

SECTION 5

LANDING GEAR AND BRAKES

TABLE OF CONTENTS

	Page		Page
LANDING GEAR	5-1	Nose Wheel Removal and Installation	5-17
General Description	5-1	Disassembly (Cleveland)	5-17
Trouble Shooting	5-2	Inspection and Repair (Cleveland).	5-18
Main Gear	5-2	Reassembly (Cleveland)	5-18
Removal (Flat Gear)	5-3	Disassembly (McCauley Wheel with	
Installation (Flat Gear)	5-3	Thru-bolts)	5-18A
Removal (Tubular Gear)	5-3	Inspection and Repair (McCauley	
Installation (Tubular Gear)	5-3	Wheel with Thru-bolts)	5-18A
Step Bracket Installation	5-3	Reassembly (McCauley Wheel with	
Main Wheel Speed Fairing Removal		Thru-bolts)	5-18A
and Installation	5-6	Disassembly (McCauley Wheel with	
Removal and Installation of Main		Capscrews)	5-18A
Landing Gear Fairing	5-6	Inspection and Repair (McCauley	
Main Wheel Removal	5-8	Wheel with Capscrews)	5-18A
Disassembly (Cleveland)	5-8	Reassembly (McCauley Wheel with	
Inspection and Repair (Cleveland).	5-8	Capscrews)	5-18A
Reassembly (Cleveland)	5-8	Wheel Balancing	5-19
Disassembly (McCauley Wheel).	5-8A	Nose Gear Shock Strut Disassembly.	5-19
Inspection and Repair (McCauley		Nose Gear Shock Strut Reassembly	5-19
Wheel)	5-8A	Torque Links	5-21
Reassembly (McCauley Wheel-		Shimmy Dampener	5-21
Aluminum Flange)	5-8A	Nose Wheel Steering System	5-22
Reassembly (McCauley Wheel-		Steering Rod Assembly	5-22
Steel Flange)	5-8A	Nose Wheel Steering Adjustment	5-22
Main Wheel Installation	5-8B	Brake System	5-23
Main Wheel Axle Removal (Flat Gear).	5-9	General Description	5-23
Main Wheel Axle Installation		Trouble Shooting	5-23
(Flat Gear)	5-11	Brake Master Cylinders	5-24
Main Wheel Axle Removal (Tubular		Removal and Installation	5-24
Gear)	5-11	Repair	5-24
Main Wheel Axle Installation (Tubular		Hydraulic Brake Lines	5-24
Gear)	5-11	Wheel Brake Assemblies	5-24
Main Wheel Alignment (Flat Gear)	5-11	Removal	5-24
Main Wheel Alignment (Tubular		Inspection and Repair	5-24
Gear)	5-11	Reassembly	5-24
Wheel Balancing	5-11	Installation	5-24
Nose Gear	5-11	Checking Brake Lining Wear	5-24
Trouble Shooting	5-14	Brake Lining Installation	5-24
Nose Gear Removal and Installation	5-14	Brake System Bleeding	5-26
Nose Wheel Speed Fairing Removal		Parking Brake System	5-26
and Installation	5-14		

5-1. LANDING GEAR.

5-2. DESCRIPTION. On 1969-1970 Model aircraft, a non-retractable tricycle landing gear equipped with Cessna flat spring-steel main gear struts and an air/oil steerable nose gear shock strut are used. Beginning with 1971 Model aircraft, a non-retractable tricycle landing gear equipped with Cessna tubular spring-steel main gear struts and an air/oil steerable nose gear shock strut are used. A bracket to attach a step to each strut is bonded to the main gear strut with a thermo-setting, high-strength cement. Wheels with disc-type brakes and tube-type tires are install-

ed. The brake disc is attached with the wheel thru-bolts or capscrews and becomes an integral part of the wheel. The nose gear is a combination of a conventional air/oil (oleo) strut and fork, incorporating a shimmy dampener. The nose wheel is steerable with the rudder pedals up to a maximum pedal deflection, after which it becomes free-swiveling up to a maximum travel of 30 degrees right or left of center. Through use of the brakes, the aircraft can be pivoted about the outer wing strut fittings. Speed fairings for the nose and main wheels are available for installation. A heavy-duty nose gear may be installed on some aircraft.

5-3. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
AIRCRAFT LEANS TO ONE SIDE.	Incorrect tire inflation.	Inflate to pressure specified in figure 1-1.
	Landing gear attaching parts not tight.	Tighten loose parts and replace defective parts.
	Landing gear spring excessively sprung.	Remove and install new parts.
	Incorrect shimming at inboard end of spring. (Flat Gear)	Install shims as required. Refer to paragraph 5-6 for limitations.
	Bent axles.	Replace axles.
TIRES WEAR EXCESSIVELY.	Incorrect tire inflation.	Inflate to pressure specified in figure 1-1.
	Main wheels out of alignment. (Flat Gear)	Align in accordance with paragraph 5-22.
	Main wheels out of alignment. (Tubular Gear)	Remove and install new part(s).
	Landing gear spring excessively sprung.	Remove and install new parts.
	Incorrect shimming at inboard end of spring. (Flat Gear)	Install shims as required. Refer to paragraph 5-6 for limitations.
	Bent axles.	Replace axles.
	Dragging brakes.	Refer to paragraph 5-42.
	Wheel bearings too tight.	Adjust properly.
	Wheels out of balance.	Correct in accordance with paragraph 5-23.
	Loose torque links.	Add shims or install new parts as required.
WHEEL BOUNCE EVIDENT EVEN ON SMOOTH SURFACE.	Out of balance condition.	Correct in accordance with paragraph 5-23.

5-4. MAIN GEAR. The main gear used on the 1969-1970 Model year aircraft is the flat-spring-steel strut shown on sheet 1 of figure 5-1. The main gear used beginning with 1971 Models is the tubular spring-steel strut shown on sheet 2 of figure 5-1.

The illustrations should be used in conjunction with the following procedures during removal and installation of component parts. Disassembly, inspection and repair, and reassembly of the various main wheel configurations are described in separate paragraphs for each configuration. The solid wheels having two wheel halves are manufactured by Cleveland Aircraft

Products Co. and webbed wheels having two flanges and a hub are manufactured by McCauley Industrial Corporation. The Cleveland wheels are shown in figure 5-3. The McCauley wheels have either aluminum flanges or steel flanges as shown in figure 5-3A. The aluminum flanges are attached to the wheel hub by thru-bolts and nuts as shown in figure 5-3A and the steel flanges are attached to the wheel hub by cap-screws as shown in figure 5-3A. During assembly of the main wheels the thru-bolt nuts or capscrews, as applicable, shall be tightened evenly and torqued to the value specified in figure 5-2A.

5-5. REMOVAL. (FLAT.) (See sheet 1 of figure 5-1.) The following procedural steps remove the landing gear as a complete assembly. Refer to applicable paragraphs for removal of the individual components.

- a. Remove floorboard access covers over spring-strut being removed.
- b. Hoist or jack aircraft in accordance with Section 2.
- c. Remove screws and slide external fairing plate and seal down around spring strut.
- d. Drain hydraulic brake fluid from brake line on spring-strut being removed.
- e. Disconnect hydraulic brake line at bulkhead fitting inboard end of spring-strut so that brake line is removed with the spring-strut. Cap or plug disconnected fitting to prevent entry of foreign material.
- f. Remove nuts and washers from U-bolt at outboard attaching structure and remove U-bolt.
- g. Remove bolt attaching the inboard end of the spring-strut and pull entire gear out of fuselage. Note shims placed under inboard end of the spring-strut and mark or tape shims together to be sure they are installed correctly at installation of the spring-strut.

5-6. INSTALLATION. (FLAT.) (See sheet 1 of figure 5-1.) The following procedural steps install the landing gear as a complete assembly. Refer to applicable paragraphs for installation of the individual components.

- a. Slide external fairing plate and seal over upper end of landing gear spring-strut.
- b. Slide the spring-strut into place and work shims into position under inboard end of spring-strut. Install bolt, washer, and nut to secure inboard end of spring-strut.

NOTE

Shims are installed under inboard end of the spring-strut as required to level the wings within a total tolerance of three inches. Maximum number of shims permissible is two.

- c. Install U-bolt at outboard attaching structure with washers and nuts. Tighten nuts evenly to 270-300 lb-in. Also torque inboard attach bolt to specified torque of 1100-1300 lb-in.
- d. Attach seal and external fairing with screws.
- e. Lower aircraft and remove jacks or hoist.
- f. Connect brake line; fill and bleed brake system as outlined in paragraph 5-54.
- g. Install floorboard access covers.

5-7. REMOVAL. (TUBULAR.) (See sheet 2 of figure 5-1.) The following procedural steps remove the landing gear as a complete assembly. Refer to ap-

plicable paragraphs for removal of the individual components.

- a. Remove floorboard access covers over spring-strut being removed.
- b. Hoist or jack aircraft in accordance with Section 2.
- c. Remove screws attaching fairing to fuselage and remove screw at splice in fairing and remove fairing.
- d. Drain hydraulic brake fluid from brake line on spring-strut being removed.
- e. Disconnect hydraulic brake line in fuselage so that brake line is removed with the spring-strut. Cap or plug disconnected fittings to prevent entry of foreign material.
- f. Remove nut, washer, and bolt attaching inboard end of spring-strut to the inboard landing gear bulkhead fitting.
- g. Pull landing gear from fitting and bushing. Use care when removing landing gear to prevent damage to the hydraulic brake line. The landing gear is a compression fit in the bushing in the outboard landing gear bulkhead.

5-8. INSTALLATION. (TUBULAR.) (See sheet 2 of figure 5-1.) The following procedural steps install the landing gear as a complete assembly. Refer to applicable paragraphs for installing the individual components.

- a. Re-install all parts removed from spring-strut.
- b. Apply Dow Corning Compound DC7 to approximately 11 inches on upper end of spring-strut.
- c. Work spring-strut into place through bushing in outboard spring-strut fitting and into spring-strut inboard fitting.
- d. Align spring-strut in inboard fitting and install bolt through fitting and spring-strut. Install washer and nut on bolt and tighten to torque value of 1100-1300 lb-in.
- e. Connect hydraulic brake line to fitting. Fill and bleed brake system in accordance with paragraph 5-54.
- f. Install fairing.
- g. Lower aircraft and install floorboard access covers.

5-9. STEP BRACKET INSTALLATION.

NOTE

The step bracket is secured to the landing gear spring-strut with EA9309, or a similar epoxy base adhesive.

- a. Remove landing gear strut fairing, if installed.
- b. Mark position of the step bracket so that the new step bracket will be installed in approximately the same position on the strut.

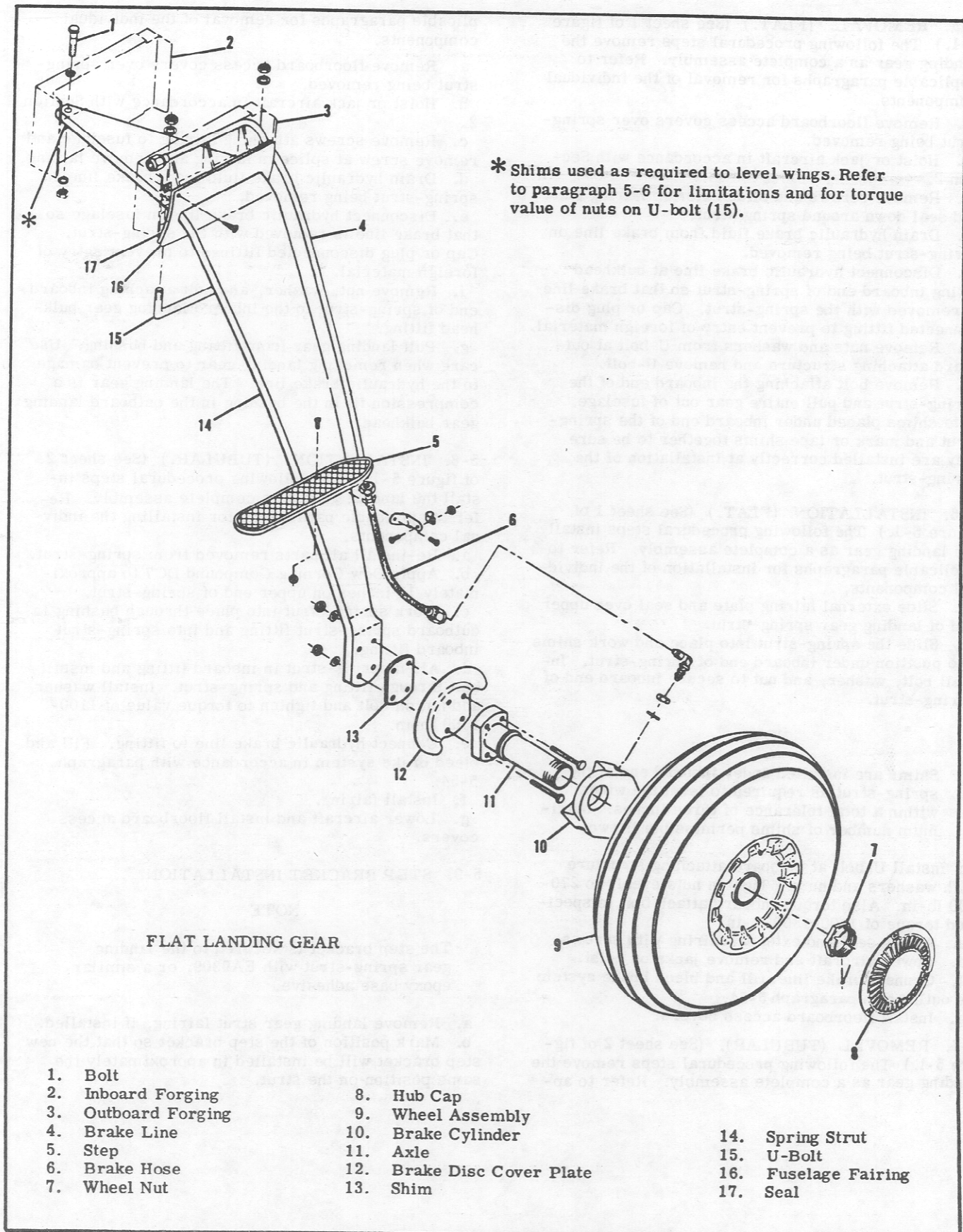
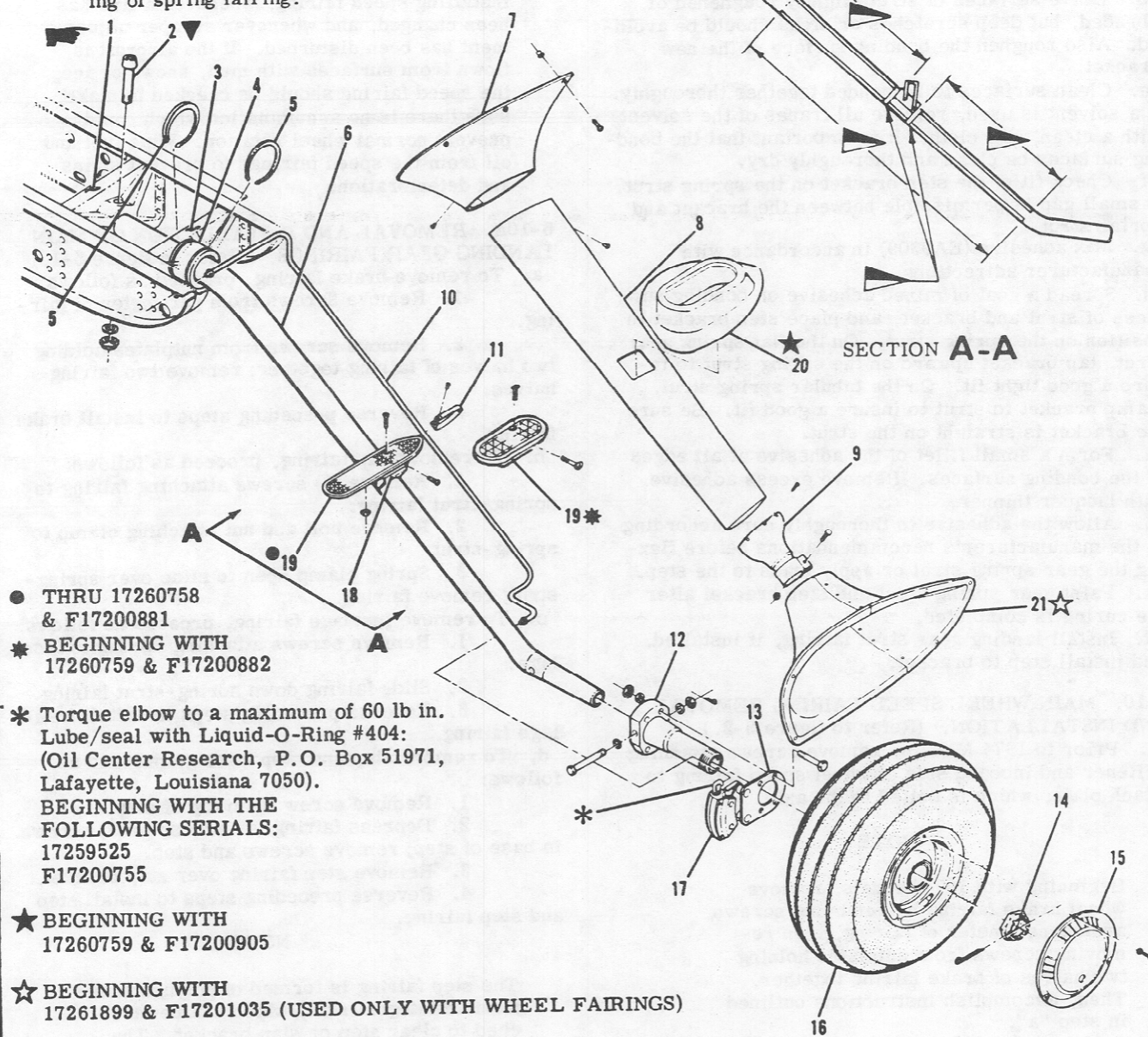


