



Sept/Oct 2021

SEPT/OCT

Dakota Territory Air Museum's P-47 Update

by Chuck Cravens



AIRCORPS AVIATION



A spare R-2800 has been mounted for fitting the various firewall forward components.



www.dakotaterritoryairmuseum.com



Update

This month the work on the control surfaces continues. The turbosupercharger system ducting is also progressing nicely. Two exciting milestones were reached in October as the landing gear were mounted in the wings and an R-2800 was affixed to the engine mount for firewall forward mock up work.

In the history section, we look into the long range challenges a pilot had to endure on missions lasting as much as 8 hours in a tropical climate.

Control Surfaces

Work on the rudder, flaps, and aileron linkage was a big part of the restoration work this month.



The rudder structure has been painted and it is ready for the skins to be permanently riveted on.



Work on skinning the rudder continues after the internal structure has come back from the paint shop.



The flap structure also has been painted and placed back in the fixture for final assembly and skinning.





Main Landing Gear

The main landing gear assemblies require a great deal of precision fitting to be sure they will function flawlessly. They were fitted, adjusted and installed in October.



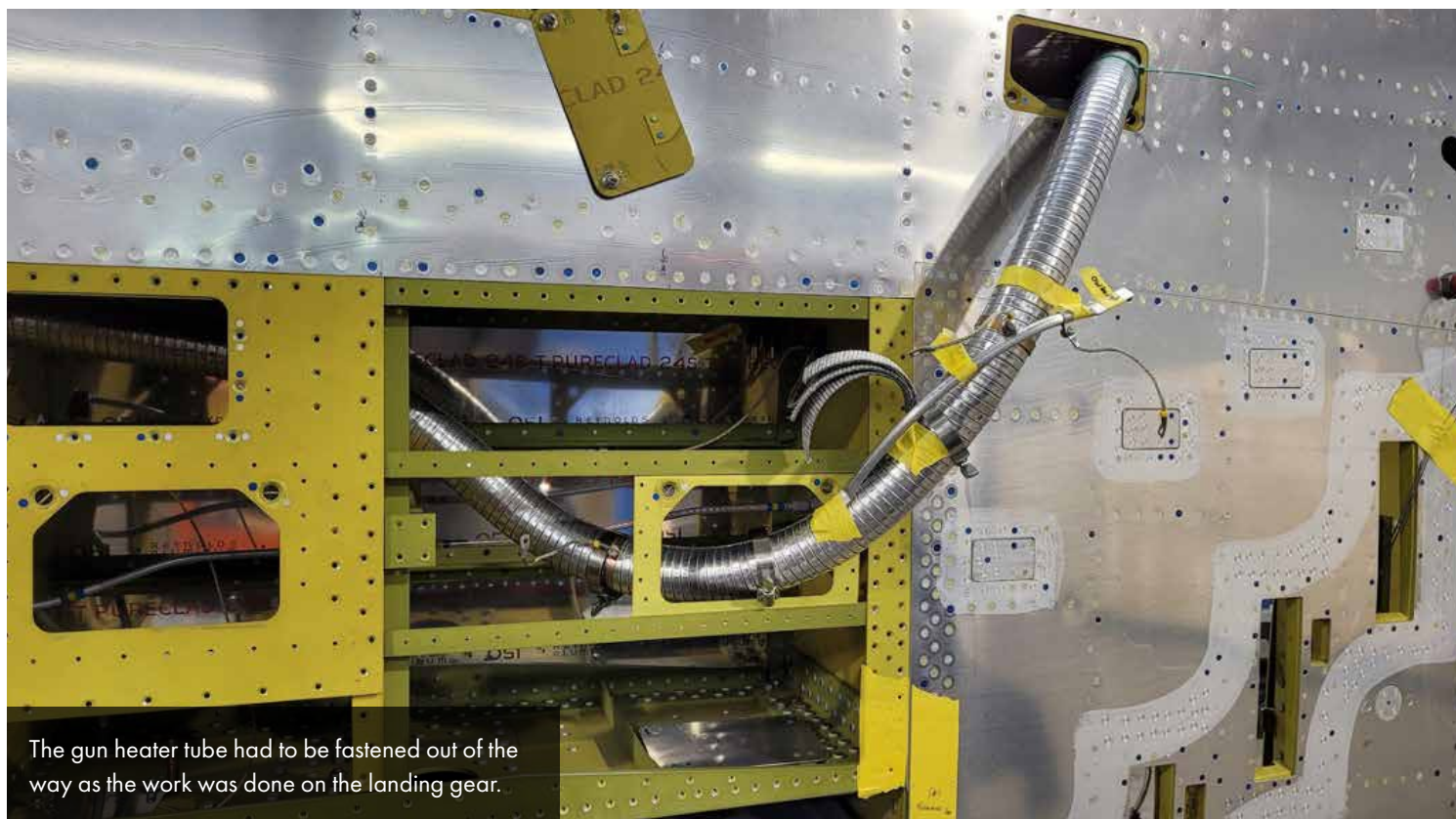
Randy examines the main gear wheel well.



Here is a close-up of the main gear.



