

# Nose gear leg bungee, replacement with springs

<b>Classification</b>	Optional
<b>Applicability</b>	Europa Tri-gear Classic and XS
<b>Compliance</b>	Optional

## Introduction

The steel tube of the Europa's nose gear leg is designed to act as its spring. The leg is supported in a structure that is attached to the nose gear mounting frame via bearing blocks so that the assembly can pivot in the event of an overload on the landing gear. Preventing the leg from pivoting during normal operations is a single continuous length of bungee cord tensioned round a "T" bar at the rear of the leg assembly and the upper strut of the nose gear mounting frame (6 loops, 12 active strands). The bungee should prevent any rotation of the nose gear assembly until a 150kg force is reached, measured at the nose wheel. When a force in excess of 150kg is experienced the nose gear will then rotate up to 50mm until restrained by a safety cable. This is designed to protect the aircraft structure and nose gear in the event of an excessive load being applied or failure of the bungee cord.

This modification uses two, handed steel springs to replace the bungee. See figure 1. The safety cable is retained as in the original design. As with the bungee, the initial springing is done by the nose leg/tyre. Once the nose leg is bounced off the stop the steel springs will give a "harder" ride due to the higher Young's modulus of the steel springs. This reduces the likelihood of the cable stop being reached and, in consequence, reduces the chance of a bent leg or prop strike. Once the nose leg hits the stop, and if sufficient further force is applied, the nose leg may bend as with the bungee supported system.

## Action

### Step 1 - Preparing the springs

Note that the two springs are different from each other. The upper hook ends, which are slightly larger than the lower ends, are slightly offset from the spring's centre line. Refer to figure 6.

Extend each spring just sufficiently to open the coils to insert a 6mm or ¼" spacer between each and no more. Excessive extension may result in a permanent set on the spring. This will require a force of some 270kg so must be done with great care. A safe way of achieving this is shown in figure 2 below. *Do not* use the method shown in figure 1 as this may distort the hook of the spring. Be very careful to ensure the spring cannot slip off. Should this happen, at this tension, the spring can be propelled at very high speed so wear gloves and some form of face protection in case this happens.

Insert eleven 6mm or ¼ inch metal spacers (bolts will do perfectly) between the coils (see figures 2 and 3) to hold the spring open. Carefully release the jacking tension and ensure the spacers are stable and the spring can be handled. The spring will take on a slight banana shape, figure 3.



*Fig 1. Incorrect method.*



*Fig 2. Correct method.*



*Fig 3. Spacers installed*

## **Step 2 - Bungee removal**

Ensure that the main wheels are chocked and the aircraft is secure against movement. Support the nose of the aircraft either side of the nose wheel leg pivot.

Remove the bungee. The bungee is exerting over 400kg of force on the nose wheel leg and could cause serious damage if released uncontrollably, so take care.

It will be necessary to remove the edges of the curved plate at the top of the bump stop to provide clearance for the springs. See figure 4. The nose wheel can be raised by hand to give limited access to the bump stop. Pushing the catch cable forward towards the pivot bearings as far as possible will enable the leg to rotate further. Use a hacksaw and file for this job.

## **Step 3 - Springs installation**

***Wear protective gloves and use extreme care.***

Remembering that the springs are handed port and starboard, the upper hook being offset slightly towards the aircraft centre line, place them in position as shown in the figures 4 and 5, installing them from the rear of the nose gear assembly.

The springs must be placed as close to the centre as possible to avoid excess bending loads on the "T" end of the nose wheel leg. Ensure the springs are equidistant from the nose leg. Also adjust the position to ensure there is clearance for the leg to move to the wire bump stop under excess load.

Pack a small quantity of grease round the four contact points between the springs and the tubes. This is to prevent water (that could be held in place by capillary action) corroding the contact points.

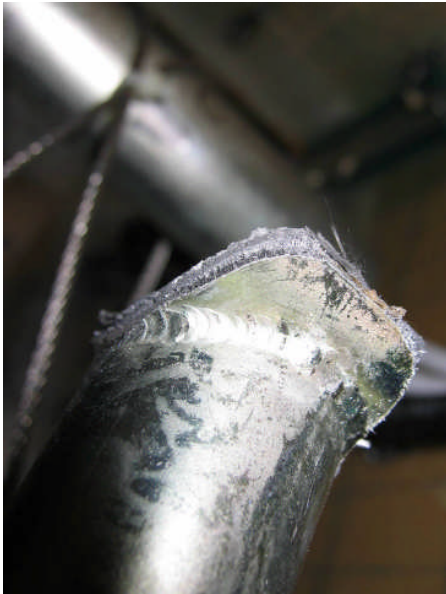


Fig 4. Bump stop sides trimmed.

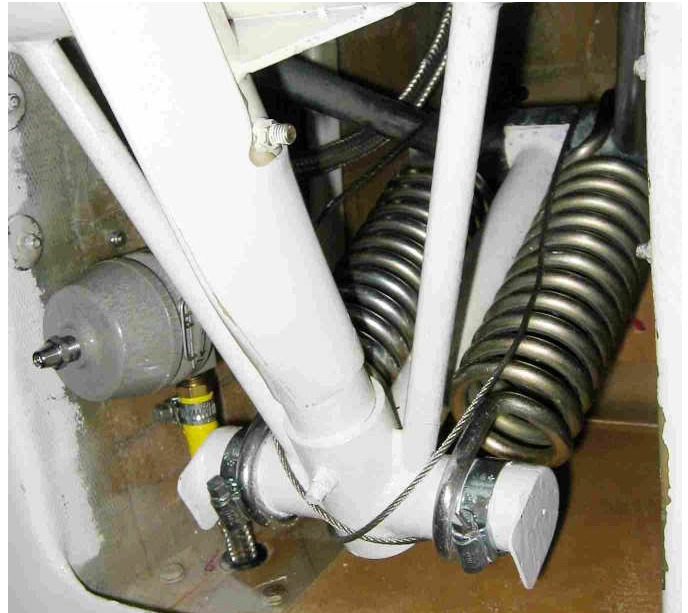


Fig 5. Springs installed.

