Shimmy Damper Overhaul

as described by

Dennis King

CAVEAT

This must be done by an A&P

(The A&P is required to use the most current FAA approved maintenance manual.)

or

Under supervision and signed off by an A&P

Maintenance Manual

- The maintenance manual specifies inspection procedure, tolerances, damage repair and parts needing replacement.
- Overhaul without the current approved maintenance manual is illegal.
- Servicing requires only O-rings and cotter pin, overhaul requires replacement of additional items.

Equipment

- The kit Dennis King puts together makes it easier.
- Performance Aero sells a kit which has everything needed for servicing
- You supply pliers, awl, small punches.

Overhaul Kit

Items will be shown as they are used.

Kit Contains

- Pliers, side cutting pliers, small mallet with rubber and plastic striking surfaces
- 0. 067 diameter stiff piano wire (obtained from hobby shop)
- 6/32” threaded wires with T-handle attached (a 6” 6/32” screw will do)
- Small piece of 3/8” tubing split longitudinally, small piece of 3/8” tubing not split
- Two wooden dowels 6.5” long, one ¾” diameter, the other 3/16” diameter, a ¾” piece of PVC pipe 5” long
- 5/16” and 3/32” punches, small brass wire brush
- Awl, dental type pick, small punches
- ¾” wide piece of wood as a gauge, small wooden skewers of the type used for barbeque.

- **The shimmy damper (dampner, dampener – all spellings in equal usage and Beech uses all three in the parts catalogue) requires servicing every ten years, but every annual or so is reasonable.**

- **Lack of shimmy is not an adequate sign of needing overhaul. There may be no shimmy even if hydraulic fluid is totally gone.**

- **Hydraulic fluid volume is tested by putting a stiff wire through the spread cotter pin in the shaft. If it goes in 2+3/8” or more it definitely needs servicing. The wire should enter the threaded portion of the moving piston and bottom out for measurement. If it goes in less than 2+3/8” there is sufficient fluid in the damper.**
- **Hydraulic fluid is somewhat hygroscopic (attracts water). Servicing to eliminate water before the test rod indicates depletion may avoid corrosion.**

- The shimmy damper pivots on the two bolts attaching it to the nose wheel assembly.
- Tighten snugly when reinstalling, but not so tight as to interfere with this pivoting, especially at the fork.
- Frequently there are shims present, often of different thicknesses. Diagram or photograph their location and the orientation of the bolts as you remove the damper; replace as removed.
- Clean up the bolts and apply a little grease to the pivot area.

Place the split 3/8” tubing over the shaft to prevent damage to the shaft as you lever with wire cutters or pliers to remove the cotter key. Internally, inside the shaft, the components are spring loaded. Place the cotter key end in doubled baggies as you remove the cotter key to prevent parts flying all over the hangar floor.

- The piston internal structure consists of a fluid chamber bounded on each side by a floating piston and a spring.
- The chamber replenishes depleted 5606 hydraulic fluid as needed through a small transfer hole.
- The springs supply the internal pressure for fluid replenishment.
- A washer is needed outboard of the spring on the cotter pin side.

- The washer, spring and floating piston on the cotter pin side of the piston usually fly out.
- If not, remove the spring with a small wire with a hook. Do not scratch the barrel.
- Remove the piston by threading in the 6/32 wire with T-handle and pulling out.

Barrel disassembly

- Remove the spring clips on each side of the barrel.
- Pull the clevis end of the shaft out of the barrel or push the shaft towards the clevis (forked) end, away from the cotter key side to remove the shaft.
- You may need to tap the cotter key end with the rubber end of a mallet. This removes the shaft, the scraper ring and end cap on one side.

- The opposite end cap and scraper ring may need to be pushed out in the opposite direction using the wooden dowel.

