



July/August 2022

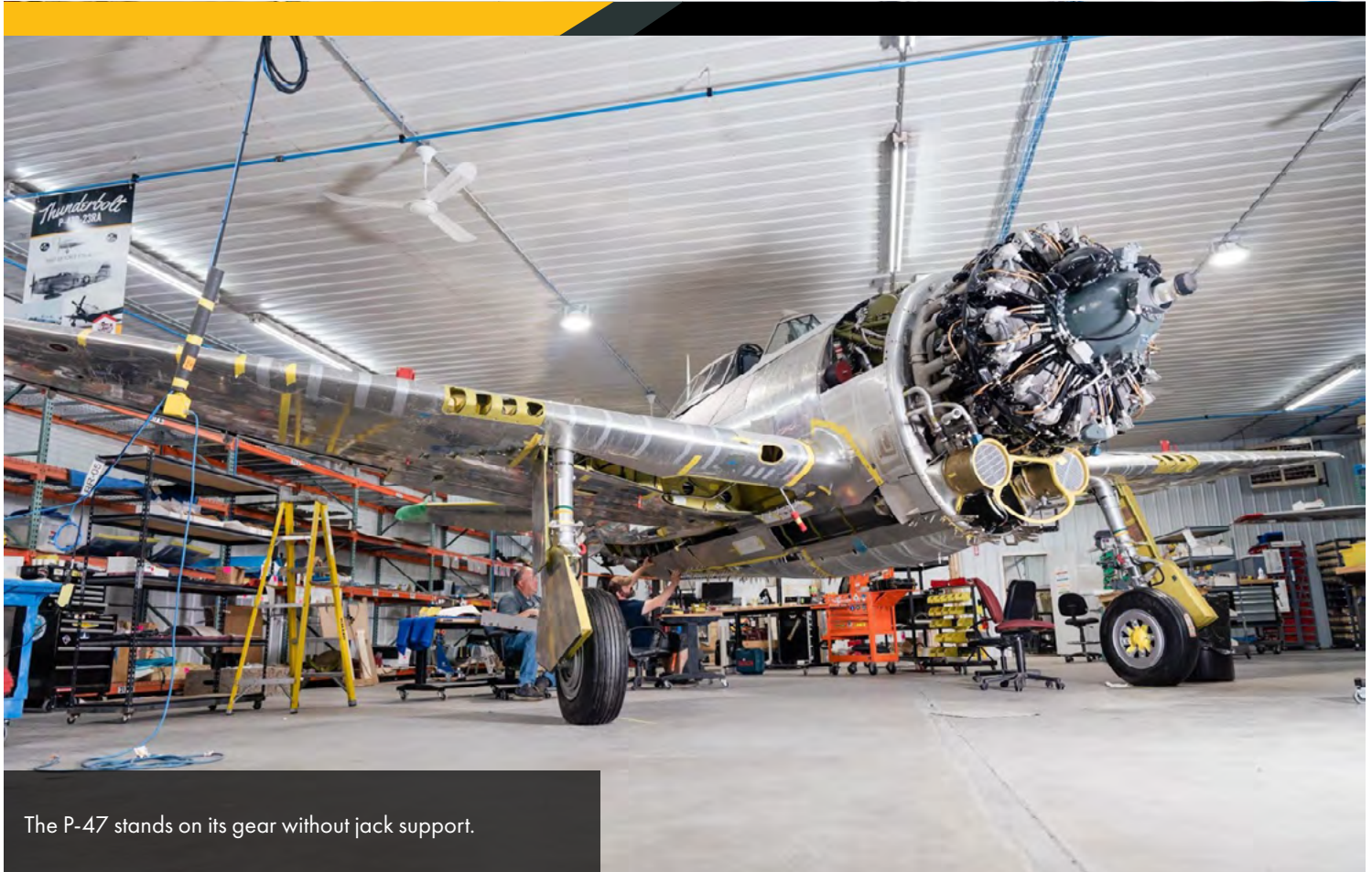
JULY/AUGUST

Dakota Territory Air Museum's P-47 Update

by Chuck Cravens



AIRCORPS AVIATION



The P-47 stands on its gear without jack support.



www.dakotaterritoryairmuseum.com

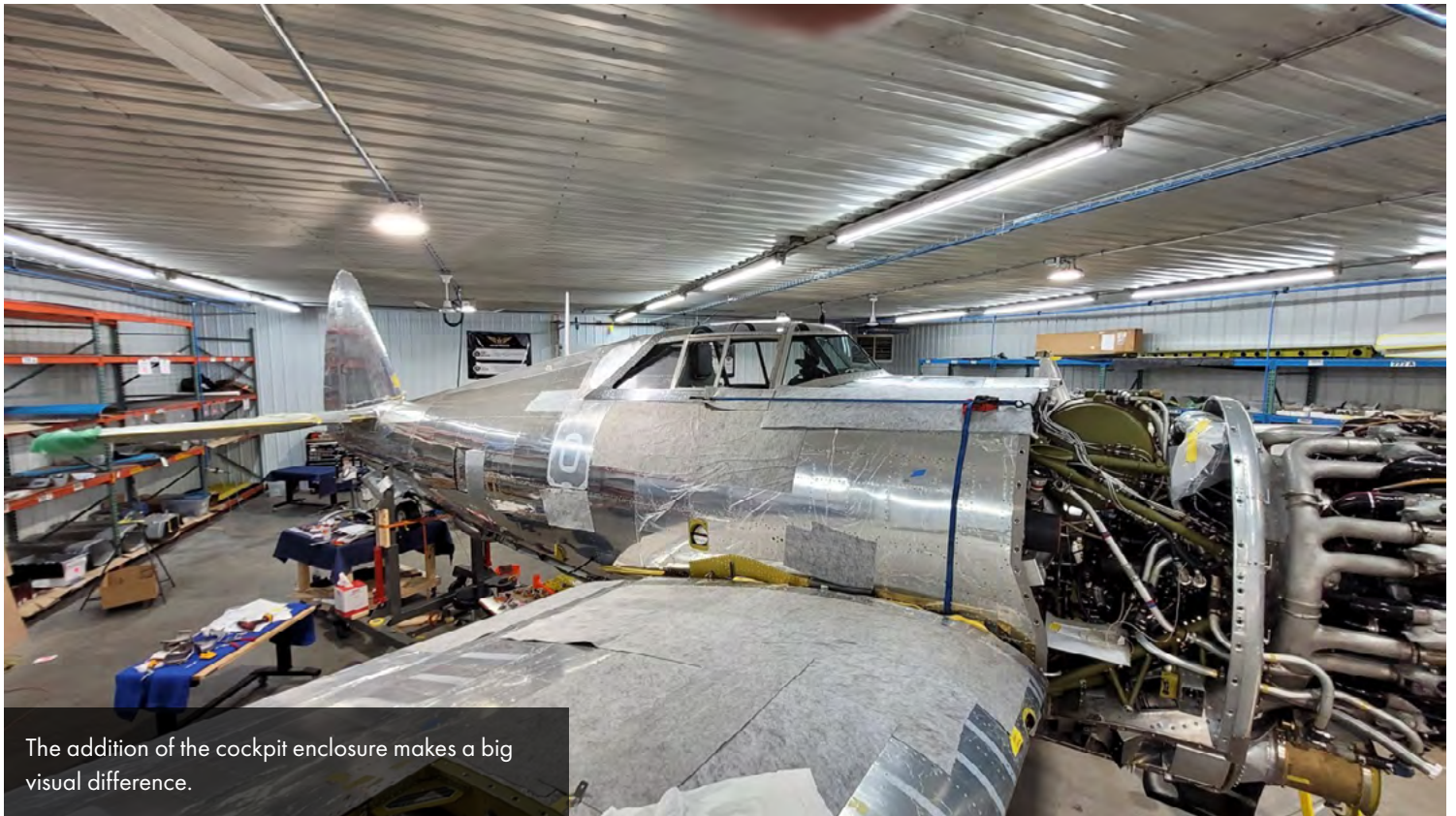


Update

This month, work centered on getting the cowling completed, installing the cockpit enclosure, skinning the underside of the fuselage, and installing duct covers.

Cockpit Enclosure

The characteristic razorback cockpit enclosure has been installed on the P-47. It really adds to the finished look of the what will soon be the only Republic-built P-47 razorback flying.

