



Fall 2024

AT-10 WICHITA



AIRCORPS AVIATION

Cadet Air Corps Museum AT-10 Wichita Restoration

by Chuck Cravens



Freeman Army Air Field in Indiana

At Freeman Army Air Field in Indiana, at least five crewmen maintain an AT-10, one on each engine, one probably working on the autopilot at the front, and two beneath the cockpit floor access door checking or adjusting control systems. The demountable nose assembly is visible on the lower right of the photo.

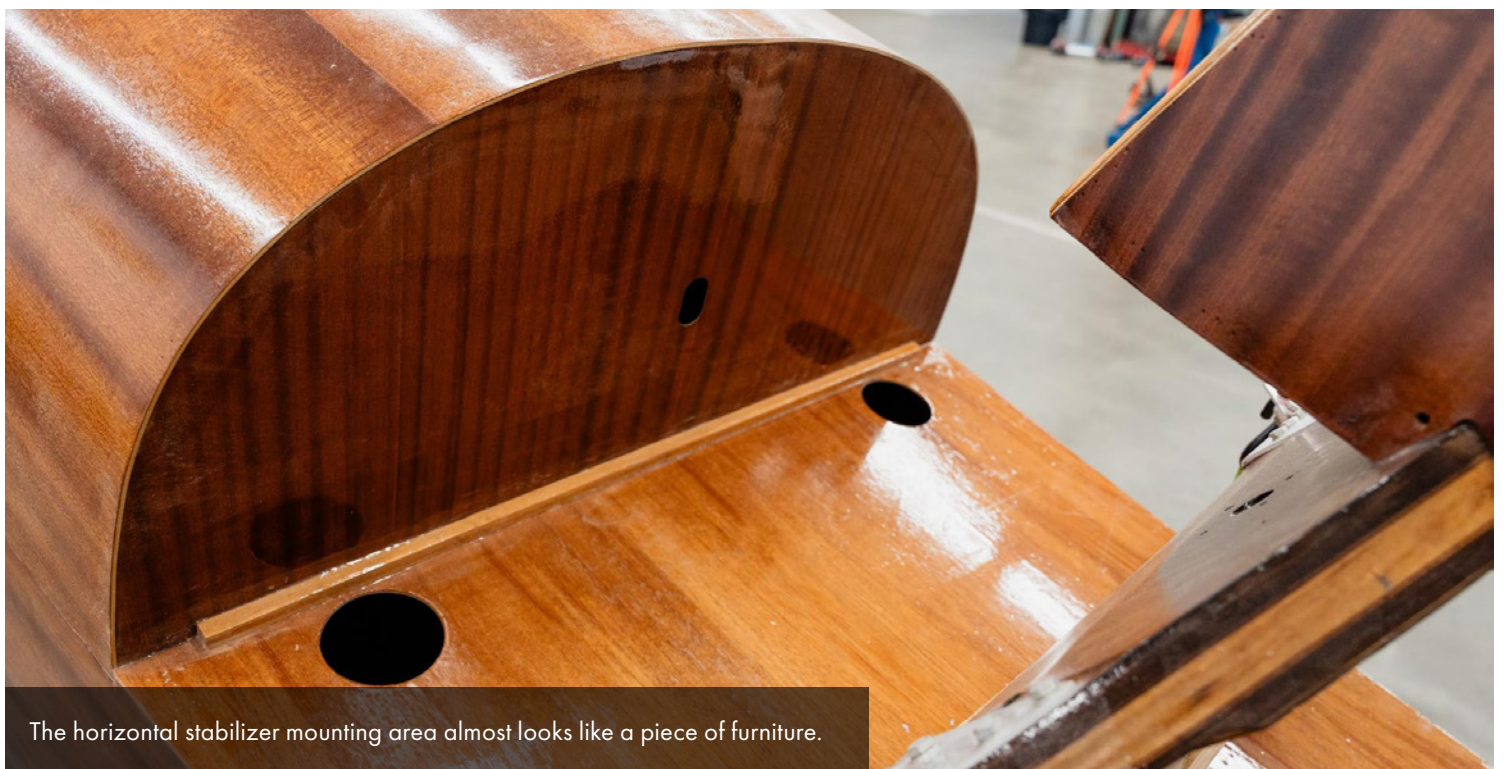


Fuselage

As the cover photo shows, the nose assembly on an AT-10 is removable to facilitate maintenance. Aaron recently fabricated and installed this “nose assembly, demountable” as Beechcraft named it.



