

General Landing Gear repairs and alignment for Luscombe 8 series non-silflex gear.

The upper and lower gear legs (and silflex legs) are heat treated units. They MAY NOT be welded or repaired by application of heat unless normalized and re-heat treated to attain their full strength and durability. If inspection reveals welding repairs in the field, it is recommended that those legs be replaced. Toe in MAY NOT be adjusted by heating and bending the legs as we are frequently asked. This was done on some early tube and fabric airplanes, but this service is not appropriate for Luscombes.

Alignment of the landing gear assembly 08311 (two piece units)

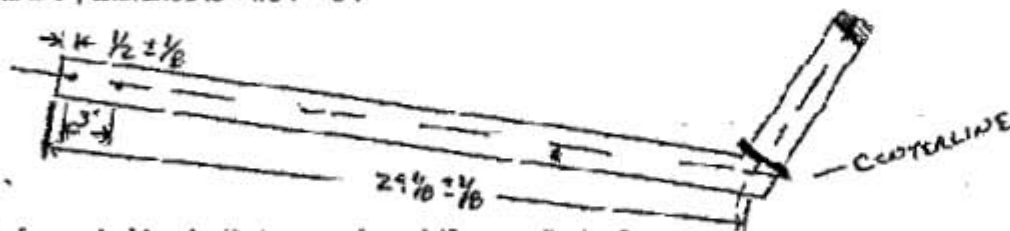
This job is most easily accomplished inside on a level hard surface floor with both main wheels off the ground about six to eight inches or .2 meters.

Support the airplane in a level attitude both longitudinally and laterally. The level lines are the horizontal splice plate on the fuselage side, and the front carry through spar. Be sure to support the fuselage at bulkheads and formers to keep from darraging the skins.

Drop a plumb line at the tail post centerline (spring attach bolt) and the fuselage center using either the oleo mounting bolt, or the top center engine mount as reference. Snap a chalk line between these points. This is your reference line.

Gear dimensions

The top mounting hole is specified at 1/2" from the lower leg's top edge. Some aftermarket legs are longer or shorter requiring an adjustment of this installation dimension. Distance from the top of the lower strut (measured on the leg centerline) to the axle centerline of the gear is $29 \frac{1}{8}'' \pm \frac{1}{8}''$ for prop clearance. Distance from the top of the strut to the center of the top hole is $1/2'' \pm \frac{1}{8}''$. From Centerline of the top hole to Centerline of the bottom hole is 3", tolerance is $+1/64'' - 0''$.



Toe in Adjustments

Factory specification is for neutral toe-in (0 degrees from A/C centerline). Ground handling will be improved with up to 1 degree of toe out, and would be considered to be within dimensional tolerance. Avoid toe in where possible as it makes the airplane "skittish" on the ground.

Mark the lower leg to the dimensions above with a circle around the leg. Measure up the upper leg from the existing hole an appropriate distance and mark it. This is usually 1/2 inch but may be more or less depending on the overall length of the gear leg. (see gear dimensions). Install the lower leg to the line marked on the upper gear leg. Rotate the lower leg until the axle is approximately perpendicular to the aircraft centerline reference. This can be measured with a carpenter's square on the axle tube and a tape measure to the centerline reference we snapped earlier. Clamp the leg in place. Draw a string or straight edge down the front or rear of the axle shafts from right to left to visually check alignment. Readjust and clamp the leg in position as needed. Drill a small (1/8 to 3/16) hole in the approximate center of the top mounting point/line approximately 1/2" from the top of the Lower gear leg. Drill in the front wall of the tubing only until alignment is set and assured. Expand this hole to 5/16ths in small increments.

Remove the leg and locate the lower mounting hole (front side only) in a similar manner using measurements taken from the upper gear leg.

Reinstall the lower leg and drill the rear holes in the lower leg tube only AFTER having properly aligned and drilled the front holes and only after having checked the toe in three times. A similar starter hole and expansion to size is a good method to use since the existing upper leg hole will help center the drill as it becomes close to the proper size.

ALTERNATE REPAIR

If the alignment above was done incorrectly, it is possible to slot the Lower leg mounting holes across the tube up to 1/8" to align the gear. DO NOT slot the upper leg holes.

When slotting is completed, drill a small hole and tap it for a 3/16ths set bolt midway between the two main gear leg mounting bolts. This is a safety precaution on case the main mounting bolts were to work loose and un-adjust the toe in as set. The bearing area of the bolts/tube if properly torqued will lock the lower leg in place if ONLY the outer gear leg is slotted. An alternative method using oversize bolts is discussed in a service letter dated 6-1-46. Either method is acceptable and reliable, however the "slotting" method minimizes the number and complexity of the parts to be modified.

