



Mar/Apr 2022

# MAR/APR

Dakota Territory Air Museum's P-47 Update

by Chuck Cravens with Jenna Grindberg



AIRCORPS AVIATION



The fuselage, cockpit enclosure, and left wing all appear in this photo.



[www.dakotaterritoryairmuseum.com](http://www.dakotaterritoryairmuseum.com)



## Update

The fitting of the eight Browning M2 machine gun replicas began this month. Control surfaces are getting nearer to completion. Access panels for the gun and ammunition bays also received attention and the finished turbosupercharger has been mounted. We will also check out the history and mission of the Dakota Territory Air Museum for whom the P-47 is being restored.

## Control Surfaces

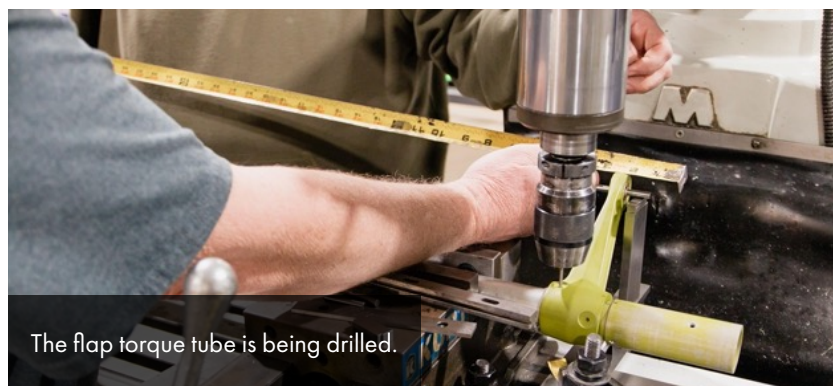
The restoration shop has been working on the control surfaces for quite a while. The left wing has the finished flap and aileron mounted. The right wing's movable surfaces are close to completion along with the elevators. These are the final large assemblies for the restoration effort.



Work continues on the elevator's leading edge. Visible here is a leading-edge counterweight.



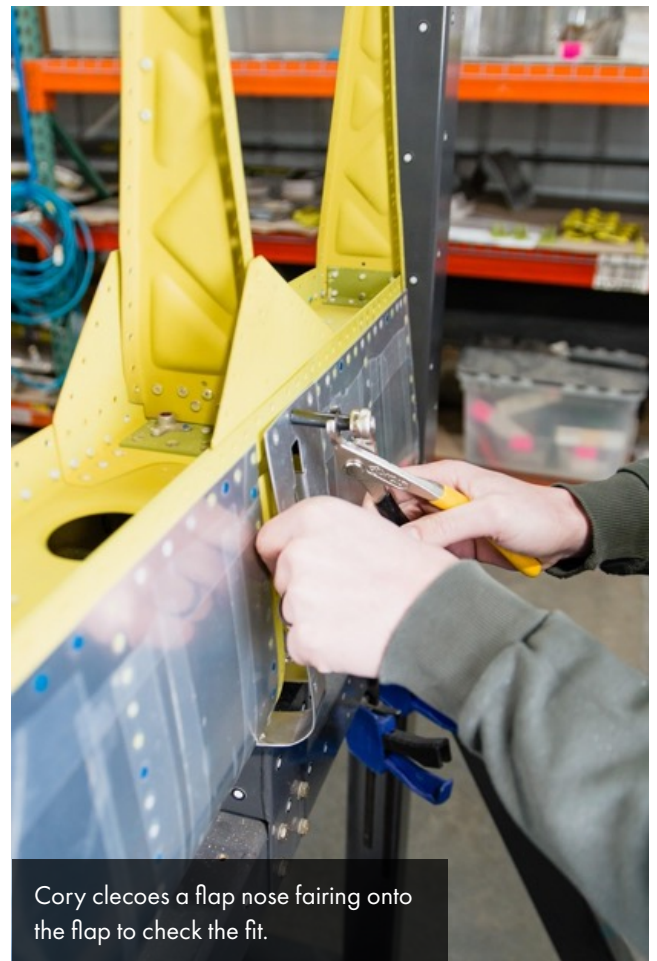
One of the elevators takes shape as more skin is fitted.



The flap torque tube is being drilled.



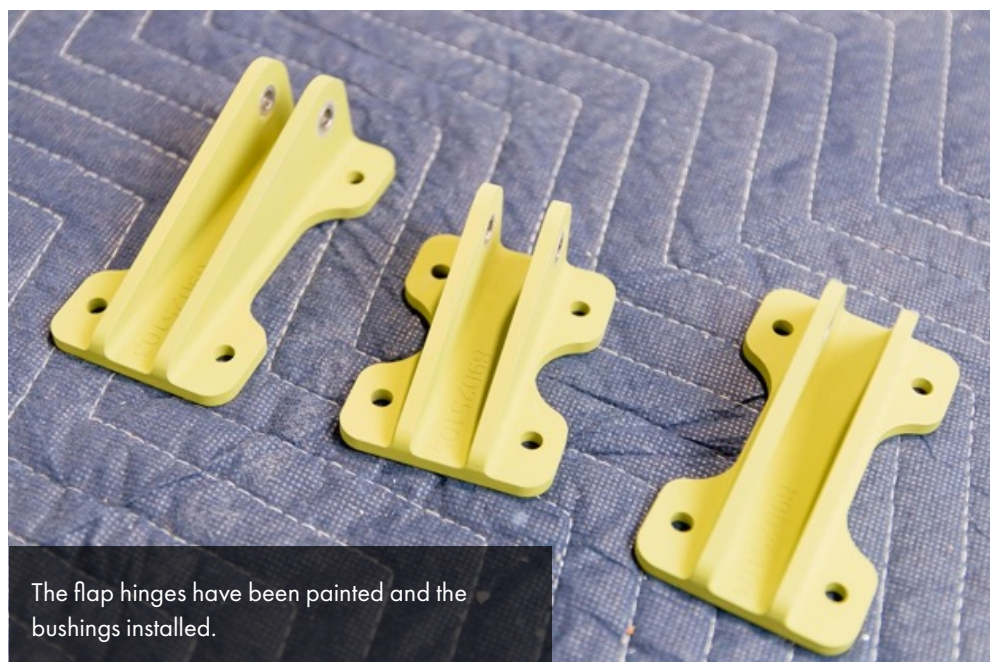
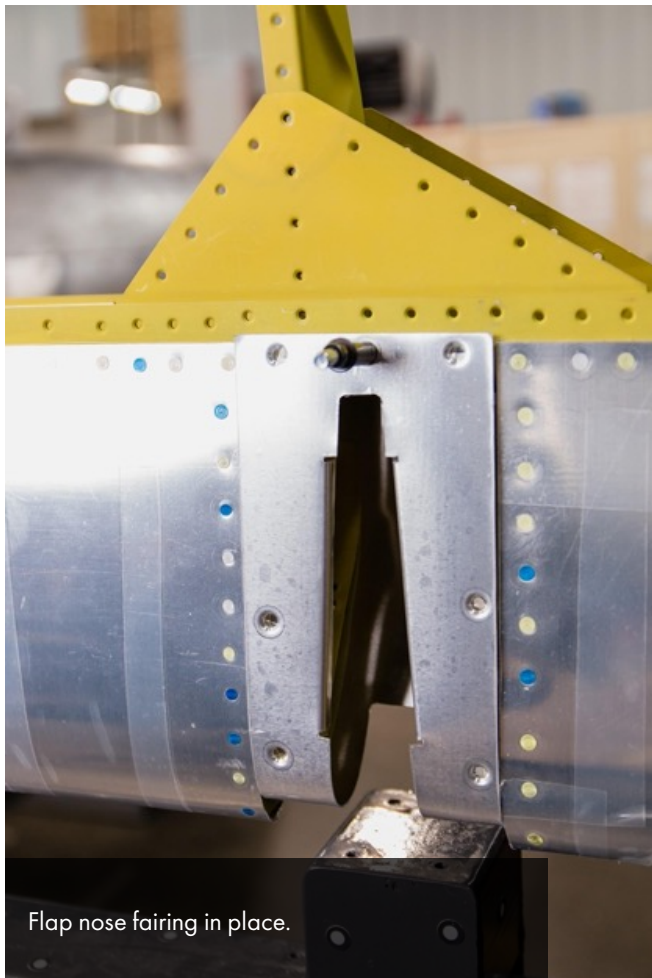
The P-47 flap torque tube is in a fixture to precisely set the angle of the drilled hole.