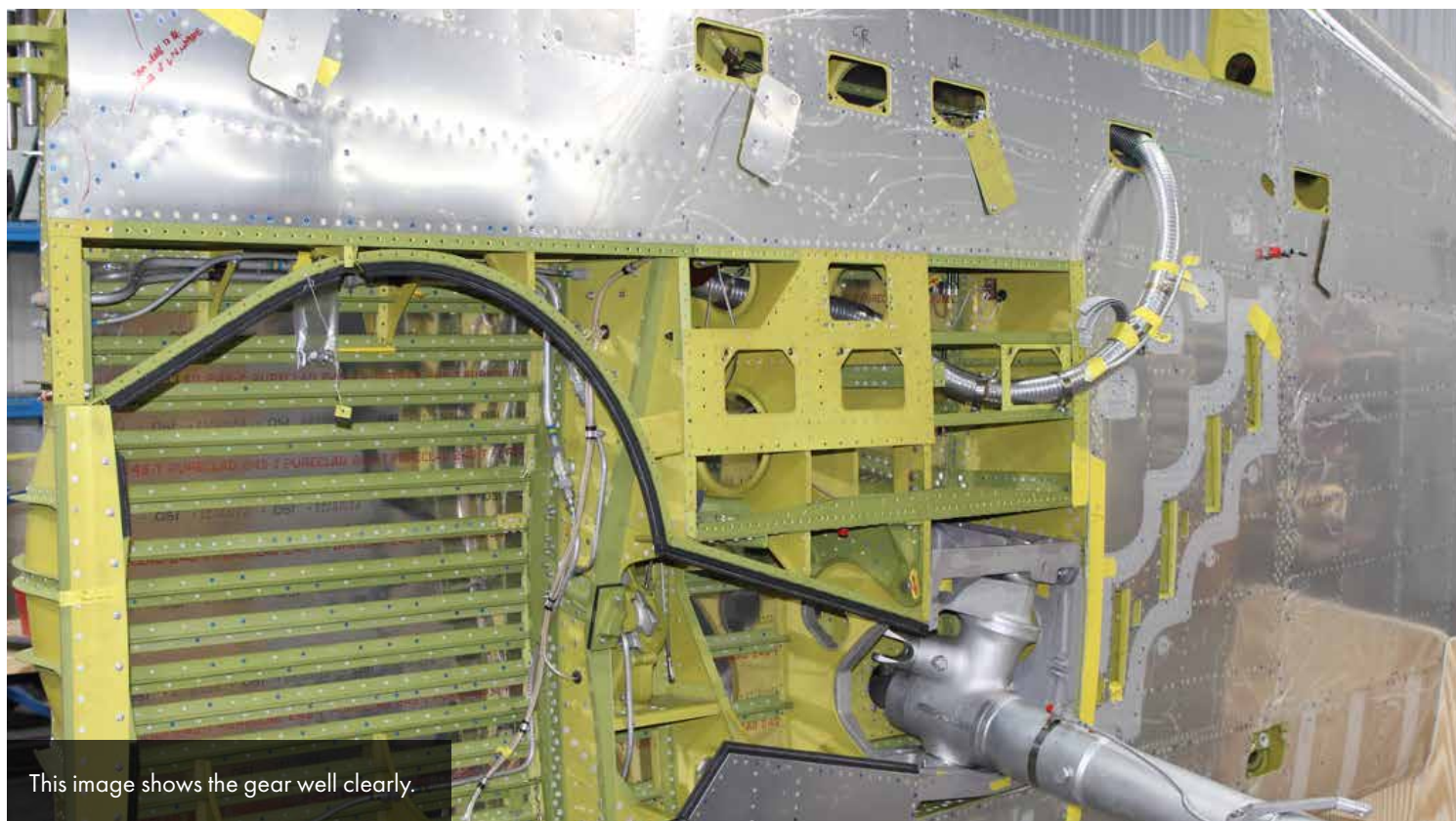
Mark and John check the fit of the main landing gear assembly in the right wing.



The gun heater tube had to be fastened out of the way as the work was done on the landing gear.



Steve is sizing the main landing gear attachment bolt hole.



This image shows the gear well clearly.



John and Mark work on the swing of the right gear.



