

# Supplemental Type Certificate

*Number* SA03708AT

*This certificate issued to* The Aeronautical Design Service Pty Ltd  
P. O. Box 307  
Woombye, Queensland  
Australia,

*certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.*

*Original Product - Type Certificate Number :* 1A15 & A1EA  
*Make :* Piper  
*Model :* PA-24, PA-24--250, PA-24 -260, PA-24 -400,  
PA-30, PA-39

*Description of Type Design Change:*

This design approval is based on Australian Civil Aviation Safety Authority Supplemental Type Certificate Number SVA510 for replacement of the Main Landing Gear Housing and the existing Bilateral Aviation Safety Agreement Implementation Procedures for Airworthiness between the United States and Australia.

*Limitations and Conditions:*

This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated, unless it is determined by the installer that the interrelationship between this change and any other previously approved modifications will produce no adverse effect upon the airworthiness of that airplane. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application :* October 4, 2008

*Date reissued :*

*Date of issuance :* June 2, 2009

*Date amended :*



*By direction of the Administrator*

*Rick Jones*  
\_\_\_\_\_  
(Signature)

Rick Jones  
Associate Manager, ACE-119A  
Atlanta Aircraft Certification Office

\_\_\_\_\_  
(Title)



Australian Government

Civil Aviation Safety Authority

# Supplemental Type Certificate

Number: SVA510

**This certificate issued to:** The Aeronautical Design Service Pty Ltd  
PO Box 5250  
Bundaberg West  
QLD, 5670  
Australia

**certifies that the change in the type design for the following product with the limitations and conditions as specified herein meets the airworthiness requirements of CAR 3, Amdt 3-6.**

<b>Original Product:</b>	Type Acceptance Certificates	A230 and A231
	FAA Type Certificates:	1A15 & A1EA
	Make:	Piper
	Models:	PA-24 Series, PA-30, PA-39.

**Description of Type Design Change:** Replacement Main Landing Gear Housing in accordance with Aeronautical Design Service (ADS) Report # 990100-MDL, Revision 1, dated 26<sup>th</sup> September 2006.

**Limitations and Conditions:** This approval is issued on the basis of a standard aircraft compliant with the referenced type certification and should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationship between this change and any of those previously approved modifications will produce no adverse effect upon the airworthiness of that aircraft.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

Instructions for Continued Airworthiness for the modified main landing gear are contained in ADS Report # 990100-SMS, Revision 1, dated 3<sup>rd</sup> October 2006 or later revision issued by ADS.

This certificate and the supporting data, which is the basis for approval, shall remain in effect until suspended, cancelled or a termination date is otherwise established by the Civil Aviation Safety Authority.

**Date of application:** 20<sup>th</sup> July 2006  
**Date of issuance:** 3<sup>rd</sup> October 2006

**This certificate is issued pursuant to Part 21.113A of the Civil Aviation Safety Regulations**

Dinh Nguyen  
Delegate of the Authority

This certificate may be transferred in accordance with CASR 21.047.

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# **Installation Instructions**

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## **AeroDesigns PA24-0100-01 Oleo Housings**

On Piper Comanche Aircraft

Alan Kerr

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## 1. PREAMBLE

The Aeronautical Designs PA24-0100 Oleo Housing has been designed as a replacement component for the Main Landing Gear Oleo Housing fitted to the Comanche Series of Aircraft. Added strength, and different manufacturing techniques have generated the distinctively different shape of the housing. Even with this shape and its increased bulk, the AeroDesigns component is a direct replacement item for MLG Assemblies. Two micro-switch brackets are included in the kit to accommodate the two different kinds of switches which are used on the aircraft.

The replacement housing operates in exactly the same mode, and is serviced in exactly the same manner as the original housing. Installation in the aircraft is essentially the same except that bracket attachment and orientation is slightly different. These differences are highlighted in this set of instructions.

This set of installation instructions is supplementary to the instructions provided in the PIPER COMANCHIE SERVICE MANUAL for servicing the Main Landing Gear. These instructions deal only with the operations required to install the oleo housing and adjust the safety switch.

## 2. Approval

Approval for this installation is provided under CASA STC Serial Number SVA510 and FAA STC SA03708AT.

## 3. Parts Break-Down

Figure #1 shows the Oleo Housing and parts that are supplied in the installation kit. Figure #2 is a view of the Safety Switch Bracket, used on the LHS Main Landing Gear and replaces the existing switch bracket.

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□ Figure 2 Safety Switch Bracket

Table #1 provides a Listing of parts

Description	P/NO LHS	P/No RHS	Qty Required Per Housing Assembly
Oleo Housing	PA24-100-0L	PA24-100-0R	1
Bungee Spring Bracket	PA24-100-5	PA24-100-5	1
Switch Bracket	PA24-100-2	Not Required	1
Bungee Arm Pin	PA24-100-8	PA24-100-8	2
Crown Washer	PA24-100-5	PA24-100-5	1
Cap Screw	3/16UNC-	3/16UNC-	LHS – 6 RHS – 4
Screw	AN4-5A	AN4-5A	1

Figure 3 is a view of the assembled Main Landing Gear System with the replacement Oleo Housing Installed.

### 3.1. Consumables required but not issued with the kit

Description	Supplier or Specification
Faying Surface Sealant	"HYLOMAR" or equivalent
Lock-Wire	0.014" (Spec MS20995C41)
Hydraulic Fluid	MIL-H-5606
Nitrogen Gas	

## 4. Installation Instructions

### 4.1. General

Installation of the AeroDesigns PA24-0100 Oleo housing will require the existing housing to be removed and disassembled. Some hardware items, and components fitted to the existing housing will be used on the replacement housing.

### 4.2. Remove the Main Landing Gear From the Aircraft

Remove the Main Landing Gear From the aircraft using the procedures given in Section 6-31 of the Piper Service Manual

### 4.3. Disassemble the Main Landing Gear

Disassemble the main landing gear using the procedures contained in paragraph 6-9 of the PIPER COMANCHIE SERVICE MANUAL.

Identify and retain the following components for fitment to the replacement housing.

- The complete Piston Tube Assembly
- Upper and Lower Torque Link assemblies, complete with bolts washers, and spacers.
- The complete orifice Tube Assembly
- The Bungee Arm, associated retaining bolt and Barrel Nut
- All installation shims and washers.

Remove and retain the following items from the oleo housing

- The two Torque Link Pivot Bushes
- The Lower Drag Link Bush
- Strut Filler Valve

- Torque Link Bolt Grease Nipple

#### 4.4. Service all Retained Components

Service all of the retained components in accordance with Section 6-32 of the PIPER COMANCHIE SERVICE MANUAL.