Cory clecos a flap nose fairing onto the flap to check the fit.



These are part number 89D25124, the flap nose fairings.





Cory deburrs a hole in the flap leading edge skin.



Cory is fitting more flap skin.

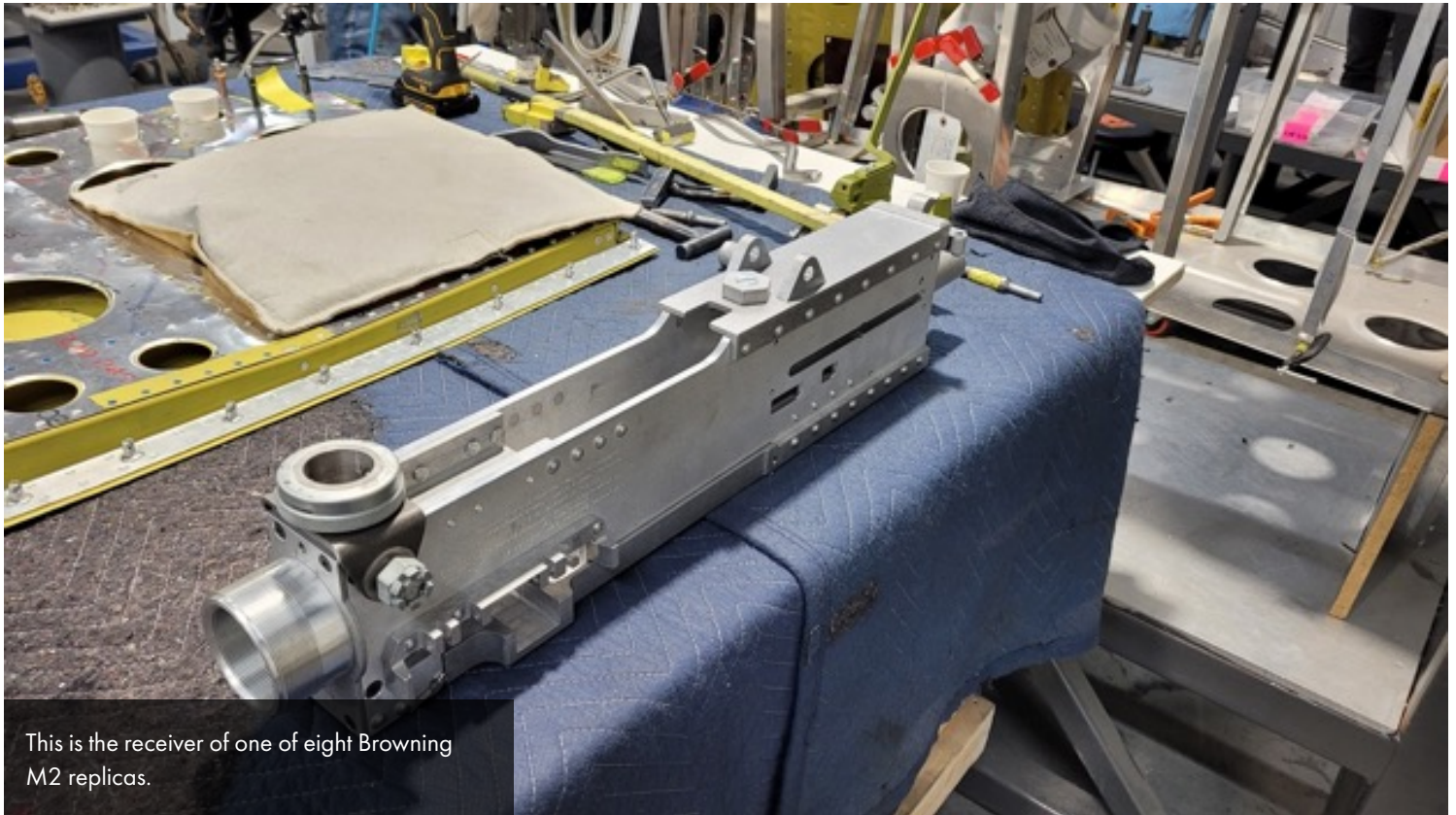


## Guns

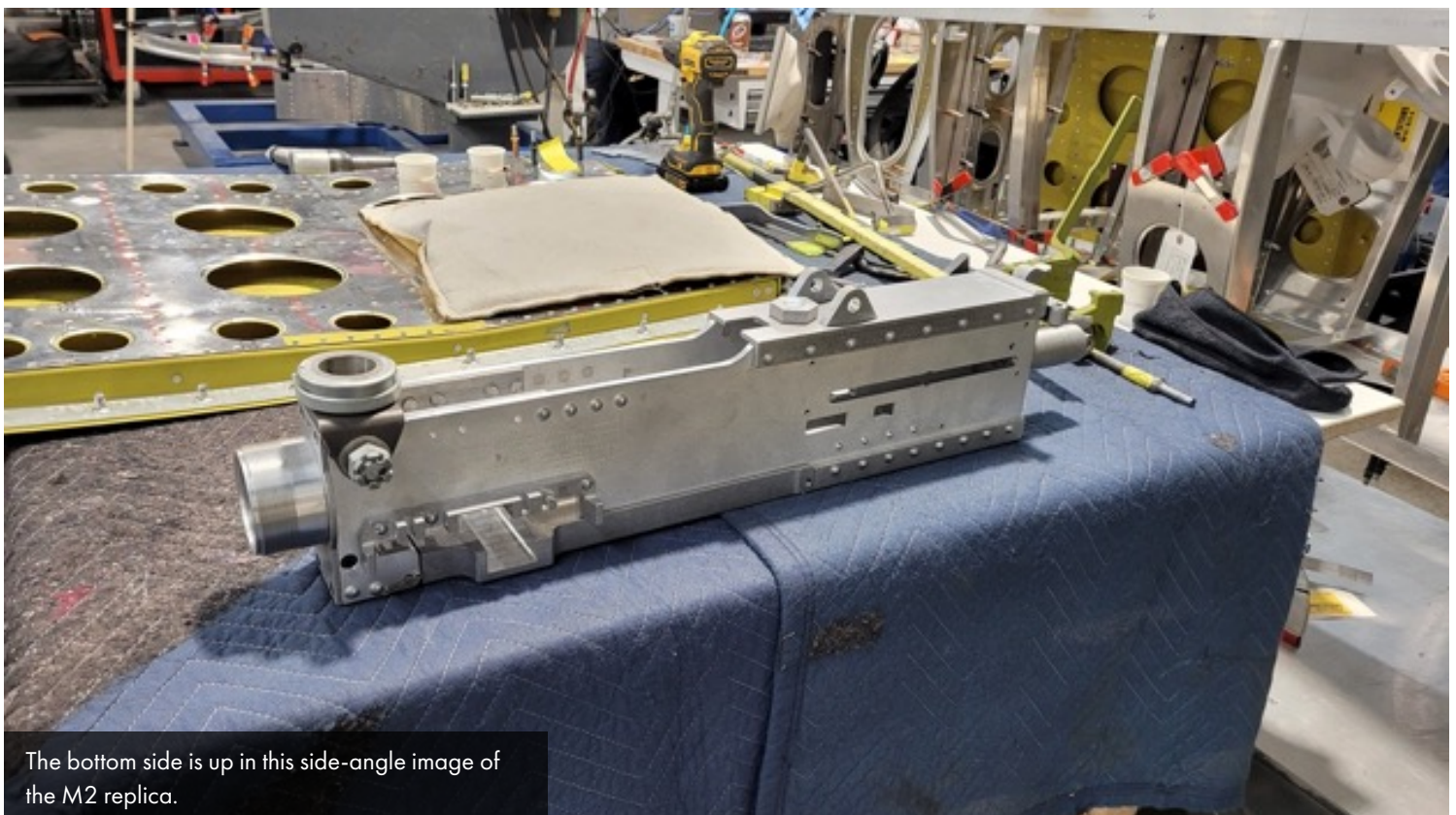
A WWII airplane isn't a fighter without its guns (or at least nonfunctional replicas). This month, the replica M-2 Brownings were fitted in place.



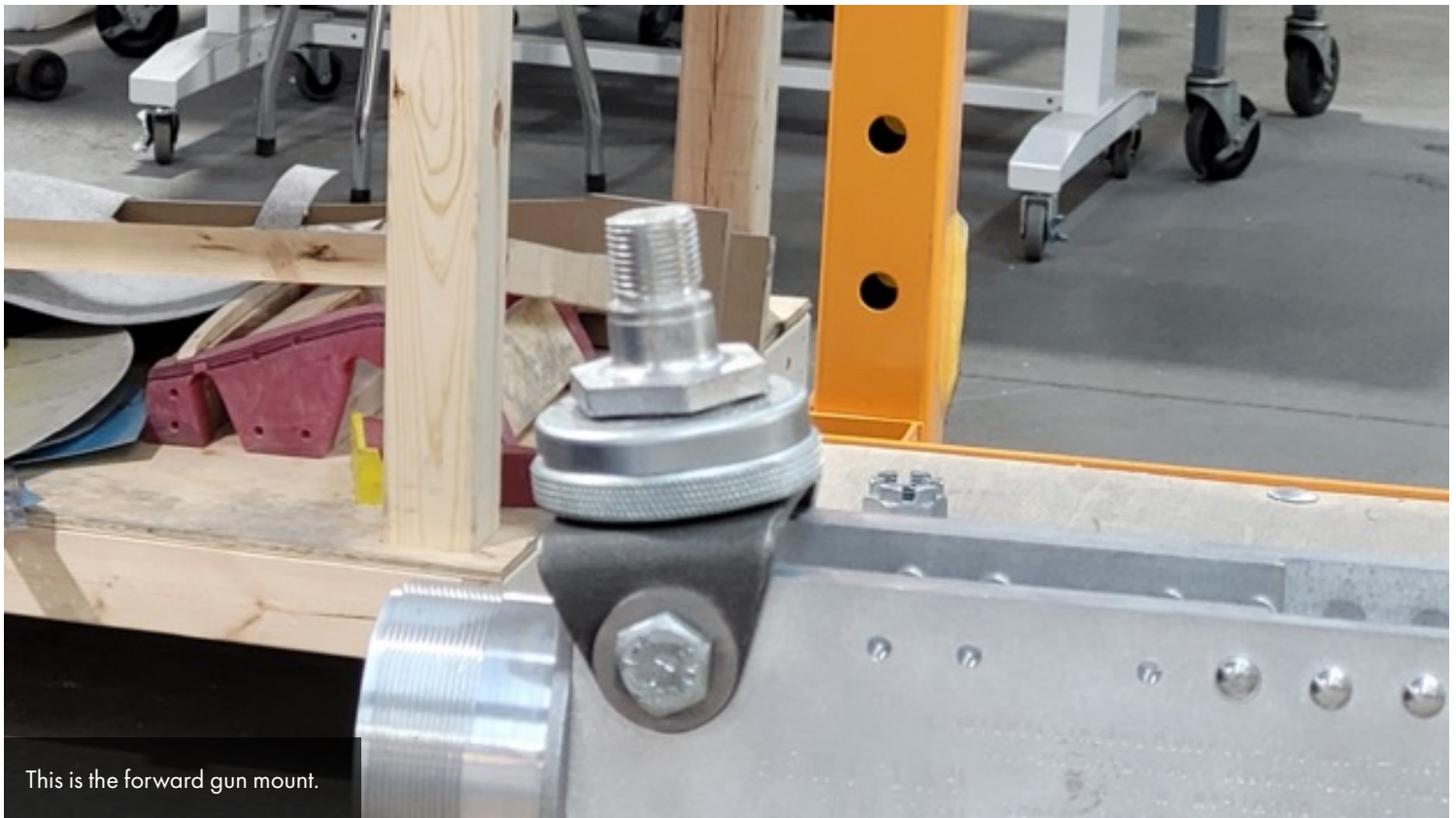
The gun bay is ready for the guns to be fitted.



This is the receiver of one of eight Browning M2 replicas.



The bottom side is up in this side-angle image of the M2 replica.



This is the forward gun mount.



These are rear gun mounts.



The rear gun mount levers work on a cam action to lock the rear of the M2 receivers in place.



This is an original rear gun mount showing the adjustment slotted screw used to regulate the aiming point of the guns. It is difficult to read in the photo but it says muzzle up-down



Here is a close-up of the tag on the right rear gun mount.



Theo fits the replica M2 receiver into the gun bay.



The first of eight guns has been fitted into place.



This is a close-up of the gun mount as it fits into the gun cradle.



## Wings

Doors, access panels, and landing gear were all part of the work on the wings in March and April.



The rear wing attachments, called the wing hinges by Republic, are visible in the upper center of this photo of the root rib.



The left wing has the ammunition bay door, the flap, and the aileron in place.



The main landing gear ( interestingly named alighting gear in some Republic manuals) has been removed from the wing. The large square opening is for the landing gear bearing box.

