Can You Stop Nose Gear Shimmy?
By Dave McFarlane

“A Cessna nose wheel is supposed to shimmy.”

“You can’t really stop it.”

“All the Pipers do it.”

You have heard similar comments many times. My response is always the same question. “Did it shimmy when it was new?” I would like to share with you our experience in solving this problem.

I will bore you with the routine detail of what to look for and how to fix the mechanical issues that allow shimmy to get started in a minute. First, let’s talk about the physics of nose gear shimmy. Years ago and after a lot of experimenting, we discovered what was causing our shimmy problems. We observed that uncorrectable nose gear shimmy seemed to only happen on hard surface runways and rarely on turf runways. Our customers reported that they could stop the shimmy by either taking weight off the nose gear with the elevator or applying the brakes putting more weight on the nose gear. It didn’t seem logical that just changing the weight on the nose gear could affect shimmy since the airplane is designed to function with different loadings and weight distribution.

The key to shimmy problems is to prevent shimmy from starting in the first place. You have to start with the routine stuff that is in the service manuals. The Cessna Pilots Association has a very good article on fixing the mechanical issues associated with nose gear shimmy on Cessna airplanes. Their Tech Note No. 001, Revision 004 dated 04/15/2010 does cover shimmy on Cessna airplanes. Their Tech Note seems to parallel the Cessna Service Information Letter SE84-21 on the same subject.

We still had shimmy! In frustration, an experiment was done by removing some tread rubber from the tire. It did not seem to be a logical solution, but it worked. The shimmy went away! There are some interesting dynamics going on during the shimmy action (besides trying to vibrate your airplane apart). When the nose tire is shimmying down the runway it is oscillating from pointing left and then pointing right many times per second while the airplane is going straight. The greater the tire angle diverges from straight ahead, the greater the shimmy inertia and energy. Since the oscillations are equal in divergence angle and time duration, the rubber on your tire is being scuffed in a uniform and distinct pattern that repeats itself each revolution of the tire. This wear pattern shape is directly related to the tire shape created by the amount of weight on the nose tire, the tire pressure, and the speed of the aircraft. The frequency of the shimmy is a derivative of these factors. You might have noticed a braking feel to the airplane when severe shimmying is happening. The braking is from the nose tire skidding sideways during the more extreme angle divergent portion of the shimmy cycle. Since shimmy generally takes place for a short time, the early stages of this wear pattern are microscopic and hard to detect visually or by feeling the tire tread by hand. After the first shimmy, the then created wear pattern tends to start the oscillating action when the airplane speed and nose gear weight matches the speed and weight that the airplane was traveling when the shimmy wear pattern was created. You might have noticed that shimmy starts at about the same landing or taxing speed each time. The results are that the shimmy gets worse every time it happens even if the mechanical issues that let it start shimmying the first time have been corrected and the shimmy damper is working and trying to do its job. The shimmy damper simply is not strong enough to prevent shimmy when a nose tire has an established shimmy wear pattern in the tread. The hidden mystery to this problem is that early shimmy wear patterns in the tire are virtually undetectable.

One of the hardest parts of proper rigging is determining where the nose tire is straight ahead. The method we use is to create an airplane center line by dropping a plumb bob from the center of the firewall to the ground (center can be determined from the rivet pattern or measuring from the motor mount attachments) and again dropping the plumb bob from the center of the tail tie down hook. Mark both of the plumb bob points on the shop floor and create a chalk line mark between the points. This is your airplane center line. Extend the center line forward as close to the nose tire as possible.

Place a straight 2x4 stud or a piece of straight angle iron against the side of the nose tire. Adjust the nose wheel and tire until the 2x4 is parallel with the airplane center line. Check your results by placing the 2x4 on the other side of the tire. The 2x4 acts as a tire angle multiplier giving you measurable results.

Parallelism can be checked by simply measuring the distance between the 2x4 and the chalk line in two places. Be sure not to move the airplane while you make your nose gear alignment adjustments.

Prevention Tips
The key to shimmy problems is to prevent shimmy from starting in the first place. You have to start with the routine stuff that is in the service manuals. The Cessna Pilots Association has a very good article on fixing the mechanical issues associated with nose gear shimmy on Cessna airplanes. Their Tech Note No. 001, Revision 004 dated 04/15/2010 does a good job of describing and illustrating the system and directing corrective repairs. This tech note seems to parallel the Cessna Service Information Letter SE84-21 on the same subject.