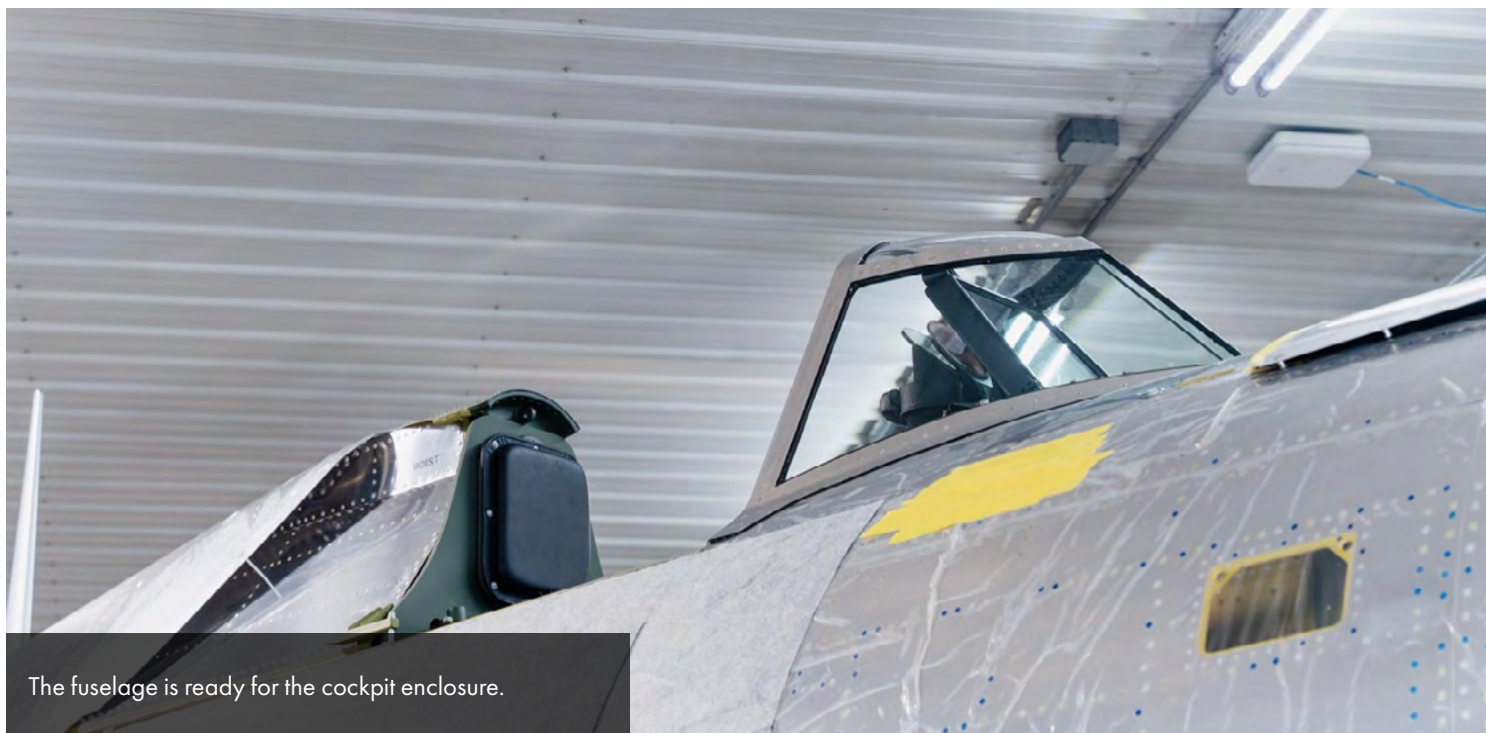




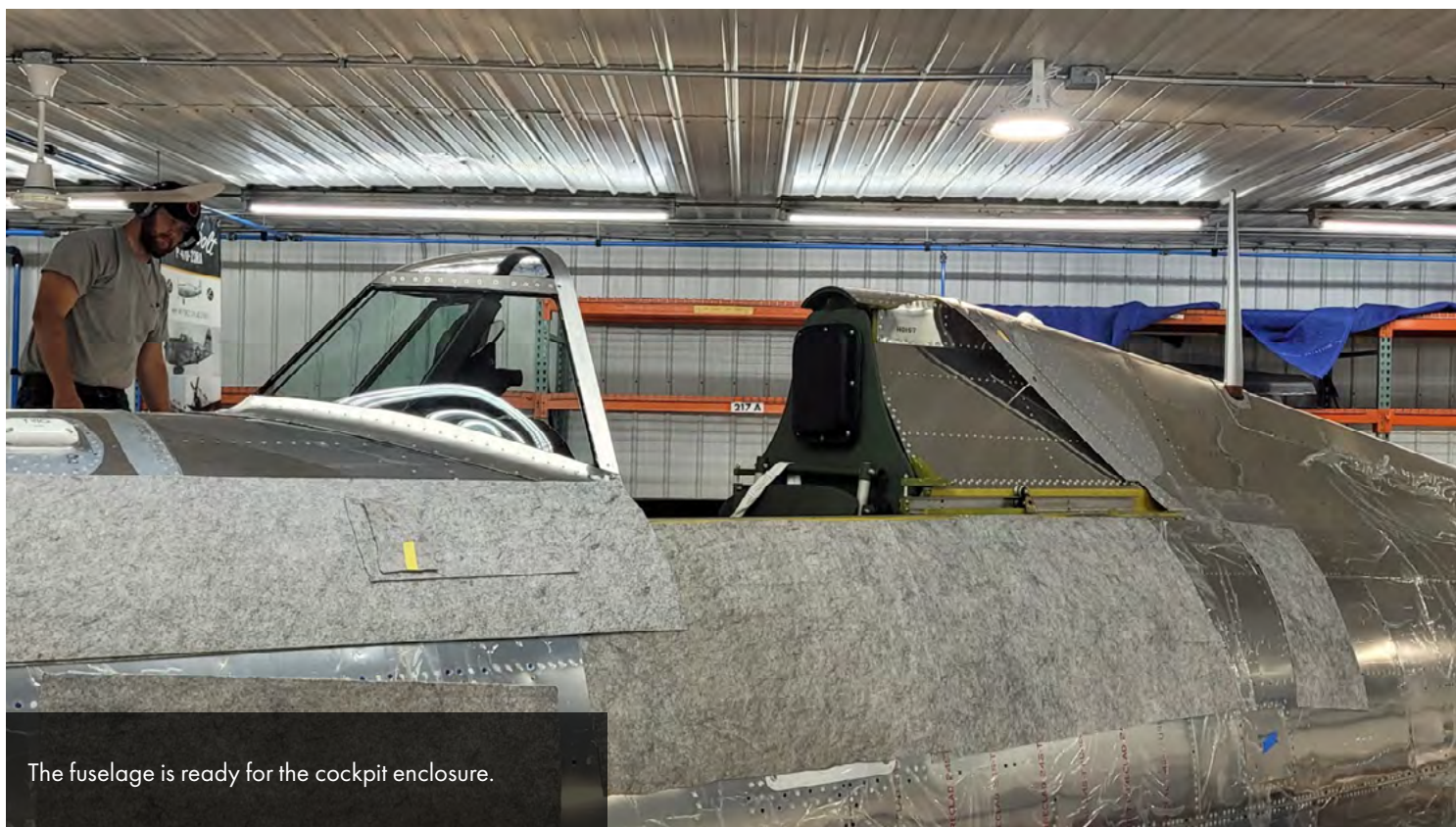
The windshield encloses the gunsight and the bullet-resistant glass panel that protects the pilot from frontal attacks.



The sliding part of the cockpit enclosure is ready.



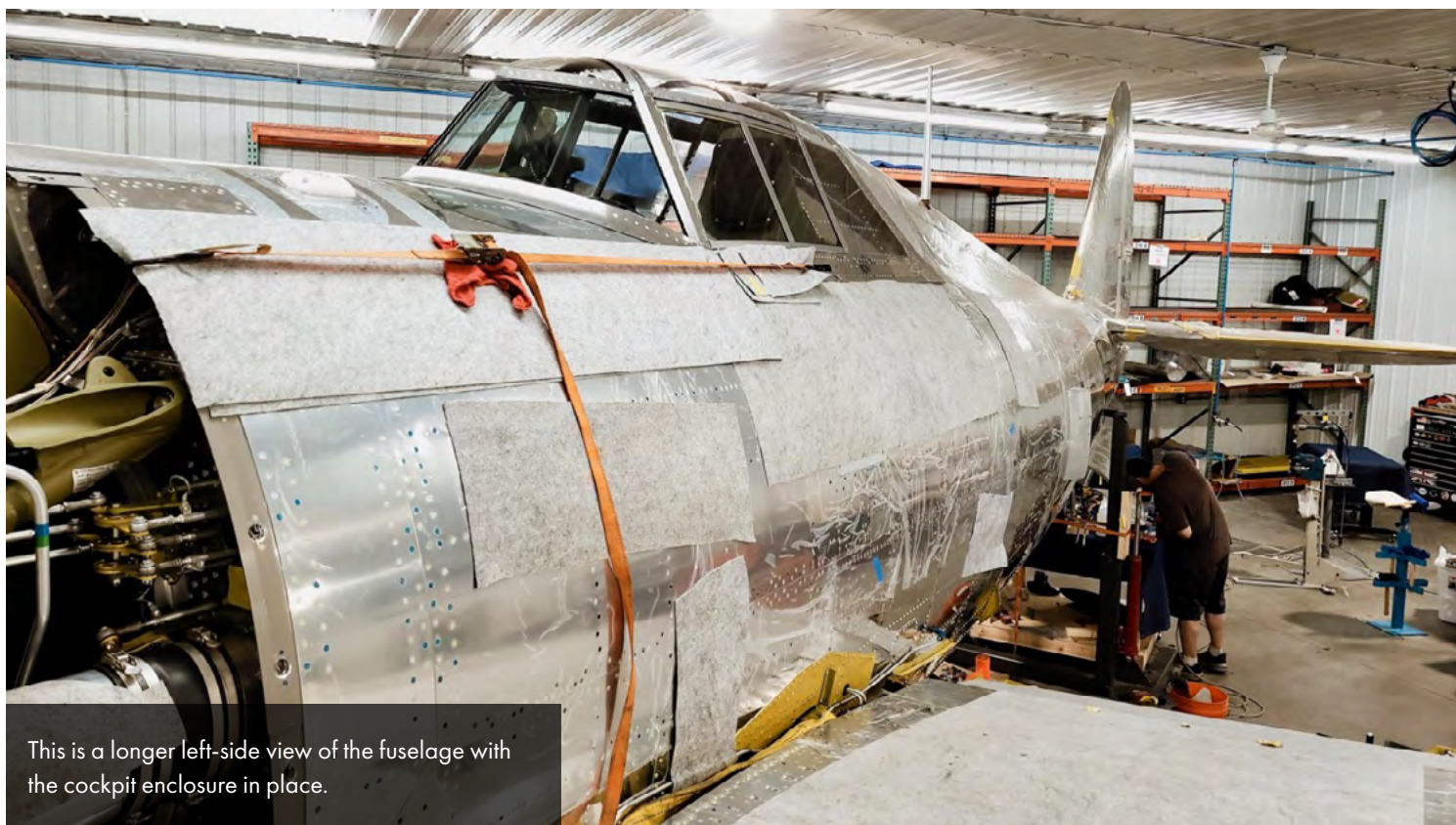
The fuselage is ready for the cockpit enclosure.



The fuselage is ready for the cockpit enclosure.



The sliding portion of the cockpit enclosure is in place.



This is a longer left-side view of the fuselage with the cockpit enclosure in place.



