

NOSE LANDING GEAR - MAINTENANCE PRACTICES

1. Description and Operation

- A. The airplane has a steering nosewheel that is linked through the rudder pedals to give ground control. Major components of the nose landing gear are as follows:
- (1) Shock Strut - The shock strut is made of top and bottom machined cylinders that contain a mixture of oil and air. The top and bottom cylinders give changes in the shock-absorb rates.
 - (2) Torque Links - The torque links give a mechanical link between the top and bottom parts of the shock strut and help to keep the nosewheel aligned with the airframe.
 - (3) Nosewheel Steering - The nosewheel steering operates through the use of the rudder pedals. The spring-loaded steering rod assemblies connect the nose gear steering arm assembly to the arms on the rudder pedals. The steering gives up to approximately 10 degrees each side of neutral, after which the brakes can be used to get a maximum deflection of 30 degrees right or left of the center.
 - (4) Shimmy Damper (For airplanes with the Lord Shimmy Damper) - The shimmy damper uses rubber with a lubricant to absorb nosewheel vibration. The damper is connected between the shock strut and the steering arm assembly.
 - (5) Shimmy Damper (For airplanes that do not have the Lord Shimmy Damper) - The shimmy damper gives resistance to shimmy when it moves hydraulic fluid through the small orifices in a piston. The damper is connected between the shock strut and the steering arm assembly.

2. Nosewheel Speed Fairing Removal/Installation

- A. Speed Fairing Removal (Refer to [Figure 201](#)).
- (1) Remove the bolt that attaches the cover plate to the bottom torque link and remove the cover plate. Install the bolt.
 - (2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
 - (3) Remove the nosewheel axle stud.
 - (4) Remove the bolt that attach the speed fairing and towbar spacers to the strut.
 - (5) Move the speed fairing up and remove the nosewheel. Loosen the scraper as necessary.
 - (6) Turn the speed fairing 90 degrees to center line of airplane and work the fairing down over the fork to remove it.
- B. Speed Fairing Installation (Refer to [Figure 201](#)).
- (1) Move the speed fairing up over the nose gear fork with the speed fairing at 90 degrees to the center line of the airplane.
 - (2) Move the speed fairing up and install the nosewheel in fork.
 - (3) Install the axle stud.
 - (4) Set the speed fairing over the nosewheel and tighten the axle stud nut until you feel friction when the wheel is turned.
 - (5) Loosen the nut to the nearest castellation and install a cotter pin.
 - (6) Install the bolt, towbar spacers, washers, and the nut that attach the fairing to the strut.

CAUTION: Damage will result if the correct clearance is not set between the tire and scraper. You must do a check of the clearance every time the scraper moves or the tire is changed when you install the speed fairings. If any mud, snow, or ice collects on the scraper, it will prevent the tire from correct rotation. You must keep the scraper clean for correct tire rotation.

- (7) Complete a check of the clearance between the tire and the scraper.
 - (a) Clean off any dirt or ice that has collected on the scraper.
 - (b) Adjust the clearance as necessary to have a minimum of 0.55 inch (14 mm) to a maximum of 0.80 inch (20 mm).
- (8) Lower the nose of the airplane to the floor.
- (9) Remove the bottom torque link attach bolt.
- (10) Set the cover plate over the speed fairing and attach it with the bottom torque link attach bolt.

3. Nose Landing Gear Removal/Installation

- A. Nose Landing Gear Removal (Refer to [Figure 202](#)).
- (1) Remove the cowl. Refer to Chapter 71, [Cowl - Removal/Installation](#).
 - (2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
 - (3) Disconnect the nosewheel steering tubes from the nose gear steering collar.

CAUTION: Make sure the strut is fully deflated before you remove the bolt or roll pin at the top of the strut.

- (4) Remove the strut clamp cap and shims from the bottom strut fitting.
- (5) Deflate the strut fully and collapse the strut to its shortest length.
- (6) Remove the bolt from the top of the strut.
- (7) Pull the strut assembly down from the top attach forging.

B. Nose Landing Gear Installation (Refer to [Figure 202](#)).

- (1) Before you inflate the nose gear strut, install the top of the strut in the top attach forging and attach it with a bolt.
- (2) Extend the strut to connect the cap to the strut clamp with the bottom strut fitting on the firewall.
- (3) Install the shims and the cap for the strut clamp attaching strut to lower strut fitting.

NOTE: When you install the cap, examine the gap between the cap and the strut fitting before the attach bolts are tightened. The gap tolerance is 0.010 inch (0.254 mm) minimum and 0.016 inch (0.406 mm) maximum. If the gap is more than the maximum tolerance, install shims as necessary. Replace the cap with shims to get the correct gap if the gap is less than the minimum. Install the shims as equal as possible between the sides of the gap.

