

**CHAPTER**

**32**

**LANDING GEAR**



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**EFFECTIVITY:** All

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EFFECTIVITY: All

## GENERAL

The landing gear of tricycle type consists of main and nose landing gears. The main landing gear is created by flat steel legs. The nose landing gear is provided with oleo shock absorber and shimmy damper. The wheels of main landing gear are equipped with hydraulic actuated disk brakes. The nose landing gear is pedal steered.

**EFFECTIVITY:** All

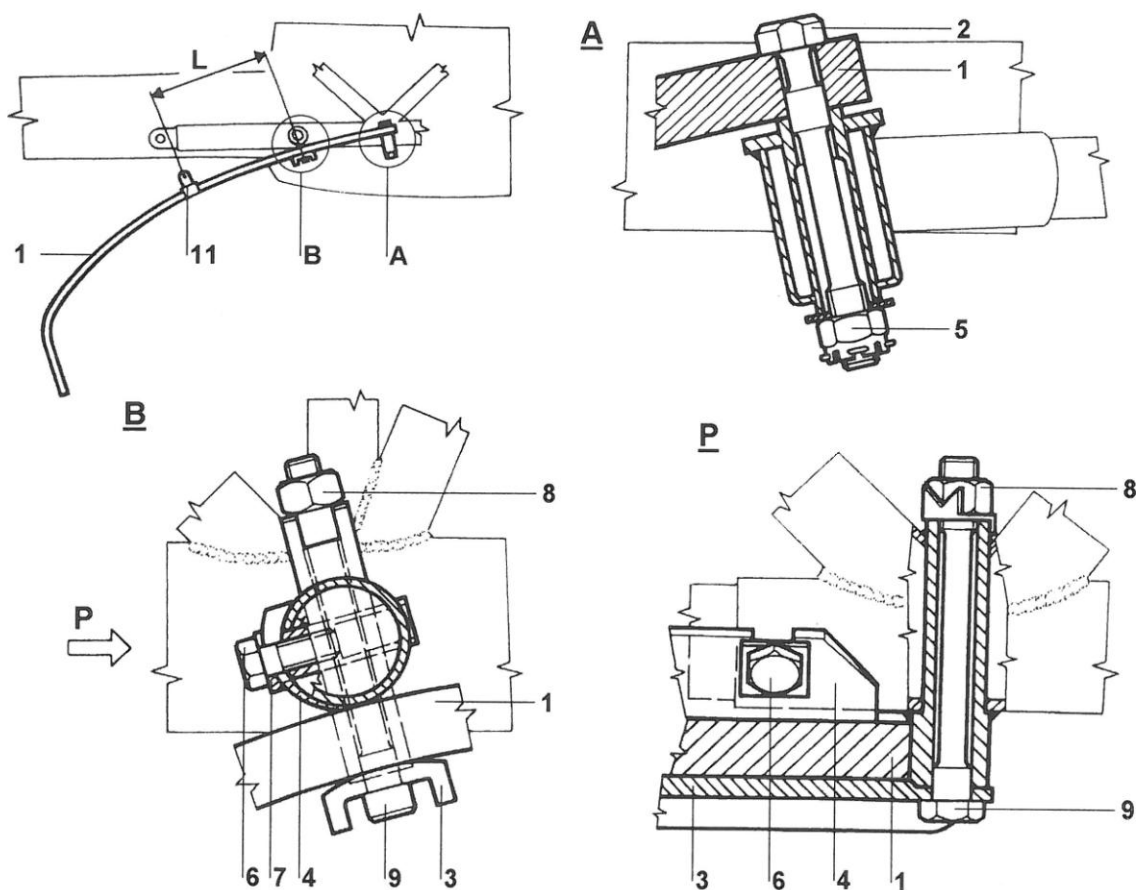
**32-00-00**

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# MAIN LANDING GEAR

## DESCRIPTION AND OPERATION

The main landing gear legs (Fig. 32-1, item 1) are bolt fixed to main fuselage beam landing gear suspension (2). The main landing gear leg is joined to fuselage frame by clip (3). The play between main landing gear leg and fuselage frame is limited by spacer (4).



A ... fixing of main landing gear leg

B ... nose landing gear pinch

L ... distance of sleeve (11) from bolt axis (8); L = 278 mm

P ... view upon pinch "B" from the left side

1 ... leg of main landing gear

2 ... suspension bolt of main landing gear

3 ... clip

4 ... spacer

5 ... nut

6 ... bolt

7 ... washer

8 ... nut

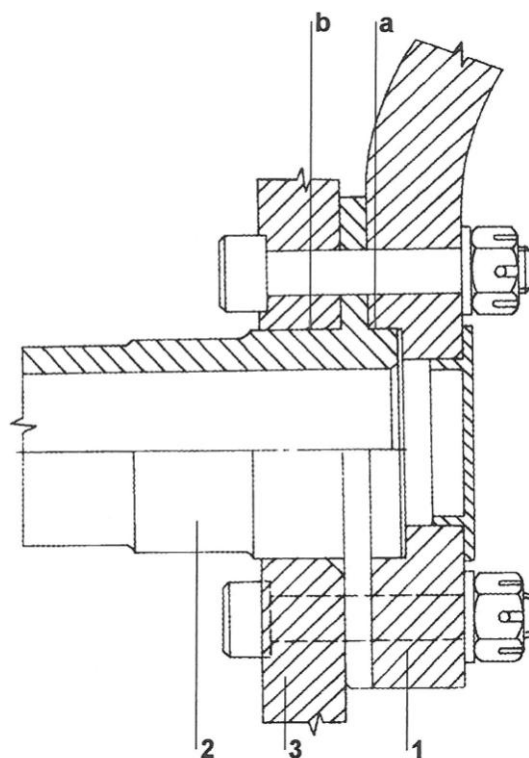
9 ... bolt

For information only:

11 ... sleeve

Fig. 32-1 Suspension of main landing gear

EFFECTIVITY: All



Joint	Item	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
a	1	Main landing gear leg (L; R)	Ø 40 H8	+ 0,039 0	$\frac{P}{0,049}$	+ 0,060
	2	Wheel shaft	Ø 40 j7	+ 0,015 - 0,010		- 0,015
b	3	Brake body	Ø 40 H8	+ 0,039 0	$\frac{0}{0,139}$	+ 0,030
	2	Wheel shaft	Ø 40	0 0,100		- 0,015

Fig. 32-2 Dimensions, allowances and plays in shaft suspension of main landing gear wheel

EFFECTIVITY: All

**32-10-00**

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## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **REMOVAL OF MAIN LANDING GEAR LEG**

##### **Preparatory works**

- a) Remove access cover of bottom and rear wing mount (Fig. 52-5, item 24) and panel of wing center section (33).
- b) Remove left and right floor panels in cockpit.
- c) Lift the airplane by jacks to have landing gear wheels at least 10 cm (4 in) above the ground.
- d) Drain brake fluid from the airplane brake system as follows: Unscrew cap nut (Fig. 12-2, item 1) of the filing valve (2). Release filing valve upon brake body and vent valve (4) upon pedal brake units. Speed up the fluid draining by repeated stepping upon brake pedals.
- e) Uncouple the brake piping in fuselage.
- f) Disconnect the pushrod of stall warning switch control from the sleeve (Fig. 32-1, item 11) upon starboard leg of main landing gear.
- g) Remove wheel fairing, wheel of main landing gear (subsection 32-41-00) and brake (subsection 32-43-00).

##### **Removal of main landing gear leg**

##### **NOTE**

The removal of port and starboard main landing gear legs is the same.

- a) Remove suspension of main landing gear leg (Fig. 32-1, item A) unlock and unscrew nut (5), remove washer and slide the bolt (2) from the suspension.
- b) Release clipping of landing gear (Obr. 32-1, item B). Unlock and unscrew two bolts (6) and remove washers (7). Remove spacer (4) by light hammering it via soft block.
- c) Remove clip (3) in the spot of main landing gear pinch (Fig. 32-1, item P). Unlock and unscrew nuts (8) and remove bolts (9).
- d) Slide the main landing gear leg (1) from the fuselage.



## **INSTALLATION OF MAIN LANDING GEAR LEG**

### **NOTE**

The installation of port and starboard main landing gear leg is the same.

- a) Fit the clip (Fig. 32-1, item 3) to the fuselage frame and install screws (9). Tighten the nuts (8) with 46 to 58 Nm (34 to 42,8 lbft) torque and lock them by means of tap washer.
- b) Insert main landing gear leg (1) into the gap between fuselage frame and clip (3) and fix it with suspension bolt (2). Do not tighten at the moment the nut (5).
- c) Insert by light hammering the spacer (4) between main landing gear leg and fuselage frame to remove play in main landing gear suspension. Do not tighten the bolts (6) at the moment.
- d) Tighten the nut (5) of suspension (2) with 80 to 100 Nm (59 to 74 lbft) torque and lock it with cotter pin.
- e) Hammer the spacer (4) in to remove play, tighten the bolts (6) and lock them with safety wire.

### **Final works**

- a) Install brake (subsection 32-43-00), main landing gear wheel and wheel fairing (subsection 32-41-00).
- b) Join control pushrod of stall warning switch to clip (11) on the starboard landing gear leg. The distance from the center of hole in sleeve (11) to axis of bolt (8) measured along the upper outline of main landing gear leg (1) is issued in Fig. 32-1, dimension L.
- c) Couple the brake pipes in fuselage.
- d) Fill the airplane brake system with brake fluid and deaerate the system (section 12-10-00).
- e) Install wing and fuselage panels and access port covers (Fig. 52-5, items 24; 26; 33).
- f) Install left and right floor panels in cockpit.
- g) Lower the airplane from the jacks.

**EFFECTIVITY:** All

## **INSPECTION / CHECK**

### **CHECK OF PLAY IN MAIN LANDING GEAR LEG SUSPENSION**

- a) Lift the airplane by fuselage jacks.
- b) Check play manually acting with force upon lower end of main landing gear leg forward and backward and up and down.
- c) Removal of play:
  - Play in main suspension (Fig. 32-1, point A): unlock nut (5) upon the bolt (2), release nut and tighten it again with 80 to 100 Nm (59 to 74 lbft) torque
  - Play in the spot of main landing gear leg pinch (Fig. 32-1, point B): unlock bolts (6) and remove play by light hammering of spacer (4); tighten the bolts (6) and lock them with safety wire.
- d) Check the play according to point b) again. Remove the leg of main landing gear from the airplane and check denting of suspension hole, suspension bolt (2) and spacer (4) in case the play has not been removed. Repair detected faults.

## PAINT RENEWAL

### PAINT RENEWAL OF MAIN LANDING GEAR LEG

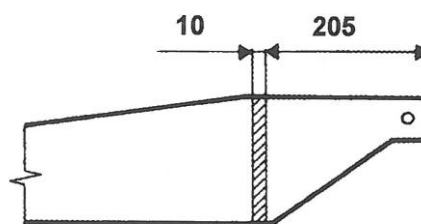
General instructions for paint repair are issued in subsection 51-72-00.

#### 1. Paint repair

- a) Degrease cleaned spot with acetone.
- b) Apply primer upon the repaired spot and apply after its drying a layer of suitable polyurethane or epoxy resin lacquer.  
The paints used by airplane manufacturer are issued in subsection 51-72-00.

#### 2. Paint renewal upon whole surface of main landing gear leg

- a) Remove paint by means of epoxy lacquer paint remover e.g. ALDURIT STRIP and clean the leg by means of cleaning agent, e.g. alcohol.
- b) Protect reamed holes against entry of paint and apply primer mixed in 4:1 ration with S 6011 catalyst.
- c) Cover the 10 mm (0,4 in) wide area upon the upper surface of leg (Fig. 32-3) and spray the leg with one layer of S 2322/1000 epoxy lacquer mixed in 100:12 ratio with S 7300 hardener and one layer of S 2321 epoxy lacquer mixed in 100:33 ratio with S 7300 hardener.
- d) Preserve unpainted spots with preservation grease.



*Fig. 32-3 Paint free area upon main landing gear leg*

**EFFECTIVITY:** All

## APPROVED REPAIRS

### REPAIR OF MAIN LANDING GEAR

#### CAUTION

MAKE PERTINENT ENTRY UPON CARRIED REPAIRS TO AIRPLANE LOGBOOK.

IN CASE OF DAMAGE, CORROSION OR PLAY IN MAIN LANDING GEAR SUSPENSION THAT CANNOT BE REMOVED AND IN OTHER CASES THAT PROVIDE WELL - GROUNDED SUSPICION OF CRACK EXISTENCE IN MAIN LANDING GEAR LEGS EXITS, E.G. AFTER HEAVY LANDING, ETC. IT IS RECOMMENDED TO CARRY OUT FLAW DETECTION OF MAIN LANDING GEAR LEGS.

Fault	Remedy
1) Faulty paint of main landing gear leg.	Grind the leg paint defects with emery paper No. 120 along leg longitudinal axis to remove all the paint and make cleaned spots flush with surrounding paint. Use emery paper No. 200 to remove traces of previous grinding. Check ground spots visually if the leg base is faultless. Repair paint according to subsection RENEWAL OF PAINT.
2) Defects of leg as transversal scratches, cracks, dents and corrosion less than 0,2 mm (0,008 in) deep.	Grind roughly along the leg longitudinal axis the defects with emery paper No. 80 to 120. Grind finally the defects and traces of previous grinding with emery paper No. 200 or finer to make the ground spots flush with surrounding areas. The maximum depth of ground spots is 0,2 mm (0,008 in). Grind the defective edge of leg to achieve 4 mm (0,16 in) minimum edge radius. Make sure visually there are no defects in and in the vicinity of repaired spots. Renew leg paint according to subsection RENEWAL OF PAINT.
3) Faulty surface as transversal scratches, cracks, dents and/or corrosion in steel base of main landing gear leg exceeding 0,2 mm (0,008 in) depth.	Grind the defects as described in point 2). Make in case the defect cannot be repaired the leg flaw detection as follows: - remove paint from all the leg surface by means of epoxy paint remover as ALDURIT STRIP - make the flaw detection of leg by magnetic-particle method - replace leg with cracks - demagnetize flawless leg and decide together with the manufacturer the further steps.
4) The play in main landing gear leg suspension cannot be removed.	Remove the legs of main landing gear from the airplane. Replace dented bolt of leg suspension (Fig. 32-1, item. 2). Repair dented hole according to subsection „REAMING OF HOLES IN MAIN LANDING GEAR SUSPENSION“. Grind dented spacer (4), replace excessively dented or faulty spacer.

**EFFECTIVITY:** All

Fault	Remedy
5) Deformation or other defects reducing serviceability or strength of main landing gear legs. 6) Expired life time of main landing gear legs (section 04-20-00).	Replace legs of main landing gear including suspension bolts (Fig. 32-1, item 2). Check intactness of suspension hole of fuselage and spacer (Fig. 32-1, item 4). Repair dented hole according to subsection "REAMING OF HOLES IN MAIN LANDING GEAR SUSPENSION". Grind dented spacer (4), replace excessively dented or faulty spacer.

**EFFECTIVITY:** All

### REAMING OF MAIN LANDING GEAR SUSPENSION HOLES

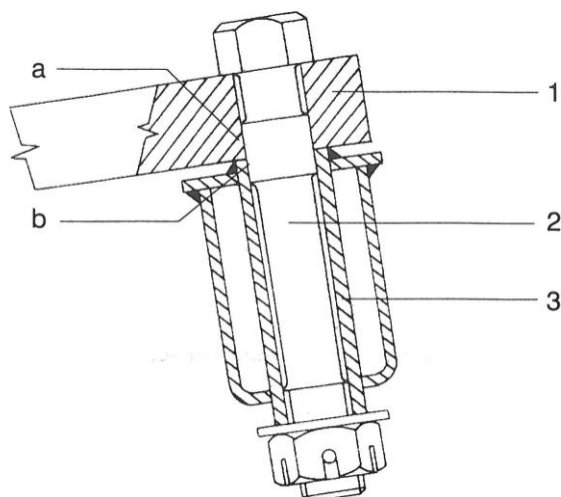
#### CAUTION

CHECK AFTER HOLE REAMING THE MAIN LANDING GEAR WHEEL CONVERGENCE (subsection 32-41-00).

General instructions on hole reaming are issued in subsection 20-21-00.