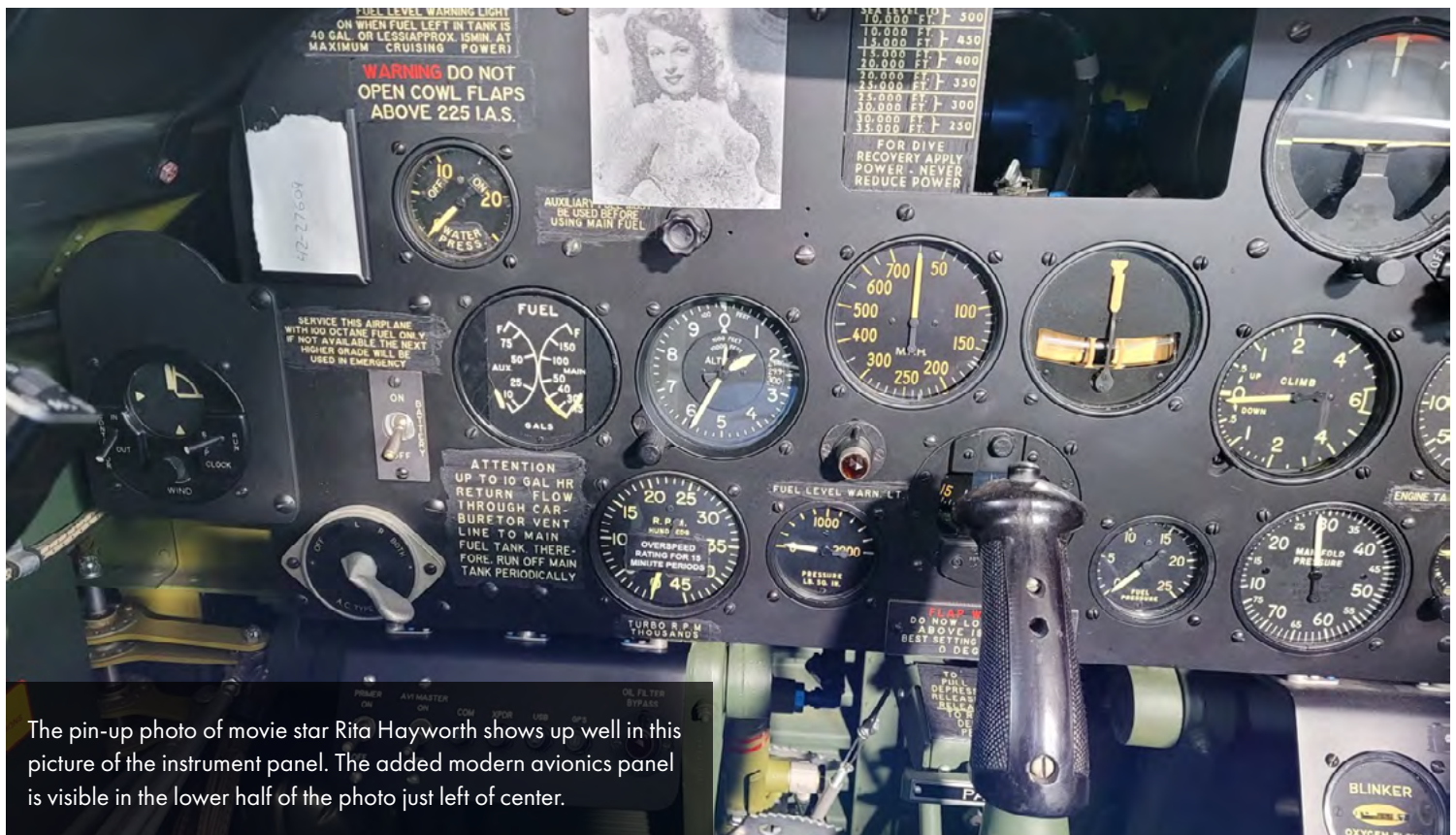
A close view of the right shows the distinctive lines of a razorback P-47's cockpit enclosure.



Here's a little more distant view of the right side of the fuselage.



This is a panel that will be added to accommodate modern avionics.



The pin-up photo of movie star Rita Hayworth shows up well in this picture of the instrument panel. The added modern avionics panel is visible in the lower half of the photo just left of center.



Engine

Aaron installed the prop governor this month.



Aaron installs the propeller governor.



The propellor governor is in place between the two magnetos.



The General Electric "turtleback magneto" got its nickname for obvious reasons.



The mighty R-2800-59 is imposing from any viewpoint.



Main Landing Gear

One important project this month was filling the reservoirs in the oleo strut main landing gear. Oleo struts are a kind of fluid-spring shock absorber filled with gas, in this case, nitrogen, and hydraulic fluid.



This angle gives a good size reference for how large the main landing gear and tires are.



John is holding a nitrogen line as he fills the main gear. Nitrogen is less likely to promote corrosion, so it is preferred to the dry air used in some lighter planes' oleos.



Mark is next to the supporting jack. Once the gear is filled and pressurized, the jacks can be removed.



John checks the lower chamber pressure in the main strut.



The main landing gear uplock is the red-painted part here. Republic used the red paint to let ground crews know not to tow the P-47 by this part.



The landing gear scissors are on the forward side of the landing gear on the P-47.



This is the right main gear leg.



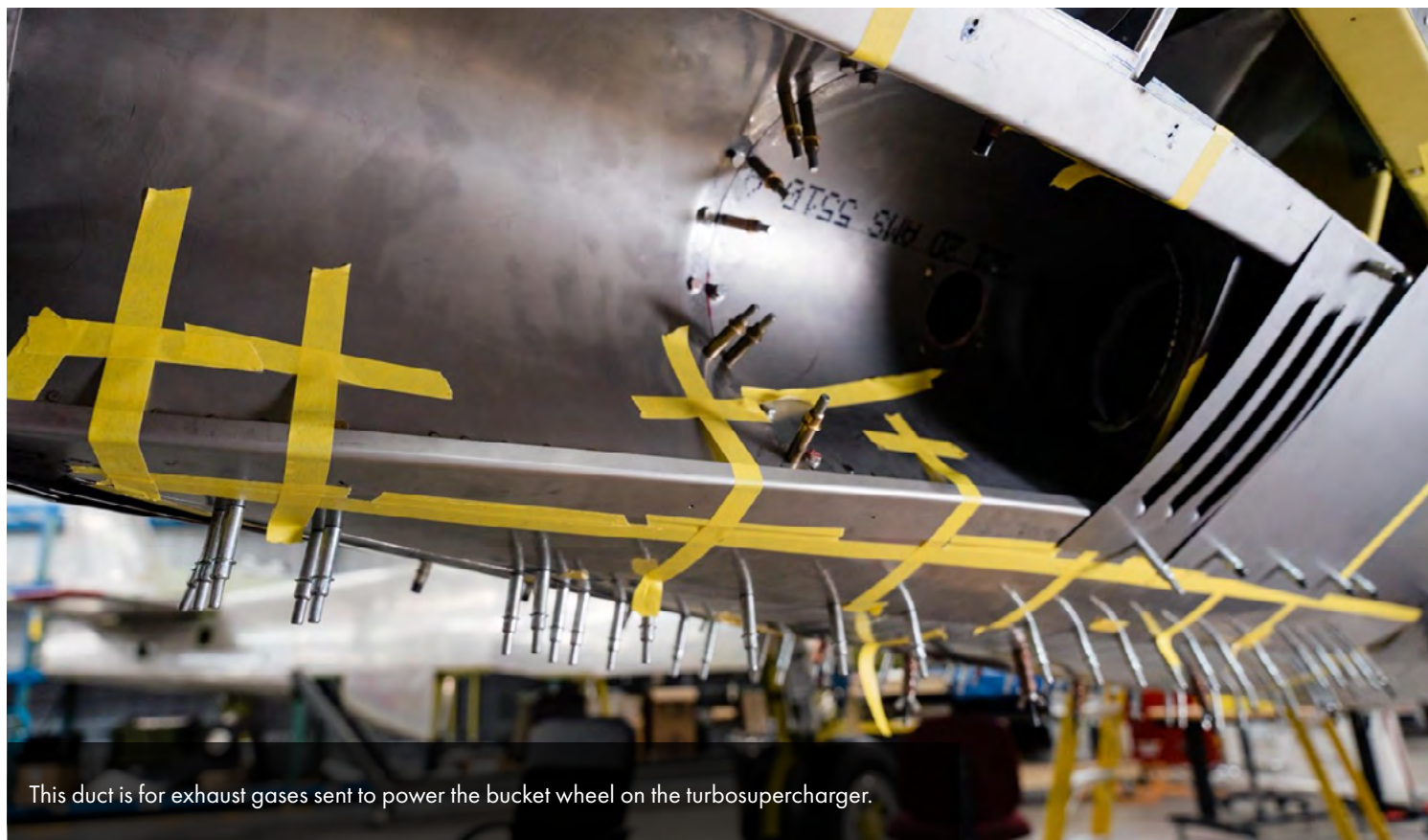
The left gear leg can be seen here.





Fuselage





This duct is for exhaust gases sent to power the bucket wheel on the turbosupercharger.



The rectangular yellow-painted assembly is a step for the pilot to use as he or she climbs into the cockpit. All USAAF pilots were men, but many P-47s were ferried from the factories to the coastal embarkation points by Women Air Force Service Pilots or Women's Auxiliary Ferrying Squadron pilots before they combined with the WASP.



The yellow-painted part clecoed to the fuselage is a support for the wing fairing.



The rear exhaust shroud divides at this spot.