- (4) Inflate and service the shock strut. Refer to Chapter 12, [Nose Landing Gear Shock Strut - Servicing](#).
- (5) Rig the nosewheel steering tubes. Refer to Chapter 27, [Rudder Control System - Maintenance Practices](#).
- (6) Remove the weights or the tie down from the tail, and lower the nosewheel to the floor.
- (7) Install the cowl. Refer to Chapter 71, [Cowl - Removal/Installation](#).

4. Nose Landing Gear Steering Tube Removal/Installation

A. Nose Landing Gear Steering Tube Removal (Refer to [Figure 202](#)).

- (1) Remove the upholstery from the area below the instrument panel as necessary.
- (2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
- (3) Loosen the clamp that holds the fire sleeve around the steering tube.
- (4) From inside the airplane, remove the nut that attaches the ball joint part of the steering tube to the rudder bar.
- (5) Remove the bolt and the nut that attach the clevis on the steering tube to the rod end on the nosewheel strut.
- (6) Remove the steering tube from the airplane.

B. Nose Landing Gear Steering Tube Installation (Refer to [Figure 202](#)).

- (1) From inside the airplane, attach the ball joint part of the steering tube to the rudder bar with the nut.
- (2) Loosen the jam nut.
- (3) Turn the clevis until the holes in the rod end and the clevis align.
- (4) Attach the clevis to the rod end with the bolt and the nut.
- (5) Tighten the jam nut.
- (6) Pull the fire sleeve down around the steering tube and attach it with the clamp.
- (7) Remove the weights or the tie down from the tail and lower the nosewheel to the floor.
- (8) Install the upholstery in the area below the instrument panel as necessary.
- (9) Do the rigging of the nosewheel steering tubes. Refer to Chapter 27, [Rudder Control System - Maintenance Practices](#).

5. Torque Link Removal/Installation

A. Torque Link Removal (Refer to [Figure 202](#)).

WARNING: Completely deflate the shock strut before you remove the torque links.

- (1) Disconnect the top and bottom attach bolts, spacers, shims, and nuts.
- (2) Remove the torque links.

B. Torque Link Installation (Refer to [Figure 202](#)).

NOTE: If the safety lug and stop lug are removed from the top torque link during disassembly, they must be installed and the retaining bolts tightened 20 to 25 in-lbs (2.26 to 2.82 N.m). After you tighten the bolts, bend the tips of the safety lug to safety them into position.

- (1) Install the top and bottom torque link assemblies with the shock strut fully deflated.
- (2) Install the bolt that attaches the top and bottom assemblies.
- (3) Tighten the nuts at each end of the torque links until they are almost tight. Then tighten the nuts to align the next castellation with a cotter pin hole in the bolt.
- (4) Examine the top and bottom torque link for looseness. If looseness is apparent, shims can be installed to remove any slack. This will help to prevent nosewheel shimmy.
- (5) Fill and inflate the shock strut to the correct pressure. Refer to Chapter 12, [Nose Landing Gear Shock Strut - Servicing](#).

6. Shimmy Damper Removal/Disassembly/Installation

A. Shimmy Damper Removal (Refer to [Figure 202](#)).

NOTE: There are no inspection or overhaul requirements for the Lord Shimmy Damper. The Lord Shimmy Damper is discarded.

- (1) Remove the cotter pin, nut, washer, and bolt that attach the piston shaft clevis to the bracket that is welded on the bottom of the top strut tube.
- (2) Remove the cotter pin, nut, spacer, and bolt that attach the housing to the steering arm assembly.
- (3) Remove the shimmy damper.
- (4) For airplanes with the Lord shimmy damper, discard the Lord Shimmy Damper.

B. Disassemble and Assemble the Hydraulic Shimmy Damper (Refer to [Figure 202](#)).

NOTE: There are no inspection or overhaul requirements for the Lord Shimmy Damper. The Lord Shimmy Damper is discarded.

- (1) Use Detail F as a guide to disassemble the shimmy damper. When you assemble the damper, all of the new O-rings must be used. All parts must be lubricated before you assemble with clean hydraulic fluid.
- (2) When the damper is fully assembled, it must be serviced using procedures in Chapter 12, [Nose Landing Gear Shimmy Damper - Servicing](#).