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1 The first step in preventing the problem is to look for any un-damped nose gear movement. This is motion of the nose tire without the shimmy dampener moving. Looseness in the nose gear system cannot be detected with the nose wheel off the ground unless the pressure is released from the nose strut. When you move the nose wheel right and then left, the shimmy dampener should also move. If there is any un-damped motion, tighten or replace the worn components such as the torque link bushings and spacers, the steering collar, and shimmy dampener attachments.

2 Remove the shimmy dampener attachments. Check the shimmy dampener for proper fluid and proper operation. Check the damper for seal condition and excessive wear in the piston and damper bore. The damper shaft must have considerable resistance to motion when moved quickly but move easily when moved slowly.

3 Nose gear rigging is important to prevent shimmy. If the steering rods or bungees are biased, damaged, or holding improper tension, shimmy can be started. The aircraft service manuals do a good job of describing proper nose gear rigging procedures. Wheel bearings must be in good condition and properly adjusted.

4 Bad bearings or adjustments can allow un-damped tire movement. Tire balance is also critical for preventing shimmy as an out of balance tire puts cyclic centrifugal loads on the tire tread. Out of round tires will do the same thing. One of the objectives of preventing shimmy is to not have any type of cyclic loads going into the tire system.

Check the tire itself for casing shift or other damage as follows:

• Take the weight off the nose tire for a period of time to let the tire take its proper shape.

• Assure that the tire is inflated to the proper pressure for the aircraft.

• Spin the tire by hand and look for any significant lateral divergence (tire wobble) or vertical divergence (out of round). The tire must rotate true, but a little out of round is normal.

• If tire casing shape problems are detected, let the tire stabilize longer without weight. If that does not correct the problem, the only fix is to replace the tire.

• If the tire casing seems to run out true and the tire is determined to be airworthy in all aspects, remove the shimmy wear pattern in the tire tread.

How do you remove rubber on a good tire to get rid of this mysterious and evil tread wear pattern that nobody can see or feel? We use an electric disc grinder that is used in the weld shop for grinding welds and smoothing structural steel. Any large sanding disk power tool with a coarse grit disc or a belt sander would also work. There will be some rubber flying around the shop so this is a good job to do outside. Get someone else to do it if you have allergic reactions to latex or rubber products. Block the nose gear off the ground and give the tire time to stabilize its

5 shape without weight. Again assure that the tire has the correct inflation pressure. Touch the grinder to the tire at an angle that rotates the tire and removes rubber. With a little practice you will be able to control the tire rotational speed with small grinder angle adjustments. If you allow the tire to rotate too fast, very little rubber will be removed. If you allow the tire to rotate too slow, it is hard to remove the rubber evenly. Taxi speed tire rotation seems to work best. You can actually remove small "out of round" tire conditions by being steady with the grinder and allowing the grinder to work harder on the tire high spots. The grinder must be worked across the tire tread as evenly as you can. Never grind into the sidewall of the tire. You can feel advanced shimmy wear patterns before you start and they will take more work to remove than the patterns you cannot feel. The tire must feel smooth and even when you are done. Only experience will tell you how much rubber to remove. Be sure that the tire has good tread depth when you are finished, and verify that there is not any inadvertent damage to the tire. Clean up the rubber grindings and high speed taxi test the airplane. You will probably be smiling with the results. It is a good idea to re-balance the tire after grinding the tread and before returning the aircraft to service. If the test does fail, repeat the process. Yes, with a little patience, this shimmy beast can be tamed!
Nose Wheel Steering Rod Boots for Cessna Aircraft
P/N MC0413304-3 for 150-152 series and P/N MC0543015-6 for 172, 175 and early 182 series
McFarlane steering rod boots are manufactured with a black Kevlar®/fiberglass blend fabric. The fatigue resistance of Kevlar® is uniquely mated with the fire resistance of fiberglass. This is a super tough, high-temperature fabric that will provide many years of outstanding performance.

