



May/June 2021

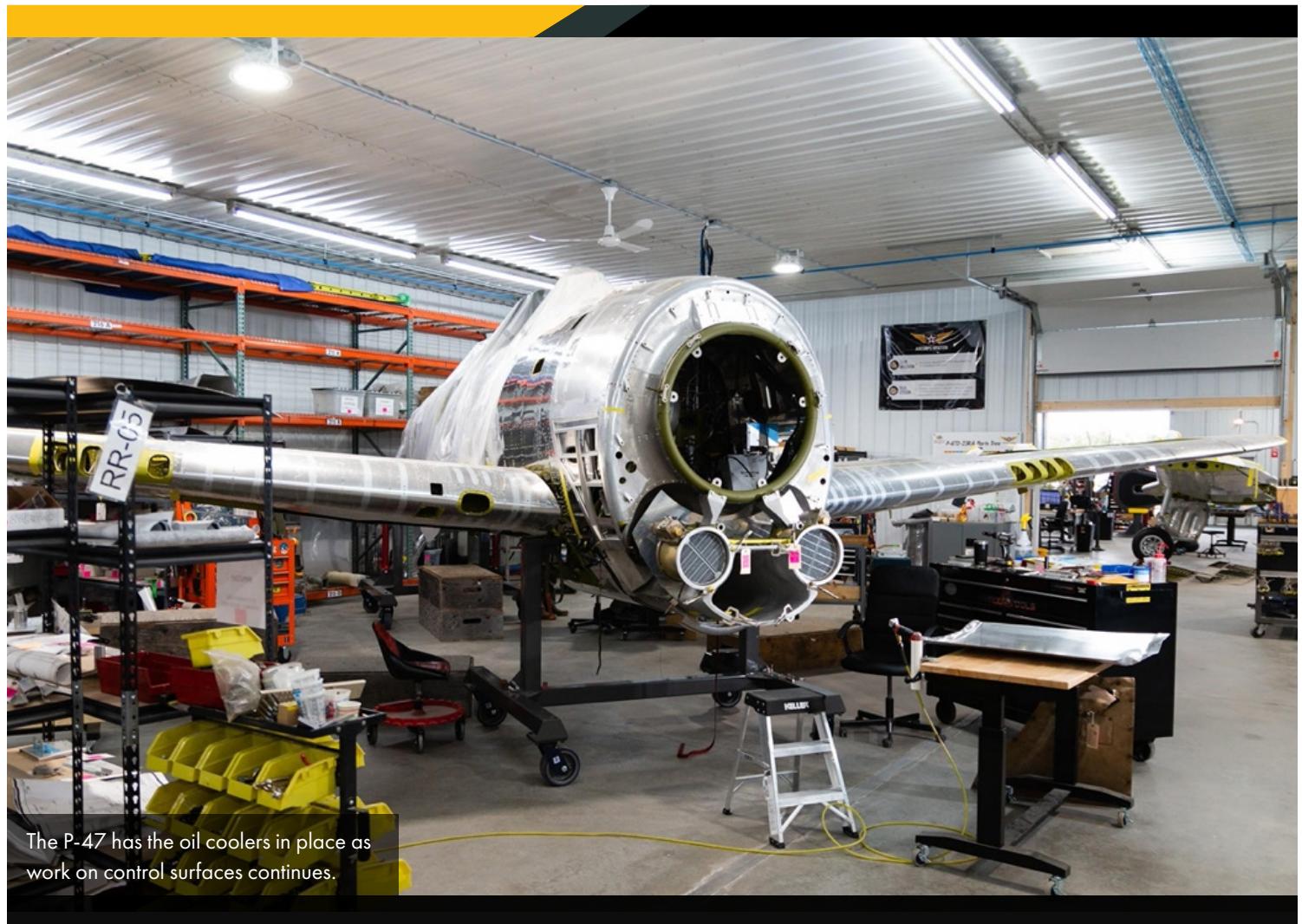
MAY/JUNE

Dakota Territory Air Museum's P-47 Update

by Chuck Cravens



AIRCORPS AVIATION



The P-47 has the oil coolers in place as work on control surfaces continues.

Oxygen tank installation, and control surfaces for the wing and empennage were the focus of restoration work this month. The Thunderbolt is getting closer to the time that the R-2800 will be hung on the mounts.