C. Shimmy Damper Installation (Refer to [Figure 202](#)).

- (1) Before you install the shimmy damper, do the maintenance that follows:
 - (a) If a Lord Shimmy Damper has been in storage for a long period, make sure that the shaft moves freely before you install it. Refer to Chapter 12, [Nose Landing Gear Shimmy Damper - Servicing](#).
 - (b) Make sure that the tire is in good condition, is balanced, and has no tears or foreign objects in it.
 - (c) Examine the interface between the bottom of the steering collar and the top of the nose gear fork. If there is looseness here, replace or add more shims under the collar.
 - (d) Examine the assembly hardware such as bolts and nuts for wear, and replace as necessary.
 - (e) Examine the shimmy damper arm attach points on the landing gear and structure for wear and replace as necessary.
- (2) Attach the shimmy damper housing to the steering arm assembly with the bolt, spacer, nut, and cotter pin.
- (3) Attach the shimmy damper piston rod clevis to the bracket that is welded on the bottom of the top strut tube with the bolt, washers (as necessary), and nut.
- (4) For cleaning and servicing of the shimmy damper, refer to Chapter 12, [Nose Landing Gear Shimmy Damper - Servicing](#).

7. Shock Strut Disassembly/Inspection/Assembly

A. Disassemble the Shock Strut (Refer to [Figure 202](#)).

NOTE: The procedures that follow apply to the nose gear shock strut after it has been removed from the airplane and the speed fairings and nosewheel have been removed. If you separate the top and the bottom strut, you do not have to remove or completely disassemble the strut to do an inspection and parts installation.

WARNING: Make sure that you completely deflate the shock strut before you remove the lock ring in the bottom end of the top strut and before you disconnect the torque links.

- (1) Remove the shimmy damper. Refer to [Shimmy Damper Removal/Disassembly/Installation](#).
- (2) Remove the torque links. Refer to [Torque Link Removal/Installation](#).
 - (a) To help in assembly, record the position of the washers, shim, and spacers.

- (3) Remove the lock ring from the groove inside the bottom end of the top strut.

NOTE: There is a small hole at the lock ring groove to help you remove the lock ring.

NOTE: Hydraulic fluid will drain from the strut halves as the bottom strut is pulled from the top strut.

- (4) Use a straight, hard pull to separate the top and bottom struts.
 - (a) Turn the bottom strut upside down and drain the hydraulic fluid.
- (5) Remove the lock ring and the bearing at the top end of the bottom strut assembly.
 - (a) Make a mark on the top side of the bearing for assembly.
- (6) Slide the packing support ring, scraper ring, retaining ring, and lock ring from the bottom strut.
 - (a) Make a mark at the relative position and the top side of each ring. Wire or tape the rings together to be sure that you install them in the correct position.
- (7) Remove the O-ring and the backup rings from the packing support ring.
- (8) Remove the bolt that attaches the towbar spacers.

NOTE: The bolt that attaches the towbar spacers also holds the bushing and the base plug in position.
- (9) Remove the bolt that attaches the fork to the strut barrel.
- (10) Remove the base plug and the metering pin from the bottom strut.
- (11) Remove the O-rings and the metering pin from the base plug.

NOTE: The bottom strut barrel and fork are a press fit and are drilled on the assembly. Separation of these parts is not recommended unless you install a new part.
- (12) Remove the retaining ring that attaches the steering arm assembly on the top strut.
- (13) Remove the steering arm assembly, shims (if installed), and washer.
 - (a) If shims are installed, record the quantity and position of each shim.
- (14) Push the orifice support from the top strut and remove the O-ring.
- (15) Remove the filler valve from the orifice support.

B. Inspect/Repair the Strut.

- (1) Clean all the parts in cleaning solvent.
- (2) Examine all the parts for damage and wear.
- (3) Replace all parts that show wear or damage and all O-rings and backup rings with new parts.
- (4) Sharp metal edges must be smoothed with Number 400 emery paper and cleaned with solvent.

C. Assemble the Shock Strut (Refer to [Figure 202](#)).

NOTE: All parts must be cleaned and lubricated with hydraulic fluid before assembly. All O-rings must be new.

- (1) Install the washer and the shims.
- (2) Lubricate the needle bearings in the steering collar.
- (3) Install collar and retaining ring.
- (4) Make sure the steering collar has a tight fit against washer.
 - (a) Shims of variable thicknesses are available from Cessna Aircraft Company to give a tight fit for the collar against the washer. Refer to the Model 172 Illustrated Parts Catalog for the shim numbers.
- (5) Install the rod ends in the steering collar.
- (6) Adjust the rod ends to the dimensions specified in [Figure 202](#), View B-B.
- (7) Install the O-rings and filler valve in the orifice piston support.
- (8) Install the orifice piston support in the top strut.
- (9) Install the O-ring and metering pin with the O-ring in the base plug. Attach with a nut.