Hole in suspension (Fig. 32-4, item 1; 3)		Reamer	Caliper
Original dimension	Ø 12 H8	-----	-----
Dimension after repair	Ø 12,1 H8	Ø 12,1 H7 000-224-5013	Ø 12,1 H7 000-511-1016
	Ø 12,2 H8	Ø 12,2 H7 000-224-5014	Ø 12,2 H7 000-511-1017
	Ø 12,3 H8	Ø 12,3 H7 000-224-5015	Ø 12,3 H7 000-511-1018
	Ø 12,4 H8	Ø 12,4 H7 000-224-5043	-----

Suspension bolt (Fig. 32-4, item 2)		Bolt No.
Original dimension	Ø 12 f8	Z 143.5100-00.08
Dimension after repair	Ø 12,1 f8	Z 143.5100-00.13
	Ø 12,2 f8	Z 143.5100-00.14
	Ø 12,3 f8	Z 143.5100-00.17
	Ø 12,4 f8	Z 143.5100-00.18



Joint	Item	Name	Dimensions (mm)				
			Original				Operation
			D1	T1	V min./max.	T2 max.	D2 max.
a	1	Main landing gear (L; R)	Ø 12 H8	+ 0,027 0	$\frac{0,016}{0,070}$	+ 0,040	Ø 12,4 H8
	2	Suspension bolt	Ø 12 f8	- 0,016 - 0,043		- 0,055	Ø 12,4 f8
b	3	Suspension bushing	Ø 12 H8	+ 0,027 0	$\frac{0,016}{0,070}$	+ 0,040	Ø 12,4 H8
	2	Suspension bolt	Ø 12 f8	- 0,016 - 0,043		- 0,055	Ø 12,4 f8

*Fig. 32-4 Dimesions, allowances and plays in main landing gear suspension*

**EFFECTIVITY:** All

**32-10-00**

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# **NOSE LANDING GEAR**

## **DESCRIPTION AND OPERATION**

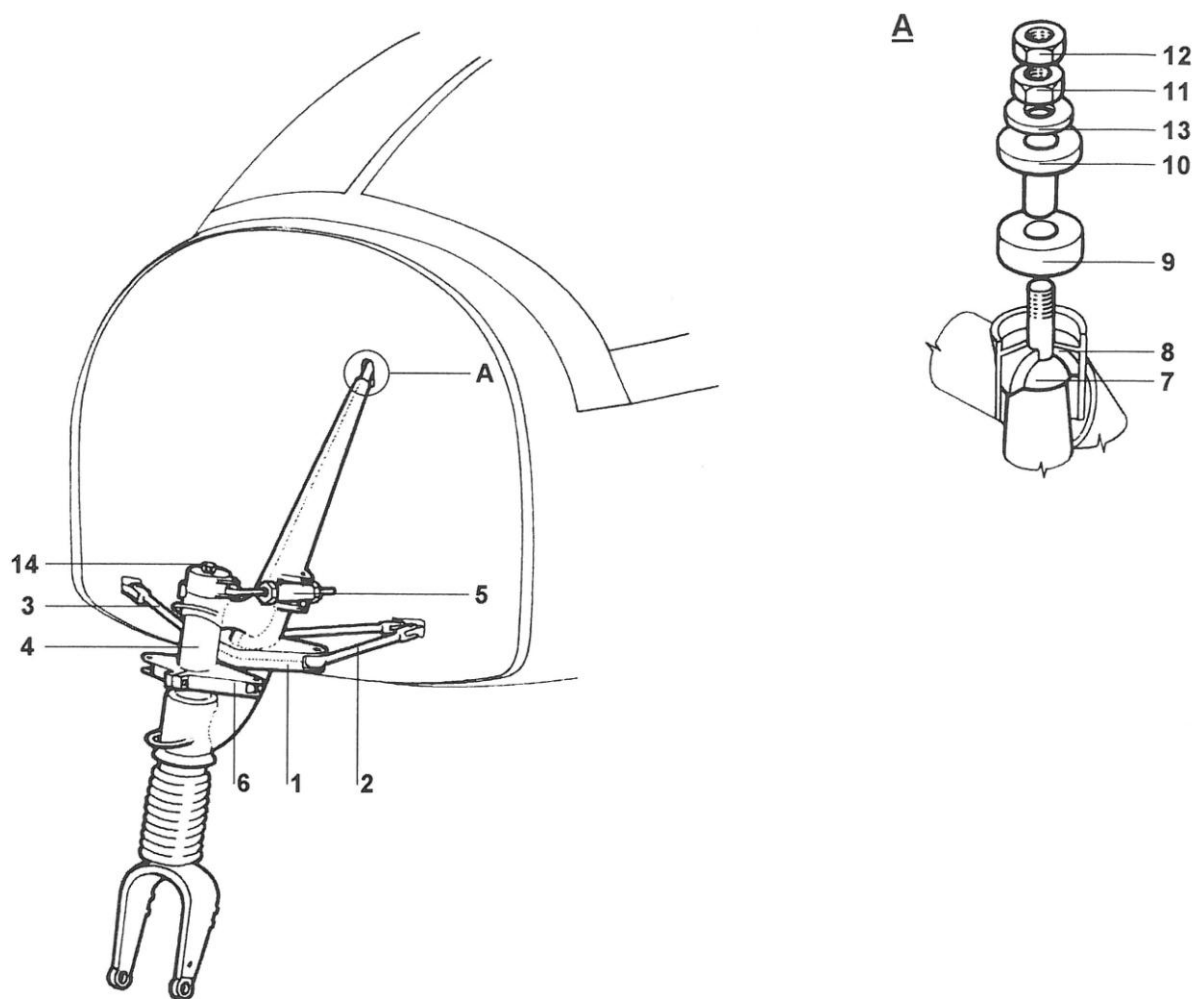
The nose landing gear is suspended upon the first bulkhead of fuselage frame:

- the upper part of nose landing gear is suspended in upper suspension (Fig. 32-5, detail A)
- the holder of nose landing gear suspension (1) is joined by brace (2) and twin brace (3) to bottom suspensions.

The nose landing gear is equipped with oleo shock absorber (4) and shimmy damper (5).

The steering sleeve (6) carries spring mechanism of nose wheel steering (section 32-50-00).





A ... suspension of upper part of nose landing gear

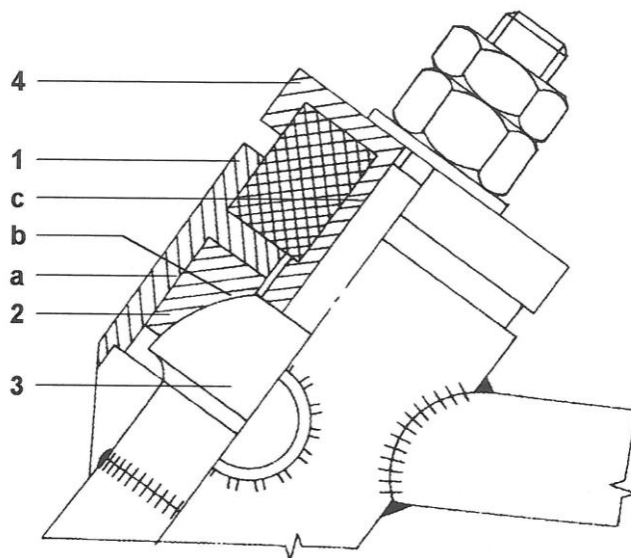
- 1 ... holder of nose landing gear suspension
- 2 ... brace
- 3 ... twin brace
- 4 ... oleo shock absorber
- 5 ... shimmy damper
- 6 ... sleeve of nose wheel steering
- 7 ... articulated joint of upper nose landing gear suspension
- 8 ... bushing of articulated joint
- 9 ... rubber damper
- 10 ... support lid
- 11 ... nut
- 12 ... lock nut
- 13 ... washer
- 14 ... filling valve

*Fig. 32-5 Nose landing gear suspension*

**EFFECTIVITY:** All

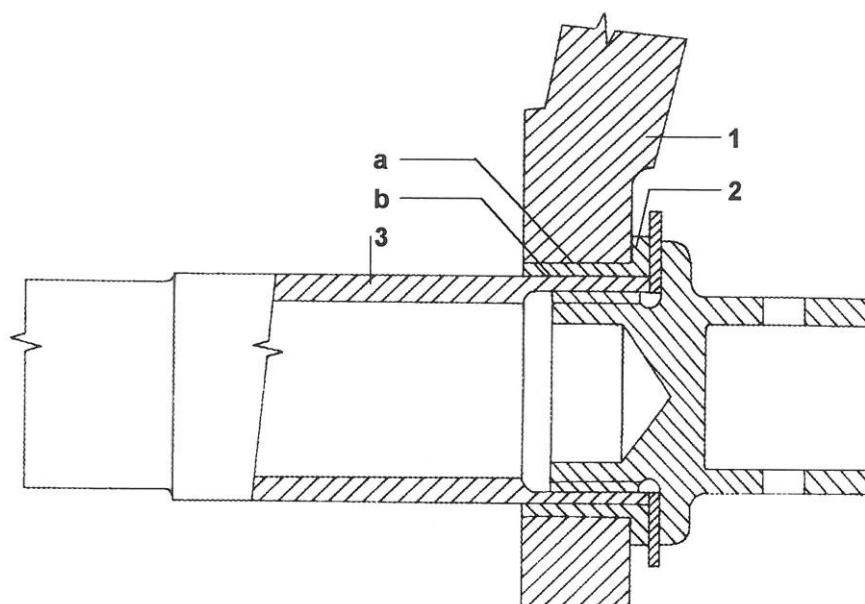
**32-20-00**

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Joint	Item	Name	Dimesion (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
a	1	Upper suspension of nose landing gear	Ø 32 H8	+ 0,039 0	$\frac{0,025}{0,103}$	+ 0,060
	2	Bushing of articulated joint	Ø 32 f8	- 0,025 - 0,064		- 0,085
b	2	Bushing of articulated joint	Ø 28 H8	+ 0,033 0	$\frac{0}{0,066}$	+ 0,050
	3	Upper part of nose landing gear	Ø 28 h8	0 - 0,033		- 0,050
c	4	Support lid	Ø 8,4	+ 0,250 0	$\frac{0}{0,340}$	+ 0,350
	3	Upper part of nose landing gear	Ø 8 h11	0 - 0,090		- 0,135

*Fig. 32-6 Dimensions, allowances and plays in upper nose landing gear suspension*



Joint	Item	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
a	1	Nose landing gear fork	Ø 29 H7	+ 0,021 0	$\frac{P}{0,006}$	
	2	Bushing	Ø 29 n6	+ 0,028 + 0,015		
b	2	Bushing	Ø 25 H8	+ 0,033 0	$\frac{0,020}{0,086}$	+ 0,050
	3	Wheel axle	Ø 25 f8	- 0,020 - 0,053		- 0,085

*Fig. 32-7 Dimensions, allowances and plays in nose wheel axle suspension*

**EFFECTIVITY:** All

**32-20-00**

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## REPAIRS

Fault	Possible reason	Remedy
Excessive static stroke of nose landing gear shock absorber.	Pressure of fluid ascapes from oleo shock absorber.	Fill the shock absorber with compressed air and hydraulic fluid according to section 12-10-00 (FILLING OF NOSE LANDING GEAR SHOCK ABSORBER OR ACCORDING TO THE MAIN-TENANCE AND OPERATION MANUAL ON CONDITION OF THE NOSE LANDING GEAR TYPE 793-HPK-185-19, 793-HPK-185-19-7

## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **NOTE**

Removals and installations of nose landing gear incl. dampers are also described in maintenance and operation manual on condition of the nose landing gear type 793-HPK-185-19, 793-HPK-185-19-7.

#### **REMOVAL OF NOSE LANDING GEAR**

##### **Preparatory Works**

- a) Remove engine cowlings (section 71-10-00).
- b) Lift the airplane by jacks to have nose wheel at least 10 cm (0.4 in) above the ground.
- c) Uncouple the nose wheel steering cables from the sleeve removing bolts (Fig. 32-32, item 13).
- d) Unscrew fixing screws of left instrument panel and tilt the panel to make access to upper suspension of nose landing gear.
- e) Remove wheel fairing and nose wheel (subsection 32-42-00).

##### **Removal of Nose Landing Gear**

#### **d) WARNING**

IT IS STRICTLY PROHIBITED TO HAMMER THE FILLING VALVE (Fig. 32-5, item 14) OF OLEO SHOCK ABSORBER.

- a) Remove from joints of brace (2) and twin brace (3) upon firewall and nose landing gear the cotter pins, nuts, and washers. Remove fitted bolts from the suspensions and remove braces.
- b) Remove nuts (11, 12) washer (13), support lid (10), and rubber damper (9) of upper nose landing gear suspension.
- c) Slide the nose landing gear with bushing of articulated joint (8) downwards.

#### **NOTE**

The removal of upper nose landing gear suspension may be made simpler by light hammering the upper edge of oleo shock absorber (4) via soft block.

- d) Install free parts of nose landing gear suspension (detail A) upon upper part of shock absorber.

**EFFECTIVITY: All**

**INSTALLATION OF NOSE LANDING GEAR**

- a) Grease articulated joint (Fig. 32-5, item 7) and joint bushing of upper suspension (subsection 05-21-00).
- b) Insert nose landing gear with articulated suspension joint (8) into the suspension in holder of nose landing gear to fuselage. Insert rubber damper (9), support lid (10) and washer (13) from upwards and screw the nuts (11, 12). Do not tighten the nuts at the moment.
- c) Fit nose landing gear braces (2, 3) into the suspensions of nose landing gear holder (1) and fuselage frame in front of firewall. Insert the fitted bolts into the brace joints. Provide bolts with washers and screw nuts upon them. Tighten the nuts with 23 to 29 Nm (17 to 21,4 lbft) torque and lock them with cotter pins.
- d) Tighten the nut (11) of upper suspension and lock it with locking nut (12).

**Final works**

- a) Install nose wheel and nose wheel fairing (subsection 32-42-00).
- b) Join nose wheel steering cables to sleeve by means of bolts (Fig. 32-32, item 13).
- c) Install the left instrument panel in place and screw in the panel fixing screws.
- d) Reinstall engine covers (section 71-10-00)
- e) Down the airplane from the jacks.

## **REMOVAL OF NOSE LANDING GEAR SHOCK ABSORBER**

### **Preparatory works**

- a) Remove engine cowlings (section 71-10-00).
- b) Lift the airplane nose by means of jack to permit sliding the shock absorber off.
- c) Remove if necessary nose wheel fairing and nose wheel (subsection 32-42-00, REMOVAL / INSTALLATION).

### **Removal of oleo shock absorber**

#### **WARNING**

IT IS STRICTLY PROHIBITED TO HAMMER THE FILLING VALVE (Fig. 32-8, item 9) OF OLEO SHOCK ABSORBER.

- a) Uncouple by unscrewing the nut and removal of bolt (6) the piston rod of shimmy damper from the sleeve (3).
- b) Remove sleeve (3) by removing two screws (5) and sliding the sleeve off with light hammering.
- c) Uncouple the nose wheel steering cables by removing screws (Fig. 32-32, item 13).
- d) Remove steering sleeve (Fig. 32-8, item 12) by unscrewing the nut and removal screws (11).
- e) Remove divided dust guard ring (16). Lever the ring from its embedding by screwdriver.
- f) Remove the nut (7) after cotter pin removal and unscrewing the nut by wrench No. 22.

#### **NOTE**

The wrench No. 22 is supplied with airplane tool kit.

- g) Slide the released oleo shock absorber (1) from the suspension (15). In order that the removal may be simplified it allowed to hammer at the upper part of shock absorber via soft block.

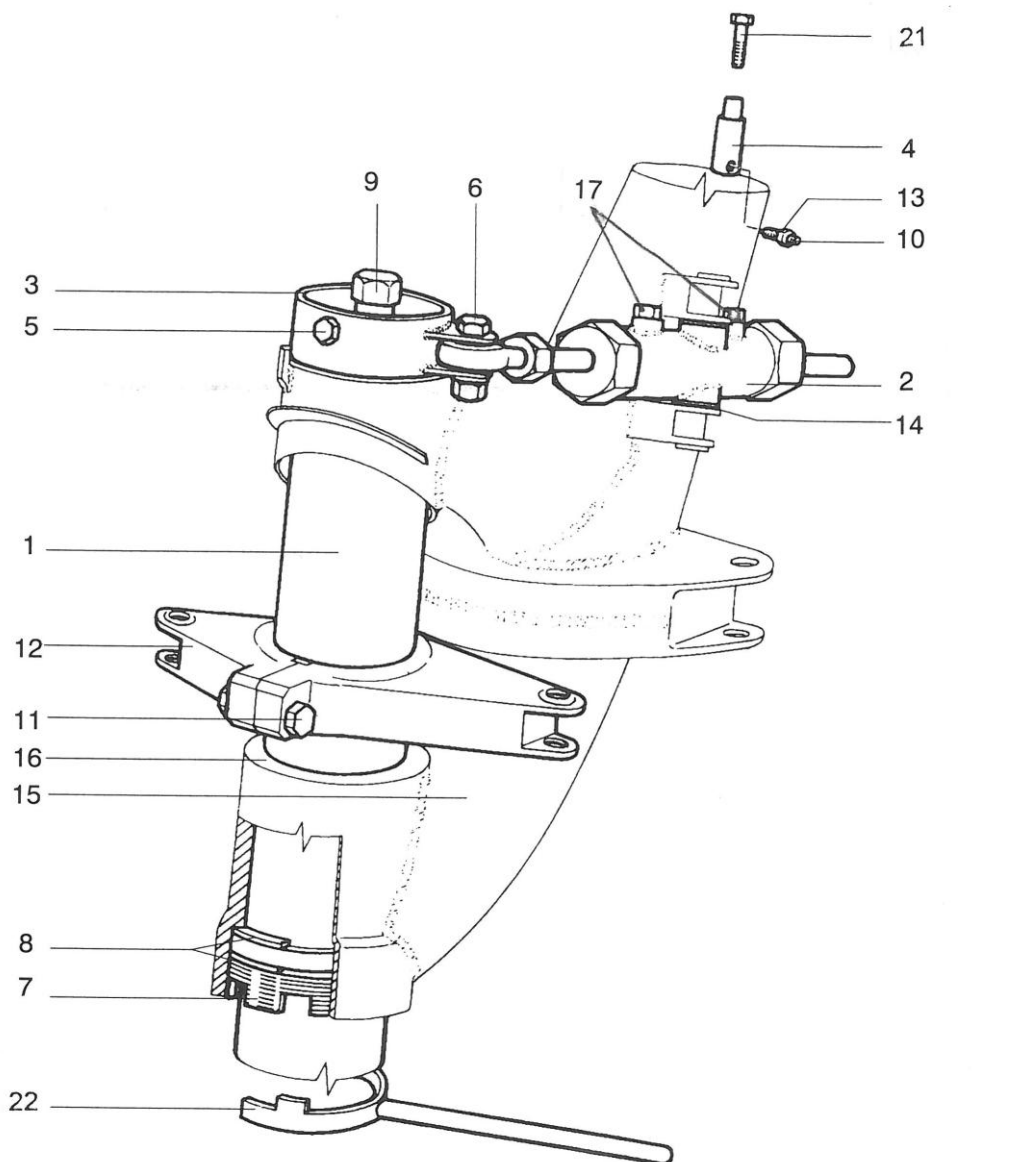
### **Removal of shimmy damper**

- a) Uncouple the piston rod of shimmy damper from sleeve (3) by unscrewing the nut and removal of bolt (6).
- b) Release nut (13) of locking bolts (10) and unscrew the locking bolts.
- c) Remove suspension pins (4) by means of removing screw (21).

#### **NOTE**

The removing screw (21) is delivered with airplane tool kit.

- d) Remove released shimmy damper (2) from its suspension.



- 1 ... nose landing gear oleo shock absorber
- 2 ... shimmy damper
- 3 ... sleeve
- 4 ... suspension pin
- 5 ... screw
- 6 ... bolt
- 7 ... nut
- 8 ... axial rings
- 9 ... filling valve

- 10 ... locking screw
- 11 ... bolt
- 12 ... steering sleeve
- 13 ... nut
- 14 ... washer
- 15 ... suspension
- 16 ... divided dust guard ring
- 17 ... plug

For information only:  
 21 ... removal screw (M6x60)  
 22 ... wrench No. 3 235 970

*Fig. 32-8 Joining the oleo shock absorber and shimmy damper of nose landing gear*

**EFFECTIVITY: All**



### **INSTALLATION OF NOSE LANDING GEAR SHOCK ABSORBER**

#### **Installation of oleo shock absorber**

- a) Clean the surface of oleo shock absorber (Fig. 32-8, item 1) and suspension (15), grease the bearing surfaces (subsection 05-21-00).
- b) Fix by grease the axial ring (8) to cylinder shoulder with teflon surface turned to shoulder.
- c) Insert oleo shock absorber (1) with care into the suspension (15) without axial ring (8) got jammed.
- d) Insert to the shoulder from downwards the axial ring (8) and screw the nut (7) in. Tighten the nut with wrench No. 22 and release it for about 45° to enable free turning of oleo shock absorber without axial play. Lock the nut (7) with cotter pin.
- e) Fill a quarter of space in lower suspension (15) with grease (subsection 05-21-00) and plug it with divided dust guard ring (16). Push the ring reces into the bottom of holder.
- f) Fit the steering sleeve (12) upon shock absorber (1) and install bolts (11) with washers and nuts. Lock the nuts with cotter pins.
- g) Join the cables of nose wheel steering to steering sleeve by bolts (Fig. 32-32, item 13).
- h) Sleeve installation (Fig. 32-8, item 3):
  - fit the sleeve upon shock absorber and insert screws (5) into the holes
  - provide bolts with washers and screw the self-locking nuts on the bolts.
- i) Join piston rod of shimmy damper by bolt (6) provided with washer and nut to sleeve (3). Lock the nut after tightening with cotter pin.

