Can You Stop Nose Gear Shimmy?

By Dave McFarlane

*Nose gear shimmy is destructive and not normal! And yes, **it can be stopped**. Never allow any amount of nose gear shimmy to continue. **The quicker you take action**, the easier it will be to stop it.*

"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 frustration by us and our customers and 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 loading on the nose gear and the weight change does not significantly change the nose gear geometry. We guessed that our customer's shimmy might have been stopped by the fact that the changing nose weight also changed the tire shape. We assumed that when the tire shape changes so does the contact profile of the tire to the runway. We had already done all of the normal things to perfect the nose gear and shimmy damping system rigging and mechanicals. The customer's tire seemed fine with no unusual wear patterns that could be detected. 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 its self 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 taxiing 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 dampener is working and trying to do its job. The shimmy dampener 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 un-detectable.

Drop a plumb bob to determine aircraft center line



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 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.

Continued on next page

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Continued from previous page

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 dampener for seal condition and excessive wear in the piston and dampener bore. The dampener 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 course 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

5 or rubber products. Block the nose gear off the ground and give the tire time to stabilize its 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!



Use a belt sander to remove the shimmy wear pattern in the tread.



To check tire for proper balance, use our wheel balancer tool.
P/N TOOL128 for 3/4" diameter axles
P/N TOOL129 for 1", 1¼", and 1½"axles
(additonal sizes available)
See Tools and Maintenance section for details.

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Shimmy Dampener Assembly

Replace the Lord throw away dampener with our fully repairable Shimmy Dampener!
P/N MC0442512-1
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!

- Quicker steering response
- Oversize shaft for rigid strength
- Wear resistant hard anodized housing
- Totally repairable
- Self lubricating
- Costs less than the throw away rubber dampener

Temperature compensated hydraulics

- Thermally compensated hydraulic action for low maintenance
- Even the first minor movements are dampened
- Consistent dampening action
- No oil leaks
- Go years without servicing!

Seal Kit P/N SDKT-7

- Designed specifically to re-seal our Shimmy Dampener P/N MC0442512-1
- Contains all required O-rings and back up rings

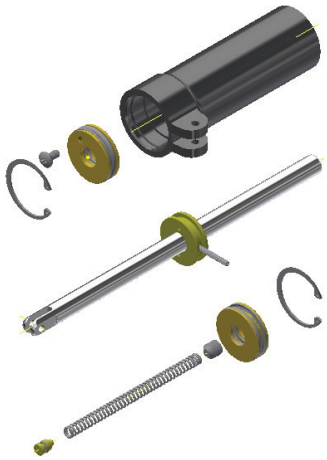


Up to 5x the dampening power of Lord® !



Shimmy Dampener Assembly P/N MC0442512-1	
Model	**Serial Number**
150G,H,J,K,L,M, A150K,L,M, F150G,H,J,K,L,M, FA150K,L,M, FRA150L,M	All
152, A152, F152, FA152	All
172, 172A,B,C,D,E,F,G,H, ,K,L,M,N,P,Q, F172D,E,F,G,H,K,L,M,N,P, FP172, P172D, FR172E,F,G,H,J,K R172K	46433 and on
172R	17280001 thru 17281142
172S	172S8001 thru 172S9288
175, 175A,B,C	55896 and on
182B,C,D	All

Replacement Parts	Description
1520	Barrel
1521	Bearing, Head, Shimmy Dampener
1522	Bearing, Head, Shimmy Dampener w/ Fill Hole
1523	Shaft, Shimmy Dampener
1524 [1]	Piston (base number)
1525	Piston, Floating, Shimmy Dampener
1526	Screw, Set
1527	Spring, Shimmy Dampener
1530	Tool, Extraction, Floating Piston
1531	Tool, Spring Insertion
1532	Screw, Seal
AN565AC624H6	Screw, Set, 3/8-24 X 3/8"
MS1665-1137	Ring, Retaining
SDKT-7	Seal Kit
MS51031-137	Screw, Set, 3/8-24, SS
NAS561P4-16	Pin, Retaining
[1] Housings and Pistons that are letter coded require placement of Piston P/N 1524 and Seal Kit P/N SDKT-7 (see following pages)	

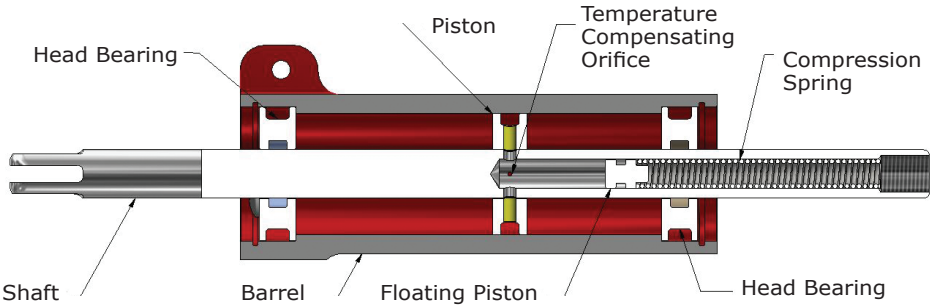


What Does Temperature Compensated Mean?

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
See next page!

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Why is a hydraulic Shimmy Dampener better than a rubber Dampener?

By Dave McFarlane

General Discussion

The McFarlane shimmy dampener is designed to drastically outperform the Lord® brand rubber dampener and the original Cessna hydraulic shimmy dampeners. All the dampening forces of the McFarlane dampener where found similar to the original vintage Cessna hydraulic dampeners. Our improved dampener extends the life, offers greater consistency of dampening forces, and reduces the required servicing frequency as compared to the Cessna dampener. Tests were performed and carefully measured on a new McFarlane dampener, a new Cessna hydraulic dampener, and a new Lord rubber dampener. The Cessna hydraulic dampener was found to have similar dampening characteristics as the new McFarlane hydraulic dampener. For simplicity, only the McFarlane hydraulic dampener results are shown in the data charts.

What Would the Ideal Dampener Do? The best possible dampener would move easily with no resistance to motion at slow speeds for quick and easy control of the nose wheel while steering the aircraft and the dampener would have tremendous resistance to motion when moved at high speeds during shimmy. The aircraft steering system uses spring pressure to turn the nose wheel. If the dampener is hard to move while steering, the steering input of the pilot is absorbed by the steering springs and no steering occurs. The result is that the nose wheel does not respond or responds slowly and more erratically to pilot input. The less force required to move the dampener at slow speeds the better steering control the pilot has. Nose wheel shimmy creates high speed movement of the dampener. Shimmy is prevented or stopped by high dampener resistance to motion. The higher the force required to move the dampener at shimmy speeds the better the dampener will stop shimmy. It is desirable to have the dampener forces increase as the speed of the shimmy cycle increases. The ideal dampener would also have heavy dampening forces for a large portion of the shimmy travel cycle. Good shimmy dampening characteristics would be a combination of strong dampening forces and a long motion cycle for the dampening forces.

How Does a Hydraulic Resistance Dampener Work? In general, the hydraulic shimmy dampener design depends on oil flow through a controlled orifice (several small holes in the piston or clearance between the piston and cylinder wall or both). Since the orifice or clearance is a fixed size there is more resistance to the oil flow the faster the dampener is moved. The oil path is designed to be large enough that when the oil is moving slowly while steering it can flow easily through the allowed space from one side of the piston to the other. When the oil is moving fast, the oil path is too small to let higher volume of oil through quickly. The faster the shimmy dampener moves the more resistance there is to oil flow. As the dampener action becomes faster, the dampening forces increase. Since dampening forces are related to the speed of the oil flowing through the orifice, there is high dampening forces for all of its travel cycle except when it is changing directions. Restricted flow hydraulics makes the perfect shimmy dampener system.

How Does a Lord® Friction Type Rubber Dampener Work? The Lord® rubber dampener depends on the friction of the rubber piston against the cylinder wall. Rubber by nature requires a lot more force to start it to move (static friction) than the force required when it is in motion (dynamic friction). By characteristic of rubber sliding on metal, there is little difference in the friction forces when a rubber piston is moved slowly in the cylinder or if it move fast in the cylinder. The friction can actually decrease with the speed of the rubber piston. The Lord® rubber piston is designed where the rubber expands during the change of direction adding more friction that gives it its dampening action. The problem is that as the rubber piston moves back and forth there is increased friction only at the direction change position which is a very small part of the motion cycle. The friction forces during the rest of the shimmy motion cycle is close to the low slow motion (steering) friction forces. The change of direction is only a short part of the travel cycle. With the Lord® dampener, there is a diminishing gain of the dampening action as the speed increases. See Figures 1 and 2.

How Does the Service Life Compare? The service life of the different dampeners was tested by cycle testing a new vintage Cessna hydraulic dampener, a new McFarlane dampener and a new Lord® dampener. The Cessna hydraulic dampener failed at approximately 17,000 cycles with the O rings leaking and with significant wear in the head bearing. The McFarlane dampener went over 300,000 cycles without seal failure or any significant wear in the head bearings and did not fail. The Lord dampener also went over 300,000 cycles without a failure. The Cessna hydraulic dampener wears out the head bearing area and that allows the piston to shift out of position resulting in scratches and grooves in the cylinder wall and piston. The Cessna hydraulic dampener is repairable but generally comes up a little short of new performance after rebuild due to the cylinder wall scratches and groves that remain. The new McFarlane dampener is designed with an o-ring seal between the piston and cylinder. The o-ring and a heavier head bearing along with hard anodizing prevents piston and cylinder wall scratching and grooving. The improvements allow the McFarlane dampener to be economically rebuilt many times to original performance. The Lord® dampener does not have a repair and must be thrown away when they fail to prevent shimmy.

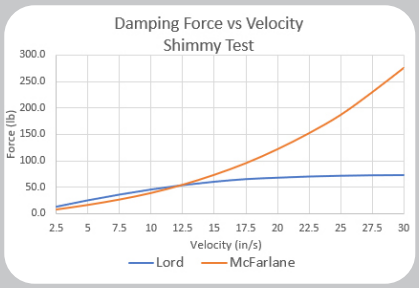


Figure 1

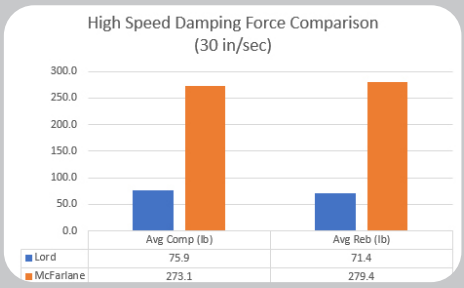


Figure 2

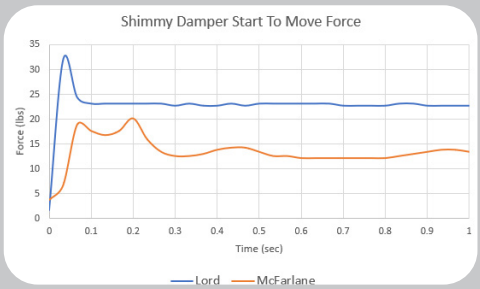


Figure 3

What Do the Charts Tell Us?

You can see from the test data charts, Figure 3, that the rubber dampener is going to make the airplane steer harder and be less responsive to pilot inputs. The Figure 1 charts show that at 20 in/sec of motion (a very slow shimmy), the McFarlane dampener has twice the dampening power of the Lord® rubber dampener and at 30 in/sec the McFarlane dampener has 5 times the dampening power. In conclusion, the McFarlane dampener allows more responsive steering and a much stronger dampening action to stop shimmy.

Original Cessna Shimmy Dampener Parts

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 throwaway unit
- Proven design with up to 5x the dampening power of Lord®

Improved Shimmy Dampener Shaft

Save up to 50% - Lasts longer!