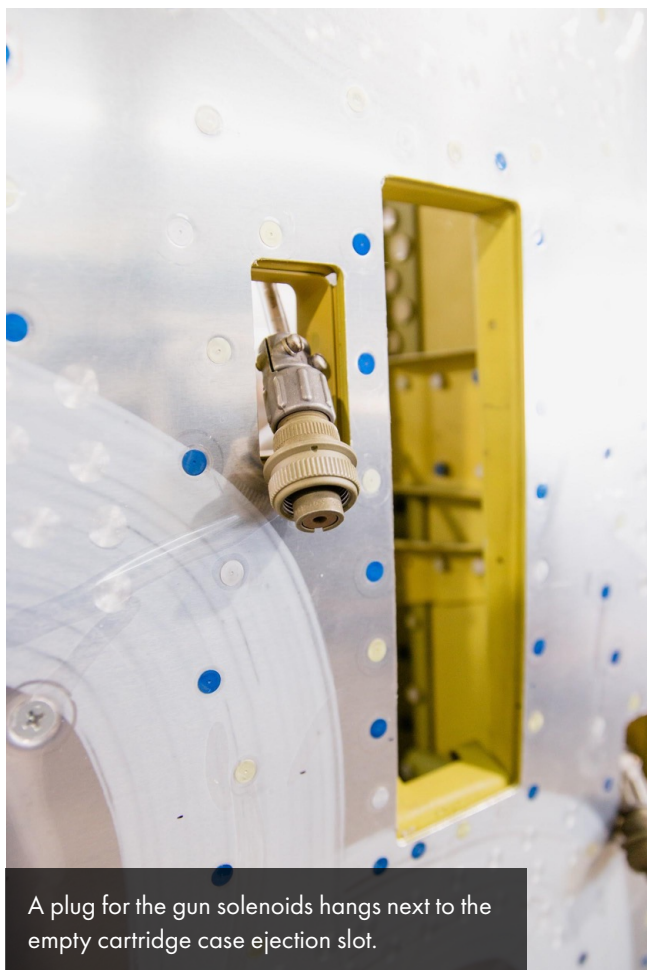


Here the main landing gear has been reinstalled in the right wing.

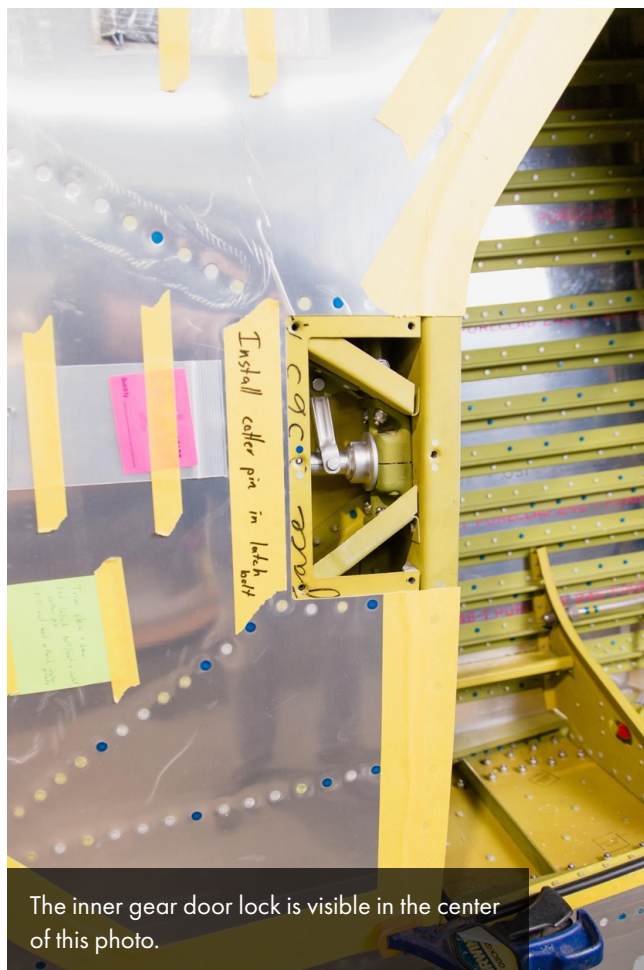
The long rod that runs diagonally along the gear leg in this photo is the shrinkage strut. Its function is to compress the main landing gear strut as it retracts to allow for a shorter gear bay. This in turn allows more room outside of the gear bay for the gun and ammunition bays.



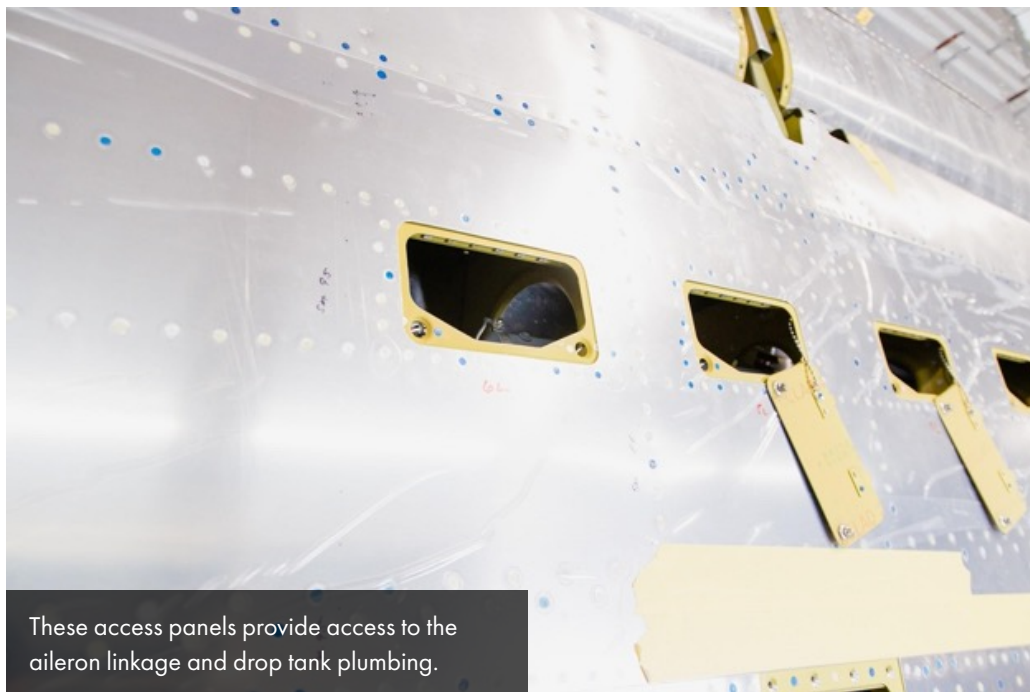
The round opening is for the landing light; the other two provide access to the landing gear downlock.



A plug for the gun solenoids hangs next to the empty cartridge case ejection slot.



The inner gear door lock is visible in the center of this photo.



These access panels provide access to the aileron linkage and drop tank plumbing.