Figure 5-1. Main Gear Installation (Sheet 1 of 2)

Apply Y-8560 (3M Corporation) polyurethane tape (1" wide) to upper and lower surface of spring and above and below step bracket to prevent chafing of spring fairing.



SECTION A-A

- THRU 17260758 & F17200881
- ★ BEGINNING WITH 17260759 & F17200882

* Torque elbow to a maximum of 60 lb in. Lube/seal with Liquid-O-Ring #404: (Oil Center Research, P.O. Box 51971, Lafayette, Louisiana 7050). BEGINNING WITH THE FOLLOWING SERIALS: 17259525 F17200755

- ★ BEGINNING WITH 17260759 & F17200905

- ★ BEGINNING WITH 17261899 & F17201035 (USED ONLY WITH WHEEL FAIRINGS)

- ▼ Torque bolt (2) to 1100-1300 lb-in.

TUBULAR LANDING GEAR

- | | | |
|--------------------------|-------------------------|--------------------------|
| 1. Inboard Forging | 8. Spring-Strut Fairing | 15. Hub Cap |
| 2. Bolt | 9. Cap Fairing | 16. Wheel Assembly |
| 3. Outboard Forging | 10. Brake Line | 17. Wheel Brake Assembly |
| 4. Bushing | 11. Clamp | 18. Step Bracket |
| 5. Bushing Retainer Ring | 12. Axle | 19. Step |
| 6. Spring-Strut | 13. Brake Torque Plate | 20. Step Fairing |
| 7. Fuselage Fairing | 14. Nut | 21. Brake Fairing |

Figure 5-1. Main Gear Installation (Sheet 2 of 2)

c. Remove all traces of the original bracket and adhesive as well as any rust, paint, or scale with a wire brush and coarse sandpaper.

d. Leave surfaces of strut slightly roughened or abraded, but deep scratches or nicks should be avoided. Also roughen the bonding surface of the new bracket.

e. Clean surfaces to be bonded together thoroughly. If a solvent is used, remove all traces of the solvent with a clean, dry cloth. It is important that the bonding surfaces be clean and thoroughly dry.

f. Check fit of the step bracket on the spring strut. A small gap is permissible between the bracket and spring strut.

g. Mix adhesive (EA9309) in accordance with manufacturer's directions.

h. Spread a coat of mixed adhesive on bonding surfaces of strut and bracket, and place step bracket in position on the spring strut. On the flat spring gear strut, tap bracket upward on the spring strut to insure a good tight fit. On the tubular spring strut, clamp bracket to strut to insure a good fit. Be sure the bracket is straight on the strut.

i. Form a small fillet of the adhesive at all edges of the bonding surfaces. Remove excess adhesive with lacquer thinner.

j. Allow the adhesive to thoroughly cure according to the manufacturer's recommendations before flexing the gear spring strut or apply loads to the step.

k. Paint gear spring strut and step bracket after the curing is completed.

l. Install landing gear strut fairing, if installed, and install step to bracket.

5-10. MAIN WHEEL SPEED FAIRING REMOVAL AND INSTALLATION. (Refer to figure 5-2.)

a. Prior to 1974 Models, remove screws attaching stiffener and inboard side of wheel speed fairing to attach plate, which is bolted to the axle.

NOTE

Beginning with 1974 Models, remove wheel brake fairing by removing screws around perimeter of fairing, then removing screws from nutplates holding two halves of brake fairing together. Then, accomplish instructions outlined in step "a".

b. Remove bolt securing outboard side of fairing to axle nut.

c. Loosen scraper, if necessary, and work speed fairing from the wheel.

d. Reverse preceding steps to install wheel speed fairing.

e. After installation, check scraper-to-tire clearance for a minimum of 0.25-inch to a maximum of 0.38-inch. Elongated holes are provided in the scraper for clearance adjustment.

NOTE

Refer to Cessna Service Kit SK182-12 for repair of wheel speed fairings used on 1969 - 1970 Model aircraft.

CAUTION

Always check scraper-to-tire clearance after installing speed fairing, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from the speed fairings to prevent stains and deterioration.

5-10A. REMOVAL AND INSTALLATION OF MAIN LANDING GEAR FAIRINGS. (Refer to figure 5-1.)

a. To remove brake fairing, proceed as follows:

1. Remove screws from perimeter of fairing.

2. Remove screws from nutplates holding two halves of fairing together; remove two fairing halves.

3. Reverse preceding steps to install brake fairing.

b. To remove cap fairing, proceed as follows:

1. Remove (3) screws attaching fairing to spring-strut fairing.

2. Remove bolt and nut attaching clamp to spring-strut.

3. Spring clamp open to slide over spring-strut; remove fairing.

c. To remove fuselage fairing, proceed as follows:

1. Remove screws attaching fairing to fuselage.

2. Slide fairing down spring-strut fairing.

3. Reverse preceding steps to install fuselage fairing.

d. To remove step and step fairing, proceed as follows:

1. Remove screw from top of step.

2. Depress fairing for access to (2) screws in base of step; remove screws and step.

3. Remove step fairing over step bracket.

4. Reverse preceding steps to install step and step fairing.

NOTE

The step fairing is formed of polyurethane flexible integral skin, which can be stretched to clear step or step bracket. The material will return to its formed shape.

e. To remove spring-strut fairing, proceed as follows:

1. Remove brake fairing as outlined in step "a".

2. Remove cap fairing as outlined in step "b".

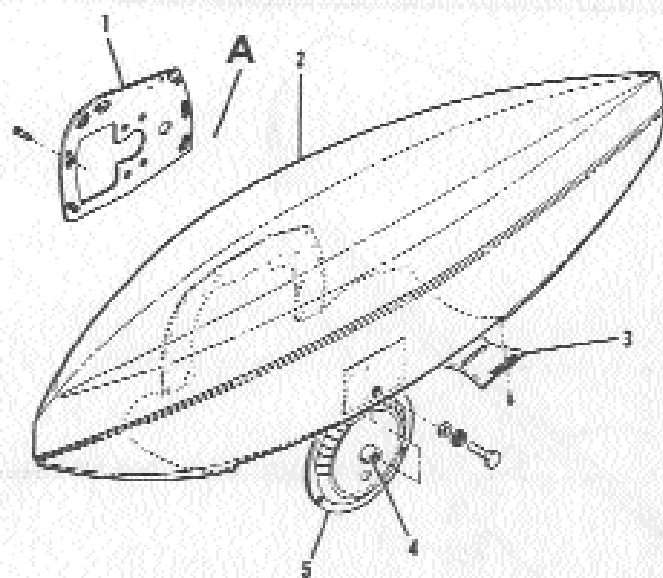
3. Remove fuselage fairing as outlined in step "c".

4. Remove step and step fairing as outlined in step "d".

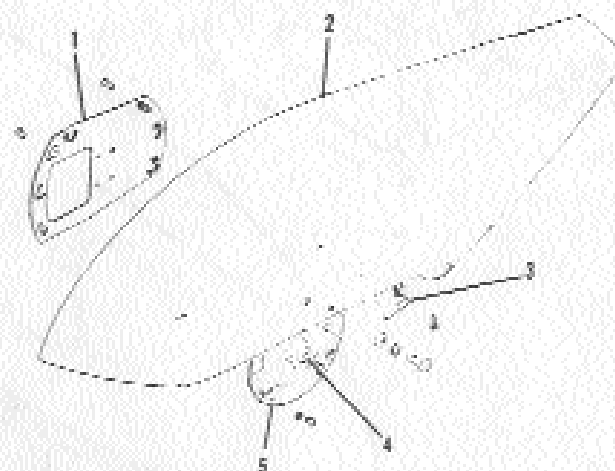
5. Remove screws from "U"-type sheet spring nuts (thru 17260308 and F172-0079); nutplates (beginning with 17260309 and F172-0080).

6. Spring fairing over tubular spring-strut.

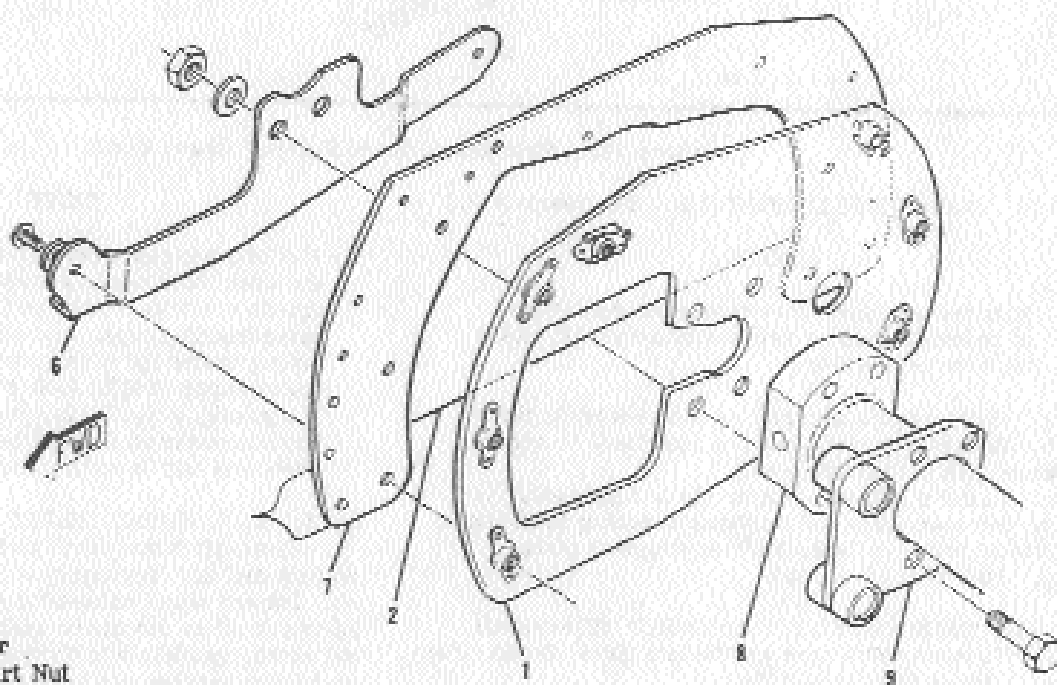
7. Reverse preceding steps to install strut fairing.



