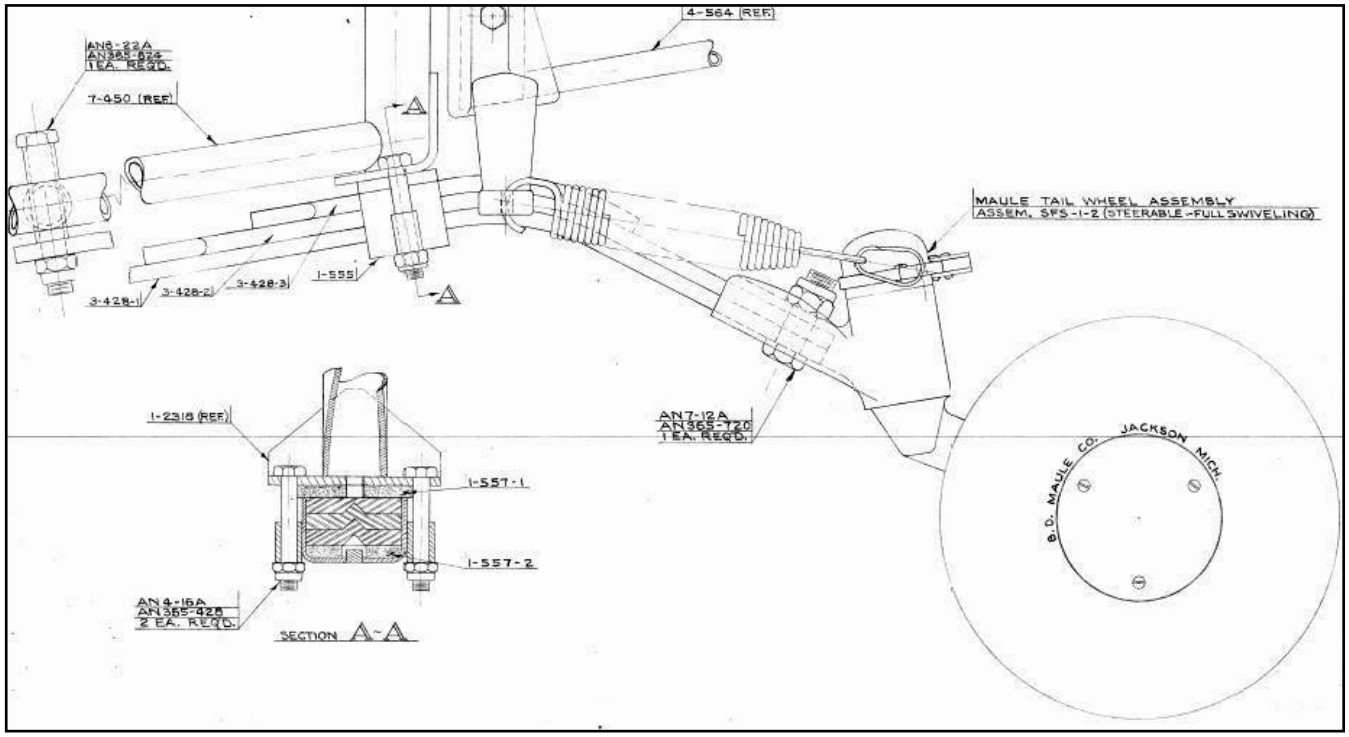
Champ and Chief Tail Wheel Landing Gear
Inspection and Maintenance

By John Propst with Technical overview by Bill Pancake

Abstract: This article provides guidance and insight into the inspection and maintenance of tail wheel landing gear on Aeronca 7AC and 11AC aircraft.

In order to understand the correct installation of the rear landing gear on Champs and Chiefs it is important to first review the Aeronca design drawings. Many of the original Aeronca drawings are available and many certified maintenance and repair parts can be obtained from vintage aircraft part suppliers. A better understanding of the tail wheel landing gear can be gained by reviewing drawing 4-620, which is titled “Installation – Maule Tail Wheel”. There is also a companion drawing 3-533 associated with Scott tail wheels. For the aspects that this article will be dealing with, drawing 4-620 should apply equally to all types of wheel assemblies. Drawing 4-131 provides tail wheel details for some older pre-war Aeroncas.