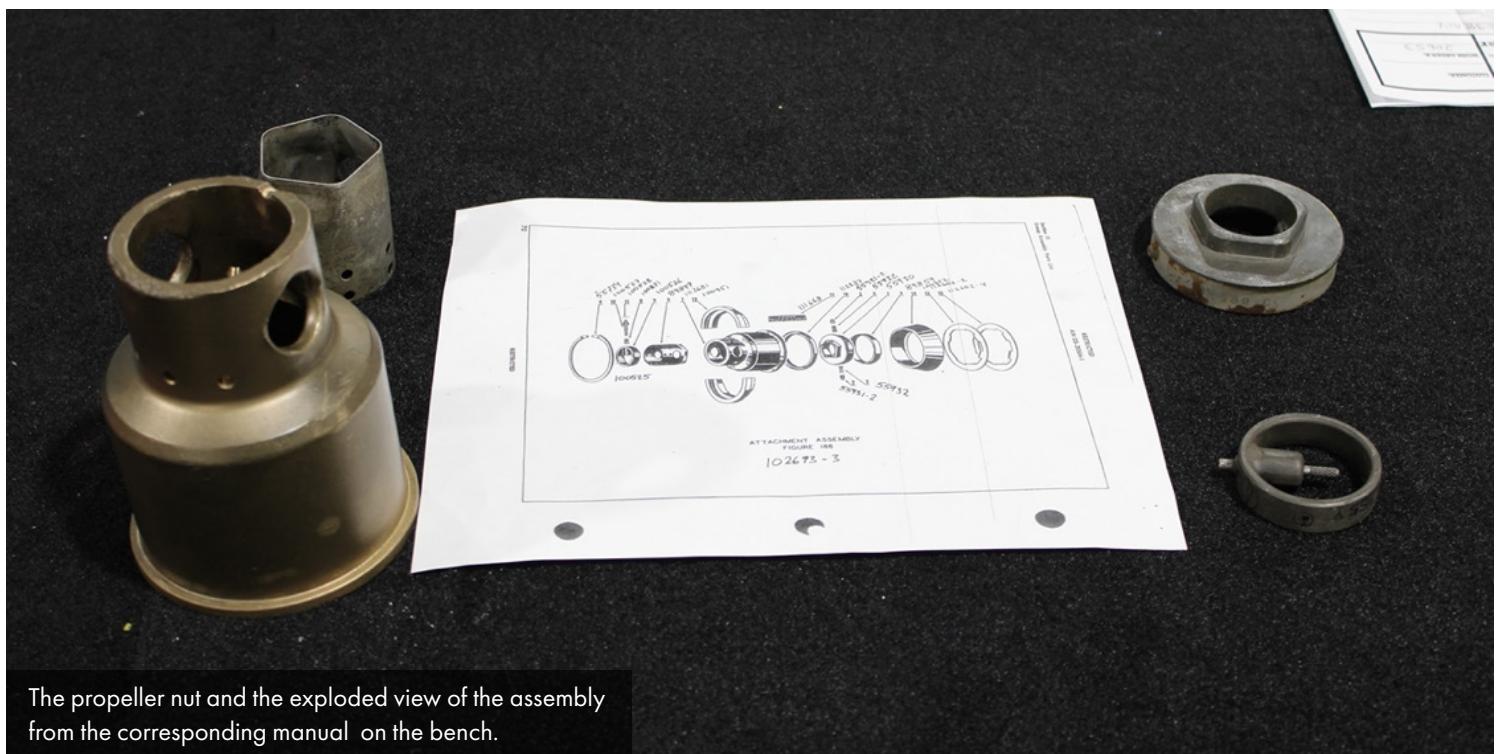
www.dakotaterritoryairmuseum.com



Propeller Nut



The propeller nut needs restoration work to be serviceable.



The propeller nut and the exploded view of the assembly from the corresponding manual on the bench.



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Jacob is machining a mandrel to use to work the prop nut into perfect concentricity.



Oxygen Tank Installation

The oxygen tanks were moved to a different location when the Christmas tree fuel tank was installed. Aaron has worked hard to duplicate this field modification.