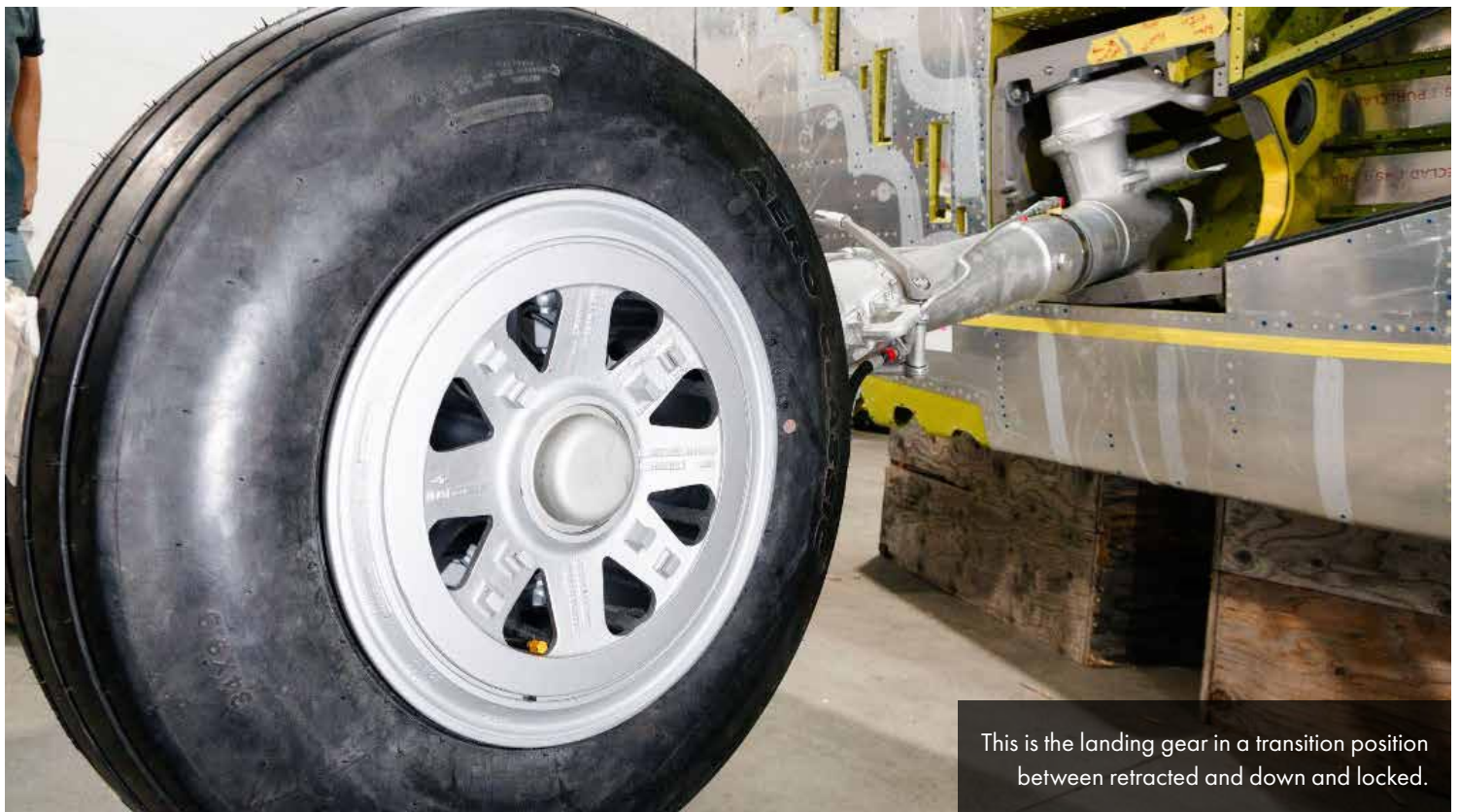
Mark and Brad work on the free movement on the left main gear.



Brad and Mark swing the gear up into the retracted position.



The left main gear is tucked up in the retracted position.



This is the landing gear in a transition position between retracted and down and locked.



Here is a close-up of the landing gear strut and tire. The rod connecting the lower gear fork and the landing gear box in the wing is the compression rod that reduces the length of the gear strut as the landing gear retracts, allowing it to fit in a shorter wheel well than would otherwise be possible. This allows more room outboard of the gear for the gun and ammo bays. It was the Republic engineers' solution to the problem of fitting four .50 caliber M2 machine guns in each wing.



The gear is installed in the right wing in this view of the right wing gear well.



Mark Tisler worked on fabricating the landing gear doors this month.



The basic gear door structure is fitted for skins.



Induction and Turbosupercharger System Parts



This section of the turbosupercharger system has been nicknamed "the pants" by the guys for its resemblance to a pair of trousers. These passages carry exhaust gases back to the turbine section of the turbosupercharger.