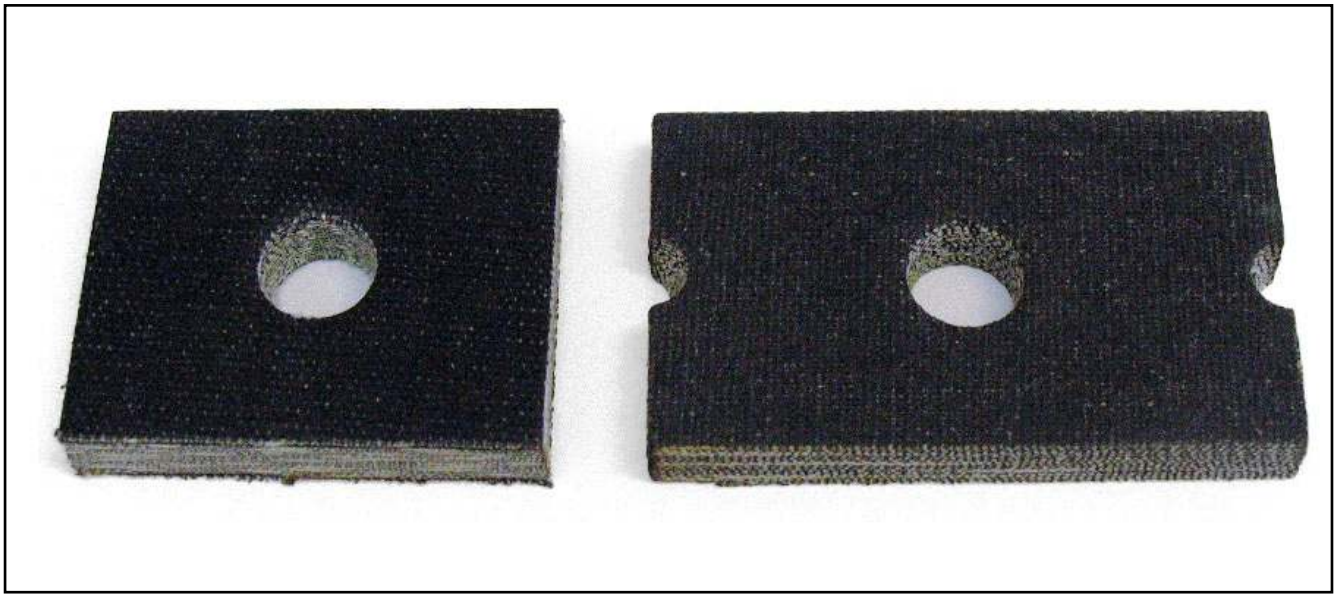
This figure shows a portion of drawing 4-620. It shows the mounting of the spring assembly to the airframe, provides reference part numbers to various components of the assembly, indicates the correct bolts and associated hardware for installing the tail wheel assembly and in section A-A provides details on how to clamp the spring assembly to the airframe.

There are several important components shown in the details of Section A-A. First, part 1-555 as shown on drawing 1-555 is called the Fitting Assembly. It is the “U” shaped clamping bracket that goes under the spring assembly and clamps the spring to the airframe.

Notice also that the spring assembly is sandwiched within the “Fitting Assembly” with pad 1-557-1 on top of the spring and pad 1-557-2 beneath the spring. Like all other Aeronca parts, details of these parts are shown on drawings of the same number.

Drawing 4-620 shows a tail wheel steering horn installed external to the bottom of the rudder. This was an early design used on some pre-war and some early post-war Aeroncas. Later a cast aluminum steering horn that was mounted internal to the rudder tube was used. There is evidence that the external steering horn was also used on some later model planes, probably due to Aeronca using parts available in the assembly of planes.

Drawing 1-557 is titled “Pad – Tail Skid Spring Leaf”. This drawing provides the dimensions of each pad and indicates the material of construction. The drawing indicates that the material as “Fabreeka”. The company Fabreeka International, Inc. is still in business in Stoughton, MA where they manufacture vibration and shock control products, and they still produce the material that the tail pads are made of. (P.O. Box 210 10232 Turnpike St. Stoughton, MA 02072 800-322-7352).



This is a photo of pad 557–2 on the left and pad 557–1 on the right. The material resembles very dense conveyor belting material. The material is very hard and difficult to bend. Completed pads, fabricated by Fabreeka are available for purchase on the Aeronca.com website.