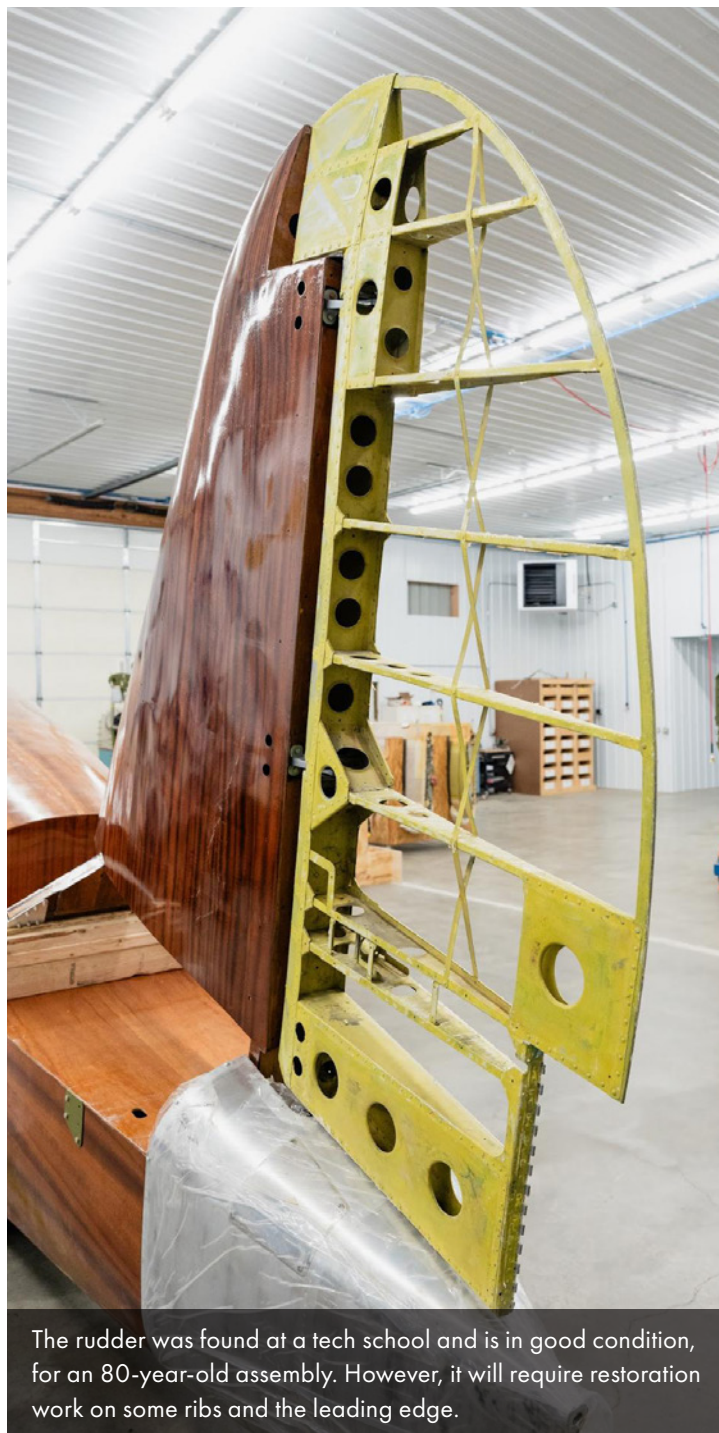
The fuselage nose where the demountable assembly will be installed.