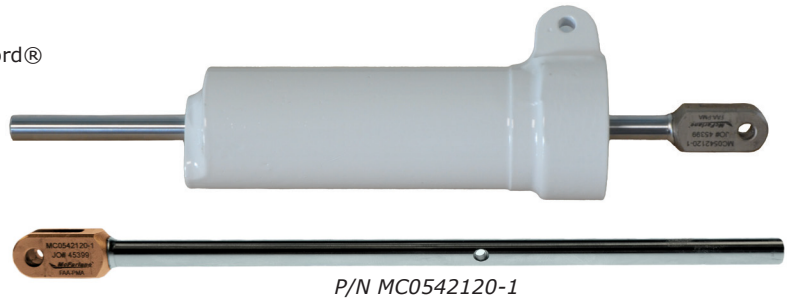
- Perfected chrome finish for improved O-ring life
- Durable one piece design

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



P/N MC0542120-1
Shaft

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





P/N MC0542102-1
Head Bearing
(1 5/16″ diameter)

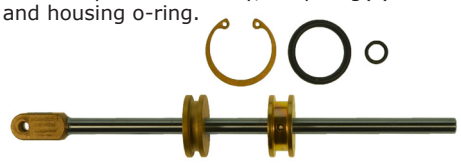


P/N MC0542102-3
Head Bearing
(1 3/16″ diameter)



P/N MC0842400-3
Piston

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



See next page for eligibility!

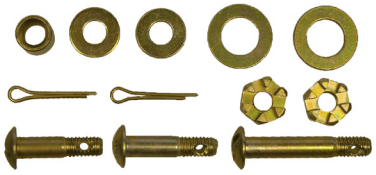
Repair Kit
P/N SDKT-3 (1 3/16″ diameter)
Includes piston assembly, snap ring(s) and housing o-ring.



Piston Assemblies include pre-assembled shaft, head bearing, piston, head bearing o-rings, and roll pin.

Maintenance Tip:
Measure the diameter of the head bearing to determine the correct piston assembly or repair kit. Always replace worn head bearings as they keep the shaft and piston in alignment. Support the shaft well when replacing the piston.

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





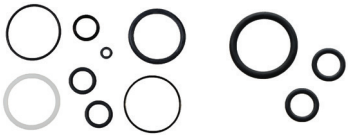
Piston Assembly
P/N MC0542118-5
(with 1 3/16″ head bearing)

Quick and Easy
We have done the assembly for you!



Piston Assembly
P/N MC0542118-1
(with 1 5/16″ head bearing)

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



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Original Cessna Shimmy Dampener Parts continued from previous page

Shimmy Dampener Replacement Parts for Cessna Aircraft

Aircraft	Serial Number	MC0542102-1 Head Bearing (1 5/16" diameter head bearing)	MC0542102-3 Head Bearing (1 3/16" diameter head bearing)	MC0542118-1 Piston Assy (1 5/16" diameter head bearing)	MC0542118-5 Piston Assy (1 3/16" diameter head bearing)	MC0842400-3 Piston	MC0542120-1 Shaft	SDKT-1 Seal Kit	SDKT-2 Repair Kit (1 5/16" diameter head bearing)	SDKT-3 Repair Kit (1 3/16" diameter head bearing)	SDKT-4 Hardware Kit	SDKT-5 Seal Kit	SDKT-6 Seal Kit
150, 150A,B,C,D,E,F, F150F	17879 and On	4	3					2			2		
150G[1]	15064533 thru 15067056	4	3	4	3	2	2	2	4	3	2		
150G[1],H,J	15067057 and On		3		3	2	2	2		3	2		
150K,L,M, A150K,L,M, FA150K,L,M, FRA150L,M	All		3		3	2	2	2		3	2		
F150G	All	4	3	4	3	2	2	2	4	3	2		
F150H,J	All		3		3	2	2	2		3	2		
F150K,L,M	All		3		3	2	2	2		3	2		
152, A152, F152, FA152	All		3		3	2	2	2		3	2		
172, 172A,B,C,D,E,F,G,H[1]	46433 thru 17256449	4	3	4	3	2	2	2	4	3	2		
172H[1],I,J,K,L,M,N,P,Q,R,S	17256450 and On		3		3	2	2	2		3	2		
F172D,E,F,G,H[1]	F172-0001 thru F172-0519	4	3	4	3	2	2	2	4	3	2		
F172H[1],K,L,M,N,P	F172-0520 thru F17202254		3		3	2	2	2		3	2		
FP172, P172D	All	4	3	4	3	2	2	2	4	3	2		
FR172E,F,G,H,J,K, R172K	All		3		3	2	2	2		3	2		
175, 175A,B,C	55896 and On	4	3	4	3	2	2	2	4	3	2		
177, 177A,B	ALL											2	
182B,C,D	All	4	3	4	3	2	2	2	4	3	2		
182E	18253599 thru 18254143	4											
182K,L,M,N,P,Q,R,S,T[1]	18257626 thru 18281197												2
A182K,L,N	All												2
F182P,Q	All												2
T182T	T18208001 thru T18299999												2

[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



Shimmy Dampener

for Cessna 150, 152, 172, and 182

Everything the original should have been and more than the rubber units could ever be!

Coming Soon

Full Cessna 182 series, 206, 207, 210 series, and Piper PA-28 aircraft

Nose Wheel Steering Rods for Cessna Aircraft

Tired of *soft* worn out steering rods with broken down springs?
Replace them with our improved steering rods!

Save Thousands $$$

Cessna 150 thru 182D

- Redesigned long life springs that will never weaken!
- Stainless steel tubes for improved corrosion resistance (MC0543022 Series)
- Hardened internal washer for greater durability
- Our springs will never fail!

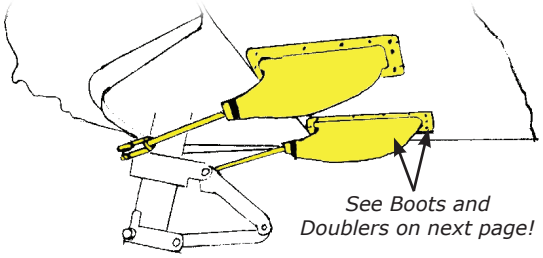


150 thru 172 Steering Rod
P/N MC0743008-2



175 and early 182 Steering Rod
P/N MC0543022-1

150 thru early 182 Steering Rod
P/Ns MC0543022-1 and MC0743008-2



See Boots and Doublers on next page!

Model	Steering Rod		Rod End (2 per A/C)
	Left Hand	Right Hand	
150, 150A,B,C,D,E,F,G,H	MC0543022-3	MC0543022-4	S1107-3
150J,K,L,M	MC0543022-3	MC0543022-4	S1823-3
A150K,L,M	MC0543022-3	MC0543022-4	S1823-3
F150F,G,H	MC0543022-3	MC0543022-4	S1823-3
F150J,K,L,M, FA150K,L	MC0543022-3	MC0543022-4	S1823-3
FRA150L,M	MC0543022-3	MC0543022-4	S1823-3
152, A152, F152, FA152	MC0543022-3	MC0543022-4	S1823-3
172, 172A	MC0543022-1	MC0543022-2	S1107-3
172B,C	MC0743008-1	MC0743008-2	S1107-3
172D,E,F,G,H,I,K,L,M,N,P,Q	MC0543022-1	MC0543022-2	S1823-3
F172D,E,F,G,H,K,L,M,N,P	MC0543022-1	MC0543022-2	S1823-3
FP172	MC0543022-1	MC0543022-2	S1823-3
FR172E,F,G,H,J,K	MC0543022-1	MC0543022-2	S1823-3
P172	MC0543022-1	MC0543022-2	S1823-3
R172E,F,G,H,K [1]	MC0543022-1	MC0543022-2	S1823-3
172R,S	MC0543022-1	MC0543022-2	S1823-3
175, 175A,B,C	MC0743008-1	MC0743008-2	S1107-3
177, 177A,B [1]			S1823-3
182,182A,B,C,D	MC0743008-1	MC0743008-2	S1107-3
182E,F,G,H,J,K,L,M,N,P,Q,R,S,T F182P,Q, T182, T182T	MC0760622-1		MCMM3M12

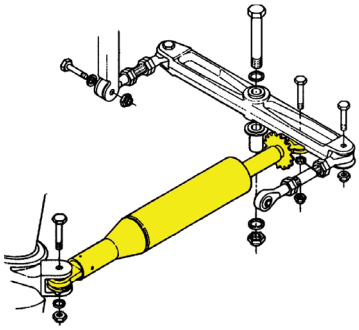
[1] Quantity of one Rod End required per aircraft.

Cessna 182E thru 182T

- More durable and lasts longer than the OEM
- Save thousands $$$
- More secure retention method
- Stronger and thicker washers
- Treated for anti-corrosion, primed, and painted



Later 182 Steering Rod
P/N MC0760622-1



Replace your worn/rusty Rod Ends!



P/N S1823-3



P/N S1107-3



P/N MCMM3M12

Don't forget your Sprocket!
P/N MC0760630-1
Anodized to prevent corrosion and wear
For Cessna 182E thru 182T



Maintenance Tip:
How do I know if my steering rods need to be replaced?
- *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*

Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Nose Wheel Steering Rod Boots for Cessna

P/N MC0413304-3 for 150 thru 152 series
P/N MC0543015-6 for 172, 175 and early 182 series *(see below for later 182 series)*
Our Steering Rod Boots for Cessna 150 thru early 182 series 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 exhaust and carbon monoxide out of the cabin
- Protects the cabin in case of an engine fire



These bad boys can take the abuse!

Doubler for Cessna Aircraft

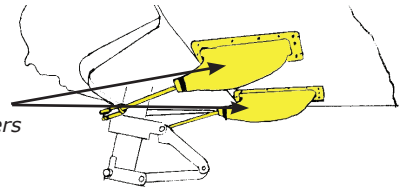
McFarlane doubler for 150-152 aircraft is now FAA-PMA approved
P/N MC0413304-6
Cheaper to replace than clean corrosion, prime, and paint the original! Doublers are alodined, primed, and painted to save installation time.



Save $$$

Now Offering Boot and Doubler Kits!

Each kit contains:
(2) boots, (2) doublers



Model	Boot (2 per A/C)	Doubler (2 per A/C)	Complete Kits[1]
150, 150A,B,C,D,E,F,G,H	MC0413304-3	MC0413304-6	SRB-KT-1
150J,K,L,M	MC0413304-3	MC0413304-6	SRB-KT-1
A150K,L,M	MC0413304-3	MC0413304-6	SRB-KT-1
F150F,G,H	MC0413304-3	MC0413304-6	SRB-KT-1
F150J,K,L,M, FA150K,L	MC0413304-3	MC0413304-6	SRB-KT-1
FRA150L,M	MC0413304-3	MC0413304-6	SRB-KT-1
152, A152, F152, FA152	MC0413304-3	MC0413304-6	SRB-KT-1
172, 172A	MC0543015-6	0543026-1	SRB-KT-2
172B,C	MC0543015-6	0543026-1	SRB-KT-2
172D,E,F,G,H,I,K,L,M,N,P,Q	MC0543015-6	0543026-1	SRB-KT-2
F172D,E,F,G,H,K,L,M,N,P	MC0543015-6	0543026-1	SRB-KT-2
FP172	MC0543015-6	0543026-1	SRB-KT-2
FR172E,F,G,H,J,K	MC0543015-6	0543026-1	SRB-KT-2
P172	MC0543015-6	0543026-1	SRB-KT-2
R172E,F,G,H,K [1]	MC0543015-6	0543026-1	SRB-KT-2
172R,S	MC0543015-6	0543026-1	SRB-KT-2
175, 175A,B,C	MC0543015-6	0543026-1	SRB-KT-2
182,182A,B,C,D	MC0543015-6	0543026-1	SRB-KT-2
182E,F,G,H,J,K,L,M,N,P,Q,R,S,T F182P,Q, T182, T182T	***New!*** MC0713666-1	***New!*** MCS2357-2S	N/A

[1] Each kit contains (2) boots and (2) doublers

Steering Rod Boot for 182E thru 182T

10 times the life at half the price!
P/N MC0713666-1 for 182E thru 182T
McFarlane has improved the design of both the boot and the retaining flange. The Cessna boot is prone to ripping and tears caused by fatigue and premature infrared heat related material break down. McFarlane has utilized a three ply material design incorporating both Kevlar and fiberglass, and a supple high temperature rubber coating. Kevlar and fiberglass work together to prevent wear, fatigue, and heat failures while offering 15 times the fire resistance of the original boot for extended fire protection at 2,000 degrees F.

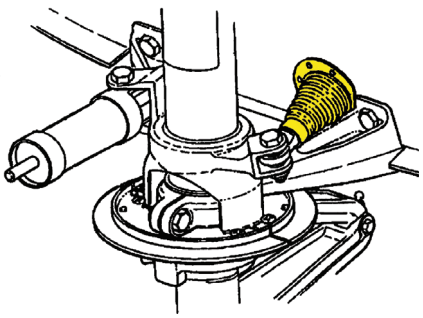
McFarlane has also upgraded the original aluminum flange to a stainless steel firewall material. The flange is included with the boot.