- Keeps the exhaust and carbon monoxide out of the cabin
- Protects the cabin in case of an engine fire

Nose Wheel Steering Rods for Cessna Aircraft
Tired of 'soft' worn out steering rods? Replace them with improved McFarlane steering rods.

- Redesigned long life springs!
- Stainless steel tubes for improved corrosion resistance (MC0543022 Series)
- Hardened internal washer for greater durability
- Optimum performance even after years of service!

Doubler for Cessna Aircraft
Doubler for 150-152 aircraft is now McFarlane FAA-PMA approved.

- White Poly Paint - ready to install
- 1/2 the price!

Maintenance Tip:
- How do I know if my steering rods need to be replaced?
  - Nose wheel steering is unusually sluggish.
  - One or both sides offer little or no spring resistance to steering input.
  - More than 1 1/8” of free travel is present in either steering rod.
  - The aircraft pulls to either side during taxiing.
  - Inconsistent steering or rudder rigging.

Removing Torque Link Bushings (Nose Gear Scissors)
By Dave McFarlane
Removing the flanged bushings from the torque link forging can be difficult as there is not a good surface to press against or grab onto. An easy way to remove them is to thread them with a tap, screw a bolt in the thread you made, and then drive or press against the bolt. The thread does not have to be a full depth thread for the bolt to hold securely in the bushing. The bushing material is somewhat hard, but not so hard that a standard hardware store tap will not do the job. Use cutting oil on the tap to prevent tap damage. Normally the bushing will then come out easily. For stubborn bushings, soak the link assembly in boiling water before pressing the bushing. The heat will expand the aluminum forging more than the steel bushing. This helps loosen the press fit while limiting the temperature to prevent from overheating and harming the heat treat of the aluminum forging. A controlled oven can be substituted for boiling water as a heat source, but do not exceed 350° F. Do not use flame or other non-controlled heat sources. An alternate method is to put dry ice in the bushing before driving or pressing on the bolt.

Cessna Brake Line Fairing Extrusion
Reduce Drag!
P/N PS80058
- Paintable
- Easily attaches with super glue
- Replaces P/N S1511-1

White rubber extrusion that attaches to the trailing edge of flat Cessna landing gears and serves as a fairing for the brake line. This extrusion was original equipment on later model aircraft with flat gears. Many mechanics use this as an improvement for the earlier aircraft.

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Nose Gear Torque Link Repair Kits for Cessna Aircraft
P/Ns TL-KT-1 thru TL-KT-11
• Includes all commonly replaced torque link parts in a convenient kit.
• McFarlane manufactured FAA-PMA approved kits.
• Fits most single engine Cessna aircraft.
• Now with specific model eligibility.
• Prevents Nose Wheel shimmy.

Kits include:
Bushings, Spacers, Shims, Nuts, Bolts, Washers and Cotter Pins.

Brass Nose Gear Torque Link Shim Kit for Cessna Aircraft
• Eliminates undamped torque link motion to prevent shimmy
• Also available individually or in torque link repair kits

P/N TL-SHIM-KT-1
Kit contains:
(2) MCS1450-6B14-005 .005" Thick
(2) MCS1450-6B14-007 .007" Thick
(5) MCS1450-6B14-010 .010" Thick

Torque Link Spacers for Cessna Aircraft
P/N MC0543047-1 and MC0543047-2
• Tightly controlled minimal end chamfer maximizes bearing surface between spacer and fork to ensure a secure clamp and prevent fork wear.
• Precision length

Nose Gear Torque Link Repair Kits for Cessna Aircraft
P/Ns TL-KT-1 thru TL-KT-11

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Part Number

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TL-KT-2 | 122
TL-KT-4 | 122
TL-KT-5 | 122
TL-KT-6 | 122
TL-KT-7 | 122
TL-KT-8 | 122
TL-KT-9 | 122
TL-KT-10 | 122
TL-KT-11 | 122
MC0543047-1 | 122
MC0543047-2 | 122

Not included in torque link kits.