Caster Adjustments

Install the upper gear legs. These have a 2 to 3 degree forward sweep welded in, to properly position the axle/wheel at the +3 distance from the datum (leading edge at level) this distance may be adjusted by up to an inch fore and aft with the jack strut S-9 adjustment fork.

Camber adjustments

The Luscombe gear legs are welded in place to set camber. The left leg is hinged directly to the gearbox. The right leg is hinged through a shackle to the gearbox, and is less indicative of camber problems since it "follows" the strut motions. Camber at the wheels is adjusted by the length of the center suspension spring. This spring should be 8" in length when un-loaded. Up to 1/4" in shims is authorized and were used from the factory. Tolerance beyond this should be repaired by replacing the spring as it may have become un-sprung through use or age. DLAHF can provide serviceable or new springs for installation. Loose tie rods can affect the caster adjustment but is not generally the problem. The tie rods and jack struts should never be tightened to such an extent as to make a "bow" or bend in the lower leg noticeable visually.

Shackle modifications

Several service difficulties have been attributed to the Right gear shackle pin and shackle forging deformation.

The right gear is mounted to the gear box through a shackle and pin. In service this pin has a propensity to bend since it is captive on only one end and then only with a cotter pin. It has also been noted in service that the lower bolt through the forward and rear gear bulkheads, with which the shackle is mounted, tends to freeze in the shackle from a lack of lubrication. There are several modifications which will improve the service life and lubrication of this gear part.

1. After removing the shackle, drill a 1/16th inch hole through one wall of the mounting bolt tube (bottom of the "U") for lubrication of the center section of the bolt. (preferably the outboard & accessible wall) Lubricate this often and freely.
2. The current production shackle has only one hole to locate the shackle pin on the forked shackle end. It is suggested that the other side of the shackle also be drilled with a 1/16th hole. Instead of using cotter pins to lock the shackle pin in place, use a spring steel roll pin, driven in with a small punch and hammer.

Safety this pin in position by threading a small piece of safety wire through the middle of the roll pin and tie it off to itself. This modification will reduce the lateral working of the shackle pin and place it in a consistent shear load condition (as designed) rather than allowing a bending load to develop on the pin and shackle assembly.

LTS MOORE AIRPLANE CORPORATION
DALLAS, TEXAS

MODEL 8A

June 1, 1946

REWORK INSTRUCTIONS FOR ALIGNMENT OF LANDING GEAR WHEELS

A few aircraft were delivered with a certain amount of main landing gear wheel toe in which has now been determined to be objectionable particularly in operating from hard surfaced runways.

Owners in possession of aircraft requiring corrective measures will be furnished with two (2) new drag struts, two (2) AN76-31 drilled head bolts, four (4) AN315-6R nuts, two (2) AN6-20 nuts. Instructions for rework, including sketch are as follows:

1. Raise the aircraft in such a manner as to free the gear from all weight.
2. Remove the four (4) 5/16 bolts attaching the upper and lower arms.
3. Remove drag struts.
4. With the aircraft in approximate flight position turn the lower arms of the gear until the center line of the axle forms a 90° angle with the center line of the ship. It will be noted that the 5/16 holes no longer line up. (See Sketch).
5. Clamp the upper and lower arms securely in this new position and ream the 5/16 holes to 3/8.
6. Install the new drag struts using the new standard attaching parts. (New drag struts have been tapped to accommodate AN6 bolts).

