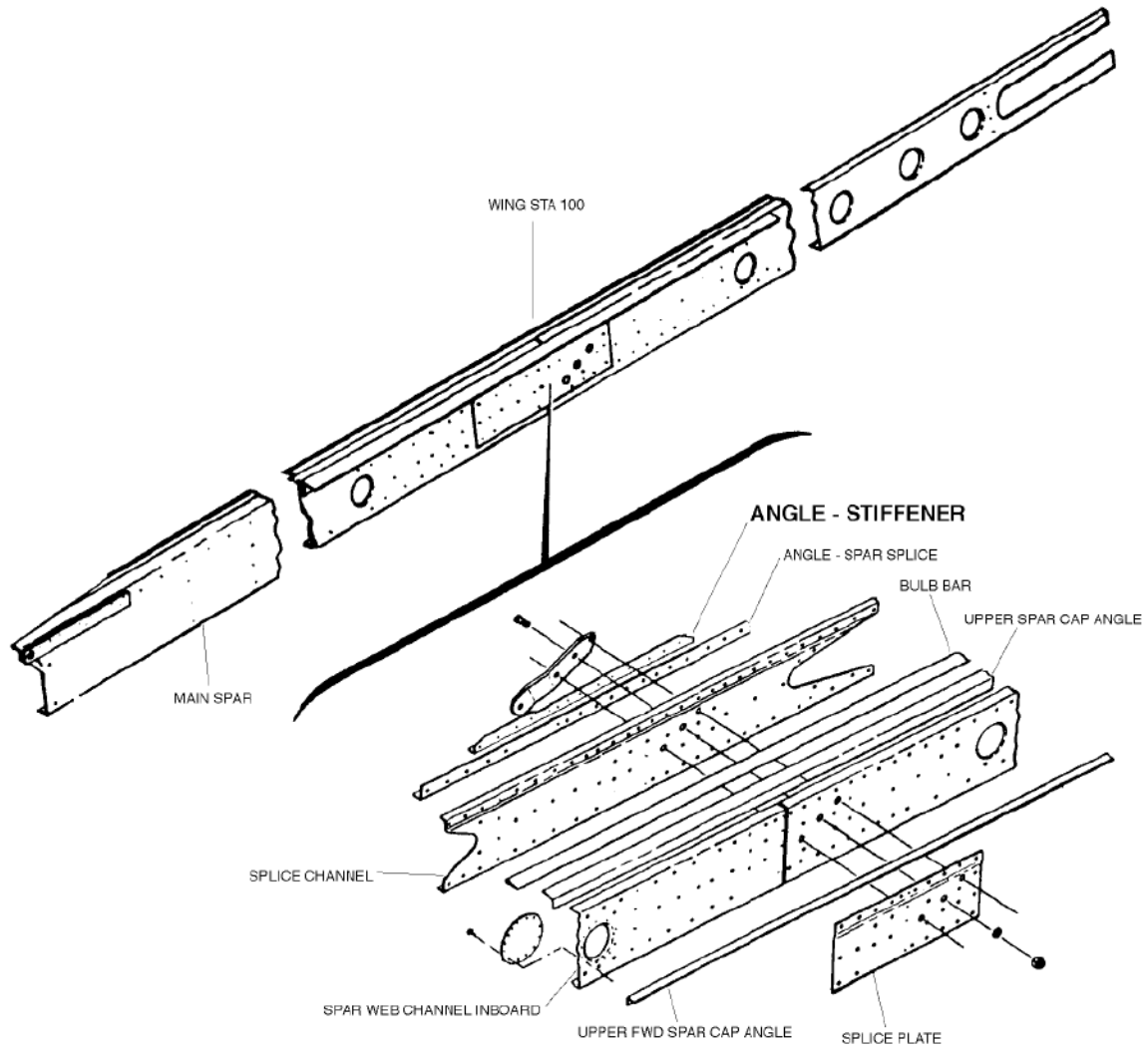


Figure 1: Spar Construction Detail