## Wing Doors



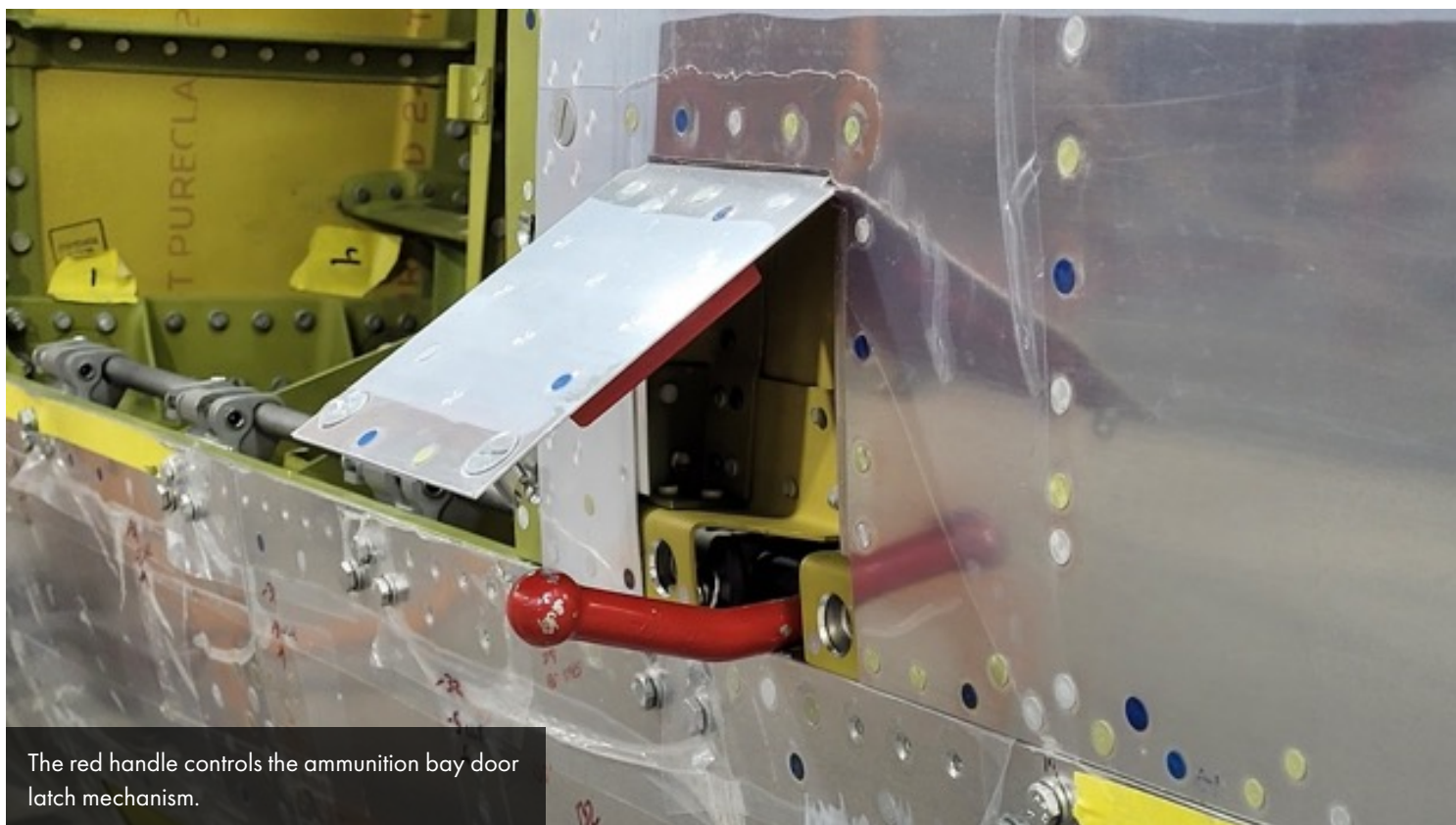
The gun bay door has been painted and the inner skin is clecoed on.



The gun bay cover door nears completion.



The ammunition bay door is in place to check the fit before applying the outer skin.



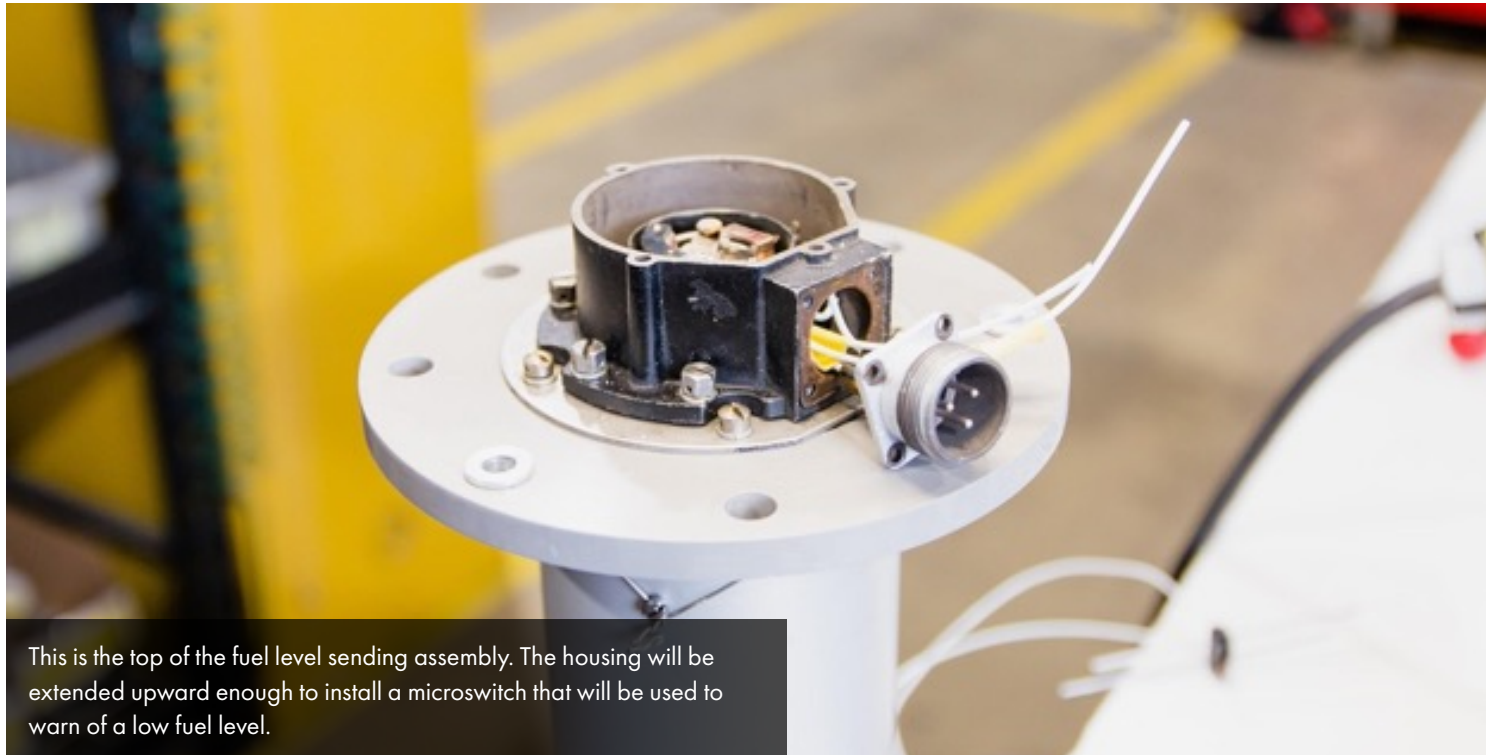
The red handle controls the ammunition bay door latch mechanism.