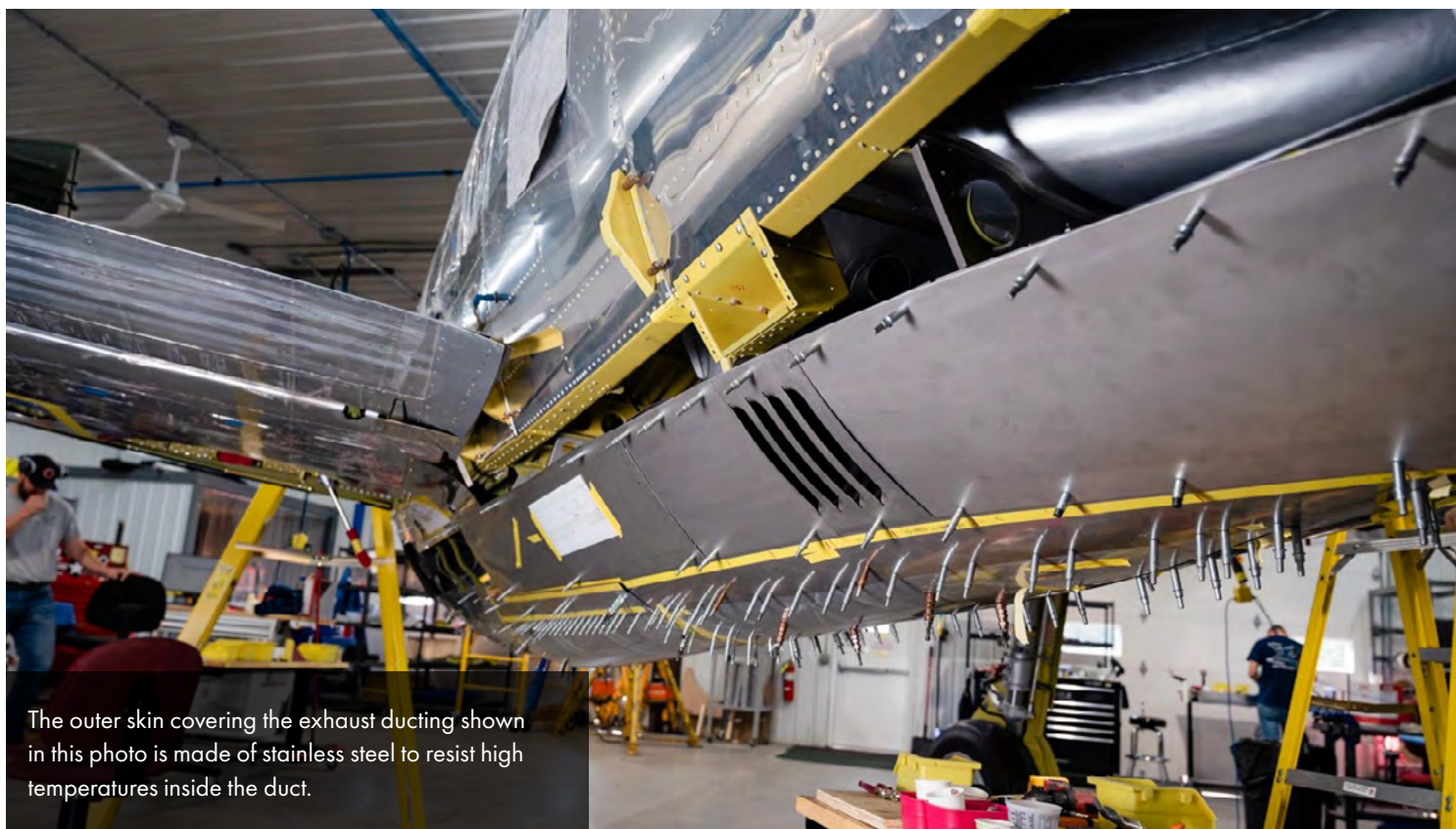
Mark and Randy work on fitting and installing stainless steel ducting covers.



Mark works on installing the belly skin.



The turbosupercharger is visible buried in the fuselage. It is the cast part with the rectangular opening just right of the center in this image.



The outer skin covering the exhaust ducting shown in this photo is made of stainless steel to resist high temperatures inside the duct.



In this quartering rear view of the fuselage, the intercooler exit doors (just left of center) and the opening for the large inspection panel (just right of center) are visible.



This side view shows the turbosupercharger exit just right of the bottom center of the photo.



Cowling

The cowling for a P-47 is an assembly of complex curves and presents a real challenge to fabricate. Mike has spent months carefully replicating the P-47 cowling.



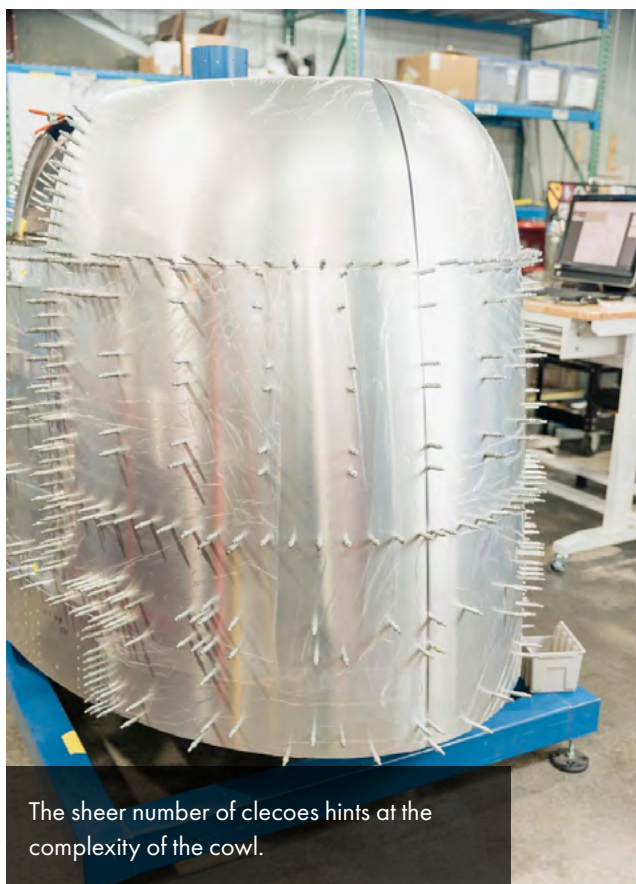
Mike refines a latch opening.



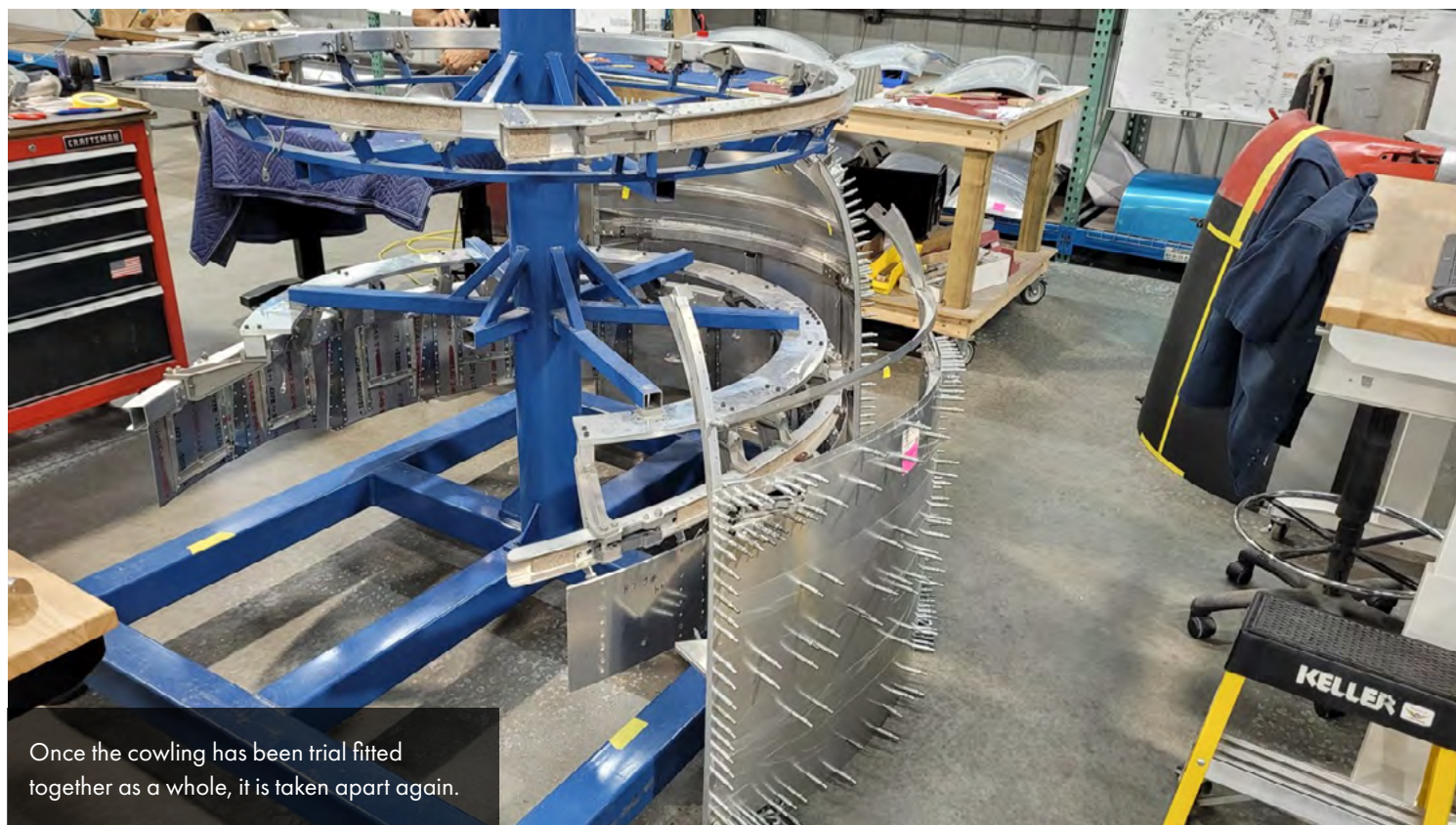
Soon the clecoes will be replaced by permanent rivets.



Mike inserts a cleco.



The sheer number of clecoes hints at the complexity of the cowl.