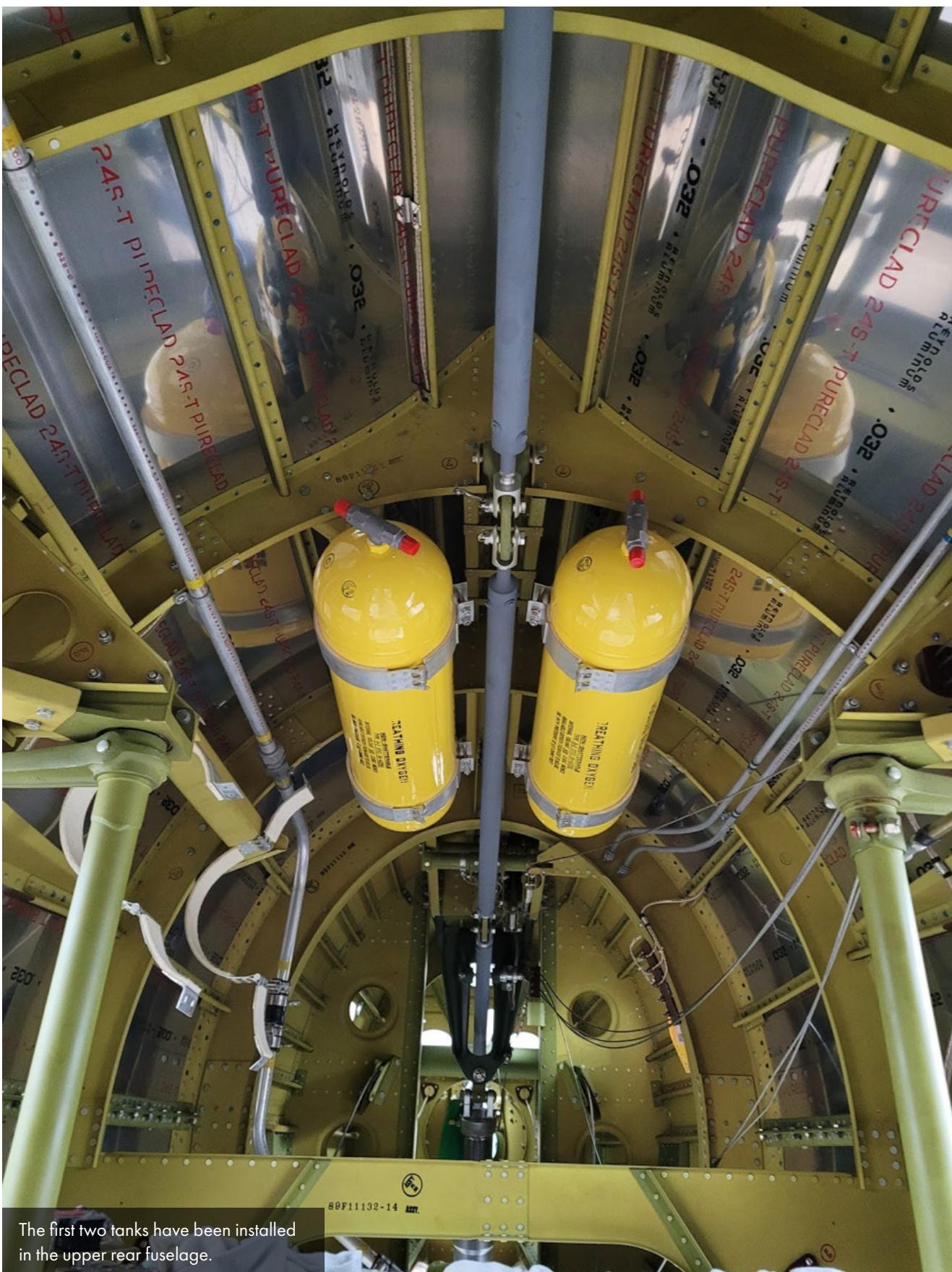


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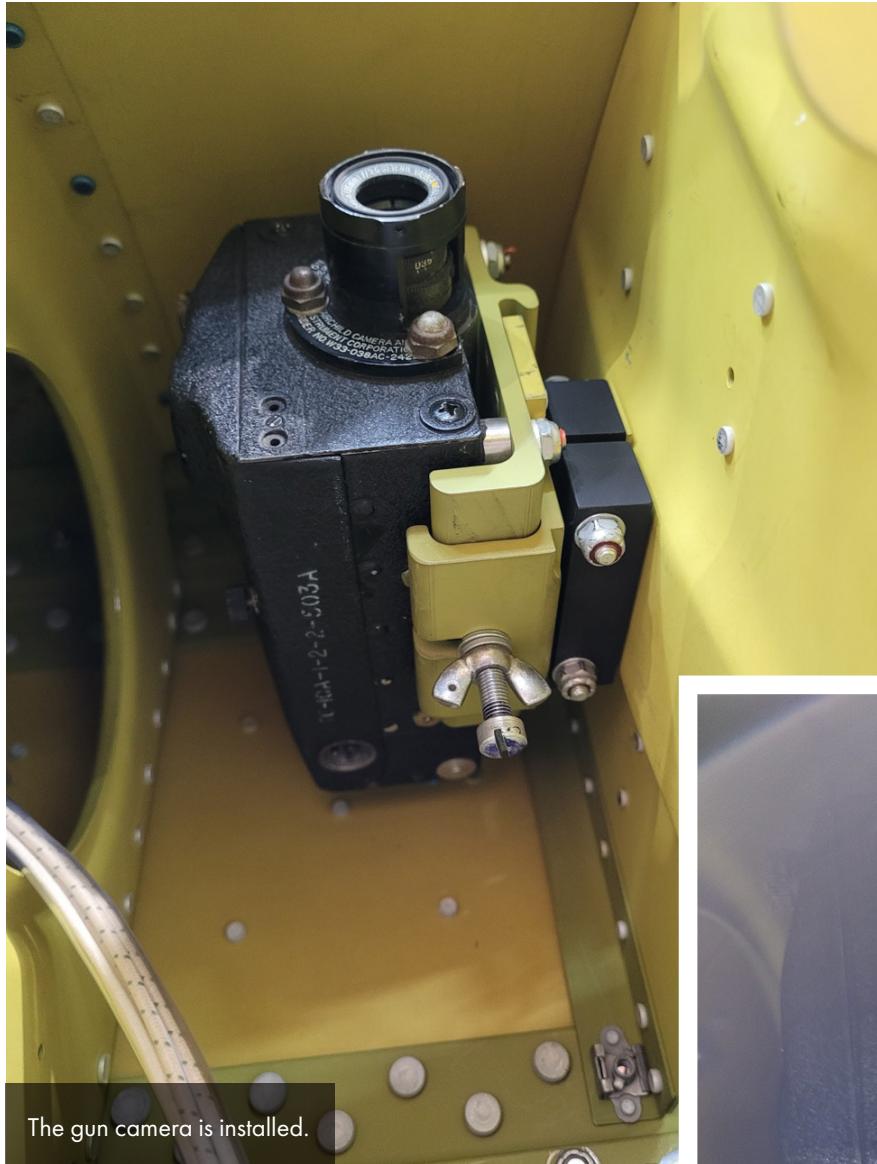


The oxygen tank installation is complete, except for the single tank that mounts in the leading edge of the left wing.

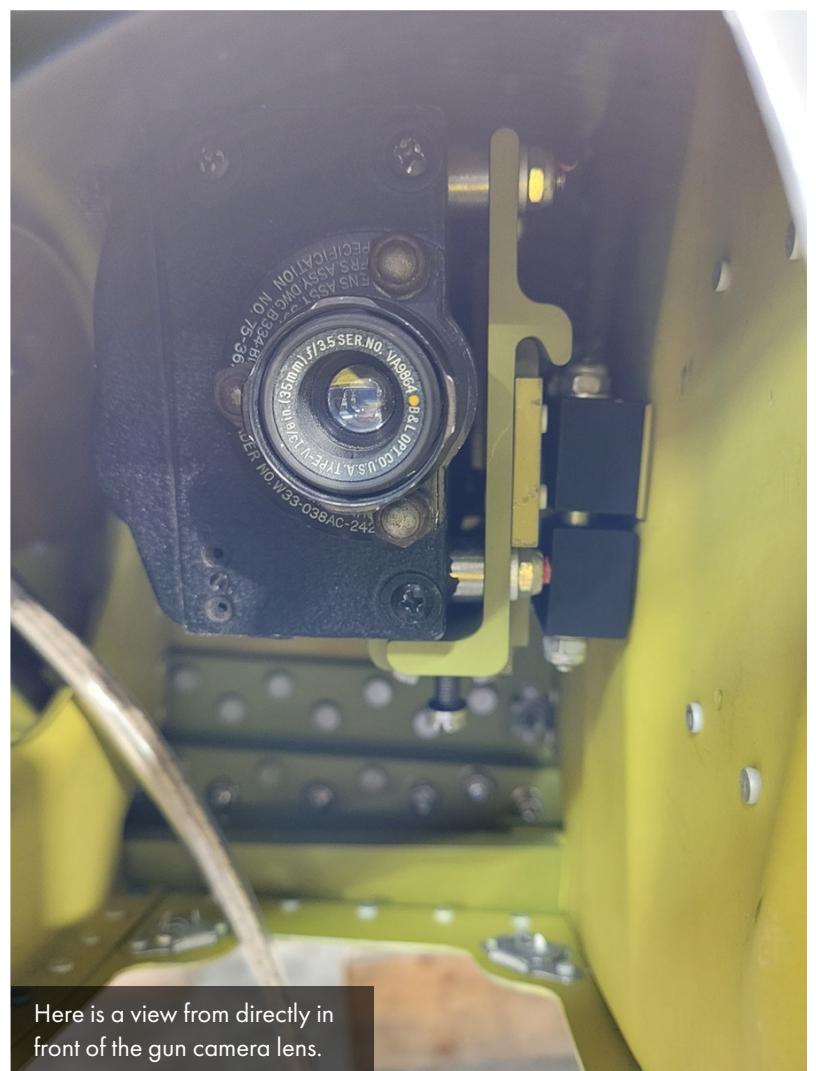
The lower tank, left center in this image, is mounted in original brackets from 42-27609. Those brackets are 90% original 5th Air Force field modified parts installed in 42-27609.