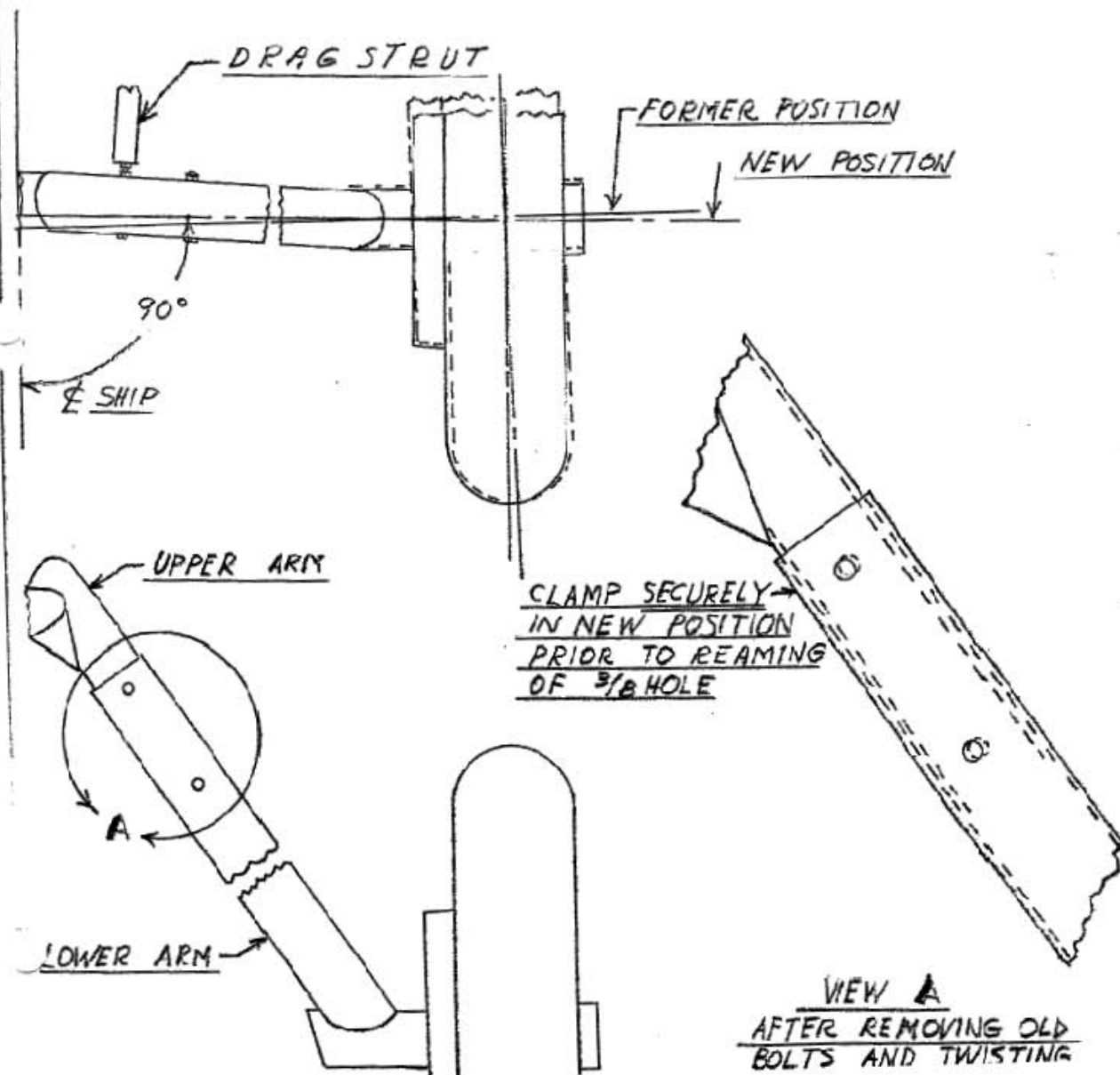
/s/ E.W. Morris
Chief Engineer

/s/ Otto Hoernig
Service Manager

Retyped March 9, 1960
SILVAIRE AIRCRAFT CO.
P.O. Box 719
FORT COLLINS, COLORADO

ped

SKETCH
REWORK INFORMATION
CORRECTING EXCESSIVE TOE IN



Luscombe Silvaire model 8 Aircraft Type Certificate Holder

SERVICE RECOMMENDATION #4

January 22, 1996

Applicability: All Luscombe model 8 series aircraft.

Purpose: To facilitate annual inspection for airworthy condition in Luscombe Silvaire airplane landing gear, both conventional and Siflex style.

Background: NTSB and several owners have reported failure of the main landing gear leg within the 2" area just above the axle weldment (see fig A). Corrosion damage in this area can be exacerbated by loose attachments and fittings to the gear leg which can lead to metal fatigue. The past few years of Luscombe operations have been punctuated by owner/operator reports of rust damage, or in several occasions, complete failure of the lower main gear leg from corrosion just above the axle shaft weld joint. Mechanics in the field have also reported "weld" repairs to gearlegs which are not authorized on Luscombe landing gear.

Condensation within the gear leg lets moisture accumulate in the sealed leg between the axle tube and the first hole up the leg where the brake pulley mounting bolt pierces the assembly, which makes this section particularly susceptible to corrosion.

Time of Compliance: The next annual inspection, or within the next 12 calendar months, whichever comes first, and at intervals not to exceed 12 months thereafter.

Compliance procedure: Remove the gear fairings as necessary to gain access to the lower gear leg area for inspection. Locate the reinforcement patch on the rear side of the gearleg and centerpunch the reinforcement as noted on figure A. Drill the reinforcement and gearleg with a small hole (1/8") in the center of the reinforcement patch area where the upper leg joins the axle, just slightly (1/2") above the axle centerline. This drain hole at the rear of the gear leg will allow any trapped moisture to drain from the leg and minimize corrosion to this area. It will also allow some "drying air" access to the area to keep corrosion to a minimum.