#### 4.5. Preparation of the Replacement Oleo Housing Assembly

Visually inspect the oleo housing to ensure that it has not been damaged by handling or in transit.

##### 4.5.1. Painting

The surface of the oleo housing has been treated with a conversion coating to help prevent corrosion, and improve paint adherence. Solvent degreasing of the surface is the only preparation required for painting.

Paint as required.

##### 4.5.2. Install Torque Link Bushes

If the torque link bushes removed from the original housing were declared serviceable after inspection, coat the external surfaces with "HYLOMAR" or an equivalent barium chromate paste, and install these in the replacement housing. Use new bushes if the original one's were declared unserviceable.

##### 4.5.3. Install Drag Link Bush

If the drag link bush removed from the original housing was declared serviceable after inspection, coat the external surface with "HYLOMAR" or an equivalent barium chromate paste, and install these in the replacement housing. Use a new bush if the original one was declared unserviceable.

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#### 4.5.4. Install the Spring Bracket

The spring bracket is a new item P/N PA24-100-5 supplied with the oleo housing. This is installed using Qty 4 3/16UNC X 1/2" Cap Screws. Coat the threads, and faying surfaces liberally with HYLOMAR before assembly.

#### 4.5.5. Install the Switch Bracket (LHS Housing Only)

The switch bracket is a new item P/N PA24-100-2 supplied with the oleo housing. This is installed using Qty 2 3/16UNC X 1/2" Cap Screws. Coat the threads, and faying surfaces liberally with HYLOMAR before assembly.

### 4.6. Assembly of the Main Landing Gear Oleo

Note
Assembly of the Main Landing Gear Oleo is the same as that described in the PIPER COMANCHIE SERVICE Manual except that the new Crown Washer P/N PA24-100-3 replaces the washer (13) removed from the original installation,

Ascertain that all of the parts removed from the original assembly are cleaned and inspected and determined to be serviceable.

Re-insert the piston tube plug (21) using procedures contained in paragraph 6-30(b) of the PIPER COMANCHIE SERVICE MANUAL

Assemble the components of the orifice tube (19) using procedure contained in paragraph 6-30(d) of the PIPER COMANCHIE SERVICE MANUAL

Trial fit the orifice tube in the oleo housing (7) to verify correct crush on the o-ring by inserting the tube up through the housing. With the end of the tube exposed through the top of the housing, install the "O" ring (15), back-up ring (14), and Crown Washer (New Part JABIRU PA24-100-3. Verify that at least 1-mm of crush is available before fitting, and locknut (12). Tighten only finger tight.

Assemble the piston tube assembly using the procedure in paragraph 6-30(f) of the PIPER COMANCHIE SERVICE MANUAL.

Lubricate the wall of the oleo housing (7), and piston tube (8), and carefully insert the tube assembly into the housing, guiding the orifice tube (19) into the piston tube until the snap ring (29) can be installed in the annular slot at the lower end of the housing.

Tighten the orifice tube lock nut (12) at the top of the housing.

Verify full and free travel of the piston tube assembly by gently moving the tube into the housing until it bottoms. Gently withdraw the tube after bottoming until it reaches its full travel.

Install the wiper strip (27), slide the washer (28) into position and secure the assembly with the snap ring (29).

Ascertain that the bushings are installed in the upper and lower torque links (5 and 12).

When assembling the LHS main landing gear. Trial fit the upper torque link bolt with the switch lever (New JABIRU PART PA24-100-4). Adjust the deformable tabs on the base of the switch lever so that the face sits snugly against the milled face of the torque link when the bolt is installed. Verify the installation by checking that the switch lever will not rotate.

Install the links. Use the same thickness of spacer washer (3) between the two links as those removed to maintain the correct wheel alignment. Tighten the bolts only tight enough to allow no side-play on the links, yet free enough to rotate.

Lubricate the landing gear assembly. (Refer to Lubrication Chart, Section II in the PIPER COMANCHE SERVICE MANUAL.

## 4.7. Installation of the Main Landing Gear

Note
When assembling components of the landing gear, lubricate bearings, bushings and friction surfaces with proper lubricant as described in Section II of the PIPER COMANCHE SERVICE MANUAL.

Check the landing gear support bearings (43 and 48) are clean and secure

Install the landing gear housing in the wheel well of the wing

Place a spacer washer (17), 0.035, P/No 19513-10, or original number of washers and then the forward support fitting (18) on the forward support arm of the housing.

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Clean the threads of the forward-support attaching bolt (AN4-5A) Item 49, and in the forward support arm of the strut housing with a suitable solvent. (This is a new item either supplied with the oleo housing or obtained from local stock)

Apply LOCTITE 620 to the threads of the forward-support attaching bolt using the procedures recommended by LOCTITE.

Install the forward-support attaching bolt with the washer removed and retained from the original assembly.

Tighten the bolt and check the support for freedom of rotation.

Check that the head of the bolt does not extend beyond the surface of the forward surface fitting.

Secure the aft support fitting (11) to the rear spar web with the attaching bolts, washers, and nuts that were removed from the original installation.

Position the main landing gear strut assembly in the wheel well and attach the front support fitting to the main spar web with the attaching bolts washers and nuts removed from the original installation.

Using the access hole behind the rear spar, insert the bungee tube (10) with washer (44) (0.125, P/N 14843-20) through the rear support fitting and into the rear strut arm using enough shim washers (12) between the rear support fitting and the strut arm to diminish end play of the strut housing.

Position the side brace support bracket (22) on the main spar web and secure with the attaching bolts, and washers removed from the original installation.

Assemble the Upper and Lower Drag Links (24 and 27) with the pivot bolt removed from the original assembly.

Adjust the lower drag link to a dimension 6.125 inches from the center of the middle pivot bolt to the center of the rod end bearing. (Refer Figure 6-10 of the PIPER COMANCHE SERVICE MANUAL)

Install the landing gear door retraction arm on the strut housing and secure with the bolt, washers, and nut removed from the original installation.

Attach the upper drag link to the support bracket with the clevis bolt, washer, nut and cotter pin removed from the original installation.

Attach the lower drag link to the strut housing with the bolt, washers at each side of the bearing, and nut that were removed from the original installation.

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Check for clearance between the drag link middle pivot drag link bolt (26) and the main landing gear cap strip, and for binding of the lower drag link and bearing by retracting and extending the landing gear by hand. If clearance is less than 0.062 inches between the pivot head bolt and the spar cap strip, additional shims (17) must be added between the strut arm and the front support bracket.

Install the Bungee Arm Pins (Qty 2 {New Item P/N PA24-100-8}) in the rear strut arm and safety with minimum 0.041 (spec. MS20995C41) lock-wire. (13)

Install barrel nut (46) in rear strut arm and insert bolt (9) with washer through the bungee tube and tighten.