- Kevlar/Fiberglass composite for strength and fire protection
- Fire proof stainless steel flange
- Deeper convoluted design for better flexibility and longer life

Don't Forget the Hose Clamp!
P/N MCS2357-2S
Cessna failed to list the clamp in the parts catalog, therefore people tend to use a nylon cable tie which will easily melt away with an engine fire. Always use metal clamp P/N MCS2357-2S to attach the boot to the steering link.







Maintenance Tip:
Boot failure occurs from radiant heat off of the exhaust system and flexing with the steering system. Cessna original boots are manufactured with a fragile fiberglass base material and peroxide cured silicone that becomes stiff and brittle. This system offers poor resistance to flexing fatigue which causes premature boot failure. The 182 boot must be free from holes and leaks to prevent carbon monoxide from entering the cabin. It is normal for the exhaust system to leak exhaust at the component joints. Leaks in the firewall will allow exhaust and carbon monoxide to enter the cabin.



2,000° Flame Test

New original boot
failed in 40 seconds

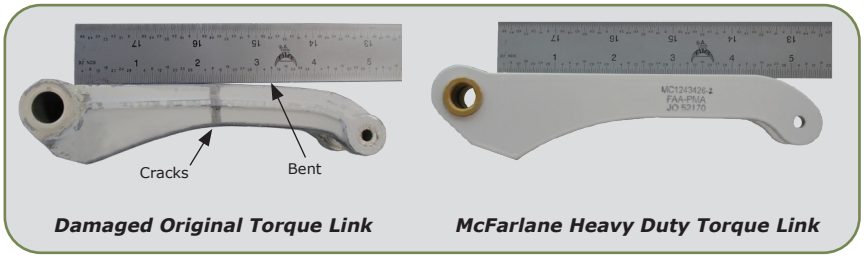
McFarlane boot still intact
for more after 15 minutes!

Replacement Torque Links for Cessna 100 & 200 Series Aircraft

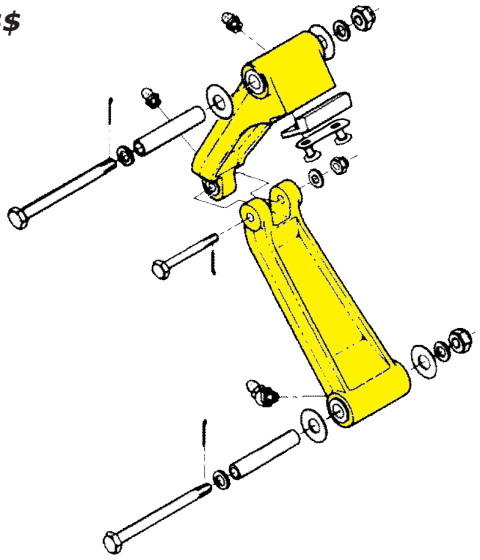
Replace your bent Torque Links and worn Stop Lugs with our assemblies! Ours are stronger, last longer, and cost less.

- Stronger alloy — made from a high-strength billet
- More metal to resist cracking and bending
- Increased service life
- Substantial cost savings $$$
- Primed and painted, ready for installation
- Complete with pre-installed Stop Lug, Bushings, and Grease Fittings

Save thousands $$$



Damaged Original Torque Link ***McFarlane Heavy Duty Torque Link***



See next page for Stop Lug and Safety Plate details

Use this chart to purchase Torque Links without bushings and stop lugs

Torque Link with Bushings	Torque Link without Bushings
MC0442506-1	1715
MC0442506-2	1716
MC0442506-12	1715
MC0543035-3	1717
MC0543035-8	1718
MC1243635-1	1715

Torque Link Assembly						
Aircraft	**Serial Number**	**Upper**	**Lower**	**Stop Lug**	**Safety Plate**	**Stop Lug Safety Plate & Bolt Kit**
150D[1],E,F[1], F150F[1]	15060477 thru 15063457 F150-0001 thru F150-0055	MC0442506-1[3]	MC0442506-2[3]	MC0442506-8[3]	MC0442506-9[3]	TLSL-KT-1
150G,H,J, F150G,H,J	All	MC0442506-1[2]	MC0442506-2[2]	MC0442506-8	MC0442506-9	TLSL-KT-1
150K,L,M, A150K,L,M, F150K,L,M, FA150K,L,M	All	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-1
FRA150L,M	All	MC0442506-1	MC0442506-2			
152, A152, F152, FA152	All	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-1
172B,C	All	MC0543035-8	MC0543035-3			
172D,E,F,G, F172D,E,F,G	All	MC0543035-8[4]	MC0543035-3[4]			
172H,I,K,L,M[1]	17245893 thru 17263458	MC0442506-1[4]	MC0442506-2[4]	MC0442506-8	MC0442506-9	TLSL-KT-1[3] TLSL-KT-2[2]
172M[1],N,P,Q	17263459 and on	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-2
172R,S	All	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-1
172RG	All		MC0442506-2			
F172H,K,L,M[1]	F17200655 thru F17201234	MC0442506-1[4]	MC0442506-2[4]	MC0442506-8	MC0442506-9	TLSL-KT-1[3] TLSL-KT-2[2]
F172M[1],N,P	F17201235 and on	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-2
FR172E,F,G	All	MC0442506-1[4]	MC0442506-2[4]	MC0442506-8	MC0442506-9	TLSL-KT-1[3] TLSL-KT-2[2]
FR172H,J	All	MC0442506-1[2]	MC0442506-2[2]	MC0442506-8	MC0442506-9	TLSL-KT-1
FR172K	All	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-2
P172D	All	MC0543035-8[4]	MC0543035-3[4]			
R172E,F,G,H	All	MC0442506-1[3]	MC0442506-2[3]	MC0442506-8	MC0442506-9	TLSL-KT-2
R172K	All	MC0442506-1	MC0442506-2	MC0442506-8	MC0442506-9	TLSL-KT-2
175A,B,C	All	MC0543035-8	MC0543035-3			
177RG, F177RG	All		MC0442506-2			
182A[1],B,C,D	34754 thru 18253598	MC0543035-3				

Notes:
[1] Partial model eligibility
[2] Standard Nose Strut
[3] Heavy Duty Nose Strut
[4] Standard and Heavy Duty Nose Struts
[5] Replacement bolts for upper torque links on these aircraft is P/N MC1243422-1
[6] Replacement shims for upper torque links on these aircraft are P/N MC1243618-2 is 0.020" and P/N MC1243618-3 is 0.011"
Upper Torque Links use Lube Fitting P/N AS15002-1P where applicable
Lower Torque Links use Lube Fitting P/N AS15002-3P where applicable

Continued on next page

Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Replacement Torque Links continued from previous page

Torque Link Assembly						
Aircraft	**Serial Number**	**Upper**	**Lower**	**Stop Lug**	**Safety Plate**	**Stop Lug Safety Plate & Bolt Kit**
182E,F,G,H,J	All		MC0543035-3 4			
182K,L,M,N	All	MC0442506-1 3	MC0442506-2 3	MC0442506-8 3	MC0442506-9	TLSL-KT-2 3
182K,L,M,N,P1	18257626 thru 18262465	MC0442506-12 2		MC0442506-11 2	MC0442506-9	TLSL-KT-4 2
182P 1	18260826 thru 18262465		MC0442506-2 2	MC0442506-11	MC0442506-9	TLSL-KT-4
182P 1,Q,R, T182T, F182P,Q	18262466 and on	MC0442506-12	MC0442506-2	MC0442506-11	MC0442506-9	TLSL-KT-4
182S,T, T182T	All	MC0442506-12	MC0442506-2	MC0442506-11	MC0442506-9	TLSL-KT-3
FR182,R182,T182,TR182	All		MC0442506-2			
205	All	MC0543035-3 4				
206H, T206H	All	MC1243635-1 4	MC0442506-2 4	MC1243629-2 4	MC0442506-9	
P206B,C,D,E, TP206B,C,D,E	All		MC0442506-2 4	MC0442506-8 3	MC0442506-9 3	TLSL-KT-2
TU206B,C,D,E,F 1 U206B,C,D,E,F 1	U206-0657 thru U20602199	MC1243635-1 4	MC0442506-2 4	MC0442506-8 3	MC0442506-9 3	TLSL-KT-2
TU206F, 1G, U206F 1,G	U20602200 thru U20607020	MC1243635-1 4	MC0442506-2 4	MC1243629-2 4	MC0442506-9 3	
207, 207A, T207, T207A	All	MC1243635-1 4	MC0442506-2 4	MC1243629-2 4	MC0442506-9	
208, 208B	All	See details below				
210G,H, T210G,H	All	5 6				
210J,K,L,M,N,R, T210J, T210K,L,M,N,R, P210N,R	All	MC1243426-2 5 6		MC1243038-1		

Notes:
1 Partial model eligibility
2 Standard Nose Strut
3 Heavy Duty Nose Strut
4 Standard and Heavy Duty Nose Struts
5 Replacement bolts for upper torque links on these aircraft is P/N MC1243422-1
6 Replacement shims for upper torque links on these aircraft are P/N MC1243618-2 is 0.020" and P/N MC1243618-3 is 0.011"
Upper Torque Links use Lube Fitting P/N AS15002-1P where applicable
Lower Torque Links use Lube Fitting P/N AS15002-3P where applicable

Nose Gear Torque Link Assemblies

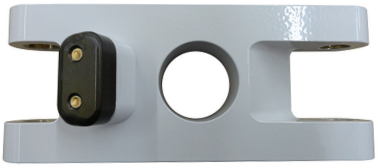
Improved to reduce wear and prevent cracks
Upper P/N AF2643084-1
Lower P/N AF2643084-2

- Approved for all Cessna 208, 208B models
- Hard aluminum surface to reduce wear
- Precision fit and ready for installation
- Designed to prevent cracking in threaded grease fitting holes
- Durable powder coating finish

P/N AF2643084-1 (Upper)



P/N AF2643084-2 (Lower)



Manufactured by Airforms Inc.

Torque Link Stop Lugs and Safety Plate for Cessna Aircraft

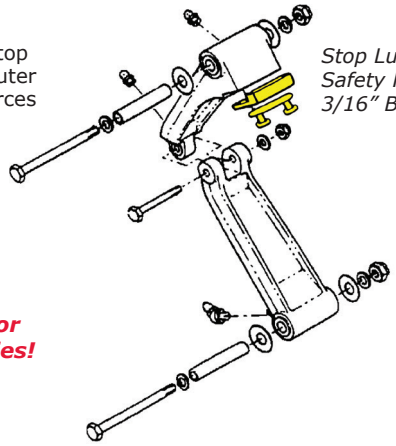
Replace worn out stop lugs to reduce drag!

This often overlooked but important part is affordable at McFarlane! The torque link stop lug is a sacrificial part that hammers against a flat spot on the lower part of the shock strut outer tube when the strut extends after take off. This prevents the strut from overextending and forces the nose wheel and rudder system into proper alignment for flight.

Due to repeated hammering with every takeoff, these stop lugs must be periodically replaced. Excessive wear can allow overextension of the strut. They also often wear unevenly resulting in inconsistent alignment of the nose wheel in flight which then causes extra drag and yaw. The extra yaw can require increased rudder trim which causes even more drag. So yes, replacing a torque link stop lug can reduce drag!

- Safety plate features bend up tabs to secure stop lug bolts
- Super tough 4130 alloy steel
- Kits include stop lug, safety plate and applicable 3/16" bolts.

See previous page for Torque Link Assemblies!



Stop Lug
Safety Plate
3/16" Bolt

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 dampening action and the pin hammering the orifice every landing and distorting and enlarging it. Over time, the excess nose strut travel and lack of dampening 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.



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.

Cessna Nose Gear Torque Link Repair Kits

FAA-PMA approved P/Ns TL-KT-1 thru TL-KT-11

Includes all commonly replaced torque link parts in a convenient kit:
Bushings, Spacers, Shims, Nuts, Bolts, Washers and Cotter Pins

Prevents nose wheel shimmy!

Cessna Brass Nose Gear Torque Link Shim Kit

Eliminates undamped torque link motion to prevent shimmy

Only McFarlane has three shim sizes for a precision fit!