NOTE: If the base plug is to be replaced, the new part will need to be line-drilled to accept the NAS75-5 bushing.
- (10) Install the bushing (if removed) in the base plug.
- (11) Install the base plug assembly in the bottom strut.

- (a) Align the holes of the bushing, hole in the bottom strut, and the hole in the fork.
 - (b) Install the towbar spacer under the head of the bolt.
 - (c) Install the bolt through the fork, bottom strut and bushing, which is installed in base plug.
 - (d) Install the towbar spacer on the threaded end of the bolt.
 - (e) Install and tighten the nut.
- (12) Install the lock ring, retaining ring, and scraper ring on the bottom strut. Make sure they are installed in the same positions before they were removed.
- (13) Install the O-rings and backup rings in the packing support ring.
- (14) Move the packing support ring over the bottom strut.
- (15) Install the bearing and the lock ring at the top end of the bottom strut assembly. Note top side of bearing.
- (16) Install the top strut assembly over the bottom strut assembly.
- (17) Install the lock ring in the groove of the bottom end of the top strut.
- (a) Set the lock ring in position so that one of its ends covers the small access hole in the lock ring groove (View C-C).
- (18) Install the torque links.
- (a) Set the washers, shims, and spacers in the same positions as before they were removed.
- (19) Install the shimmy damper.
- (20) After the shock strut assembly is complete, install the strut on the airplane.
- (21) Fill and inflate the strut. Refer to Chapter 12, [Nose Landing Gear Shock Strut - Servicing](#).

8. Steering Rod Assembly Adjustment

A. Adjustment Criteria (Refer to [Figure 202](#)).

- (1) Adjust the rod ends to the dimension specified in Detail G, View B-B.
- (2) Attach the nosewheel steering rods to the rod ends protruding from the steering arm assembly.

NOTE: The nosewheel steering and rudder systems are connected. An adjustment to one system can have an effect on the other system and must be taken into consideration.