Check landing gear strut arm support bearings for freedom of rotation by retracting and extending the landing gear by hand.

Install attaching bolt, and bungee chord roller in roller bracket (7)

Install roller (6) in bracket and secure with pin, washer and cotter pin.

Install the inboard pulley (4) and bungee chord assembly on bungee tool (P/N 752 998).

Secure outboard bungee chord bracket to its fitting aft of the rear spar.

Place the main landing gear in the up position and secure the inboard bungee pulley to the bungee arm (10) with washers and bolt.

Extend the landing gear and remove the bungee tool.

Connect the retraction push pull cable (21) to the upper drag link with attaching bolt and adjust. (Refer to paragraph 6-55 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the push pull control cables)

Install the assist spring (19) between the Bungee Spring Bracket (Jabiru New Part PA24-100-5) and the upper drag link.

Install the main landing gear down limit switch (25) and adjust. (Refer to paragraph 6-53 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the landing gear down limit switches.)

Install the landing gear safety switch (28) (left Landing Gear Only) and adjust. (Refer to paragraph 6-52 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the safety switch.

Connect the landing gear door retraction rod to the bracket on the main landing gear strut housing.

Service the oleo strut with fluid and nitrogen (Refer Oleo Struts, Section II of the PIPER COMANCHIE SERVICE MANUAL)

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Cycle the undercarriage up and down. Verify correct operation. Verify correct security and adequate clearance for the electrical leads and brake hoses.

Check the main landing gear alignment. (Refer to paragraph 6-35 of the PIPER COMANCHIE SERVICE MANUAL for instructions on checking the alignment).

Remove the aircraft from jacks.

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# Service Manual Supplement

## For Piper Comanche Service Manual

### Revisions Notes

This report at its latest revision status superseded all previous revisions. Only a total reprint of the report promulgates revisions. All pages bear the same revisions/date status

Rev No.	Revision Date	Details of Change
0	20 Sept 06	Original Issue
1	3 Oct 06	Format changed to include date and revised footer format.

## 1. Preamble

This Service Manual Supplement has been raised to specify the servicing and maintenance activities for Comanche Main Landing Gear assemblies which are fitted with the AeroDesigns PA24-100-00 replacement Oleo Housings.

This supplement only contains information which is associated with the AeroDesigns Housings and needs to be read in conjunction with the PIPER Comanche Service Manual which contains instructions for all other features of the aircraft.

This supplement is to be inserted into the Piper Service Manual at the beginning of Section 6, when replacement Oleo Housings are installed on the aircraft.

Where the information in this manual is contradictory with information contained in the Piper Service Manual the Piper Manual will take precedence over all things except those which are explicitly stated for the Oleo Housing. In those instances, this manual should take precedence.

## 2. Description and Operation

The Aeronautical Designs PA24-0100 Oleo Housing has been designed as a replacement component for the Main Landing Gear Oleo Housings identifies in Table #1. Added strength and different manufacturing techniques have generated the distinctively different shape of this housing. Even with this shape and its increased bulk, the Aero Designs component is a direct replacement item on all of the identified MLG Assemblies.

Table 1

Aero Designs P/No	Description	Piper Part No	Aircraft Serial Nos Applicable
PA24-100-01L	Undercarriage Housing – Main Gear - Port	20752-12	24-1 to 24-3999 24-4000 to 24-4782 24-4784 to 24-4803
		20752-08	24-4783 24-4804 and Up 26-2 and Up 30-2 and Up 39-1 to 39-135
		27053-00	39-136 and Up
PA24-100-01R	Undercarriage Housing – Main Gear - Starboard	20798-05	24-1 to 24-3999
		20752-13	24-4000 to 24-4782 24-4784 to 24-4803
		20752-09	24-4783 24-4804 and Up 26-2 and Up 30-2 and Up 39-1 to 39-135

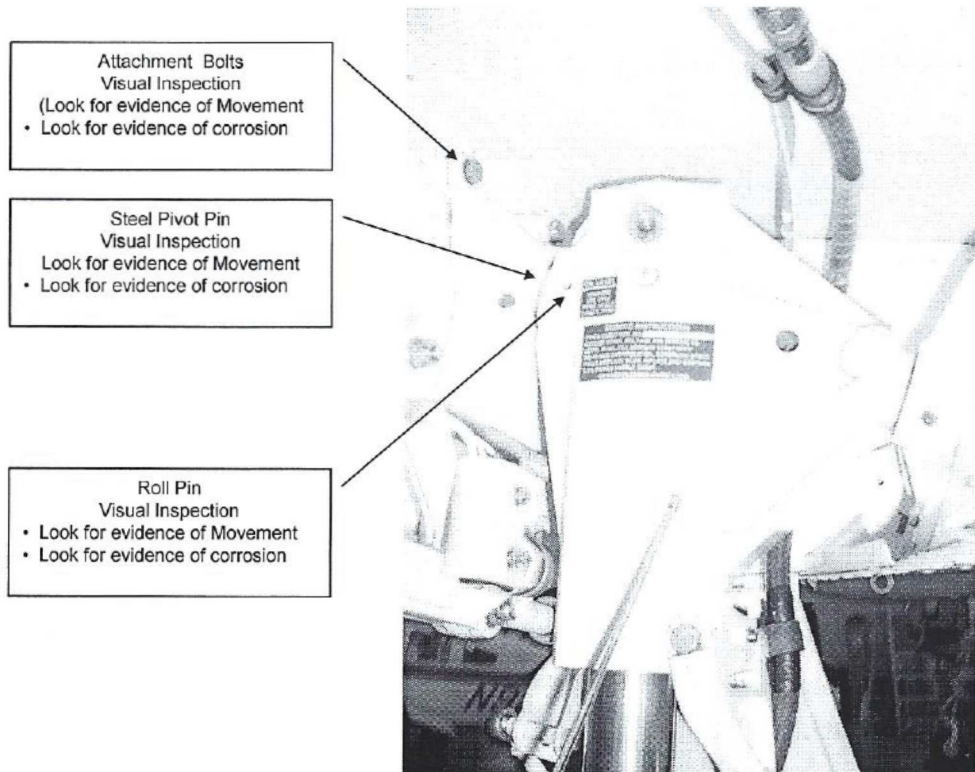




Item	Description	Item	Description
1	Main Gear Door	20	Bolt Assembly
2	Bolt Assembly	21	Push Pull Cable
3	Attachment Bolt	22	Side Brace Support Bracket
4	Bungee Pulley	23	Pivot Bolt
5	Bungee Chord	24	Upper Drag Link
6	Bungee Pulley	25	Down Limit Switch
7	Bracket	26	Pivot Bolt
8	Fitting	27	Lower Drag Link
9	Attachment Bolt	28	Safety Switch Late Model
10	Bungee Arm	29	Door Retract Rod
11	Strut Support Fitting - Rear	30	Upper Torque Link
12	Shims	31	Shim Washers
13	Bungee Arm Anti-Rotation Bolts	32	Lower Torque Link
14	Crown Washer	33	Brake line
15	Strut Housing	34	Fork Assembly
16	Strut Filler Valve	35	Brake Cylinder Assembly
17	Shims	36	Wheel
18	Strut Support Fitting Front	37	Tyre
19	Assist Spring	38	Safety Switch Bracket