#### **Installation of shimmy damper**

- a) Clean the shimmy damper (2) surface and suspensions (15). Grease holes of suspension pins (4) (subsection 05-21-00).
- b) Fit the shimmy damper into the suspension (15) and remove axial play by spacers (14).
- c) Insert suspension pins (4) into the holes in shimmy damper and screw locking screws (10) in. Lock the locking screws by tightening the nuts (13).
- d) Join piston rod of shimmy damper to sleeve (3) by bolt (6) provided with washer and nut. Lock the nut with cotter pin.

#### **Final works**

- a) Install nose wheel with fairing (subsection 32-42-00, REMOVAL / INSTALLATION).
- b) Down the airplane from jack.

## **INSPECTION / CHECK**

### **NOTE**

Check of liquid quantity and plays in dampers and check of air pressure in damper is also described in maintenance manual on condition of the nose landing gear type 793-HPK-185-19, 793-HPK-185-19-7.

### **CHECK OF AIR PRESSURE IN OLEO SHOCK ABSORBER**

Check the air pressure in oleo shock absorber by means of filling fixture supplied with airplane tool kit (Fig. 12-1).

### **NOTE**

During pressure check the damping liquid may escape together with escaping air. Due to that check the air pressure only in case of excessive static stroke of oleo shock absorber and at intervals according to section 05-22-00.

#### Procedure of check:

- a) Unload the nose landing gear so that the piston rod of shock absorber extends.
- b) Unscrew cap nut (Fig. 12-1, item 2) of filling valve.
- c) Screw the nut (3) of filling fixture upon the filling valve (1). Make sure the control knob (4) is screwed fully out and plugging nut (6) screwed upon filling fixture.
- d) Screw the control knob (4) in to open valve (1).
- e) Check the pressure reading of fixture pressure gauge (5) and refill the compressed air if it is less than 360 kPa (52 p.s.i.) according to section 12-10-00, Filling the air pressure to oleo shock absorber).
- f) Screw the control knob (4) out to shut the valve (1).
- g) Unscrew cap nut (3) of filling valve (1).
- h) Check tightness of filling valve by soap water. No bubble should be detected within 10 minutes. Replace filling valve if untaught or replace gasket under the valve.
- i) Provide filling valve (1) with plug nut (2) and lock it with safety wire.

### **CHECK OF LIQUID QUANTITY IN OLEO SHOCK ABSORBER**

- a) Lift the airplane on jacks.
- b) Deflate the oleo shock absorber through the filling fixture (Fig. 12-1) slowly – not to be dumping liquid drifted away with air.
- c) Unscrew the filling valve (Fig. 32-8, item 9) of the shock absorber body and remove the seal ring.
- d) Push the piston rod to upper extreme position by slow smoothly motion and check whether liquid in the shock absorber reaches an edge of the filling opening.
- e) If necessary, refill the shock absorber with dumping liquid according to procedure given in section 12-10-00.
- f) Screw in the filling valve (1) with new gasket, fill the shock absorber with air and check tightness if the filling valve (section 12-10-00).

**EFFECTIVITY:** All

### CHECK OF LIQUID QUANTITY IN SHIMMY DAMPER

- Unscrew the plugs (Fig. 32-8, item 17) of the shimmy damper.
- Check whether liquid in the shimmy damper reaches edges of filling necks.
- If necessary, refill the shimmy damper with the liquid according to procedure given in section 12-10-00.
- Screw the plugs into the filling necks.

### CHECK OF PLAY IN OLEO SHOCK ABSORBER

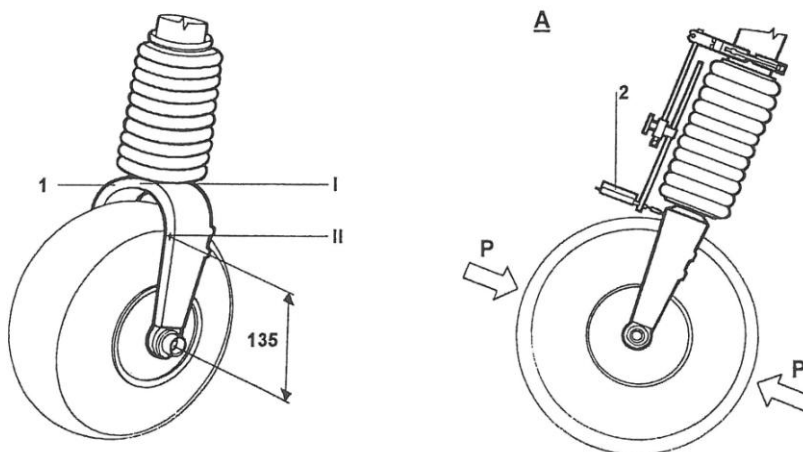
#### Procedure of Check

- Lift the airplane by jacks so that the nose wheel is not in touch with the ground.
- Check axial play of piston rod of oleo shock absorber and remove detected play by tightening the nut (Fig. 32-8, item 7) with wrench (22) such a way that the piston rod is without axial play but it revolves lightly.
- Check the forward play of shock absorber piston rod at the upper part of nose wheel fork (Fig. 32-6, point I) with inclinometer when acting upon fork with 100 N (22.5 lbf) force in the direction opposite to flight direction. Under this condition the maximum play may be 0.8 mm (0.03 in).

#### Recommendation

Fix the inclinometer to nose landing gear oleo shock absorber according to Fig. 32-9.

- Check revolving play by means of inclinometer joined to side of nose landing gear wheel fork (Fig. 32-9, point II) upon alternating action of about 100 N (22.5 lbf) force to tire sides perpendicularly. The revolving play under this condition may be maximum 0.5 mm (0.02 in).
- Repair of excessive fwd and revolving plays may be carried out either by oleo shock absorber manufacturer or by authorized repair shop.



A ... example of piston rod fwd play measurement

P ... action of alternating force

I ... spot for measurement of fwd piston rod play

II ... spot for measurement of piston rod revolving play

1 ... fork of nose landing gear

2 ... inclinometer

*Fig. 32-9 Measurement of play of oleo shock absorber*

**EFFECTIVITY:** All

### APPROVED REPAIRS

#### REPAIR OF NOSE LANDING GEAR

Fault	Remedy
1) The air pressure escapes from nose landing gear oleo shock absorber.	Drain the air pressure from the oleo shock absorber and replace faulty filling valve or filling valve gasket or "O" ring.
2) The damping fluid escapes from oleo shock absorber and/or shimmy damper. It may be detected by small springs of fluid upon the piston rod. Lightly damp piston rod surfaces are of no significance.	Defective sealing collars or special sealing in oleo shock absorber or defective sealing in shimmy damper replace allways behind new special sealling BUSAK+SHAMBAN in oleo shock absorber or behind new sealing in shimmy damper.
3) Damaged paint of nose landing gear	Grind defects with fine emery paper and renew paint (2x S 2013/1000).
4) Faulty leather cover of oleo shock absorber.	Replace defective cover: - Remove oleo shock absorber, replace leather cover and reinstall shock absorber again.
5) Dented holes in nose landing gear brace suspension.	Repair fault according to paragraph "REPAIR OF HOLES IN BRACE SUSPENSIONS OF NOSE LANDING GEAR".

#### NOTE

Repair procedures are described in maintenance and operation manual on condition of the nose landing gear type 793-HPK-185-19, 793-HPK-185-19-7.

#### NON-APPROVED REPAIRS

1) Callosity from balls, material rolled-up in grooves on oleo shock absorber piston rod.	Perform the oleo shock absorber disassembly from nose landing gear fixing. Send oleo shock absorber with wheel axis to the manufacturing factory AXL, Inc. Semily, Czech republic for repair.
2) Lenght of piston rod extension from damper valve to cover ring is greater than 194 mm and at ejection of piston rod is hear metallic noise.	Perform the oleo shock absorber disassembly from nose landing gear fixing. Send oleo shock absorber with wheel axis to the manufacturing factory AXL, Inc. Semily, Czech republic for repair.
3) Exceeding of permitted forward clearance and revolving clearance of oleo shock absorber piston rod	Perform the oleo shock absorber disassembly from nose landing gear fixing. Send oleo shock absorber with wheel axis to the manufacturing factory AXL, Inc. Semily, Czech republic for repair.
4) Cracks on nose landing gear fixing.	Perform the nose landing gear disassembly from aircraft. Send nose landing gear with wheel axis to the manufacturing factory AXL, Inc. Semily, Czech republic for repair.

EFFECTIVITY: All

### **REPAIR OF HOLES IN BRACE SUSPENSIONS OF NOSE LANDING GEAR**

General instructions for reaming of holes are issued in subsection 20-21-00.

Instructions for grinding the internal ring of articulated bearing (Fig. 32-10, item 9; 15):

- turn internal ring to suitable position perpendicular to external ring and replace it
- grind the hole in internal ring to the same diameter the hole in nose landing gear holder (5) has been reamed.
- clean and grease the internal ring and insert it into the external ring of articulated bearing.

Instructions for replacement of articulated bearing (Fig. 32-10, item 7; 13) with border bushing (11; 17) are issued in subsection 20-22-00.

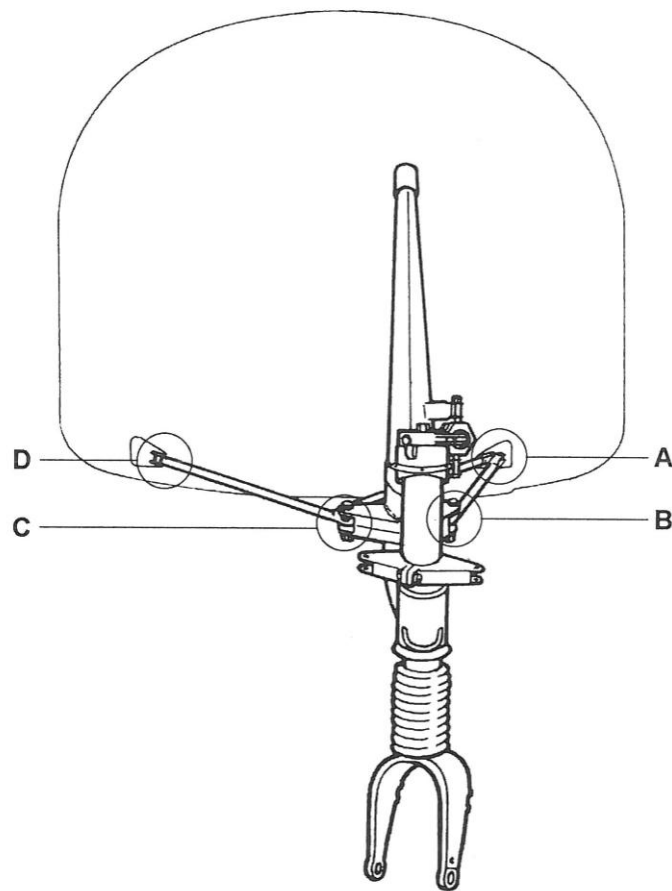
Hole in suspension (Obr. 32-10, poz. 1; 3; 4; 5; 18; 20)		Reamer	Caliper
Original dimension	Ø 8 H8	-----	-----
Dimension after repair	Ø 8,1 H8	Ø 8,1 H7 000-224-5001	Ø 8,1 H7 000-511-1004
	Ø 8,2 H8	Ø 8,2 H7 000-224-5002	Ø 8,2 H7 000-511-1005
	Ø 8,3 H8	Ø 8,3 H7 000-224-5003	Ø 8,3 H7 000-511-1006
	Ø 8,4 H8	Ø 8,4 H7 000-224-5004	Ø 8,4 H7 000-511-1007

Suspension bolt (Fig. 32-10, item 2; 6; 12; 19)		Number of bolt (Fig. 32-10)		
		item 2; 19	item 6	item 12
Original dimension	Ø 8 f8	8 x 27 ONL 3120.14	8 x 43 ONL 3120.14	8 x 49 ONL 3120.14
Dimension after repair	Ø 8,1 f8	8,1 x 27 MoN 1167	8,1 x 43 MoN 1167	8,1 x 49 MoN 1167
	Ø 8,2 f8	8,2 x 27 MoN 1167	8,2 x 43 MoN 1167	8,2 x 49 MoN 1167
	Ø 8,3 f8	8,3 x 27 MoN 1167	8,3 x 43 MoN 1167	8,3 x 49 MoN 1167
	Ø 8,4 f8	8,4 x 27 MoN 1167	8,4 x 43 MoN 1167	8,4 x 49 MoN 1167

**EFFECTIVITY:** All

Hole in suspension (Fig. 32-10, item 10; 16)		Reamer	Caliper
Original dimension	Ø 18 H7	-----	-----
Dimension after repair	Ø 18,1 H7	Ø 18,1 H7 000-224-1025	Three-point inside micrometer caliper
	Ø 18,2 H7	Ø 18,2 H7 000-224-1026	
	Ø 18,3 H7	-----	
	Ø 18,4 H7	-----	

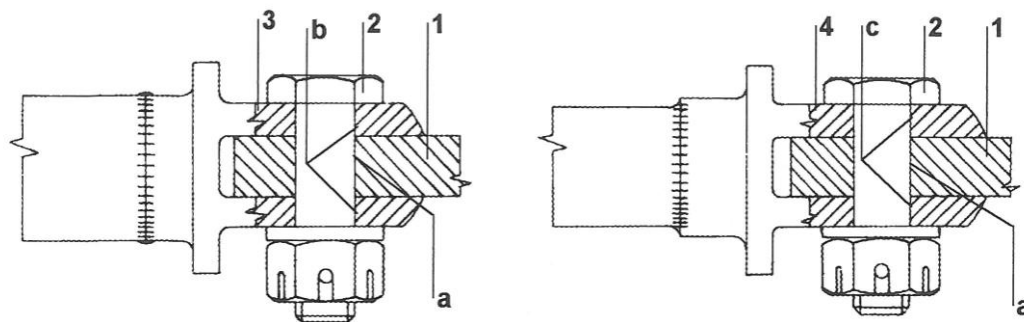
Bordering bushing of suspension (Fig. 32-10, item 11; 17)		Number of bordering bushing
Original dimension	Ø 18 h8	Z 42.5210-01.03
Dimension after repair	Ø 18,1 h8	Z 42.5210-01.17
	Ø 18,2 h8	Z 42.5210-01.18
	Ø 18,3 h8	Z 42.5210-01.19
	Ø 18,4 h8	Z 42.5210-01.20



- A ... suspension of brace and twin brace
- B ... articulated brace suspension
- C ... articulated twin brace suspension
- D ... suspension of twin brace

*Fig. 32-10 Dimensions, allowances and plays in nose landing gear brace suspension  
(page 1 of 4)*

**A**

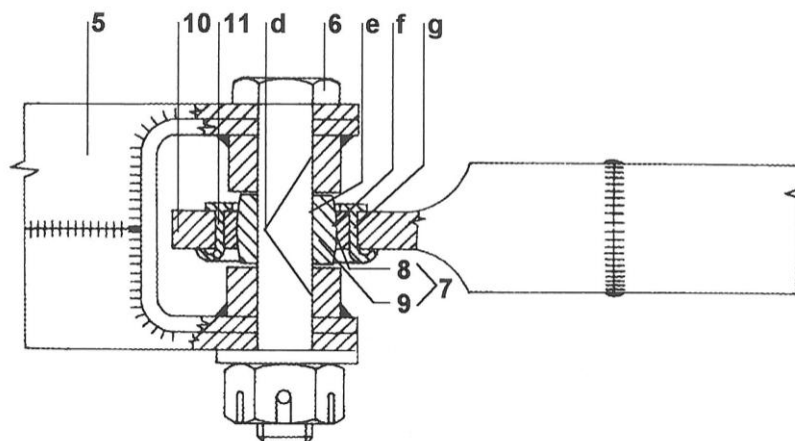


Joint	Item	Name	Dimensions (mm)					
			Original			Operation	Repairs	
			D1	T1	V min./max	T2 max.	D2 max.	K min.
a	1	Suspension	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	7,0
	2	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
b	3	Fork of twin brace	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	
	2	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
c	4	Fork of brace	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	
	2	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	

*Fig. 32-10 Dimensions, allowances and plays in nose landing gear brace suspension  
(page 2 of 4)*



**B**



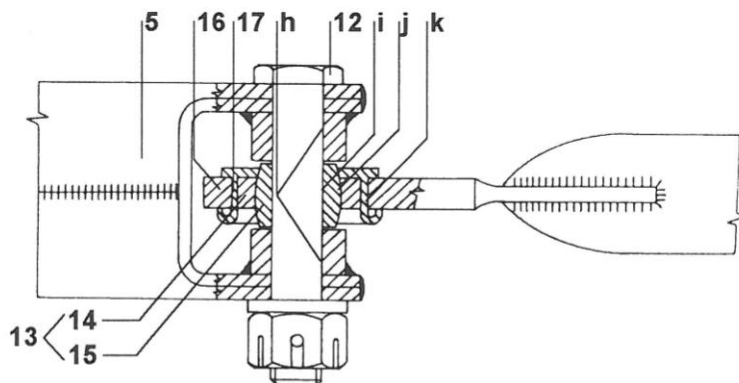
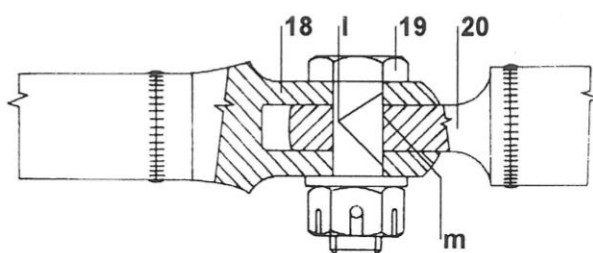
Joint	Item	Name	Dimensions (mm)					
			Original			Operation	Repairs	
			D1	T1	V min./max.	T2 max.	D2 max.	K min.
d	5	Holder of nose landing gear suspension	Ø 8 H8	+ 0,022 0	0,013 0,057	+ 0,030	Ø 8,4 H8	
	6	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
e	7	Articulated bearing	Ø 8 J8	+ 0,012 - 0,010	0,003 0,047	+ 0,020	Ø 8,4 J8	
	6	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
f	8	Bearing external ring	Ø 13 H8	+ 0,027 0	0 0,054	+ 0,040		
	9	Bearing internal ring	Ø 13 h8	0 - 0,027		- 0,040		
g	10	Brace eye	Ø 18 H7	+ 0,027 0	R	+ 0,040	Ø 18,4 H7	5,5
	11	Border bushing	Ø 18 h8	0 - 0,027			Ø 18,4 h8	

Fig. 32-10 Dimensions, allowances and plays in nose landing gear brace suspension  
(page 3 of 4)

**EFFECTIVITY:** All

**32-20-00**

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**C**

**D**


Joint	Item	Name	Dimensions (mm)					
			Original			Operation	Repairs	
			D1	T1	V min./max	T2 max.	D2 max.	K min.
h	5	Holder of nose landing gear suspension	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	
	12	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
i	13	Articulated bearing	Ø 8 J8	+ 0,012 - 0,010	<u>0,003</u> 0,047	+ 0,020	Ø 8,4 J8	
	12	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
j	14	External bearing ring	Ø 13 H8	+ 0,027 0	<u>0</u> 0,054	+ 0,040		
	15	Internal bearing ring	Ø 13 h8	0 - 0,027		- 0,040		
k	16	Twin brace eye	Ø18 H7	+ 0,027 0	R	+ 0,040	Ø 18,4 H7	5,5
	17	Border bushing	Ø 18 h8	0 - 0,027			Ø 18,4 h8	
l	18	Fork	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	
	19	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	
m	20	Suspension	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,030	Ø 8,4 H8	7,0
	19	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,055	Ø 8,4 f8	

Fig. 32-10 Dimensions, allowances and plays in nose landing gear brace suspension  
(page 4 of 4)

**EFFECTIVITY: All**

# **WHEELS AND BRAKES**

## **DESCRIPTION AND OPERATION**

The wheel are made from aluminium alloy. The are split to two parts joined together by bolts, provided with washers and nuts, to simplify wheel disassembly and assembly. The wheels are provided with wheel fairings.