## Fuselage

One interesting piece of 1940s technology is the fuel gauge assembly. A modification in the interest of better operational safety is being done on this assembly. The fuselage work continues to primarily consist of the installation of the complex systems that control engine, turbosupercharger, hydraulic, and electrical components.





This is the top of the fuel level sending assembly. The housing will be extended upward enough to install a microswitch that will be used to warn of a low fuel level.



A template part for the extension was first machined from REN plastic.



The low fuel level micro switch is test mounted in the extension.



The aluminum extension made from the REN plastic pattern is partially machined at this point.



The flex hose is for fresh air ventilation leading into the cockpit.



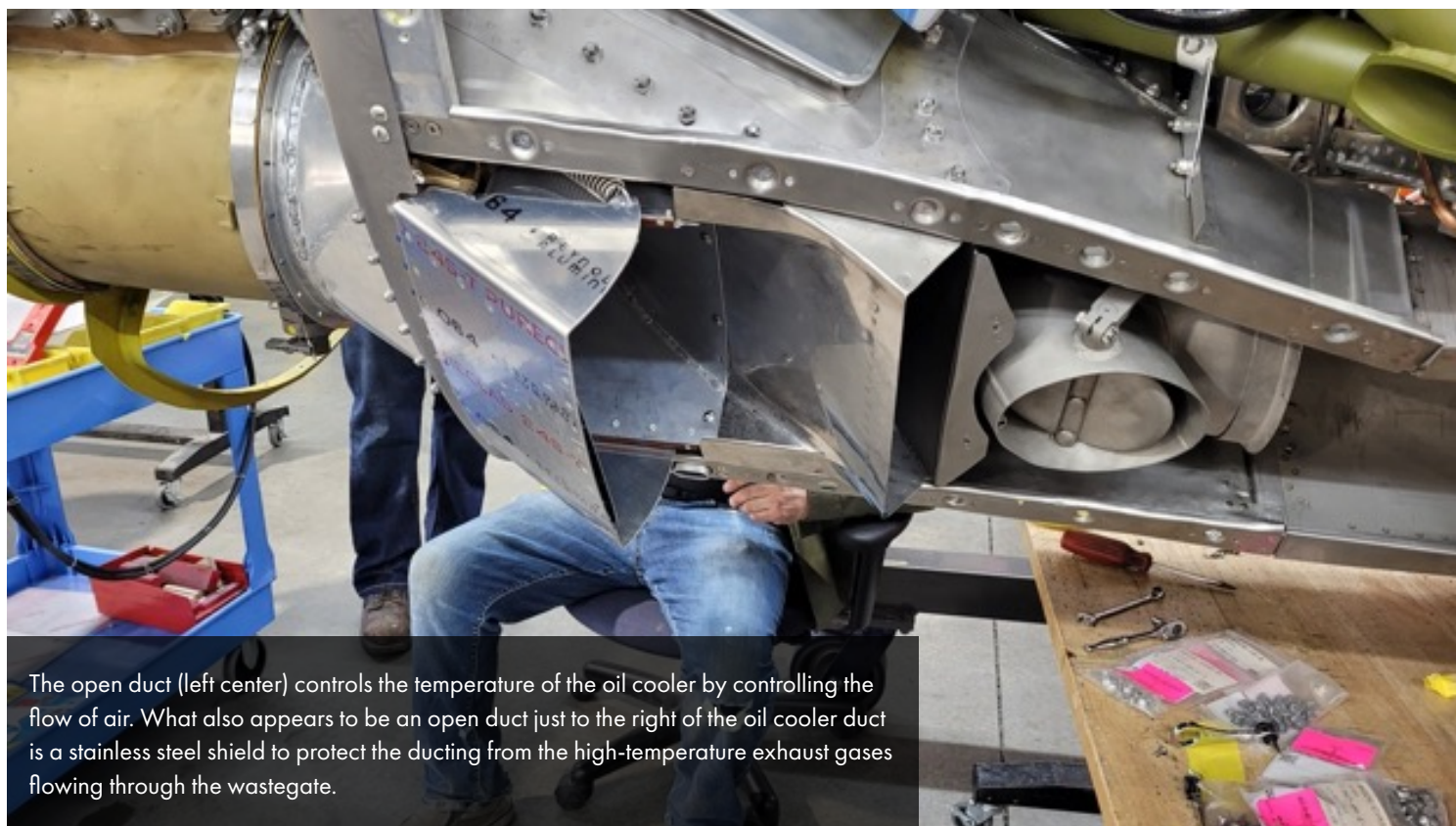
The yellow-green bracket mounts the original 1944 manual starter control. The hole below that originally mounted a propane control. Propane was used to assist in starting.



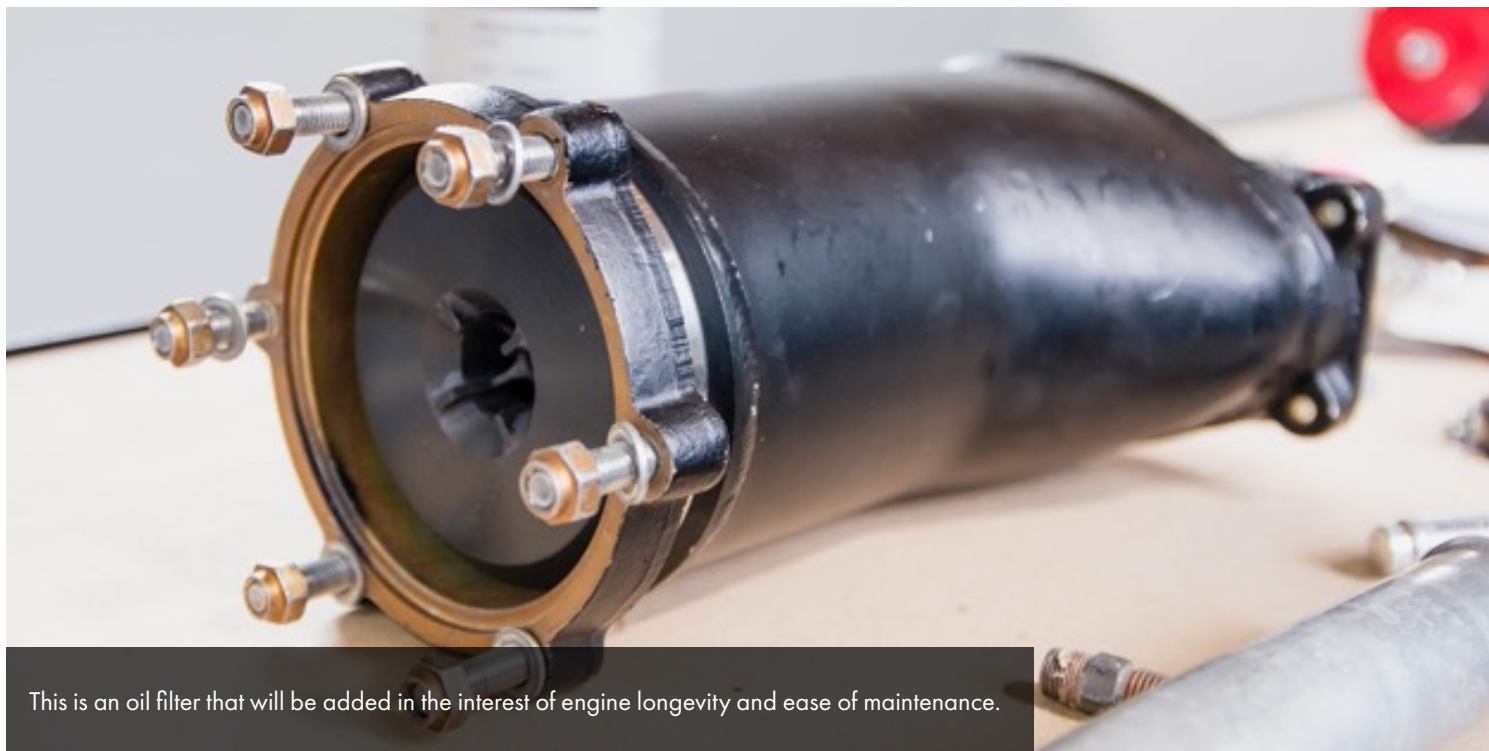
Here is the shipping box, unopened since 1944.