**3. Servicing**

Servicing procedures specified in the Piper Comanche Service Manual continue to apply when this AeroDesigns Oleo Housing is fitted however additional inspections are required to check features which are unique to this housing assembly. The additional inspections specified in Figure 2 and Figure 3 are to be completed at each 100-hourly inspection of the aircraft.



□Figure 2

When evidence of movement is detected at the bolts attaching the forward of aft pivot bearing housings to the airframe structure (Figure #2 refers), it is permissible to retension the bolts to the following recommended limits in inch-pounds ( AN4 50 min, 70 max; AN5 100 min , 140 max), and note these items for a repeat inspection at the next 100 hourly inspection. If the bolts are loose on the second inspection contact Mr. Alan Kerr at AeroDesigns for evaluation and corrective action.

The Steel Pivot Pin is a shrink fit into the Oleo housing. The Roll Pin functions as a positive backup to lock the pivot pin. No movement of the pivot pin or the roll pin relative to the housing is permitted. If movement of

the pivot or the roll pins in the housing is detected then contact Mr Alan Kerr at AeroDesigns for an evaluation and corrective action.

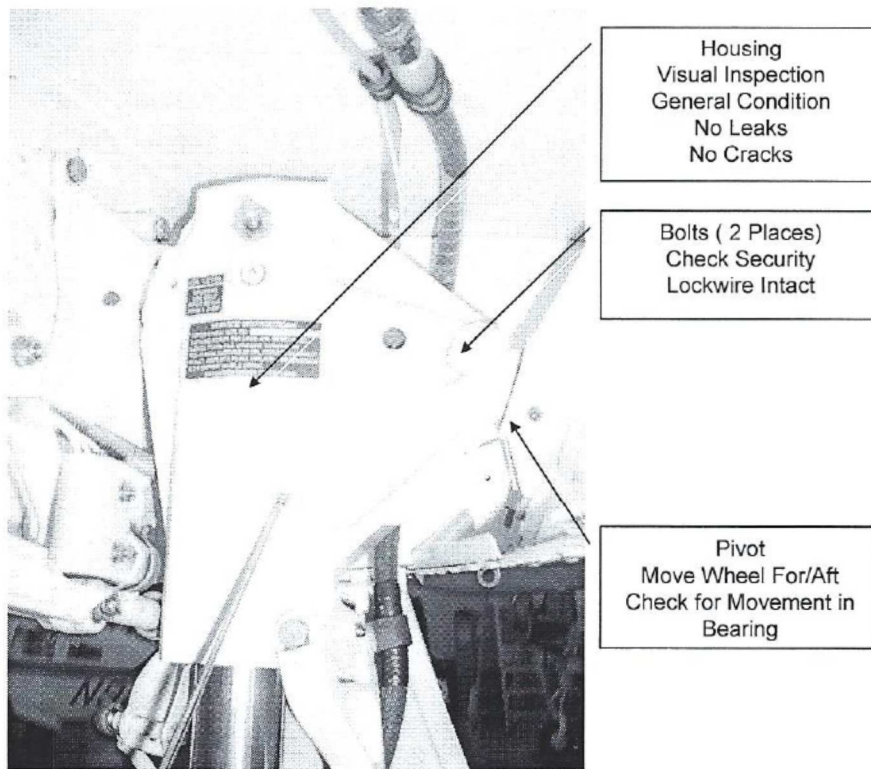


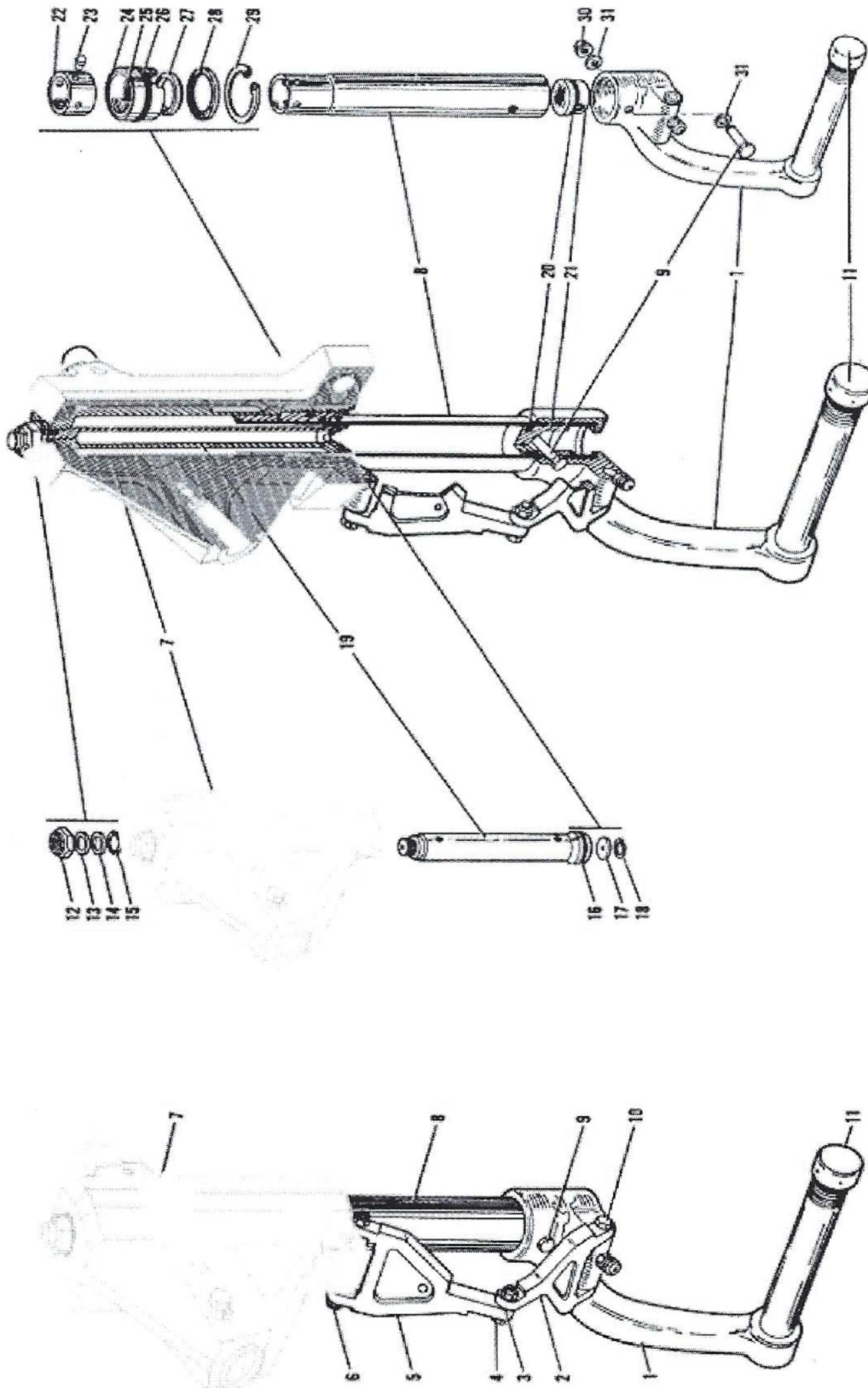
Figure 3

Movement of the pivots in the bearing housing is checked by pushing and pulling on the fork assembly when the aircraft is on jacks and the undercarriage is fully extended. An allowable movement of 3-mm measured at the wheel axle when the gear is fully extended is permitted. If more than this amount of movement is measured, contact Mr. Alan Kerr at Aero Designs for evaluation and corrective action.

#### 4. Removal and Installation Instructions Removal of the main landing gear Oleo Housing from the aircraft

Refer Figure 4

- a) Place the airplane on jacks
- b) Disconnect the retraction mechanism by pulling up on the release lever
- c) Retract the landing gear until it hangs in the neutral position, by using the emergency extension lever
- d) The side brace link assembly may be removed by the following procedure
  - i. Disconnect the assist spring, (This may be accomplished while disconnecting the push-pull cable as described in the next step)
  - ii. Disconnect the push-pull cable from the upper drag link by removing attaching nut, washer and bolt with swivel assembly (20)
  - iii. Disconnect the gear down limit switch (25) by removing the switch attaching nut.
  - iv. Remove the side brace links by removing the pivot bolts (23) at each end
  - v. Remove side brace support bracket (22) from the front spar by removing attaching bolts