The horizontal stabilizer mounting area almost looks like a piece of furniture.



Wood spacers hold the vertical stabilizer in position as the assemblies are checked for proper fit and clearance.



The rudder was found at a tech school and is in good condition, for an 80-year-old assembly. However, it will require restoration work on some ribs and the leading edge.



View from rear fuselage.



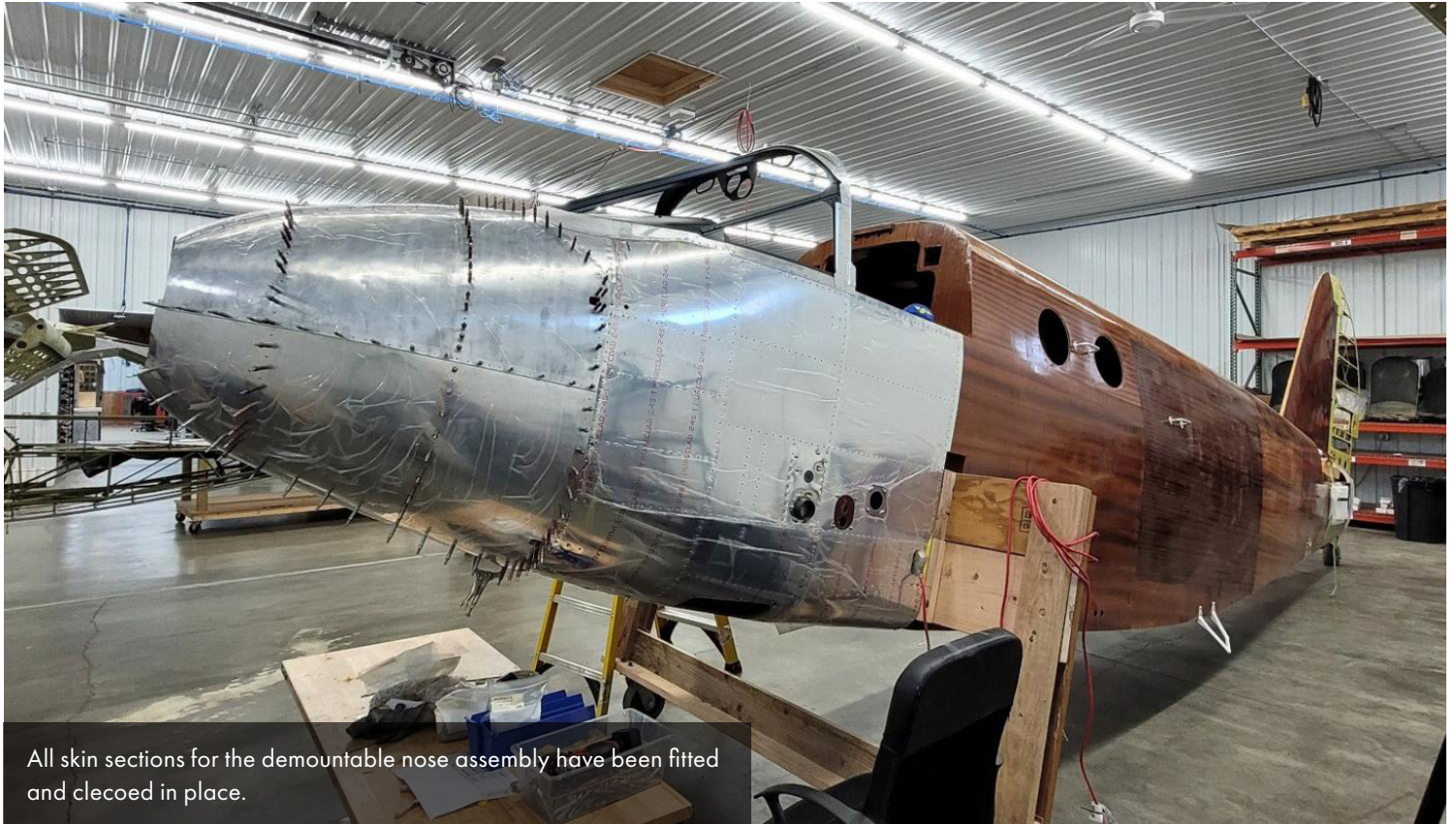
The forward aluminum section is ready for the demountable nose assembly to be attached.