The main landing gear wheels are equipped with hydraulic actuated disk brakes provided with automatic adjustment of brake play. The short term braked parking is enabled by parking brakes.

**EFFECTIVITY:** All

**32-40-00**

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## **MAINTENANCE**

### **INSPECTION / CHECK**

#### **CHECK OF TIRES**

1. Tire outer appearance check

Replace tire in case of its damage or excessive wear, at least when the play is visible.

#### **Recommendation**

Remove single sided irregularly worn tire from one wheel and install it in opposite direction to the other wheel to ensure regular tire wear and improved tire life time.

2. Check of tire skidding

#### **NOTE**

Each tire and rim are mutually marked with red strip to enable tire skidding check.

#### **Procedure in case the tire skidding is detected**

- a) Remove the wheel with tire and tube from the airplane.
- b) Check the tube intactness especially around the inflation valve and intactness of tire including tire bead. Replace faulty tube and/or tire.
- c) Assemble the wheel and install it to the airplane.  
Make sure during assembly to set the tire with its red mark opposite to red mark upon rim or remove old red marks and mark out both tire and rim with new red strip mark.

## RENEWAL OF PAINT

### RENEWAL OF PAINT OF WHEELS AND BRAKES

General instructions for paint repair are issued in subsection 51-72-00.

#### **1. Repair of paint of parts made from magnesium alloys**

- wheel hub (Fig. 32-11, item 1) and removable rim (2) - wheel K 22-0100-7
- left side of wheel (Fig. 32-19, item 1) and right side of wheel (2) - wheel K 23-0000-7
- brake body (Fig. 32-24, item 1) produced up to the 4<sup>th</sup> series of K 22-1200-7 brakes.

#### **NOTE**

The brake series is issued in brake manufacturer label.

Repair paint of K 22-1200-7 brake from 5<sup>th</sup> series on according to Point 2.

- a) Degrease the faulty spots after grinding.
- b) Pickle the repaired spots with solution of following composition:

- selenious acid ( $H_2SeO_3$ )	18 g (0,04 lb)
- sodium dichromate ( $Na_2Cr_2O_7$ )	9 g (0,02 lb)
- water	1 l (0,26 US gal)

Solve each agent independently and mix them after solution. This solution may be stored in bottle closed with ground joint neck at + 10 °C (50 °F) for three month.  
Apply above solution upon repaired spots and let it act for about 5 minutes.
- c) Rinse the repaired spots with water, blow them with compressed air and dry them at 55 to 65 °C (131 to 149 °F).
- d) Paint the spots with S 2003/9109 paint or similar.

#### **2. Paint repair of other parts made from light alloys or steel (except magnesium alloys)**

- a) Grind and degrease defective spots.
- b) Apply single layer of S 2003 primer paint or two layers of fast drying, e.g. S 2029/9110 lacquer of aluminium shade.

**EFFECTIVITY:** All

# WHEELS OF MAIN LANDING GEAR

## DESCRIPTION AND OPERATION

### WARNING

THE AIRPLANE SHOULD BE EQUIPPED WITH THE SAME SET OF WHEELS AND TIRES ON BOTH MAIN LANDING GEAR WHEELS.

The airplane main landing gear may be equipped with following wheels, tires and tubes:

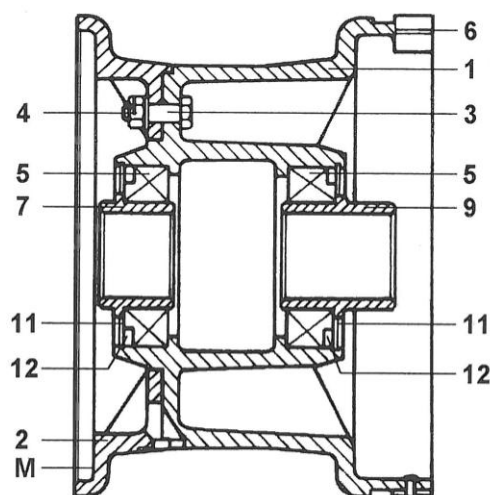
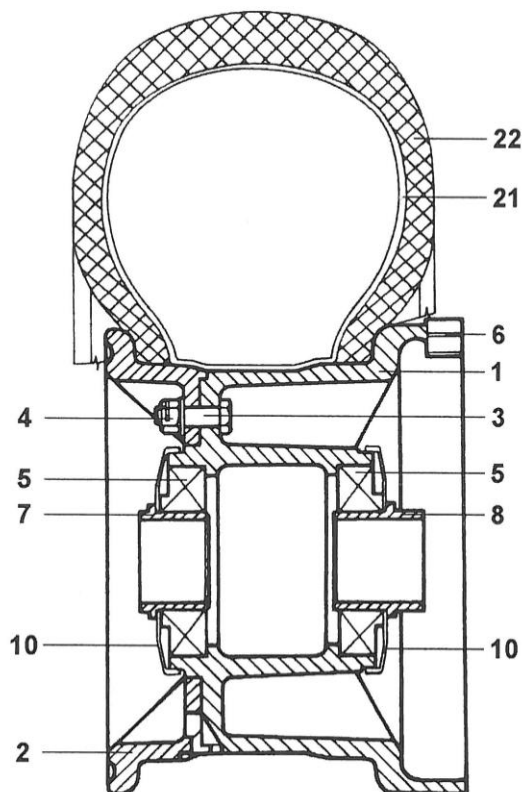
Marking		
Wheel	Tube	Tire
K 22-0100-7 or K 22-3100-7	MICHELIN 6.00-6 or GOODYEAR 6.00-6 or MITAS 420x150	MITAS 420x150 (Model 2) or GOODYEAR 6.00-6.5 (Part.No. 607 C 41-1)

Inflation pressure of tires MITAS and GOODYEAR of main landing gear:  $250 \pm 10$  kPa ( $36 \pm 2$  p.s.i.).

The wheel hub (Fig. 32-11, item 1) is joined with removable rim (2) by six bolts (3) provided with washers and nuts (4). The wheel are fit upon two bearings (5) protected against dirt penetration. The elongated wheel rim hub (1) is provided with riveted drivers of brake disk (6).

K 22-0100-7 wheel

K 22-3100-7 wheel



- 1 ... wheel hub
- 2 ... removable rim
- 3 ... bolts (6 pcs)
- 4 ... nuts
- 5 ... bearing
- 6 ... brake disk driver
- 7 ... bushing
- 8 ... bushing
- 9 ... insertion piece
- 10 ... lid
- 11 ... locking ring
- 12 ... sealing
- M ... red K 22-3100-7 wheel heaviest spot mark (without tire)

For information only:

- 21 ... tube
- 22 ... tire

*Fig. 32-11 Cut-away view of main landing gear wheel*

**EFFECTIVITY:** All

**32-41-00**

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## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **REMOVAL OF WHEEL OF MAIN LANDING GEAR**

##### **Preparatory works**

a) Lift the airplane by jacks to have wheels at least 5 cm above the ground.

##### **1. Removal of fairing of man landing gear wheel**

- a) Unscrew screws (7) to remove scraper (Fig. 32-12, item 4).
- b) Unscrew screws (6) from the wheel fairing holder (2).
- c) Unscrew screw (5) from the nut (Fig. 32-13, item (3) in wheel axle and remove wheel fairing (Fig. 32-12, item 1).

##### **2. Removal of wheel of main landing gear**

- a) Bend off the safety tap (Fig. 32-13, item 2) from the nut edge (3).
- b) Unscrew nut (3) from wheel axle and remove washer (1).
- c) Remove wheel from the wheel axle of main landing gear.

##### **3. Disassembly of wheel set**

- a) Deflate tire.
- b) Remove internal bearing rings:
  - K 22-0100-7 wheel:
    - remove bushings (Fig. 32-11, item 7; 8) with lids (10) and internal bearing rings from the wheel.
  - K 22-3100-7 wheel:
    - remove safety rings (11), sealing (12), bushing (7) with internal bearing ring and insertion piece (9) from the wheel.
- c) Unscrew nuts (4) of bolts (3) by means of two wrenches and remove nut, bolt and washers from the wheel.

##### **Recommendation**

Let one or two bolts (3) tightened until the beads are loose from rim. Remove last bolt(s).

- d) Push the tire beads from the rim.

##### **Recommendation**

Use K 47-7130.00 or K 51-7110.00 fixture to push off the tire beads from wheel rim. It is recommended to push the GOODYEAR 6.00-6.5 tire from the K 22-0100-7 wheel rim by removing fixture that is pushing the bead from the rim all along the wheel periphery. In order that the beads may be pushed from the rim it is necessary to use removal drum of at least 75 mm (2,95 in) depth (Fig. 32-14, dimension A)

**EFFECTIVITY: All**



Procedure of use of K 47-7130.00 fixture:

- place wheel on base (Fig. 32-14, item 5) so that the guide pin (4) passes through wheel axis
- set the lever (3) and pusher (2) to initial position according to tire dimension to have the pusher in vertical position and lever (3) is inclined to base plane at 15° to 30°
- push off gradually the tire bead by applying force upon lever (3) until the bead is free of rim all along the periphery
- turn the wheel round to push off the wheel bead on the other side of wheel.

Procedure of use of K 51-7110.00 fixture:

- put the wheel with tire to the stand (Fig. 32-14b, item 6) so that the removable side rim is up (effective only for K 22-3100-7 wheel).
- put disc (3) or (4).
- tighten with the bolt (1) to loose the head along the whole periphery.
- unscrew the bolt (1); remove the rim
- turn the wheel round and repeat the procedure on the opposite side.

- e) Remove remaining bolts (Fig. 32-11, item 3) with nuts (4) and washer.
- f) Remove gradually wheel hubs (1), removable rims (2) and tube.
- g) Wash the tire by detergent water solution or soap. Wash remaining disassembled parts with suitable degreasing agent and dry by compressed air.

### **NOTE**

In case the wheel check is not carried out immediately after disassembly it is recommended not to degrease the internal bearing ring with cage and tapered rolls. Wash the external bearing rings and as soon as dried with compressed air preserve them with grease.

Wash the preserved bearings immediately before check with suitable degreasing agent and dry them with compressed air.

- h) Remove, if needed, the external bearing ring.

### **Recommendation**

Use K 49-7110.00 fixture to remove external bearing ring:

- heat the wheel part with external bearing ring (Fig. 32-15, item 11) in electric oven to max. 120°C (248 °F)
  - insert support (1) through the center wheel section and fit bolt (3), screwed in transversal piece (2), into the recess of support
  - insert teeth of remover (5) under the external bearing ring (11) and turning the bolt (3) by rod (4) get the tooth of remover tight to the external bearing ring
  - center the fixture properly and remove while turning the bolt (3) uniformly the external bearing ring from the wheel section.
- i) Mark the new bearing ring before installation by electric marker the same way as the original one, i.e. to be identical with wheel hub it is installed in. Press the external bearing into the pertinent heated wheel section up to the very bottom of bearing recess.

EFFECTIVITY: All

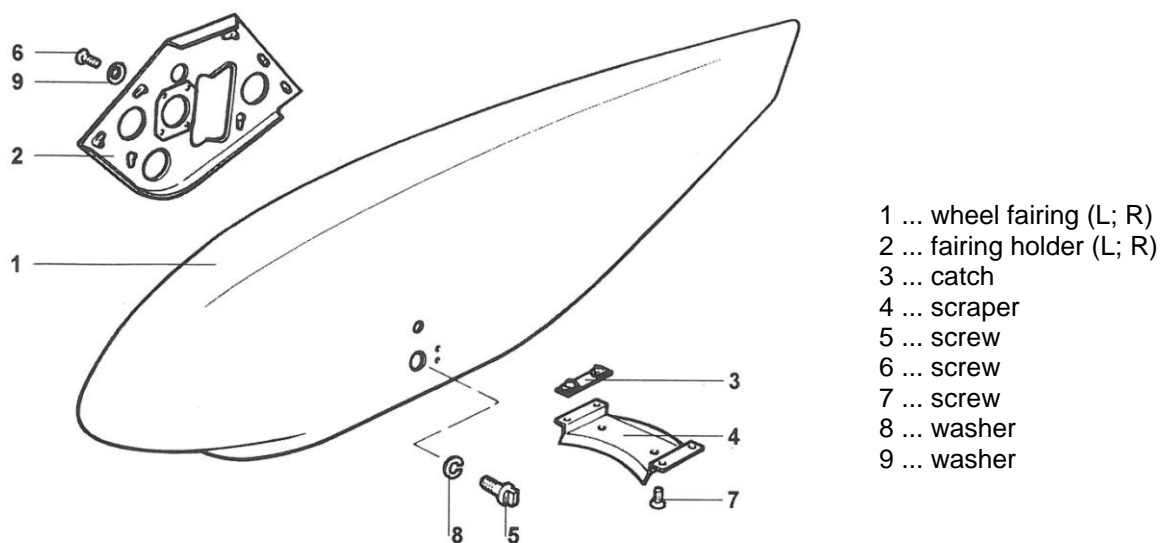


Fig. 32-12 Fairing of main landing gear wheel  
(left wheel fairing in view)

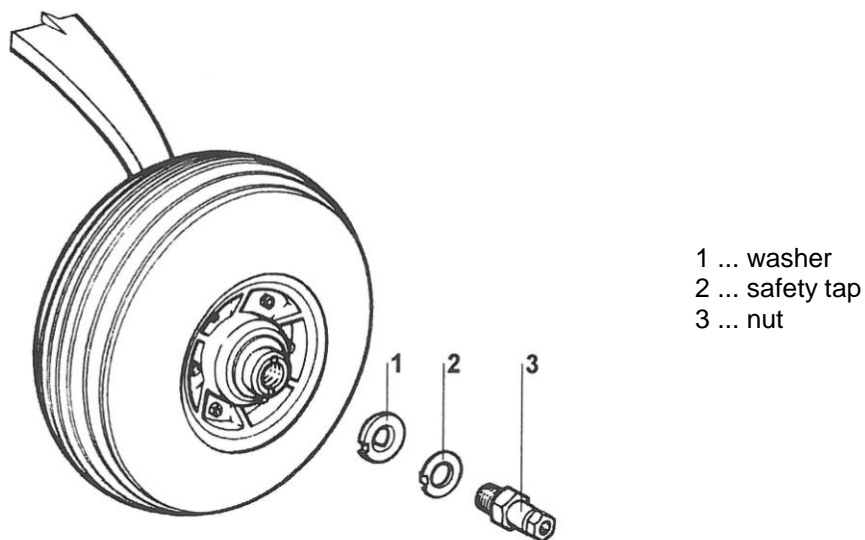
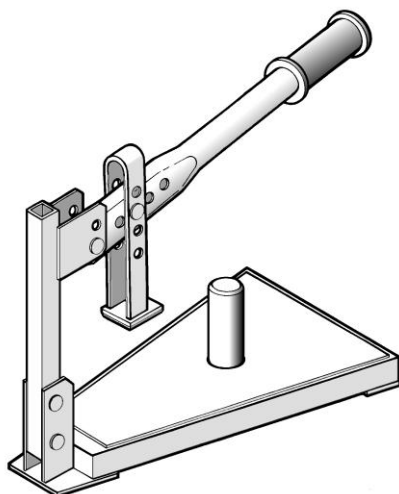


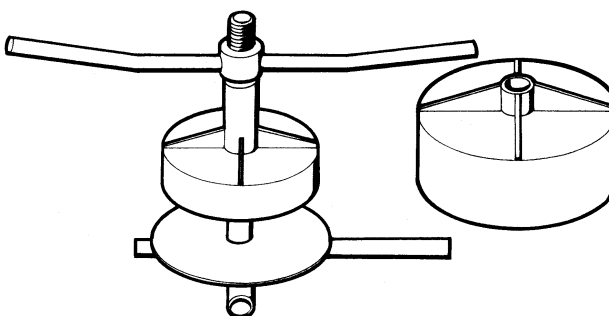
Fig. 32-13 Wheel of main landing gear

A K 47-7130.00 FIXTURE



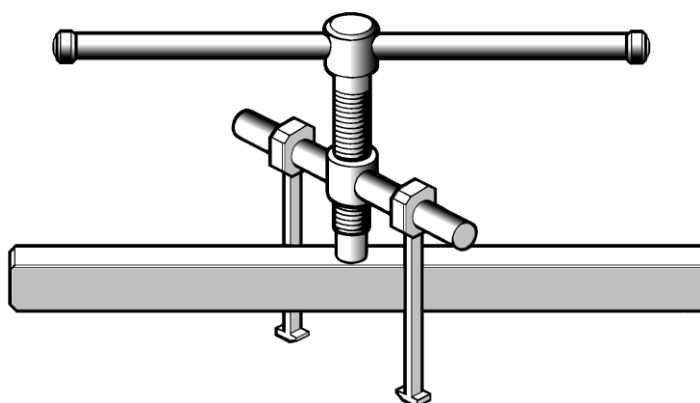
- 1 ... web
- 2 ... push bar
- 3 ... lever
- 4 ... pilot
- 5 ... plate