- e) Remove main gear strut housing with components using the following procedure
  - i. Disconnect the gear door retraction rod (29) from the strut housing
  - ii. Disconnect the brake line (33) and cap it to prevent dripping and contamination
  - iii. Remove the access panel aft of the rear spar by removing the attaching screws
  - iv. Swing the landing gear enough to allow insertion of a bungee tool, P/No 752 998, between the inboard (4) and outboard (6) bungee pulleys
  - v. With tension relieved from the bungee, remove the inboard pulley attaching bolt (3) and remove the bungee assembly by unscrewing the outboard pulley bracket (7) from its fitting.



1	Fork Assembly
2	Torque link Lower
3	Spacer Washers
4	Bolt Assembly
5	Torque Link Upper
6	Piston Tube
7	Housing: Oleo Strut
8	Piston Tube
9	Bolt Assembly
10	Bolt Assembly
11	Axle Nut
12	Nut: Orifice Tube
13	Washers
14	Back-Up Ring, Orifice Tube
15	"O"-Ring Orifice Tube
16	Ring, Orifice Tube (PA 24-400)
17	Orifice Plate
18	Snap Ring
19	Orifice Tube
20	"O" Ring, Piston Tube Plug
21	Plug, Piston Tube
22	Bearing, Upper Piston Tube
23	Pin, Retaining
24	Bearing, Lower Piston Tube

Figure 4

- vi. Remove the bolt (9) holding the bungee arm (10) to the rear support fitting (11)
- vii. Remove the two bungee arm anti-rotation bolts (13)
- viii. Slide the bungee tube out of the rear support fitting and rear strut arm

- ix. Remove the gear assembly from the wheel well by removing the attaching bolts holding the front support fitting (18) to the front spar web.
- x. Remove the rear support fitting by gaining access to the attaching nuts through the access hole behind the rear spar and remove nuts, washers and bolts.

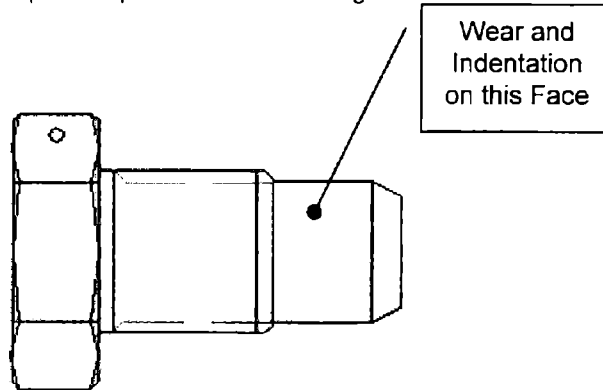
**5. Cleaning, Inspection of Main Gear Oleo**

Refer to Figure 4.

- a) Clean all parts with a suitable dry type cleaning agent
- b) Inspect the main landing gear oleo assembly component for the following
  - i. Bearings and bushing for excessive wear  
The Piper Service Manual provides no guidance for allowable wear on any of the bushings or plain bearings that are used in the MLG assembly. The following is provided for guidance:

Reference Diameter	Allowable Tolerance on Bore Diameter of Mating Hole in the housing	Allowable tolerance on external diameter of the bush	Allowable tolerance on the internal diameter of the bush
¼	0.003 oversize	0.002 undersize	0.003 oversize
5/16	0.003 oversize	0.002 undersize	0.003 oversize
3/8	0.004 oversize	0.003 undersize	0.004 oversize
7/16	0.004 oversize	0.003 undersize	0.004 oversize
½	0.005 oversize	0.004 undersize	0.005 oversize