Figure 201 : Sheet 1 : Nosewheel Speed Fairing Installation

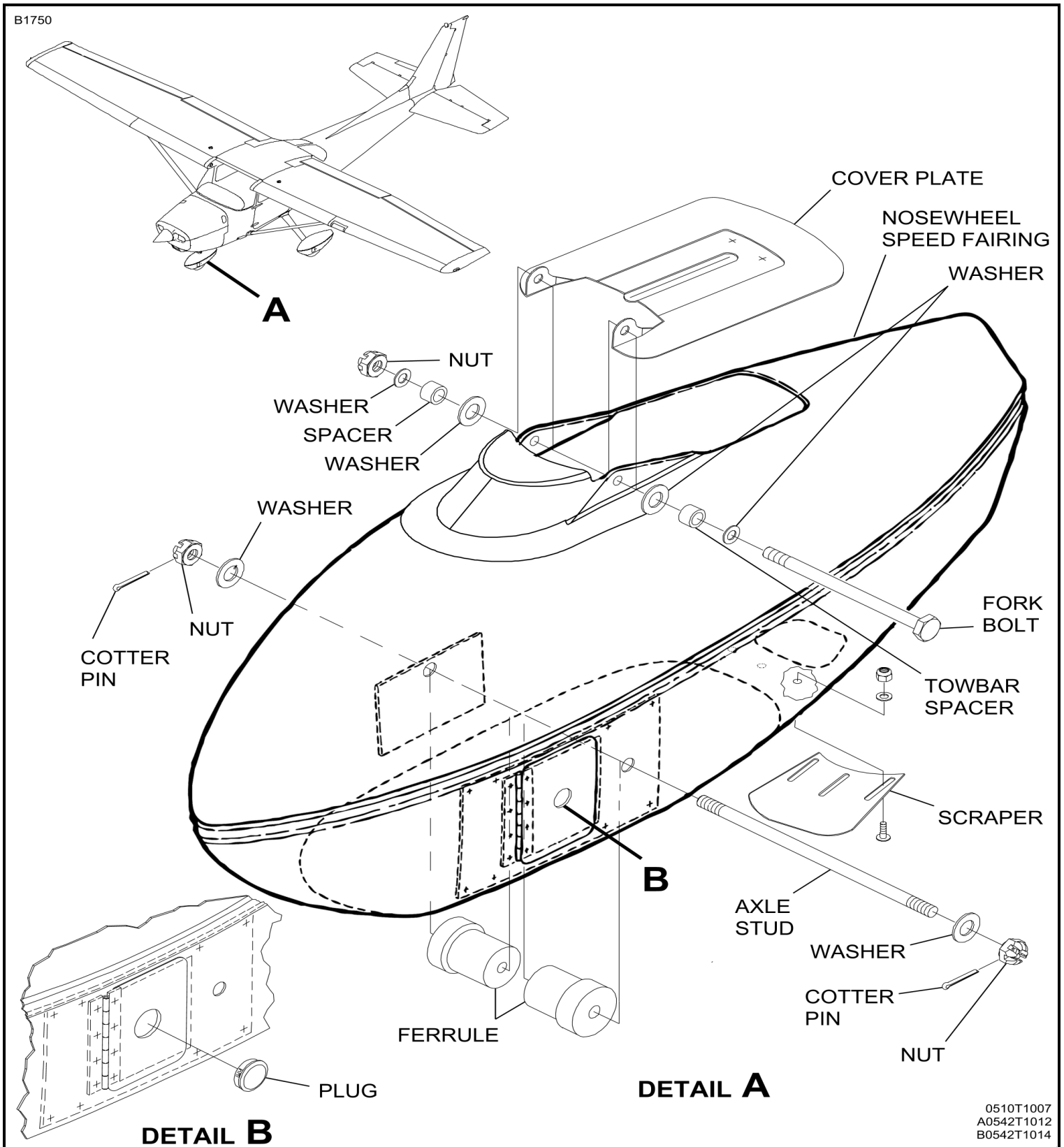


Figure 202 : Sheet 1 : Nose Landing Gear Installation