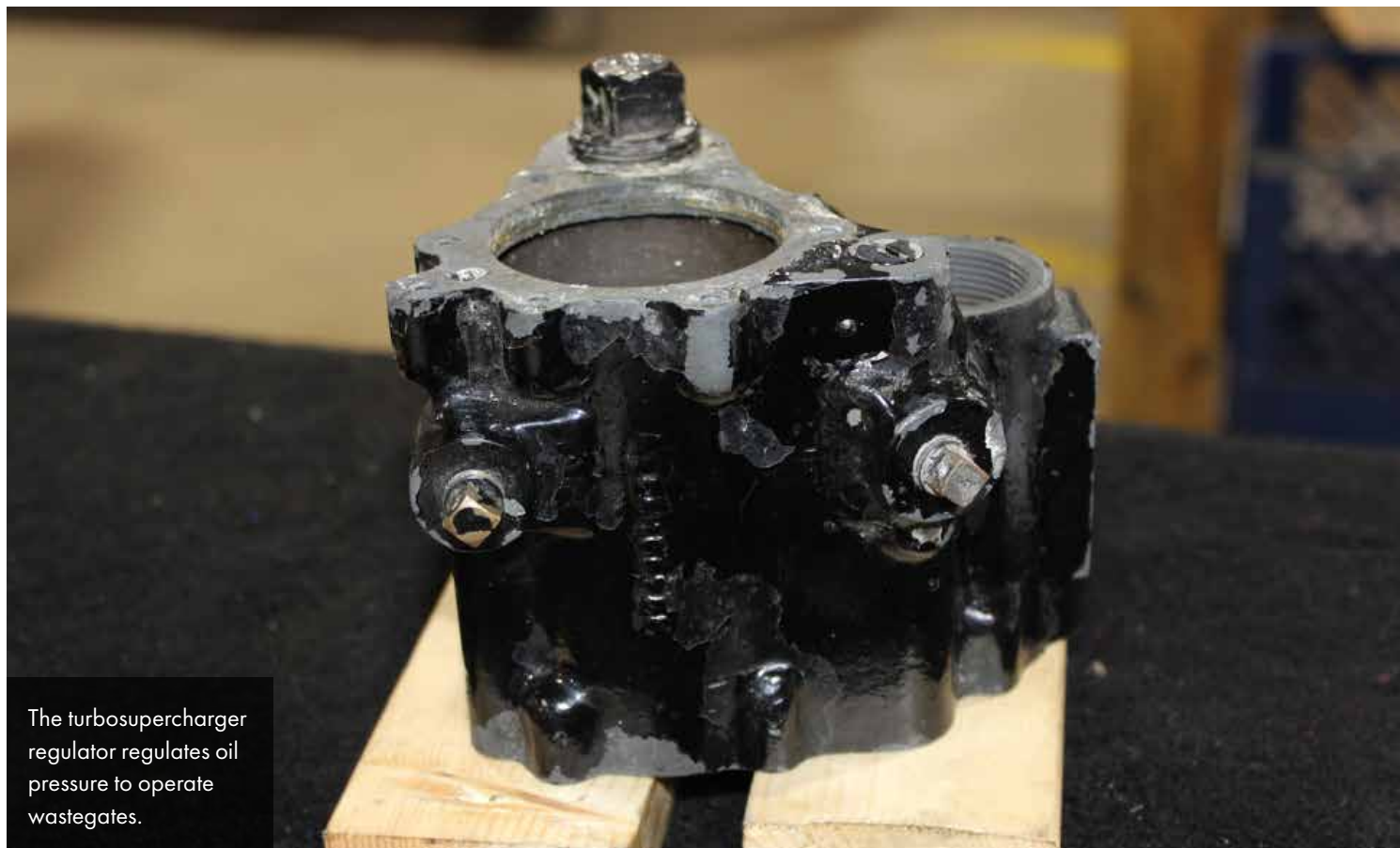
The large casting is the housing for the bearing that goes between the compressor and turbine sections of the turbosupercharger. The smaller part to the left is the turbosupercharger oil pump.



The carburetor and intercooler air duct is ready for installation.



This large duct component guides incoming air to the intercooler and to the turbosupercharger.



The turbosupercharger regulator regulates oil pressure to operate wastegates.



Here is another view of the turbosupercharger regulator.



Aaron works on an intercooler duct.



Firewall Forward

One of this month's milestones was the trial installation of an engine for mock up purposes. This allows all the connecting assemblies to be fitted in readiness for the delivery of the airworthy overhauled R-2800 when it arrives.



These are the Lord engine mounts for the R-2800 that will absorb vibration as the big radial turns 13 feet of Curtiss Electric prop.



A Pratt & Whitney R-2800 has been mounted on the P-47. It is not the overhauled engine that will eventually power the Thunderbolt, but it is very useful for fitting the various accessories.



Some of the collection of exhaust manifold parts rest on a bench. Some of these components were not usable, or were missing, but a trip to the California desert this month happened and enough new old stock exhaust parts were found and purchased to complete that phase of the restoration.



This new/old stock exhaust manifold section still has sand from the desert visible inside.