Aaron has begun assembling the demountable nose frame and skin sections.



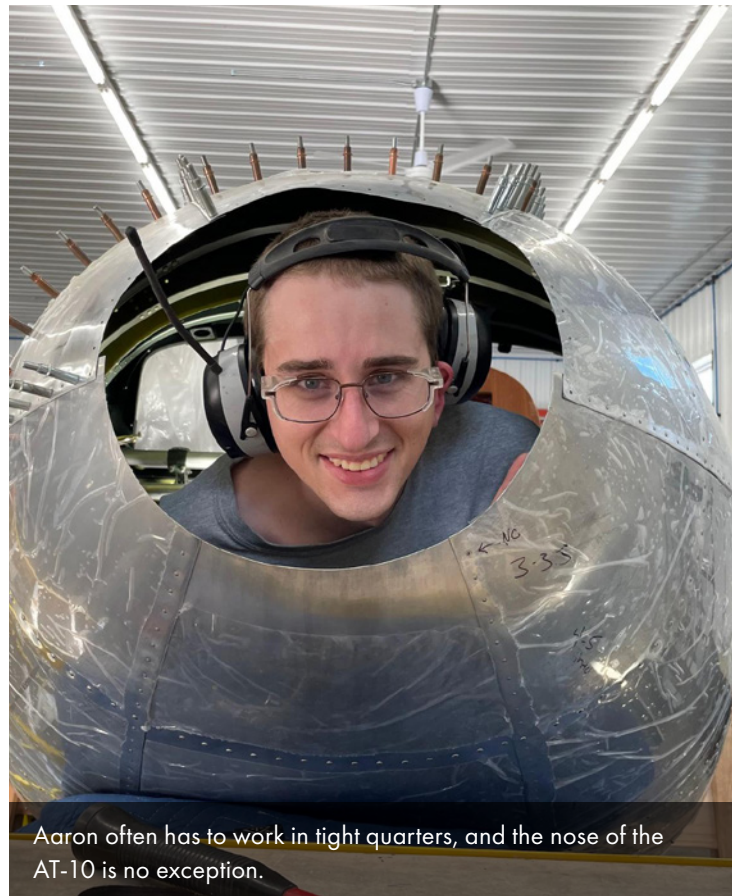
Here the upper left and lower center skin sections are clecoed in place.



All skin sections for the demountable nose assembly have been fitted and clecoed in place.



The lower skins are riveted in place permanently.



Aaron often has to work in tight quarters, and the nose of the AT-10 is no exception.