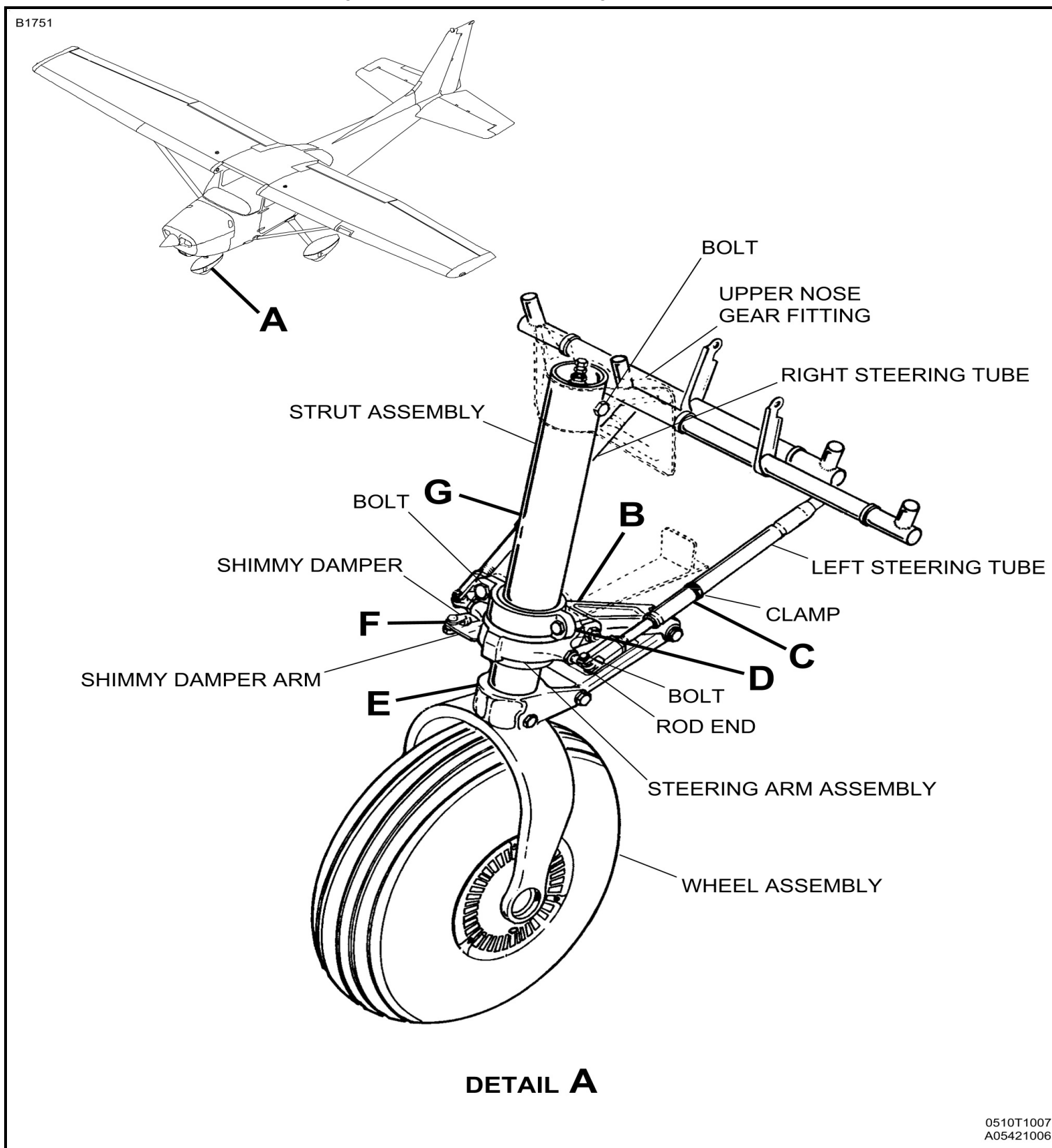
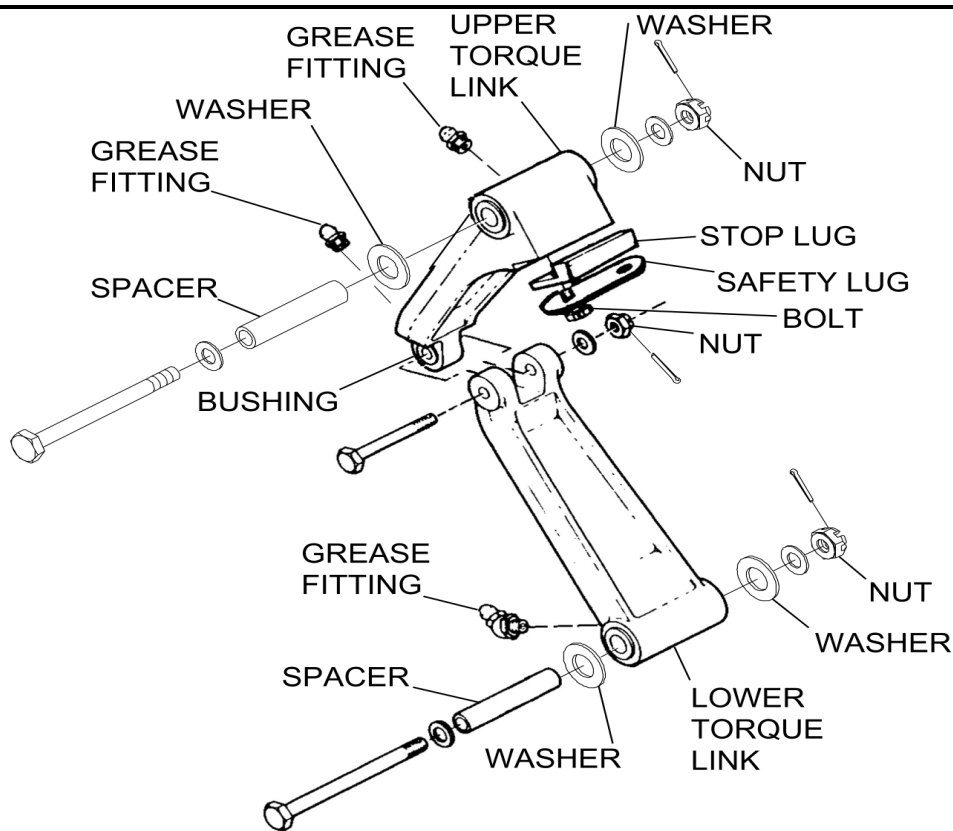
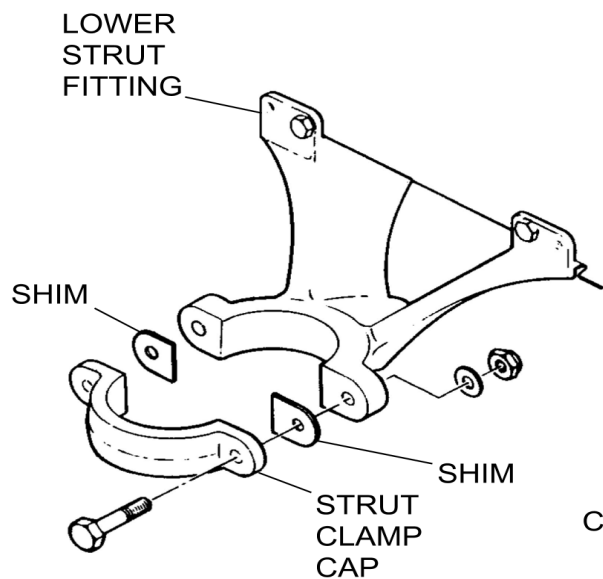