P/N TL-SHIM-KT-1 contains:

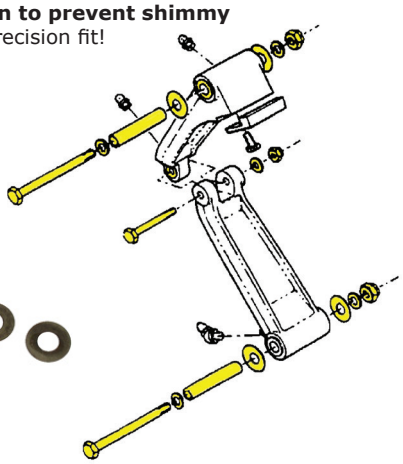
(2) MCS1450-6B14-005 0.005" Thick
(2) MCS1450-6B14-007 0.007" Thick
(5) MCS1450-6B14-010 0.010" Thick

Cessna Torque Link Spacers

P/N MC0543047-1 and MC0543047-2

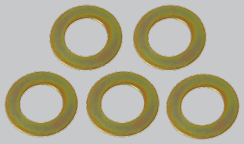
Tightly controlled minimal end chamfer maximizes bearing surface between spacer and fork to ensure a secure clamp and prevent fork wear





NAS1149F0316P Ultra-Thin Washers

Hard to find 3/16" ID, 0.016" thick standard steel washers are useful for fine tuning the center "knee" joint fit on most Cessna torque links. Available in packs of 5.



Not included in torque link kits

Model	Serial Number	Part Numbers: TL-KT-1	TL-KT-1-H [8]	TL-KT-2	TL-KT-4	TL-KT-5	TL-KT-6	TL-KT-7	TL-KT-8 [2]	TL-KT-9 [2] [7]	TL-KT-10	TL-KT-11	TL-SHIM-KT-1	MC0543047-1	MC0543047-2	MCS1450-6B14-005	MCS1450-6B14-007	MCS1450-6B14-010	MCS1450-6B14-012	MCS1450-6B14-015
150, 150A,B,C,D,E,F,G,H,J,K,L,M, A150K-M, F150F-M, FA150K-M, FRA150L,M	All	•	•										•	•		•	•	•	•	•
152, A152, F152, FA152	All	•											•	•		•	•	•		
172, 172A,B,C,D,E,F,G,H,I,K,L,M,N,P,Q,R,S,	28000 thru 36141, 36150 thru 36153								•										•	•
F172D-P, FP172, FR172E-K, P172D, R172K	36142 thru 36149, 36154 thru 172S99999	•											•	•		•	•	•	•	•
172RG	All						•						•	•		•	•	•	•	•
175, 175A,B,C	All	•											•	•		•	•	•		
177, 177A,B	All										•								•	•
177RG, F177RG	All						•						•	•		•	•	•	•	•
182	All	•								•			•	•		•	•	•	•	•
182A,B,C,D,E,F,G,H,J,K,L,M,N,P,Q	All	•											•	•		•	•	•	•	•
182R	All						•						•	•		•	•	•	•	•
182S,T, T182T	All	•											•	•		•	•	•	•	•
F182P,Q	All	•											•	•		•	•	•	•	•
R182, T182, FR182, TR182	All						•						•	•		•	•	•	•	•
205 (210-5) 205A, (210-5A)	All	•											•	•		•	•	•	•	•
206, P206, P206A, TP206A, TU206A, U206, U206A [3]	All	•		•									•	•	•	•	•	•	•	•
P206B,C,D,E [1], TP206B,C,D,E [1] [6]	P206-0307 thru P20600641	•										•	•	•	•	•	•	•	•	•
P206E [1], TP206E [1]	P20600642 thru P20600647											•	•	•	•	•	•	•	•	•
TU206B,C,D,E [1], U206B,C,D,E [1] [6]	U206-0657 thru U20601537	•										•	•	•	•	•	•	•	•	•
TU206E [1],F [1], U206E [1],F [1]	U20601538 thru U20602199											•	•	•	•	•	•	•	•	•
TU206F [1],G, U206F [1],G	U20602200 thru U20607020				•								•	•	•	•	•	•	•	•
206H, T206H	All				•								•	•	•	•	•	•	•	•
207 [1], 207A, T207 [1] [4], T207A	20700001 thru 20700228				•	•							•	•	•	•	•	•	•	•
	20700229 thru 20700788				•								•	•	•	•	•	•	•	•
210, 210A,B,C,D,E,F,G,H,J	All	•											•	•		•	•	•	•	•
210K [3]	All	•		•									•	•	•	•	•	•	•	•
210L [1] [5], T210L [1] [5]	21059503 thru 21060255	•						•					•	•	•	•	•	•	•	•
210L [1],M,N,R, P210N,R, T210L [1],M,N,R	21060256 and on							•					•	•	•	•	•	•	•	•
T210F,G,H,J,K	All	•											•	•		•	•	•	•	•

[1] Partial model eligibility
[2] Used on Cessna models with heavy duty landing gear that use AN6 size (3/8-24 UNF) bolts in the upper and lower torque link joints. The normal duty landing gear uses AN4 size (1/4-28 UNF) bolts in the upper and lower torque link joints.
[3] These models may use one of two choices. Aircraft with both upper and lower spacers measuring ~ 2 inches long will use TL-KT-1 (containing two MC0543047-1 spacers). Aircraft with an upper spacer measuring ~ 2.6 inches and a lower spacer measuring ~2 inches will use TL-KT-2 (containing one MC0543047-1 and one MC0543047-2 spacer).
[4] These models may use one of two choices. Aircraft with both upper and lower spacers measuring ~ 2 inches long will use TL-KT-5 (containing two MC0543047-1 spacers). Aircraft with an upper spacer measuring ~ 2.6 inches and a lower spacer measuring ~2 inches will use TL-KT-4 (containing one MC0543047-1 and one MC0543047-2 spacer).
[5] These models may use one of two choices. Aircraft with both upper and lower spacers measuring ~ 2 inches long will use TL-KT-1 (containing two MC0543047-1 spacers). Aircraft with an upper spacer measuring ~ 2.6 inches and a lower spacer measuring ~2 inches will use TL-KT-7 (containing one MC0543047-1 and one MC0543047-2 spacer).
[6] These models may use one of two choices. Aircraft with both upper and lower spacers measuring ~ 2 inches long will use TL-KT-1 (containing two MC0543047-1 spacers). Aircraft with an upper spacer measuring ~ 2.6 inches and a lower spacer measuring ~2 inches will use TL-KT-11 (containing one MC0543047-1 and one MC0543047-2 spacer).
[7] Availability of one component of this kit (0841000-63) is limited. Call for current status.
[8] P/N TL-KT-1H only eligible for serials 15060477 thru 15064532 - **WITH** heavy duty nose gear

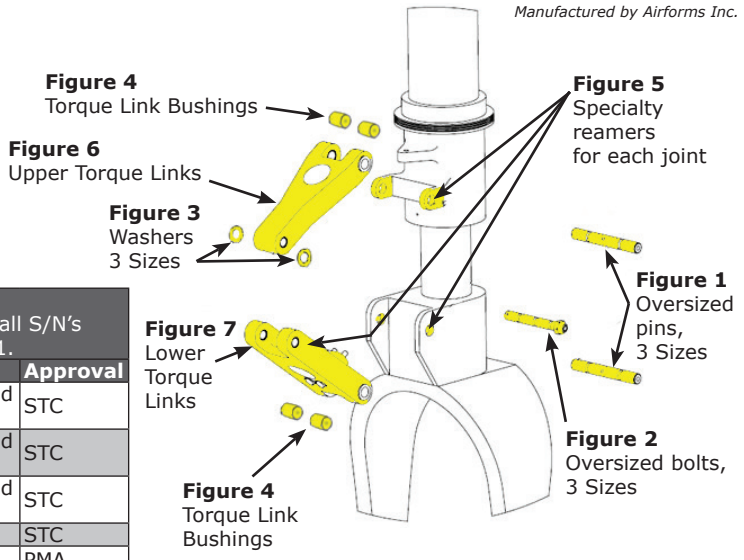
Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

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

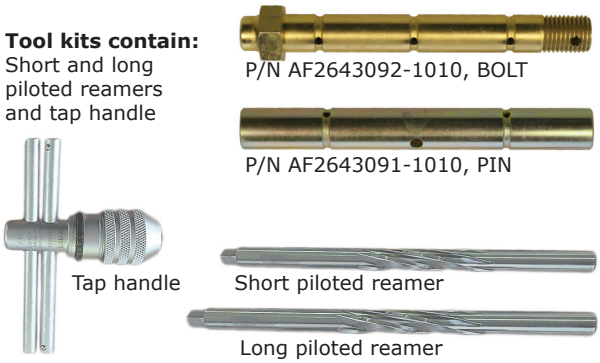
Manufactured by Airforms Inc.



Eligible model series:
Fits all Cessna 208/208B with "double lug" torque links. Includes all S/N's after 2080133/208B0098 or earlier S/N's equipped with SK208-51.

Fig	Part Number	Description	Approval
5	TOOL KIT + .010	REAMERS, Oversized .010 - short and long piloted reamers + tap handle	STC
5	TOOL KIT + .020	REAMERS, Oversized .020 - short and long piloted reamers + tap handle	STC
5	TOOL KIT + .030	REAMERS, Oversized .030 - short and long piloted reamers + tap handle	STC
5	TOOL KIT 32-604-56-01	REAMERS, all three sizes	STC
6	AF2643084-1	Upper Torque Link	PMA
7	AF2643084-2	Lower Torque Link	PMA
1	AF2643091-1	PIN, Nominal	PMA
1	AF2643091-1010	PIN, Oversize .010	PMA
1	AF2643091-1020	PIN, Oversize .020	PMA
1	AF2643091-1030	PIN, Oversize .030	PMA
2	AF2643092-1	BOLT, Nominal	PMA
2	AF2643092-1010	BOLT, Oversize .010	PMA
2	AF2643092-1020	BOLT, Oversize .020	PMA
2	AF2643092-1030	BOLT, Oversize .030	PMA
3	32-604-37-22005	WASHER, .005 thickness	STC
3	32-604-37-22010	WASHER, .010 thickness	STC
3	32-604-37-22015	WASHER, .016 thickness	STC
4	AF2643085-200	BUSHING, Torque Link	PMA
	STC-TORQUE LINK	Torque Link STC	STC

Tool kits contain:
Short and long piloted reamers and tap handle

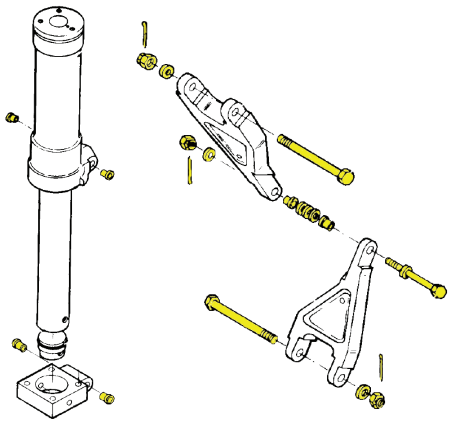


Nose Gear Torque Link Repair Kits for Piper Aircraft

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 FAA-PMA parts from PMA Products, standard hardware, or original Piper parts
- Save time and money! No more research and ordering of individual parts





Aircraft	Serial Number	Main Wheel Kit *2 kits req if not labeled Left/Right*	Nose Wheel Kit
PA-23, PA23-160	All	PTL-KT-91	PTL-KT-91
PA-23-235	All	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings
PA-23-250	All	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings
PA-E23-250	All	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings	PTL-KT-92 w/o Notched Bushings PTL-KT-93 w/Notched Bushings
PA-24, PA-24-250, PA-24-260, PA-24-400	All	PTL-KT-36 Left PTL-KT-75 Right	PTL-KT-95
PA-28-140, PA-28-150, PA-28-160, PA-28-180	All	PTL-KT-11	PTL-KT-31
PA-28-151	All	PTL-KT-13	PTL-KT-29

Continued on next page

Nose Gear Torque Link Repair Kits for Piper Aircraft continued from previous page

