

## NOSE GEAR SHOCK STRUT - MAINTENANCE PRACTICES

### 1. General

- A. This section gives procedures for the shock strut removal/installation and disassembly/assembly. For information about the time limits for the nose gear assembly replacement, and surface rework instructions for the grease seal bore and the cup backing bore, refer to Nose Landing Gear - Maintenance Practices. For servicing of the nose gear shock strut, refer to Chapter 12, Nose Gear Shock Strut - Servicing.
- B. The nose gear consists of an oil snubber shock strut assembly mounted in a trunnion, a shimmy damper, nose wheel, tire and tube, a drag link spring assembly and a steering bungee linkage to the pilot's rudder pedals. An extended nose gear fork, which lets there be more propeller to ground clearance, is available as an option for Airplanes 20800095 thru 20800396 and 208B0150 thru 208B1173.
- C. A longitudinal nose gear fairing extends aft to cover the upper part of the shock strut and the drag link spring. The shock strut trunnion is attached to the lower forward engine mount at two pivot lugs. The drag link spring is attached at the upper part of the wheel fork and to the lower side of the fuselage using two bearing blocks, in tandem. This makes it easy to remove the complete nose gear assembly when replacement is necessary, or when you install floats. For more information about the nose gear fairing and drag link spring, refer to Nose Gear Fairing - Maintenance Practices and Nose Landing Gear - Maintenance Practices.
- D. Vertical loads that occur when you land and taxi are absorbed by the drag link spring and the nose gear shock strut. Minor loads, such as when you taxi, are absorbed primarily by the drag link spring, but as the rate of application of loads increases, such as when you land, a larger and larger proportion of the total load is absorbed by the shock strut. For more information about the nose gear fairing, refer to Nose Gear Fairing - Maintenance Practices.
- E. The nose wheel is steerable through an arc of 15 degrees each side of center by use of the rudder pedals, and by applying brakes, the angle may be increased up to 56 degrees either side of center.

### 2. Nose Gear Shock Strut Removal/Installation

- A. Remove the Nose Gear Shock Strut (Refer to Figure 201).
  - (1) Remove the left and right lower cowlings sections and the nose gear fairing as necessary to get access to the nose gear shock strut. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices and Nose Gear Fairing - Maintenance Practices.
  - (2) Lift the nose of the airplane with jacks. Refer to Chapter 7, Jacking - Maintenance Practices.
  - (3) Disconnect the steering bungee from the bell crank.
  - CAUTION: The nose gear drag link spring has a preload of 150 pounds (667.23 N) applied to the extended nose gear fork. Support the drag link spring before removing the bolts to prevent damage to components.**
  - (4) Remove the bolt and washers to disconnect the drag link spring from the shock strut.
    - (a) Remove the load on the extended shock strut.
    - (b) Keep the safety clips.
  - (5) Pivot the shock strut slightly forward to clear the drag link spring fork.
  - (6) With the nose gear shock strut supported, remove the bolts from the trunnion assembly and the engine mount lugs.
    - (a) Record the position of the washers.
  - (7) Slide the nose gear shock strut straight down to remove it from the airplane.
- B. Install the Nose Gear Shock Strut (Refer to Figure 201).
  - (1) Raise the nose gear shock strut assembly straight up to put the pivot holes in the trunnion in position with the holes in the engine mount lugs.
  - (2) Put the washers in the position they were in before removal and installation of the bolts, then torque the nuts from 290 to 410 inch-pounds (32.7 to 46.3 N.m).
  - (3) Apply approximately 150 pounds (680 N) upward force to the nose gear drag link spring.
  - (4) Align the holes in the fork with the holes in the nose wheel fork.
  - (5) Insert the safety clips between the gear spring fork and the trunnion with one leg resting against the boss of the trunnion bearing block.
  - (6) Make sure the leg of the safety clip is positioned tightly against the bearing block surface.

**NOTE:** The safety clip must not be able to turn.

- (7) Install bolts and torque from 60 to 85 inch-pounds (6.8 to 9.6 N.m).
- (8) Safety the bolts with wire to the safety clip or washer.
- (9) Connect the steering bungee to the bell crank.
- (10) Install the lower cowl and the nose gear fairing as necessary. Refer to Chapter 71, Engine Cowling and Nose Cap - Maintenance Practices and Nose Gear Fairing - Maintenance Practices.
- (11) Remove the airplane from the jacks. Refer to Chapter 7, Jacking - Maintenance Practices.