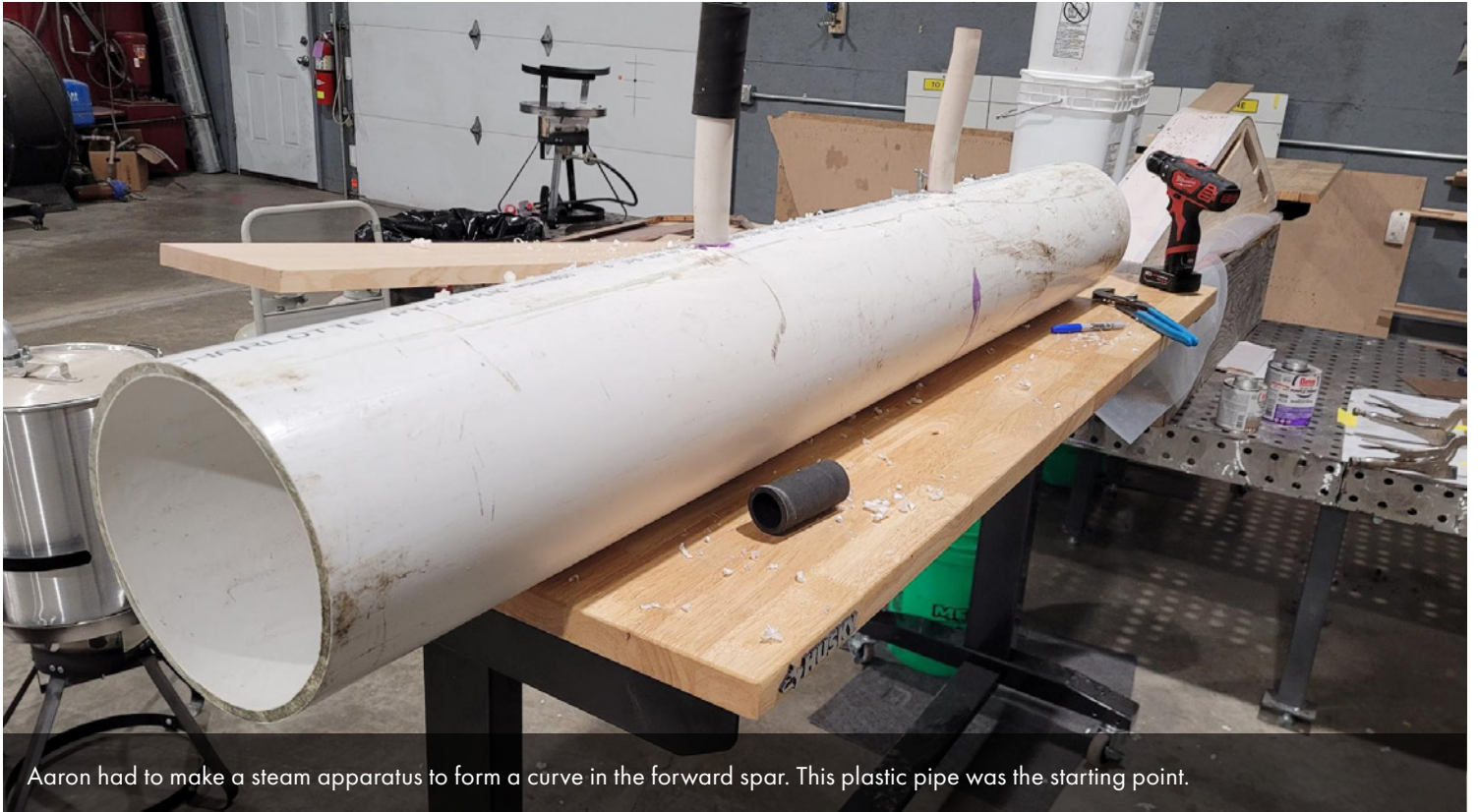
The demountable nose assembly is nearly complete.

Steam Forming a Spar for the Horizontal

A mostly wood airplane like the AT-10 presents a continuing challenge to form and bend wood to the required shapes. This is accomplished in several ways, but mainly by using steam. The infusion of steam softens the wood's lignans, the polymers that hold the cellulose fibers together. When the wood cools, the lignans harden again, and the wood holds the bent shape. The forward spar for the horizontal stabilizer is one such part that requires steam bending.



Superior quality aircraft spruce will be used to make horizontal stabilizer spars. Clear and straight grain is necessary in this application. Wood like this is both rare and expensive!



Aaron had to make a steam apparatus to form a curve in the forward spar. This plastic pipe was the starting point.



The steam "box" setup is ready.



Steam is applied to the center of the spar, making the wood pliable.