B K 51-7110.00 FIXTURE



- 1 ... nut
- 2 ... washer
- 3 ... disk for K 22 wheels
- 4 ... disk for K 51 wheels
- 5 ... tire
- 6 ... stand

Fig. 32-14 Tire removing fixtures



- |                         |                              |
|-------------------------|------------------------------|
| 1 ... support           | 5 ... puller (2 pcs)         |
| 2 ... transversal piece | For information only:        |
| 3 ... bolt              | 11 ... external bearing ring |
| 4 ... rod               |                              |

Fig. 32-15 K 49-7110.00 fixture for removing the external bearing ring

**EFFECTIVITY:** All

### INSTALLATION OF WHEEL OF MAIN LANDING GEAR

#### 1. Assembly of wheel set

##### CAUTION

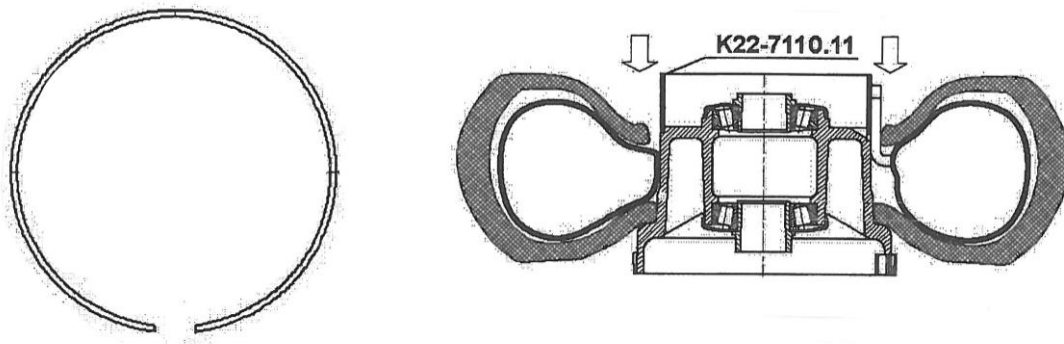
MAKE SURE DURING WHEEL ASSEMBLY TO HAVE THE NUMBER INSRIBED UPON INTERNAL BEARING RING THE SAME AS THAT INSCRIBED UPON WHEEL HUB THE BEARING IS INSTALLED TO.

THE TIRE INSTALLED UPON K 22-3100-7 WHEEL SHOULD BE SET WITH ITS RED MARK (LIGHTEST SPOT OF TIRE) OPPOSITE TO RED MARK (Fig. 32-11, mark M) UPON REMOVABLE RIM (HEAVIEST SPOT OF WHEEL).

- a) Apply talc upon the internal surface of tire.
- b) Insert the tube into the tire and place the tire upon clean flat place.
- c) Inflate tube partially.
- d) Insert removable rim (Fig. 32-11, item 2) into the tire such a way that the inflation valve of tube passes through hole for valve.

##### NOTE

To facilitate the assembly, there is a possibility to insert K 22-7110.11 auxiliary ring hub (1) shoulder – locate ring slit to tube. It is possible to order K 22-7110.11 auxiliary ring at airplane manufacturer.



- e) Press the tire down to get tire bead below division plane of the wheel and keep pressed down.
- f) Take off auxiliary ring (if used).
- g) Fit the tire with removable rim (2) upon the wheel hub (1) that is placed with the brake disk drivers (6) downwards.
- h) Turn the assembled wheel round to have the wheel hub upwards and insert two bolts (3) with greased threads into the holes of wheel hub and removable rim (2).
- ch) Push the removable rim and wheel hub one to the other, provide bolts (3) with washers and screw the nuts (4) upon bolts. Install remaining four bolts (3).
- i) Tighten the nuts (4) uniformly crosswise with 15 to 18 Nm (11,0 to 13,2 lbft) torque.

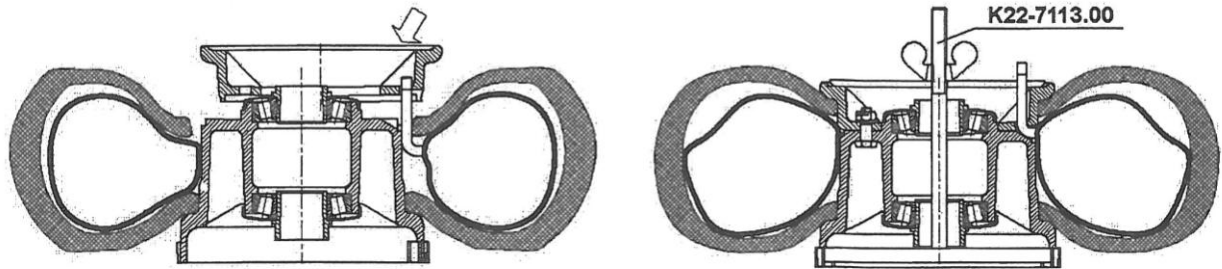
##### Recommendation

Use MoN 1931 wrench with Nm-scale or MoN 1931.1 wrench with lbft-scale to tighten nuts (4).

EFFECTIVITY: All

### **NOTE**

To facilitate the screw assembly, it is possible to use K 22-7113.00 fixture to fasten removable side rim (2) to wheel hub (1). It is possible to order K 22-7113.00 fixture at airplane manufacturer.



- j) Inflate tire to  $250 \pm 10$  kPa ( $36 \pm 2$  p.s.i.) operation pressure and check serviceability of inflation valve.
- k) Degrease the threads of bolts (3) and nuts (4) and paint them with, e.g. S 2003 primer and then with 2029/9110 aluminium shade fast drying lacquer.
- l) Mark out tire position upon wheel rim by 10x30 mm (0,4x1,2 in) strip made by epoxy lacquer to detect tire skidding in airplane operation.
- m) Clean bearings and grease them. Install internal bearing rings into the wheel as follows:
  - K 22-0100-7 wheel:
    - insert bushings (7; 8) into the wheel with internal bearing rings and lids (10).
  - K 22-3100-7 wheel:
    - insert bushings (7) and insertion pieces (9) with internal bearing rings into the wheel
    - cover bearing (5) by sealing (12)
    - lock the sealing (12) by safety rings (11).

### **NOTE**

In case of storing the assembled wheel before its installation to airplane it is necessary to protect bearings against dirt.

## **2. Installation of main landing gear wheel**

- a) Apply grease in light layer upon wheel axle (subsection 05-21-00).
- b) Insert wheel upon wheel axle so that the brake disc drivers (Fig. 32-24, item 3) engage to drivers of wheel hub (11).
- c) Insert washer (Fig. 32-13, item 1) and tap washer (2) upon wheel axle.
- d) Screw nut (3) into the wheel axle.
- e) In order that the axial play in bearings may be removed it is necessary to tighten the nut (3) until the resistance to wheel revolving is detectable and then the nut should be released for  $10^\circ$  to  $17^\circ$ , i.e. for 4 to 6 mm (0,16 to 0,24 in) at the periphery of nut head. This ensures bearing play from 0,04 to 0,07 mm (0,0016 to 0,0028 in).
- f) Make sure the wheel revolves freely and then lock the nut (3) by bending the tab washer (4).

**EFFECTIVITY:** All

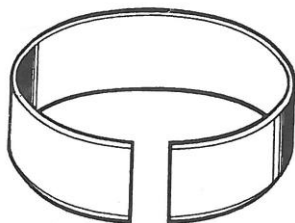
### 3. Installation of fairing of main landing gear wheel

- a) Fit wheel fairing (Fig. 32-12, item 1) to wheel, and join scraper (4) to holders (3) by screws (7).
- b) Fix the wheel fairing (1) to the fairing holder (2) by screws (6) with washers (9) and to the nuts (Fig. 32-13, item 3) in wheel axis with bolt (Fig. 32-12, item 5) provided with washers (8). Lock the bolt (5) with safety wire to the hole in wheel fairing.
- c) Check gap between scraper (4) and wheel that should be from 8 to 10 mm (0,32 to 0,40 in).

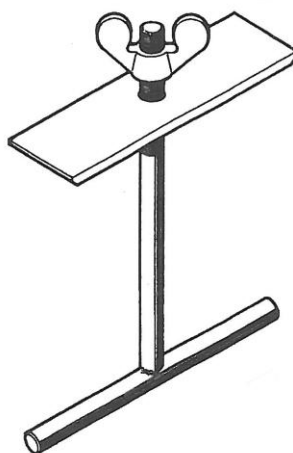
#### Final works

- a) Down the airplane to ground.

A K 22-7110.11 FIXTURE



B K 22-7113.00 FIXTURE



*Fig. 32-15a Facilitate the assembly fixtures*

INTENTIONALLY LEFT BLANK

**EFFECTIVITY: All**

**32-41-00**

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2011-02-02

## INSPECTION / CHECK

### CHECK OF CONVERGENCE OF MAIN LANDING GEAR

#### Preparatory works

- Remove bottom fuselage panel (Fig. 52-5, item 24) and fairings of main landing gear wheels (subsection 32-41-00, REMOVAL / INSTALLATION).
- Lift the airplane by fuselage jacks and set it to horizontal position. In longitudinal direction use for leveling NiB points 2 and 3 and in lateral direction use NiB 6 (Fig. 08-3).

#### NOTE

Check wheel convergence in shut hangar.

#### Procedure of convergence measurement of main landing gear wheels

- Mark out the longitudinal axis of airplane as follows:
  - fix holder (Fig. 32-16, item 1) by nut to front bolt of middle bushings (11) of pedal mechanism
  - suspend clip (2) into the hole in tail skid hole.

#### NOTE

Make holder (1) from the sheet and clip (2) from string according to details A a B.

- suspend plumb bobs (3) upon holder (1) and clip (2)
  - stretch string between plumb bobs (4) to pass under the plumb bob tips (3).
- Fit the ruler (6) upon the wheel rim to be in touch with its stops with peripheral points of rim while in horizontal level.
  - Measure the distance of end points of ruler (a, b) from longitudinal axis of airplane.
  - Calculate "a - b" difference and determine convergence angle  $\alpha$  from below table:

a-b		$\alpha$	a-b		$\alpha$	a-b		$\alpha$	a-b		$\alpha$	a-b		$\alpha$
mm	in		mm	in		mm	in		mm	in		mm	in	
1	0,04	0° 03'	9	0,35	0° 31'	17	0,67	0° 58'	25	0,98	1° 26'	33	1,30	1° 53'
2	0,08	0° 07'	10	0,39	0° 34'	18	0,72	1° 01'	26	1,02	1° 29'	34	1,34	1° 57'
3	0,12	0° 10'	11	0,43	0° 38'	19	0,76	1° 05'	27	1,06	1° 33'	35	1,38	2° 00'
4	0,16	0° 14'	12	0,47	0° 41'	20	0,80	1° 09'	28	1,10	1° 36'	36	1,42	2° 04'
5	0,20	0° 17'	13	0,51	0° 44'	21	0,84	1° 12'	29	1,14	1° 40'	37	1,46	2° 07'
6	0,24	0° 20'	14	0,55	0° 48'	22	0,88	1° 15'	30	1,18	1° 43'	38	1,50	2° 11'
7	0,27	0° 24'	15	0,59	0° 51'	23	0,92	1° 19'	31	1,22	1° 46'	39	1,54	2° 14'
8	0,31	0° 27'	16	0,63	0° 55'	24	0,96	1° 22'	32	1,26	1° 50'	40	1,57	2° 18'

EFFECTIVITY: All



- e) Detect convergence angle  $\alpha$  for second wheel according to points b) to d).
- f) In case the convergence  $\alpha$  is out of permitted limits ( $0^\circ$  to  $1^\circ$ ), adjust the convergence of pertinent wheel by use of suitable tapered insertion pieces (Fig. 32-25, item 2; 3).

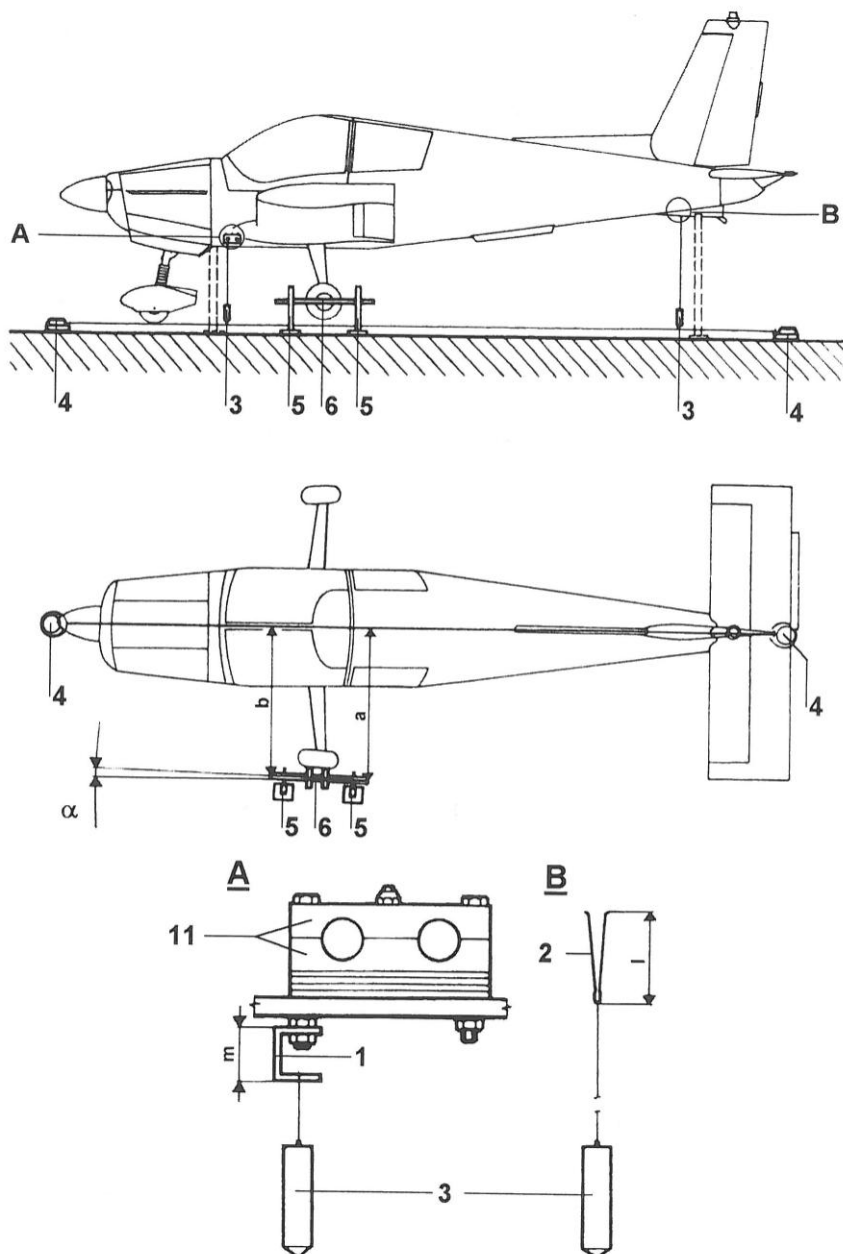
### **NOTE**

The tapered insertion pieces are supplied as follows:

- $0^\circ 30' \pm 5'$  (drawing number L 242.5100-25.00)
  - $1^\circ \pm 5'$  (drawing number L 242.5100-28.00).
- g) Verify the wheel convergence again by carrying out points b) to f).
  - h) Record results of wheel convergence to the Table 6 of airplane Leveling and Adjustment Record (Fig. 08-5).

### **Final works**

- a) Remove holder (Fig. 32-16, item 1) and clip (2).
- b) Down the airplane to ground.
- c) Install wheel fairings of main landing gear wheels (subsection 32-41-00, REMOVAL / INSTALLATION) and bottom fuselage panel (Fig. 52-5, item 24).



A ... fixing of holder (1)

B ... suspension of clip (2)

a; b ... distance of ruler points (6) from airplane axis

l ... recommended length of clip (2) : about 60 mm (2,4 in)

m ... recommended length of holder (1): about 30 mm (1,2 in)

$\alpha$  ... convergence angle

1 ... holder

2 ... clip

3 ... plumb bob

4 ... plumb

5 ... height adjusting fixture

6 ... ruler, fixture number 34-Z 42-5317

For information only:

11 ... bushings of pedal mechanism

Fig. 32-16 Convergence measurement of main landing gear wheels

**EFFECTIVITY: All**

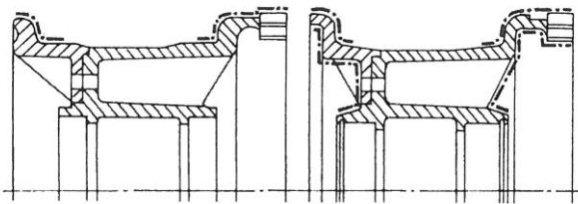
## APPROVED REPAIRS

### REPAIR OF WHEELS OF MAIN LANDING GEAR

#### CAUTION

NEVER FORGET TO ENTER THE NOTES ON CARRIED OUT REPAIRS INTO THE LOG BOOK.