### 3. Nose Gear Shock Strut Disassembly/Assembly (Airplanes 20800134 and On, 208B0099 and On, and Airplanes 20800001 thru 20800133 and 208B0001 thru 208B0098 Incorporating SK208-51)

#### A. Disassemble the Nose Gear Shock Strut (Refer to Figure 201).

- (1) Remove the plug from the outer barrel, then drain the hydraulic fluid.
- (2) Remove the cotter pin from the castellated nut.
- (3) Keep the castellated nut for assembly, but discard the cotter pin.
- (4) Remove the bolt assembly and washers, and keep the washers for assembly.
  - (a) Using a micrometer, measure the outside diameter of the bolt assembly and the inside diameter of the lower bushing in the upper torque link assembly and the upper bushings in the lower torque link assembly. The difference in measurement in the bolt assembly and the bushing tolerances must not be more than 0.0031 inches (0.0787 mm). Refer to Table 201 for the necessary bolt assembly and bushing tolerances.
  - (b) Replace the bolt assembly and/or bushing(s) as necessary.
- (5) Using an appropriate size drill bit, shank through the access hole in the lower forward surface of the outer barrel, dislodge the lock ring and engage the hook shaped tool to the lock ring, to remove the lock ring from the groove in the barrel. Remove the retainer ring.
- (6) Grasping the nose wheel fork, pull the inner barrel assembly free of the outer barrel assembly. Remove the inner backup rings, packing, and the outer packing from the support ring. Discard the inner backup rings, packing, and outer packing but keep the support ring.

**CAUTION:** Use care not to drop the bearing and races from the bearing block.

- (7) Remove the nut, washers, spacer, and bolt from the nose wheel fork and separate the inner barrel and keep it for reassembly.
- (8) Remove the plug and metering pin assembly from the inner barrel and discard the packing.
- (9) Cut safety wire from the lower spacer, and using a suitable pin punch, drive out the roll pin and keep for reassembly.
- (10) Remove the pin and separate the lower torque link assembly from the nose wheel fork.
  - (a) Using a micrometer, measure the outside diameter of the pin and the inside diameter of the lower bushings in the lower torque link assembly. The difference in measurement in pin and bushing tolerances must not exceed 0.002. Refer to Table 201 for required pin and bushing tolerances.
  - (b) Replace the pin and/or bushing(s) as required.
- (11) Cut safety wire from the upper spacer, and using a suitable pin punch, drive out the roll pin and keep for reassembly.
- (12) Remove the pin assembly and separate the upper torque link from the outer barrel.
  - (a) Using a micrometer, measure the outside diameter of the pin assembly and the inside diameter of the upper bushings in the upper torque link assembly. Refer to Table 201 for required pin assembly and bushing tolerances. The difference in measurement in the pin assembly and bushing tolerances must not exceed 0.002 inch (0.05 mm).
  - (b) Replace the pin assembly and/or bushing(s) as required.
- (13) Cut safety wire from the bolts and remove and keep the bolts, washers, spacers, shims and bumper.
- (14) Remove the shimmy damper (if installed).
- (15) Remove and keep the nut, washer, and bolt. Remove the strut tube.
- (16) Remove the cap plug from the steering ring.
- (17) Remove and keep the nut, washer, and bolt. Separate the steering ring from the top of the outer barrel.

(18) Bend the locking tab(s) of the key washer flat, and using a suitable spanner wrench, remove and keep the spanner nut and seal.

(19) Remove the upper bearing cone from the trunnion.

**NOTE:** The bearing cups are pressed into the trunnion and do not need to be removed unless damaged.

(20) Pull the outer barrel from the trunnion and remove the lower bearing cone.

**Table 201. Torque Link Bolt Assembly, Pin Assembly and Bushing Diameters**

COMPONENT	DIAMETER	MAXIMUM ALLOWABLE DIFFERENCE
Bolt Assembly	0.4364 Inch, +0.0005 or -0.0005 Inch (11.08 mm, +0.0127 or -0.0127 mm)	0.0031 Inch (0.0787 mm)
Lower Bushings, Upper Torque Link	0.4375 Inch, +0.0015 or -0.0015 Inch (11.1125 mm, +0.0381 or -0.0381 mm)	
Upper Bushings, Lower Torque Link	0.4375 Inch, +0.0015 or -0.0015 Inch (11.1125 mm, +0.0381 or -0.0381 mm)	
Pin Assembly	0.5300 Inch, +0.0004 or -0.0004 Inch (13.462 mm, +0.01016 or -0.01016 mm)	0.002 Inch (0.0508 mm)
Upper Bushings, Upper Torque Link	0.5313 Inch, +0.0003 or -0.0003 Inch (13.495 mm, +0.00762 or -0.00762 mm)	
Pin	0.5300 Inch, +0.0004 or -0.0004 Inch (13.462 mm, +0.01016 or -0.01016 mm)	0.002 Inch (0.0508 mm)
Lower Bushings, Lower Torque Link	0.5313 Inch, +0.0003 or -0.0003 Inch (13.495 mm, +0.00762 or -0.00762 mm)	

