

ACE Allisons

Volume VIII Issue I

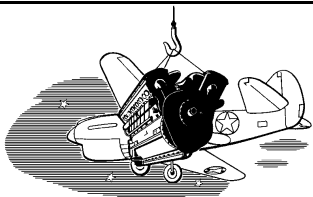
April 2011

The Ever Expanding Demands for the Allison V-1710

Those of you who have been following *ACE Allisons* for some time are aware that we are building the unique two-stage V-1710-G6s for Pat Harker's forthcoming P-82. Everything about this project is unique, and that it is being pursued is a tribute to Pat Harker, his vision and perseverance. A roadblock to the success of the project has been the lack of flight worthy right and left-handed, full-feathering, *AeroProducts* propellers. Pat has taken the path of commissioning MT Propellers to design replacements, and made the decision to obtaining FAA certification prior to flying the P-82E. This program requires a 110-hour ground test as a part of the qualification program. To this end *ACE Allisons* is building up one of Pat's engines to drive the test propeller. This engine will incorporate all of the associated *ACE Allisons* modifications, both approved and pending, to take advantage of the prolonged test and subsequent teardown for inspection. This engine will first be calibrated on our Dyno, then mounted on an instrumented test truck.

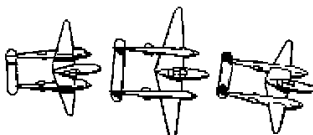


A key feature of the repackaged Dyno is the incorporation of a Torque sensor in the drive line and a digital data system to record both torque and speed, directly computed as horsepower.



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A major component of the unique G6 engine is the Bendix SD400 Speed Density Carburetor. This "Carburetor" is actually a fuel control, and there are no vendors able to overhaul and qualify the unit. Pat Harker has acquired a special purpose test bench tai-

lored to the requirements of the SD400 and *ACE Allisons* has adapted the USAF test and overhaul procedures necessary to repair and calibrate the units for service. Needless to say, this comprehensive program has been a primary focus during the past year.

We are continuing our quest to improve the V-1710 by seeking FAA approval of additional repairs directed toward keeping these engines flight worthy for many years to come. With time comes corrosion, and many of the items we are working on remove the effects of corrosion and return parts to service without the necessity of manufacturing expensive new parts, or use modern processes to minimize future degradation of engine components. The acceptance of these improvements and repairs by owners and operators of our engines shows that there is a need and interest in our continuing efforts to enhance these wonderful engines, while providing pilots, operators and owners with the confidence that their Warbird has the best Allison in the world.

Bud Wheeler, President

Report from NWOC 2011

This year the National Warbird Operators Conference program did not include an Engine panel, a feature that was obvious for its omission. Still a number of the presenters did provide information relative to our engine interests.

- The FAA presenter noted that the agency is aggressively working to standardize policies and practices between the regions. Warbird operators are likely to be affected by these changes. One outcome of this is likely to be a higher standard for documentation and engineering of changes to both engines and airframes.
- The future of leaded aviation fuel was a major topic. Since last year there has been a lot of action precipitated by the Environmental Protection Agency. In particular all States must meet new standards for air quality regarding lead by 2017. This is not a ban on 100LL fuel, rather air basins found to be in non-compliance will have to have mitigating plans in effect. At the present time testing and sampling is underway to establish what the baseline amounts of lead in the air are.
- There are several projects underway to identify a replacement fuel. It was stated that there is not a “drop in” replacement, however there does appear to be some hope that a 100VLL fuel specification having 20% less lead than allowed in 100LL may be viable. In fact, this is about the actual amount of lead being used today as the quality of the base fuel stock is quite good.

Prototype P-82 Propeller Powers P-51A Polar Bear

MT Propeller is very experienced at designing and manufacturing propellers for a wide range of engines and aircraft. Still a constant speed, four blade, propeller for a SAE 50 spline shaft having full feathering capability and rated for over 2,000 horsepower, was new; however the design utilizes features already in their manufacturing line. Even so, since the propeller is to undergo the expensive and prolonged certification process, it was necessary that the design be finalized prior to the 110-hour test. For that purpose

the prototype propeller was installed on Gerry Gabe's Allison powered P-51A *Polar Bear* and flown through a 10-hour test program beginning last December. Pitch change rates, rpm stability and vibration levels were all investigated in a successful flight test program.