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The gun camera is installed.



Here is a view from directly in front of the gun camera lens.



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Control Surfaces

The last major airframe assemblies besides the engine installation are the control surfaces. Flaps, ailerons, elevators and rudder are all in progress.



This aileron was produced by Kellett Aircraft Company acting as a subcontractor to Republic.



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Many inspector's stamps on the ailerons look like this one with a prominent "K". This "K" may signify Kellet as the manufacturer, but documentation of that hasn't been found.



This original part tag on the aileron identifies the part number (93A26000), this drawing identifies the part as "aileron assembly - blunt nose aileron". This original tag will be used in the restoration.



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These are aileron hinge pivots.



One aileron hinge pivot is shown in a closer view.



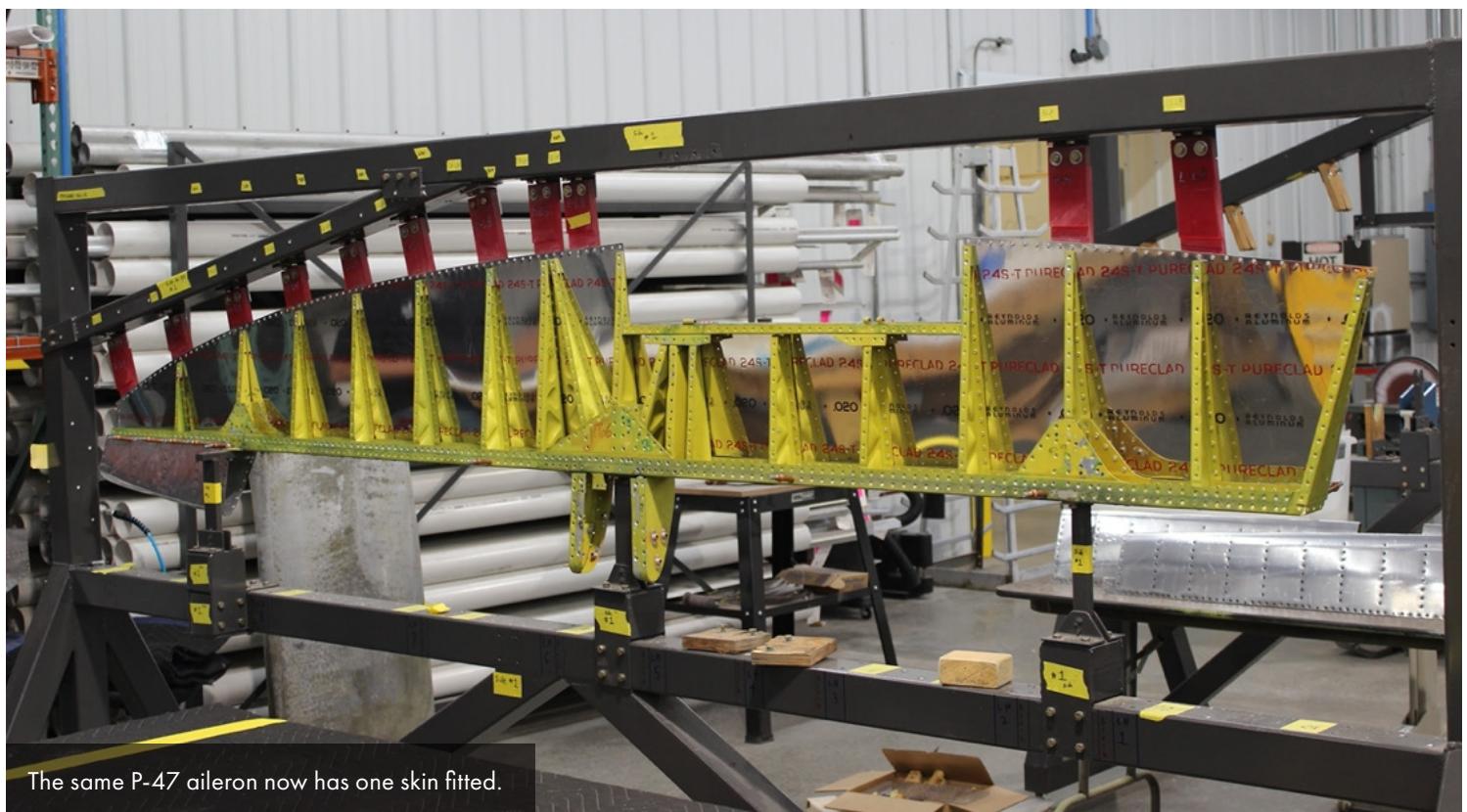
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This is one of the P-47 aileron structures fitted to the fixture.



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The same P-47 aileron now has one skin fitted.



Brad is making the second skin section for the aileron in the fixture.



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These are the gun port openings on the leading edge of the right wing.



Stenciling has been applied to the P-47 aileron push rods.