1971 THRU 1973 MODELS



PRIOR TO 1971 MODELS



Detail **A**

1. Fairing Plate
2. Speed Fairing
3. Wheel Scraper
4. Fairing Support Nut
5. Hub Cap
6. Stiffener
7. Fairing Doubler
8. Axle
9. Brake Torque Plate

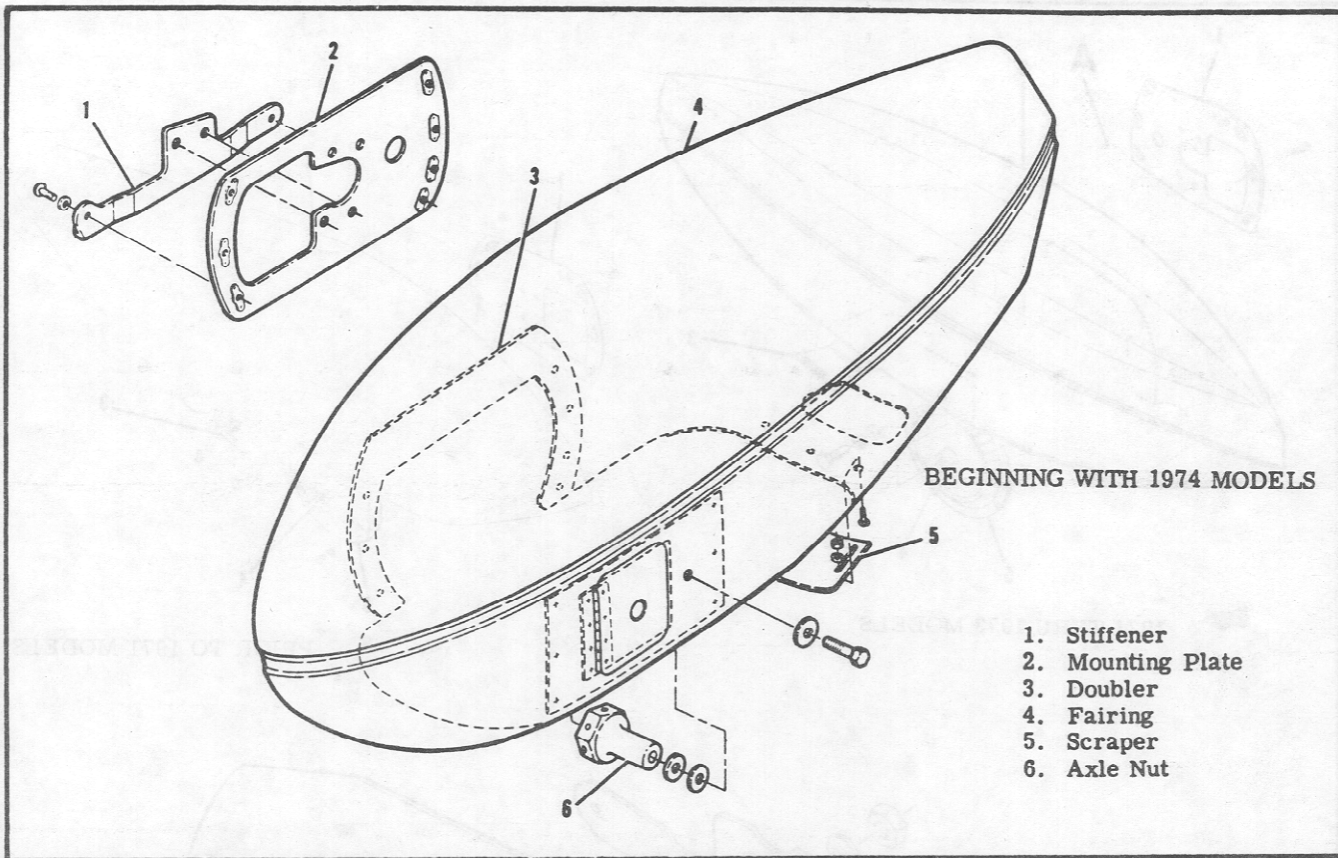


Figure 5-2. Main Wheel Speed Fairing (Sheet 2 of 2)

5-11. MAIN WHEEL REMOVAL. (See figure 5-1.)

NOTE

It is not necessary to remove the main wheel to reline brakes or remove brake parts, other than the brake disc.

- Hoist or jack aircraft as outlined in Section 2.
- Remove speed fairing, if installed, in accordance with paragraph 5-10.
- Remove hub cap, cotter pin and axle nut.
- Remove bolts and washers attaching brake back plate to brake cylinder and remove back plate.
- Pull wheel from axle.

5-12. MAIN WHEEL DISASSEMBLY. (Cleveland).

- Remove valve core and deflate tire. Break tire beads loose from wheel rims.

WARNING

Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge, or nick in the wheel may cause wheel failure.

- Remove thru-bolts and separate wheel halves, removing tire, tube, and brake disc.
- Remove the grease seal rings, felts, and bearing cones from the wheel halves.

NOTE

The bearing cups (races) are a press fit in the wheel halves and should not be removed unless a new part is to be installed. To remove bearing cups, heat wheel halves in boiling water for 30 minutes or in an oven not to exceed 149°C (300°F). Using an arbor press, if available, press out bearing cup and press in the new bearing cup while the wheel half is still hot.

5-13. MAIN WHEEL INSPECTION AND REPAIR.

- Clean all metal parts and grease seal felts in solvent and dry thoroughly.
- Inspect wheel halves for cracks. Cracked wheel halves shall be discarded and new parts used. Sand out nicks, gouges, and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.
- Inspect brake disc. If excessively warped or scored, or worn to a thickness of 0.190-inch, the brake disc should be replaced with a new part. Sand smooth small nicks and scratches.
- Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease (figure 2-5) before installing in wheel half.

5-14. MAIN WHEEL REASSEMBLY. (Cleveland).

- Insert thru-bolts through brake disc and position

disc in the inner wheel half, using thru-bolts to guide the disc. Ascertain that the disc is bottomed in the wheel half.

b. Position tire and tube on outboard wheel half with the tube inflation valve through hole in wheel half.

c. Place the inner wheel half in position on outboard wheel half. Apply a light force to bring wheel halves together. While maintaining the light force assemble a washer and nut on thru-bolt and tighten to maintain force. Assemble the remaining washers and nuts to the thru-bolts. Tighten nuts evenly to the torque value stipulated in the chart in figure 5-2A.

CAUTION

Uneven or improper torque of thru-bolt nuts can cause failure of bolts, with resultant wheel failure.

d. Clean and pack bearing cones with clean aircraft wheel bearing grease (figure 2-5).

e. Assemble bearing cones, grease seal felts, and rings into wheel halves.

f. Inflate tire to seat tire beads, then adjust to correct tire pressure. See figure 1-1.

5-14A. MAIN WHEEL DISASSEMBLY (McCauley Wheel).

a. Remove valve core and deflate tire and tube. Break tire beads loose from wheel flanges.

WARNING

Injury can result from attempting to remove wheel flanges with the tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flange could cause wheel failure.

b. Remove thru-bolt nuts and washers or capscrews from outboard wheel flange.

c. Remove thru-bolts and washers or capscrews from inboard wheel flange.

d. Remove brake disc.

e. Separate wheel flanges from wheel hub. Retain spacers on each side of wheel hub.

f. Remove wheel hub from tire.

g. Remove retainer rings and remove grease seal retainers, grease seal felts, and bearing cones.

NOTE

The bearing cups (races) are a press fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out the bearing cup and press in the new bearing cup while the wheel hub is still hot.

5-14B. MAIN WHEEL INSPECTION AND REPAIR. (McCauley Wheel).

a. Clean all metal parts, grease seal felts and mylar spacers in cleaning solvent and dry thoroughly.

b. Inspect wheel flanges, and wheel hub for cracks. Cracked wheel flanges or hub shall be discarded and new parts installed. Sand out smooth nicks, gouges, and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.

c. If excessively warped or scored, or worn to a thickness of 0.190-inch, brake disc should be replaced with a new part. Sand smooth small nicks and scratches.

d. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease (Section 2) before installing in wheel hub.

5-14C. MAIN WHEEL REASSEMBLY. (McCauley Wheel - Aluminum Flange).

a. Place wheel hub in tire and tube with tube inflation stem in cutout of wheel hub.

b. Place spacer and wheel flange on inboard side of wheel hub (opposite of tube inflation stem), then with washer under head of thru-bolt, insert bolt thru brake disc, wheel flange, and wheel hub.

c. Place spacer and wheel flange on outboard side of wheel hub with valve inflation stem through cutout in wheel flange.

d. Install washers and nuts on thru-bolts.

CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of thru-bolt nuts can cause failure of bolts, with resultant wheel failure.

e. Tighten thru-bolt nuts evenly and torque to the value stipulated in figure 5-2A.

f. Clean and pack bearing cones with clean aircraft wheel bearing grease. (Refer to Section 2.)

g. Assemble bearing cones, grease seal felts, and retainers into wheel hub.

h. Inflate tire to seat tire beads, then adjust to correct tire pressure. See figure 1-1 for correct tire pressure.

5-14D. MAIN WHEEL REASSEMBLY (McCauley Wheel - Steel Flange).

a. Place wheel hub in tire and tube with tube inflation stem in cutout of wheel hub.

b. Place spacer and wheel flange on inboard side of wheel hub (opposite of tube inflation stem).

c. Place washer under head of each cap screw, insert cap screw thru brake disc, wheel flange, and spacer and start cap screws into wheel hub threads.

LANDING GEAR WHEEL THRU-BOLT NUT AND CAPSCREW TORQUE VALUES						
MAIN GEAR	NOSE GEAR	WHEEL NUMBER	SIZE	MANUFACTURER	NUT/CAPSCREW TORQUE	WHEEL HALF/FLANGE
X		C163001-0103	6.00 X 6	CLEVELAND	150 lb-in	MAGNESIUM
X		C163001-0104	6.00 X 6	CLEVELAND	90 lb-in	ALUMINUM
X		C163002-0101	6.00 X 6	MC CAULEY	90-100 lb-in	ALUMINUM
X		C163003-0101	6.00 X 6	MC CAULEY	*190-200 lb-in	STEEL
	X	C163002-0201	5.00 X 5	MC CAULEY	90-100 lb-in	ALUMINUM
	X	1241156-12	5.00 X 5	CLEVELAND	90 lb-in	MAGNESIUM
	X	C163003-0201	5.00 X 5	MC CAULEY	90-100 lb-in	STEEL
	X	C163003-0401	5.00 X 5	MC CAULEY	*190-200 lb-in	STEEL

*Capscrew

Figure 5-2A. Main and Nose Wheel Thru-Bolt Nut and Capscrew Torque Values

CAUTION

Be sure that spacers, wheel flanges and brake disc are seated on flange of wheel hub. Uneven or improper torque of capscrews can cause failure of capscrews or hub threads with resultant wheel failure.

d. Tighten capscrews evenly and torque to the value specified in figure 5-2A.

e. Place spacer and wheel flange on outboard side of wheel hub and align valve stem cutout in wheel flange.

f. Place washer under head of each capscrew, insert capscrew thru wheel flange and spacer and start capscrews into wheel hub threads.

CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of capscrews can cause failure of the capscrews, or hub threads with resultant wheel failure.

g. Tighten capscrews evenly and torque to values specified in figure 5-2A.

h. Clean and pack bearing cones with clean aircraft wheel bearing grease. (Refer to Section 2 for grease type.)

i. Assemble bearing cones, grease seal felts and retainer into wheel hub.

j. Inflate tire to seat tire beads, then adjust to correct tire pressure. Refer to figure 1-1 for correct tire pressure.

5-15. MAIN WHEEL INSTALLATION.

a. Place wheel assembly on axle.

b. Install axle nut and tighten axle nut until a slight bearing drag is obvious when the wheel is rotated. Back off nut to nearest castellation and install cotter pin.

c. Place brake back plate in position and secure with bolts and washers.

d. Install hub cap. Install speed fairing (if used) as outlined in paragraph 5-10.

CAUTION

Always check scraper-to-tire clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Refer to paragraph 5-10 for correct scraper-to-tire clearance.

CLEVELAND WHEEL AND BRAKE

NOTE

Tighten thru-bolt nuts evenly to the torque value specified in figure 5-2A.

- | | | |
|---------------------|---------------------|--------------------|
| 1. Snap Ring | 8. Tube | 15. Brake Cylinder |
| 2. Grease Seal Ring | 9. Inner Wheel Half | 16. Brake Bleeder |
| 3. Grease Seal Felt | 10. Bearing Cup | 17. O-Ring |
| 4. Grease Seal Ring | 11. Brake Disc | 18. Piston |
| 5. Bearing Cone | 12. Torque Plate | 19. Thru-Bolt |
| 6. Outer Wheel Half | 13. Pressure Plate | 20. Brake Lining |
| 7. Tire | 14. Anchor Bolt | 21. Back Plate |

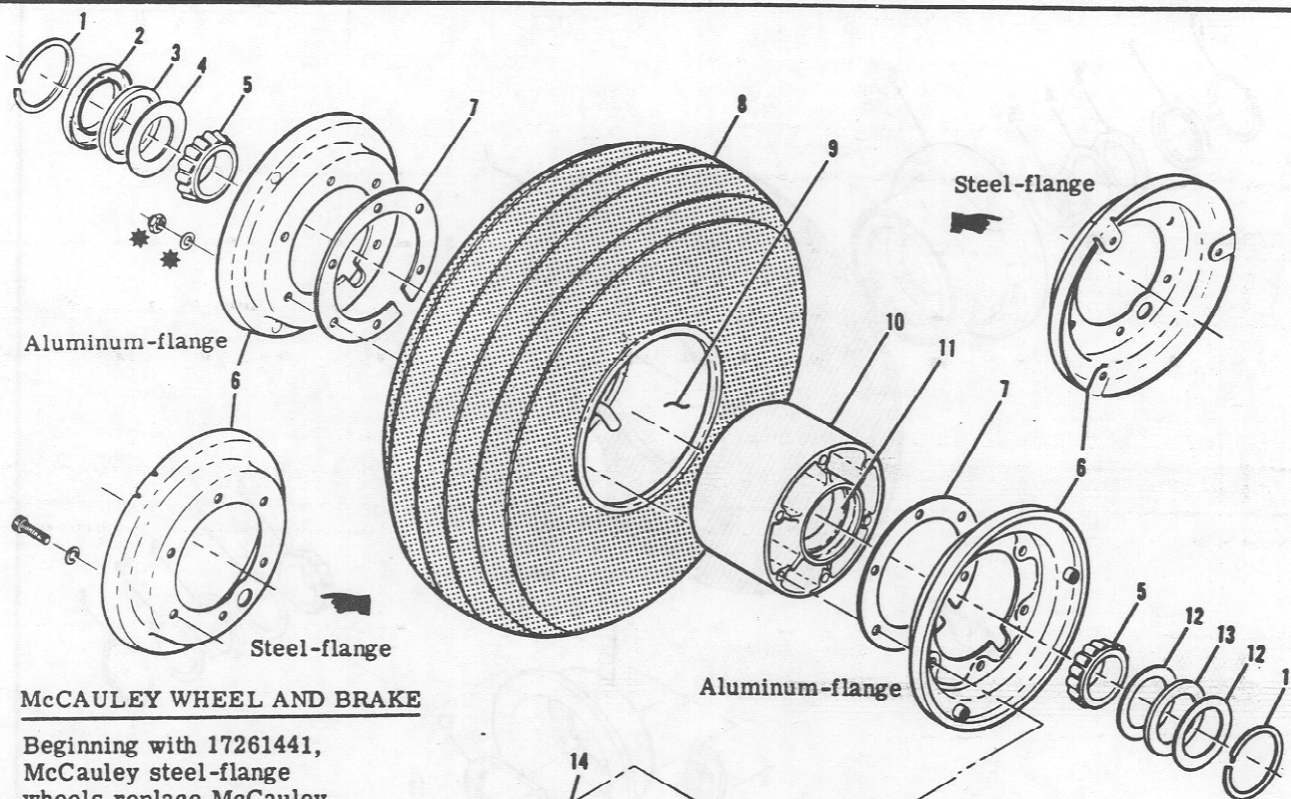
Figure 5-3. Main Wheel and Brake Assembly (Cleveland)

5-16. MAIN WHEEL AXLE REMOVAL. (FLAT GEAR.)