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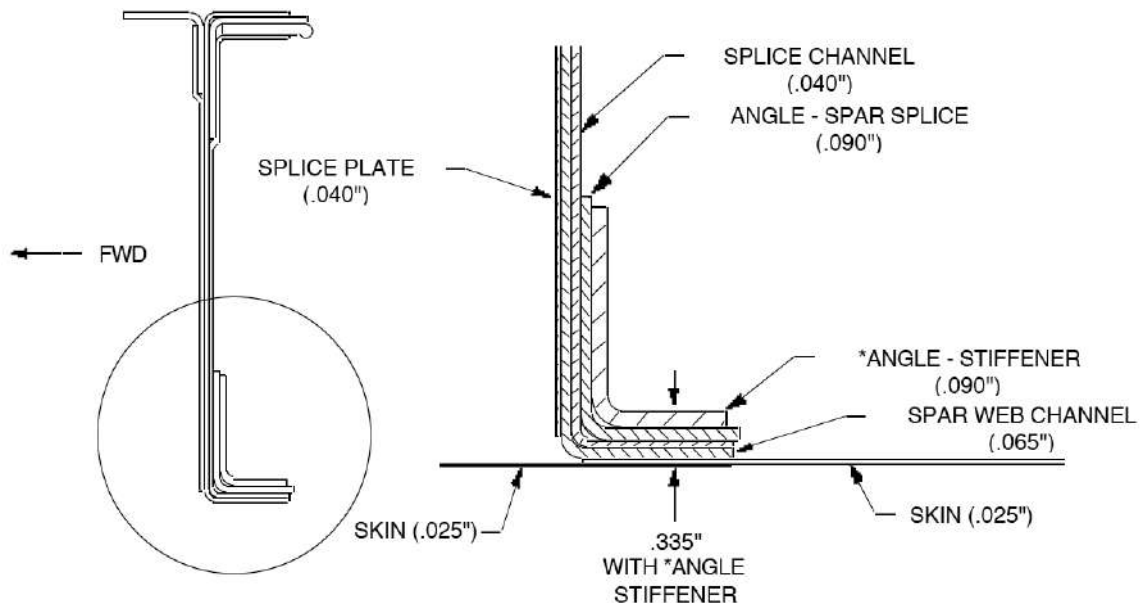