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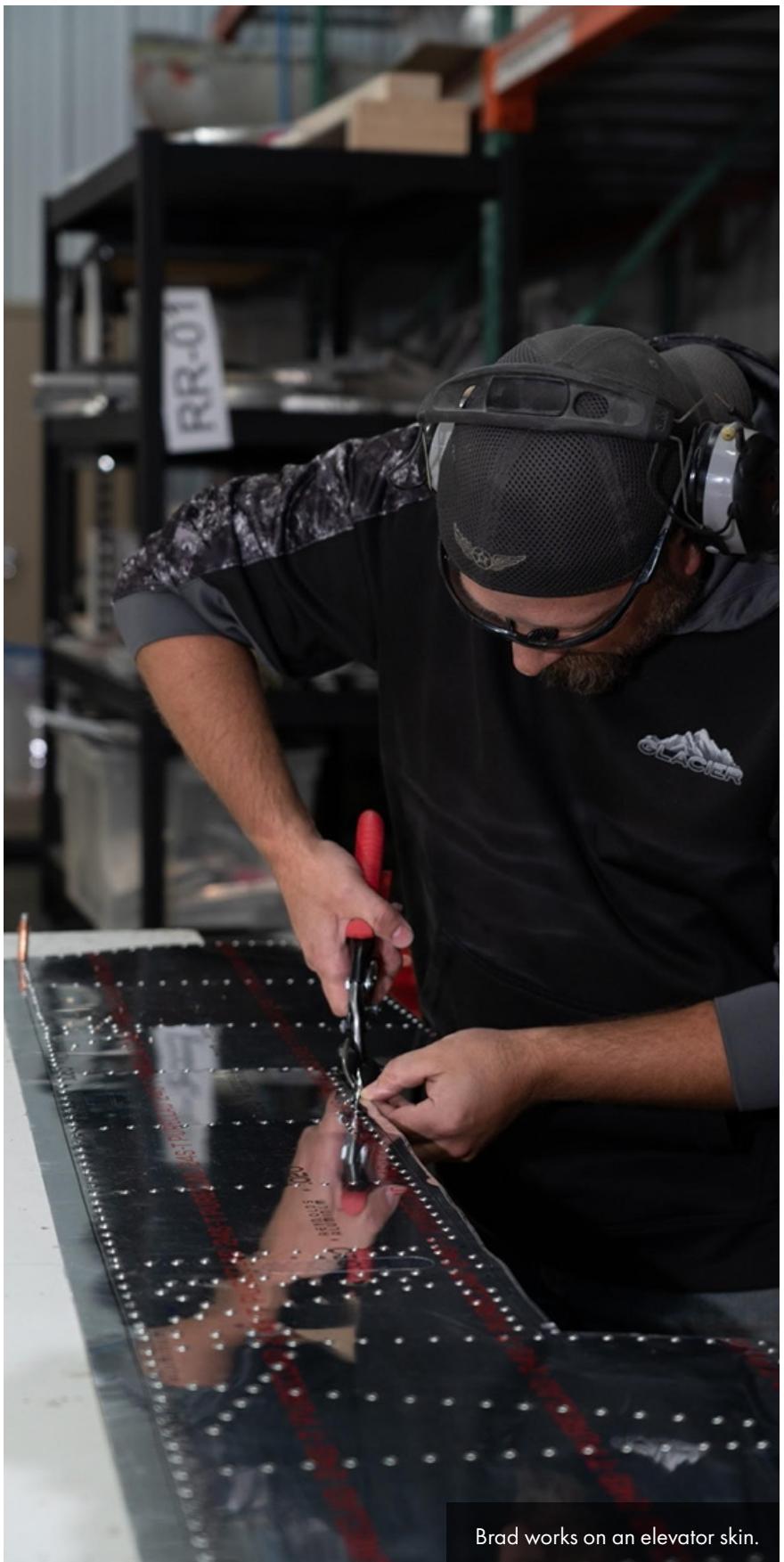




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This particular elevator has been temporarily reassembled so that it can be 3D scanned.



Brad works on an elevator skin.



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Corey works on the flap spar.



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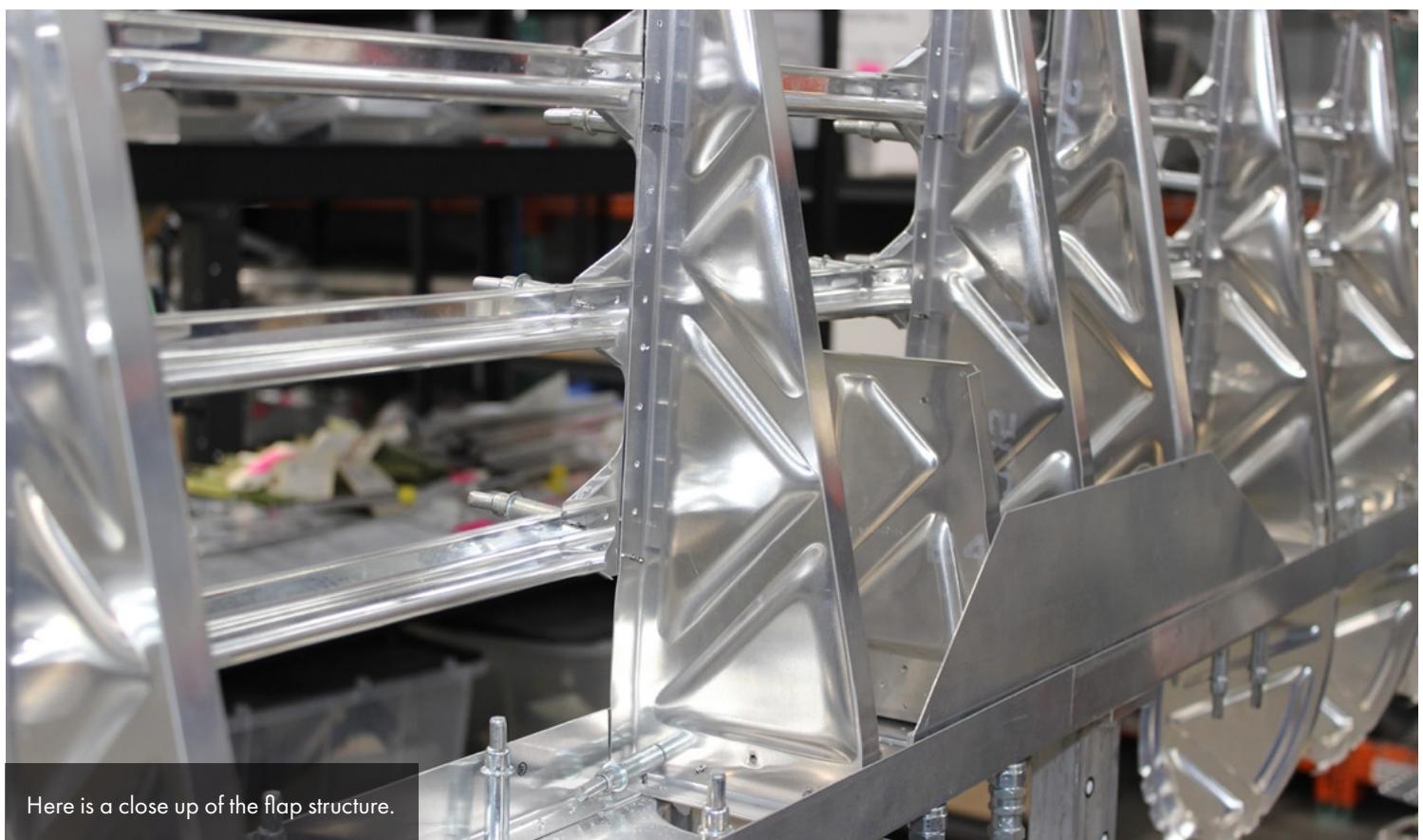