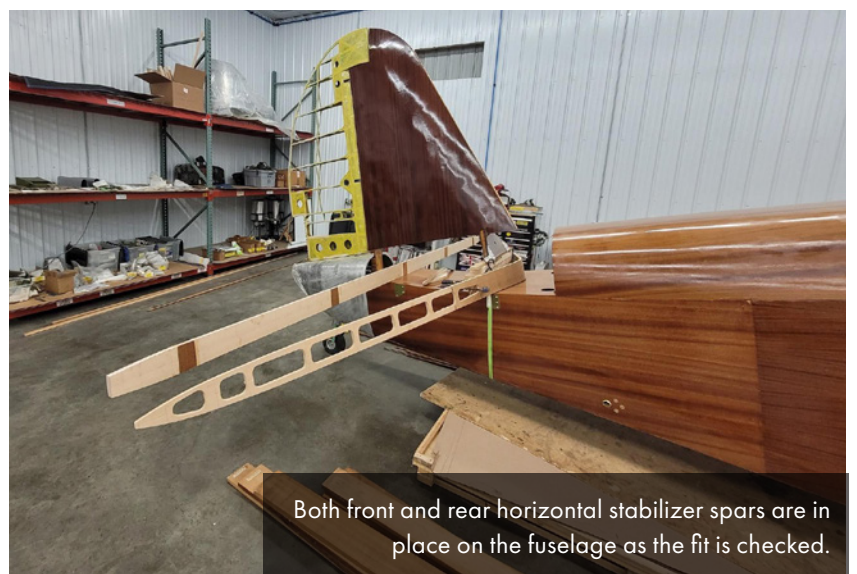
Forming wood with steam requires two separate procedures, steaming to soften the lignans followed by clamping to a form. This process assures that the wood will hold the shape until it cools and hardens.



The spar has lightening holes. Aaron made a template for accurate drilling and cutting to form the holes accurately.



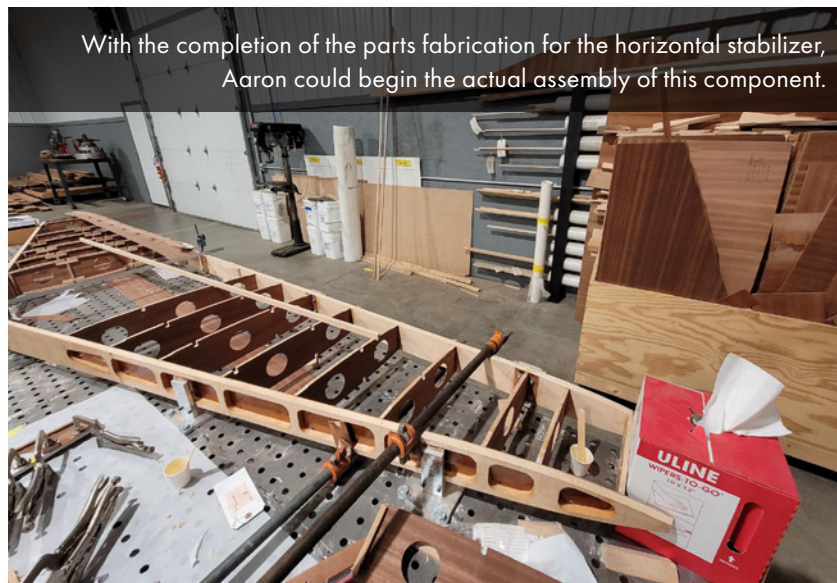
Here we can see the spar with its lightening holes.