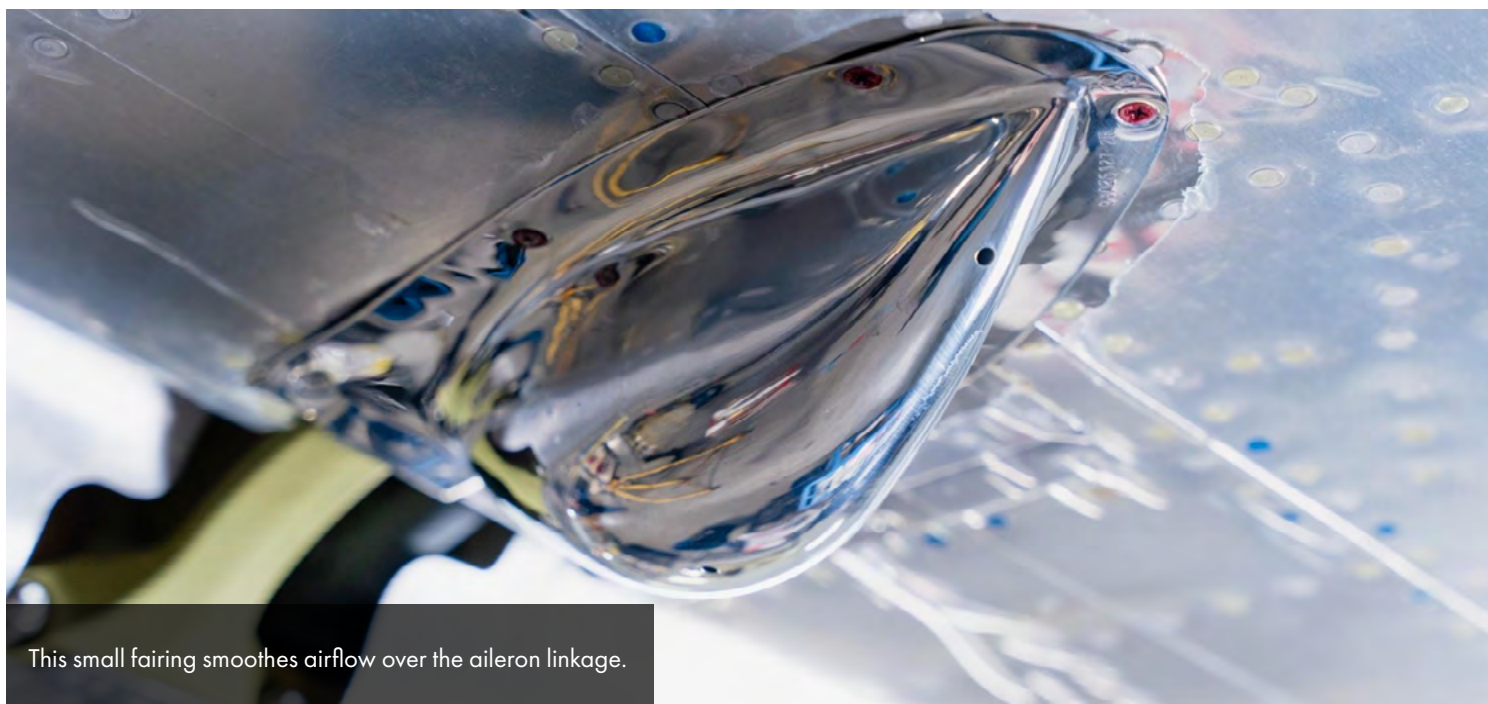
Once the cowling has been trial fitted together as a whole, it is taken apart again.



The lower cowl rests in a special cradle to protect it.

Wings

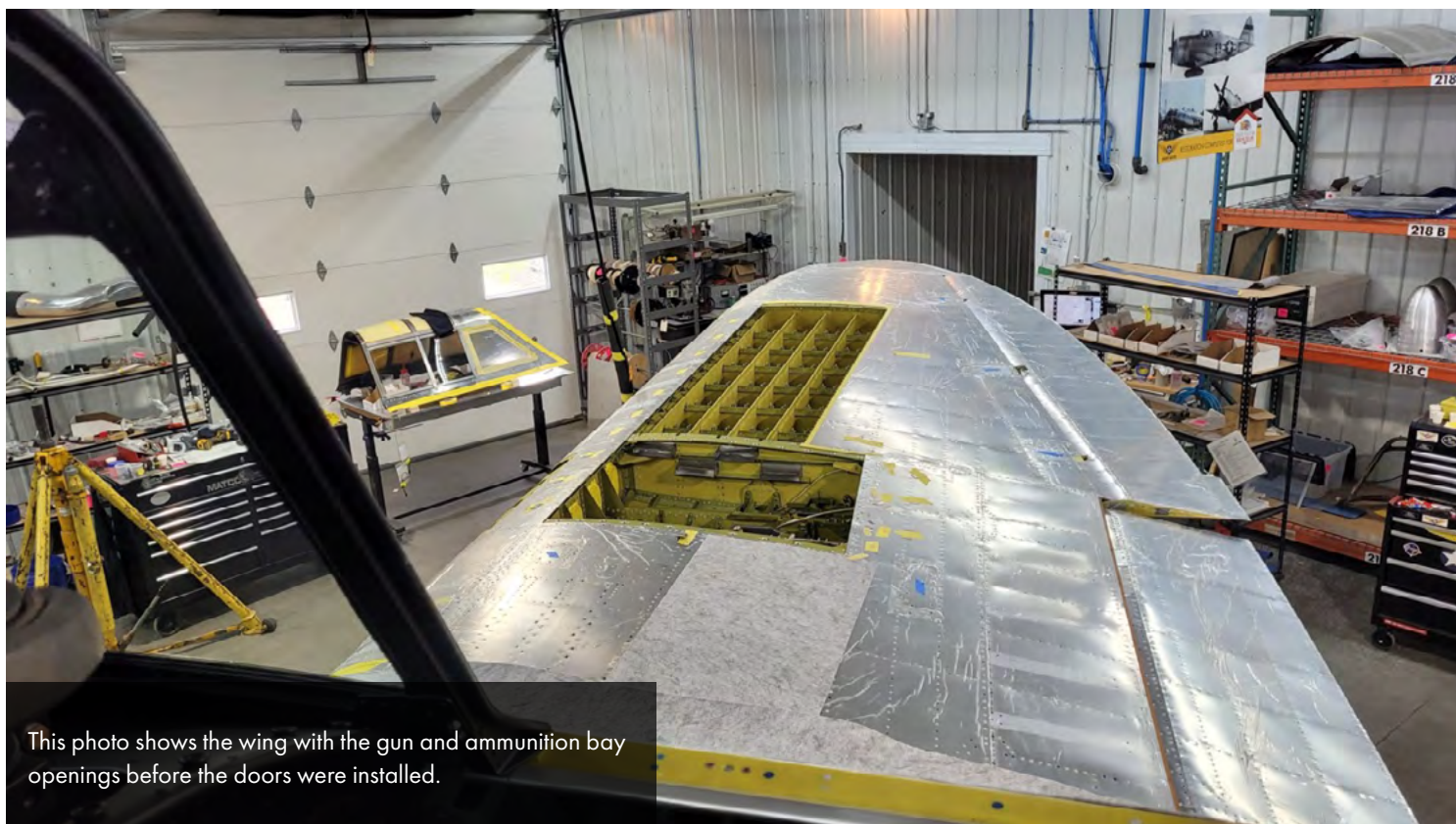
Ammunition bay doors, hinge fairings, and wing root fairings were all part of the restoration workload this month.



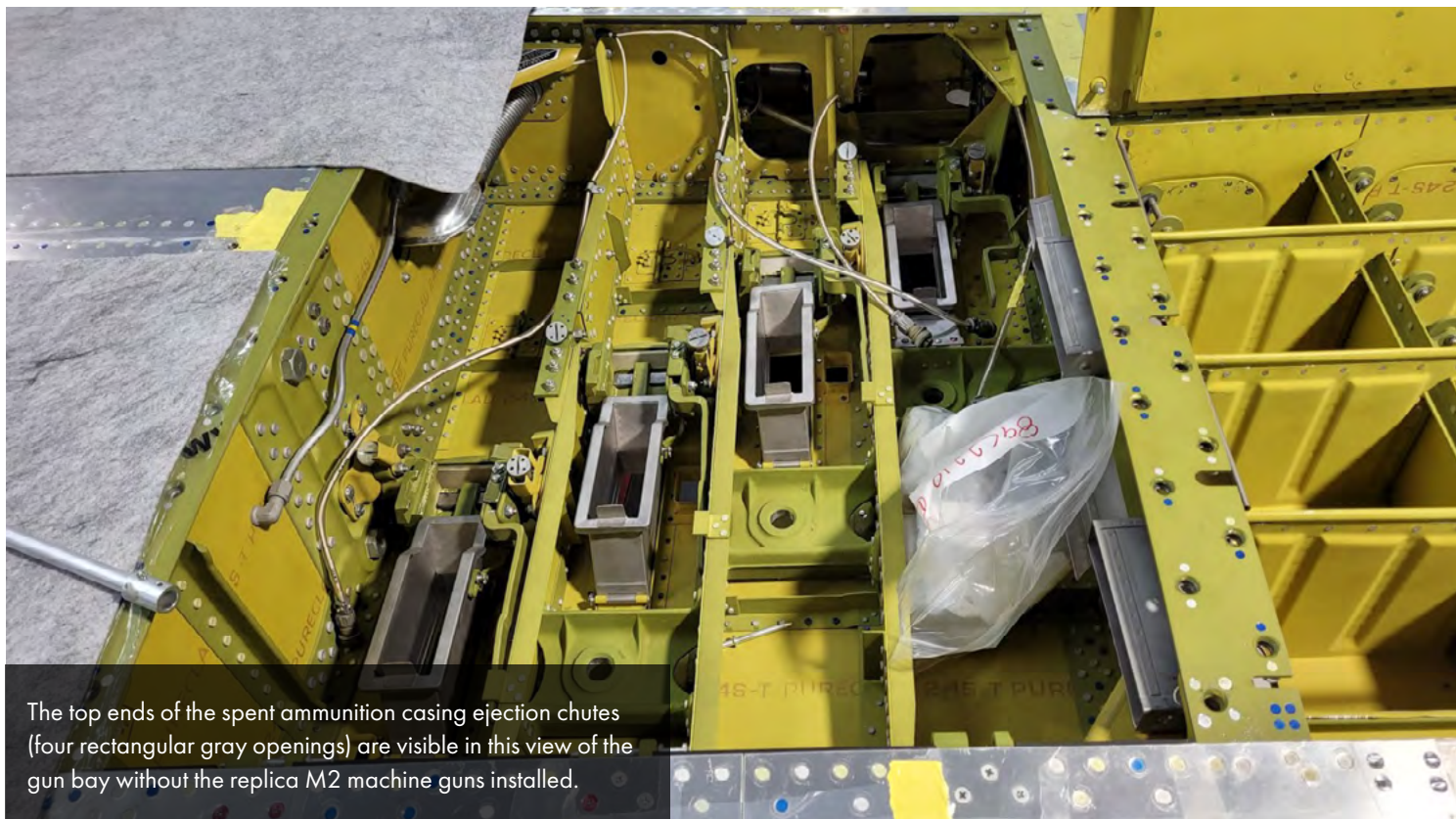
This small fairing smoothes airflow over the aileron linkage.



A closer angle details how the fairing is attached.



This photo shows the wing with the gun and ammunition bay openings before the doors were installed.



The top ends of the spent ammunition casing ejection chutes (four rectangular gray openings) are visible in this view of the gun bay without the replica M2 machine guns installed.