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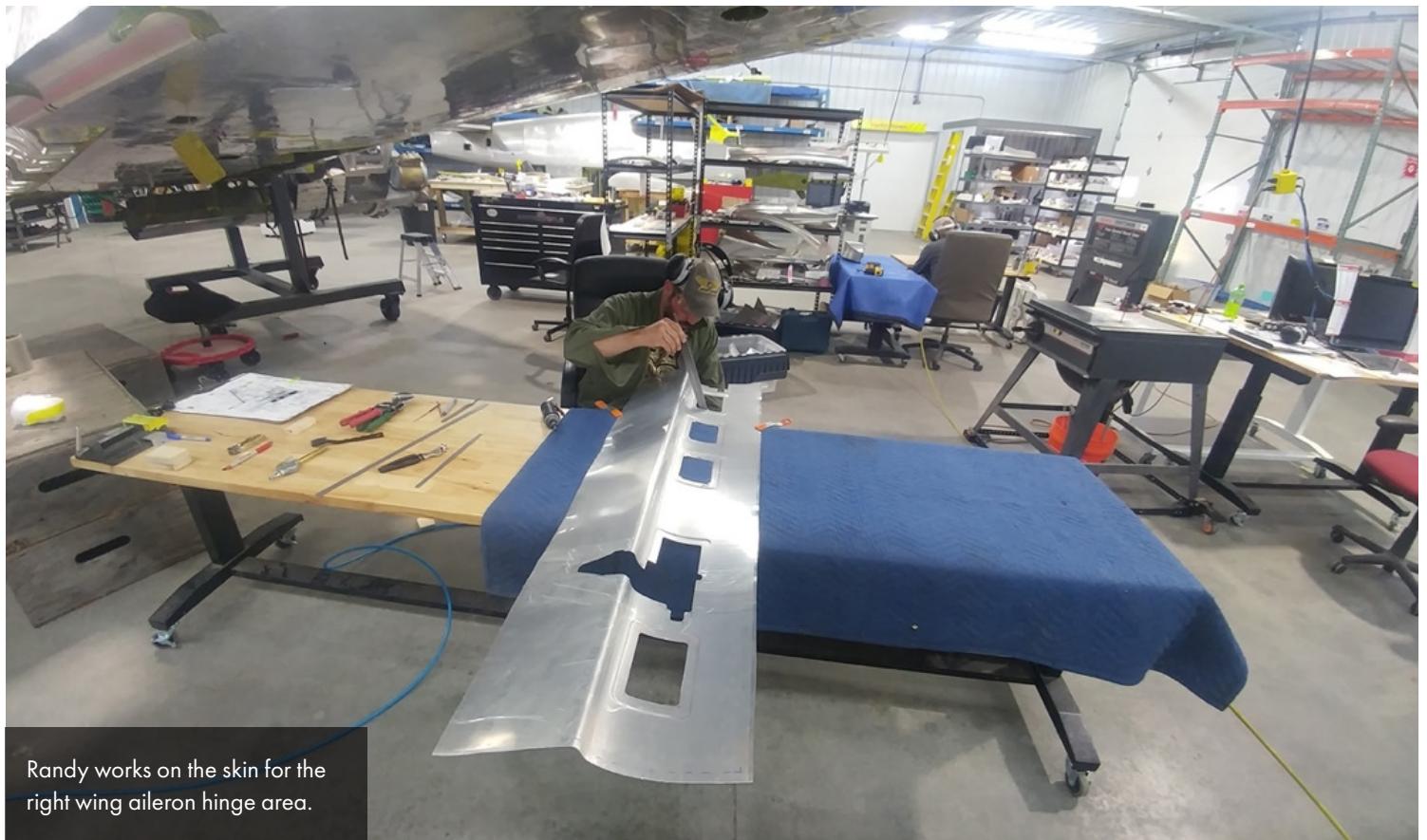
The flaps are progressing.



Here is a close up of the flap structure.



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Wheel Wells

Aaron completed much of the hydraulic plumbing and wiring in the main gear wheel wells this month.