According to drawing 1-557 and the various master drawing lists the Fabreeka pads are used on the following Aeronca models: 50C, 65C, 65CA, 65LA, 65LB, TA, 11A, 11B, 11C, 7A, 7DC, 7BCM, and 7CCM. Drawing 1-555 indicates that the “U” clamp is also used on these models.

As shown in Section A-A on Drawing 4-620 pad – 1 is clamped between the upper edge of the “Fitting Assembly” and the airframe. The AN-4-16A bolt and AN365-428 nut should be torqued in accordance with 43-13 -7-13 f table 7-2.

It is important to check the tightness of these bolts on a regular basis and check the condition of the pads. As the pads become worn and compressed and the attachment bolts become loose, forces caused by the movement of the spring during takeoffs, landings, and taxing can result in the breakage of the bolts. Likewise the torque on the AN6-22A bolt and AN365-624, which attaches the front of the top spring leaf to the airframe needs to be inspected and checked on a regular basis to assure that it remains tight.

Likewise the bolt that attaches the tail wheel assembly to the rear two leaf springs needs to be inspected on a regular basis. Note on drawing 4-620 that the bolt for attaching the tail wheel assembly is installed from the bottom up with the nut on top. The bolt is installed from the bottom up on Maule wheels because the bolt cannot be installed from the top down due to interference with the pivot bolt cap.

The previous text has focused on the attachment of the tail spring and tail wheel to the aircraft. The next section will now take a closer look at the tail spring itself.

Drawing 3-428 (shown on the next page) titled “Spring – Tail Wheel – Leaf” provides the dimensions and specifications of the tail spring. For reference drawing 3-81 provides spring details for several older models, and drawing 4-131 provides tailwheel details for several older models.

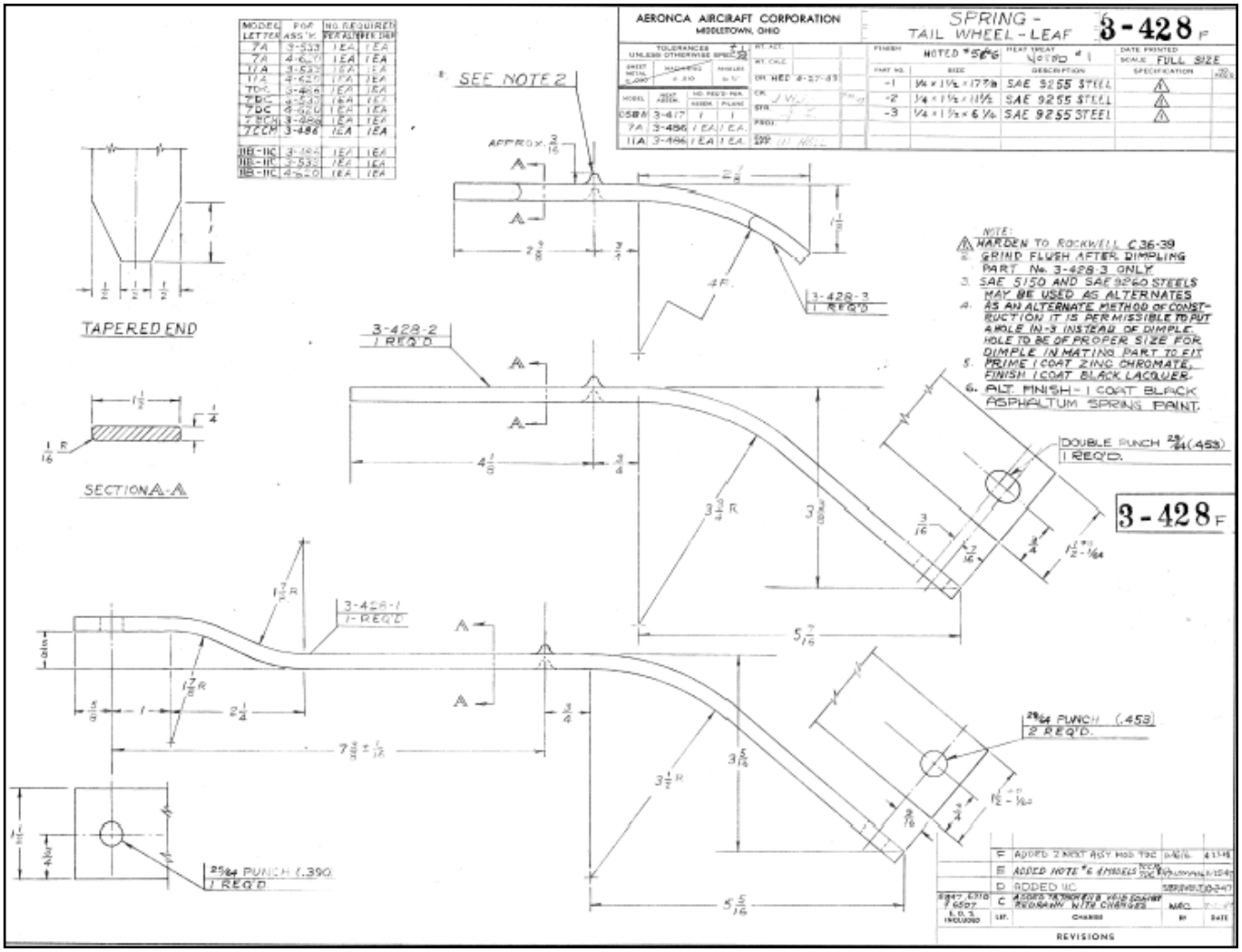
As shown on the drawing the tail spring assembly is made up of three leaves. Information in the notes provides detailed specifications for the hardness and other important specifications for manufacturing the springs. The drawing shows the side profile of new uncompressed springs.