B. Reassemble the Nose Gear Shock Strut (Refer to Figure 201).

**NOTE:** Use all new packings, seals and backup rings when assembling the nose gear shock strut. Assemble these parts lubricated with a film of Petroleum VV-P-236, hydraulic fluid (MIL-PRF-5606), or Dow-Corning DC-7.

- (1) Clamp the trunnion in a suitable holding fixture, repack the lower bearing with MIL-G-21164 high and low temperature grease, and install on the lower bearing cup.
- (2) Position the outer barrel assembly in the trunnion.
- (3) Pack the upper bearing cone, using MIL-G-21164 high and low temperature grease and install in the upper trunnion bearing cup.

(a) Install the seal, new key washer, and spanner nut.

(b) Using a suitable spanner wrench, torque the nut until a slight drag is felt on the outer barrel turn action.

- (4) Back off the nut to the first key tab and bend tab(s) 90 degrees to the nut keyway.
- (5) Install the steering ring to the top of the outer barrel. Align the attach holes, and install the bolt, washer and nut.
- (6) Lubricate all surfaces of the steering ring cavity with MIL-G-21164C high and low temperature grease before you install the cap plug.

**NOTE:** The steering ring cavity is the inside surface of the outer barrel that is above the bolt and cap plug in the outer barrel (Refer to Figure 201).

- (7) Clean the outside area of the cap plug and a 0.25 inch (6.35 mm) down the inner diameter of the outside barrel assembly with MEK or a suitable cleaning solvent.
- (8) Apply a fillet of B-2 TYPE I sealer around the inner surface of the outer barrel cap plug flange before installation, refer to Nose Gear Shock Strut - Servicing.
- (9) Install the cap plug into the barrel top.
- (10) Apply a fillet of B-2 TYPE I sealer around the outside surface of the cap plug and barrel top, refer to Nose Gear Shock

## Strut - Servicing.

- (11) Install the cap plug into the steering ring.
  - (12) Install the shimmy damper.
  - (13) Lubricate the new packing and install in the groove at the top of the strut tube.
  - (14) Insert the strut tube into the outer barrel. Align the attach holes, and install the bolt, nut and washers.
  - (15) Assemble the previously kept shims and bumper, and spacers to the lower torque link and install the washers and bolts. Safety wire the bolts.
  - (16) Install the new 2643085-200 lower bushings in the lower torque link assembly, as required.
  - (17) Position the spacer between bushings in the lower torque link assembly, and align the attach holes in the lower torque link assembly with holes in the nose wheel fork.
  - (18) Put the new or existing pin assembly through the holes. Make sure the roll pin hole in the pin assembly aligns with the roll pin hole in the spacer.
  - (19) Install the previously kept roll pin and safety wire.
  - (20) Install the new 2643085-200 upper bushings in the upper torque link assembly as required.
  - (21) Position the upper spacer beneath the over travel indicator cable and between the bushings in the upper torque link.
  - (22) Align the attach holes in the upper torque link assembly with holes in the outer barrel and put the new or existing pin assembly through the holes. Make sure the roll pin hole in the pin assembly aligns with the roll pin hole in the spacer.
  - (23) Install the previously kept roll pin and safety wire.
  - (24) Lubricate the new packing and install in the groove of the plug.
  - (25) Lubricate the new packing and install in the groove of the collar on the inner barrel.
  - (26) Pack the bearing with MIL-G-21164 high and low temperature grease. Assemble the races on each side of the bearing and insert it into the shallow (lower) recess of the bearing block.
  - (27) Slide the inner barrel through the bearing block, bearing, bearing races, and into the nose wheel fork.
  - (28) Position the plug and metering pin assembly through the bottom of the fork so that the attach holes through the plug, fork, and inner barrel are aligned. Install the previously kept bolt, spacers, washers and tighten nut.
- NOTE:** If installing a new 2643018-2 Metering Pin Assembly that is not drilled, do the following: Drill and ream 0.375 +0.003 -0.000 inch (9.525 +0.0762 -0.000 mm) diameter hole through wall, drill and ream through opposite wall. Install bolt, washer, and nut. Refer to Figure 202.
- (29) Lubricate the new packing and the new backup rings and assemble with backup rings on each side of the packing into the interior grooves of the support ring.
  - (30) Lubricate the new packing and install it into the exterior groove of the support ring.
  - (31) Install the lock ring, retainer ring, and the new wiper ring, lubricate with MIL-PRF-5606 hydraulic fluid, over the inner barrel.
  - (32) Position the support ring, with the packing installed, over the inner barrel.
  - (33) Install the bearing on the end of the inner barrel and secure it in place with the lock ring.
  - (34) Slide the assembled inner barrel into the outer barrel assembly. Tap the lock ring into place in the groove at the bottom of the outer barrel.
  - (35) Install the new bushing to the lower end of the upper torque link and the new bushing to the upper end of the lower torque link as required. Refer to the Model 208 Series Illustrated Parts Catalog for bushing part numbers.
  - (36) Insert the new or existing bolt assembly and washer through the lower torque link and upper torque link and install the previously kept washer, castellated nut and the new cotter pin. Refer to the Model 208 Series Illustrated Parts Catalog for the cotter pin part number.
  - (37) Service the shock strut with MIL-PRF-5606 hydraulic fluid, refer to Nose Gear Shock Strut - Servicing.
  - (38) Install the plug.