Figure 2: Spar Section Detail With Angle Stiffener Present

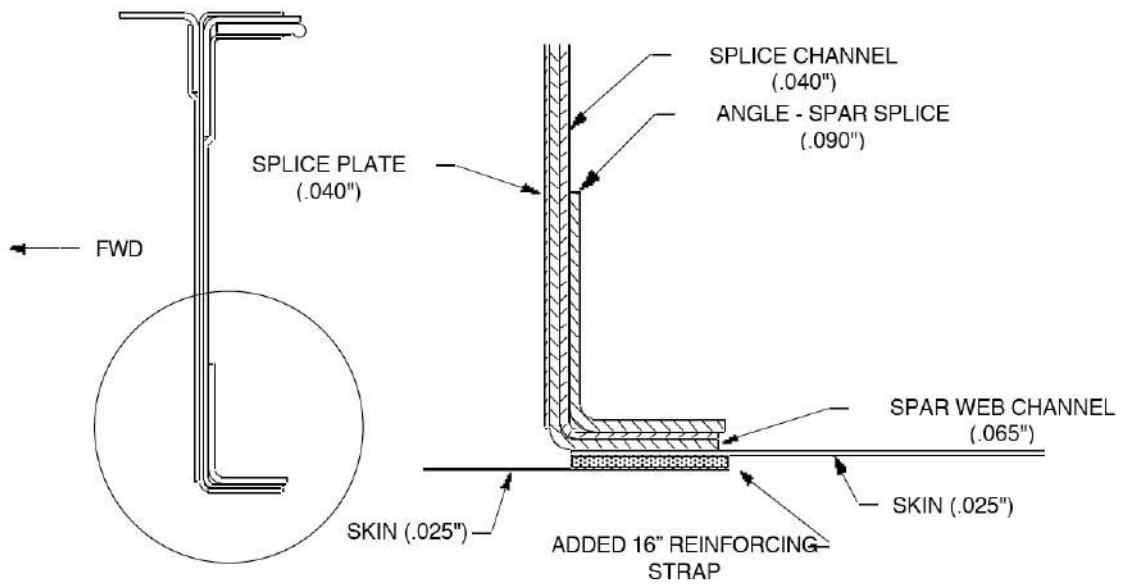


Figure 3: Spar Section Detail Without Angle Stiffener Present

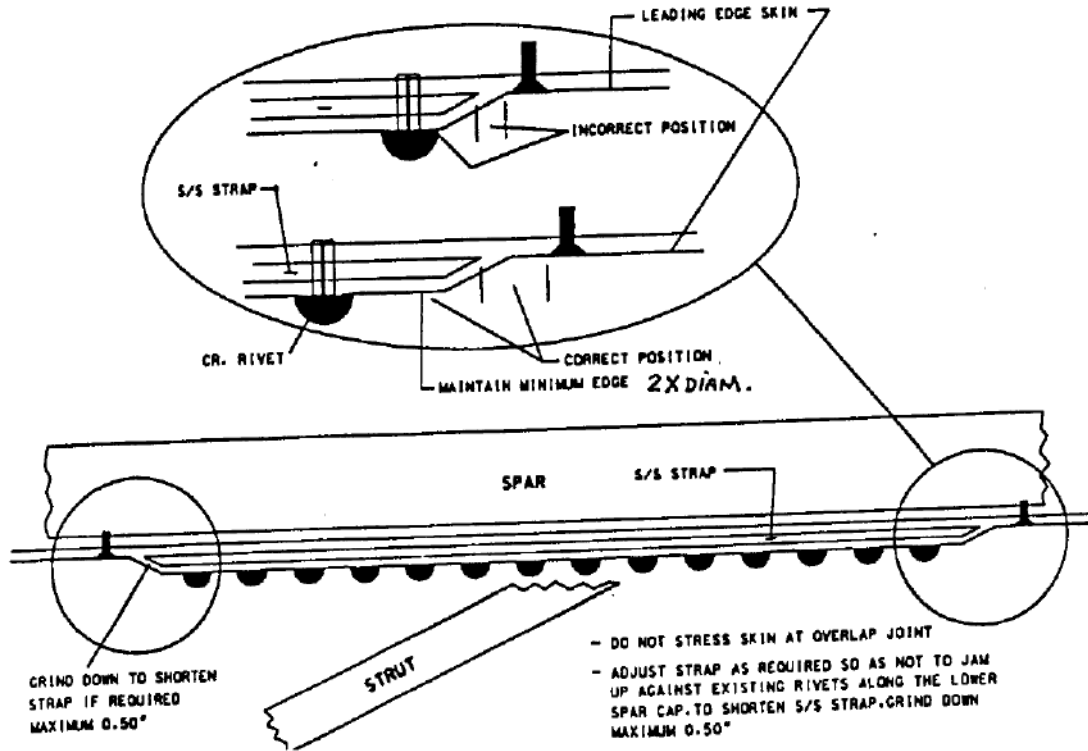