Aircraft	Serial Number	Main Wheel Kit *2 kits req if not labeled Left/Right*	Nose Wheel Kit
PA-28-161	2816001 thru 2816119	PTL-KT-41	PTL-KT-31
	2841001 thru 2841365	PTL-KT-10	PTL-KT-26
	2842001 thru 2842999	PTL-KT-5	PTL-KT-32
	28-7716001 thru 28-7816253	PTL-KT-15	PTL-KT-31
	28-7816254 thru 28-8616057	PTL-KT-41	
PA-28-181	2843001 thru 2843999	PTL-KT-3	PTL-KT-30
	2890001 thru 2890231	PTL-KT-7	PTL-KT-27
	28-7690001 thru 28-7890231	PTL-KT-12	
	28-7890232 thru 28-8690062	PTL-KT-7	
PA-28-201T	All	PTL-KT-2	PTL-KT-52
PA-28-235	All	PTL-KT-11	PTL-KT-31
PA-28-236	All	PTL-KT-77	PTL-KT-28
PA-28R-180	28R-30002 thru 28R-31279	PTL-KT-59 Right	PTL-KT-78
	28R-7130001 thru 28R-7130005	PTL-KT-40 Left PTL-KT-60 Right	PTL-KT-81
	28R-7130006 thru 28R-7130013	PTL-KT-39 Left PTL-KT-60 Right	PTL-KT-81
PA-28R-200	28R-30482, 28R-35001 thru 28R-7135062	PTL-KT-40 Left PTL-KT-59 Right	PTL-KT-78
	28R-7135063 thru 28R-7135109	PTL-KT-40 Left PTL-KT-60 Right	PTL-KT-81
	28R-7135110 thru 28R-7635545	PTL-KT-39 Left PTL-KT-60 Right	PTL-KT-81
PA-28R-201, PA-28R-201T	2803001 thru 2837061	PTL-KT-44 Left PTL-KT-61 Right	PTL-KT-81
PA-28R-201	2844001 thru 2844999	PTL-KT-39 Left PTL-KT-68 Right	PTL-KT-100
PA-28R-201, PA-28R-201T	2803001 thru 2837061 28R-7703001 thru 28R-7837317	PTL-KT-44 Left PTL-KT-61 Right	PTL-KT-81
PA-28RT-201, PA-28RT-201T	All	PTL-KT-43 Left PTL-KT-61 Right	PTL-KT-80
PA-30	All	PTL-KT-95	PTL-KT-95
PA-31, PA-31-300, PA-31-325	31-5 thru 31-7812120	PTL-KT-22 w/Notched Bushings PTL-KT-21 w/o Notched Bushings	PTL-KT-90 w/o Notched Bushings PTL-KT-98 w/Notched Bushings
	31-7812121 thru 31-8312019		PTL-KT-97 w/Notched Bushings PTL-KT-56 w/o Notched Bushings
PA-31-350	31-5001 thru 31-8553002	PTL-KT-25 w/o Notched Bushings PTL-KT-18 w/Notched Bushings	PTL-KT-67 w/o Notched Bushings PTL-KT-73 w/Notched Bushings
PA-31-350 (T1020)	31-8253001 thru 31-8553002	PTL-KT-24 w/o Notched Bushings PTL-KT-17 w/Notched Bushings	PTL-KT-70 w/o Notched Bushings PTL-KT-64 w/Notched Bushings
PA-31P	All	PTL-KT-25 w/o Notched Bushings PTL-KT-18 w/Notched Bushings	PTL-KT-65 w/o Notched Bushings PTL-KT-72 w/Notched Bushings
PA-31P-350	All	PTL-KT-25 w/o Notched Bushings PTL-KT-18 w/Notched Bushings	PTL-KT-65 w/o Notched Bushings PTL-KT-71 w/Notched Bushings
PA-31T, PA-31T1, PA-31T2, PA-31T3	All	PTL-KT-23 w/o Notched Bushings PTL-KT-16 w/Notched Bushings	PTL-KT-65 w/o Notched Bushings PTL-KT-71 w/Notched Bushings
PA-32-260	32-1 thru 32-7700023	PTL-KT-14	PTL-KT-33
	32-7800001 thru 32-7800008	PTL-KT-9	
PA-32-300	32-40000 thru 32-7840043	PTL-KT-14	PTL-KT-33
	32-7840044 thru 32-7940290	PTL-KT-9	
PA-32-301, PA-32-301T	All	PTL-KT-8	PTL-KT-34
PA-32-301FT, PA-32-301XTC	All	PTL-KT-6	PTL-KT-35
PA-32R-300	All	PTL-KT-37 Left PTL-KT-69 Right	PTL-KT-81
PA-32R-301, PA-32R-301T	3213001 thru 3229003	PTL-KT-42 Left PTL-KT-60 Right	PTL-KT-81
	3246001 thru 3257999	PTL-KT-45 Left PTL-KT-63 Right	PTL-KT-80
	32R-8013001 thru 32R-8629008	PTL-KT-42 Left PTL-KT-60 Right	PTL-KT-81
PA-32RT-300, PA-32RT-300T	All	PTL-KT-41 Left PTL-KT-60 Right	PTL-KT-99
PA-34-200	All	PTL-KT-42 Left PTL-KT-60 Right	PTL-KT-86
PA-34-200T	All	PTL-KT-38 Left PTL-KT-58 Right	PTL-KT-86
PA-34-220T	3433001 thru 3447029	PTL-KT-57	PTL-KT-86
	3448038 thru 3448079	PTL-KT-57	PTL-KT-86
	3449001 thru 34-8633031	PTL-KT-57	PTL-KT-86
PA-38-112	All		PTL-KT-1
PA-39	All	PTL-KT-95	PTL-KT-95

Continued on next page

Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Nose Gear Torque Link Repair Kits for Piper Aircraft continued from previous page

Aircraft	Serial Number	Main Wheel Kit *2 kits req if not labeled Left/Right*	Nose Wheel Kit
PA-42, PA-42-720, PA-42-720R	All	PTL-KT-20 PTL-KT-25 w/o Notched Bushings	PTL-KT-65 w/o Notched Bushings PTL-KT-71 w/Notched Bushings
PA-42-1000	All	PTL-KT-19	PTL-KT-65 w/o Notched Bushings PTL-KT-71 w/Notched Bushings
PA-44-180	4495001 thru 4495013	PTL-KT-44 Left PTL-KT-61 Right	PTL-KT-80
	4496001 thru 4496999		PTL-KT-74
	44-7995001 thru 44-8195026		PTL-KT-80
PA-44-180T	All	PTL-KT-43 Left PTL-KT-62 Right	PTL-KT-80
PA-46-310P	All	PTL-KT-48	PTL-KT-96
PA-46-350P (w/ G1000)	All	PTL-KT-47	PTL-KT-88
PA-46-350P (w/o G1000)	4622001 thru 4622200	PTL-KT-46	PTL-KT-96
	4636001 thru 4636195	PTL-KT-51	PTL-KT-88
	4636196 thru 4636999	PTL-KT-50	
PA-46-500TP (w/ G1000)	All	PTL-KT-54	PTL-KT-87
PA-46-500TP (w/o G1000)	All	PTL-KT-55	PTL-KT-87
PA-46R-350T (w/ G1000)	All	PTL-KT-50	PTL-KT-89
PA-46R-350T (w/o G1000)	All	PTL-KT-50	PTL-KT-88

1 Some aircraft eligible for PLT-KT-4 are fitted with a bolt. Aircraft serial number does not indicate which bolt is needed, the installer must determine the correct bolt. Bolt P/N 37881-002 is 3.96" long and used with fairings made from cycolac (plastic). Bolt P/N 37881-003 is 4.22" long and used with fairings made from fiberglass. Bolts are available from McFarlane.

Removing Torque Link Bushings (Nose Gear Scissors)

By Dave McFarlane

Removing the flanged bushings from the torque link forging can be difficult without a good surface to press against or grab onto. To easily remove them, thread them with a tap, screw a bolt in the thread, and then drive or press against the bolt. The thread does not have to be full depth to hold securely in the bushing. The bushing material is somewhat hard, but a standard hardware store tap will work. Use cutting oil on the tap to prevent tap damage. Normally the bushing will 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, which prevents overheating and harming the heat treat of the aluminum forging. A controlled oven can be substituted for boiling water, but do not exceed 350° F. Do not use flame or other non-controlled heat sources. For an alternate method, put dry ice in the bushing before driving or pressing on the bolt that you threaded into the bushing. Do not over-press or hammer as the aluminum can gall to the bushing and leave a damaged bushing bore. If the bushing does not come out with light to moderate force, use heat or cold to help.

Australian Strut Seal Kits for Cessna Aircraft

Don't waste your time with substandard seals, nothing compares!

- Double edge ("X" style) seal that will not twist and leak!
- Solves the continuous leak and re-service problems with the Cessna nose strut
- Go years without servicing!

Maintenance Tip:
Wipe the chrome strut down with Stoddard solvent (mineral spirits) periodically to soften & remove dried oil film, dirt, dust and bugs.

P/N MCSK172-1F
Fits most Cessna Nose Struts

- PMA direct replacement for Cessna P/N SK172-1F
- Includes all O-rings and back-up rings needed
- Includes scraper and AN901-5A gasket
- Improved lock rings are made of 304 stainless steel for better corrosion resistance

P/N MCSK172-2
Fits many Cessna Nose Struts and Main Gear!
Visit our website for Main Gear eligibility.

- Includes all O-rings and back-up rings needed
- Includes scraper and AN901-5A gasket
- Improved lock rings are made of 304 stainless steel for better corrosion resistance



Components available separately

NEW

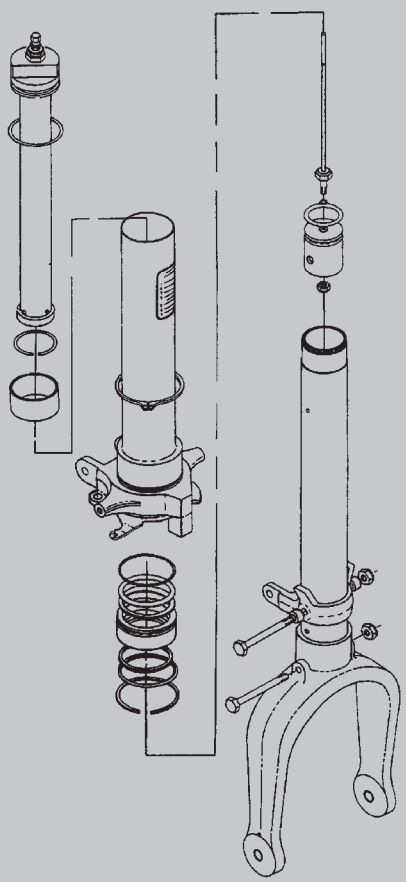
	Kit P/N			Component P/N and Description											
Aircraft	MCSK172-1F	MCSK172-2	NSS-KT-2	AN901-5A Gasket	MC0841200-19 Lock Ring	MC0841200-25 Lock Ring	MCS1628-329 Scraper Ring	MCS2418-1 Scraper Ring	MS28775-010 O-ring	MS28775-221 O-ring	MS28775-225 O-ring	MS28775-228 O-ring	1100 Quad Ring	MS28782-32 Retainer Packing
All 150, 152, 172, 175 and 177RG	•			•	•	•	•	•	•	•	•	•	•	
182, 182A,B,C,D		•	•	•	•	•		•	•	•	•	•	•	•
182E-T, A182J,K,L,N	•			•	•	•	•	•	•	•	•	•	•	
F182P,Q, FR182, R182, TR182, T182, T182T	•			•	•	•	•	•	•	•	•	•	•	
210-5 (205)			•	•	•	•		•	•	•	•	•		•
210-5A (205A)	•			•	•	•	•	•	•	•	•	•	•	
206, 207	•			•	•	•	•	•	•	•	•	•	•	
210, 210A		•	•	•	•	•		•	•	•	•	•	•	•
210B-R, P210N,R, T210F-R	•			•	•	•	•	•	•	•	•	•	•	
T303	•			•	•	•	•	•	•	•	•	•	•	
310, 310B,C,D,F,G,H, I,J,J-1,K,L,N		•	•	•	•	•		•	•	•	•	•	•	•
310P,Q			•	•	•	•		•	•	•	•	•		•
E310H,J		•		•	•	•		•	•	•	•	•	•	
320, 320-1, 320A,B,C,D,E,F		•	•	•	•	•		•	•	•	•	•	•	•
336		•	•	•	•	•		•	•	•	•	•	•	•
337	•			•	•	•	•	•	•	•	•	•	•	

Why Does My Cessna Nose Strut Keep Leaking Down?