Figure 202 : Sheet 2 : Nose Landing Gear Installation

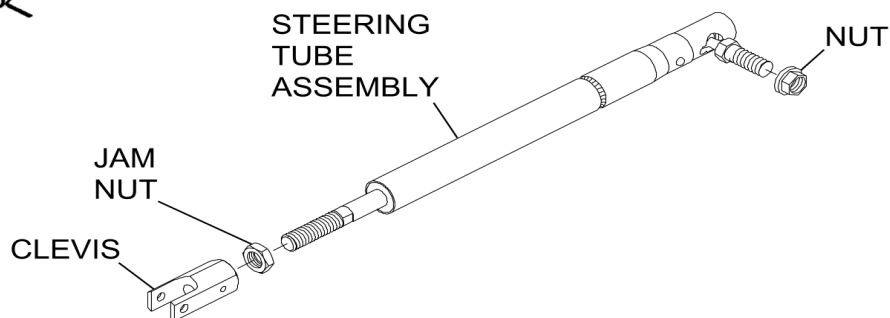
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DETAIL B



DETAIL D



DETAIL C

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Figure 202 : Sheet 3 : Nose Landing Gear Installation

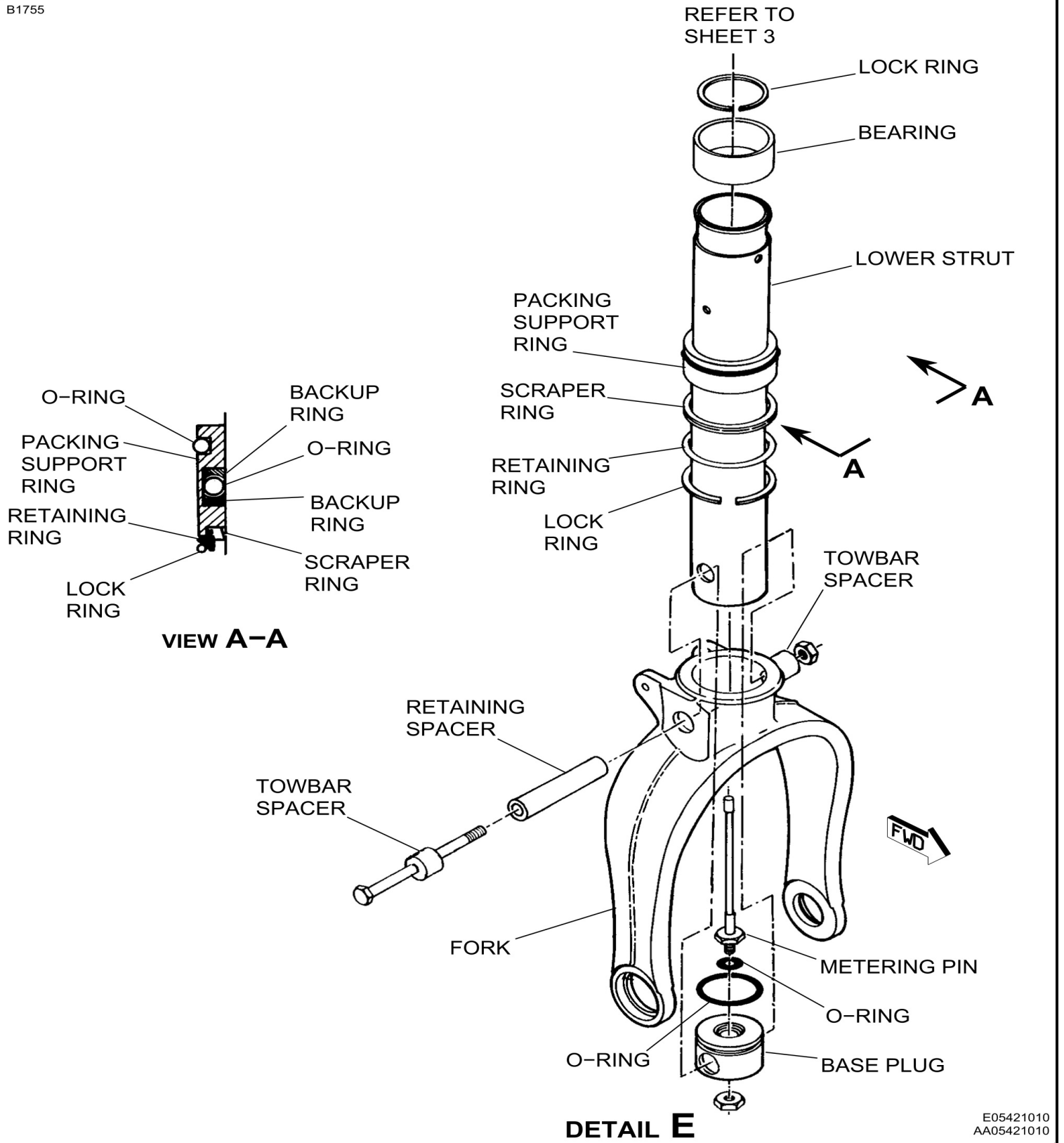
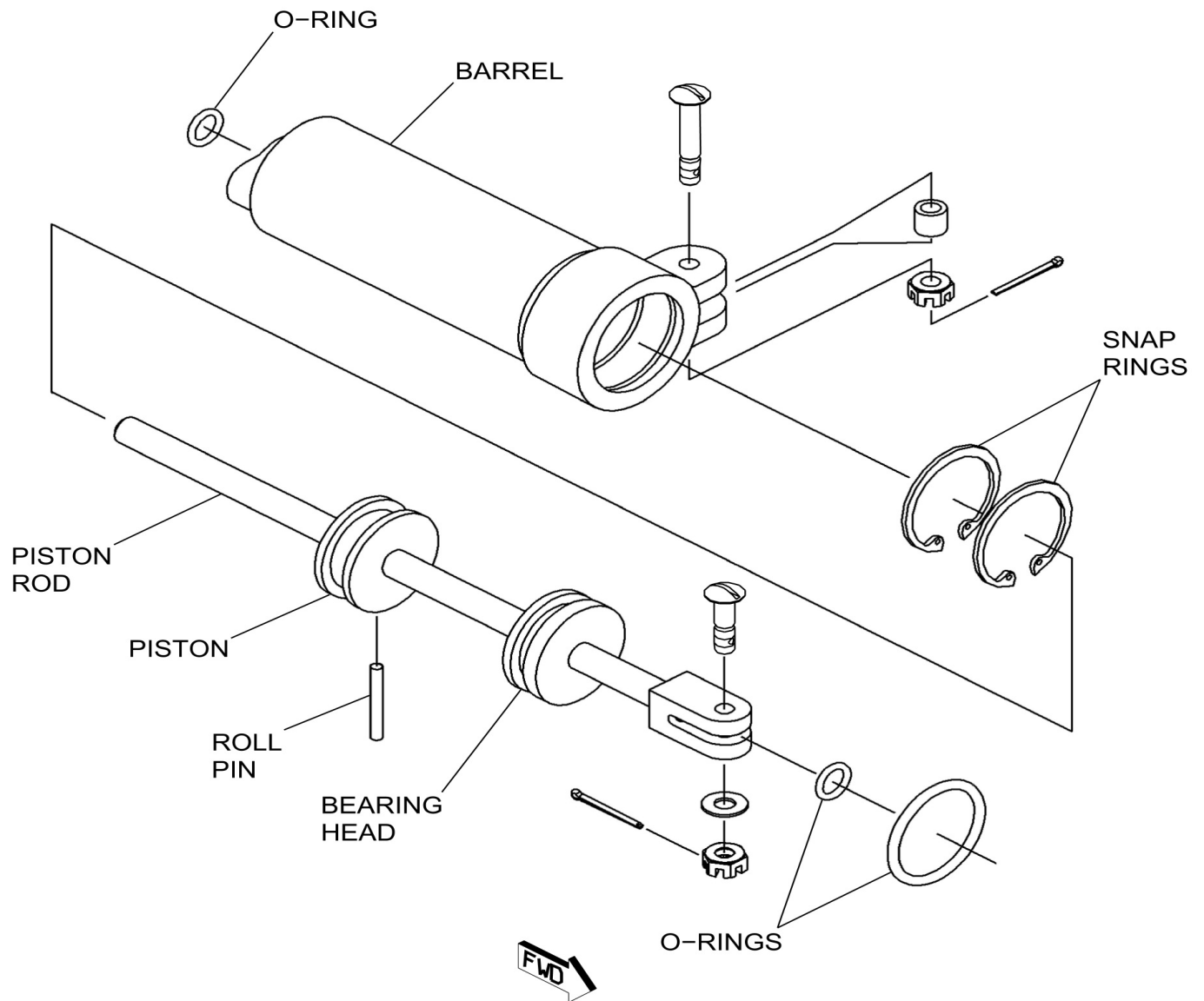


Figure 202 : Sheet 4 : Nose Landing Gear Installation

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DETAIL F

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Figure 202 : Sheet 5 : Nose Landing Gear Installation