- Remove speed fairing, if installed, in accordance with paragraph 5-10.
- Remove wheel in accordance with paragraph 5-11.

c. Disconnect, drain, and plug or cap the hydraulic brake line at the wheel brake cylinder.

d. Remove four nuts, washers, and bolts securing axle, brake components, and speed fairing mounting plate (if used) to spring-strut.



McCAULEY WHEEL AND BRAKE

Beginning with 17261441, McCauley steel-flange wheels replace McCauley aluminum-flange wheels.

Aluminum-flange

Steel-flange

Steel-flange

NOTE

Tighten thru-bolt nuts or capscrews evenly to the torque value specified in figure 5-2A.

* THRU 17261440 AND F17201044
* BEGINNING WITH 17261441 AND F17201045

1. Snap Ring
2. Grease Seal Retainer (Outboard)
3. Grease Seal Felt (Outboard)
4. Grease Seal Retainer (Outboard)
5. Bearing Cone
6. Wheel Flange
7. Spacer
8. Tire
9. Tube
10. Wheel Hub
11. Bearing Cup (Race)
12. Grease Seal Retainer (Inboard)
13. Grease Seal Felt (Inboard)
14. Brake Disc
15. Torque Plate
16. Pressure Plate

17. Anchor Bolt
18. Brake Cylinder
19. Bleeder Valve
20. O-Ring (Piston)
21. Brake Piston
22. Brake Lining
23. Thru-Bolt
24. Back Plate
25. Screw

Figure 5-3A. Main Wheel and Brake Assembly (McCauley)



SERVICE MANUAL CHANGE NOTICE

REFERENCE MANUAL NUMBER: D972-13 & D849-13

SMCN #77-1

DATE: Jan. 14, 1

MANUAL TITLE: Skyhawk 1969 thru 1976 & Reims Rocket 1968 thru 1976

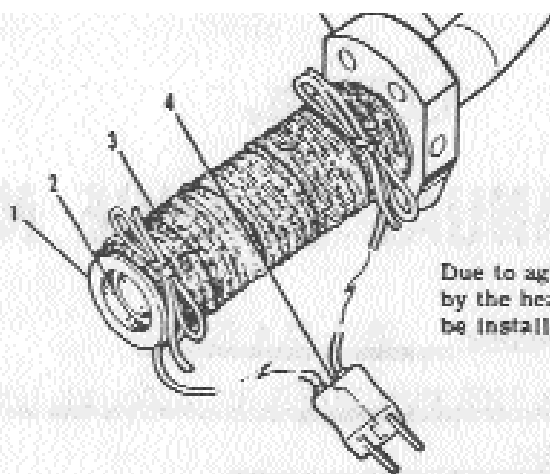
TO: ALL ZONES AND DEALERS

FROM: CUSTOMER SERVICES DEPARTMENT

CORRECT YOUR SERVICE MANUAL AS SHOWN BELOW.

SECTION NUMBER	PAGE NUMBER	PARAGRAPH NUMBER	DESCRIPTION OF CHANGES
i	5-11	5-18 & 5-19	(Manual D972-13 Skyhawk 1969 thru 1976)
i	5-12 & 5-13	5-18 & 5-19	(Manual D849-13 Reims Rocket 1968 thru 1976)
			Some main gear axles on the above aircraft were bonded on at the factory. The attached procedure describes field removal and installation of the bonded on axles, and is to be retained as permanent information for use in conjunction with the above listed sections of these manuals.

Do not place tape in direct contact with tubular gear spring.



WARNING

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

1. Axle
2. Tubular Gear Strut
3. Electrical Heating Tape
4. Plug

Main Wheel Axle Removal

MAIN WHEEL AXLE REMOVAL.

- a. Remove speed fairings, if installed, according to procedures outlined in applicable paragraph.
- b. Remove wheels in accordance with procedures outlined in applicable paragraph of this section.
- c. Disconnect, drain and cap or plug hydraulic brake line at the wheel brake cylinder.
- d. Remove cotter pin, nut and bolt attaching axle to spring strut.
- e. Remove brake components and speed fairing plate from axle.

NOTE

Axles are bonded to the struts of tubular gear aircraft with EA9309-25GR adhesive, which is available from the Cessna Service Parts Center. The bond is too strong to allow the axle to be removed without first weakening the bond strength. The only methods of weakening the bond are with heat or cryogenic cold; heat being the most practical. A temperature of approximately 500°F is sufficient to weaken the bond so the axle can be removed. This is still a low enough temperature to prevent damage to the tubular strut.

- f. Remove axles as follows:

NOTE

Axles should be removed from strut, using electric heating tape, available from most scientific supply companies. One type can be obtained from Curtin Scientific Co., 6550 East 42nd St., P.O. Box 747, Tulsa, Oklahoma 74101. Tape should conform to the following: 192 watts, 24" long, 1" wide, flexible and heavily insulated.

- g. Wrap heating tape around axle from base head to outer end of axle and tie it on with string provided with the tape, as shown in the figure.

CAUTION

Do not place tape in direct contact with tubular gear spring.

- h. Plug electric tape into 110 volt wall socket and heat for 20 to 30 minutes.
- i. Unplug tape and remove from axle. Remove

axle by striking axle base head with a few sharp blows.

- j. Clean any old adhesive off landing gear spring with a wire brush. Brush strokes should run lengthwise along the spring. After old adhesive has been removed, wipe with clean rag saturated with acetone or alcohol. Immediately wipe dry with a clean, lint free cloth.

WARNING

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

MAIN WHEEL AXLE INSTALLATION.

- a. Prior to installing new axle, wipe outer surface of tubular gear and inside of axle with solvent, drying immediately with a clean, lint free cloth.
- b. Mix EA9309-25GR adhesive, available from the Cessna Service Parts Center, in accordance with instructions in the package. Spread adhesive thinly and evenly on outer surface of landing gear spring in area that will be covered by axle.
- c. Place axle on gear spring and rotate axle to assure even coverage between inner surface of axle and outer surface of spring.
- d. Install retaining bolt, washers, nut and cotter pin. Tighten nut securely.
- e. Allow 24 hours at 75°F for Adhesive to cure, or 30 minutes at 250°F, if heating equipment is available.
- f. Install brake components and speed fairing mounting plate to axle.
- g. Install wheel on axle in accordance with procedures outlined in applicable paragraph of this section.
- h. Connect hydraulic brake line to wheel brake cylinder.
 - i. Fill and bleed hydraulic brake system in accordance with applicable paragraph in this section.
 - j. Install speed fairings, if used, in accordance with applicable paragraph in this section.

NOTE

When removing axle from spring-strut, note number and position of the wheel alignment shims between axle and spring-strut. Mark these shims or tape them together carefully so that they can be installed in exactly the same position to ensure wheel alignment is not disturbed.

5-17. MAIN WHEEL AXLE INSTALLATION. (FLAT GEAR.)

- a. Secure axle and brake components to spring-strut, making sure that wheel alignment shims and speed fairing mounting plate (if used) are installed in their original position.
- b. Install wheel assembly on axle in accordance with paragraph 5-15.
- c. Connect hydraulic brake line to wheel brake cylinder.
- d. Fill and bleed affected brake system in accordance with paragraph 5-54.
- e. Install speed fairing (if used) in accordance with paragraph 5-10.

5-18. MAIN WHEEL AXLE REMOVAL. (TUBULAR.)

- a. Remove speed fairing, if installed, in accordance with paragraph 5-10.
- b. Remove wheel in accordance with paragraph 5-11.
- c. Disconnect, drain, and cap or plug hydraulic brake line at the wheel brake cylinder.
- d. Remove four bolts attaching brake torque plate and speed fairing mounting plate to axle.
- e. Remove cotter pin, nut, washer, and bolt attaching axle to tubular strut.
- f. Remove axle from spring-strut.

5-19. MAIN WHEEL AXLE INSTALLATION. (TUBULAR.)

- a. Install axle on spring strut, using wet primer on faying surfaces of axle and spring-strut. Axle is installed with tapered edges to bottom.
- b. Install bolt, washer, and nut attaching axle to spring-strut. After tightening nut, install cotter pin.
- c. Install brake components and speed fairing mounting plate to axle.
- d. Install wheel on axle in accordance with paragraph 5-15.
- e. Connect hydraulic brake line to wheel brake cylinder.
- f. Fill and bleed hydraulic brake system in accordance with paragraph 5-54.
- g. Install speed fairing, if used, in accordance with paragraph 5-10.

5-20. Deleted.

5-21. Deleted.

5-22. MAIN WHEEL ALIGNMENT (FLAT GEAR).

Correct main wheel alignment, for the flat gear, is obtained through the use of tapered shims between the flange of the axle and spring-strut. See figure 5-4 for procedure to use when main wheel alignment is required. Wheel shims and the correction imposed on the wheel by the various shims and their location are listed in the illustration.

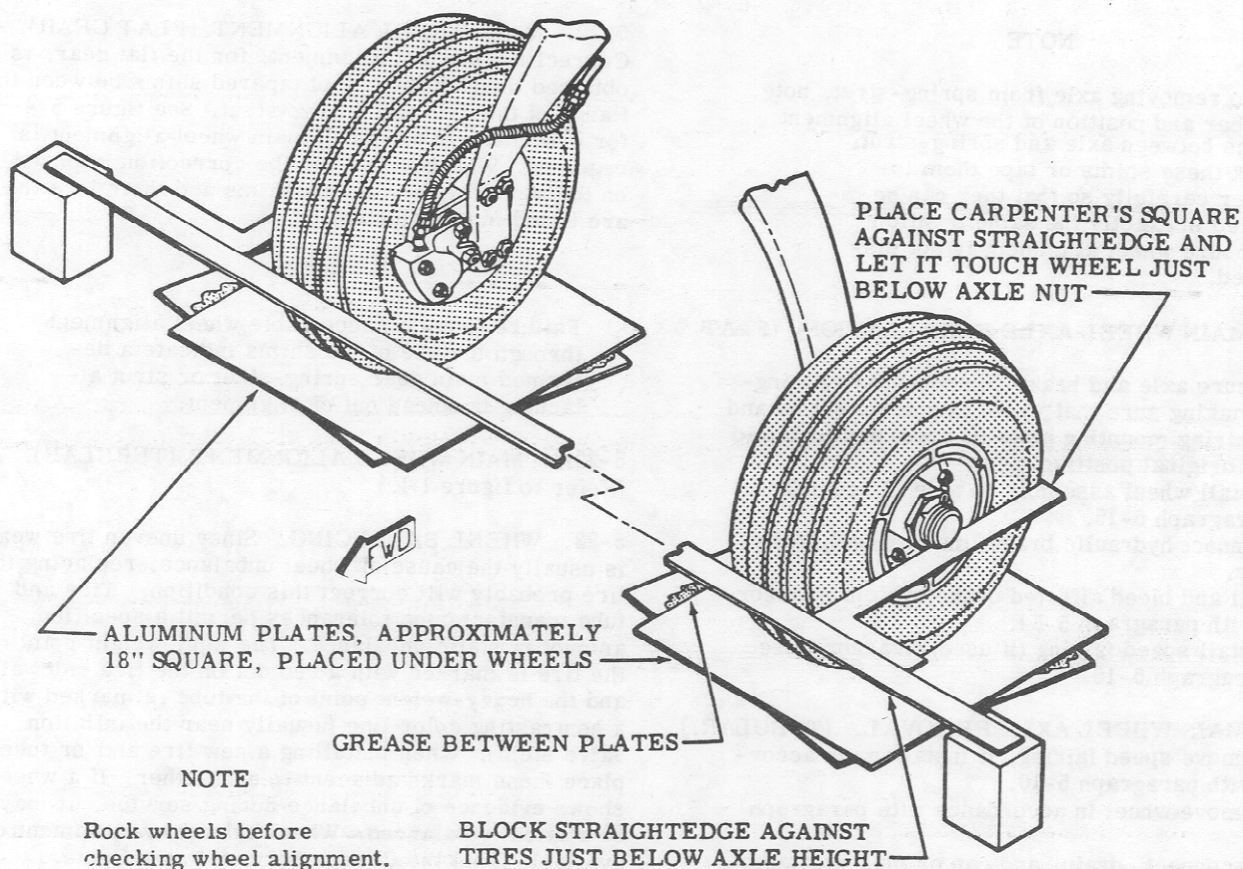
NOTE

Failure to obtain acceptable wheel alignment through the use of the shims indicate a deformed main gear spring-strut or strut attaching bulkhead out of alignment.

5-22A. MAIN WHEEL ALIGNMENT (TUBULAR). (Refer to figure 1-1.)

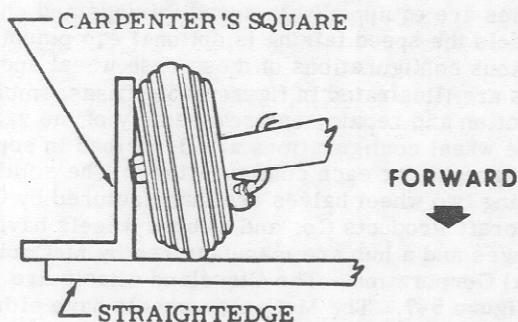
5-23. WHEEL BALANCING. Since uneven tire wear is usually the cause of wheel unbalance, replacing the tire probably will correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The light-weight point of the tire is marked with a red dot on the tire sidewall and the heavy-weight point of the tube is marked with a contrasting color line (usually near the inflation valve stem). When installing a new tire and/or tube, place these marks adjacent to each other. If a wheel shows evidence of unbalance during service, it may be statically balanced. Wheel balancing equipment is available from the Cessna Service Parts Center.

5-24. NOSE GEAR. The steerable nose wheel mounted on an air-oil shock strut comprises the nose gear. The shock strut is secured to forgings riveted and/or bolted to the firewall and lower fuselage structure. Nose wheel steering is afforded by two spring-loaded push-pull rods from the rudder pedal bars. A hydraulic fluid-filled shimmy dampener is provided to minimize nose wheel shimmy. Some models of the 172 Series are equipped with speed fairings and on some models the speed fairing is optional equipment. The various configurations of these nose wheel speed fairings are illustrated in figure 5-5. Disassembly, inspection and repair, and reassembly of the various nose wheel configurations are described in separate paragraphs for each configuration. The solid wheels having two wheel halves are manufactured by Cleveland Aircraft Products Co. and webbed wheels having two flanges and a hub are manufactured by McCauley Industrial Corporation. The Cleveland wheels are shown in figure 5-7. The McCauley wheels have either aluminum flanges or steel flanges as shown in figure 5-8. The aluminum flanges are attached to the wheel hub by thru-bolts and nuts as shown in figure 5-8. The steel flanges are attached to the wheel hub by either thru-bolts or capscrews as shown in figure 5-8. During assembly of the nose wheel, the thru-bolt nuts or capscrews, as applicable, shall be tightened evenly and torqued to the value specified in figure 5-2A.