By Dave McFarlane

Cessna Nose strut "leak down" has plagued Cessna owners for the last 65 years. Why is it that a month after you reseal the nose strut you find the strut down again or just low and showing signs of a little MIL-5606 on the pretty chrome? It always happens on Sunday when no one is around to help you service it. You service it up the next week only to have it do it again next month. After several strut reseals most people just resign to servicing it often and consider it part of owning a Cessna. Piper and Beech struts do not leak down or need to be resealed often and they are high pressure!

With a strong belief that everything that goes wrong on an airplane has a reason that can be explained by physics, we did some research. It was observed that the low time leaking O-ring that was removed always showed signs of being slightly twisted and otherwise like new. Further experiments and close evaluations proved that the O-ring would twist from friction caused by an oxidized hydraulic fluid film on the chrome strut. You probably have noticed how MIL-5606 hydraulic fluid tends to dry and get sticky after it is exposed to air. Add a little runway dust to the back side of the strut and it really gets sticky. The low operating pressures of the Cessna strut does not put a lot of holding pressure to stabilize the sealing O-ring. It was observed that the sticky film on the chrome strut can grab and adhere to the O-ring during a normal strut action cycle. If the sticky film is not evenly dispersed on the strut, the O-ring is rolled a little on the filmy side only. This uneven rolling action puts a slight twist in the O-ring. This slight twist can break the normal seal between the strut and the O-ring allowing a slow unpredictable leak.



It seemed logical that if you lowered the friction on the O-ring surface you could eliminate the problem. A hunt was on for a low friction O-ring that would resist being rolled and would have good durability. After many experiments with Teflon® coated and other specialty O-rings only partial success was achieved. They either were not as durable or the sealing characteristics were not as good as the standard rubber O-ring.

A break finally came at Airventure Oshkosh when Tony Brand of Horsham Aviation Services located in Horsham, Victoria, Australia came by and explained how they solved the problem. They had observed the same twisting of the strut O-ring and went on to explain how they replaced the round O-ring with a square ("X" style) O-ring that can not rotate. The standard backup rings were simply reversed to match the square sides of the new style O-ring. The "X" O-rings have the same material as the standard ones. Brilliant! Why didn't we think of that!? We rushed home and changed all the O-ring seals in five of the airplanes on the field. One of them was our 152 trainer that takes a lot of abuse. We were going to find out if those innovative Aussies knew what they were talking about. Sure enough, that was almost five years ago and we have never had to service the nose strut (not even with air) on any of the aircraft with the square O-rings! My hat goes off to the boys from Down Under for saving the industry thousands of man hours every year and making the Cessna fleet more reliable! Thank you!

Our FAA-PMA seal kit, P/N MCSK172-1F now includes the square ("X" style) O-ring and instructions for reversing the back up rings.

Main and Nose Strut Seal and Repair Kits for Piper Aircraft

Vast Eligibilty for Pipers: PA-22 thru PA-46 aircraft

McFarlane has main and nose, strut seal kits and repair kits for Piper aircraft. Kits are model and serial number specific giving you only the parts required, saving you time and money. All components are industry standard or original Piper parts.

- Save time and money!
- Reference your model and serial number for the best fit kit
- One kit = parts for one strut

PSS seal kits contain rubber and plastic parts.
PSR repair kits contain the required PSS seal kit and commonly needed metal parts.

More kits added!





Aircraft Model	Serial Number	Main Strut				Nose Strut			
		Seal Kit	Qty	Repair Kit	Qty	Seal Kit	Qty	Repair Kit	Qty
PA-22, PA-22-108, PA-22-135, PA-22-150, PA-22-160, PA-22S-135, PA-22S-150, PA-22S-160	All	N/A	N/A	N/A	N/A	PSS-KT-19	1	PSR-KT-31	1
PA-23, PA-23-160	All	PSS-KT-3	2	PSR-KT-77	2	PSS-KT-3	1	PSR-KT-77	1
PA-23-235, PA-23-250, PA-E23-250	All	PSS-KT-3	2	PSR-KT-14	3	PSS-KT-3	1	PSR-KT-14	3
PA-24, PA-24-250, PA-24-260, PA-24-400	All	PSS-KT-1	2	PSR-KT-1	2	PSS-KT-1	1	PSR-KT-1	1
PA-28-140, PA-28-150, PA-28-160	28-01 thru 28-3281 28-10003 thru 28-10719 28-20002 thru 28-21639	PSS-KT-10	2	PSR-KT-34	2	PSS-KT-19	1	PSR-KT-75	1
	28-3282 thru 4377 28-10720 thru 28-7710089 28-21640 thru 28-7725290					PSS-KT-20	1	PSR-KT-60	1
PA-28-151	All	PSS-KT-36	2	PSR-KT-58	2	PSS-KT-18	1	PSR-KT-26	1

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Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Main and Nose Strut Seal and Repair Kits for Piper Aircraft continued from previous page

Aircraft Model	Serial Number	Main Strut				Nose Strut			
		Seal Kit	Qty	Repair Kit	Qty	Seal Kit	Qty	Repair Kit	Qty
PA-28-161	2816001 thru 2816119 2841001 thru 2841365 2842001 thru 2842999 28-7716001 thru 28-8616057	PSS-KT-36	2	PSR-KT-58	2	PSS-KT-18	1	PSR-KT-26	1
PA-28-180	28-671 thru 28-3281	PSS-KT-10	2	PSR-KT-34	2	PSS-KT-19	1	PSR-KT-75	1
	28-3282 thru 28-7205328					PSS-KT-20	1	PSR-KT-60	1
	28-730501 thru 28-7505260					PSS-KT-26	1	PSR-KT-76	1
PA-28-181	2890001 thru 2890231 28-7690001 thru 28-8690062	PSS-KT-36	2	PSR-KT-58	2	PSS-KT-20	1	PSR-KT-60	1
	2843001 thru 2843999	PSS-KT-33	2	PSR-KT-9	2	PSS-KT-20B		PSR-KT-60B	1
PA-28R-180, PA-28R-200	All	PSS-KT-12	2	PSR-KT-11	2	PSS-KT-4	1	PSR-KT-20	1
PA-28-201T	All	PSS-KT-31	2	PSR-KT-44	2	PSS-KT-37	1	PSR-KT-59	1
PA-28R-201	2844001 thru 2844999	PSS-KT-12	2	PSR-KT-17	2	PSS-KT-12	1	PSR-KT-10	1
	2837001 thru 2837061 28R-7737002 thru 28R-7837317	PSS-KT-11	2	PSR-KT-8	2	PSS-KT-4B	1	PSR-KT-18	1
PA-28R-201T	2803001 thru 2803012 28R-7703001 thru 28R-7803373	PSS-KT-11	2	PSR-KT-8	2	PSS-KT-4B	1	PSR-KT-18	1
PA-28RT-201, PA-28RT-201T	All	PSS-KT-12	2	PSR-KT-17	2	PSS-KT-25	1	PSR-KT-9	1
PA-28-235	28-10001 thru 28-10719	PSS-KT-10	2	PSR-KT-34	2	PSS-KT-19	1	PSR-KT-75	1
	28-10720 thru 28-7210033					PSS-KT-20	1	PSR-KT-60	1
	28-7310001 thru 28-7710089					PSS-KT-26	1	PSR-KT-76	1
PA-28-236	2811001 thru 2811050, 28-7911001 thru 28-8611008	PSS-KT-31	2	PSR-KT-44	2	PSS-KT-18	1	PSR-KT-26	1
PA-30	All	PSS-KT-1	2	PSR-KT-1	2	PSS-KT-1	1	PSR-KT-15	1
PA-31	31-2 thru 31-7812120	PSS-KT-23	2	PSR-KT-56	2	PSS-KT-34	1	PSR-KT-52	1
	31-7812121 thru 31-8312019					PSS-KT-39	1	PSR-KT-62	1
PA-31-300, PA-31-325	31-2 thru 31-78121200	PSS-KT-23	2	PSR-KT-56	2	PSS-KT-34	1	PSR-KT-52	1
	31-7812121 thru 31-8312016					PSS-KT-39	1	PSR-KT-62	1
	31-8312017 thru 31-8312019	N/A	N/A	N/A	N/A				
PA-31-350	31-5001 thru 31-8352036	PSS-KT-22B	2	PSR-KT-48	2	PSS-KT-34B	1	PSR-KT-52B	1
	31-8352037 thru 8553002	PSS-KT-22	2	PSR-KT-47	2				
PA-31-350 (T1020)	All	PSS-KT-22	2	PSR-KT-47	2	PSS-KT-34	1	PSR-KT-53	1
PA-31P	All	PSS-KT-13	2	PSR-KT-67	2	PSS-KT-16	1	PSR-KT-68	1
PA-31P-350	All	PSS-KT-22	2	PSR-KT-47	2	PSS-KT-33	1	PSR-KT-49	1
PA-31T	31T-7400002 thru 31T-8120050	PSS-KT-52B	2	PSR-KT-55	2	PSS-KT-33	1	PSR-KT-49	1
	31T-8120051 thru 31T-8120104	PSS-KT-52	2	PSR-KT-54	2	PSS-KT-33B	1	PSR-KT-49B	1
PA-31T1	31T-1104004 thru 31T-7804000	PSS-KT-52	2	PSR-KT-54	2	PSS-KT-33	1	PSR-KT-49	1
	31T-7804001 thru 31T-8104055	PSS-KT-52B	2	PSR-KT-55	2				
	31T-8104056 thru 31T-8304003	PSS-KT-52	2	PSR-KT-54	2	PSS-KT-33B	1	PSR-KT-49B	1
PA-31T2	31T-1166001 thru 31T-8166000	PSS-KT-52	2	PSR-KT-54	2	PSS-KT-33	1	PSR-KT-49B	1
	31T-8166001 thru 31T-8166013	PSS-KT-52B	2	PSR-KT-55	2	PSS-KT-33	1	PSR-KT-49	1
	31T-8166014 thru 31T-8166076	PSS-KT-52	2	PSR-KT-54	2	PSS-KT-33B	1	PSR-KT-49B	1
PA-31T3	All	PSS-KT-32	2	PSR-KT-45	2	PSS-KT-33	1	PSR-KT-49	1
PA-32-260, PA-32-300	All	PSS-KT-10	2	PSR-KT-32	2	PSS-KT-2	1	PSR-KT-23	1
PA-32-301, PA-32-301T, PA-32-301FT, PA-32-301XTC	All	PSS-KT-9	2	PSR-KT-33	2	PSS-KT-20	1	PSR-KT-60	1
PA-32R-300	All	PSS-KT-12	2	PSR-KT-11	2	PSS-KT-4B	1	PSR-KT-18	1
PA-32R-301, PA-32R-301T	3213001 thru 3213103 3229001 thru 3229003	PSS-KT-4B	2	PSR-KT-73	2	PSS-KT-4	1	PSR-KT-20	1
	3246001 thru 3246999 3257001 thru 3257999	PSS-KT-12	2	PSR-KT-11	2	PSS-KT-25	1	PSR-KT-9	1
	32R-8013001 thru 32R-8613006 32R-8029001 thru 32R-8629008	PSS-KT-4B	2	PSR-KT-73	2	PSS-KT-4	1	PSR-KT-20	1
PA-32RT-300, PA-32RT-300T	All	PSS-KT-28	2	PSR-KT-40	2	PSS-KT-28	1	PSR-KT-39	1
PA-34-200	All	PSS-KT-12	2	PSR-KT-11	2	PSS-KT-7B	1	PSR-KT-71	1
PA-34-200T	All	PSS-KT-4B	2	PSR-KT-70	2	PSS-KT-7B	1	PSR-KT-29	1
PA-34-220T	3447001 thru 3447029 3449001 thru 3449999	PSS-KT-43	2	PSR-KT-69	2	PSS-KT-7	1	PSR-KT-29	1
	3448001 thru 3448079 3433001 thru 3433172 34-8133001 thru 34-8633031	PSS-KT-11 [1] PSS-KT-11B [3]		PSR-KT-6 [3]		PSS-KT-7 [4] PSS-KT-7B [2]		PSR-KT-27 [4] PSR-KT-28 [1]	
PA-39	All	PSS-KT-1	2	PSR-KT-1	2	PSS-KT-1	1	PSR-KT-15	1
PA-42	All	PSS-KT-40	2	PSR-KT-63	2	PSS-KT-42	1	PSR-KT-65	1
PA-42-720	42-5501003 thru 42-5501060 42-8301001 thru 42-8301002	PSS-KT-40	2	PSR-KT-63	2	PSS-KT-42	1	PSR-KT-65	1
PA-42-720R	All	PSS-KT-40	2	PSR-KT-63	2	PSS-KT-42	1	PSR-KT-65	1