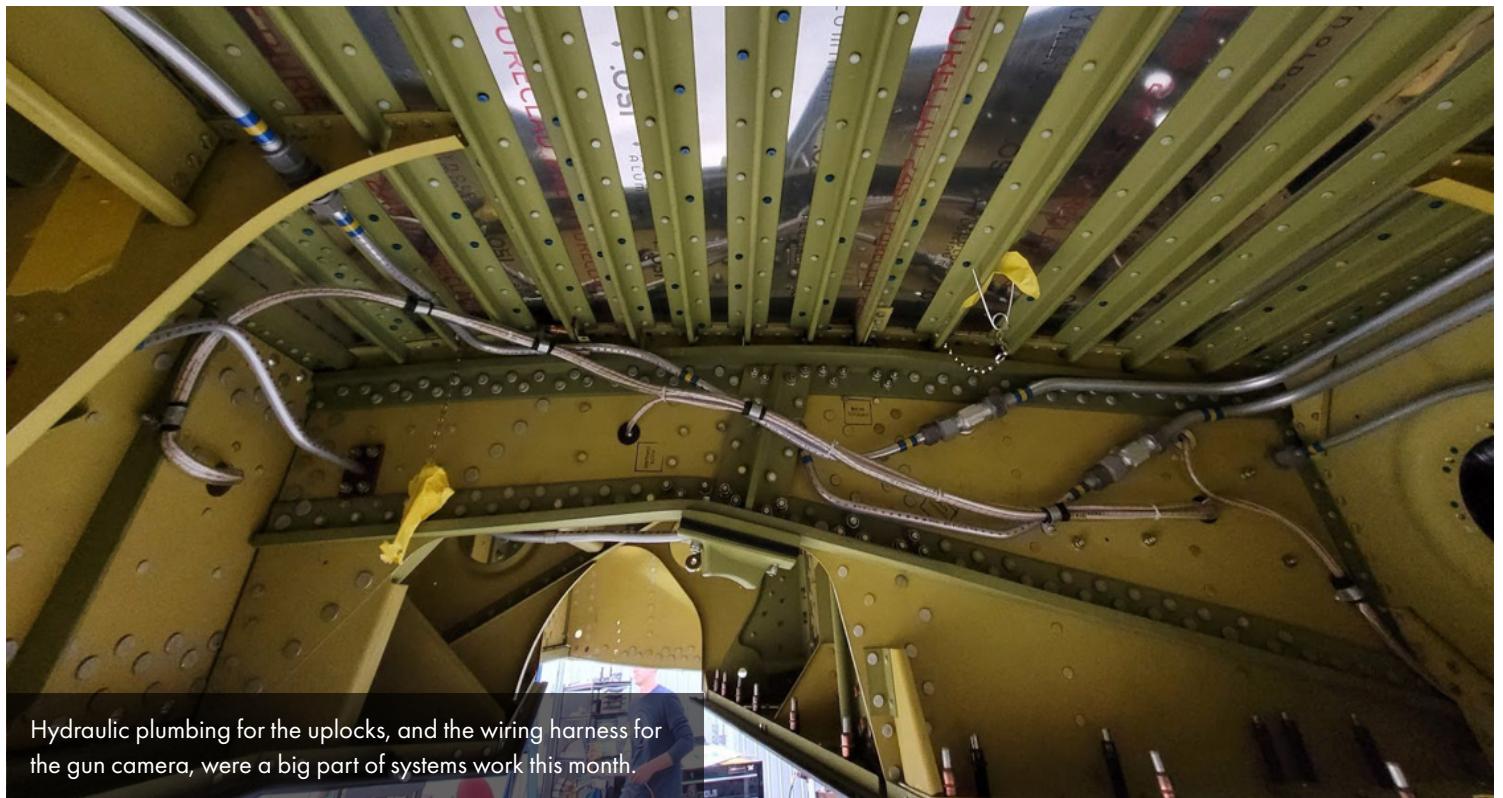
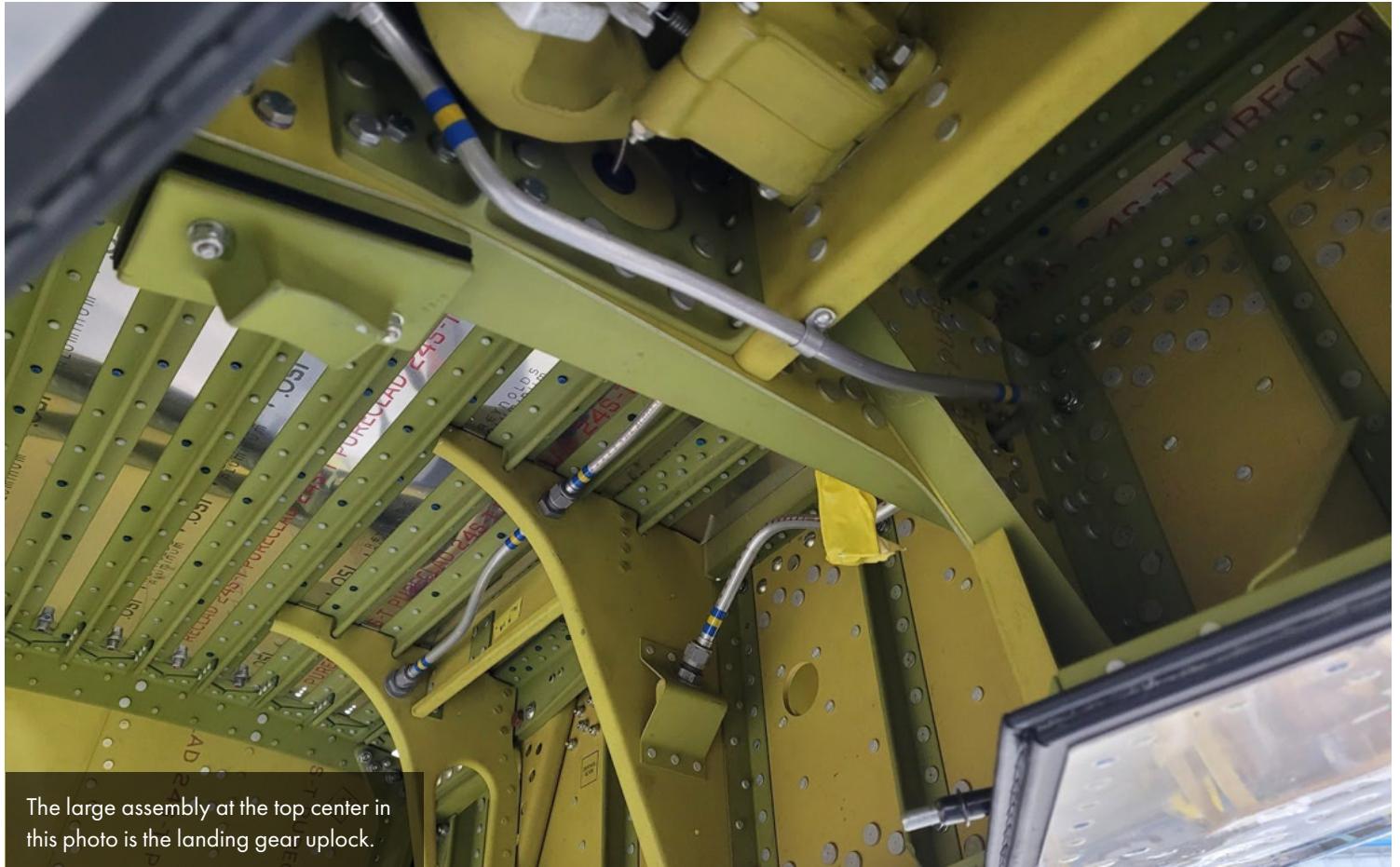