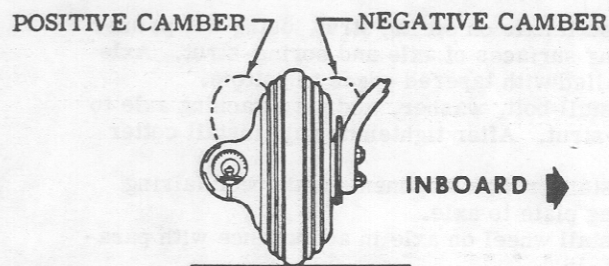
TOP VIEW OF TOE-IN CHECK

Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for one wheel. (half of total toe-in.)



FRONT VIEW OF CAMBER CHECK

Measure camber by reading protractor level held vertically against outboard flanges of wheel.



NOTE

Setting toe-in and camber within these tolerances while the cabin and fuel tanks are empty will give approximately zero toe-in and zero camber at gross weight. Therefore, if normal operation is at less than gross weight and abnormal tire wear occurs, realign the wheels to attain the ideal setting for the load conditions. Refer to sheet 2 of this figure for shims availability and their usage. Always use the least number of shims possible to obtain the desired result.

Figure 5-4. Main Wheel Alignment (Sheet 1 of 2)

5-25. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NOSE WHEEL SHIMMY.	Nose strut loose in attaching clamps.	Tighten nose strut attaching bolts.
	Shimmy dampener lacks fluid.	Refer to paragraph 2-24.
	Defective shimmy dampener.	Repair or replace defective shimmy dampener.
	Loose or worn nose wheel steering linkage.	Tighten or replace defective linkage.
	Nose wheel out of balance.	Correct in accordance with paragraph 5-32.
	Loose or defective nose wheel bearings.	Tighten wheel bearings properly; replace, if defective.
	Loose torque links.	Add washers or replace as necessary.
NOSE STRUT WILL NOT HOLD AIR PRESSURE.	Defective air filler valve, or valve not tight.	Check gasket and tighten loose valve. Replace, if defective.
	Defective strut seals.	Replace defective seals.
HYDRAULIC FLUID LEAKAGE FROM NOSE STRUT.	Defective strut seals.	Replace defective seals.

5-26. NOSE GEAR REMOVAL AND INSTALLATION. (See figure 5-6.)

- Remove engine cowling for access.
- Weight or tie-down the aircraft tail to raise nose wheel off floor.
- Disconnect nose wheel steering tubes from nose gear steering collar.
- Deflate strut completely and telescope strut to its shortest length.

WARNING

Be sure strut is deflated completely before removing bolt at top of strut or disconnecting the torque links.

- Remove bolt at top of strut and remove bolts, and nuts which clamp strut to lower forging on fire-wall.
- Pull the strut assembly down and out of upper attach forging.
- To install the nose gear assembly, reverse the preceding steps. Always install bolt at top forging before clamping strut in lower forging to prevent misalignment. Tighten clamp bolts in lower forging to 120±20 lb-in.

NOTE

Observe CAUTION in figure 5-6 when installing nose gear strut.

5-27. NOSE WHEEL SPEED FAIRING REMOVAL AND INSTALLATION.

- Weight or tie-down tail of aircraft to raise nose wheel off the floor.
- Remove nose wheel axle stud.

WARNING

The cover plate is secured by the lower torque link attaching bolt. Deflate strut before removing this bolt.

- Deflate strut and remove bolt securing cover plate to strut. Remove cover plate.
- Remove bolt securing speed fairing and tow-bar spacers to strut.
- Slide speed fairing up and remove nose wheel. Loosen scraper as necessary.
- Rotate speed fairing 90 degrees and work it down over the nose wheel fork to remove.
- Install speed fairing by reversing the preceding steps. Tighten axle stud until a slight bearing drag is obvious when the wheel is rotated. Back off the nut to the nearest castellation and install cotter pins.
- Service shock strut after installation has been completed.

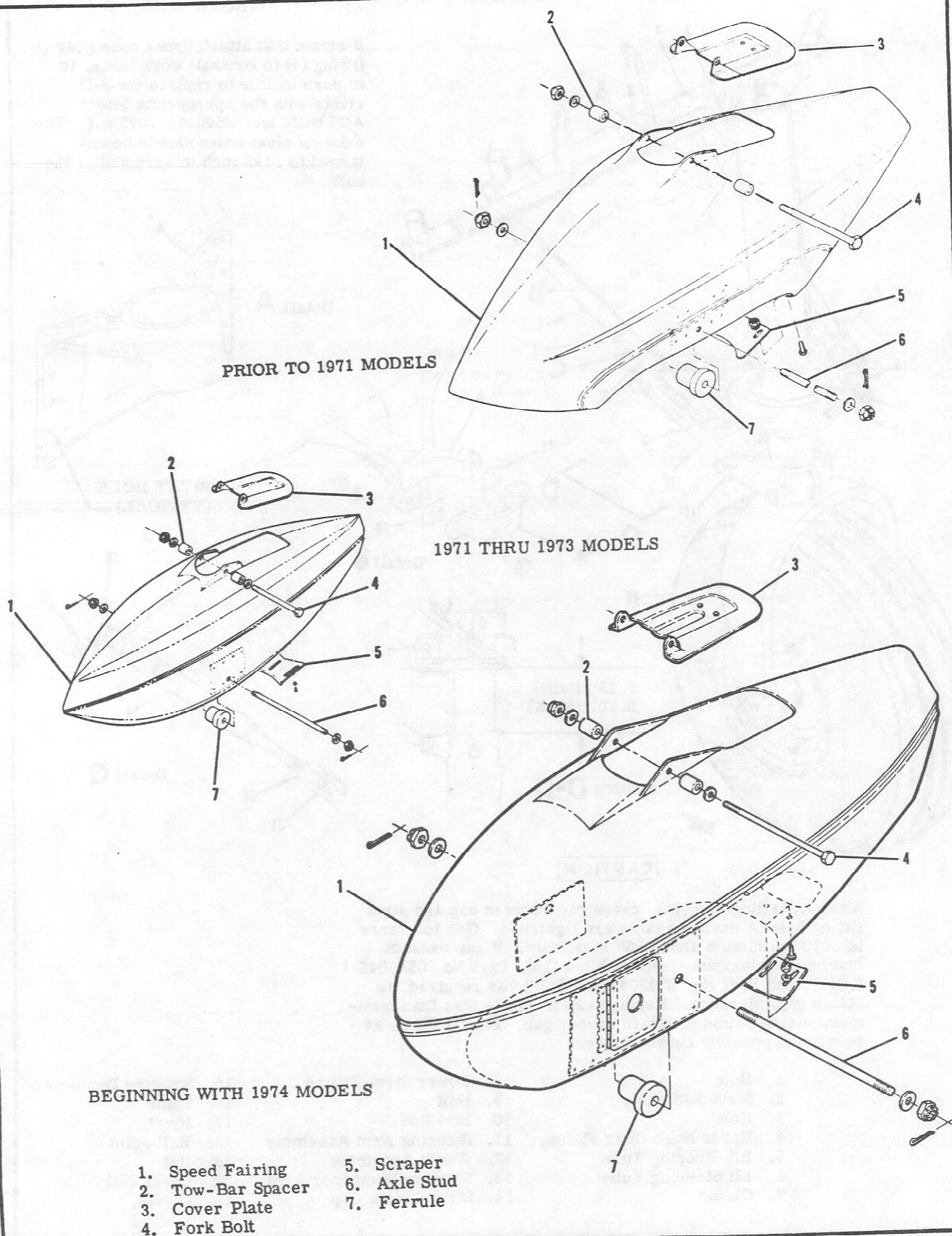


Figure 5-5. Nose Wheel Speed Fairing

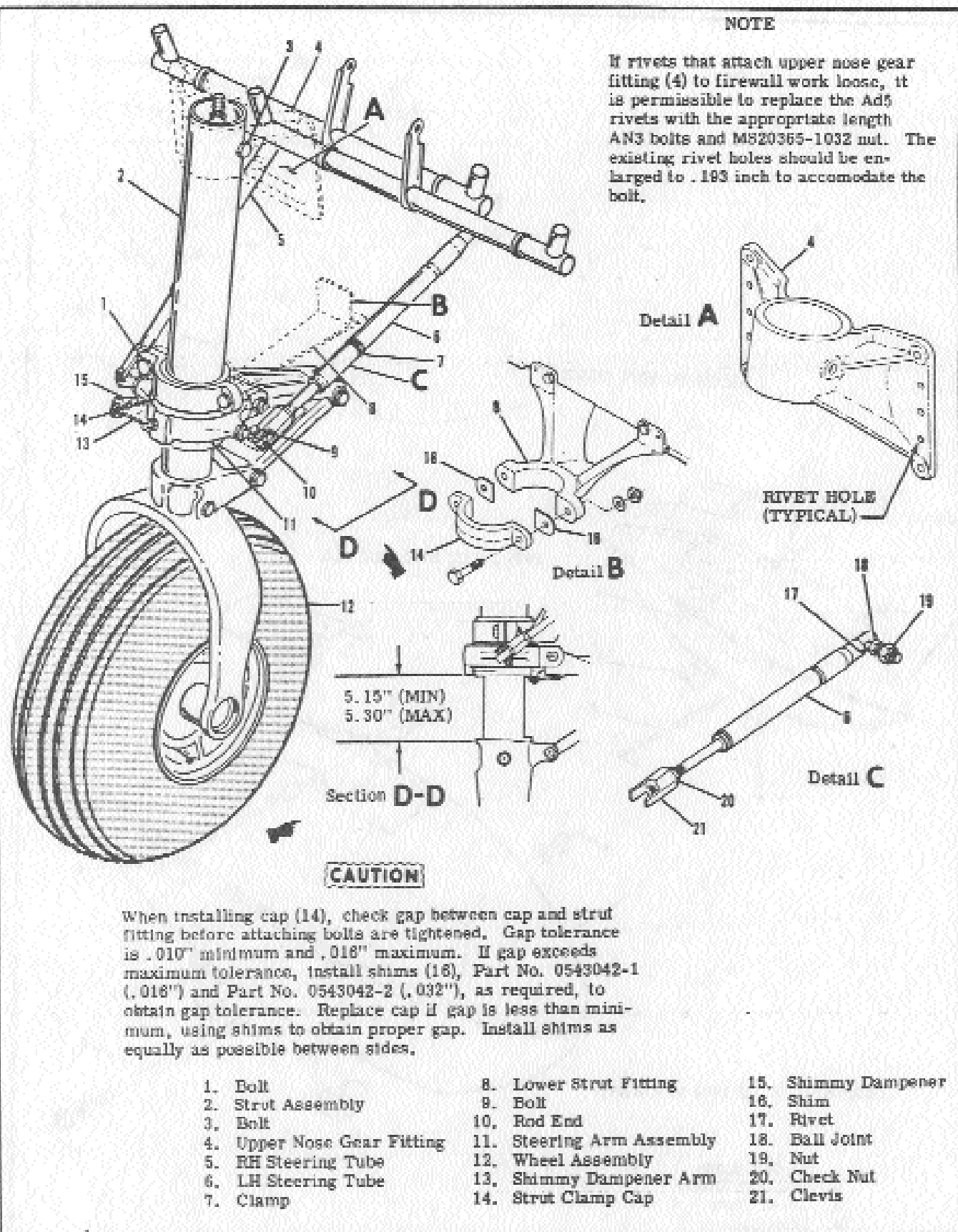


Figure 5-8. Nose Gear Installation

CAUTION

Always check scraper clearance after installing speed fairing, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. Set clearance between tire and scraper for 0.38 inch. Elongated holes in the scraper are provided for adjustment. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairings should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from speed fairing to prevent stains and deterioration.

5-28. NOSE WHEEL REMOVAL AND INSTALLATION.

- a. Weight or tie-down tail of aircraft to raise nose wheel off the floor.
- b. Remove nose wheel axle bolt.
- c. Use a rod or long punch inserted through one axle bolt bucket or ferrule to tap the opposite one out of the fork. Remove both buckets or ferrules and pull nose wheel from fork. Loosen scraper if necessary.

NOTE

Buckets are used on aircraft without speed fairings. Solid ferrules are used on aircraft with speed fairings.

- d. Remove spacers and axle tube before disassembling the nose wheel.

e. Reverse the preceding steps to install the nose wheel. Tighten axle bolt until a slight bearing drag is obvious when the wheel is rotated. Back off the nut to the nearest castellation and install cotter pin.

CAUTION

On aircraft equipped with speed fairings, always check scraper-to-tire clearance after installing speed fairing, whenever a tire has been changed, or whenever scraper adjustment has been disturbed. Set scraper clearance in accordance with paragraph 5-27.

5-29. NOSE WHEEL DISASSEMBLY. (Cleveland)

- a. Remove hub caps and valve core, completely deflate tire and break tire beads loose from wheel rims.

WARNING

Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge, or nick in the wheel may cause wheel failure.

- b. Remove thru-bolts and separate wheel halves.
- c. Remove tire and tube from wheel halves.

