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MLG Oleo and Shock Pad Maintenance

This guidance is applicable to ERCOUPE 415-C, CD, D, E, G, F-1, F-1A and Alon aircraft that are equipped with either the Hayes welded or Erco forged trailing link MLG assembles. Serial numbers 112 and up.

Background

Ercoupe / Forney / Alon aircraft are designed with a number of unique safety features that add to its stability on the ground and in the air. Among those features are its ability to run on the ground up to 60 mph without flying off prior to the pilots' deliberate rotation and upon landing, to run out on the ground without the tendency to balloon back into the air.

This feature is a function of a design that places the wings angle of attack at a slightly negative angle (-3.5 Degrees) when running on the ground. This negative angle of attack is only assured when the aircraft is rigged correctly, with the proper tail height. Any loss of tail height results in the angle of attack moving positive, thus negating this design feature.

Nose Landing gear (NLG)

The Ercoupe is designed to rest on its NLG and MLG with a 75" tail height resulting in the wings being at slightly negative angle of attack.

At this point the aircrafts NLG is resting on its internal taxi spring. This height is fixed and can only be adjusted by the use of a shorter or longer taxi spring. As an example, when the Univair STC'd dual nose fork is installed a shorter taxi spring is required to maintain the proper angle of attack. In addition to the taxi spring an oil only oleo is incorporated into the design for the sole purpose of cushioning the landing forces and dampening the action of the NLG taxi spring.

Main Landing Gear (MLG)

The MLG is resting solely on the rubber shock pads (taxi stack). This height is fixed and only changes as the shock pads age; resulting in reduced tail height.

When installed new, the rubber shock pads (taxi stack) are firmly fixed between the bottom plate and the taxi stack top fitting.

Aging will be noticed as a loss of tail height at rest, rattling of the taxi stack top fitting as you taxi and upon inspection (on jacks) vertical movement of the taxi stack top fitting along the oleo strut cylinder.

Any loss of tail height due to a worn MLG taxi stacks should be corrected to restore the static angle of attack by replacement of the shock pads.

Lacking a maintenance limit call out – it would be appropriate to replace the taxi stack donuts at any time the rubber becomes hard, shows significant cracking and/or deterioration; or there is over 3/8" of play in the stack. The play in the taxi stack can be measured while on jacks or viewed while static thru the side holes in the taxi stack top fitting, as the distance from the snap ring to the bottom flange.

Adding Spacers to the MLG oleo struts

Many aircraft are experiencing a tail low condition even with the MLG taxi stack in a serviceable condition and one way to restore the proper static attack angle is to lower the upper stop on the taxi stack, which is the stop collar near the top of the MLG oleo piston.

Our method to lower the stop is to add up to 2 clamping collars to each piston. Each clamping collar is ½" in height and raises the tail by approximately 2".

To install; the MLG strut fairings are removed, the aircraft is jacked up and the collars are installed without disassembly of the MLG.

The Log Book Entry

The FAA divides aircraft alterations into 2 categories, Major and Minor.

Major alterations require pre-approval thru the STC or Field Approval process, while Minor alterations can be accomplished by a licensed mechanic and the work documented as a log book entry only.

In this case, the spacers may be considered a Minor Alteration;

They do not require structural modification by cutting, drilling or welding.
They do not change the function of the MLG oleo.
They do not pose a safety of flight issue.

As with any Minor alteration, each mechanic will have to agree that the alteration is Minor in nature and agree to the sign off.

Maintaining NLG Oleo Struts

The maintenance of the NLG taxi spring and oleo dampener is well covered in the current addition of the Ercoupe Service Manual and Service Bulletins which are available from Alpha Aviation Inc, Skyport or Univair at a very reasonable cost.

Maintaining MLG Oleo Struts

An oil only oleo is provide for the sole purpose of cushioning landing forces and dampening the action of the MLG taxi stack.

Dampening that will increase the service life of the MLG shock pads.

The Oleo Strut is a simple tube in tube design that incorporates an orifice that meters the fluid between the two chambers and which causes resistance that absorbs much of the MLG taxi and landing loads.

Post war production thru SN 812 are equipped with oleo struts that incorporate an automotive style cup seal and are serviced with automotive DOT 3 brake fluid ONLY.