NAS1149F0316P Ultra-Thin Washers
These hard to find 3/16" ID, 0.016" thick standard steel washers are sometimes useful for fine tuning the center "knee" joint fit on most Cessna torque links. Available in packs of 5.

www.mcfarlaneaviation.com
Landing Gear and Nose Wheel Steering Parts

McFarlane has developed a stronger upper torque link for Cessna 210 Aircraft
Upper Torque Link Assembly P/N MC1243426-2

- Direct replacement for the original Cessna parts
- Stronger aluminum alloy and heavier flanges.
- More resistant to the bending
- Bent links allow the strut to overextend

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

Maintenance Tip:
Replace the stop lug if it is no longer flush with the strut, mushroomed, worn rounded, bent away from the torque link, or if it has stress cracks. The safety plate should not be reused.

More resistant to the bending

More resistant to the bending

McFarlane has developed a stronger upper torque link for Cessna 210 Aircraft
Upper Torque Link Assembly P/N MC1243426-2

- Direct replacement for the original Cessna parts
- Stronger aluminum alloy and heavier flanges.
- More resistant to the bending
- Bent links allow the strut to overextend

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

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Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

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Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

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Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
FAA-PMA Approved

Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

More Important Than You Think

Overextension of the nose strut due to a worn out stop lug can lead to a cascade of problems. McFarlane A&P mechanics have seen struts over extend to the point where the metering pin comes out of the orifice. This results in loss of damping action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of damping can result in fatigue cracks in the torque link arms. McFarlane recommends thoroughly inspecting all nose strut components when replacing a severely worn stop lug.

Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
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Stop Lug Safety Plate
3/16" Bolt

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Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved

www.mcfarlaneaviation.com

McFarlane Aviation Products
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Stop Lug Safety Plate
3/16" Bolt

Upper Torque Link Assembly

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Save Thousands $$

Cracks

Damaged Torque Link

Undamaged Torque Link

FAA-PMA Approved
Nose Gear Torque Link Repair Kits for Piper Aircraft
Prevents shimmy by removing looseness in the torque links.
- Replaces all common wear torque link components in a convenient kit
- Fits most Piper aircraft
- Contains all FAA approved parts and standard hardware
- Save time and money! No more research and ordering of individual parts.

### Aircraft

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Eligibility continued on next page
Nose Strut Seal Kits for Cessna Aircraft

McFarlane has received FAA approval for manufacturing all of the components of the Cessna nose strut seal kits for most Cessna aircraft. We can now offer improved kits at a lower price!

P/Ns MCSK172-1F and NSS-KT-2
- FAA-PMA direct replacement for Cessna P/N SK172-1F.
- Also includes AN901-5A gasket.
- Improved lock rings are made of 304 stainless steel for better corrosion resistance.
- Components also available separately.

Maintenance Tip: Cessna Strut Seal Failure
Strut seal leaks and flat struts can be caused by roll or twist of the main O-ring seal. It is very frustrating to carefully check all the parts and surfaces and put a new seal kit in the strut only to find it flat again after a relatively short time. We have seen this happen when a film of MIL-5606 hydraulic fluid dries out on the exposed chrome strut shaft. MIL-5606 by nature has a tendency to get sticky as it is exposed to air and dirt and then dry. Very slight dried oil films are sometimes hard to detect and they can get past the plastic wiper seal. When this happens the sticky strut has a tendency to grab the O-ring and roll or twist it when the strut slides in or out causing the seal to distort. A very small O-ring twist or distortion will cause a leak. This phenomena is aggravated by the low pressure that the Cessna strut is designed for. Wipe the chrome strut down with Stoddard solvent (mineral spirits) periodically to soften and remove any dried oil film, dirt, dust and bugs.
### Shimmy Dampener Parts for Cessna Aircraft

**Save $$ — Repair your fluid dampener**

Don't buy a disposable rubber dampener. Save money with replacement PMA parts. McFarlane now has affordable repair parts for the original fluid dampener. Save over $400.

- More cost effective than a disposable unit
- Proven design

**Improved Shimmy Dampener Shaft**

Save more than 50% - Lasts longer!

- Perfected chrome finish for improved o-ring life and seal
- Durable one piece design — heat treated 4130 steel

### Head Bearings and Piston

**Precision Machined, Direct Replacements**

**Convenient Assemblies and Kits**

- Simplify your repair process
- Assembled kits make overhaul more efficient
- One part number gives you everything you need

### Maintenance Tip:

Measure the diameter of the head bearing to determine the correct piston assembly or repair kit.

### Piston Assemblies

Includes pre-assembled shaft, head bearing, piston, head bearing o-rings, and roll pin.