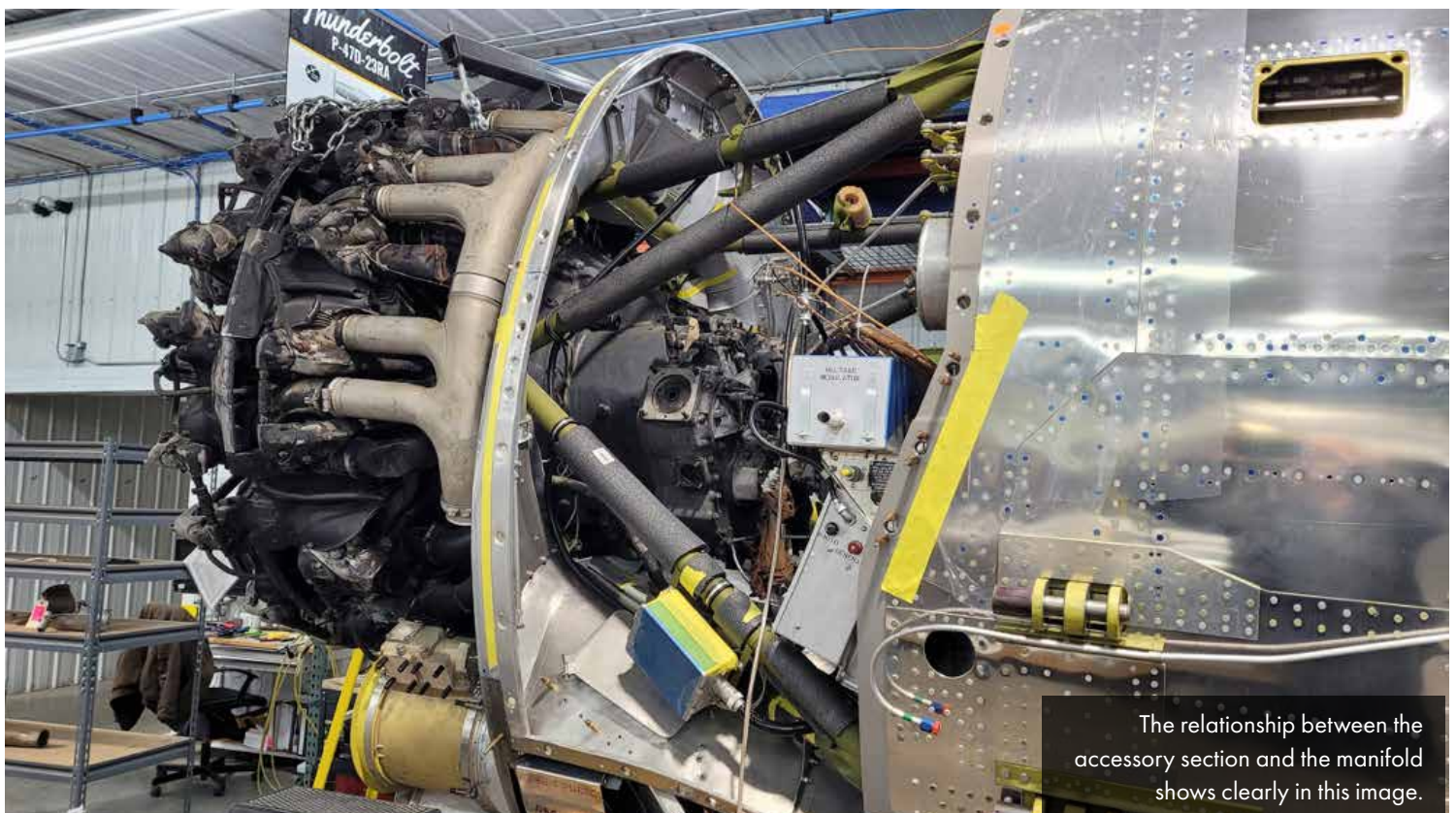
The R-2800 from the front.