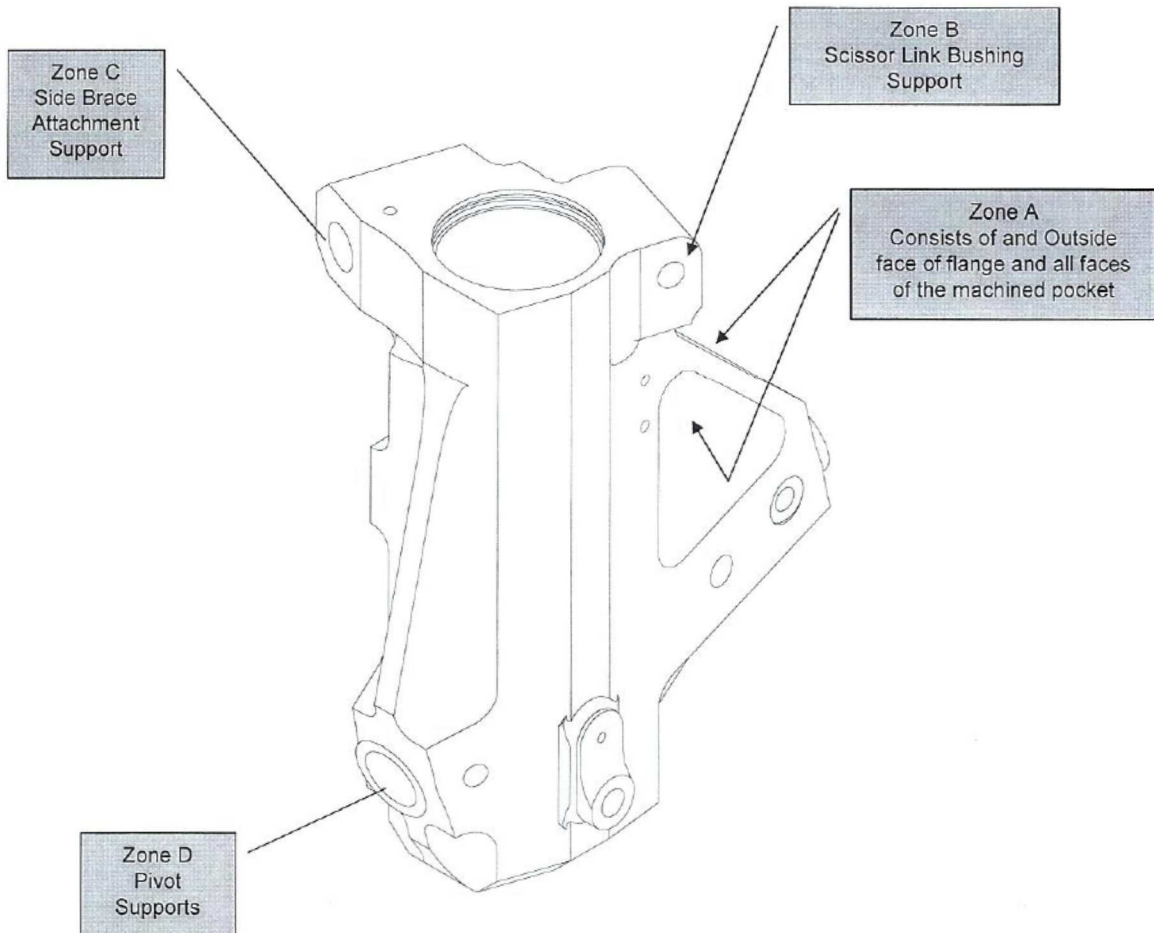
- ii. Retaining Pins for wear and damage  
The retaining pins prevent the bungee arm from rotating. The machined tip of the retaining pins, fits into a hole in the bungee arm and the associated wear will be evident on the machined tip of the pin as shown in the figure below.



- An allowable wear depth is 0.020 inches. Clean the face with abrasive paper to ensure that the edges of any wear pattern are free from burrs.
- iii. Lock Rings for cracks and burrs  
This is a visual inspection of the Lock Rings (Circlips), replace Lock ring if cracks or burrs are observed.
  - iv. Cylinder and Orifice Tube for corrosion, scratches, nicks and excess wear  
Allowable damage not to exceed 0.005 inches after damage has been blended.
  - v. Orifice plate for hole restriction  
Check that the hole is clear and free from any debris.
  - vi. Fork tube for corrosion, scratches nicks, dents, and misalignment  
No cracking which is visually detected is allowable. Scratches nicks and dent are acceptable provided that the depth of damage does not exceed 0.005 inches after blending.

## vii. Air Valve general condition

Check that the air valve is free from corrosion or debris and that the seat is free from cracks. Replace valve if defects are observed.

**6. Approved Repairs Oleo Housing****6.1. External surface Zone A**

Zone A consists of the material in the flange and the faces of the machined pockets on either side of the flange.

If cracking is observed, contact Mr Alan Kerr at Aero Designs for an evaluation and a repair scheme.

Scratches, nicks, and corrosion, if present, can be repaired by blending, provided that the depth after blending does not exceed 0.010 inches. There is no limitation on the surface area of a blend.

**6.2. External Surface Zone B and Zone C**

Zone B consists of the material in the boss into which the scissor link bushings are inserted, Zone C consists of the material in the boss into which the side brace rod end is inserted.

Cracking may be repaired by blending, provided that the depth after blending does not exceed 0.020 inches. Blending within the bore must not exceed more than 25% of the circumference at any one location.

**6.3. External Surface Zone D**

Zone D consists of the housing material which forms the boss which supports the steel pivot which is located with an interference fit into the housing.

Cracking and corrosion are not permitted in this area. If cracks or corrosion is found contact Mr. Alan Kerr at AeroDesigns for evaluation and a repair scheme.

Nicks and scratches can be repaired by blending provided the maximum depth after blending is less than 0.020 inches.

#### 6.4. Internal Bore

Likely damage to the internal bore is expected to be scratches, gouging, and/or corrosion. Damage if this kind can be repaired by smoothing and blending provided that the maximum depth of the damage does not exceed 0.010 inches, and does not extend more than 20% of the circumference of the bore at any one locations.

#### 6.5. Replacement of Wiper Strips

Individual replacement of wiper strips may be accomplished using the instructions given in Section #5 below