### Shimmy Dampener Replacement Parts for Cessna Aircraft

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<td>Head Bearing (1 1/8&quot; diameter head bearing)</td>
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</table>

1. Partial model eligibility
2. When equipped with fluid filled dampener (not a Lord rubber dampener)
3. When equipped with fluid filled dampener with a 1 3/16" diameter head bearing
4. When equipped with fluid filled dampener with a 1 5/16" diameter head bearing

---

**Quick and Easy! We have done the assembly**

---

**Seal Kit**

P/N SDKT-1
Includes all necessary o-rings and backup rings

**Repair Kit**

P/N SDKT-2 (1 5/16" diameter)
Includes piston assembly, snap ring(s) and housing o-ring.

**Hardware Kit**

P/N SDKT-4
Includes all nuts, bolts, washers, cotter keys, and bushings to attach the shimmy dampener to the nose strut.

**Seal Kits**

P/N SDKT-5 and SDKT-6
Includes all necessary o-rings and backup rings.

---

**www.mcfarlaneaviation.com**
**Brand New Complete Shimmy Dampener Assembly for Cessna Aircraft 150, 152, 172, 175, 182**

**This is a new temperature compensated hydraulic design!**

Assembly P/N MD0442512-1

- Direct replacement for part numbers 0442512-1 and 0542119-1
- It’s everything the original should have been and more than the rubber units ever could be!!
  - Oversize shaft for rigid strength
  - Wear resistant hard anodized housing
  - Better shimmy dampening
  - Costs less than the throw away rubber dampener
  - Totally repairable
  - Self lubricating

**Temperature compensated hydraulics**

- Almost no service required
- Even the first minor movements are dampened
- Consistent dampening action
- No oil leaks

---

**What Does Temperature Compensated Mean?**

**By Dave McFarlane**

When hydraulic oil changes temperature, the volume of the oil also changes. This volume change from a temperature reduction will create a vacuum in the oil chamber of the original Cessna uncompensated shimmy dampener. This vacuum will cause the oil to vaporize giving the oil a foamy expanded mixture that is compressible. The shimmy dampener action is then drastically degraded. An increase in temperature will increase the oil volume causing a drastic pressurization of the dampener oil chamber. This pressure will force small quantities of oil past the dampener shaft seals. The decrease in oil will then aggravate any temperature reduction with increased chamber vacuum and related oil vaporization. This process explains why continuous servicing of the original shimmy dampener is required.

The temperature compensation system works by having a small chamber of oil that is spring pressurized through a very small passage into the main dampening restrictive orifice of the shimmy dampener. The spring loaded oil chamber can adjust for oil volume changes as temperature changes. A similar system is built into your car shock absorbers. The temperature compensated hydraulic system requires very little service over extended periods of time and assures stable shimmy dampening action.

---

**Why is a hydraulic shimmy dampener better than a rubber dampener?**

**By Dave McFarlane**

A rubber based dampener is continuously fatiguing the rubber components as it changes direction of motion. The rubber system depends on stable friction of the rubber riding in a metal tube. This is very difficult to achieve over extended usage. There are inherent differences in static friction of rubber and dynamic friction of rubber that affect dampening performance. Long term use changes the performance of the dampener caused by all of these un-repairable factors. The hydraulic system works in a film of oil with stable performance for long periods of time and it is totally repairable.
**Landing Gear and Nose Wheel Steering Parts**

**Landing Gear Box Shims**
- P/N AD0441023-2, .100" tapered shim
- P/N AD0441023-160, .100" tapered shim
- P/N AD0741022-1, .040" shim
- P/N AD0741022-2, .050" shim
  - For Cessna aircraft using leaf spring landing gear
  - 4130N steel, plated
  - FAA-PMA

**Main Gear Scraper Ring**
- P/N MS28776M-2-18
- Fits Piper Models
  - PA28-140, 150, 151, 160, 161
  - PA28-180, 181, 235, 236, 260, 300

**Main Gear Quad Ring**
- P/N CA484-769
- Fits Piper Models
  - PA-28-140, 150, 151, 160, 161
  - PA-28-180, 181, 235, 236, 201T, 32, PA-32-260, 300, 301, 301T