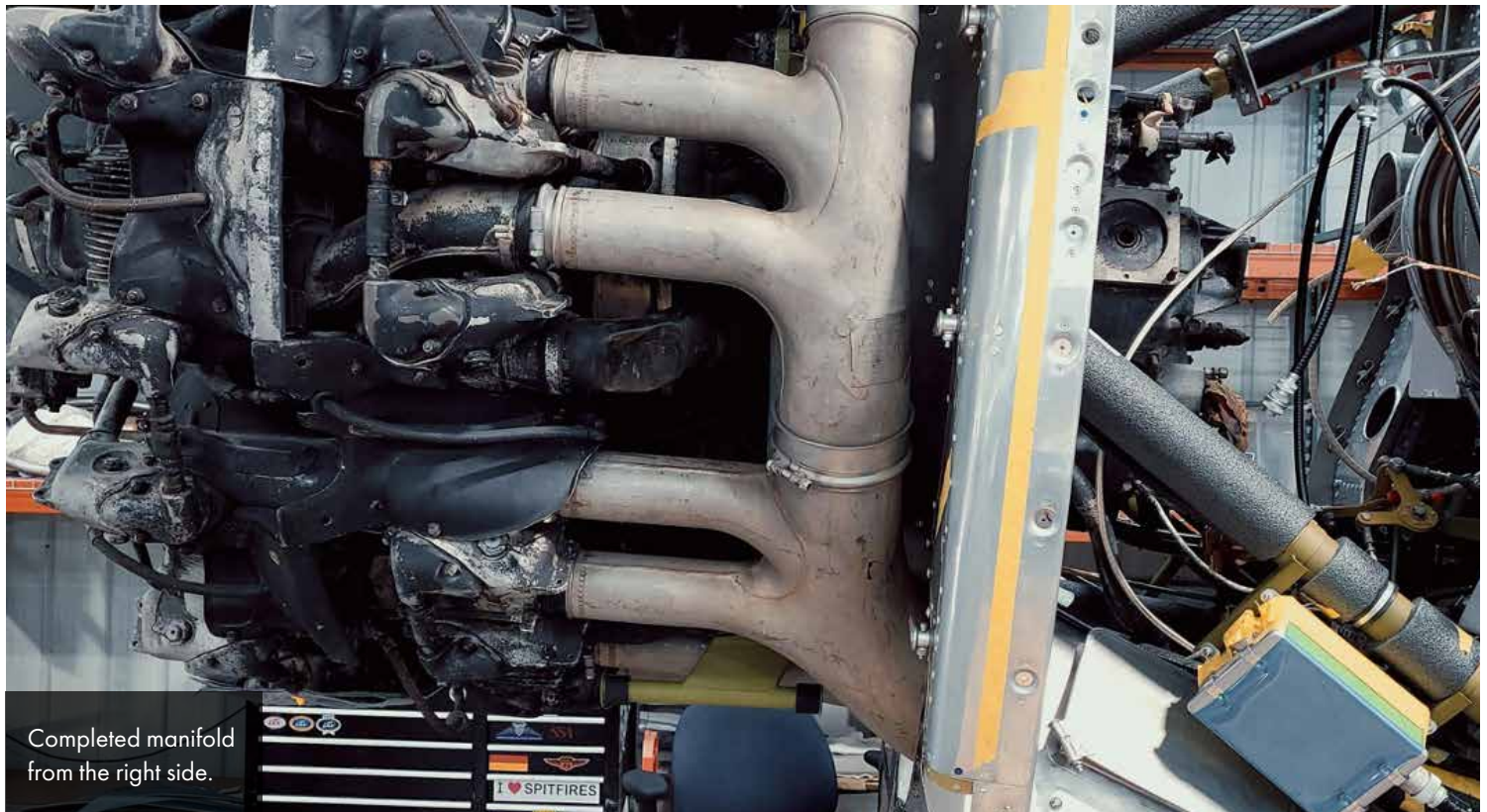


Mark works on assembling the exhaust manifold.



Work progresses from the top of the manifold to the left side.