Here is a close-up of the wastegate.



The open duct (left center) controls the temperature of the oil cooler by controlling the flow of air. What also appears to be an open duct just to the right of the oil cooler duct is a stainless steel shield to protect the ducting from the high-temperature exhaust gases flowing through the wastegate.



This is an oil filter that will be added in the interest of engine longevity and ease of maintenance.



The rear skin of the cockpit enclosure required a great deal of fitting, adjusting the curvature, and refitting before it perfectly mated to the fuselage.



The glare shield is being fabricated. It fits just over the gunsight inside the cockpit.



Mike works on trimming a primary cowl angle.





## Turbosupercharger Installation

The very large turbosupercharger is one of the defining characteristics of the P-47's engineering philosophy. This month, the turbosupercharger was finished, tested, and installed.



Ed prepares to install the 280-pound turbosupercharger into the fuselage.



The oval-shaped lower opening is for exhaust gases to drive the bucket wheel in the bottom section of the turbosupercharger. The square opening above that is where compressed air leaves the turbosupercharger on its way to the intercooler and eventually the carburetor.



Here is a view of the intercooler from the front side.



The air exit door for the intercooler is open in this image.



Aaron has started fitting the connecting ducts between the exhaust and the turbosupercharger and also the duct that leads back to the intercooler.



## Dakota Territory Air Museum

This month we will depart from our usual historical section on the history of the P-47 itself and look into the history and mission of the Dakota Territory Air Museum. The museum owns the P-47 restoration; as well as many other beautifully restored flying warbirds and is located at 100 34th Ave NE in Minot, North Dakota. Museum Director, Jenna Grindberg provided the following information about the museum and its mission.

### The Dakota Territory Air Museum's mission statement:

"To be a vital historical aviation resource honoring the men, women, and machines that have impacted the rich history of aviation through displays and events that educate, inspire and entertain people of all ages."

Lope's Hope 3rd and Miss Kitty, two of the flying restored warbirds at Dakota Territory Air Museum are just a small part of the Bruce Eames Collection, *Photo courtesy of William Morgan and DTAM*



The Dakota Territory Air Museum was incorporated in 1986 (the same year as the Minot-Ward County Centennial) by Don Larson, Al Pietsch, and Warren Pietsch. With assistance from the State Centennial Committee, the newly incorporated Dakota Territory Air Museum helped put on the Centennial Air Show in Minot. Construction began on the first building in 1988, an 80ft. x 100ft. hangar now known as the Restoration Hangar on the east side of the property. In 1990-1991 an addition was made to the original hangar which now includes the main entrance of the museum and is known as the Wright Flyer Hangar.



A generous donation in the mid-1990s made by Oswin H. Elker made possible the construction of the third building, the Oswin H. Elker Memorial Wing, which was completed in 2001. Oswin H. Elker was a World War II veteran who flew with the Flying Tigers in the China-Burma-India Theater and was a Surrey, North Dakota native (Surrey is about eight miles east of Minot). Oswin and his family had visited the museum and really liked what was going on here at the museum. Oswin donated some of his items from World War II which are currently a featured exhibit at the museum. In 2007, the Wings of Freedom expansion was completed which almost doubled the gallery space in the Oswin H. Elker Memorial Wing. The fifth building was completed in 2013, the Flying Legends Hangar.

The Dakota Territory Air Museum is now home to over 60 aircraft and thousands of artifacts that have been generously loaned or donated to the museum over the years. The Wright Flyer Hangar is home to the museum's full-scale Wright Flyer replica that was built by museum volunteers in 2003 to commemorate the 100th anniversary of the Wright Brothers first flight in 1903. This hangar is also host to a room full of artifacts and exhibits dating from World War I up through today.



Wilbur and Orville Wright and the replica Wright Flyer display, photo courtesy of Jenna Grindberg  
DTAM Museum Director

The Restoration Hangar is home to many displays including a DC-3 nose cone that is accessible by museum guests, an aircraft engine display that includes engines dating from the late 1910s to the 1960s, and an antique fire truck display that features three immaculately restored fire trucks once in use with the Minot Fire Department that date back to 1919. Several restoration projects call this hangar home. Restoration projects are worked on by museum volunteers. Several of the aircraft on display at the museum today would not have been possible without the dedicated volunteers to help restore and maintain them.



The Oswin H. Elker Memorial Wing currently houses the majority of the museum's general aviation aircraft collection. The Elker Wing features aircraft from just about every decade from the 1910s onward; such as a 1910 Curtiss Pusher (replica), a 1929 Arrow Sport, a Cessna 195, a Beechcraft Staggerwing, and a Lear Jet. The Elker Wing is also the home to our extensive aviation library in our library loft. The library loft contains 3,000+ books on various aviation-related topics which include military aviation history, instruction manuals, commercial aviation history, and much more!

The Flying Legends Hangar is the current home of the Bruce Eames Collection of warbirds. This incredible flying collection has only grown to include rare World War II-era planes like the P-47 Thunderbolt, the Hawker Hurricane, and the FM-2P Wildcat.



Part of the Bruce Eames Collection is two more of DTAM's rare and beautiful flying restored warbirds, the Half Stork Spitfire Mark IX and the Hurricane Hurricane MK IIX #5708 in Wing Commander L.C. Wade's color scheme.  
*Photo courtesy of William Morgan and DTAM*

The Bruce Eames Collection was once based in Houston, Texas at the Texas Flying Legends Museum for part of the year. Every summer, the aircraft would travel to the Dakota Territory Air Museum as a way to keep them safe during the summer hurricane season. Several would also spend some of the summer months in Maine before all migrating back down to Texas for the long North Dakota winters. Today, they are based at the museum year-round.