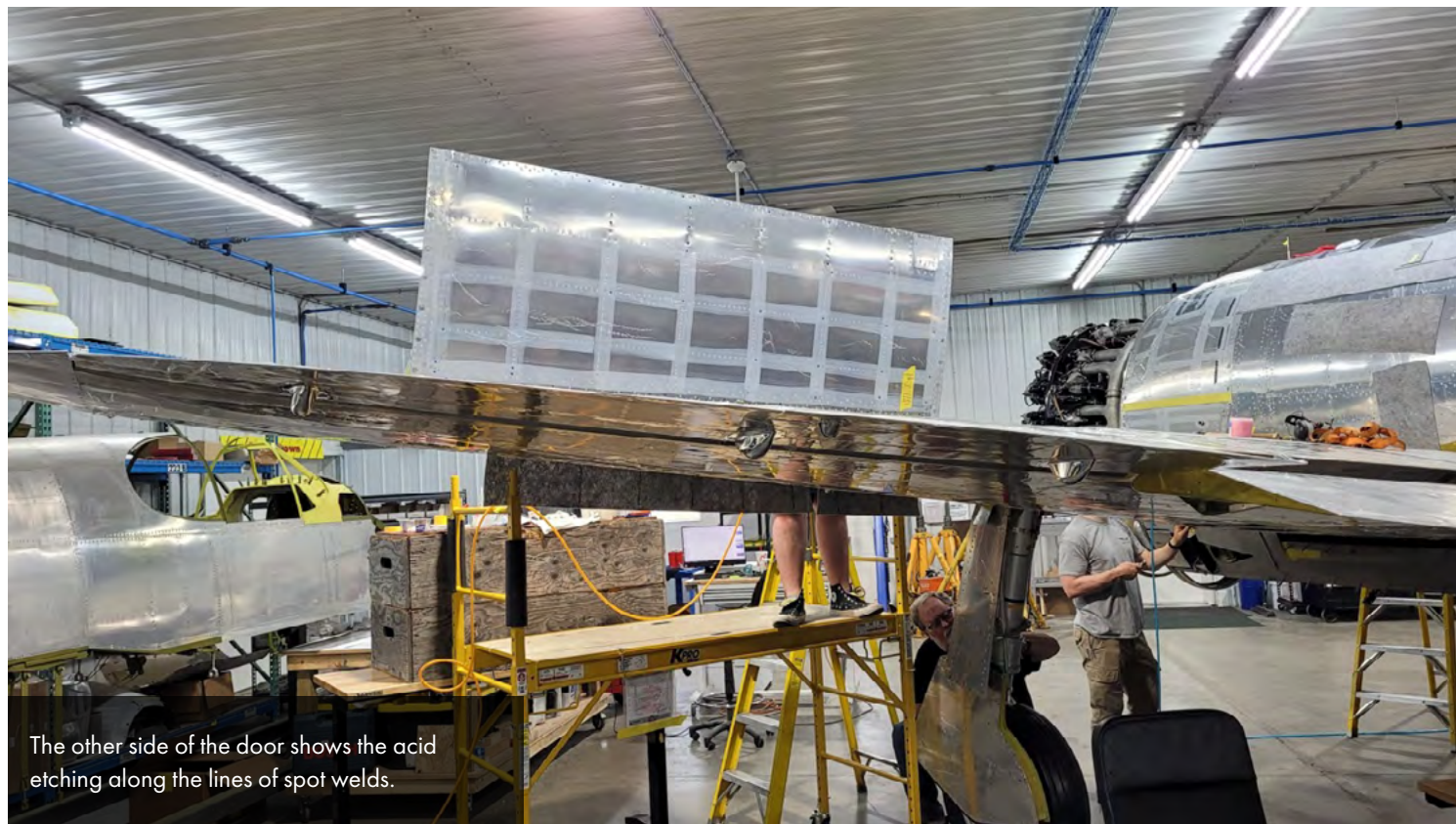
The ammunition door is painted, stenciled, and ready to install.



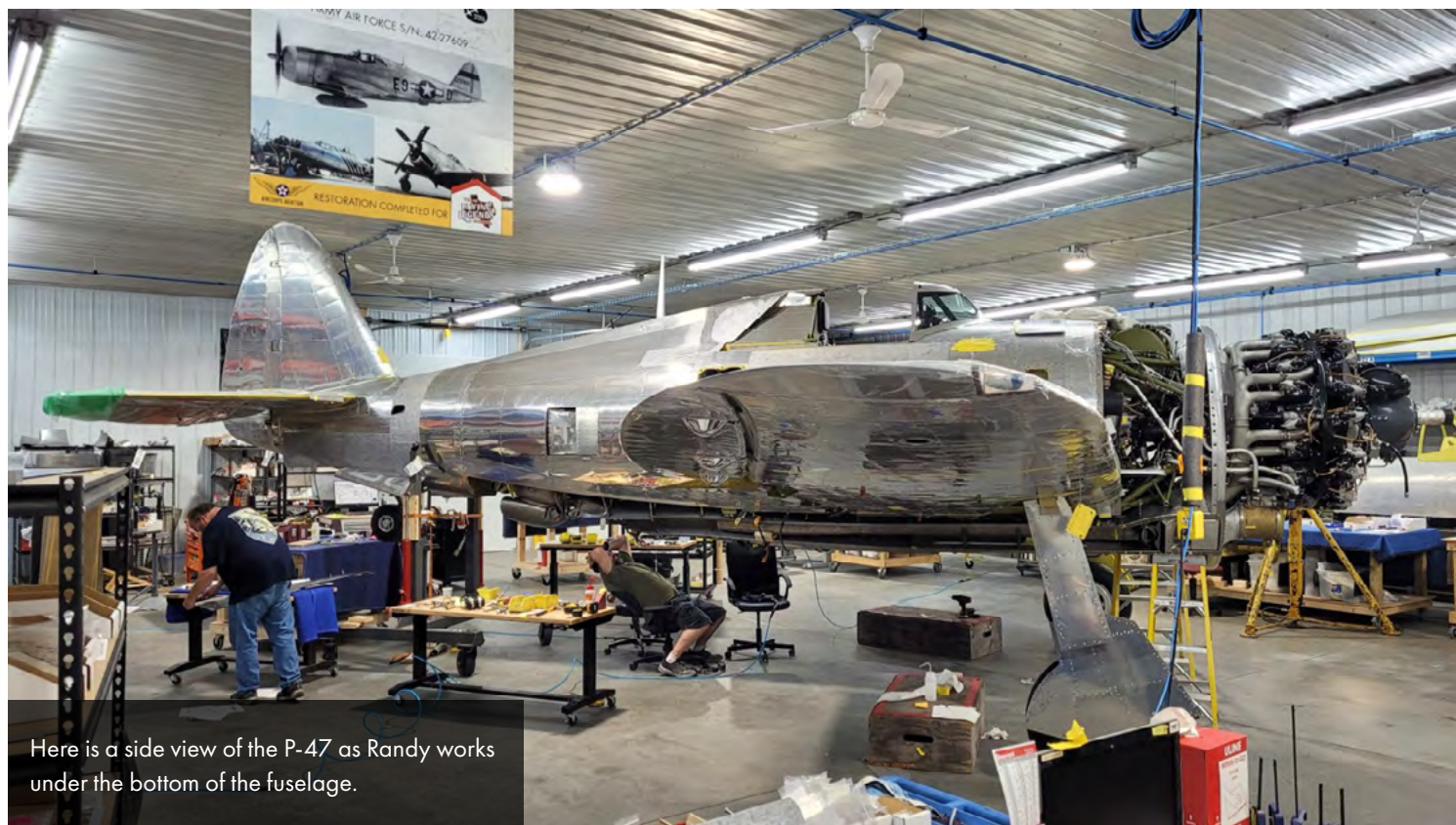
Randy, and Neil install an ammunition bay door.



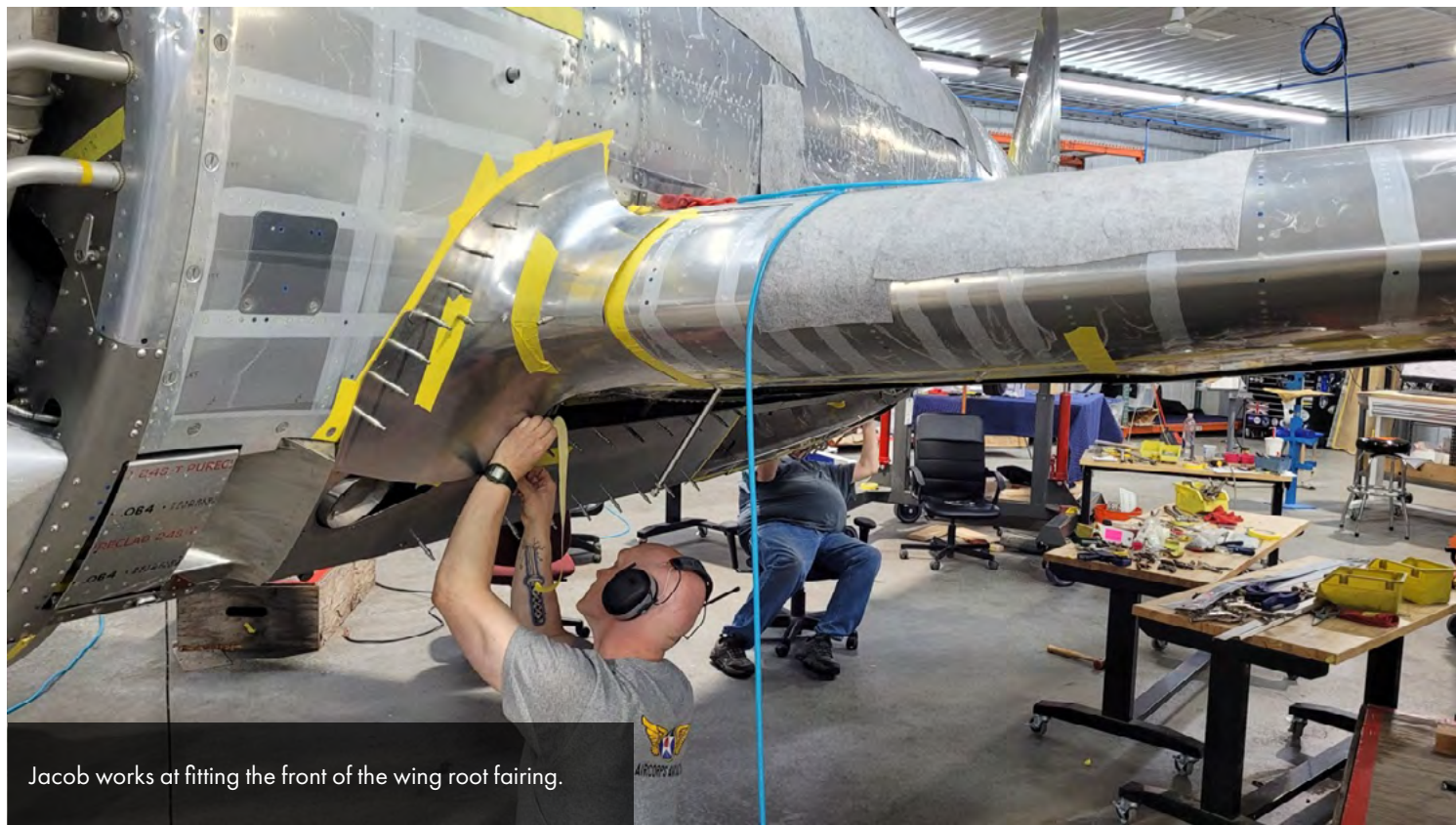
The paint and stencil markings for the ammunition bay door. If loaded to the maximum for each gun, the Thunderbolt would be carrying 2,136 rounds of ammunition. Incidentally, a 267-round belt of .50 caliber rounds is approximately 20 ½ feet long.