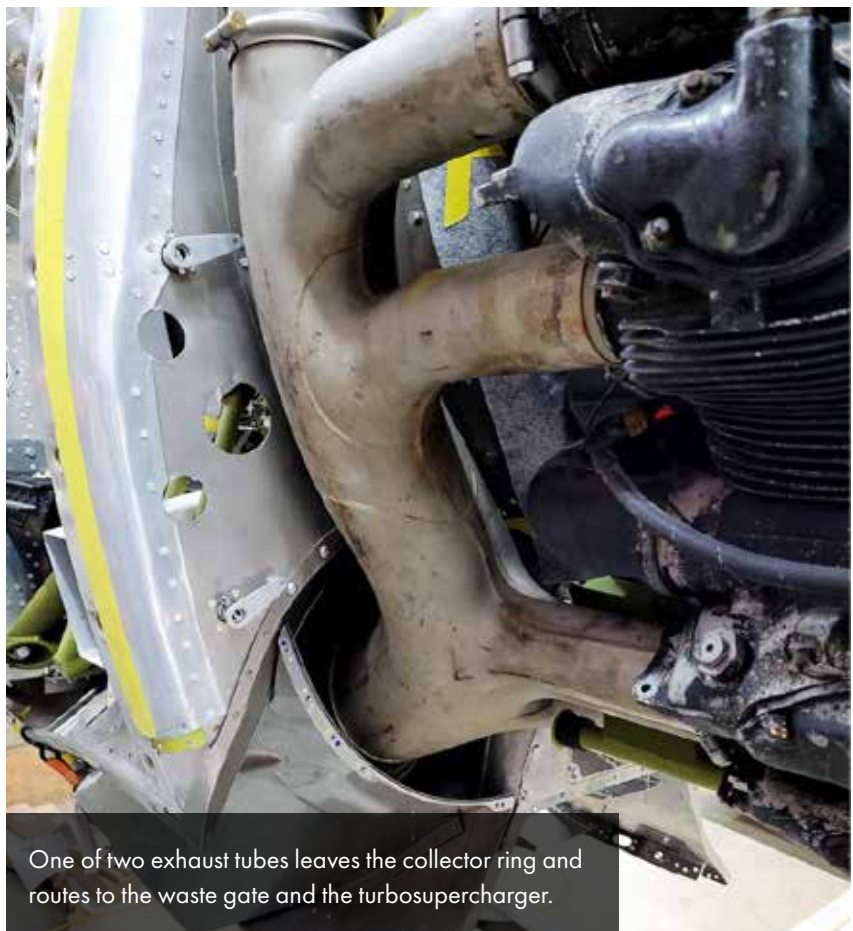




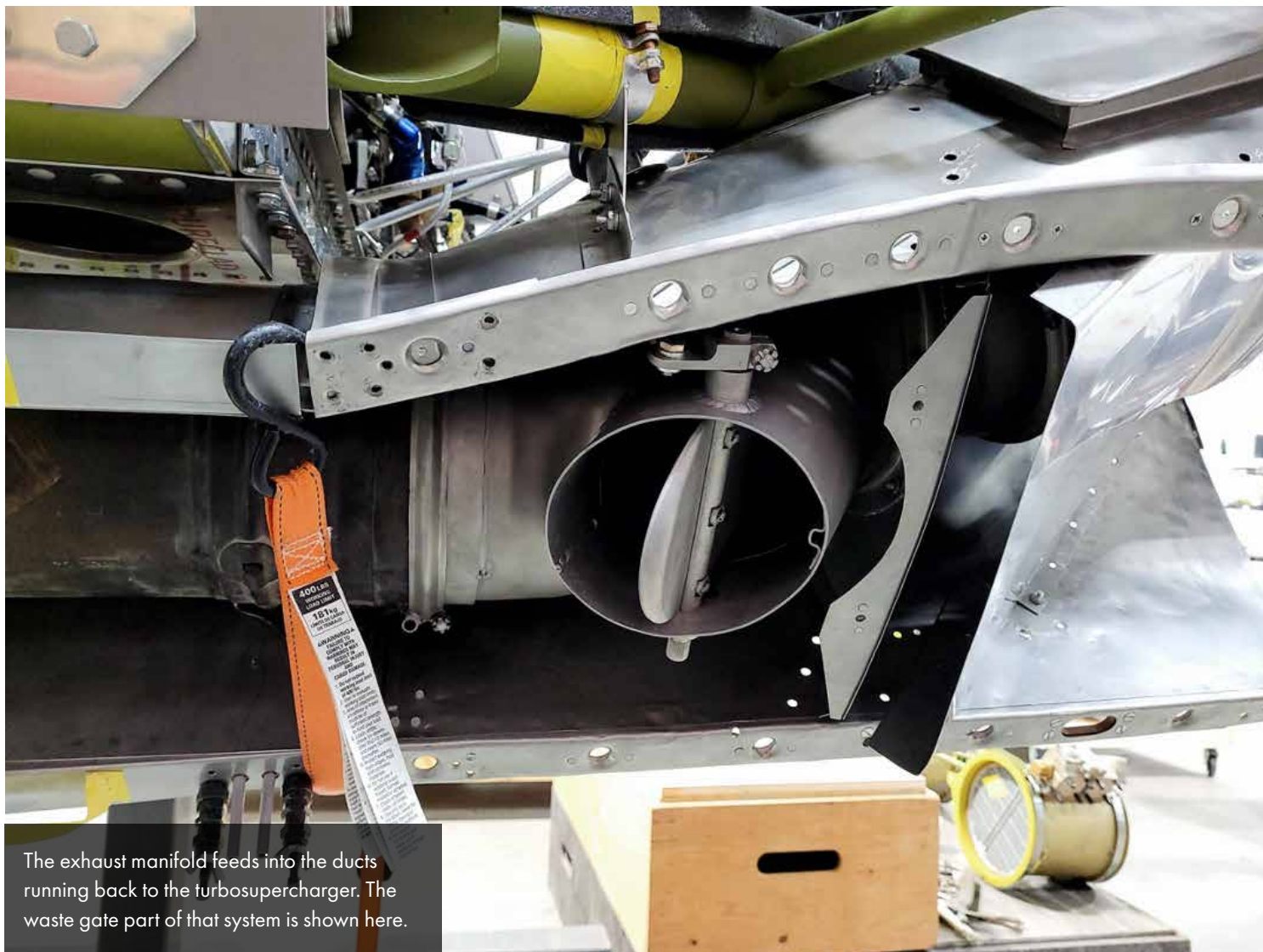
Completed manifold
from the right side.



Here is the left side of
the exhaust manifold.



One of two exhaust tubes leaves the collector ring and
routes to the waste gate and the turbosupercharger.



The exhaust manifold feeds into the ducts running back to the turbosupercharger. The waste gate part of that system is shown here.



The waste gate is used to regulate pressure to the turbosupercharger. When excess exhaust gas pressure isn't needed, the waste gate is opened and the pressure bleeds off.



Work on the cockpit enclosure has been resumed, and the skin pieces along the lower part of the assembly are being fitted.



The Long Range Missions

One of this month's milestones was the trial installation of an engine for mock up purposes. This allows all the connecting assemblies to be fitted in readiness for the delivery of the airworthy overhauled R-2800 when it arrives.



A P-47 looks ready for a mission with wing and centerline drop tanks, as used on SW Pacific long range missions. USAAF photo

July of 1944 was a relatively quiet period for the 35th Fighter Group. The 39th Fighter Squadron flew no combat missions between late June and the beginning of August. The lull in combat allowed for experimentation in the long range operation of the new P-47-23s. Training in the new techniques discovered as a result of these experiments, took up much of July.

Flying from Nadzab on August 7, 1944, Major Richard Cella led a flight of twenty-six of the new P-47D-23s on a 900 mile mission to Noemfoor. The task of the mission was to cover the building of airfields on Middleburg Island. Similar missions continued for 6 weeks, but the 39th was able to move up to Noemfoor earlier than that.

The 39th conducted its first operations from Noemfoor on August 9th. Noemfoor offered some significant advantages with its 7000 foot compacted coral runway. Continued testing of maximum takeoff loads could be conducted on the long, smooth, and relatively unobstructed, coral runway. The squadron settled on two 175 gallon tanks under the wings and an additional 75 gallon belly tank. The combined total of these three tanks was 425 gallons of fuel, which added 2,550 lbs. to the takeoff weight. With this additional weight, the minimum take off speed was found to be 125-130 mph. That is 15 to 20 mph higher than the Thunderbolt without the drop tanks.

During this time period, Charles A. Lindbergh visited various 5th AF and Navy fighter groups as a consultant. His role was to help improve range and load carrying performance of the fighters in use in the SW Pacific theater.