#### 1. Wheel hub (Fig. 32-11, item 1) and removable rim (2)

Fault	Remedy
<p>1) Cracks – the spots of probable crack occurrence is marked with dash-and-dot line:</p>  <p style="text-align: center;">K 22-0100-7 wheel      K 22-3100-7 wheel</p>	<p>Replace whole wheel in case of fault detection even in case only one part of assembly exhibits any of these defects.</p>
<p>2) Corrosion or other faults in the area of tire beads contact deeper than 0,5 mm (0,02 in), and upon the wheel surface deeper than 0,8 mm (0,03 in).</p> <p>3) Loose external bearing ring.</p>	
<p>4) Corrosion or other faults in the area of tire beads contact deeper than 0,5 mm (0,02 in) and upon the wheel surface deeper than 0,8 mm (0,03 in).</p>	
	<p>Grind the defect off by emery paper No. 60 and 120 to be flush with the other surface and repair the paint (section 32-40-00, PAINT RENEWAL).</p>

#### 2. Brake disk driver assembly (6)

Fault	Remedy
<p>1) Considerably worn out or broken brake disk drivers.</p> <p>2) Considerably worn out or broken springs (Fig. 32-24, item 12).</p> <p>3) Loose rivet joint.</p>	<p>In case these defects are detected it is necessary to replace whole disk driver assembly as follows:</p> <ul style="list-style-type: none"> <li>- drill off twelve rivets with 4 mm (0,16 in) drill</li> <li>- clean faulty surface and repair paint</li> <li>- fit and rivet brake disk drive assembly.</li> </ul>
<p>4) Corrosion and/or lightly worn out brake disk drivers or springs.</p>	
	<p>Grind off the detected faults with fine emery paper and repair paint (section 32-40-00, PAINT RENEWAL).</p>

**EFFECTIVITY:** All

### 3. Bearings (5)

Fault	Remedy
1) Prominently colored bearing due to excessive overheating (Fig. 32-17, designation b). 2) Worn bearing race traces or tapered rolls. 3) Other mechanical faults.	Replace bearings in case of this fault detection. Replace only faulty internal bearing ring of the same type and origin as the original one if the external bearing ring does not exhibit defects.

#### **NOTE**

The brownish strips upon the bearing race traces are allowed providing there is no heat caused coloring of the faces of internal bearing ring and faces of tapered rolls (Fig. 32-17, designation a).



a ... brownish strips (oxide layer)  
 b ... coloring caused by overheating

*Fig. 32-17 Bearing*

### 4. Lids (Fig. 32-11, item 10) and bushings (7; 8) - K 22-0100-7 wheel Lids (7) and insertion pieces (9) - K 22-3100-7 wheel

Fault	Remedy
1) Deformation of external/internal cylindrical surface, face seizing, cracks and corrosion deeper than 0,4 mm (0,016 in).	Replace faulty parts.
2) Corrosion less than 0,4 mm (0,016 in).	Grind off the defects with emery paper and renew the paint (section 32-40-00, PAINT RENEWAL).

### 5. Bolts (3)

Fault	Remedy
1) Faulty thread or shank, deformation and/or excessive corrosion.	Replace faulty bolts.
2) Light corrosion.	Grind the defects off with emery paper and repair the paint (section 32-40-00, PAINT RENEWAL).

### 6. Nuts (4)

Fault	Remedy
1) Faulty thread, deformation and/or excessive corrosion.	Replace faulty nuts.
2) Reduced self-locking ability.	Insert 0,2 mm (0,008 in) thick sheet into the nut groove and lightly hammer or press thinner side of nut.
3) Light corrosion.	Grind off the defect with fine emery paper and repair paint (section 32-40-00, PAINT RENEWAL).

### 7. Sealing (12) - K 22-3100-7 wheel

Fault	Remedy
1) Cracks, deformation and/or excessive denting or wear.	Replace faulty sealing.

### 8. Seafety rings (11) - K 22-3100-7 wheel

Fault	Remedy
1) Cracks, deformation and/or excessive corrosion.	Replace faulty safety rings.
2) Light corrosion.	Grind the defect with fine emery paper and repair paint (section 32-40-00, PAINT RENEWAL).

EFFECTIVITY: All

# WHEEL OF NOSE LANDING GEAR

## DESCRIPTION AND FUNCTION

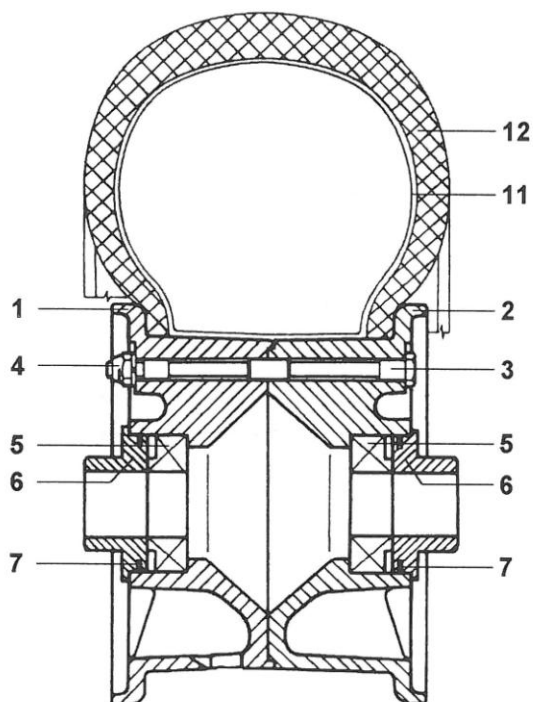
The airplane may be equipped with following wheels, tubes and tires of nose landing gear:

Mark		
Wheel	Tube	Tire
K 23-0000-7	MITAS 350 x 135	MITAS 350 x 135
or	or	or
K 51-1100-7	GOODYEAR 5.00-5 TR 67	GOODYEAR 5.00 - 5 505 C61-6
	or	or
	MICHELIN 5.00-5	GOODYEAR 5.00 - 5 505 C61-8

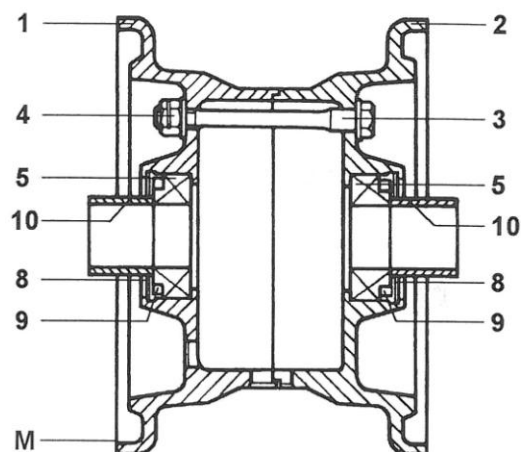
Inflation pressure of MITAS and GOODYEAR tires of nose landing gear:  $250 \pm 10$  kPa ( $36 \pm 2$  p.s.i.).

The left side of wheel rim (Fig. 32-19, item 1) is joined with the right side wheel rim (2) with three bolts (3) provided with washers and nuts (4). The wheel revolves in two bearings (5) protected against dirt. The nose is not equipped with brake.

*K 23-0000-7 wheel*



*K 51-1100-7 wheel*



- 1 ... left side of wheel
- 2 ... right side of wheel
- 3 ... bolts (3 pcs)
- 4 ... nuts
- 5 ... bearing
- 6 ... lid
- 7 ... felt ring
- 8 ... safety ring
- 9 ... sealing
- 10 ... insertion piece
- M ... marking of heaviest spot of K 51-1100-7  
(without tire) red color

For information only:

- 11 ... tube
- 12 ... tire

*Fig. 32-19 Nose wheel cut-away view*

**EFFECTIVITY: All**

## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **REMOVAL OF NOSE WHEEL**

##### **Preparatory work**

- a) Lift the airplane by jack to have nose wheel at least 5 cm (2 in) above the ground.

#### **1. Removal of nose wheel fairing**

- a) Remove scraper (Fig. 32-20, item 7) by removing screws (13).  
b) Unscrew bolts (12) of shim fairing (3) and shim collar (4) upon the upper part of wheel fairing (1). Remove these parts including bolts (14), holding the shim fairing (3) with fairing holder.

##### **NOTE**

The fairing holder (2) is fixed to nose wheel fork with screw (8) from downwards.

- c) Unscrew bolts (11) fixing the spacers (9) with washers (18) upon both sides of nose wheel fork.  
d) Unscrew bolts (15) joining the rear divisible part of wheel fairing.  
e) Open the rear divisible part of nose wheel fairing and remove the fairing from nose landing gear in fwd direction.

#### **2. Removal of nose wheel from airplane**

- a) Bend to unlock the tap washers (Fig. 32-21, item 2) at one side of nose wheel, unscrew the bolt (3) of nose wheel axle (1) and remove the axle.

##### **NOTE**

Do not unscrew, if possible, the other axle bolt (3) to make nose wheel installation simpler.

- b) Unscrew wheel axle bolt (3) and slide the wheel axle (1) from the wheel.

#### **3. Disassembly of nose wheel**

- a) Deflate nose wheel tire.  
b) Remove internal bearing rings as follows:
  - K 23-0000-7 wheel:
    - remove lid (Fig. 32-19, item 6) with felt rings (7) and internal bearing rings.
  - K 51-1100-7 wheel:
    - remove insertion pieces (10), safety rings (8), sealing (9) and internal bearing ring.

c) Unscrew nuts (4) of bolts (3) by means of two wrenches and remove nuts, bolts and washers from the wheel.

##### **Recommendation**

Leave one bolt (3) tightened and remove it as soon as the tire beads are free from wheel rim.



- d) Push the tirebeads from rim.

**Recommendation**

Use K 47-7130.00 or K 51-7110.00 fixture to push the tire beads off the rim (subsection 32-41-00).

- e) Remove last bolt (3) with nut (4) and washer.  
f) Remove gradually left and right side of wheel (1; 2) and tube from the tire.  
g) Wash the tire with water solution of detergent or with soap. Wash other parts of nose wheel with degreasing agent and blow them dry with compressed air.

**NOTE**

In case the wheel is to be stored before its check do not wash the internal bearing ring with cage and bearing tapered rollers. Wash the external bearing ring, blow it dry with compressed air, and preserve it with grease.

Wash all the bearing parts before check with suitable degreasing agent and blow them dry with compressed air.

- h) Remove if necessary the external bearing ring.

**Recommendation**

Use K 49-7110.00 fixture to remove external bearing ring (subsection 32-41-00).

- i) Mark the new bearing rings during replacement with electric marker to have the same designation mark as wheel hub they are used in. Press the internal bearing ring into the heater part of wheel rim up to the very bottom of bearing recess.

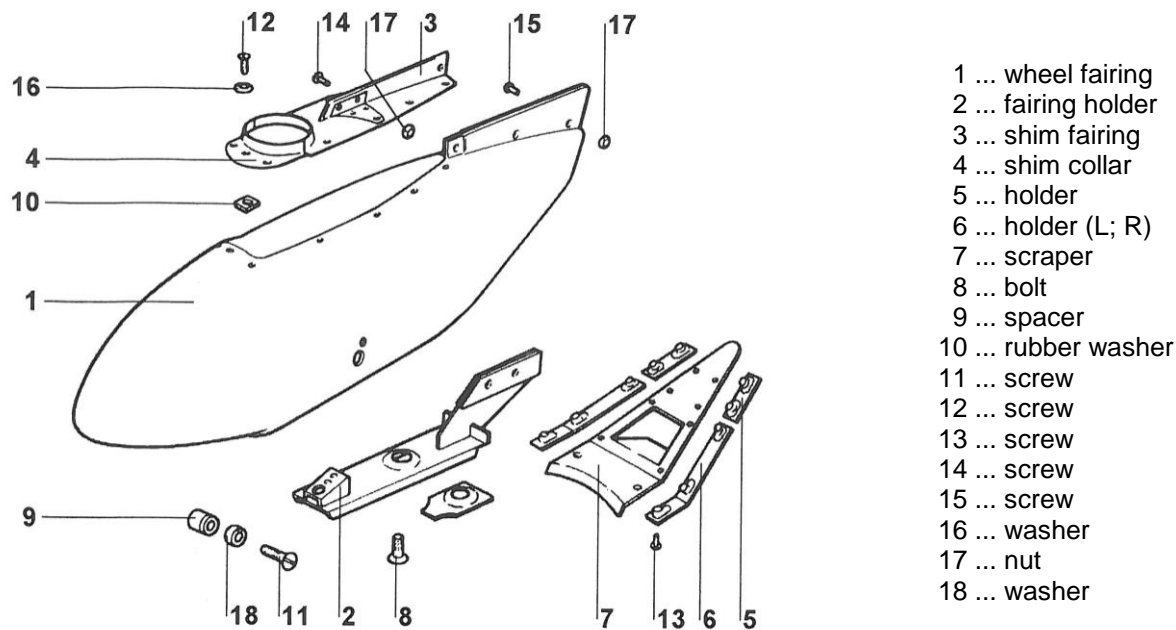


Fig. 32-20 Nose wheel fairing

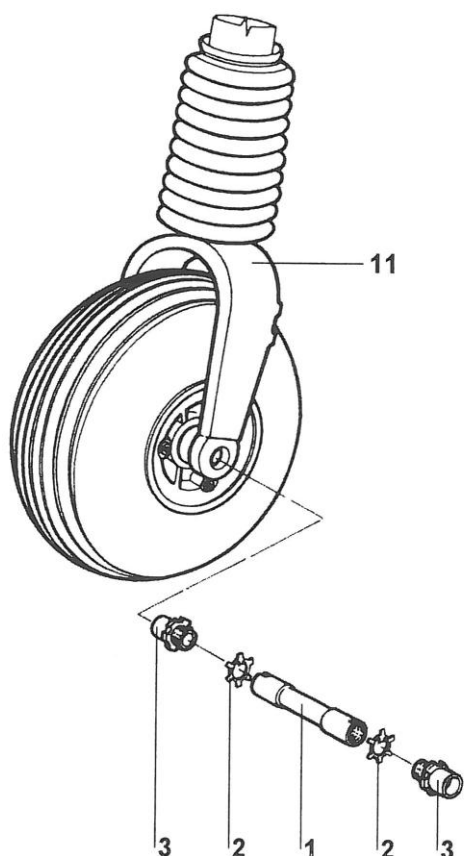


Fig. 32-21 Wheel of nose landing gear

### INSTALLATION OF NOSE WHEEL

#### 1. Assembly of nose wheel

##### CAUTION

MAKE SURE THE MARKING OF INTERNAL BEARING IS THE SAME AS THAT OF WHEEL HUB THE INTERNAL BEARING RING IS INSTALLED TO.

THE TIRE IS INSTALLED UPON THE K 51-1100-7 WHEEL RIM SUCH A WAY THE RED SPOT OF TIRE (THE TIRE LIGHTEST SPOT) IS OPPOSITE TO RED SPOT (Fig. 32-19, mark M) MADE UPON THE LEFT WHEEL RIM (THE WHEEL RIM HEAVIEST SPOT).

- a) Apply talc upon internal surface of tire.
- b) Insert tube into tire and place tire upon clean flat space.
- c) Inflate tire tube a bit.
- d) Insert left side of wheel rim (Fig. 32-19, item 1) into the tire to enable passage of tube inflating valve through recess and valve hole in rim.
- e) Insert left side of wheel rim (1) with tire upon the right wheel (2) place flat upon its rim side.
- f) Turn the wheel with tube valve downwards and insert joining bolts (3) with threads greased into both sides of wheel. The joining bolts (3) of K 51-1100-7 wheel should have washers under their heads.
- g) Push both sides of wheel rim together and provide joining bolts with washers and nuts (4).
- h) Tighten the nuts (4) gradually with 15 to 18 Nm (11,0 to 13,2 lbft) torque.

##### Recommendation

Use MoN 1931 torque wrench with Nm scale or MoN 1931.1 wrench with lbft scale, to tighten the joining nuts (4).

- i) Inflate tire to  $250 \pm 10$  kPa ( $36 \pm 2$  p.s.i.) operational pressure and check the inflation valve serviceability.
- j) Degrease protruding threads of bolts (3) and nuts (4) and paint them, e.g. with S 2003 primer and fast drying S 2029/9110 lacquer of aluminium shade.
- k) Make mutual position marking of tire and rim with 10x30 mm (0,4x1,2 in) stripe made by red epoxy paint to enable tire skidding with respect to rim in airplane operation.
- l) Clean and grease the bearings and insert the internal rings into the wheel as follows:
  - K 23-0000-7 wheel:
    - impregnate felt rings (7) with oil and insert them with lids (6) into the wheel.
  - K 51-1100-7 wheel:
    - insert sealing (9) into the wheel and lock it with safety rings (8) insert insertion pieces (10).

##### NOTE

Protect in case the wheel is stored after assembly the internal bearing rings against dirt.

## 2. Installation of nose wheel

- a) Fit the wheel into the nose landing gear fork.
- b) Apply thin layer of grease (subsection 05-21-00) upon wheel axle (Fig. 32-21, item 1) and insert it into the nose wheel.
- c) Provide the ends of wheel axle (1) with safety rings (2) and screw the bolts (3) into the wheel axle. Lock one bolt with tab washer.
- d) Adjust axial play in wheel bearings by tightening the axle screw until the detectable increase of resistance to wheel revolving is felt, i.e. when there is no play in bearings and then release the axle bolt for  $6^{\circ}$  to  $10^{\circ}$ , i.e. 2 to 3 mm (0,08 to 0,12 in) at the screw head periphery, to achieve the bearing play to be 0,02 to 0,04 mm (0,0008 to 0,0016 in).
- e) Make sure the wheel revolves freely and lock the axle bolts (3) with tab washers (2).

## 3. Installation of nose wheel fairing

- a) Fit wheel fairing (Fig.32-20, item 1) from forward upon the nose landing gear.
- b) Insert spacers (9) between wheel fairing (1) and nose wheel fork and screw the bolts (11) provided with washers (18). For locking screw (11) used on his thread LOCTITE 246 glue.
- c) Fix the scraper (7) to holders (5; 6) by screws (13).
- d) Join rear divisible part of wheel fairing by screws (15) and nuts (17).
- e) Join shim collar (4) and shim fairing (3) with wheel fairing by screws (12) with washers (16).
- f) Join shim fairing (3) with fairing holder (2) by screws (14) and nuts (17).
- g) Check gap between scraper (7) and wheel to be between 8 and 10 mm; (0,32 to 0,40 in).

### Final works

- a) Lower the airplane from the jacks to the ground.

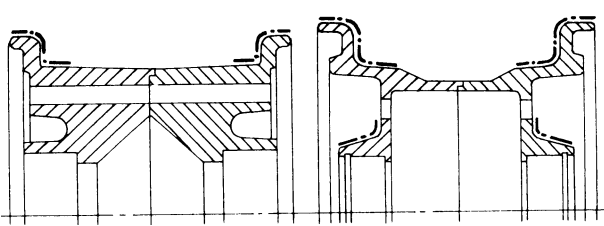
## APPROVED REPAIRS

### REPAIR OF NOSE WHEEL

#### CAUTION

NEVER FORGET TO ENTER THE NOTES ON CARRIED OUT REPAIRS INTO THE LOG BOOK.