The other side of the door shows the acid etching along the lines of spot welds.



Here is a side view of the P-47 as Randy works under the bottom of the fuselage.



Jacob works at fitting the front of the wing root fairing.



The four gun bay ports in each wing are another visual characteristic of the Thunderbolt.



Toughness

The toughness of the P-47 has often been mentioned in discussions of its combat record. According to legend, if you want to impress the girl back home, fly a P-51. If you ever want to see her again, fly a P-47. Like many sayings, this one is perhaps a bit excessive, but there is no doubt that the P-47 has a well-deserved reputation for toughness. It could both dish out and take a formidable amount of damage.



Major Loren W Herway of Indianola, Iowa examines flak damage to his P-47 Thunderbolt. A direct hit by an 88 took out his turbocharger, hydraulics, and rudder controls, but he made it back to his base and made a belly landing. When the ground crew started to tow the aircraft away, the tail section separated completely. USAAF photo

According to the Smithsonian Air & Space museum: "Of the 15,683 P-47s built, about two-thirds reached overseas commands. A total of 5,222 were lost - 1,723 in accidents not related to combat. The Jug flew more than half a million missions and dropped more than 132 thousand tons of bombs. Thunderbolts were lost at the exceptionally low rate of 0.7 percent per mission and Jug pilots achieved an aerial kill ratio of 4.6:1. In the European Theater, P-47 pilots destroyed more than 7,000 enemy aircraft, more than half of them in air-to-air combat. They destroyed the remainder on very dangerous ground attack missions."



In fact, the Thunderbolt was probably the best ground-attack aircraft fielded by the United States. From D-Day, the invasion of Europe launched on June 8, 1944, until VE day on May 7, 1945, pilots flying the Thunderbolt destroyed the following enemy equipment:

86,000 railway cars

9,000 locomotives

6,000 armored fighting vehicles

68,000 trucks¹

¹Smithsonian Air & Space Museum, website: https://www.si.edu/object/republic-p-47d-30-ra-thunderbolt%3Aasm_A19600306000#:~:text=In%20the%20European%20Theater%2C%20P,very%20dangerous%20ground%20attack%20missions.&text=The%20last%20Jug%20left%20the,for%20some%20years%20after%20that. Accessed 8-4-2022



Many pilots would stick with a damaged aircraft and crash-land, instead of bailing out -such was the strength of the airframe.

P-47C-5-RE 41-6367 belly landed by Lt. Charles W Reed on 20th December 1943. Category B damage, and after repair was transferred to 495th Fighter Training Group.² photo, American Air Museum in Britain.



There were several reasons for the excellent survivability results of belly landing in a P-47. One was that, unlike the P-51, there was no scoop on the underside of a Thunderbolt. The P-51's scoop could dig into the ground and flip or stop the airframe very quickly, making an injury or fatality to the pilot more likely.

In a water landing, the Mustang's scoop could catch water and flip the plane.

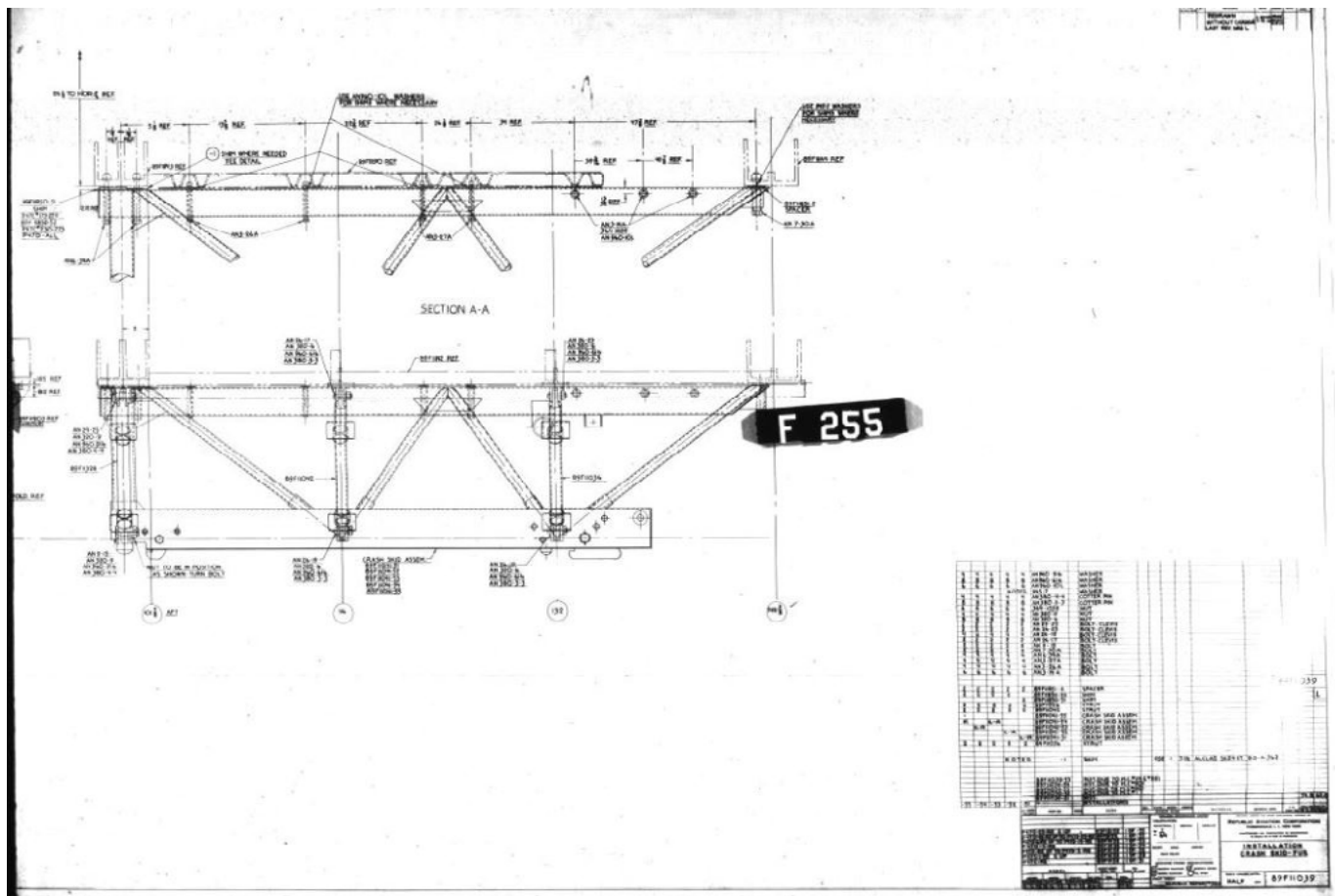
²American Air Museum in Britain website, <https://www.americanairmuseum.com/media/34938>, accessed August 9, 2022



The smoothly curved belly of a P-47 was much more likely to slide over the ground or water in a safer, more controlled fashion.

An internal design factor also helped make belly landing safer in a P-47. In the fuselage lower section is a crash skid designed to support and protect the underside of the airframe. It is mounted to the very strong forged crossies that connect each wing to the other.

The crash skid worked in conjunction with the underside ducts to cushion the impact of a belly landing.



Engineering drawing of the P-47's crash skid.
AirCorps Library

PART NO.		STOCK SIZE	MATERIAL	MATERIAL SPEC.	W.H.D.W.N.G.
Engineering drawing of the P-47's crash skid. AirCorps Library					
P47D-15-RE C UP		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47D-15-RE		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47C-15-RE C UP		93F11032	10F-53		
P47C-15-RE		93F11032	10F-53		
MODEL		PART NO.	STOCK SIZE		
P47D-15-RE C UP		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47D-15-RE		93F11032	10F-53		
P47D-15-RE UP TO P47D-15-RE		93F11032	10F-53		
P47C-15-RE C UP		93F11032	10F-53		
P47C-15-RE		93F11032	10F-53		
UNLESS OTHERWISE NOTED					
TOLERANCES:					
FRACTIONAL		DECIMAL	ANGULAR		
+ 1/64					
RADI.		END	CORNER		
END RELIEF					
MACHINE FINISH DESIGNATIONS:					
SMOOTH MACHINE		SMOOTH GRIND			
ROUGH MACHINE		ALL OVER			
HEAT TREAT:					
FINISH:					
REPUBLIC REPORT #320					
SCALE (UNLESS NOTED):					
HALF		89F11039			



Perhaps most importantly, The P-47 was larger than any other single-engine fighter, so there was more structure and mass protecting the pilot in a crash situation.