The assembly consists of:

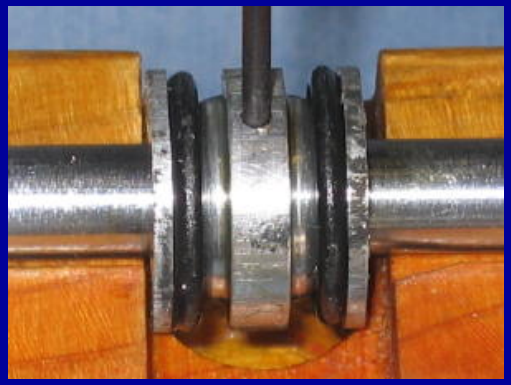
Hollow shaft with clevis at one end
- scraper ring each end
- end cap each end
- center fixed piston

Hollow shaft houses
- springs
- floating pistons
- washer (belongs on cotter pin side)

The wooden block is useful for disassembly.

- slot 3/8” wide, 1/8” deep steadies the shaft.
- 13/16” slot, 5/16” deep holds the center piston.
- ¾” x ¾” hole catches the pin when knocked out.
- ½” slot on the side may be useful when removing the pistons.

Tap out pin holding center piston with punch.
Slide piston off shaft.
Slide end cap/scraper off shaft. Use slot in block if needed.



Remove last spring and piston

- Insert small dowel through hole at clevis end and push out the spring and piston.
- If spring doesn’t come out pull it out with a hooked wire inserted through opposite end.
- Avoid scratching the barrel.

Remove O-rings

Remove all 8 O-rings. A dental pick is useful.
Remember the internal O-rings.
It helps to hold the small floating pistons on a threaded rod
when removing the tiny O-rings.

Replacement Parts Needed

Replacement O-rings		
Part #	Number	Use
AN6227-13	4	1 on outside of each end cap; 2 on piston
AN6227-7	2	1 on inside of each end cap
AN6227-1	2	1 on each floating piston

Overhaul kit can be ordered from Beechcraft vendors.

Other Replacement Parts Required

Part	Needed
Springs	2
Retaining pin	1
Washer	1
Snap rings	2
Piston scrapers	2
Cotter pin	1

Preparation

- Clean all metal components.
- Avoid damage to painted surface.
- Use brass wire brush inside shaft if needed.
- Remove burrs in cotter key area if present
  (they will damage floating piston o-rings).

O-ring replacement

- Lubricate all O-rings with 5606 hydraulic fluid.
- Replace all O-rings except on fixed center piston (do this after pin installed).
- Internal O-rings may need to be nudged in position with back of pic.
- Be sure O-rings are not twisted.

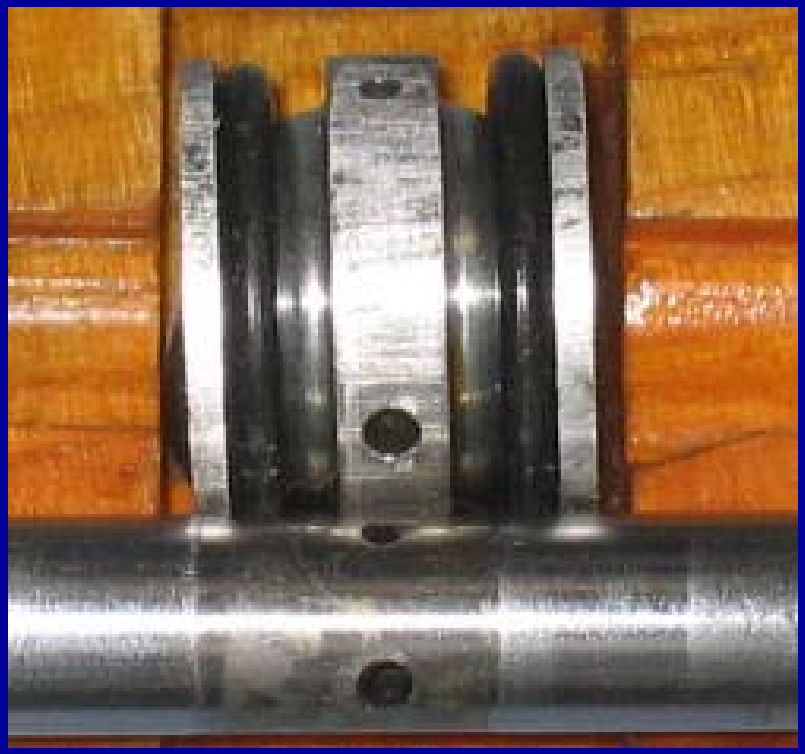
Insert 1st Spring/Floating Piston

- Insert a spring in shaft opposite the clevis followed by one floating piston with threaded portion outboard towards clevis.
- Push to clevis end with small dowel or piano wire.
- **Ensure it is beyond the pin hole for the fixed piston.**