Figure 4: Positioning of Stainless Steel Strap Between Rivets

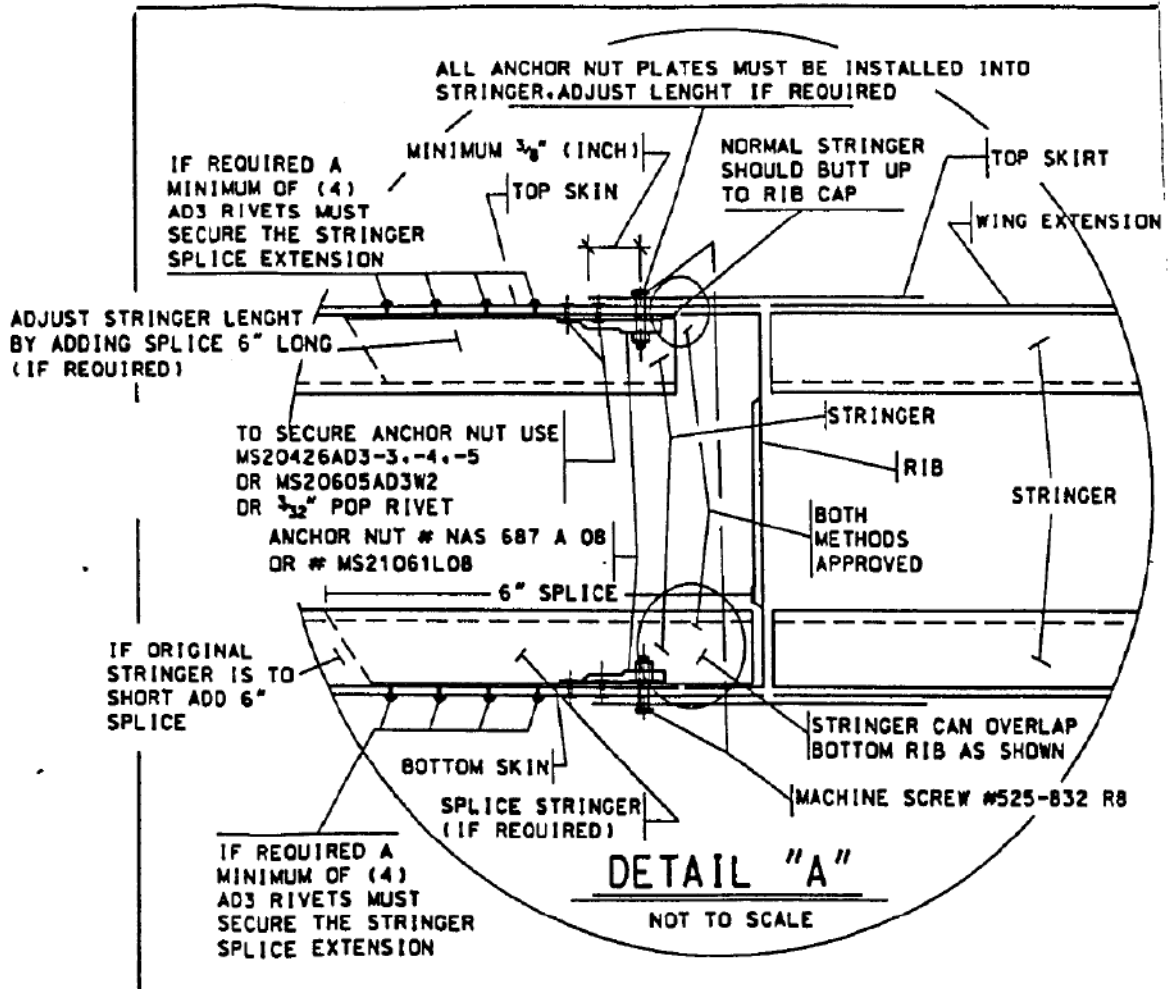


Figure 5: Positioning Anchor Nuts and Splicing Stringers

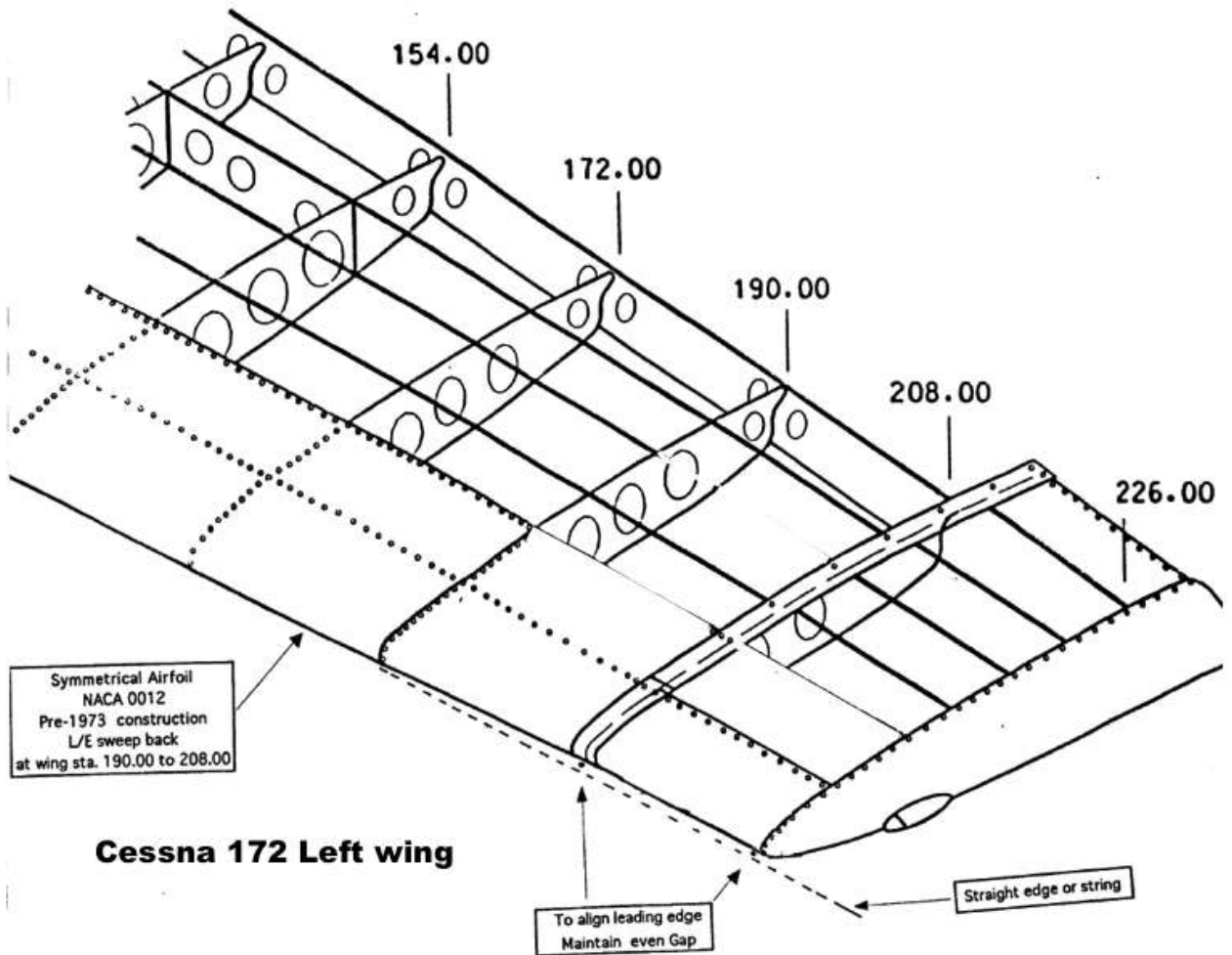


Figure 6: Leading Edge alignment on pre-1973 wings