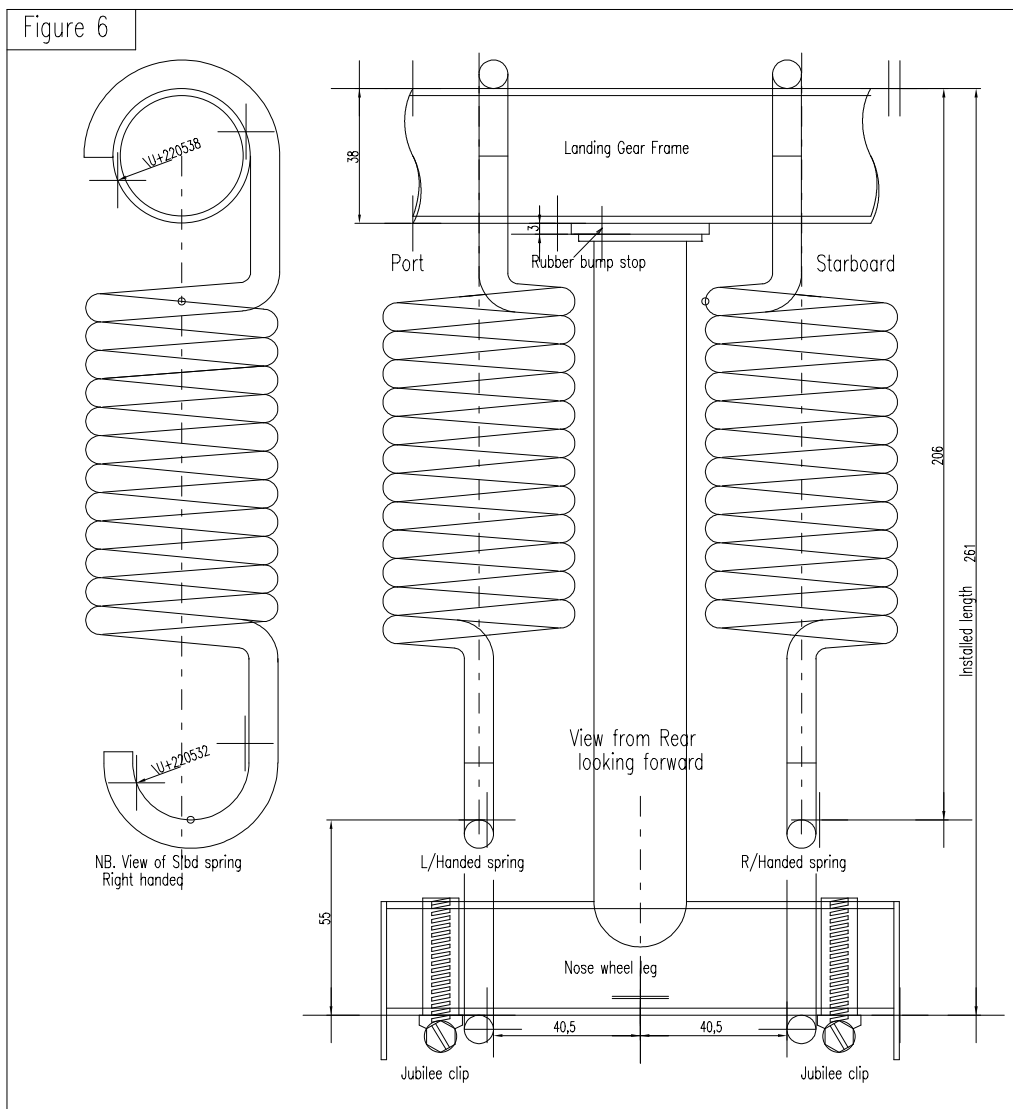


Fig 6. General arrangement (springs shown not stretched)

Install the jubilee clips on the nose wheel leg as shown in Figures 5 and 6, outboard of the springs, to ensure that they cannot move outboard.

#### **Step 4 - Removing spring spacers**

After checking the installation remove the jack supporting the aircraft. Reverse the nose wheel, as if the aircraft had been pushed backwards. This significantly increases the leverage, so reducing the force needed. By a combination of pushing the rear of the aircraft upwards and carefully applying body weight to the root of the propeller blades, sufficient force can be achieved to extend the spring sufficiently to allow the spacers to drop out. Push them out using a piece of wood if necessary.

#### **Step 5**

With the nose wheel in the normal trailing position, check that the force on the nose wheel at which the nose leg just moves off the stop is around 150kg.

Annotate the aircraft records that Mod 71 has been fitted. Amend the weight and balance records by calculation to reflect the following changes. Weight removed 1.1 lb, added 3.5 lb. Net change +2.4 lb.

Weight Change	Moment arm	Moment Change
+ 2.4 lb	+ 37 inches	+ 89

As large metal objects have been installed, check the compass and prepare a new compass deviation card if required.