1. Left side of wheel (Fig. 32-19, item 1), right side of wheel (2)

Fault	Remedy
<p>1) Cracks - the spots of probable appearance are marked by dot-and-dash line:</p>  <p>K 23-0000-7 wheel      K 51-1100-7 wheel</p>	<p>Replace whole wheel if any described defect is detected even if the defect occurs upon one part of wheel only.</p>
<p>2) Corrosion and mechanical defects in the area tire bead contact deeper than 0,5 mm (0,02 in) and upon the external surface of wheel deeper than 0,8 mm (0,03 in).</p>	
<p>3) Loose external bearing ring.</p>	
<p>4) Corrosion and mechanical defects in the area of tire bead contact less than 0,5 mm (0,02 in) deep and upon the external surface of wheel less than 0,8 mm (0,03 in) deep.</p>	<p>Grind defects off with emery paper No. 60 and 120 to be flush with the outer outline and repair paint (section 32-40-00, PAINT RENEWAL).</p>

2. Bearings (5)

Repair bearings according to paragraph 3 of subsection 32-41-00 (APPROVED REPAIRS).

3. Lids (6) - K 23-0000-7 wheel  
Insertion pieces (10) - K 51-1100-7 wheel

Repair lids and insertion pieces according to paragraph 4 of subsection 32-41-00 (APPROVED REPAIRS).

4. Bolts (3)

Repair bolts according to paragraph 5 of subsection 32-41-00 (APPROVED REPAIRS).

5. Nuts (4)

Repair nuts according to paragraph 6 of subsection 32-41-00 (APPROVED REPAIRS).

**EFFECTIVITY: All**

6. Sealing (9) - K 51-1100-7 wheel

Repair sealing according to paragraph 7 of subsection 32-41-00 (APPROVED REPAIRS)

7. Safety rings (8) - K 51-1100-7 wheel

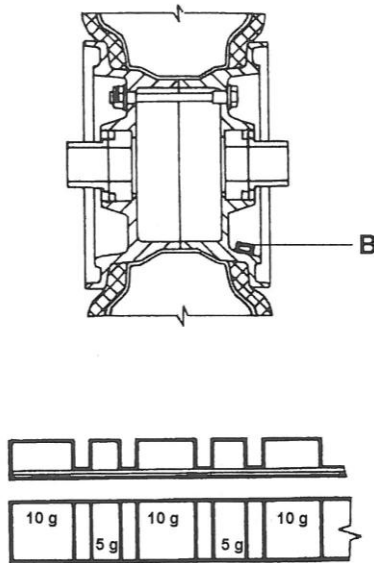
Repair safety rings according to paragraph 8 of subsection 32-41-00 (APPROVED REPAIRS).

**NOSE WHEEL BALANCING**

The excessive vibrations during and immediately after the take-off may be caused by mass unbalance of nose wheel. In this case it is necessary to balance nose wheel as follows:

- a) Remove nose wheel (see REMOVAL / INSTALLATION) and wash the bearings.
- b) Install nose wheel with bearings without grease into the fork and adjust axial play (see Installation of nose wheel, paragraph d) and do not lock the wheel bolts.
- c) Detect lightest spot (upper spot) of wheel by repeated revolving of nose wheel and mark this spot out.
- d) Balance the wheel by gluing the rubber or lead shim.
  - The wheel balancing by gluing the rubber shim
    - balance the wheel by gluing the rubber stripes to tire by stick tape in marked tire lightest spot.
    - check (mark out) the wheel and rim position and remove wheel and than tire from rim.
    - mark the spot of glued rubber stripes upon the internal surface of tire and remove stacked rubber stripes from the tire.
    - make 2 mm (0,08 in) thick rubber shim of the same mass as the removed.
    - roughen the shim from one side and the marked spot for gluing the shim with emery paper.
    - clean the roughened spots and apply rubber glue, e.g. CHEMOPRÉN; STRATI F upon cleaned spot and shim and stick the shim into the tire.
    - grind the rubber shim edges flush with internal tire surface after the glue hardening
    - assemble the wheel with tire and install it to the landing gear fork according to paragraph b).
    - verify correct wheel balancing by repeated wheel turning.
  - The wheel balancing by gluing the lead plates
    - balance the wheel by gradual sticking the balancing weights upon the lightest spot of wheel.
    - remove the balance weight and prepare lead plates of the same mass
    - shape the lead plates according to wheel radius, remove protection foil and glue them upon the internal periphery of wheel (Fig. 32-22)
    - verify wheel balancing by repeated wheel turning.
- e) Remove balanced wheel from the fork, grease the wheel bearings and install wheel and wheel fairing to the airplane (see REMOVAL / INSTALLATION).

EFFECTIVITY: All



A ... gluing the lead balancing plates  
B ... lead balancing plate (example)

*Fig. 32-22 Balancing of nose wheel*

# **AIRPLANE BRAKE SYSTEM**

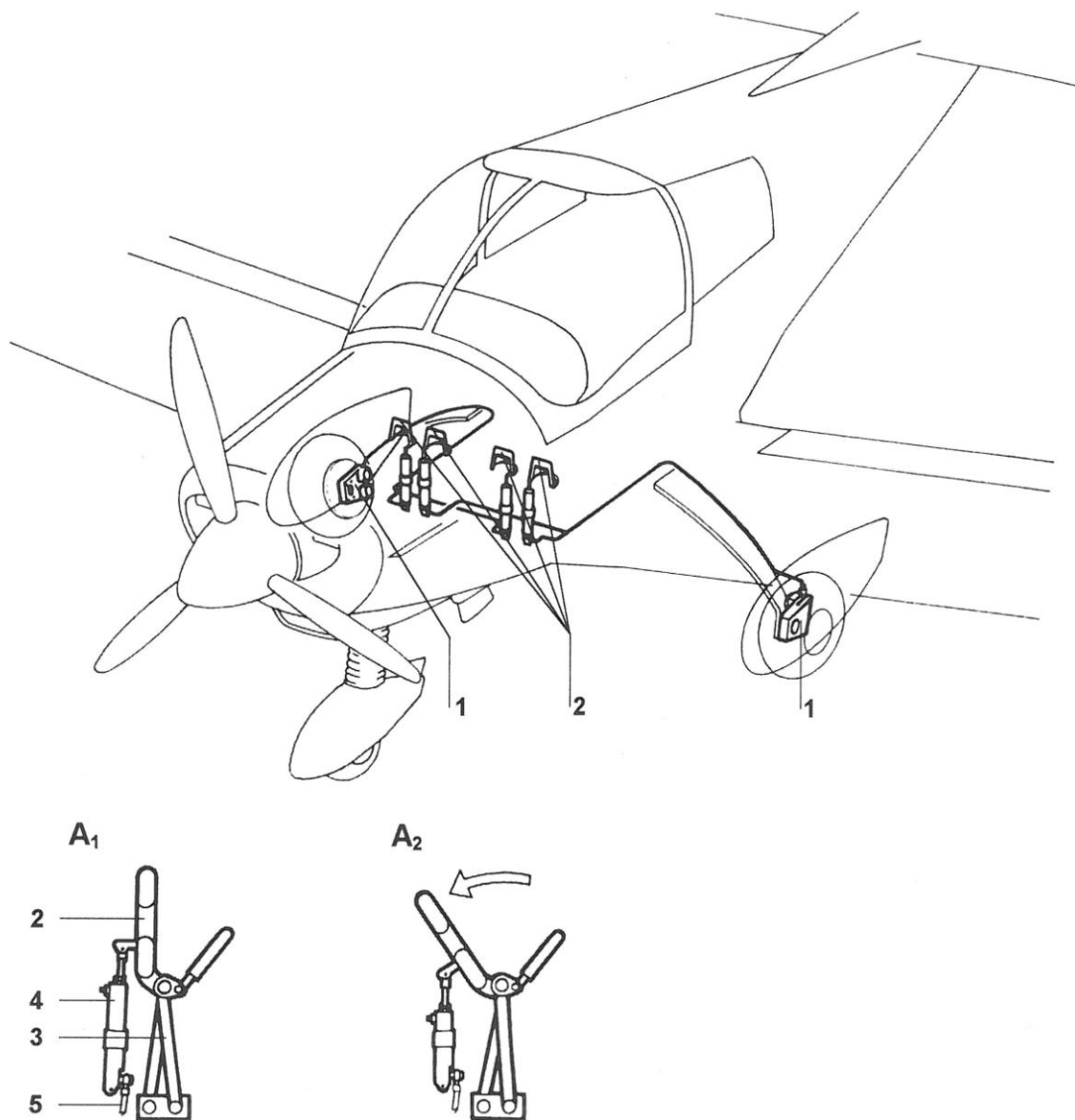
## **DESCRIPTION AND OPERATION**

The wheel of main landing gear are equipped with hydraulic actuated disk brakes (Fig. 32-23, item 1) with automatic play adjustment. Brake pedals (2) that are upon the control pedals (3), control and actuate the wheel brakes independently. The correct brake operation is subject to proper brake deaeration.

### **BRAKES**

The brake consists of three segments (Fig. 32-24, item 2), brake disk (3) and self-setting mechanism (4). The brake disk (3) is fit into the disk drivers (11) upon wheel hub of main landing gear. It is stabilized by springs (12).

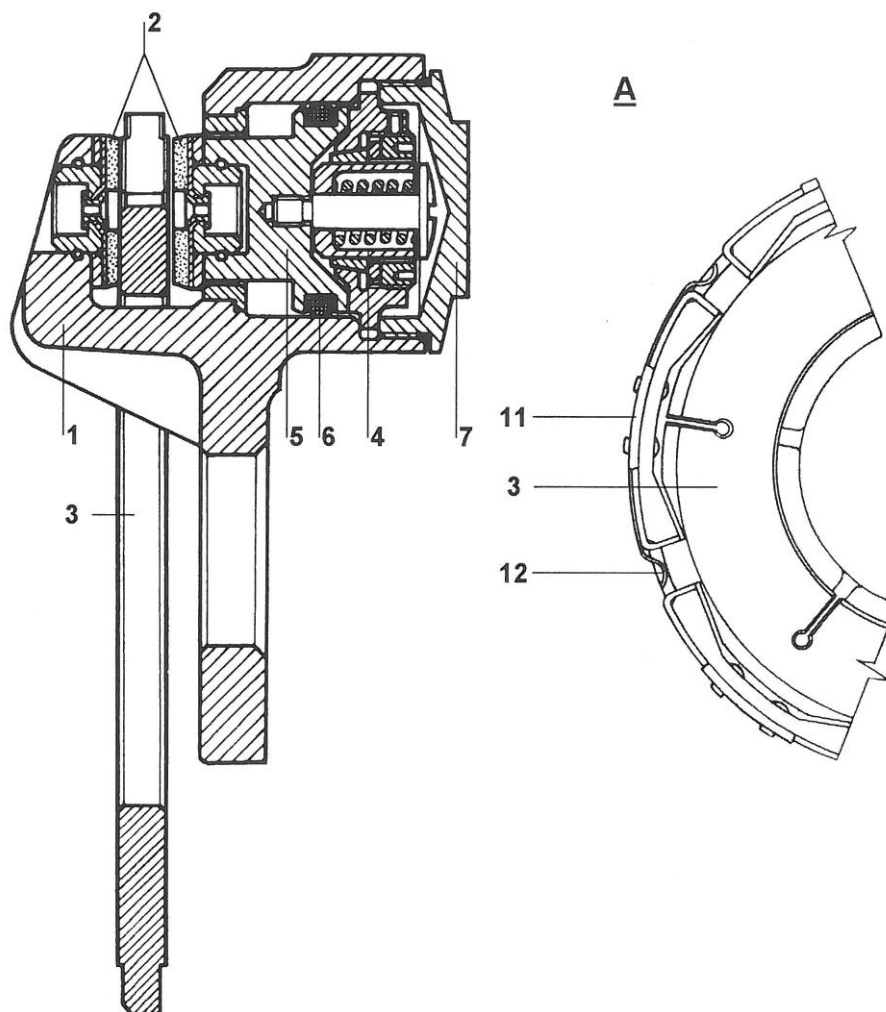




A<sub>1</sub> ... brake pedal and brake unit in position of „no braking“  
A<sub>2</sub> ... brake pedal and brake unit in position of „brake applied“

- 1 ... brakes
- 2 ... brake pedals
- 3 ... airplane control unit
- 4 ... brake unit
- 5 ... brake hose (Js 4)

*Fig. 32-23 Brake system*



A ... fitting of brake disk

- 1 ... brake body
- 2 ... friction segments
- 3 ... brake disk
- 4 ... self-setting mechanism
- 5 ... piston
- 6 ... sealing ring
- 7 ... lid

For information only:

- 11 ... brake disk driver
- 12 ... brake disk stabilizing springs

> of wheel hub of  
main landing gear

Fig. 32-24 Brake

## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **REMOVAL OF BRAKES**

##### **CAUTION**

MARK THE TAPERED WASHER AFTER REMOVAL (Fig. 32-25, items 2; 3) TO INSURE THEY ARE INSTALLED INTO ORIGINAL PLACE.

MARK THE FRICTION SEGMENTS (Fig. 32-24, item 2) AFTER REMOVAL TO ENSURE PROPER INSTALLATION OF SEGMENTS TO THEIR ORIGINAL PLACES.

##### **Preparatory works**

- a) Lift the airplane to have the landing gear wheels at least 10 cm (4 in) above the ground.
- b) Remove fairings and wheels of main landing gear (subsection 32-41-00).
- c) Drain brake fluid from the brake system.
- d) Uncouple the hoses from wheel brakes. Plug hoses and brake inlet ports.

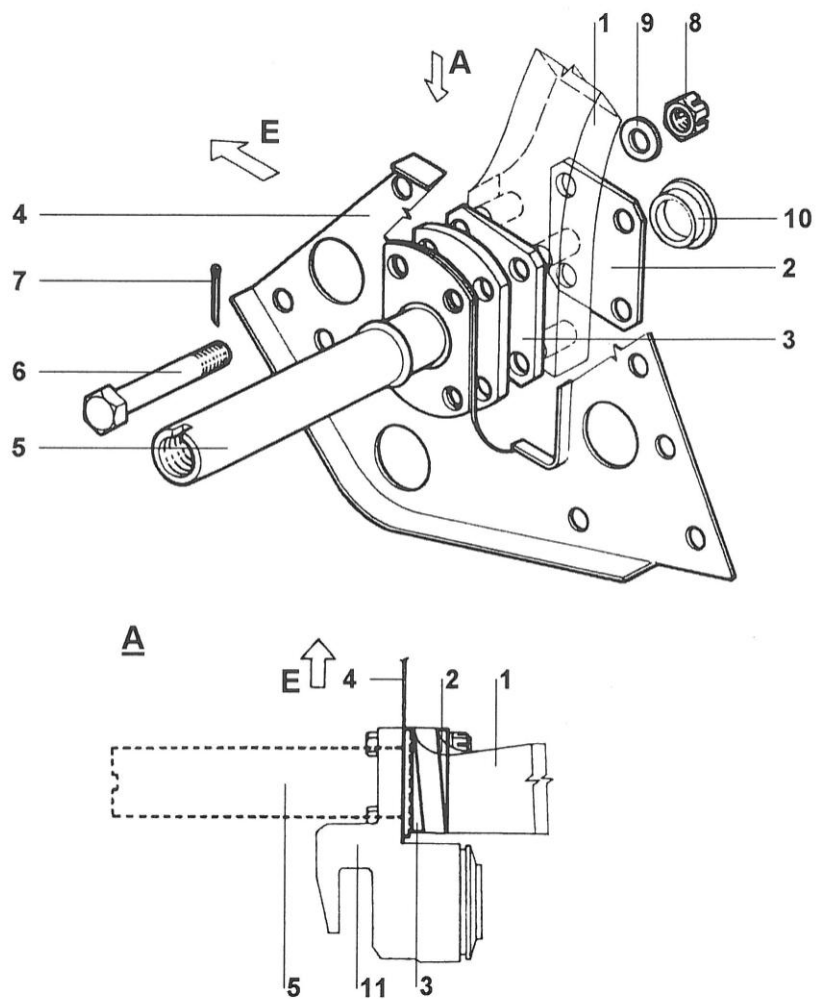
##### **Removal of brake from wheel**

##### **NOTE**

Removal of brake from the left and right wheels is the same.

- a) Remove nuts (Fig. 32-25, item 8), washers (9) and bolts (6), fixing the brake body (11) to the main landing gear leg (1). Remove brake body, wheel axle (5) and wheel fairing holder (4) from the main landing gear leg.
- b) Remove brake disk (Fig. 32-24, item 3) from the brake body.
- c) Remove worn out friction segments (2) as follows:
  - from the brake body (1) by knocking out by duralumin rod of 10 to 16 mm (0,40 to 0,63 in) diameter
  - from the piston (5) by levering it out by means of screwdriver.
- d) Remove the pistons (5) in case of untightness. Unscrew lids (7) of actuating cylinders and push the pistons (5) from brake actuating cylinders of brake body.

**EFFECTIVITY: All**



- A ... plan outline  
E ... direction of flight
- 1 ... main landing gear leg  
2 ... external tapered washer  
3 ... internal tapered washer  
4 ... holder of wheel fairing  
5 ... wheel axle  
6 ... bolt (4 pcs)  
7 ... cotter pin  
8 ... nut  
9 ... washer  
10 ... lid  
11 ... brake body

*Fig. 32-25 Tapered washers*

## **INSTALLATION OF BRAKES**

### **CAUTION**

THE FRICTION SURFACES OF BRAKE DISK (Fig. 32-24, item 3) AND FRICTION SEGMENTS (2) SHOULD BE CLEAN, DRY AND WITHOUT ANY TRACE OF FATTY SPOTS.

INSTALL FRICTION SEGMENTS TO ORIGINAL PLACE ACCORDING TO MARKING MADE DURING DISASSEMBLY.

INSTALL TAPERED WASHERS (Fig. 32-25, items 2; 3) SETTING THE MAIN LANDING GEAR WHEEL CONVERGENCE TO THE SAME PLACE THEY WERE ORIGINALLY BEFORE DISASSEMBLY.

CHECK IN CASE OF MAIN LANDING GEAR LEG REPLACEMENT THE WHEEL CONVERGENCE (subsection 32-41-00).

### **NOTE**

In case of tapered washer use the wheel axle is provided with no glued lid (Fig. 32-25, item 10).

### **Assembly of brake set**

- a) Clean parts of brake properly and grease pertinent operating surfaces (subsection 05-21-00).
- b) Insert pistons (5) with sealing rings (6) into the actuating cylinders (Fig. 32-24, item 1) with self-setting mechanism (4). Screw in the lids (7) and lock them mutually with safety wire.
- c) Press the friction segment (2) into the friction body.