This propeller is within fifteen pounds of the weight of the 3-blade Curtiss-Electric normally on the airplane, however the blades are considerably lighter. Pilot Dave Morss observed that on take-off the airplane behaved more like a wooden bladed Spitfire, and it could really climb.

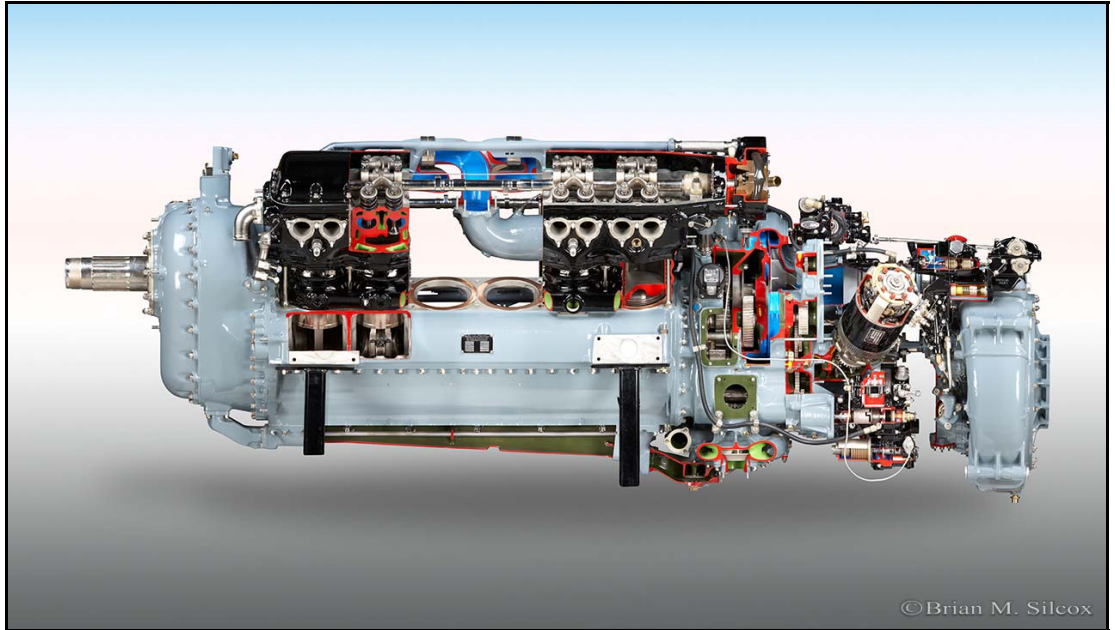
You might observe the “notch” on the trailing edge of the blades, near the hub. This will not be necessary on the P-82E, but was necessary on the P-51A because of the extended carburetor air inlet.



The MT Propeller design features a billet aluminum hub and counterweighted wooden blades. It is a hydraulically operated unit, with the counterweight and an internal spring taking the blades to feather if engine oil pressure is lost.