#### 4. Nose Gear Shock Strut Disassembly/Assembly (Airplanes 20800001 thru 20800133 and 208B0001 thru 208B0098 Except Airplanes Incorporating SK208-51)

- A. Disassemble the Shock Strut (Refer to Figure 201).

- (1) Remove the plug from the outer barrel and drain hydraulic fluid.
- (2) Remove the cotter pin from the castellated nut and remove the castellated nut, the bolt, washers and bushing from the upper and lower torque link assemblies. Note the position of washers for reinstallation. Discard the cotter pin but keep the castellated nut, the bolt, and the washers and bushings.
- (3) Using the appropriate size drill bit shank through access hole in lower forward surface of the outer barrel, dislodge lock ring and engage hook shaped tool to the lock ring to remove the lock ring from the groove in the outer barrel.
- (4) Remove the retainer ring.
- (5) Grasping the nose wheel fork, pull the inner barrel free of the outer barrel assembly.
- (6) Remove and discard inner backup rings, packing, and the outer packing from the support. Keep the support.

**CAUTION:** Use care not to drop the bearing or races from bearing block.

- (7) Remove and keep the nut, bolt and washers from the nose wheel fork. Separate the inner barrel from the nose wheel fork (4).
- (8) Remove the plug and metering pin from the inner barrel. Discard the packing.
- (9) Cut safety wire from the spacer, and using suitable pin punch, drive out the roll pin and keep it for reassembly.
- (10) Remove and keep the pin and separate the lower torque link assembly from the nose wheel fork.
- (11) Cut safety wire from the spacer, and using suitable pin punch, drive out the roll pin from the spacer and keep for reassembly.
- (12) Remove and keep pin and separate the upper torque link from the outer barrel.
- (13) Cut safety wire from the bolts. Remove and keep the bolts and shims and the bumper block.
- (14) Remove shimmy damper if installed.
- (15) Remove and keep the nut, bolt and washers. Remove the strut tube.
- (16) Remove the cap plug from the steering ring.
- (17) Remove and keep the nut and bolt. Separate the steering ring from the top of the outer barrel.
- (18) Bend the locking tab(s) of the key washer flat, and using a suitable spanner wrench, remove and keep the spanner nut, key washer and seal.
- (19) Remove the upper bearing cone from the trunnion.

**NOTE:** Bearing cups are pressed into the trunnion and do not need to be removed unless they are damaged.

- (20) Pull the outer barrel from trunnion, and remove and keep the lower bearing cone.

**B. Reassemble the Shock Strut (Refer to Figure 201).**

**NOTE:** Use all new packing, seals and backup rings when assembling the nose gear shock strut. Assemble these parts lubricated with a film of Petrolatum/VV- P-236, hydraulic fluid (MIL-PRF-5606), or Dow-Corning DC-7.