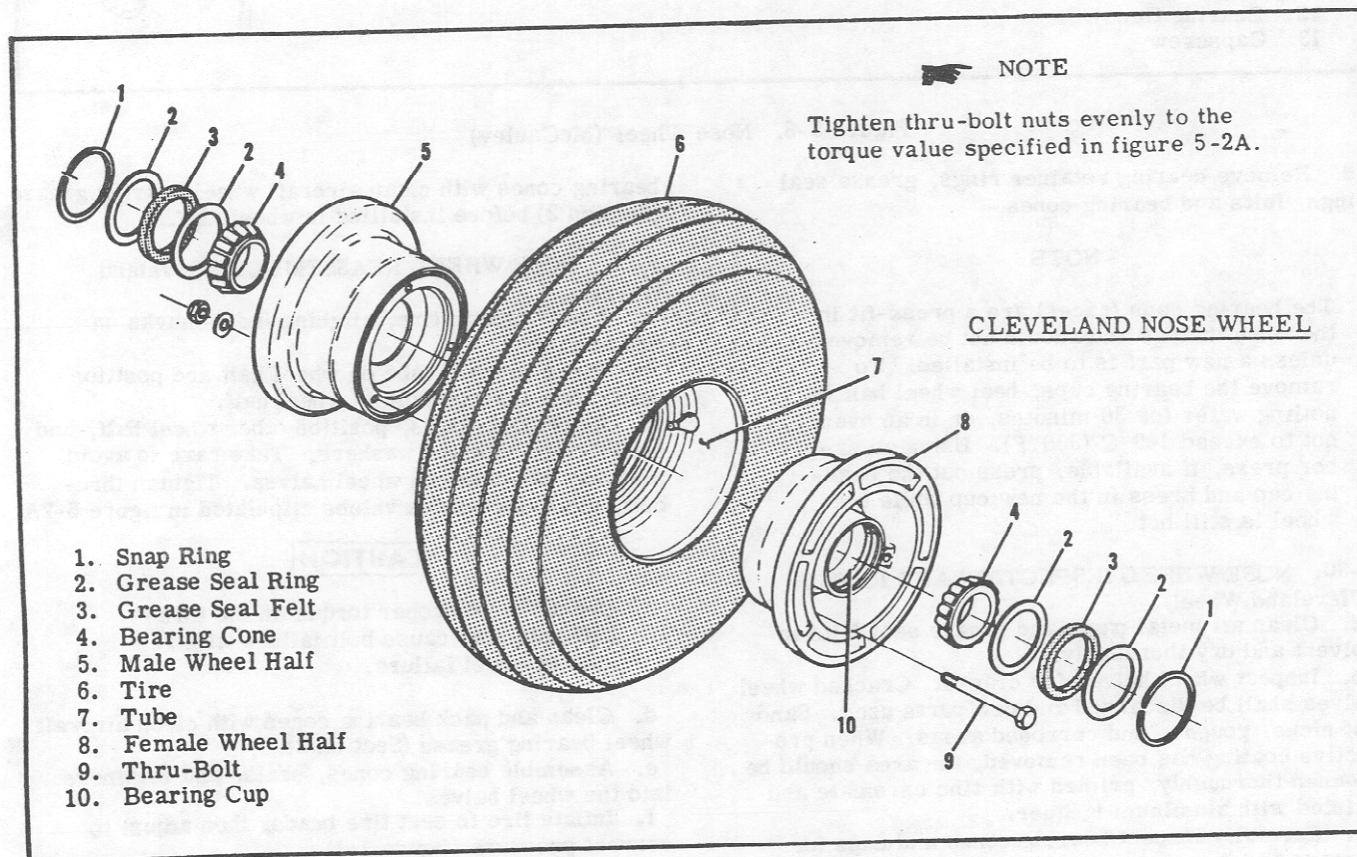


Figure 5-7. Nose Wheel (Cleveland)

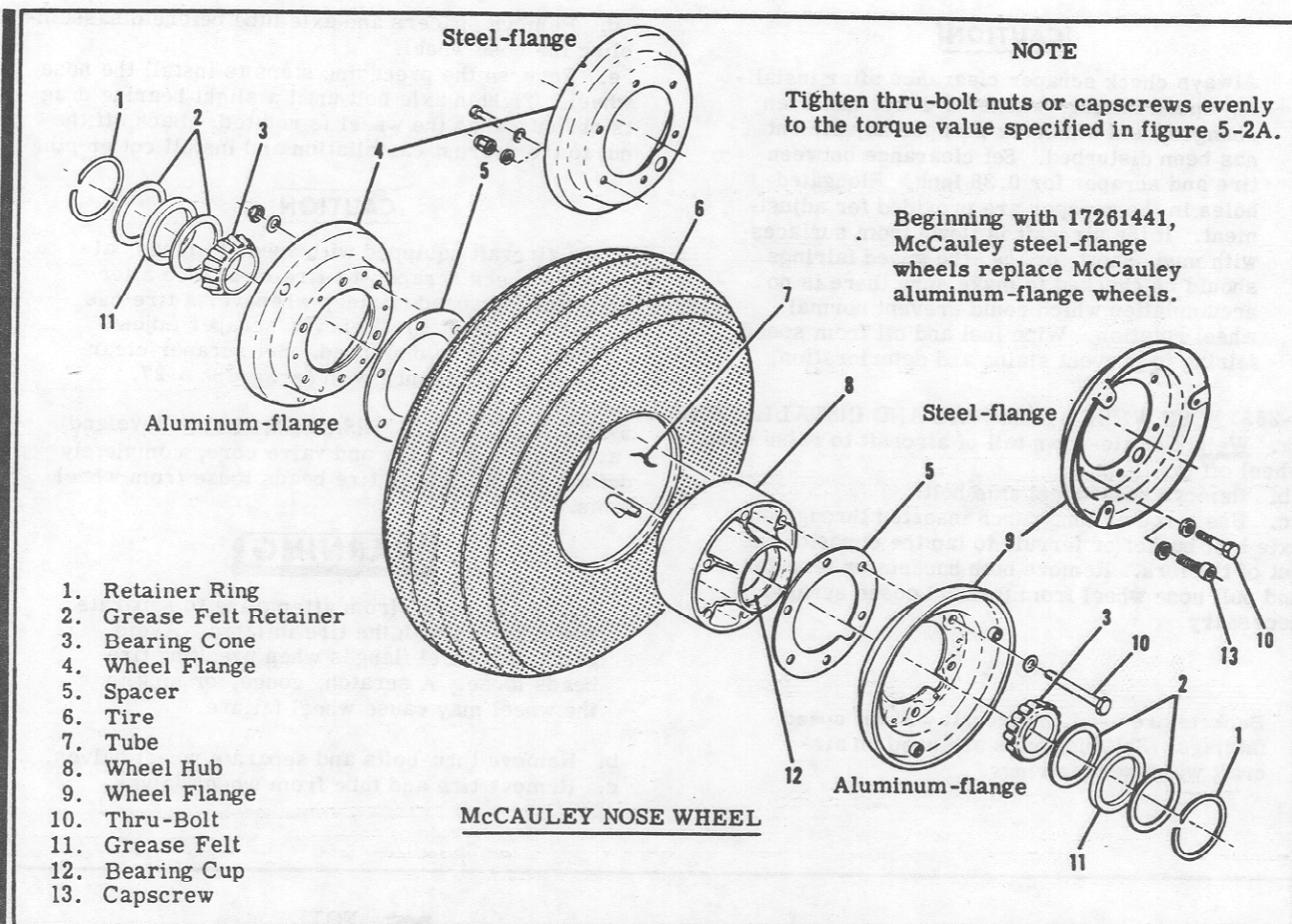


Figure 5-8. Nose Wheel (McCauley)

d. Remove bearing retainer rings, grease seal rings, felts and bearing cones.

NOTE

The bearing cups (races) are a press-fit in the wheel halves and should not be removed unless a new part is to be installed. To remove the bearing cups, heat wheel half in boiling water for 30 minutes, or in an oven not to exceed 149°C (300°F). Using an arbor press, if available, press out the bearing cup and press in the new cup while the wheel is still hot.

5-30. NOSE WHEEL INSPECTION AND REPAIR (Cleveland Wheel).

- a. Clean all metal parts and grease seal felts in solvent and dry thoroughly.
- b. Inspect wheel halves for cracks. Cracked wheel halves shall be discarded and new parts used. Sand out nicks, gouges, and corroded areas. When protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.
- c. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack

bearing cones with clean aircraft wheel bearing grease (Section 2) before installing in wheel half.

5-31. NOSE WHEEL REASSEMBLY (Cleveland Wheel).

- a. Insert tube in tire, aligning index marks on tire and tube.
- b. Place tire and tube on wheel half and position valve stem through hole in wheel half.
- c. Insert thru-bolts, position other wheel half, and secure with nuts and washers. Take care to avoid pinching tube between wheel halves. Tighten thru-bolt nuts to the torque values stipulated in figure 5-2A.

CAUTION

Uneven or improper torque on the thru-bolt nuts may cause bolt failure with resultant wheel failure.

- d. Clean and pack bearing cones with clean aircraft wheel bearing grease (Section 2).
- e. Assemble bearing cones, seals, and retainers into the wheel halves.
- f. Inflate tire to seat tire beads, then adjust to correct pressure (figure 1-1).

5-31A. NOSE WHEEL DISASSEMBLY (McCauley Wheel with Thru-bolts).

- a. Remove hub caps, completely deflate tire, and break tire beads loose at wheel flanges.

WARNING

Injury can result from attempting to remove wheel flanges with tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flange may cause wheel failure.

- b. Remove thru-bolt nuts and washers.
- c. Remove thru-bolts and separate wheel flanges from wheel hub. Retain spacers between wheel flanges and wheel hub.
- d. Remove wheel hub from tire and tube.
- e. Remove retainer rings and remove grease seal retainers, grease seal felts, and bearing cones from wheel hub.

NOTE

The bearing cups (races) are a press fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out the bearing cup and press in the new bearing cup while the wheel hub is still hot.

5-31B. NOSE WHEEL INSPECTION AND REPAIR (McCauley Wheel with Thru-bolts).

- a. Clean all metal parts, grease seal felts, and mylar spacers in cleaning solvent and dry thoroughly.
- b. Inspect wheel flanges, and wheel hub for cracks. Cracked wheel flanges or hub shall be discarded and new parts installed. Sand out smooth nicks, gouges, and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.
- c. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack bearing cones with clean aircraft wheel bearing grease (Section 2) before installing in wheel hub.

5-31C. NOSE WHEEL REASSEMBLY (McCauley Wheel with Thru-bolts).

- a. Insert tube in tire, aligning index marks on tire and tube.
- b. Place wheel hub in tire with valve stem in cutout of wheel hub.
- c. Place spacer and wheel flange on one side of wheel hub and with washer under head of thru-bolt insert bolt through wheel flange and wheel hub.
- d. Place spacer and wheel flange on other side and align valve stem in cutout in wheel flange.
- e. Install washers and nuts on thru-bolts.

CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of the thru-bolt nuts can cause failure of the bolts, with resultant wheel failure.

- f. Tighten thru-bolt nuts evenly and torque to the values stipulated in figure 5-2A.
- g. Clean and pack bearing cones with clean aircraft wheel bearing grease (Section 2).
- h. Assemble bearing cones, grease seal felts and retainers into wheel hub.
- i. Inflate tire to seat tire beads, then adjust to correct tire pressure. See figure 1-1 for correct tire pressure.

5-31D. NOSE WHEEL DISASSEMBLY (McCauley Wheel with Capscrews).

- a. Remove hub caps, completely deflate tire and break tire beads loose at wheel flanges.

WARNING

Injury can result from attempting to remove wheel flanges with tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flange could cause wheel failure.

- b. Remove capscrews and washers.
- c. Separate wheel flanges from wheel hub. Retain spacers on each side of wheel hub.
- d. Remove wheel hub from tire.
- e. Remove retainer rings and remove grease seal retainers, grease seal felts and bearing cones.

NOTE

The bearing cups (races) are a press-fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C(250°F). Using an arbor press, if available, press in the new bearing cup while the wheel hub is still hot.

5-31E. NOSE WHEEL INSPECTION AND REPAIR (McCauley Wheel with Capscrews).
Refer to paragraph 5-31B.

5-31F. NOSE WHEEL REASSEMBLY (McCauley Wheel with Capscrews).

- a. Insert tube in tire, aligning index marks on tire and tube.
- b. Place wheel hub in tire with valve stem in cutout of wheel hub.
- c. Place spacer and wheel flange on one side of wheel hub.
- d. Place washer under head of each capscrew, insert capscrew thru wheel flange and spacer and start capscrews into wheel hub threads.

CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of capscrews can cause failure of the capscrews or hub threads with resultant wheel failure.

- e. Tighten capscrews evenly and torque to the value specified in figure 5-2A.
- f. Place spacer and wheel flange on other side of wheel hub and align valve stem in cutout in wheel flange.
- g. Place washer under head of each capscrew, insert capscrew thru wheel flange and spacer and start capscrews into wheel hub threads.

CAUTION

Be sure that spacers and wheel flanges are seated on flange of wheel hub. Uneven or improper torque of capscrews can cause failure of the capscrews or hub threads with resultant wheel failure.

- h. Tighten capscrews evenly and torque to the value specified in figure 5-2A.
- i. Clean and pack bearing cones with clean aircraft wheel bearing grease. (Refer to Section 2 for grease type.)
- j. Assemble bearing cones, grease seal felts and retainer into wheel hub.
- k. Inflate tire to seat tire beads, then adjust to correct tire pressure (refer to Section 1).

5-32. WHEEL BALANCING. Refer to paragraph 5-23 for wheel balancing.

5-33. NOSE GEAR SHOCK STRUT DISASSEMBLY. The nose gear shock strut is shown in figure 5-9. Removal and installation is outlined in paragraph 5-26. The heavy-duty nose gear is shown in figure 5-10 which may be used as a guide during maintenance. Removal, installation, and disassembly procedures are the same as those for the standard nose gear strut except for the differences shown in figure 5-10. The following procedures apply to the nose gear shock strut after it has been removed from the aircraft, and the speed fairing and nose wheel have been removed. In many cases, separation of the upper and lower strut will permit inspection and parts installation without removal or complete disassembly of the strut.

WARNING

Be sure strut is completely deflated before

removing lock ring in lower end of upper strut, or disconnecting the torque links.

- a. Remove shimmy dampener.
- b. Remove torque links. Note position of washers, shims, and spacers.
- c. Remove lock ring from groove inside lower end of upper strut. A small hole is provided in the lock ring groove to facilitate removal of the lock ring.

NOTE

Hydraulic fluid will drain from strut as lower strut is pulled from upper strut.

- d. Use a straight, sharp pull to separate upper and lower struts. Invert strut and drain remaining hydraulic fluid.
- e. Remove lock ring and bearing at top of lower strut.
- f. Slide packing support ring, scraper ring, retaining ring, and lock ring from lower strut, noting relative position and top side of each ring; wire together if desired.
- g. Remove O-ring and back-up rings from packing support ring.
- h. Remove bolt securing fork and lower strut and remove bushing from fork and strut.
- i. Push metering pin and base plug assembly from lower strut. Remove O-rings and metering pin from base plug.

NOTE

Lower strut barrel and fork are a press fit, drilled on assembly. Separation of these parts is not recommended, except for installation of new parts.

- j. Remove retaining ring securing steering arm assembly on upper strut and remove steering arm assembly, shims, and washer.
- k. Push orifice support from upper strut and remove O-ring.
- l. Remove filler valve assembly from orifice support.

5-34. NOSE GEAR SHOCK STRUT REASSEMBLY. (See figure 5-9.)

- a. Thoroughly clean all parts in cleaning solvent and inspect them carefully. Replace all worn or defective parts and all O-rings and back-up rings with new parts.
- b. Assemble the shock strut by reversing the order

NOTE

Use shims as required between steering arm assembly (3) and washer (1) to provide a snug fit with retainer ring (4) installed. Also, adjust rod end (2) to provide dimension shown in detail.