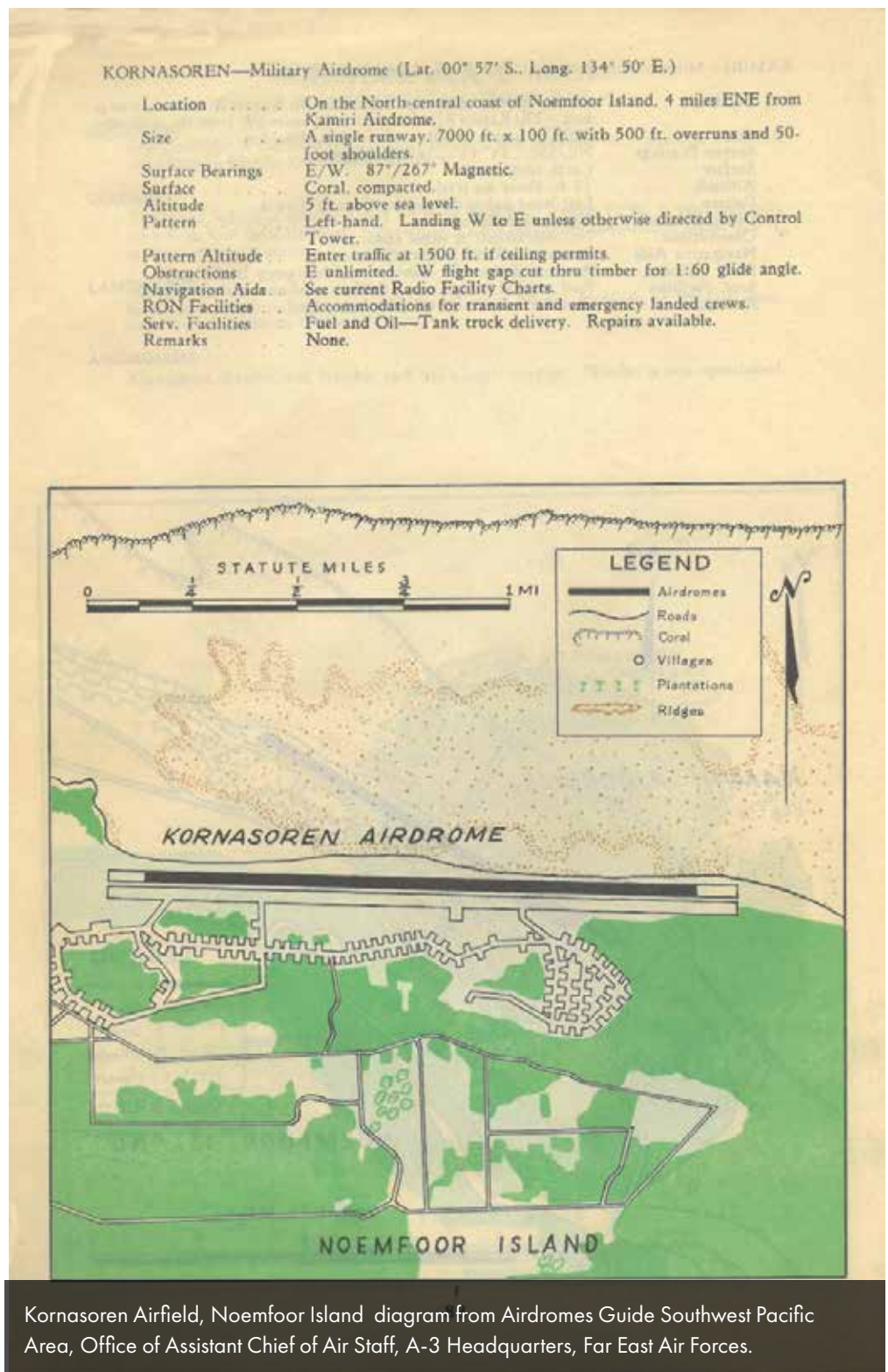
Lindbergh visited the 35th Fighter Group on August 14, 1944 and presented his increased range procedures.¹

The famous aviator demonstrated that by raising manifold pressure and lowering engine revolutions, fuel economy was greatly improved in the P-47.

On August 20th, another long range mission went on a fighter sweep led by Captain Gordon Prentice. The duration of that mission was over 5 hours and 20 minutes, making it the longest mission the 39th Fighter Squadron had flown, and perhaps the longest of any 5th AF mission to date.²

With the maximum range techniques Colonel Charles A. Lindbergh encouraged, together with the knowledge learned from the experiments that the squadron pilots conducted, the P-47 could now range out over nearly triple the range experienced before these innovations.

"No longer would the skeptics berate the P-47's range. Later in the year, the squadron registered missions up to eight hours."³



¹ Charles A. Lindbergh, *The Wartime Journals of Charles A. Lindbergh*, Harcourt, Brace, Jovanovich, Inc., New York, New York, 1970, p 905-906

² John Stanaway, *Cobra in the Clouds*, Historical Aviation Album 1982.

³ John Stanaway, *Cobra in the Clouds*, Historical Aviation Album 1982, Temple City, CA, p.29



These techniques certainly increased the combat utility of the Thunderbolt in the SW Pacific, but what is seldom discussed is what a price the pilots paid on these extended missions.

To take advantage of the technique of high manifold pressure and low rpms, the long range flights had to be flown at low altitudes. High enough manifold pressure couldn't be maintained at the low rpms if the P-47s flew much higher than 3,000 feet.

The pilot of a P-47 sits just above two tubes that supply hot exhaust gases to drive the turbosupercharger and behind the big radial R-2800. A great deal of heat is generated by the powerplant and turbosupercharger system. Even in a tropical environment like New Guinea where triple digit temperatures on the ground were common, pilots would normally mitigate the heat to some degree by climbing to an altitude that was cooler. Unfortunately for them however, the new long range techniques didn't allow that, so pilots sweated in their cockpit for as long as 8 ½ hours. The pilots would return dangerously dehydrated, and completely exhausted from missions like these.