[1] Use only when bearing has (1) O-ring on ID
[2] Use only when bearing has (1) O-ring groove on ID
[3] Use only when bearing has T-seal and backup ring or (1) O-ring with (1) backup ring
[4] Used to replace O-ring and (1) backup ring or a T-Seal and (2) backup rings in ID

Landing and Nose Gear

Main and Nose Strut Seal and Repair Kits for Piper Aircraft continued from previous page

Aircraft Model	Serial Number	Main Strut				Nose Strut			
		Seal Kit	Qty	Repair Kit	Qty	Seal Kit	Qty	Repair Kit	Qty
PA-42-1000	All					PSS-KT-42	1	PSR-KT-65	1
PA-44-180	4495001 thru 4495013 44-7995001 thru 44-8195026	PSS-KT-25	2	PSR-KT-74	2	PSS-KT-25	1	PSR-KT-74	1
	4496001 thru 4496999	PSS-KT-25	2	PSR-KT-66	2	PSS-KT-25	1	PSR-KT-9	1
PA-44-180T	All	PSS-KT-25	2	PSR-KT-74	2	PSS-KT-25	1	PSR-KT-74	1
PA-46-310P	All	PSS-KT-24	2	PSR-KT-36	2	PSS-KT-27	1	PSR-KT-35	1
PA-46-350P (w/G1000)	All	PSS-KT-24	2			PSS-KT-27	1	PSR-KT-35	1
PA-46-350P (w/o G1000)	4622001 thru 4622200 4636001 thru 4636195	PSS-KT-24	2	PSR-KT-36	2	PSS-KT-27	1	PSR-KT-35	1
	4636196 thru 4636999	PSS-KT-21	2	PSR-KT-43	2				
PA-46R-350T (w/ or w/o G1000) PA-46-500TP (w/ or w/o G1000)	All	PSS-KT-21	2	PSR-KT-43	2	PSS-KT-27	1	PSR-KT-35	1

Remote Nose Gear Servicing Port

Eliminates the need to reach up into the nose gear tunnel!
P/N ATRS-100

- For Cessna 205, 206, and 207
- Relocates the servicing port to the side of the nose gear tunnel
- Simplifies servicing of the nose gear strut

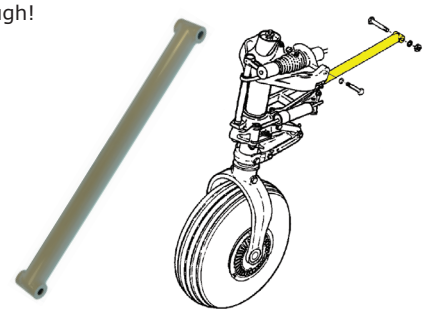


Cessna Aircraft	With STC Installed
206, 206H, T206H, P206, P206A,B,C,D,E, TP206A,B,C,D,E, TU206A,B,C,D,E,F,G, U206, U206A,B,C,D,E,F,G	SA02198AD-D
207, 207A, T207, T207A	SA02202AK-D

Nosegear Drag Link

Durable, High Quality Construction!
P/N AD1243600-1

- Corrosion resistant white powder coated finish
- Alaskan Bush Tough!
- 50% off Cessna
- FAA-PMA



Model
U206B,C,D,E,F,G
TU206B,C,D,E,F,G
P206B,C,D,E
TP206B,C,D,E
207, 207A, T207, T207A

Main and Nose Strut Seal Kit for Beechcraft

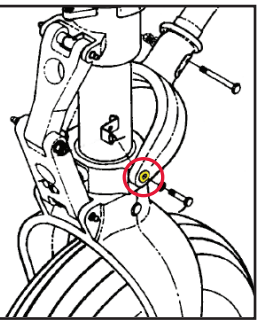
Manufactured by Rapco

Aircraft	Main P/N	Nose P/N
B-33, F-33, V-35B, 36, A36, G36, A36TC, B36TC	JMBZMS	JMBZNS

Nose Gear Spring Fork Needle Bearing for Caravan

P/N MS24462-5

- Fits all Cessna 208 models
- 2 required per aircraft
- Save up to 25%

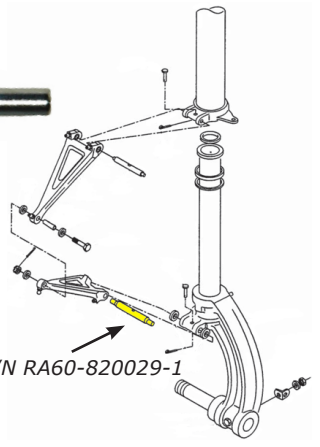


Tow Pin for Beechcraft

P/N RA60-820029-1



Aircraft
35-A33, 35-B33, 35-C33, 35-C33A, E33,F33, G33, E33A, F33A, F33C
N35, P35, S35, V35, V35A, V35B,
36,A36,A36TC,B36TC,
95-55, 95-A55, 95-B55, 95-C55, D55,E55
56TC, A56TC
58, 58TC, 58P
B60
Manufactured by Rapco

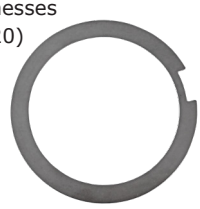


Nose Gear Shims for Cessna Aircraft

NEW

Just the right fit to remove excessive vertical free play between the collar and strut housing!

- Available in three thicknesses (.006), (.012), and (.020)
- Get exactly what you need, not more!
- Save $$$



Manufactured by Textron

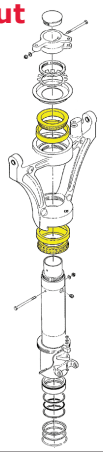
Aircraft	P/N	Thickness
150, A150, 152, A152, 172, 182, T182	1243030-5	0.006
	1243030-6	0.012
	1243030-7	0.020

Nose Gear Shock Strut Bearing Cups and Cones for Caravan

Bearing Cup
P/N L217813-20629

Bearing Cone
P/N L217849-20629

- Fits all Cessna 208 models
- 2 required per aircraft



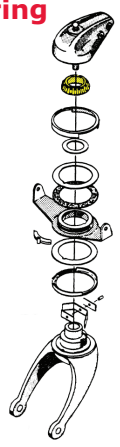
Manufactured by The Timken Company

Tail Wheel Fork Bearing for Cessna Aircraft

Bearing Cup
P/N 08231-20629

Bearing Cone
P/N 08118-20629

Direct replacement for Cessna P/N 0742400-12



Manufactured by The Timken Company

Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Nose Gear Bearings

FAA-PMA approved for Cessna aircraft

NEW

Ring Pack Support
P/N MCAJB-32T-4

Save $$$
In stock!

- Stainless steel for corrosion resistance
- PFTE composite-lined for smoother strut action
- Liner holds oil for longer life
- Easy on your chrome strut

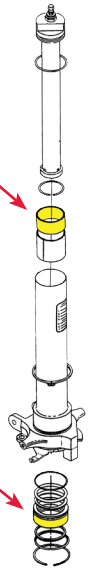
Shock Strut Bearing
P/N MC1243021-1
- Save $$$

Shock Strut Bearing
P/N MC1243021-1



Ring Pack Support
P/N MCAJB-32T-4





Bearing P/N MC1243021-1
150, 150A,B,C,D,E,F,G,H,J,L,M, A150K,L, A150M, F150F,GKL,M, FA150K,L,M
152, A152, F152, FA152
172, 172A,B,C,D,E,F,G,H,I,K,L, 172M,N,P,Q,R,RG,S, F172D,E,F,G,H,K,L,M,N,P, FP172D,E, FR172F,G, R172E,F,G,H,K
175, 175A,B,C
177RG
182, 182A,B,C,D,E,F,G,H,J,K,L, 182M,N,P,Q,R,S,T, F182Q, FR182, R182, T182, T182T
210-5A (205A)
206, 206H, P206, P206A,B,C,D,E, TU206F, TU206G, U206, U206A,B,C,D,E,F,G
207, 207A, T207, T207A
210, 210A,B,C,D,E,G,H,J,K,L,M,N,R, P210N, P210R
310, 310B,C,D,F,G,H,I,J,J-1,K,L,N,P,Q
320, 320-1, 320A,B,C,D
336
337, 337A,B,C,D,E,F,G,H, F337G,H, P337H
411, 411A

Ring Pack P/N MCAJB-32T-4
150, 150A,B,C,D,E,F,G,H,J,K,L,M, A150K,L,M, F150F,G,H,J,K,L,M, FA150K,L,M
152, A152, F152, FA152
172, 172A,B,C,D,E,F,G,H,I,K,L,M, 172N,P,Q,R,RG,S, F172D,E,F,G,H, F172K,L,M,N,P, FR172E,F,G,H,J,K, P172D, R172E,F,G,H,K
175, 175A,B,C
177RG, F177RG
182, 182A,B,C,D,E,F,G,H,J,K,L, 182M,N,P,Q,R,S,T, FR182, R182, T182, T182T, TR182
210-5A (205A)
206, 206H, P206, P206A,B,C,D,E, T206H, TU206F,G, U206, U206A,B,C,D,E,F,G
207, 207A, T207, T207A
210, 210A,B,C,D,E,G,H,J, K,L,M,N,R, P210N,R, T210G,H
T303
310, 310B,C,D,F,G,H,I,J,K, L,N,P,Q,R, T310P,Q,R
320, 320-1, 320A,B,C,D
335
336
337, 337A,B,C,D,E,F,G,H, F337E,F,G, FT337E,F, P337H, T337E,F
340, 340A
401, 401A,B
402, 402A,B,C
404
411, 411A
414, 414A
421, 421A,B,C
425
441

Nose Gear Quad Ring

P/N CA484-770
Fits Piper Models
PA-28-140,150,151,160,161,
PA-28-180,181,235,236,
PA-32-260,300,301,301T



Main Gear Scraper Ring

P/N MS28776M2-18
Fits Piper Models
PA-28-140,150,151,161,
PA-28-180,181,235,236,
PA-32-260,300



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,
PA-32, PA-32-260,300,301,301T

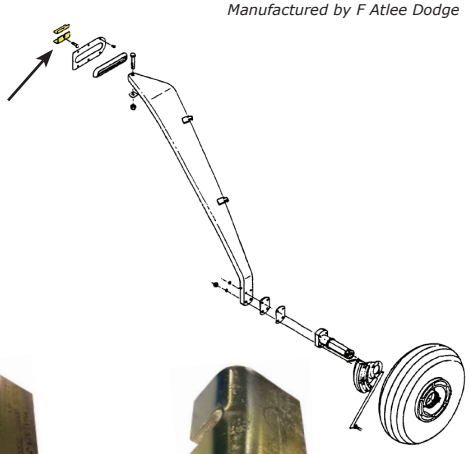


Manufactured by PMA Products, Inc.