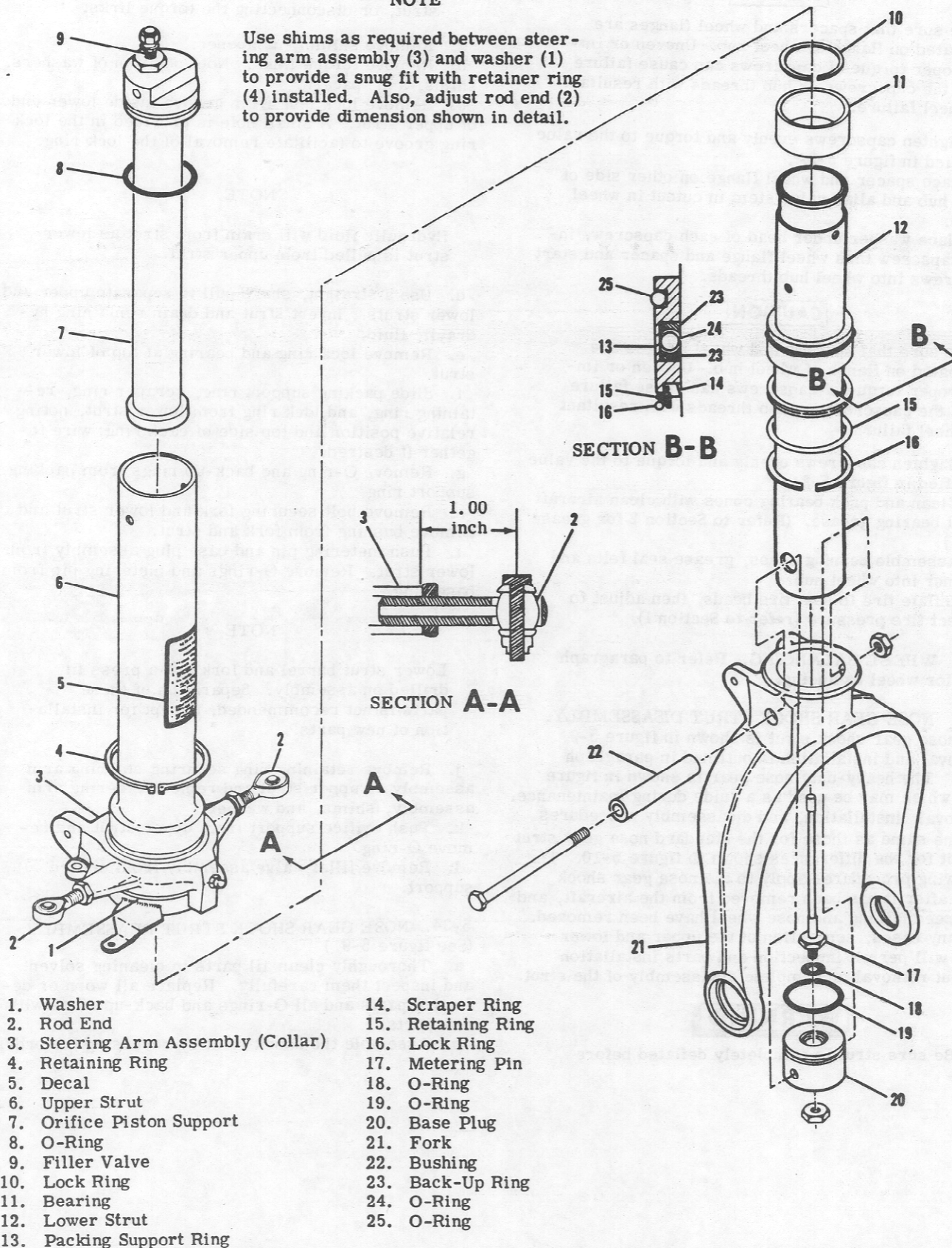


Figure 5-9. Nose Gear Shock Strut

of the procedure outlined in paragraph 5-33 with the exception that special attention must be paid to the following procedures.

c. Sharp metal edges should be smoothed with No. 400 emery paper, then thoroughly cleaned with solvent.

d. Used sparingly, Dow Corning DC-4 compound is recommended for O-ring lubrication. All other internal parts should be liberally coated with hydraulic fluid during assembly.

NOTE

Cleanliness and proper lubrication, along with careful workmanship are important during assembly of the shock strut.

e. When installing steering arm assembly, lubricate needle bearing in collar with general purpose grease (figure 2-5) before installing. If needle bearing is defective, install new steering arm assembly. Use shims as required between steering arm assembly and washer to provide a no play fit with retainer ring installed. Shims are available from the Cessna Service Parts Center as follows:

1243030-5	0.006 inch
1243030-6	0.012 inch
1243030-7	0.020 inch

f. When installing lock ring in lower end of upper strut groove, position lock ring so that one of its ends covers the small access hole in the lock ring groove at the bottom of the upper strut.

g. Temporary bolts or pins of correct diameter and length are useful tools for holding parts in correct relation to each other during assembly and installation.

h. After re-assembling the strut, install in accordance with paragraph 5-26.

i. After installation, service shock strut as outlined in Section 2.

5-35. **TORQUE LINKS.** The torque links are illustrated in figure 5-12, which may be used as a guide for removal, disassembly, assembly, and installation. The torque links keep the lower strut aligned with the nose gear steering system but permit shock strut action. Torque link bushings should not be removed except for replacement with new parts. Excessively worn parts should be replaced with new parts. Always deflate nose gear strut before disconnecting torque links.

5-36. **SHIMMY DAMPENER.** The shimmy dampener

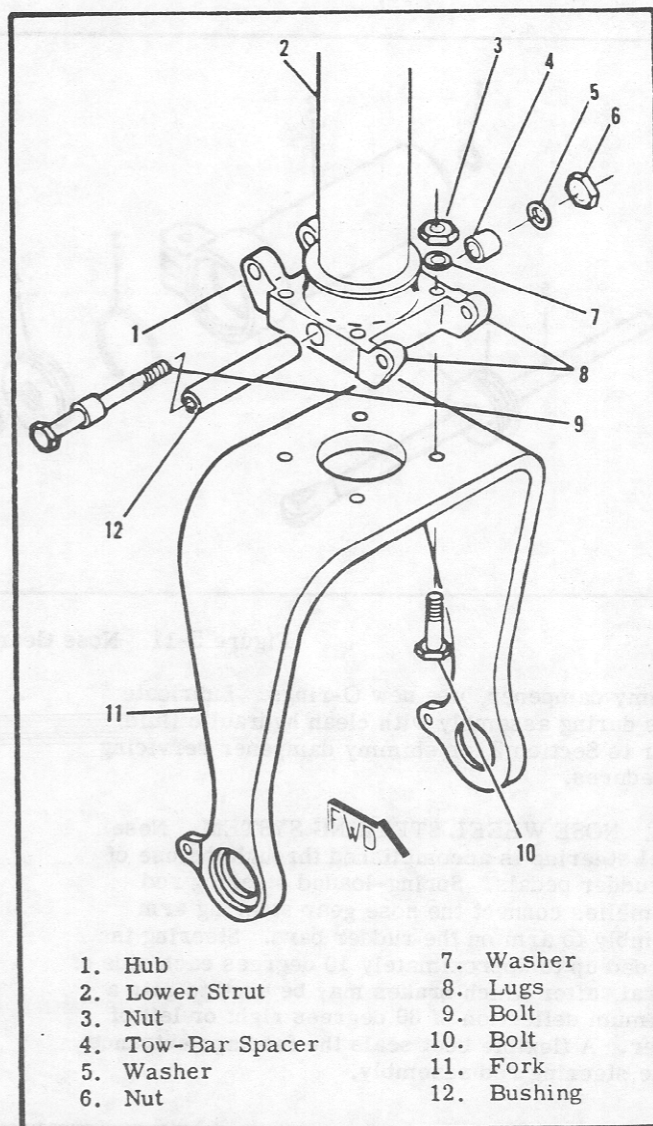


Figure 5-10. Heavy-Duty Shock Strut

er provided for the nose gear offers resistance to shimmy by forcing hydraulic fluid through small orifices in a piston. The dampener piston shaft is secured to a stationary part and the housing is secured to the nose wheel steering arm assembly which moves as the nose wheel is turned, causing relative motion between the dampener shaft and housing. The shimmy dampener is shown in figure 5-11, which may be used as a guide for removal, disassembly, re-assembly, and installation. When assembling

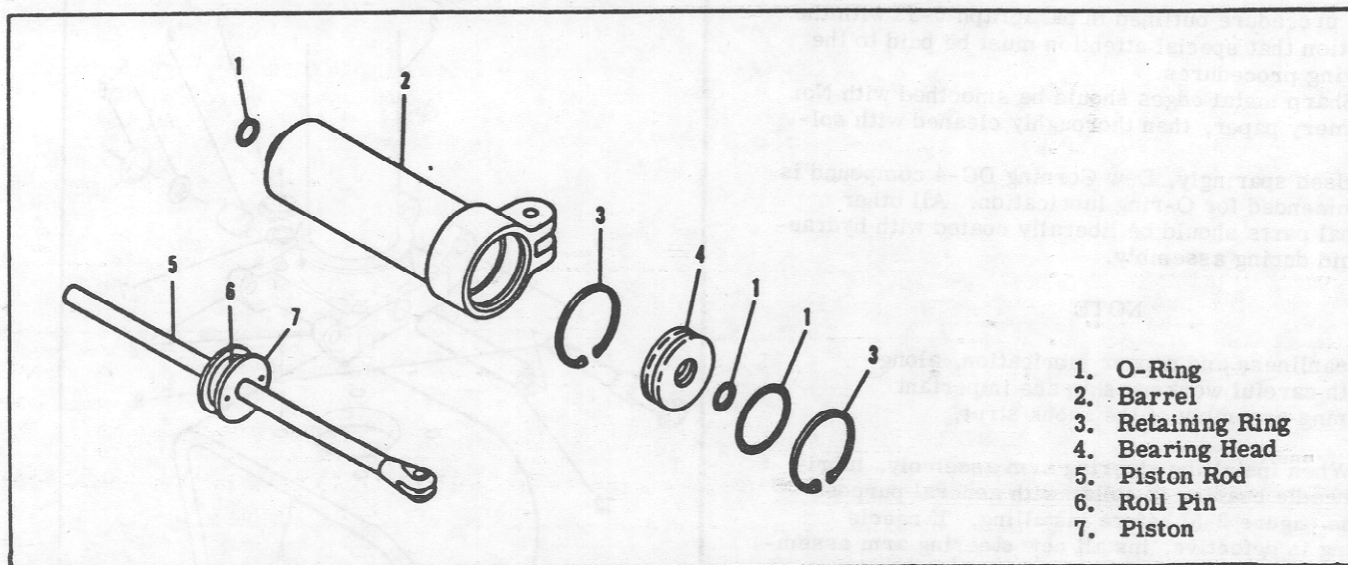


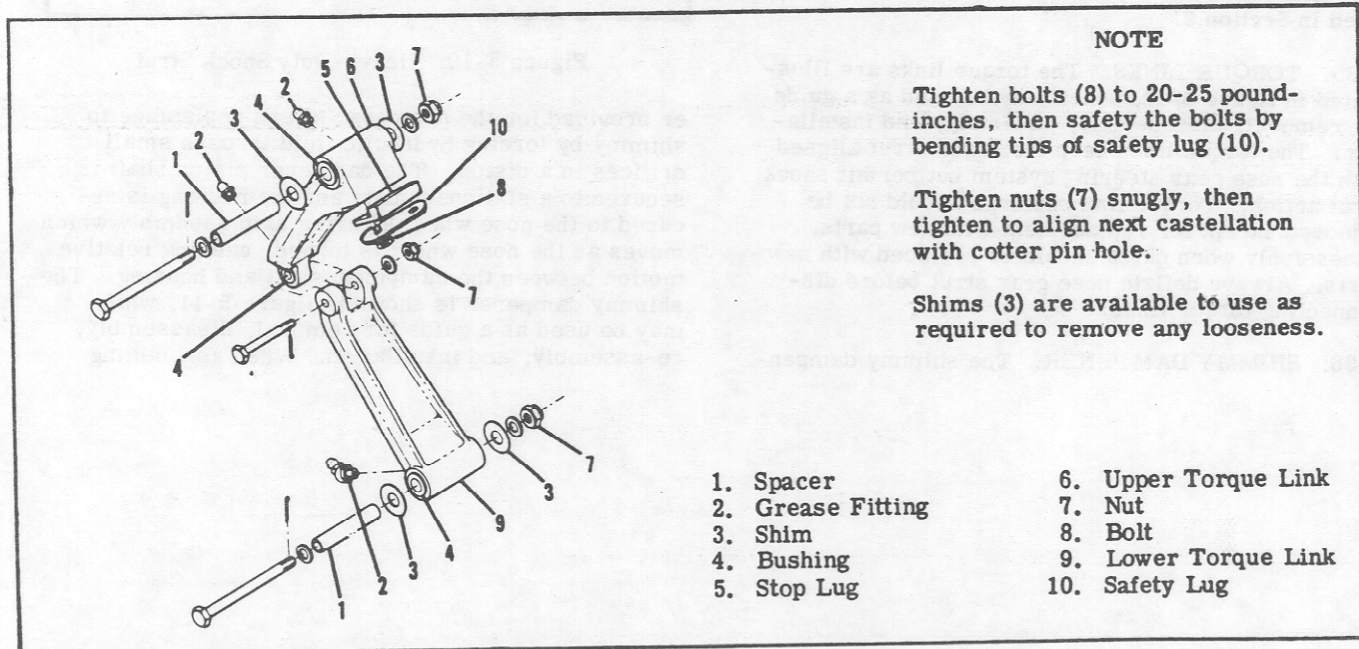
Figure 5-11. Nose Gear Shimmy Dampener

shimmy dampener, use new O-rings. Lubricate parts during assembly with clean hydraulic fluid. Refer to Section 2 for shimmy dampener servicing procedures.

5-37. NOSE WHEEL STEERING SYSTEM. Nose wheel steering is accomplished through the use of the rudder pedals. Spring-loaded steering rod assemblies connect the nose gear steering arm assembly to arm on the rudder bars. Steering is afforded up to approximately 10 degrees each side of neutral, after which brakes may be used to gain a maximum deflection of 30 degrees right or left of center. A flexible boot seals the fuselage entrance of the steering rod assembly.

5-38. STEERING ROD ASSEMBLY. The steering rod assembly is spring-loaded and should not be disassembled internally. The steering rods are connected by a clevis to the rod ends extending from the nose gear steering arm assembly and to arms on the rudder crossbars.

5-39. NOSE WHEEL STEERING ADJUSTMENT. Since the nose wheel steering and rudder systems are interconnected, adjustment to one system may affect the other system. Section 10 contains rigging instructions for the nose wheel steering system as well as the rudder system.



NOTE

Tighten bolts (8) to 20-25 pound-inches, then safety the bolts by bending tips of safety lug (10).

Tighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole.

Shims (3) are available to use as required to remove any looseness.

- | | |
|-------------------|----------------------|
| 1. Spacer | 6. Upper Torque Link |
| 2. Grease Fitting | 7. Nut |
| 3. Shim | 8. Bolt |
| 4. Bushing | 9. Lower Torque Link |
| 5. Stop Lug | 10. Safety Lug |

Figure 5-12. Nose Gear Torque Links

5-40. BRAKE SYSTEM.

5-41. GENERAL DESCRIPTION. The hydraulic brake system consists of two brake master cylinders, located just forward of the pilot rudder pedals, brake

lines and hose connecting each brake master brake cylinder to its wheel brake cylinder, the single-disc, floating-cylinder type brake assembly, located at each main landing gear wheel.