Our outside static display features aircraft once flown in the 5th Fighter Interceptor Squadron based at nearby Minot Air Force Base; the T-33 Shooting Star, the F-106 Delta Dart, and the F-15 Eagle. These three aircraft tell the story of the historic 5th FIS. An A-7 Corsair II and a C-47 Skytrain round out the outside static display area. Each aircraft has been wonderfully restored and are maintained by museum volunteers. The final part of our outside static display is a model of the B-52 Stratofortress perched on a pedestal right at the center of the museum grounds. The B-52 model was donated to the museum by the U.S. Air Force. The B-52 flies out of nearby Minot AFB and is one of two B-52 bases currently operating in the US. The Dakota Territory Air Museum has a growing aviation education outreach program. For a number of years, the museum has partnered with the Farstad Foundation and provided aviation scholarships that can be used for primary flight training, advanced flight training, maintenance training (A&P), and other aviation-related careers. The museum also hosts several youth aviation camps during the summer months for elementary-aged students and middle-school aged students interested in aviation. ACE (Aviation Camp Experience) is designed for third and fourth graders with an interest in aviation.



ACE Camp kids, photo courtesy of Jenna Grindberg DTAM Museum Director

The three-hour curriculum includes an introduction to the basic concepts of flight and other subjects to introduce aviation to kids. PACE (Passport Aviation Camp Experience) is designed for fifth and sixth graders with a strong interest in aviation. This week-long camp goes deeper into the more complex ideas of flight including advanced flight concepts, the history of modern aviation, military aviation, and careers within the aviation industry.



PACE Camp 5th and 6th graders. photo courtesy of Jenna Grindberg DTAM Museum Director

PACE ends in a free introductory flight for the participants in the class. PACE is done in partnership with the Minot Aero Center who provide the aircraft and pilots for the introductory flight.



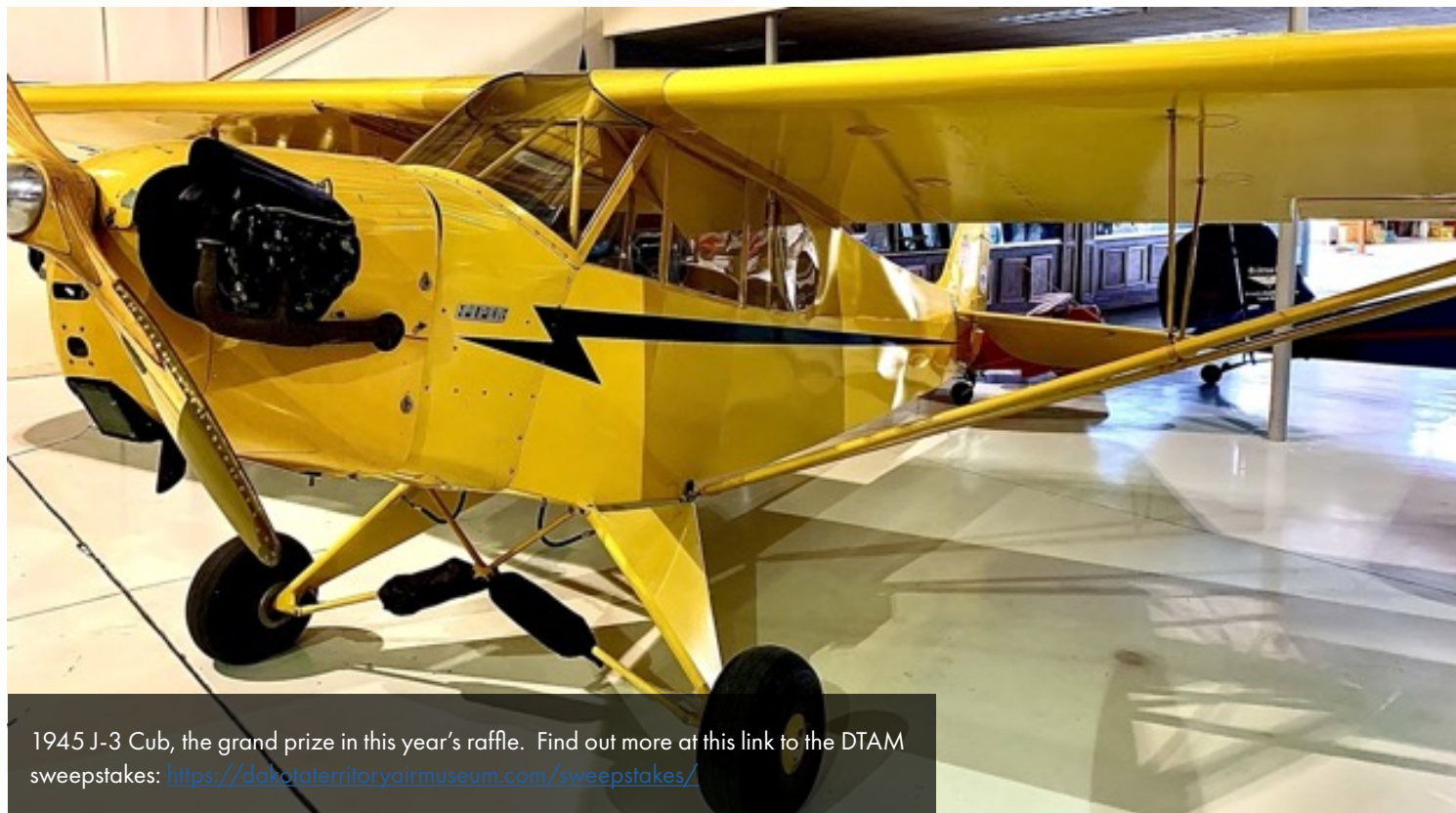
PACE Camp kids excitedly await their ride. photo courtesy of Jenna Grindberg DTAM Museum Director

During the course of the year, the Dakota Territory Air Museum also hosts numerous class groups for school tours. The museum generally has between 700-1000 students come through with school groups from all over the state. These tours are provided to the schools at no cost.



A school tour at DTAM, photo courtesy of Jenna Grindberg DTAM Museum Director

Every year for the last 25 years, the museum has been holding an annual airplane raffle as a means to fundraise for museum operations. As a 501c, non-profit organization, without the support of the public, we would not be able to continue to function as we do today. 2022 is the 26th year for the airplane raffle.



This year, the grand prize is a 1945 J-3 Piper Cub or \$20,000 cash, winner's choice! Every week we also draw for Dakota Territory Air Museum leather bomber jackets. We will give away a total of 25 jackets in 20 weeks leading up to the grand prize drawing which will be held on August 13, 2022, here at the museum. Tickets to enter the raffle are \$50/each and there will be a maximum of 4,000 paid entries. You can find more information on the museum's website, [www.dakotaterritoryairmuseum.com](https://dakotaterritoryairmuseum.com), by giving us a call at 701-852-8500 or emailing us at [airmuseum@minot.com](mailto:airmuseum@minot.com).

As you can see, Dakota Territory Air Museum has certainly fulfilled its mission statement!

Special thanks to Jenna Grindberg, Warren Pietsch, and all the folks at Dakota Territory Air Museum. Thanks also to Bruce Eames, who has committed the resources and time to keep the warbirds in the Eames Collection not only flying, but also telling the stories of the people who built, flew, and maintained the WWII planes that make up that collection.