### 7. Assembly of the Main Oleo

Refer to Figure 1

- a) Ascertain that all parts are cleaned and inspected
- b) To install the piston tube plug (21), first lubricate the plug "O" Ring (20) with hydraulic fluid, (MIL-H-5606) and install it on the plug. Lubricate the inside wall of the piston tube (8). Insert the plug into the top of the tube, and push it to the fork end. Align the bolt holes as a guide. Drill a pilot hole and ream to 0.250/0.252 inches through each side of the tube wall. Remove burrs from the inside of the tube and flush the tube with a suitable solvent to remove all metal particles.
- c) If desired bond a cork in the hole in the bottom of the fork body to prevent dirt from entering between the fork and the tube
- d) To assemble the components of the orifice tube (19), insert the orifice plate (17) into the bottom of the tube and secure with a snap ring, (18). Install ring (16) (PA24-400) only on the lower end of the tube.
- e) Trial fit the orifice tube in the oleo housing (7) to verify correct crush on the o-ring by inserting the tube up through the housing. With the end of the tube exposed through the top of the housing, install the "O" ring (15), back-up ring (14), and Crown Washer (New Part AeroDesigns PA24-100-3. Verify that at least 1-mm of crush is available before fitting, and locknut (12). Tighten only finger tight.
- f) To install the orifice tube in the oleo housing (7), insert the tube up through the housing. With the end of the tube exposed through the top of the housing, install the "O" Ring (15), backup ring (14) washer (13) and locknut (12). Tighten locknut only finger tight at this time.
- g) Assemble the components of the piston tube (8) on the tube by placing, in order, the snap ring (29), washer (28), lower bearing (24) with the outer and inner "O" Rings (26 and 25) and upper bearing (22). Align the lock pin hole of the upper bearing with the pin holes in the tube and install pins (23)
- h) Lubricate the wall of the cylinder oleo housing (7) and piston tube (8), and carefully insert the tube assembly into the housing, guiding the orifice tube (19) into the piston tube until the snap ring (29) can be installed in the annular slot at the lower end of the housing.
- i) At the top of the housing, tighten the orifice tube locknut (12). (Should it be an impossibility to tighten the locknut due to the orifice tube rotating with the nut, withdraw the piston tube assembly from the cylinder and, while tightening the nut, secure the orifice tube with the use of a 1-1/2 x 3/16 inch drag link socket held in the slot at the lower end. Check that the orifice tube is centered in the cylinder and then reinstall the piston tube assembly.
- j) Install the wiper strip (27), slide the washer (28) into position and secure the assembly with snap ring (29)
- k) Ascertain that the bushings are installed in the upper and lower torque links ( 5 and 2) and then install the links. The torque link bolt assemblies (6 and 10) should be lubricated and installed with the flat of the bolt head hex adjacent to the milled stop of the wide end of the link. ( Use same thickness of spacer washer (3) between the two links as those removed to maintain correct wheel alignment.) Tighten the bolts only tight enough to allow no side play in the links, yet be free to rotate
- l) Lubricate the gear assembly per lubrication chart in Section II of the Piper Comanche Maintenance Manual.

- m) Compress and extend the strut several times to ascertain that the strut will fall freely. The weight of the gear wheel and fork should allow the strut to extend.
- n) Service the oleo with fluid and air using the procedures given in Section II of the Piper Comanche Maintenance Manual
- o) Check the main gear alignment using the procedure given in paragraph 6.35 of the Piper Maintenance Manual.
- p) Remove the airplane from jacks

## 8. Installing the Main Landing Gear into the Aircraft

Note
When assembling components of the landing gear, lubricate bearings, bushings and friction surfaces with proper lubricant as described in Section II of the PIPER COMANCHE SERVICE MANUAL.

- a) Check the landing gear support bearings (43 and 48) are clean and secure
- b) Install the landing gear housing in the wheel well of the wing
- c) Place a spacer washer (17), 0.035, P/No 19513-10, or original number of washers and then the forward support fitting (18) on the forward support arm of the housing.
- d) Clean the threads of the forward-support attaching bolt (AN4-5A) Item 49, and in the forward support arm of the strut housing with a suitable solvent. (This is a new item either supplied with the oleo housing or obtained from local stock)
- e) Apply LOCTITE 620 to the threads of the forward-support attaching bolt using the procedures recommended by LOCTITE.
- f) Install the forward-support attaching bolt with the washer removed and retained from the original assembly.
- g) Tighten the bolt and check the support for freedom of rotation.
- h) Check that the head of the bolt does not extend beyond the surface of the forward surface fitting.
- i) Secure the aft support fitting (11) to the rear spar web with the attaching bolts, washers, and nuts that were removed from the original installation.
- j) Position the main landing gear strut assembly in the wheel well and attach the front support fitting to the main spar web with the attaching bolts washers and nuts removed from the original installation.
- k) Using the access hole behind the rear spar, insert the bungee tube (10) with washer (44) (0.125, P/N 14843-20) through the rear support fitting and into the rear strut arm using enough shim washers (12) between the rear support fitting and the strut arm to diminish end play of the strut housing.
- l) Position the side brace support bracket (22) on the main spar web and secure with the attaching bolts, and washers removed from the original installation.
- m) Assemble the Upper and Lower Drag Links (24 and 27) with the pivot bolt removed from the original assembly.
- n) Adjust the lower drag link to a dimension 6.125 inches from the centre of the middle pivot bolt to the centre of the rod end bearing. (Refer Figure 6-10 of the PIPER COMANCHE SERVICE MANUAL)
- o) Install the landing gear door retraction arm on the strut housing and secure with the bolt, washers, and nut removed from the original installation.
- p) Attach the upper drag link to the support bracket with the clevis bolt, washer, nut and cotter pin removed from the original installation.
- q) Attach the lower drag link to the strut housing with the bolt, washers at each side of the bearing, and nut that were removed from the original installation.
- r) Check for clearance between the drag link middle pivot drag link bolt (26) and the main landing gear cap strip, and for binding of the lower drag link and bearing by retracting and extending the landing gear by hand. If clearance is less than 0.062 inches between the pivot head bolt and the spar cap strip, additional shims (17) must be added between the strut arm and the front support bracket.
- s) Install the Bungee Arm Pins (Qty 2 {New Item P/N PA24-100-8}) in the rear strut arm and safety with minimum 0.041 (spec. MS20995C41) lock-wire. (13)
- t) Install barrel nut (46) in rear strut arm and insert bolt (9) with washer through the bungee tube and tighten.
- u) Check landing gear strut arm support bearings for freedom of rotation by retracting and extending the landing gear by hand.
- v) Install attaching bolt, and bungee chord roller in roller bracket (7)

- w) Install roller (6) in bracket and secure with pin, washer and cotter pin.
- x) Install the inboard pulley (4) and bungee chord assembly on bungee tool (P/N 752 998).
- y) Secure outboard bungee chord bracket to its fitting aft of the rear spar.
- z) Place the main landing gear in the up position and secure the inboard bungee pulley to the bungee arm (10) with washers and bolt.
- aa) Extend the landing gear and remove the bungee tool.
- bb) Connect the retraction push pull cable (21) to the upper drag link with attaching bolt and adjust. (Refer to paragraph 6-55 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the push pull control cables)
- cc) Install the assist spring (19) between the Bungee Spring Bracket (AeroDesigns New Part PA24-100-5) and the upper drag link.
- dd) Install the main landing gear down limit switch (25) and adjust. (Refer to paragraph 6-53 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the landing gear down limit switches.)
- ee) Install the landing gear safety switch (28) (left Landing Gear Only) and adjust. (Refer to paragraph 6-52 of the PIPER COMANCHIE SERVICE MANUAL for adjustment of the safety switch.
- ff) Connect the landing gear door retraction rod to the bracket on the main landing gear strut housing.
- gg) Service the oleo strut with fluid and nitrogen (Refer Oleo Struts, Section II of the PIPER COMANCHIE SERVICE MANUAL)
- hh) Cycle the undercarriage up and down. Verify correct operation. Verify correct security and adequate clearance for the electrical leads and brake hoses.
- ii) Check the main landing gear alignment. (Refer to paragraph 6-35 of the PIPER COMANCHE SERVICE MANUAL for instructions on checking the alignment).
- jj) Remove the airplane from jacks.