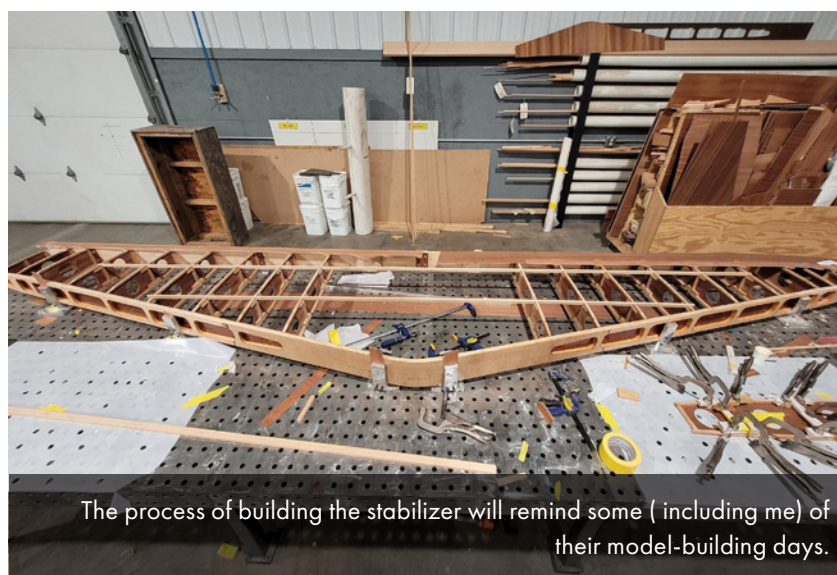
Both front and rear horizontal stabilizer spars are in place on the fuselage as the fit is checked.



Another method of creating a curved wood part is by using a combination of laminating and ammonia. For this horizontal stabilizer leading edge tip, strips of wood are soaked in ammonia, which, much like steaming, breaks down hydrogen bonds within the wood and the lignin cell walls. The procedure allows molecular movement when subjected to tensile or compressive forces. Once the ammonia evaporates from the wood, new bonds are created, leaving a permanent set.



With the completion of the parts fabrication for the horizontal stabilizer, Aaron could begin the actual assembly of this component.



The process of building the stabilizer will remind some (including me) of their model-building days.



A closer view illustrates the different types of wood used in the horizontal stabilizer structure.



Wings and Center Section

The outer wings and the center section are the next major assemblies of the AT-10 to be restored. Work begins by inspecting the parts we have in order to determine if they are still airworthy, or if they will need to be replaced with newly fabricated parts.

In the acquisition of Dusters and Sprayers (the World's largest inventory of Stearman Parts) AirCorps Depot acquired an extensive selection of aircraft spar stock and plywood. Aircraft-grade wood materials have been backordered constantly and have been extremely difficult to locate in stock. This will be of exceptional benefit to the AT-10 progress and center section needs from both a cost, shipping, minimum order, and management standpoint. The number of inventoried pieces totaled 302 items of aircraft-grade wood.



This is an original wing center section attach plate. It is clearly not airworthy due to the intergranular corrosion, but it will serve as a useful pattern to fabricate a new part.



These are also original attach plates. They are for the front spar, and would have formed the junction between the center section and outer wing panels.



A closer view of the original attach plates.



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Want to get involved?

We are constantly looking for new technical material related to the AT-10. Due to the rarity of this aircraft, and the relatively low number that were produced, acquiring engineering drawings, parts catalogs, maintenance manuals, and other documentation has been much more difficult than with our past restorations. If you have any AT-10 material, or know someone who does, we'd like to hear from you!

Be a part of helping the AT-10 return to the skies!

Contact Ester Aube, email or phone
estera@aircorpsaviation.com or 218-444-4478



Should anyone wish to contribute to the Cadet Air Corps Museum's efforts, please contact board members Brooks Hurst at 816 244 6927, email at wingnutsflyingcircus@yahoo.com or Todd Graves, todd.graves@pobox.com. Contributions are tax deductible.

WORK FOR AN AWARD-WINNING RESTORATION AND MANUFACTURING COMPANY

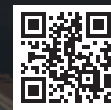
OPENINGS:

- ★ A&P/IA MECHANIC
- ★ CNC MACHINIST/PROGRAMMER
- ★ MACHINISTS
- ★ ENGINEERING/CAD
- ★ QUALITY TECHNICIAN
- ★ SHEET METAL FABRICATOR
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2023 Restoration
WWII combat vet P-47D
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