If the tail of a plane is elevated, a template of the spring profile made from the drawing can be used to check the profile of the tail spring the aircraft. This will show if the spring has flattened out over time.

Flattening of tail springs can be caused by several factors. The spring was designed to absorb the standards forces and shock associated with “normal” landings. These are the landings we picture in our minds just prior to our bouncing and skipping down the runway like a jackrabbit at full stride.

Second, if the attachment bolts and hardware are not correctly tightened, movement of the spring can cause undo forces on the spring resulting in overstressing the springs. Third, there was a time within the past when replacement springs were manufactured buy unknown suppliers that were not correctly hardened and could not withstand the design loading. Finally there have been attempts by individuals to reharden and restraighten bent springs. This practice is not recommended as it is difficult to achieve the design specifications.

The bottom line is that if a spring is bent and fatigued, it is best to replace them with new springs. There have been reports where weakened springs have flattened to a point where the tail wheel actually came in contact and damage the rudder.



A tip from Bill is to apply a very light coating of grease between the leaves of the spring and also on the Fabreeka pads. This will help eliminate squeaking of the spring leaves during taxiing.

This article will not get into the details of inspection and maintenance of tail wheels other than to say that they demand the same high level of routine inspection and maintenance that we provide to the main landing gear.

Bill indicated that he typically will replace the spring pads every 4 years or so due to wear and to assure secure attachment of the tailwheel.

It is important to closely inspect the springs and clips that connect the tail wheel to the rudder steering horn. A failure of either spring makes landing much more challenging.
Joe Henry, our resident AP I/A at 2WV3 Hale's Landing in Elizabeth, WV. offers the following tips and suggestions. Over the years the tailwheels and springs on many Champs and Chiefs have suffered from abuse and neglect. Often the pads on the "U" clamp were replaced with various types of rubber and other materials. Often relatively soft rubber type materials were

used. Also, often the pads were incorrectly installed with all the pads located above the spring between the spring and the airframe. The use of incorrect materials, often improperly installed, has resulted in the “U” shaped “Fitting Assembly” becoming severely worn. Also the excessive movement of the spring with respect to the airframe has resulted in severely worn and often overstressed AN 4 attachment bolts on the Fitting Assembly as well as the AN6 bolt that attaches the spring to the airframe. If it has not been done so lately, the tailwheel and spring should be removed with a thorough inspection the “U” shaped Fitting Assembly for wear of it and the mounting bolts. They should be replaced if there are any signs of wear or abuse. These are all components in which a single point of failure could result in severe consequences.

It is important to remember that all inspection, maintenance, alterations, and documentation should be done in accordance with Part 43 of the Federal Aviation Regulations (FAR).

All the drawings referenced and shown in this article can be found at the Aeronca.com website.