This valve controls the complex sequence as the main landing gear is retracted or extended.

For example, to extend the gear for landing, the valve first sends pressure to the inner clamshell gear doors to actuate and open them. Next, pressure causes the uplock to release. At this point, the weight of the gear helps swing itself down about 45 degrees and then more pressure is applied to the main hydraulic gear actuator in order to push the gear into its fully extended position. Finally, the sequencing valve pressurizes the downlock and the gear would be down and locked, ready for landing.



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Six different turbo supercharger housings were carefully examined in order to select the best one to restore.

Subcontractors

You probably noticed the Maytag and Kellett Aircraft Company logos on some of the previously pictured parts. These companies were important subcontractors on the P-47. I've written a bit about subcontractors in past updates but I think it is worth revisiting the subject.

Republic, and all the other major aircraft manufacturers, depended on subcontractors to support the massive production effort that was required during the war. Many subcontractors had produced consumer goods before the war and completely reworked their production lines to accommodate producing aircraft parts or assemblies.

*"The air industry was called upon," said the late Robert Gross, wartime President of Lockheed Aircraft Corp., "to build thousands of something it had built - only dozens of before. It was like a youth who is suddenly expected to go to college before he was graduated from primary school."*¹

To meet the unprecedented demand, aviation companies had to subcontract as many assemblies as they could, often utilizing companies never before involved in aviation production. The flexibility and willingness to make these drastic changes in support of the war effort was the essence of what came to be known as the Arsenal of Democracy.

¹ Karl G. Harr, Jr., Industry and World War II, AIR FORCE I SPACE DIGEST • September 1965, p55



"Non aviation firms had to dismantle their plants and rebuild them for a vastly different type of work, they had to learn about tolerances undreamed of in their peacetime production, they had to retrain even their most skilled people."²

"The aviation firms, on the other hand, had to divert valuable management and engineering talent to the task of putting the licensees in business at a time when they could not spare a single worker from their own programs. They had to build the initial parts, components, and assemblies to provide the licensee with a "shakedown" assembly line. Pratt & Whitney, for instance, had to contribute 100 man-years of production and engineering talent to educate its licensees-Ford, Buick, Chevrolet, and Nash-Kelvinator-in the art of aircraft-engine production. The pressures were certainly not conducive to harmonious relations, yet the introduction of these new companies to aviation production was carried out with a minimum of friction."³



Hydraulic landing gear sequencing valves. Notice the label indicating that Maytag was the subcontractor producing this valve.

Maytag took on so many government contracts during WWII that eventually 97% of its manufacturing was devoted to the war effort. During that time, the company built parts for 16 combat planes. Maytag's production of Packard-Merlin engine block castings for the P-51 has been called a "lifesaver" for the U.S. and Allied armed forces.

²Karl G. Harr, Jr., Industry and World War II, AIR FORCE I SPACE DIGEST • September 1965, p58

³Karl G. Harr, Jr., Industry and World War II, AIR FORCE I SPACE DIGEST • September 1965, p61



Here is another photo of the Kellett Aircraft logo with a ruler for size comparison.

A more traditionally aviation-related subcontractor on the P-47 was Kellett Aircraft Corporation.

Kellett Autogyro Company was a maker of autogyro aircraft in the 1930's and 40's and helicopters from the late 1940's through the 1950s. Kellett Autogiro Company changed its name to Kellett Aircraft Corporation in 1943 to reflect that it was also a manufacturer of helicopters.

H. Wallace Kellett was president of both Kellett Aircraft Company from its founding in 1929 and of Republic Aviation Corporation from 1939. He became Republic's chairman of the board in 1943 and remained in that office through 1945.

While famous for their autogyros, during the war, a major proportion of Kellett production was in the subcontracting division. Kellett produced ailerons and flaps for the P-47, engine mounts for the B-24, flaps for the Martin Baltimore, stabilizers for the Curtiss Helldiver, welded parts for the Grumman Wildcat, flaps and other assemblies for the P-40 and other items.⁴

⁴ Howard Mingos, The 1944 Aircraft Yearbook, Official Publication of the Aeronautical Chamber of Commerce of America, Lancair Publications, New York, New York.



Maytag and Kellett were just two of many P-47 subcontractors. Below is a list of a few of the more important subcontractors for the Evansville Indiana Republic plant and what they produced for the Thunderbolt.

- Firestone Tire & Rubber: self sealing fuel tanks, tires, engine oil seal "o" rings
- Servel Corporation: (manufacturer of heating and cooling appliances): almost all P-47 wings for the Evansville plant



Corporate photo to celebrate the 20,000 P-47 wing panel made by subcontractor Servel Corporation. Photo courtesy of Harold B. Morgan Collection.

- Hoosier Cardinal (an Evansville stamping company that made metal refrigerator parts, including ice cube trays, and lamps): tail surface section



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Workers near completion of a P-47 horizontal stabilizer at the Hoosier Cardinal factory. Photo courtesy of Harold B. Morgan Collection.



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- Curtiss Electric: propellers
- General Electric: Turbocharger
- Pratt & Whitney: R-2800-59 engine