Production beginning at SN 813 are supplied with oleo pistons that have a groove machined into the piston side wall to accept a standard AN “O” ring and are serviced with Mil Spec 5606 hydraulic fluid ONLY.

*** Servicing either with incorrect fluid will result in almost immediate seal failure ***

Common Problems with MLG Oleo Struts

Serviced with the wrong fluid as detailed above.
Not serviced and running dry – destroying the seals.
Improperly serviced and running with insufficient fluid.
Premature seal failure – resulting from corroded oleo cylinder barrels.

As can be seen from the above listing the top three causes of oleo strut problems are directly related to the servicing technicians lack understanding of the system resulting in system damage.

The solution is for the owner to ensure that the oleo struts are properly serviced per the Ercoupe Service Manual which quit clearly lays out the three simple steps to servicing the MLG struts.

More about Premature Seal Failure; This can be addressed by reconditioning the inner bore of the oleo and seal replacement or installation of SA01247CH MLG Oleo Restoration Kit which converts struts that employ "O" ring seals to the more durable Cup style seal used on early model Ercoupes.

In addition, Alpha Aviation Inc has recently introduced a Cylinder Barrel Hone Kit as an effective tool to recondition the interior running surface of the oleo cylinder barrels.

The Cylinder Hone Kit is intended to be used each time the MLG oleo struts are disassembled for routine seal replacement or when upgrading to our popular STC SA01247CH MLG Oleo Restoration Kit. The resulting clean and resurfaced interior cylinder bore results in increased seal effectiveness and service life.

The cleaning and resurfacing process can be accomplished with or without removing the Taxi Stack end fitting and shock pads.

The kit is furnished with 3 sets of honing stones to be used as conditions dictate and is provided with detailed instructions.

PRODUCT OVERVIEWS

3-Stone Rotary Cylinder Hone Kit

Alpha Aviation Inc's 3 Stone Rotary Cylinder Kit makes available an effective tool to **recondition** the interior running surface of the oleo cylinder barrel, and is intended to be used each time the MLG oleo struts are disassembled for routine seal replacement or when upgrading to our popular Main Landing Gear Oleo Restoration Kit**.**

The clean and resurfaced interior cylinder bore results in increased seal effectiveness and service life and can be accomplished with or without removing the Taxi Stack end fitting and Donuts.

This kit is applicable to Ercoupe 415-C, CD, D, E, G, F-1, F-1A, Alon A2, A2-A and early M10 aircraft that are equipped with either the Hayes welded or Erco forged trailing link MLG assemblies that incorporate liquid filled oleo struts.

Included with this Kit;

- Rotary Cylinder Hone (1)
- Cylinder Hone Extension (1)
- Course Grit 080 Stones (3)
- Medium Grit 220 Stones (3)
- Finishing Grit 320 Stones (3)
- Cotter Pins (9)
- Hex Key (1)
- Storage Pouch (1)

Main Landing Gear (MLG) Oleo Strut Restoration Kit

FAA STC SA01247CH - FAA STC/PMA approved installation for Ercoupe Models: 415-C, CD, D, E, G, F-1, F-1A, A-2, A2-A, M10 aircraft SN 813 and above.

This STC is intended to correct chronically leaking MLG oleo struts, caused by an inadequate "O" ring seal.

The kit includes the necessary modification parts and instructions to modify both Main Landing Gear (MLG) oleo strut assemblies.

The MLG piston “O” ring seal is removed, and the piston is reworked by enlarging the orifice hole and cutting threads to accommodate the installation of an AN4-5A bolt, which is modified to provide the orifice function. The final assembly includes mounting an automotive style cup seal; similar to the arrangement found on early Model 415-C aircraft, serial numbers 112 thru 812.

The finished assembly is replenished with DOT 3 automotive brake fluid as shown in the Ercoupe Service Manual for Model 415-C aircraft, serial numbers 112 thru 812.

The use of MIL 5606 (Red) hydraulic fluid in the MLG oleos is discontinued.

When accomplished in conjunction with an Annual/ 100 Hour Inspection, the additional labor requirement is approximately 1 hour.

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