Cutaway

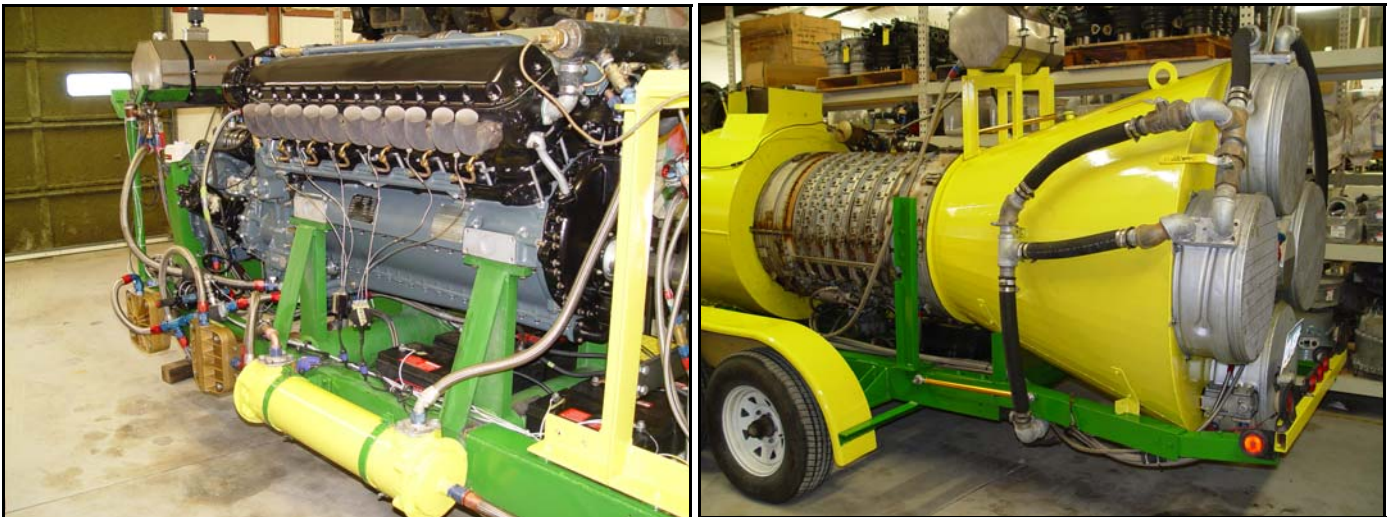
Our emphasis is usually on engines that fly, but Pat Harker came across this military prepared two-stage **V-1710-G6** cutaway of the engines on his P-82E. It was in really poor condition and he wanted a museum piece to accompany the *Twin Mustang*. ACE Allison's did the restoration, using the same



methods, tooling and skills they apply to every engine leaving their shop. While all of our engines look good from the outside, here you can see how they look on the inside. This dramatic photo was created by Brian Silcox, who has a unique way of imaging an engine. Thank you Brian!

ACE Allison's Repackages V-1710 Test Stand

In our last issue we reported that our dyno/test stand had been upgraded to include digital data acquisition and an electronic torque meter. We have now completed a repackaging project to make the unit easier to operate and to simplify changing engines and engine types. When you see us coming down the



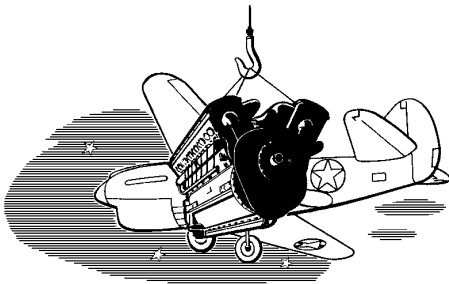
Here is a **G6** mounted on the Dyno. The right view shows the **J79** compressor and repackaged inlet shroud and its coolant radiators. It looks like a rocket ship going down the highway, but we get great cooling. The variable stators in the **J79** compressor are the key to the Dyno being able to adjust the load on the engine so that the full range of engine rpm and manifold pressures are demonstrated. Note the uniform light gray exhaust stains in the stacks showing that the ACE Allison's repaired Speed Density carburetor is operating at the proper mixture.

WHAT'S NEW AT ALLISON COMPETITION ENGINES

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Allison Engine Quiz: *See our website for answers*

- The V-1710 must always be mounted on rubber vibration mounts. Yes / No
- When mounting the engine using the four side pads, the bolts should be:
 - A. 3/8"-16 UNC
 - B. 7/16"-14 UNC
 - C. 0.363"-14 Aero-Thread
- When a go-around is necessary during landing, should the engine RPM be increased? Yes / No
- Supercharger impellers on left & right turning V-1710s turn the same direction as the Prop. Yes / No
- When is an aneroid compensated pressure relief valve required on the coolant header tank?
- Allison defines 100 % Power as:
 - A. Normal Rated
 - B. Take-Off
 - C. Military
 - D. War Emergency

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