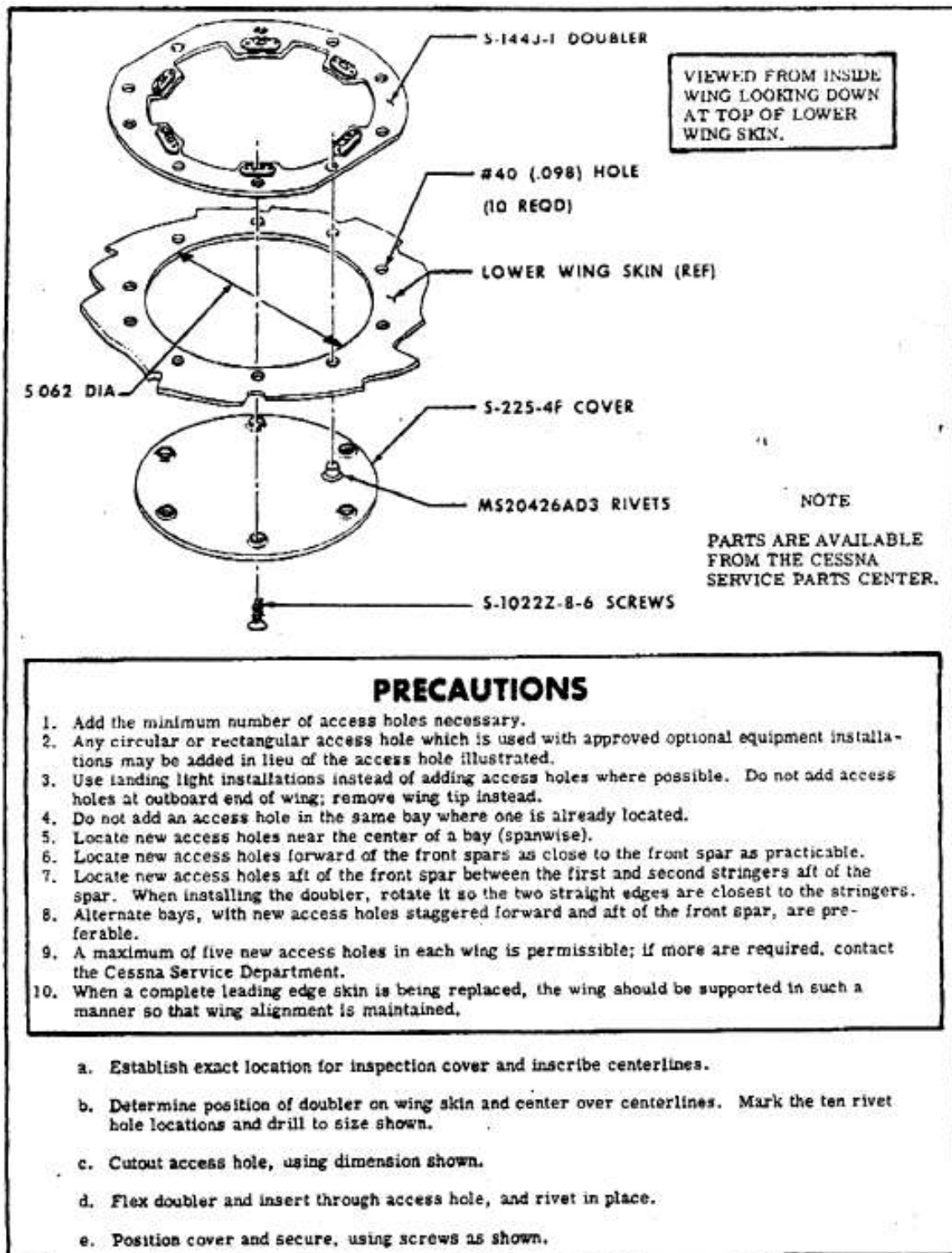


Figure 7: Inspection Access Hole Installation

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ALL MODELS:

**AEROBATIC MANEUVERS INCLUDING
SPINS PROHIBITED WITH WING
EXTENSIONS INSTALLED
OPERATE IN NORMAL CATEGORY**

**MODELS 170A, 170B, 172, 172A THRU 172N,
P172D, 175, 175A THRU 175C, R172E THRU R172J,
R172K S/N R1722000 THRU R1723399:**

**MAXIMUM FLAPS 30°
AT INCREASED GROSS WEIGHT
WITH WING EXTENSIONS**

Figure 8: Placards