Add End Cap

- Slide one scraper (beveled end outboard) and one end cap over the shaft.
- Slide the fixed piston on the shaft.

Fixed Piston



Shaft has two large holes for fixation pin and one small fluid transfer hole.

Fixed piston has matching holes.

At 90° the single small fluid transfer hole must line up with the transfer hole in the shaft.

Attach Fixed Piston

Slide piston on shaft. Line up holes.

Use wire or bamboo skewer to stabilize transfer holes in line.

Push pin into large holes. Tap gently with plastic mallet if needed. Avoid mushrooming end of pin.

Minimally peen edge of pin hole to keep pin from protruding and scraping barrel.

Add O-rings to fixed piston when done.

Assembly

- Slide shaft assembly into barrel with the clevis on the same end as the airframe mounting hole of the barrel.
- Use bamboo skewer to plug metering hole in fixed piston. This will keep fluid from leaking out as you fill from the other end.
- Invert to fill from other end.

Fill Barrel

Center fixed piston is near bottom end of barrel.
An old soap bottle makes filling the barrel with 5606 easier.
Fill to very top from clevis end. Eliminate bubbles.

Attach First End Cap

Push end cap into barrel. The PVC pipe slid over the shaft is a pusher.

Avoid trapped air or bubbles.

Lay snap ring on end cap
with (sharp) flat surface facing out.

Push end cap down with PVC pipe
while inserting snap ring.

Ensure snap ring is fully seated.

Opposite Side

- Invert with clevis end now down.
- Remove bamboo skewer.
- Pull down on shaft with metering hole highest to push out any trapped air. Center piston will now have fluid on it.
- Add 5606 fluid to fill remaining end of barrel.

Final Barrel Fill

- Fill barrel to brim.
- Insert second end cap avoiding trapped air.
- Add snap ring on end cap with (sharp) flat surface facing out.
- Push end cap down with PVC pipe while inserting snap ring.
- Ensure snap ring is fully seated.
- Barrel is held in vise by mounting flange while doing this.

Initial Compression

- Screw T-handle threaded rod with wing nut or a threaded bolt into floating piston on clevis end.
- Pull down ¾” and fix in that position with wing nut/washer.

Avoid Hydraulic Lock

- The ¾” initial compression is the distance occupied by the floating piston/compressed spring on the opposite end.
- Wood spacer avoids measuring.
- Doing this now prevents hydraulic lock when inserting the second floating piston.

Fill Shaft

- Cover cotter pin hole with rubber tubing.
- Fill shaft with 5606 fluid.
- Insert floating piston threaded portion facing out. Avoid bubbles
- With T-handle or bolt fixed in vise fully compress bottom spring.
- Secure compressed position with wing-nut and washer.

Final Assembly

- Slide stiff .067 piano wire into floating piston.
- Slide on 2nd spring and washer, then T-handle tool with slotted end.
- Handle of tool aligns with slots.
- Push down on T-handle.
- Pull out wire and insert cotter pin.

Spread Cotter Key

- Minimally bend end of cotter key to stabilize it.
- Use awl to spread cotter key within the shaft.
- Finish bending cotter key with awl in place.
- A probe can now be used to measure depth of piston.
- Overhaul if probe inserts more than 2+3/8”.

Attach to Airframe

- Re-attach as removed.
- Swivel the nose wheel to check the turning radius of the strut and for freedom of movement without binding or rough spots.
- Adjust the nose gear steering travel adjustment bolts to stop shimmy damper piston 1/32 inch to 1/4 inch from maximum travel in both directions.