Landing Gear Box Shims

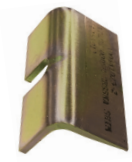
For Cessna aircraft using leaf spring landing gear
- 4130N steel, plated
- FAA-PMA

Manufactured by F Atlee Dodge



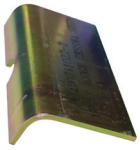
Model	AD0441023-2 [1]	AD0741022-1 [3]	AD0741022-2 [4]	AD0441023-160 [2]
	Qty per Aircraft			
120, 140, 140A		A/R		
150A	2-4	A/R		
150B,C,D,E,F,G,H,J,K	2-4	A/R		2
A150K				2
A150L, F150F,G,H,J	2-4	A/R		
F150K, FA150K	2-4	A/R		2
170, 170A,B		A/R		
180, 180A,B,C,D,E		A/R		
180F	2-4	A/R		
180G,H,J,K	2-4	A/R		A/R
180J,K	2-4	A/R	A/R	A/R
185, 185A,B,C,D,E, A185E	2-4	A/R		A/R
A185F	2-4	A/R	A/R	A/R
190, 195A,B		A/R		

[1] 0.100" tapered shim
[2] 0.160" tapered shim
[3] 0.040" shim
[4] 0.050" shim

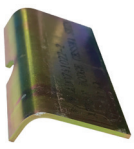


P/N AD0441023-2
0.100" Tapered Shim

P/N AD0441023-160
0.160" Tapered Shim



P/N AD0741022-1
0.040" Shim

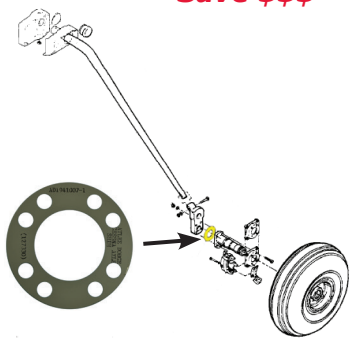


P/N AD0741022-2
0.050" Shim

Landing Gear Axle Shim

Tapered shim to adjust axle alignment
P/N AD1941007-1
FAA-PMA approved for
207, 207A, T207, T207A
(2) per aircraft

Save $$$



Manufactured by F Atlee Dodge

Cessna Brake Line Fairing Extrusion

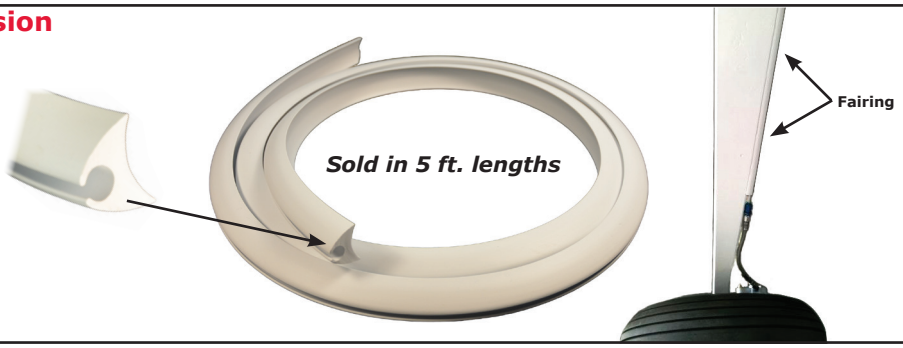
Reduce Drag! P/N P580058

- 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.

Manufactured by Cessna Aircraft Company

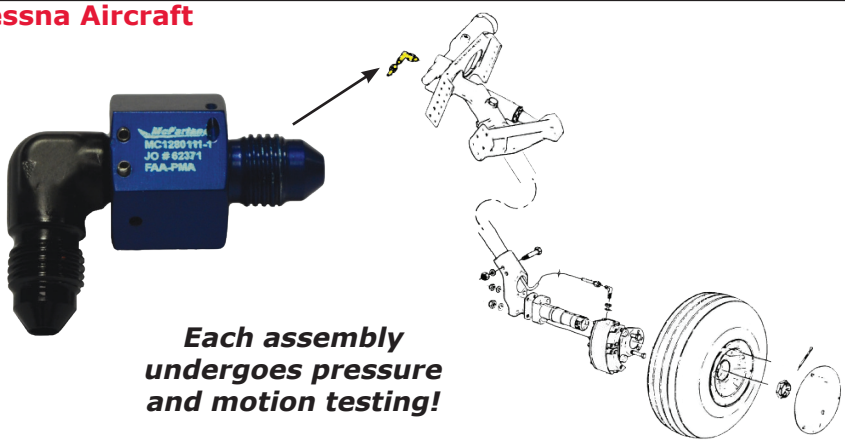


Retractable Gear Brake Swivel for Cessna Aircraft

Replace your leaking Brake Swivel Assembly

- FAA-PMA approved P/N MC1280111-1
- Save up to 25%
- Includes O-ring part number MS28778-3
- In stock, readily available!

Aircraft
172RG
177RG, FR177RG
FR182, R182, TR182
210, 210A,B,C,D,E,F,G,H,J,K,L,M,N,R
P210N,R
T210F,G,H,J,K,L,M,N,R

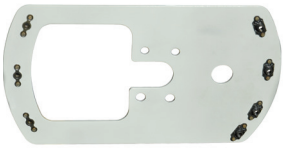


Each assembly undergoes pressure and motion testing!

Wheel Pant Mounting Plates for Cessna Aircraft

P/Ns MC0441225-1, MC0441225-2, MC0541220-1, MC0541220-2

- Machined from high strength aluminum alloy
- Anodized for corrosion resistance
- Nut plates are riveted in place — ready to install!



Maintenance Tip:

Wheel pant mounting plates commonly crack around the axle. If any cracks are present, they should be replaced. 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 Tools and Maintenance section for an effective wheel balancer.

Model	Serial Number	Left	Right
150L[1],M	15074851 thru 15079405	MC0441225-1	MC0441225-2
F150L[1],M	F15001014 thru F15001428	MC0441225-1	MC0441225-2
A150L[1],M	A1500430 thru A1500734	MC0441225-1	MC0441225-2
FRA150L[1],M	FRA1500212 thru FRA1500336	MC0441225-1	MC0441225-2
152	15279406 thru 15286033	MC0441225-1	MC0441225-2
A152	A1520735 thru A1521049	MC0441225-1	MC0441225-2
F152	F15201429 thru F15201980	MC0441225-1	MC0441225-2
FA152	FA1520337 thru FA1520425	MC0441225-1	MC0441225-2
172M[1],N,P,Q	17261899 thru 17276673	MC0541220-1	MC0541220-2
172R	17280001 and On	MC0541220-1	MC0541220-2
172S	172S80001 and On	MC0541220-1	MC0541220-2
F172M[1],N,P	F17201035 thru F17202254	MC0541220-1	MC0541220-2
FR172J[1],K	FR17200441 thru FR17200675	MC0541220-1	MC0541220-2
R172K	R1722000 thru R1723454	MC0541220-1	MC0541220-2

[1] Partial model eligibility

Axles for Cessna Aircraft

Don't lose an airplane because of a broken aluminum axle!

Steel Axle
P/N AF1441003-1

- Weighs only 2.28 lbs
- Save hundreds $$$



Titanium Axle
P/N AF1441003-1T

- Reduces weight by 2 lbs vs. steel axles
- Will not rust

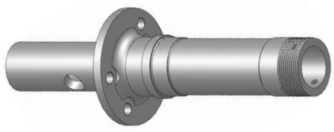


Model	Serial Number
170, 170A,B	18000 thru 27169
180, 180A-H	30000 thru 18052284
182, 182A-S	33000 and On
T182, R182, TR182	1820001 thru R18202041
185, 185A-E, A185E-F	1850001 thru 18504448
206, U206, U206A-G, TU206A-G	206-0001 thru U20607020
P206, P206A-E, TP206A-E	P206-0001 thru P20600647
206H, T206H	All

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



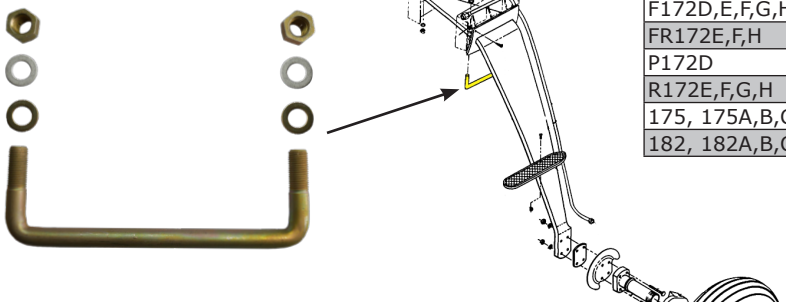
Manufactured by Airforms, Inc.

Items on this page: ⚠WARNING: Cancer and/or Reproductive Harm - www.P65Warnings.ca.gov

Landing Gear U-Bolt for Cessna Aircraft

P/N MC0541153

- Save $$$
- Vacuum re-melt crankshaft steel alloy for extreme fatigue resistance
- Rolled "J" threads instead of cut threads for twice the fatigue resistance
- FAA approved ICA allows 1200 hrs service life instead of 1000 hrs as per SE78-68



Aircraft
172, 172A,B,C,D,E,F,G,H,I,K
F172D,E,F,G,H
FR172E,F,H
P172D
R172E,F,G,H
175, 175A,B,C
182, 182A,B,C,D

U-Bolt History and Maintenance

By Dave McFarlane

U-Bolts take immense vibration and cyclic stress loading from landing and taxiing on imperfect runways. The long Cessna landing gear legs have tremendous twisting leverage on the U-Bolts. Every imperfection you feel while taxiing or operating on the runway is magnified to large stress forces on the U-Bolts that clamp the gear to the outboard fuselage support forgings. The Cessna U-Bolts are made from standard 4130 Steel with inclusions and other imperfections in the metal. The standard sharp threads are cut during Cessna manufacture. The cut threads allow stress concentration of the large stress forces in the sharp "V" of the thread where the U-Bolts are often found broken. When the aircraft is operated with broken U-Bolts, the weight of the airplane and the inboard attachment bolt keeps the landing gear in place, but the twisting gear stress results in hammering vibration on the gear forgings.

If you listen for it, you can hear a broken U-Bolt in the cabin during taxi or you can check for a broken U-Bolt by kicking the tire while holding your finger between the gear leg and the fuselage structure. You will feel movement if the U-Bolt is broken. This hammering will eventually start cracks in the aluminum gear forging and the forging must be replaced — a very expensive repair. It is also recommended to replace the inboard gear support bolt if the aircraft has been operated with a broken U-Bolt. The inboard bolt is a special high strength magnafluxed bolt that is critical to landing gear security. Because of the U-Bolt failure problem, Cessna issued Service Bulletin SE78-68 requiring periodic inspection of the U-Bolts and replacement of the U-Bolts every 1000 hours to prevent failure and to prevent continued operation with failed U-Bolts. Proper torque process and value are also very important to prevent U-Bolt failure.

McFarlane U-Bolts are manufactured from higher strength 4340 Crankshaft Steel that has been re-melted under vacuum to remove imperfections in the steel. The threads are roll formed, which strengthens the threads by perfecting the grain structure of the metal that drastically improves fatigue resistance. The "J" style rolled threads are formed with a radius in the bottom of the thread "V" that spreads out the stress loading. McFarlane furnishes new nuts that are designed to work effectively with the "J" thread design. The McFarlane U-Bolts are then carefully heat treated and tempered for perfection in strength and fatigue resistance. Our FAA approved Instructions for Continuous Airworthiness (ICA) conservatively recommend 1200 hours between U-Bolt replacements.

Nose Gear Gravel Deflector

Protect your cargo pod from costly rock damage

- Deflect rocks from belly, antennas, and cargo pod
- For maximum equipment protection, install the Main Gear Gravel Deflector and the Nose Tire Scraper
- Also great for operating from paved surfaces!



Manufactured by AeroTwin

Aircraft	P/N
Cessna	
206, 206H, T206H[1], P206, P206A,B,C,D,E[1], TP206A,B,C,D,E[1] TU206A,B,C,D,E,F,G[1] U206, U206A,B,C,D,E,F,G[1]	NGD6-100
208, 208B	NGD8-100
Quest/Daher	
Kodiak 100	NGDQ-100

Notes:
[1] Only approved with the Airglas large nose fork

Main Landing Gear Gravel Deflector

Prevent damage to the stabilizer and aft fuselage

- Deflect rocks from stabilizer and fuselage
- Keep mud, snow, and rocks off of your wings
- Installation requires no additional holes in the structure



Aircraft	P/N	Applicable w/ STC Installed
Cessna		
180, 180A,B,C,D,E,F,G,H,J,K	GD5-100	SA02022AK
182, 182A,B,C,D,E,F,G,H,J,K,L,M,N,P,Q[2]	GD5-102	
185, 185A,B,C,D,E, A185E,F	GD5-105	SA4622NM
P206, P206A,B,C,D,E[1], TP206A,B,C,D,E[1]	GD6-100	SA4614NM
TU206A,B,C,D,E,F,G[1], U206, U206A,B,C,D,E,F,G[1]	GD6-200	SA02003AK
207, 207A, T207, T207A	AT-GD-1001	SA4623NM
208, 208B	GD8-100	SA4651NM
Quest/Daher		
Kodiak 100	GDQ-100	

[1] For big tires, use P/N GD6-200
[2] S/N 33000 thru 18266590

Manufactured by AeroTwin

Nose Tire Scraper

Shield your propeller from gravel, sand, and water damage!
P/N ATI-208TS fits Caravan 208, 208B with STC SA2335NM installed
P/N TSQ-100 fits Quest/Daher Kodiak 100

- Easily install in under 20 minutes
- Rubber scraper knocks rocks out of the tire tread to keep them from being flung forward though the prop
- Replacement rubber scrapers are available



Manufactured by AeroTwin