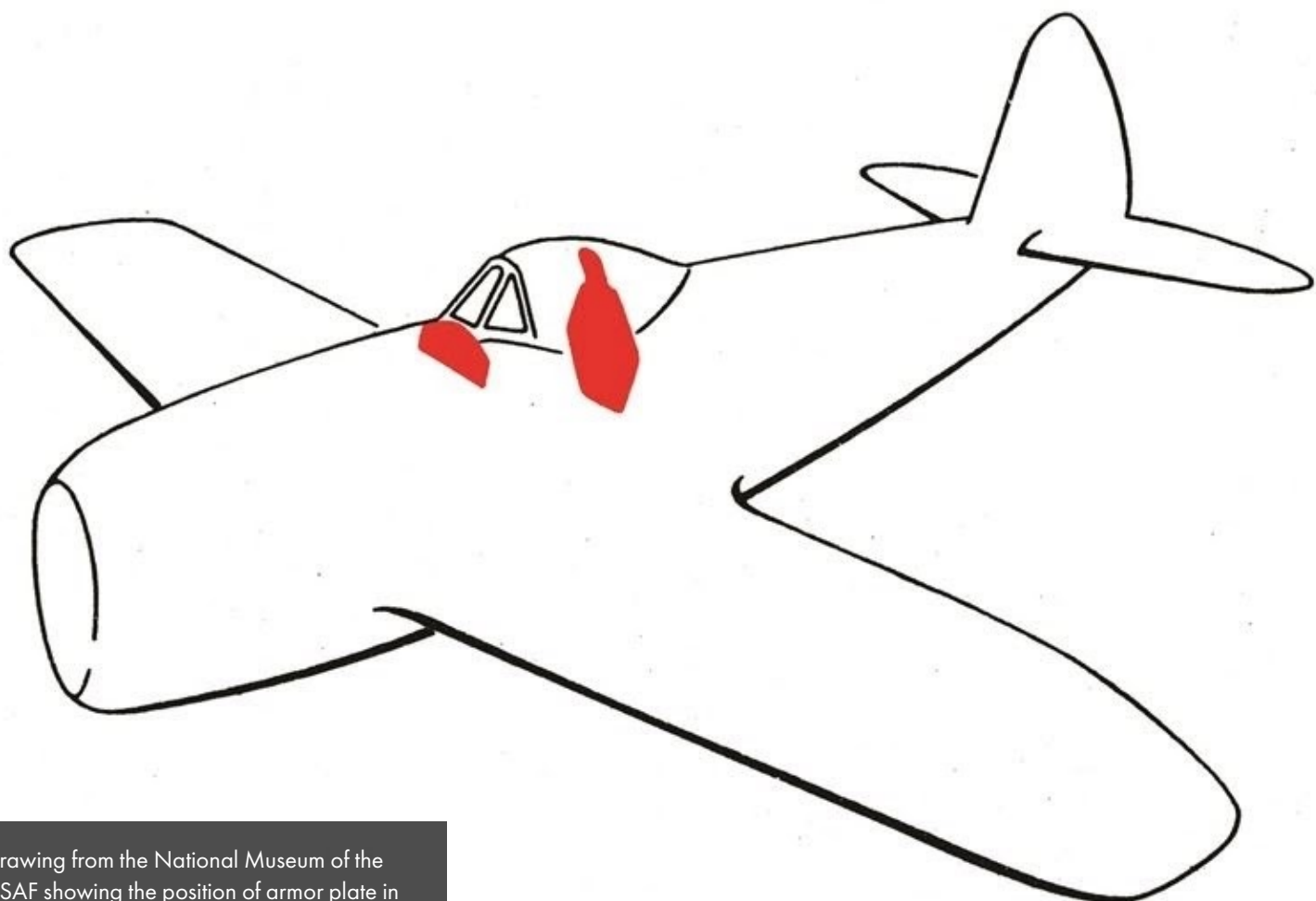
This mass and strong structure was a factor in the P-47's ability to absorb battle damage as well as crash damage.

The air-cooled radial engine famously could run with significant damage and wasn't vulnerable to cooling system damage as liquid-cooled inline engines were.



Pilot Edwin King looking over his P-47 Thunderbolt after landing with a ruptured oil line, Jan 1945, Italy. USAAF photo

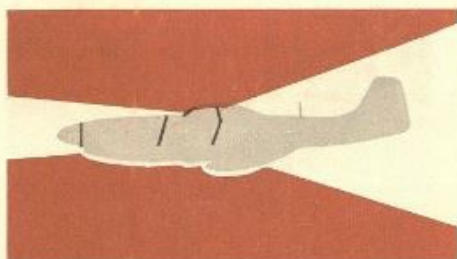
However, the common description of the Thunderbolt as a flying tank is a little extreme. A tank is heavily armored. Calling the P-47 a tank implies that it carried more armor than other fighters. The armor plate installed in US fighters in WWII was pretty much limited to a plate behind the pilot, and sometimes a smaller one just in front of the cockpit. Almost all had bulletproof glass in front of the pilot, either in the windshield itself as P-51s and later P-47s had, or a separate glass plate inside the cockpit enclosure as the razorback P-47s used.



Drawing from the National Museum of the USAF showing the position of armor plate in the P-47.



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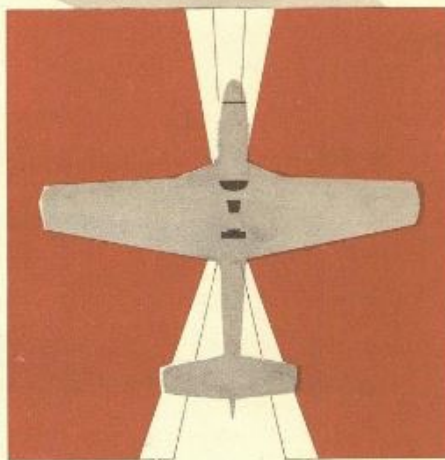
ARMOR

The armor protection is shown in the accompanying illustration. Note that there is armor plate at three points:

1. Back of the pilot's seat, which gives you protection from the rear.
2. At the firewall in the opening between the engine and the fuselage, and
3. Behind the spinner, in front of the coolant tank.

You are further protected by the bulletproof glass windshield and the engine itself, which protects you from head-on gunfire.

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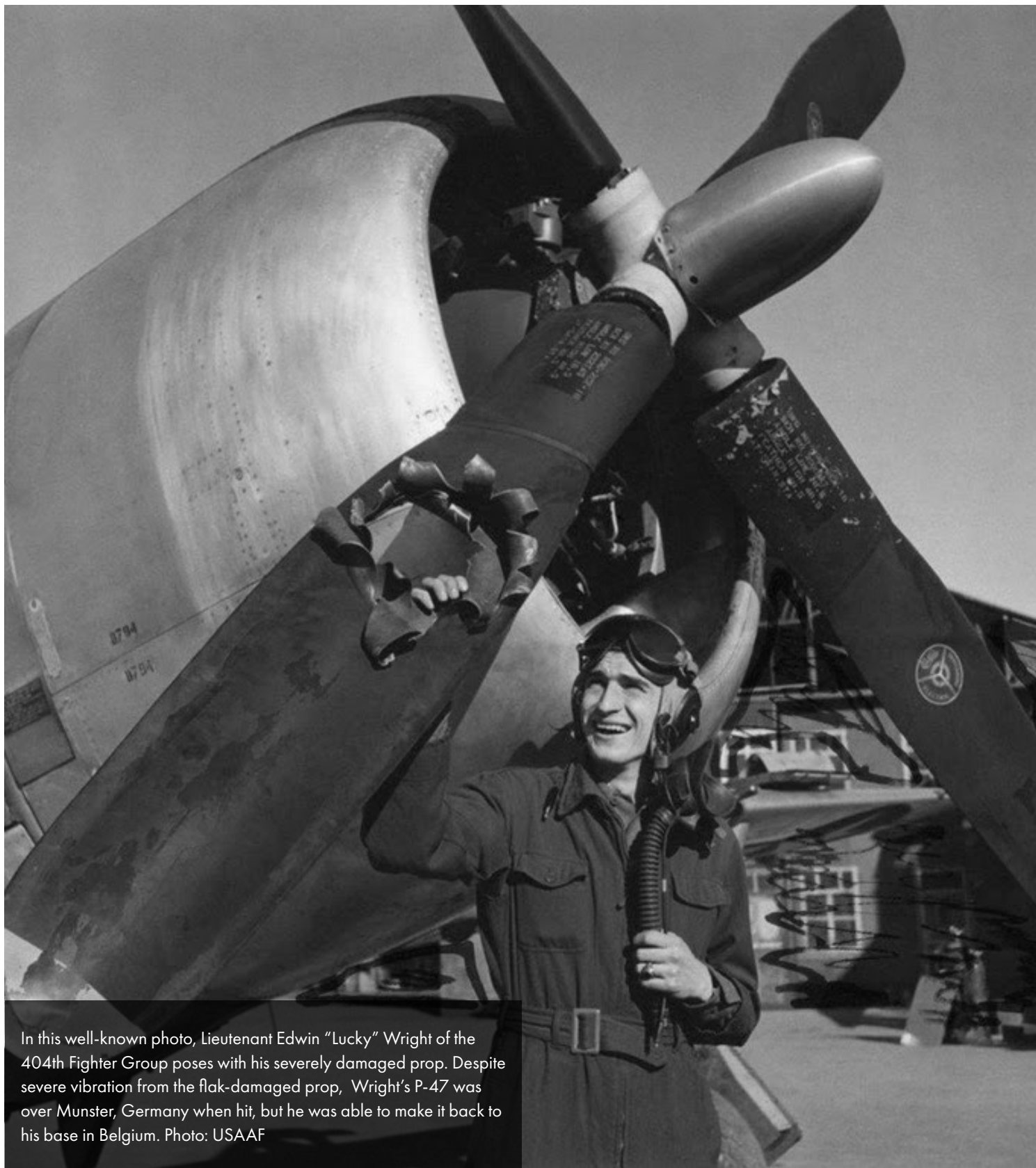
Drawing from Pilot Training for the Mustang showing P-51 armor, AAF Manual 51-127-5 (one of many available on AirCorps Library) <https://aircorpslibrary.com/>

The drawings clearly show that there is little difference in the amount of actual armor plate protecting the pilot in a P-51 or a P-47.



A P-47 flown by Lt. Richard Sulzbach of the 364th Fighter Squadron, 350th Fighter Group, 12th Air Force, had a run-in with some trees while on a strafing run over Italy. He was able to fly the plane 120 miles back to base and land safely. USAAF photo

B-57192 A.C.



In this well-known photo, Lieutenant Edwin "Lucky" Wright of the 404th Fighter Group poses with his severely damaged prop. Despite severe vibration from the flak-damaged prop, Wright's P-47 was over Munster, Germany when hit, but he was able to make it back to his base in Belgium. Photo: USAAF



P-47 battle damage, USAAF photo, American Air Museum in Britain website, <https://www.americanairmuseum.com/aircraft/20595> accessed 8-4-2022