## 9. Replacement of Wiper Strip on Landing Gear Struts

- a) Place aircraft on jacks
- b) Jack the airplane only high enough to take weight off the gear
- c) Release the air pressure from the strut by depressing the valve core pin until the pressure has diminished.
- d) Using snap ring pliers, disengage the snap ring from the annular slot in the oleo housing, and allow it to lay at the lower end of the piston tube along with the wiper strip retainer washer
- e) Remove the old wiper strip from the housing, and clean and inspect the housing to determine that no pieces remain in it.
- f) Wipe the piston tube and check for any abrasions which may damage the new part. Polish the tube to remove any abrasions found.
- g) A new wiper strip should be cut straight across and a little longer than is needed to circle the piston tube
- h) Insert the new wiper strip up into the oleo housing with the tapered edge down. Slide the retainer washer and snap ring up the piston tube and insert them into the oleo housing. Using snap ring pliers to compress the snap ring, install it into the annular slot in the oleo housing.
- i) Inflate the oleo strut in accordance with the instructions given in Section II of the Piper Servicing Manual, and remove the airplane from jacks.

## 10. Adjustment of Landing Gear Safety Switch

Adjustment of the landing gear safety switch when the AeroDesigns Housing is installed uses the same procedures as was used for the original Piper Housing. Refer Paragraph 6.52 of the Piper Comanche Service manual

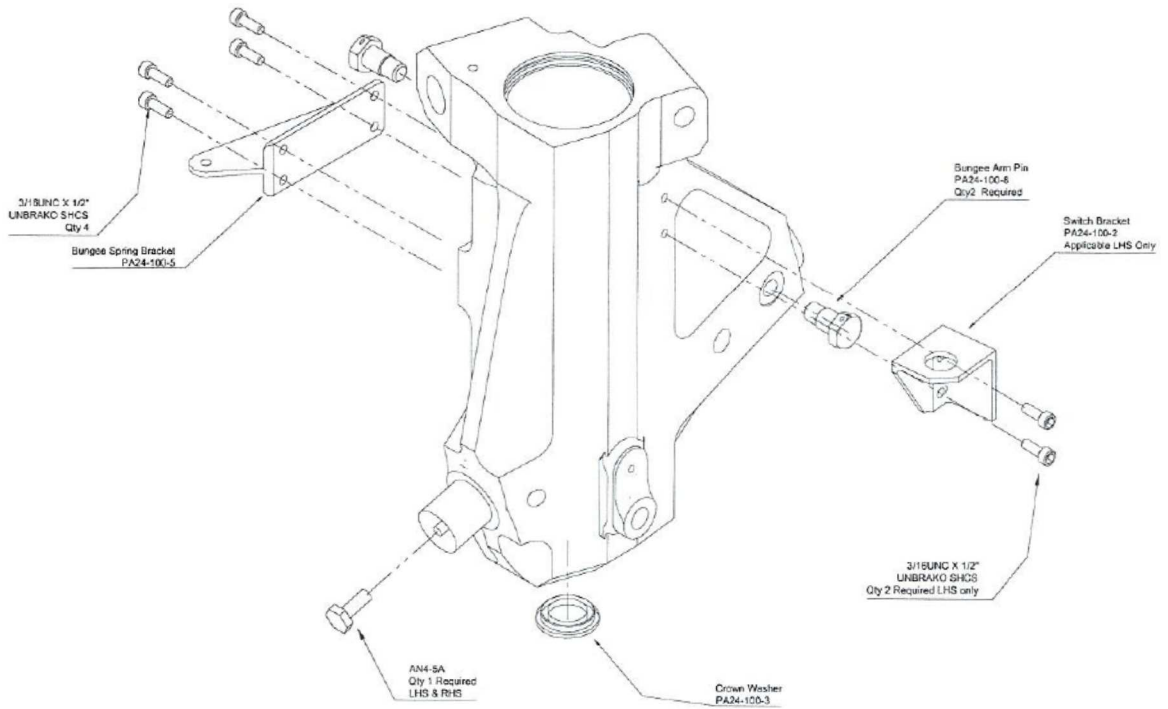
## 11. Adjustment of the Gear Down Limit Switch

Adjustment of the landing gear safety switch when the AeroDesigns Housing is installed uses the same procedures as was used for the original Piper Housing. Refer Paragraph 6.53 of the Piper Comanche Service manual

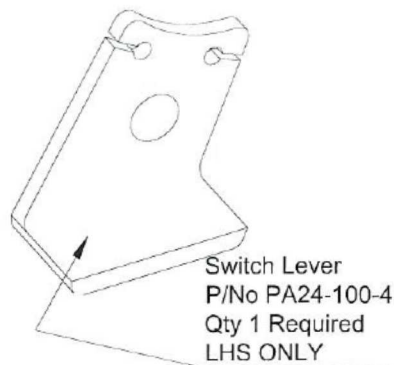


# Annex A

Figure #A-1 shows the Oleo Housing and associated components.  
 Figure #A-2 is a view of the Safety Switch Bracket, used on the LHS Main Landing Gear and replaces the existing switch bracket.



**Figure A-1 Oleo Assembly**



**Figure A-2 Safety Switch Bracket**

Table #1 provides a Listing of parts Shown in Figure A-1

Description	P/NO LHS	P/No RHS	Qty Required Per Housing Assembly
Oleo Housing	PA24-100-0L	PA24-100-0R	1
Bungee Spring Bracket	PA24-100-5	PA24-100-5	1
Switch Bracket	PA24-100-2	Not Required	1 (LHS)
Alternate Switch Bracket	PA24-100-12	Not Required	1 (LHS)
Bungee Arm Pin	PA24-100-8	PA24-100-8	2
Crown Washer	PA24-100-5	PA24-100-5	1
Cap Screw	3/16UNC-	3/16UNC-	LHS – 6 RHS – 4
Screw	AN4-5A	AN4-5A	1
Micro Switch Trip Lever	PA24-100-4	Not Required	1 (LHS)