**Nose Gear Quad Ring**
- P/N CA484-770
- Fits Piper Models
  - PA28-140, 150, 151, 160, 161
  - PA28-180, 181, 235, 236, 260, 300, 301, 301T

**Main Gear Door Hinge Pin for Cessna Citation 550 and 560 Aircraft**
- P/N MS20253-2-2050
  - Corrosion resistant
  - Two required per aircraft
  - Direct replacement

**Wheel Pant Mounting Plates for Cessna Aircraft**
- P/Ns MC0441225-1, MC0441225-2, MC0541220-1 and MC0541220-2
  - Machined from high strength aluminum alloy
  - Anodized for corrosion resistance
  - Nut plates are rivet in place - ready to install!

**Axles for Cessna Aircraft**
- Don't lose an airplane because of a broken aluminum axle!
- Steel axle P/N AF1441003-1
  - Weighs only 2.8 lbs
  - Save hundreds of $$
- Titanium axle P/N AF1441003-1T
  - Reduces weight by 2 lbs per A/C vs. steel axles
  - Will not rust

**Nose Baggage Compartment Cargo Door Up Latch for all Cessna 207 Aircraft**
- No more holding up the door while loading!
- P/N AF1213922-1
  - Improved strength
  - Nickel plated for corrosion resistance

**High Strength Parts for Helio H-295 Courier Aircraft**
- Parts are manufactured from high strength material and machined from a single billet - stronger than original welded assemblies!
- Axle P/N AF250-040-495
  - Cad plated for increased durability
  - Precision fit - drop in direct replacement
  - Accommodates wheel-ski installation

**Maintenance Tip:**
Wheel pant mounting plates commonly crack around the axle. If any cracks are present, they should be replaced. The cracks are caused by wheel pant vibration. Assure that the wheel pant axle bolts are tight. Proper wheel balance will lessen wheel pant vibration. See page 241 for a simple but effective wheel balance.

**Table 1:**

<table>
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<tr>
<th>Qty per Aircraft</th>
<th>AD0441023-2</th>
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<td>2-4 A/R</td>
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</tr>
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</table>

**Save $$**

**Manufactured by PMA Products, Inc.**

**Manufactured by Airforms, Inc.**

**Save $$**

**Manufactured by F Atlee Dodge**

**Manufactured by Airforms, Inc.**

**Manufactured by PMA Products, Inc.**

**www.mcfarlaneaviation.com**
## Main and Nose Strut Seal and Repair Kits for Piper Aircraft

Kits contain MIL-SPEC and industry standard seals and components and do not require FAA-PMA approval. Kits contain approved original Piper parts.

Seal kits contain o-rings and polymer seals.

Repair kits contain a seal kit and all components required to repair a leaky strut including retaining rings, compression rings and washers.

### More Kits Coming Soon!

## Main and Nose Strut Seal Kit for Beechcraft Aircraft

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Main P/N</th>
<th>Nose P/N</th>
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## Tow Pin for Beechcraft Aircraft

P/N RA60-820029-1

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<th>Aircraft</th>
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</tbody>
</table>

www.mcfarlaneaviation.com

1 Use only when bearing has O-ring groove on ID
2 Use only when bearing has T-seal and backup ring
**Cessna Caravan Torque Link Repair STC**

Minimal downtime repair to keep 208/208B nose gears shimmy-free

This STC will dramatically reduce nose gear swaps

- Save over $15K and be flying the same-day
- Reduce downtime by repairing in the field
- Convenient tool kit allows for on-airplane repair
- EASA approved

---

**Nose Gear Torque Link Assemblies**

Improved to reduce wear and prevent cracks

- Approved for all 208 and 208B aircraft
- Hard aluminum surface to reduce wear
- Precision fit - drop in direct replacement
- Designed to prevent cracking in threaded grease fitting holes
- Ready for installation
- Durable powder coating finish

---

**Nose Gear Spring Fork Needle Bearing for Caravan Aircraft**

P/N MS24462-5

- Fits all Cessna 208 models
- 2 required per aircraft
- Save 30%

---

**Nose Gear Shock Strut Bearing Cups and Cones for Caravan Aircraft**

P/N L217813 Bearing Cone

- Fits all Cessna 208 models
- 2 required per aircraft