- (1) Clamp the trunnion in a suitable holding fixture, repack the lower bearing with MIL-G-21164 high and low temperature grease, and install on the lower bearing cup.
- (2) Position the outer barrel assembly in the trunnion assembly.
- (3) Pack the upper bearing cone, using MIL-G-21164 high and low temperature grease and install in the upper trunnion bearing cup.
- (4) Install the seal, the new key washer and spanner nut.
  - (a) Use the applicable spanner wrench and torque the nut until a slight drag is felt on the outer barrel turning action.
  - (b) Back off the nut to the first key tab and bend the tab(s) of the key washer 90 degrees to the nut keyway.
- (5) Install the steering ring to the top of the outer barrel. Align the attach holes and install the previously kept bolt, washer, and nut.
- (6) Lubricate all surfaces of the steering ring cavity with MIL-G-21164C high and low temperature grease before you install the cap plug.

**NOTE:** The steering ring cavity is the inside surface of the outer barrel that is above the bolt and plug in the outer barrel (Refer to Figure 201).

- (7) Clean the outside area of the cap plug and a 0.25 inch (6.35 mm) down the inner diameter of the outside barrel assembly with MEK or a suitable cleaning solvent.
  - (8) Apply a fillet of B-2 TYPE I sealer around the inner surface of the outer barrel cap plug flange before installation, refer to Nose Gear Shock Strut - Servicing.
  - (9) Install the cap plug into the barrel top.
  - (10) Apply a fillet of B-2 TYPE I sealer around the outside surface of the cap plug and barrel top, refer to Nose Gear Shock Strut - Servicing.
  - (11) Install the cap plug into the steering ring.
  - (12) Install the shimmy damper.
  - (13) Lubricate new packing and install in the groove at the top of the strut tube.
  - (14) Insert the strut into the outer barrel. Align the attach holes, and install the previously kept bolt, washer, and nut.
  - (15) Assemble the previously kept shims and bumper block to the lower torque link assembly and install the kept bolts. Safety wire the bolts.
  - (16) Position the spacer between the lower bushings in the lower torque link assembly. Align the attach holes in the lower torque link assembly with holes in the nose wheel fork.
  - (17) Insert the previously kept pin through the holes. Make sure the role pin hole in pin aligns with the role pin hole in the spacer.
  - (18) Install the roll pin and the safety wire.
  - (19) Position the spacer between upper bushings in the upper torque link assembly. Align the attach holes in the upper torque link assembly with the holes in the outer barrel.
  - (20) Put the previously kept pin through the holes. Make sure the role pin hole in pin aligns with the role pin hole in the spacer.
  - (21) Install the previously kept roll pin and safety wire.
  - (22) Lubricate the new packing and install in the groove of the plug.
  - (23) Lubricate the new packing and install in the groove of the collar on the inner barrel.
  - (24) Pack the bearing with MIL-G-21164 high and low temperature grease. Assemble races on each side of the bearing and put into the shallow (lower) recess of the bearing block.
  - (25) Slide the inner barrel through the bearing block, bearing, bearing races, and into the nose wheel fork.
  - (26) Position the plug and metering pin assembly through the bottom of the fork so that the attach holes through the plug, fork, and inner barrel are aligned. Install the bolt and washer through the aligned attach holes and install the washer and nut.
- NOTE:** If installing a new 2643018-2 Metering Pin Assembly that is not drilled, do the following: Drill and ream 0.375 +0.003 -0.000 inch (9.525 +0.0762 -0.000 mm) diameter hole through wall, drill and ream through opposite wall. Install bolt, washer, and nut. Refer to Figure 202.
- (27) Lubricate the new packing and new backup rings and assemble with the backup rings on each side of the packing into the interior grooves of the support ring.
  - (28) Lubricate the new packing and install into the exterior groove of the support ring.
  - (29) Install the lock ring, retainer ring, and the new wiper ring, lubricated with MIL-PRF-5606 hydraulic fluid, over the inner barrel.
  - (30) Install the support ring, with the packings installed, over the inner barrel.
  - (31) Install the bearing on the end of the inner barrel and secure it in place with the lock ring.
  - (32) Slide the assembled inner barrel into the outer barrel assembly. Tap the lock ring into place in the groove at the bottom of the outer barrel.
  - (33) Position the previously kept washers in the same relationship as removed at each side of the upper and lower torque links connection, and install the new or existing bushings.
  - (34) Install the previously kept bolt, castellated nut, and the new cotter pin. Refer to Model 208 Series Illustrated Parts Catalog for cotter pin part number.
  - (35) Service the shock strut with MIL-PRF-5606 hydraulic fluid, refer to Nose Gear Shock Strut - Servicing.

(36) Install the plug.