Inspect: Inspect the area and note any water draining, or rust dust/flakes that might come out on the drill or a wire inserted into the hole. Use a small ballpeen hammer and scratch awl or punch to prick the base of the upper gear leg above the weld. If you are able to pierce the tubing, replace the lower leg with a new unit. Legs with no water or rust indicated may be returned to service. If there is any question as to the integrity of the leg, complete items 1-3 below. Treatment in accordance with #3 below is advised. NOTE: Inspect for weld repairs to the gear leg. Weld repairs to the gear leg is not an approved procedure. Components containing weld repairs are considered UNAIRWORTHY and must be removed and replaced because welding destroys the heat treat properties of the part.

1. Remove the lower leg for further inspection.
2. Inspect leg thoroughly. Tapping the lower leg gently with a ball peen hammer at the reinforced area will free rust flakes, dirt, and sediment that may contribute to corrosion. Turning the leg upside down and tapping it on a bench, the loose debris can be removed through the use of gravity. Small amounts of rust debris may be considered normal for an unprotected steel surface in service and should not condemn the gear leg. More than a thimble full of debris should make the gear leg suspect, and additional non destructive tests such as X-ray or ultrasound are indicated prior to returning the leg to service. Absent these tests or other conclusive inspection techniques confirming airworthiness, preventative replacement of the gear leg is indicated. NOTE: Legs showing evidence of corrosion should be inspected, then treated as noted in "preventative action" and reinspected annually for further development of corrosion. If the gear leg is found to have water or rust indicated internally;
3. Clean legs internally with thinner and a wire brush, then protect them with a water resistant epoxy primer MIL spec P23377F or equivalent, and/or washed with an epoxy finish coat (Iron 326, 924, 824, 826 or equivalent) to keep moisture away from the steel internal surface. DLAHF can supply the epoxy primer & finish kits.

DLAHF has adopted a similar specification for a finish wash of all new production gearlegs, and installation of the drainhole on new manufacture of similar parts.

Special tools and materials: Tools and materials required are a screwdriver & wrench for the fairing removal, a #31 or 1/8" drill bit, a drill motor, a small wire, a ball peen hammer, and light.

FAA REVIEW The design engineering aspects of this bulletin have been shown to apply to the applicable Federal Aviation Regulations, and are FAA Approved.

Approximate cost:
Labor: 3 man hours
Parts: None required

Supplimental data

It is also suggested that Luscombe owners and operators consult with FAA AC43.13-1A, chapter 6, dedicated to corrosion, and the COMPREHENSIVE LUSCOMBE, a detailed maintenance guide for Luscombe owners.

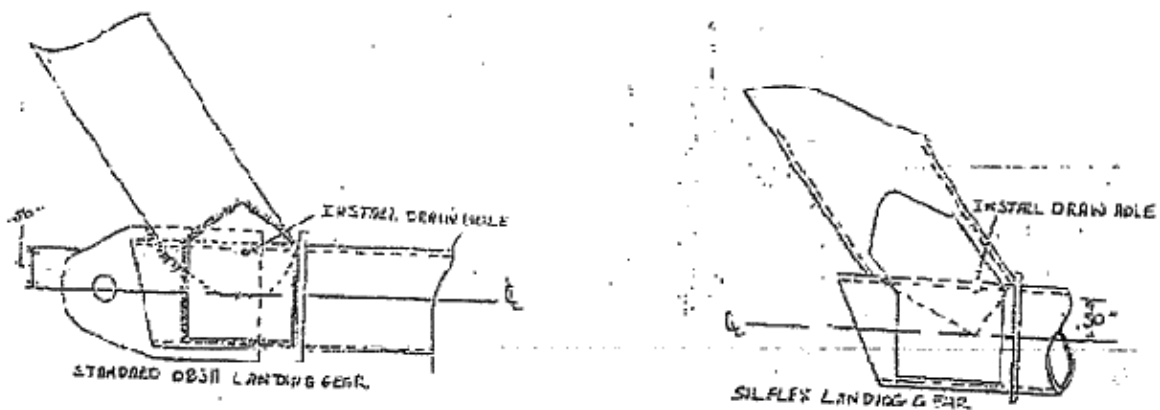


FIGURE A

Maintenance Records

After completion of the inspection of the aircraft gear in accordance with this service recommendation, so note details in the aircraft maintenance records for future reference. If any defects are noted, please complete a malfunction and defect report for filing with the FAA, a copy of this, or description of defects and location including aircraft serial and/or wing serial number, aircraft registration number and owner name should be forwarded to the Luscombe Foundation at Box 63581, Phoenix, AZ 85082.

Sample Maintenance Record Entry

"Installed drain holes in lower landing gear strut in accordance with Luscombe Foundation service recommendation #2. Completed inspection of gear for corrosion and structural defect. (note findings) Notified ATC holder and FAA of any structural defects. Mechanic # date."