5-42. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding.	Check and adjust properly.
	Parking brake linkage holding brake pedal down.	Check and adjust properly.
	Worn or broken piston return spring. (In master cylinder.)	Repair or replace master cylinder.
	Insufficient clearance at Lock-O-Seal in master cylinder.	Adjust as shown in figure 5-13.
	Restriction in hydraulic lines or restriction in compensating port in master brake cylinders.	Drain brake lines and clear the inside of the brake line with filtered compressed air. Fill and bleed brakes. If cleaning the lines fails to give satisfactory results, the master cylinder may be faulty and should be repaired
	Worn, scored or warped brake discs.	Replace brake discs and linings.
	Damage or accumulated dirt restricting free movement of wheel brake parts.	Clean and repair or replace parts as necessary.
BRAKES FAIL TO OPERATE.	Leak in system.	If brake master cylinders or wheel brake assemblies are leaking, they should be repaired or replaced.
	Air in system.	Bleed system.
	Lack of fluid in master cylinders.	Fill and bleed if necessary.
	Brake master cylinder defective.	Repair or replace master cylinder.

5-43. BRAKE MASTER CYLINDERS. The brake master cylinders, located just forward of the pilot rudder pedals, are actuated by applying pressure at the top of the rudder pedals. A small reservoir is incorporated into each brake master cylinder to supply it with fluid. When dual brakes are installed, mechanical linkage permits the copilot pedals to operate the brake master cylinders.

5-44. BRAKE MASTER CYLINDER REMOVAL AND INSTALLATION.

- a. Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake system.
- b. Remove front seats and rudder bar shield for access to the brake master cylinders.
- c. Disconnect parking brake linkage and disconnect brake master cylinders from rudder pedals.
- d. Disconnect hydraulic hose from brake master cylinders and remove cylinders.
- e. Plug or cap hydraulic fittings, hose, and lines to prevent entry of foreign material.
- f. Reverse the preceding to install brake master cylinders. After installation, fill and bleed brake system as outlined in paragraph 5-51.

5-45. BRAKE MASTER CYLINDER REPAIR. Figure 5-12 may be used as a guide during disassembly, repair, and re-assembly of the brake master cylinders. Repair of the cylinders is limited to installation of new parts, cleaning, and adjustment. Use clean hydraulic fluid as a lubricant during assembly of the cylinders.

5-46. HYDRAULIC BRAKE LINES are of rigid tubing, except for flexible hose used at the brake master cylinders. A separate line is used to connect each brake master cylinder to its corresponding wheel brake cylinder. Install new lines and hose for damaged parts.

5-47. WHEEL BRAKE ASSEMBLIES. Wheel brake assemblies use a disc which is attached to the main wheel with the wheel thru-bolts or capscrews and a floating brake cylinder attached to the torque plate which is connected to the axle. (Refer to figure 5-3.)

5-48. WHEEL BRAKES REMOVAL. Wheel brake assemblies are the floating type and can be removed after disconnecting brake line and removing the back plate. See figure 5-3. The brake disc is removed after wheel removal and disassembly. To remove the torque plate on the flat gear, remove wheel and axle as outlined in paragraph 5-16. To remove the torque plate on the tubular gear, remove four bolts attaching torque plate to axle and work torque plate from spring-strut.

5-49. WHEEL BRAKE INSPECTION AND REPAIR.

- a. Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.
- b. New O-rings are usually installed at each overhaul. If O-rings re-use is necessary, they should be wiped with a clean cloth soaked in hydraulic fluid and inspected for damage.

NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in the hydraulic brake systems.

c. Check brake lining for deterioration and maximum permissible wear. See paragraph 5-49 for wear limits of the brake lining.

d. Inspect brake cylinder wall for scores or roughness. A scored or rough wall surface will leak or cause rapid O-ring wear. If damaged, install a new cylinder.

e. If the anchor bolts on the brake assembly are nicked, gouged, or corroded, they shall be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed, press out old bolts and drive new bolts in with a soft mallet.

f. Inspect brake disc. If excessively warped or scored, or worn to a thickness of 0.190-inch, the brake disc should be replaced with a new part. Sand smooth small nicks and scratches.

5-50. WHEEL BRAKE REASSEMBLY. Use figure 5-3 as a guide during assembly of wheel brake assembly. Lubricate parts with clean hydraulic fluid and assemble components with care to prevent damage to O-rings and other components of the assembly.

5-51. WHEEL BRAKE INSTALLATION. Place brake assembly in position with pressure plate in place, then install back plate. If the brake disc was removed, install as wheel is assembled. If the torque plate was removed, install as outlined in paragraph 5-17 for the flat gear. On the tubular gear, install torque plate on axle with four bolts (see paragraph 5-19.)

5-52. CHECK BRAKE LINING WEAR. New brake lining should be installed when they are worn to a minimum thickness of 3/32-inch. Visually compare a 3/32-inch strip of material held adjacent to each lining to measure the thickness of the lining. The shank end of a correct size drill bit makes an excellent tool for checking minimum thickness of the brake linings.

5-53. BRAKE LINING INSTALLATION. (See figure 5-3.)

- a. Remove bolts securing back plate and remove back plate.
- b. Pull the brake cylinder out of torque plate and slide pressure plate off anchor bolts.
- c. Place back plate on a table with lining side down flat. Center a 9/64 inch diameter (or slightly smaller) punch in the rolled rivet, and hit the punch sharply with a hammer driving out the rivet. Punch out all rivets securing the lining to the back plate and pressure plate in the same manner.

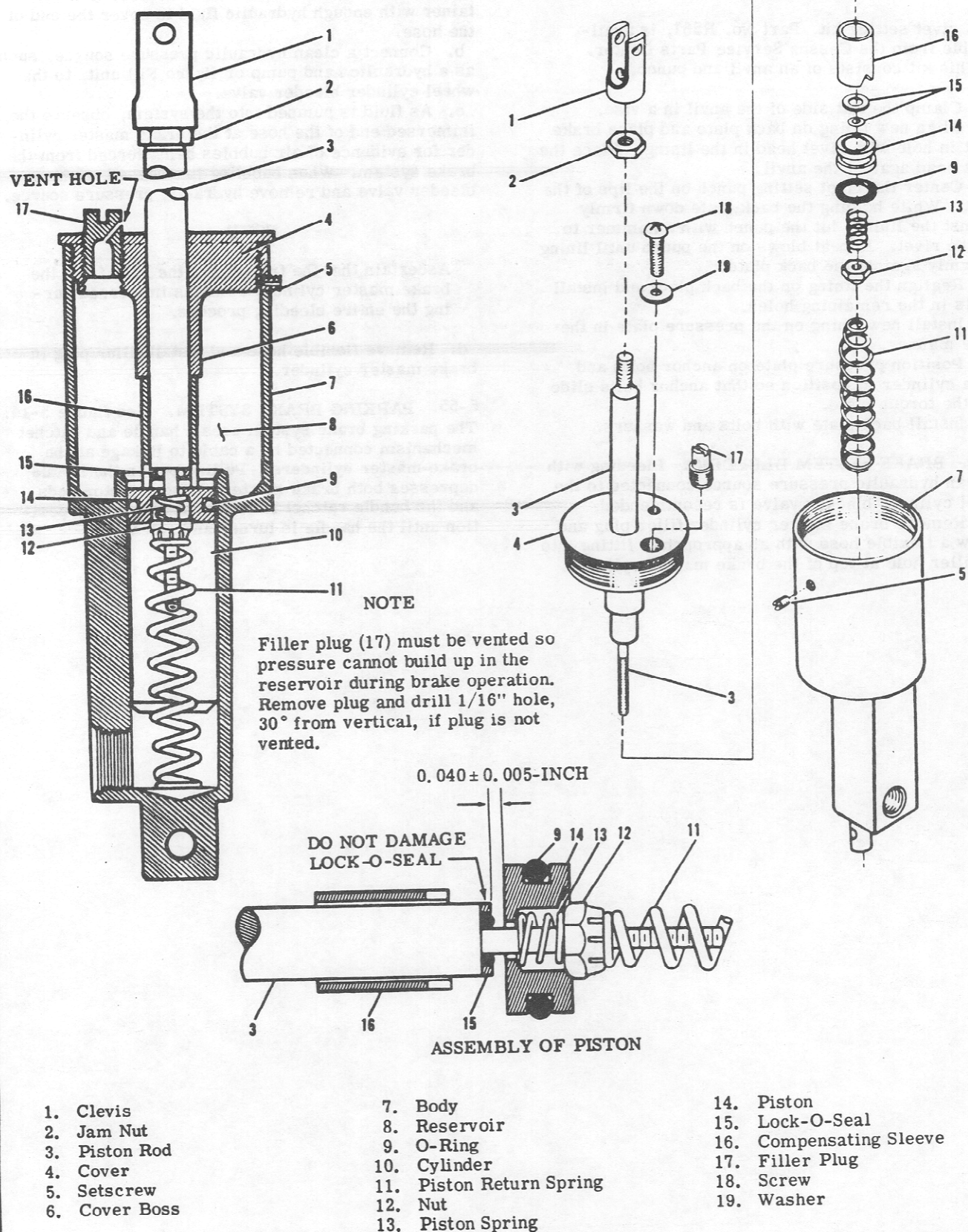


Figure 5-13. Brake Master Cylinder

NOTE

A rivet setting kit, Part No. R561, is available from the Cessna Service Parts Center. This kit consists of an anvil and punch.

- d. Clamp the flat side of the anvil in a vise.
- e. Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the rivet head against the anvil.
- f. Center the rivet setting punch on the lips of the rivet. While holding the back plate down firmly against the lining, hit the punch with a hammer to set the rivet. Repeat blows on the punch until lining is firmly against the back plate.
- g. Realign the lining on the back plate and install rivets in the remaining holes.
- h. Install new lining on the pressure plate in the same manner.
- i. Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.
- j. Install back plate with bolts and washers.

5-54. BRAKE SYSTEM BLEEDING. Bleeding with a clean hydraulic pressure source connected to the wheel cylinder bleeder valve is recommended.

- a. Remove brake master cylinder filler plug and screw a flexible hose with an appropriate fitting into the filler hole at top of the brake master cylinder.

Immerse the free end of the flexible hose in a container with enough hydraulic fluid to cover the end of the hose.

- b. Connect a clean hydraulic pressure source, such as a hydraulic hand pump or Hydro Fill unit, to the wheel cylinder bleeder valve.

- c. As fluid is pumped into the system, observe the immersed end of the hose at the brake master cylinder for evidence of air bubbles being forced from the brake system. When bubbling has ceased, tighten bleeder valve and remove hydraulic pressure source.

NOTE

Ascertain that the free end of the hose from the brake master cylinder remains immersed during the entire bleeding process.

- d. Remove flexible hose and install filler plug in brake master cylinder.

5-55. PARKING BRAKE SYSTEM. (See figure 5-14.)

The parking brake system uses a handle and ratchet mechanism connected by a cable to linkage at the brake master cylinders. Pulling out on the handle depresses both brake master cylinder piston rods and the handle ratchet locks the handle in this position until the handle is turned and released.

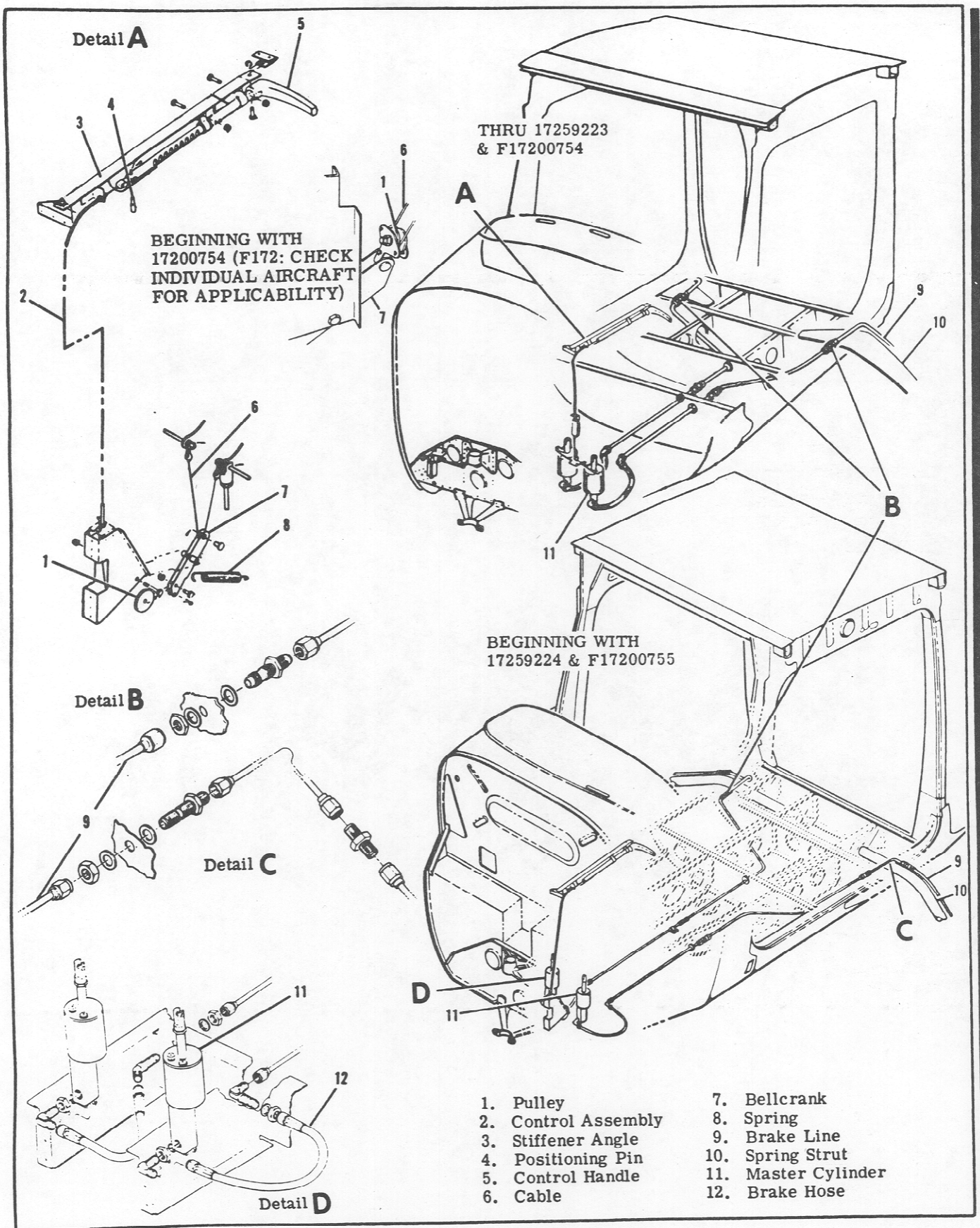


Figure 5-14. Parking Brake System