### **Installation of brake to main landing gear leg**

- a) Fit the wheel fairing holder (4) and brake body (11) upon the wheel axle (Fig. 32-25, item 5) and fix them with bolts (6). Provide screws with internal tapered washer (3) if used originally.
- b) Fit the brake body (11) upon the leg of main landing gear (1) to have brake actuating cylinders one above the other and behind the leg in the direction of flight.
- c) Fit the external tapered washer (2), if used upon the bolts (6) protruding from the holes in main landing gear leg.
- d) Provide lower rear bolt of left landing gear with grounding and washer. Provide remaining three bolts with two washers each. Screw nuts (8) upon the bolts (6) and lock them with cotter pin (7) after their tightening to 23 to 29 Nm (17 to 21,4 lbft) torque.
- e) Insert brake disk (Fig. 32-24, item 2) between friction segments (2).

### **Final works**

- a) Couple brake hose to brake.
- b) Fill the brake system with brake fluid and deaerate it (section 12-10-00).
- c) Measure if necessary the convergence of main landing gear wheels (subsection 32-41-00).
- d) Install wheels and fairings of main landing gear (subsection 32-41-00).
- e) Lower the airplane from the jacks on the ground.

**REMOVAL OF BRAKE PEDAL****Preparatory works**

- a) Drain brake fluid from brake system.
- b) Uncouple parking brake locking mechanism from the left pedal control as follows:
  - remove bolt (Fig. 32-30, item 6) with nut from the lock holder.

**NOTE**

The parking brake controller (1) should be in „brake off” position.

**Removal of brake unit**

- a) Uncouple the pedal controlled brake unit from hose (16) and brake pedal (17).
- b) Remove cotter pin from the suspension pin (19), slide the pin from the suspension and remove brake unit from the airplane.

**Replacement of sealing rings****CAUTION**

THE SEALING RINGS MAY BE STORED WITHOUT BRAKE FLUID FOR MAXIMUM 24 HOURS.

- a) Remove safety ring, unscrew nut (20) and slide piston (11) from brake unit.
- b) Replace sealing ring (13), insert piston (11) into the brake unit cylinder, screw the nut (20) on and insert safety ring.
- c) Check tightness of brake unit (see INSPECTION / CHECK).

**INSTALLATION OF BRAKE PEDAL UNIT**

- a) Fit the brake unit upon the airframe console, insert pin (19) into the suspension, provide pin with washer and lock the pin with cotter pin.
- b) Fit the fork of brake unit piston to the suspension of brake pedal (17), insert bolt (18) into the suspension, provide bolt with washer and screw the nut on it. Tighten the nut by 6 to 7,2 Nm (4,4 to 5,3 lbft) and lock it with cotter pin.
- c) Couple the brake hose (16) to brake unit by means of through bolt with sealing. Lock the coupling with safety wire.

**Final works**

- a) Fill the brake system with brake fluid and deaerate it (section 12-10-00). Check brake serviceability.
- b) Join parking brake locking mechanism to the left control pedal by bolt (7):
  - inserted into the lock holder (6) and fastened there by nut.
- c) Check the serviceability of parking brake.

**EFFECTIVITY: All**

## INSPECTION / CHECK

### TIGHTNESS CHECK OF BRAKE PEDAL UNIT

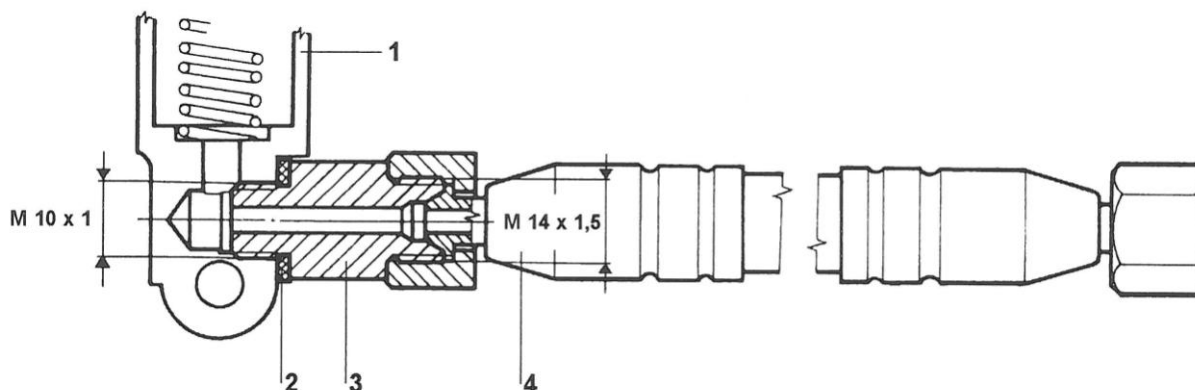
Check tightness of brake unit after each replacement of sealing rings (Fig. 32-30, item 13) as follows:

a) Couple brake unit to the pressure source.

#### Recommendation

Screw adaptation piece (Fig. 32-26, item 3) provided with sealing ring (2) into the port in the lower part of brake unit. Couple the hose (4) to the adaptation piece (3) and to the pressure source.

- b) Check the tightness of brake unit with compressed air as follows:
- pressurize the brake unit with compressed air to 100 kPa (14,5 p.s.i.) and submerge it into the tank with alcohol for three minutes.
  - no air may escape from the brake unit during this time.
- c) Check of brake unit by brake fluid:
- push the brake unit piston for about 10 mm (0,4 in) and fix the brake unit such a way that the pushed-in position of brake unit piston is not changed even when the pressure is applied
  - fill the brake unit with 3,9 Mpa (565 p.s.i.) pressure for 15 minutes
  - no fluid may escape from the brake unit.



- 1 ... brake unit  
2 ... sealing ring 10x16 ČSN 02 9310.2  
3 ... adaptation piece 6/3 ČSN 31 3809.12  
4 ... hose 6x1000 ČSN 13 7822.1

*Fig. 32-26 Coupling of brake unit to pressure source*

**EFFECTIVITY:** All

## APPROVED REPAIRS

### REPAIR OF BRAKE SYSTEM

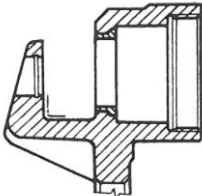
#### CAUTION

NEVER FORGET TO ENTER THE NOTES ON CARRIED OUT REPAIRS INTO THE LOG BOOK.

#### NOTE

Replace sealing rings after the lid (Fig. 32-24, item 7) and piston (5) removal. Grease sealing rings under the lid with grease and apply brake fluid upon sealing ring (6) before installation.

#### 1. Brake body (Fig. 32-24, item 1)

Fault	Remedy
1) Corrosion or other mechanical defect deeper than 0,5 mm (0,2 in).	Grind defects off by emery paper No. 60 and repair pair paint (section 32-40-00, PAINT RENEWAL).
2) Cracks - the spots of probable occurrence are marked with dot-and dash line: 	In case any of these faults is detected the brake body should be replaced.
3) Excessive corrosion and mechanical defects deeper than 0,5 mm (0,02 in) or the defects infringing the tightness. 4) Defective thread or internal surface of actuating cylinders.	
5) Untaught bushing in inlet or outlet ports.	Replace untaught bushing. In case the bushing removal is impossible without brake body damage replace whole brake body assembly.

#### Replacement of untaught bushing of inlet/outlet ports:

- Remove friction segments (2), lids (7) and piston (5) with self-setting mechanism (4) from the brake body (1).
- Warm brake body to about 60 °C (140 °F) and screw the bushing off.
- Degrease threads of new bushing and brake body, apply the glue for cold metal gluing, e.g. EPOXY 1200 and screw the bushing in.
- Insert pistons (5) with self-setting mechanism into the brake body, screw the lids (7) in and push in the friction segments (2) - see REMOVAL / INSTALLATION.

#### 2. Lids (7)

Fault	Remedy
1) Cracks, scratches, faulty thread.	Replace faulty lids.
2) Light corrosion, fault paint.	Grind defect off with emery paper and repair paint (section 32-40-00, PAINT RENEWAL).

**EFFECTIVITY:** All



### 3. Sealing rings under lids (7)

Fault	Remedy
1) Faulty or cracked sealing ring - break fluid escapes round it.	Replace faulty sealing rings.

### 4. Self-setting mechanism (4)

Fault	Remedy
1) Wheel cannot revolve freely if brake is not applied, i.e. there is no enough play in brake.	Replace broken or deformed spring of self-setting mechanism. Adjust self-setting mechanism.

Adjustment of brake self-setting mechanism:

#### **WARNING**

SPRING CAGE (Fig. 32-27, item 6) SHOULD NEVER BE EXTENDED FROM THE CLIP RING (5).

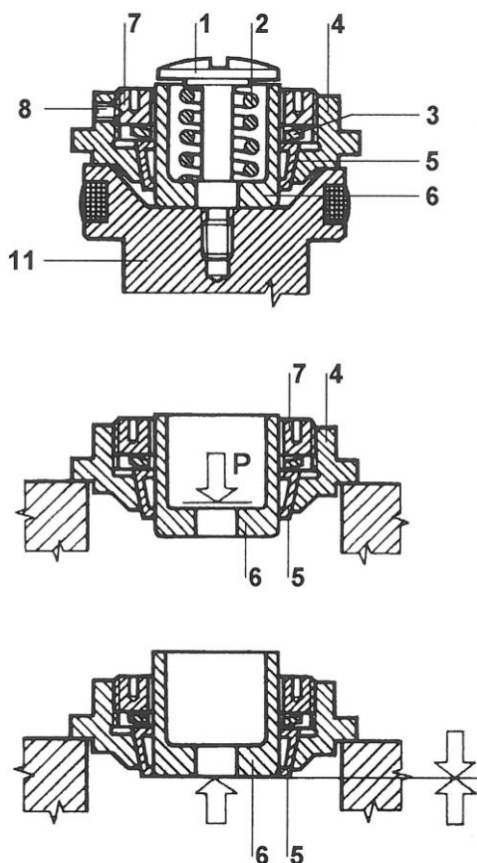
- Remove lids (Fig. 32-24, item 7) and pistons (5) with self-setting mechanism from brake body.
- Remove pushrod (Fig. 32-27, item 1) and spring (2) from the piston.
- Unscrew lock bolt (8) and nut (7) and remove spring cage (6).
- Fill the groove in clip ring (5) with grease and assemble the self-setting mechanism (point B). Do not lock the nut (7).
- Support body (4) of self-setting mechanism and check the resistance of spring cage (6) against shift with  $P = 440$  to  $540$  N ( $97,0$  to  $99,2$  lbf) force. Drop a little of brake fluid between spring (6) and nut (7).

#### **Recommendation**

Use during check 45 and 55 kg (100 and 120 lbs) weight suspended in hole in spring cage (6). When the 45 kg (100 lbs) weight is suspended the spring cage should not shift. When the 55 kg (120 lbs) weight is used the spring cage should shift.

- Adjust brake self-setting mechanism as follows:
  - if the spring cage (6) shifts at force less than 440 N (45 kg - 100 lbs weight) tighten the nut (7)
  - if the spring cage (6) shifts at force higher than 540 N (55 kg - 120 lbs weight) release the nut (7).
- Check after adjustment the resistance of spring cage (6) to shift according to paragraph e).
- Fit the spring cage (6) to have the spring cage face leveled with face of clip ring (5) - see point C.
- Lock the nut (7) with locking screw (8).
- Fit the self-setting mechanism into the piston (11), insert spring (2) into the spring cage (6) and screw the pushrod (1) into the piston.
- Insert pistons with self-setting mechanism into the brake body (Fig. 32-24, item 1) and screw the lids (7) in - see REMOVAL / INSTALLATION.

**EFFECTIVITY:** All



- A ... brake self-setting mechanism with piston (11)  
 B ... check of resistance of spring cage (6) against shift by force P  
 C ... spring cage fitting: face of spring cage (6) should be flush with clip ring face (5)  
 P ... check force for adjustment of brake self-setting mechanism
- |                      |                       |
|----------------------|-----------------------|
| 1 ... pushrod        | 7 ... nut             |
| 2 ... spring         | 8 ... locking screw   |
| 3 ... elastic washer |                       |
| 4 ... body           | For information only: |
| 5 ... clip range     | 11 ... piston         |
| 6 ... spring cage    |                       |

*Fig. 32-27 Adjustment of brake self-setting mechanism*

5. Brake disk (Fig. 32-24, item 3)

Fault	Remedy
1) Wear to 8 mm (0,32 in) thickness or less. 2) Cracks. 3) Worn out 1 mm (0,04 in) or deeper grooves.	If any defect is detected it is necessary to replace brake disk.

6. Friction segments (2)

Fault	Remedy
1) Segment wear of brake lining to the height of middle rivet head (Fig. 32-28, item 3). 2) Broken part of segment brake lining.	If any defect is detected it is necessary to replace both friction segments (see REMOVAL / INSTALLATION) or replace brake lining of segments.

Replacement of brake lining of segments:

**CAUTION**

REPLACE BRAKE LINING UPON BOTH FRICTION SEGMENTS.

NEVER ENLARGE HOLES IN BRAKE LINING CARRIER (Fig. 32-28, item 2) DURING BRAKE LINING DRILLING OFF.

- a) Remove friction segments from the brakes (see REMOVAL / INSTALLATION).
- b) Drill off the rivets (3) fixing the brake lining (1) to the brake lining carrier (2) with 4,2 mm (0,16 in).
- c) Remove remaining parts of brake lining (1) and drilled off rivets and clean the lining carrier.
- d) Fit new lining upon its carrier, insert three rivets (3) and rivet them gradually (paragraph R).
- e) Clean and degrease friction segments lining.
- f) Push the friction segments into the brake body.
- g) Install brake assembly to main landing gear leg (see REMOVAL / INSTALLATION).
- h) Run in the new lining of friction segments by multiple (at least five) braking during airplane taxiing.

7. Brake system plumbing

Fault	Remedy
1) Damaged	Replace damaged plumbing
2) Expired rubber hoses (section 05-10-00).	Replace expired rubber hoses (life time of AEROQUIP hoses is unlimited).

8. Brake fluid replenishment and system deaerating

Fault	Remedy
Brake effectiveness drops down – the brake unit piston rod stroke needed for full application of friction segments exceed 12 mm (0,47 in).	Replenish brake fluid and deaerate the brake system according to section 12-10-00.

**EFFECTIVITY:** All

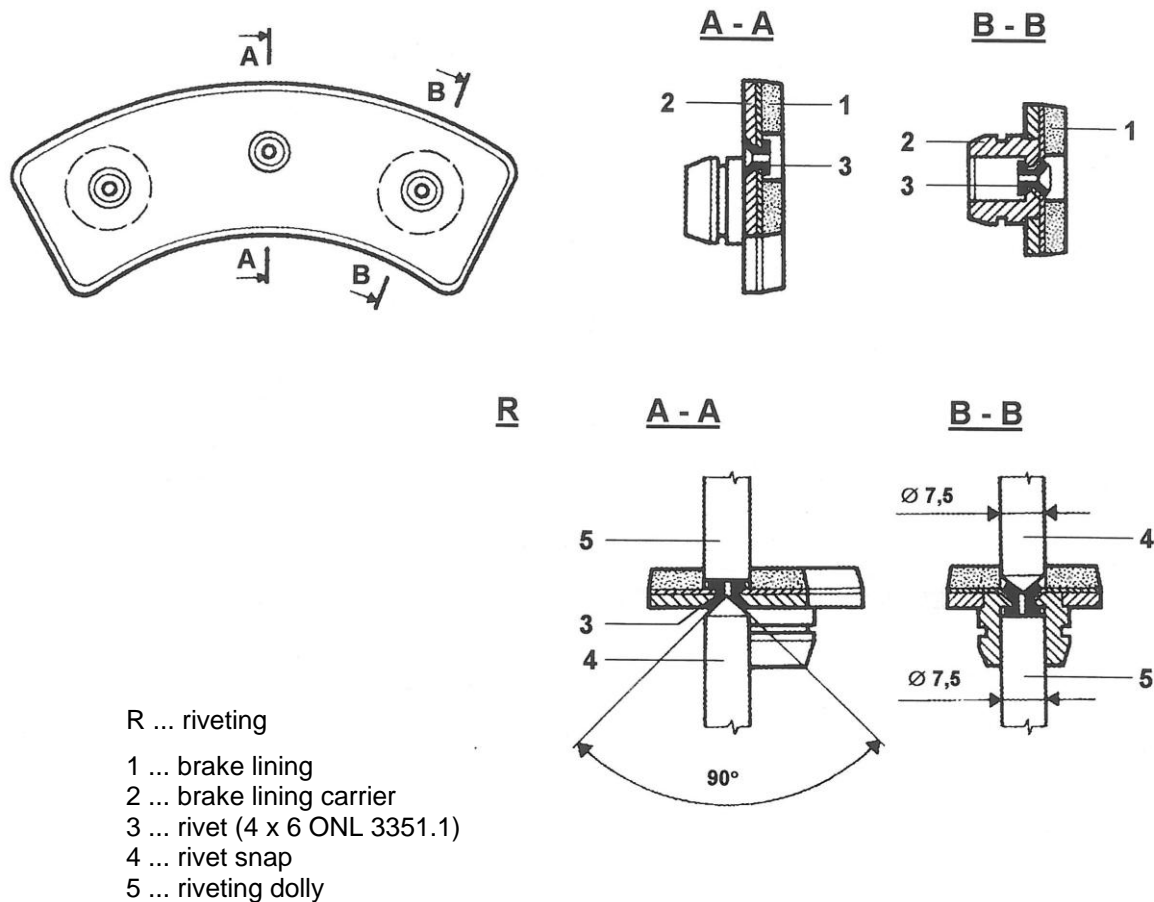


Fig. 32-28 Replacement of brake lining of friction segments

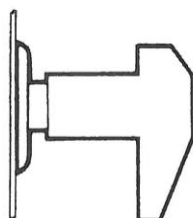
EFFECTIVITY: All

# PARKING BRAKE

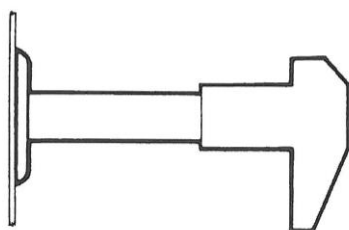
## DESCRIPTION AND OPERATION

The parking brake control both brakes at the same time. The parking brake controller (Fig. 32-30, item 1) controls brake locking mechanism installed upon brake unit (2) of left pedal controls. Pulling the parking brake controller of left pedal control when both left brake pedals are pressed the latch (4) locks piston rods of both brake units in compressed position, i.e. when both brakes are fully applied. The parking brake controller is the panel under the instrument panel.

*Positions of parking brake controller:*



- main landing gear brakes are disengaged



- main landing gear brakes are engaged

### **NOTE**

Press both brake pedals of left (port) airplane control pedals before parking brake application.  
Turn parking brake controller anticlockwise through 90° and push it in to disengage parking brake.

**EFFECTIVITY:** All

**32-44-00**

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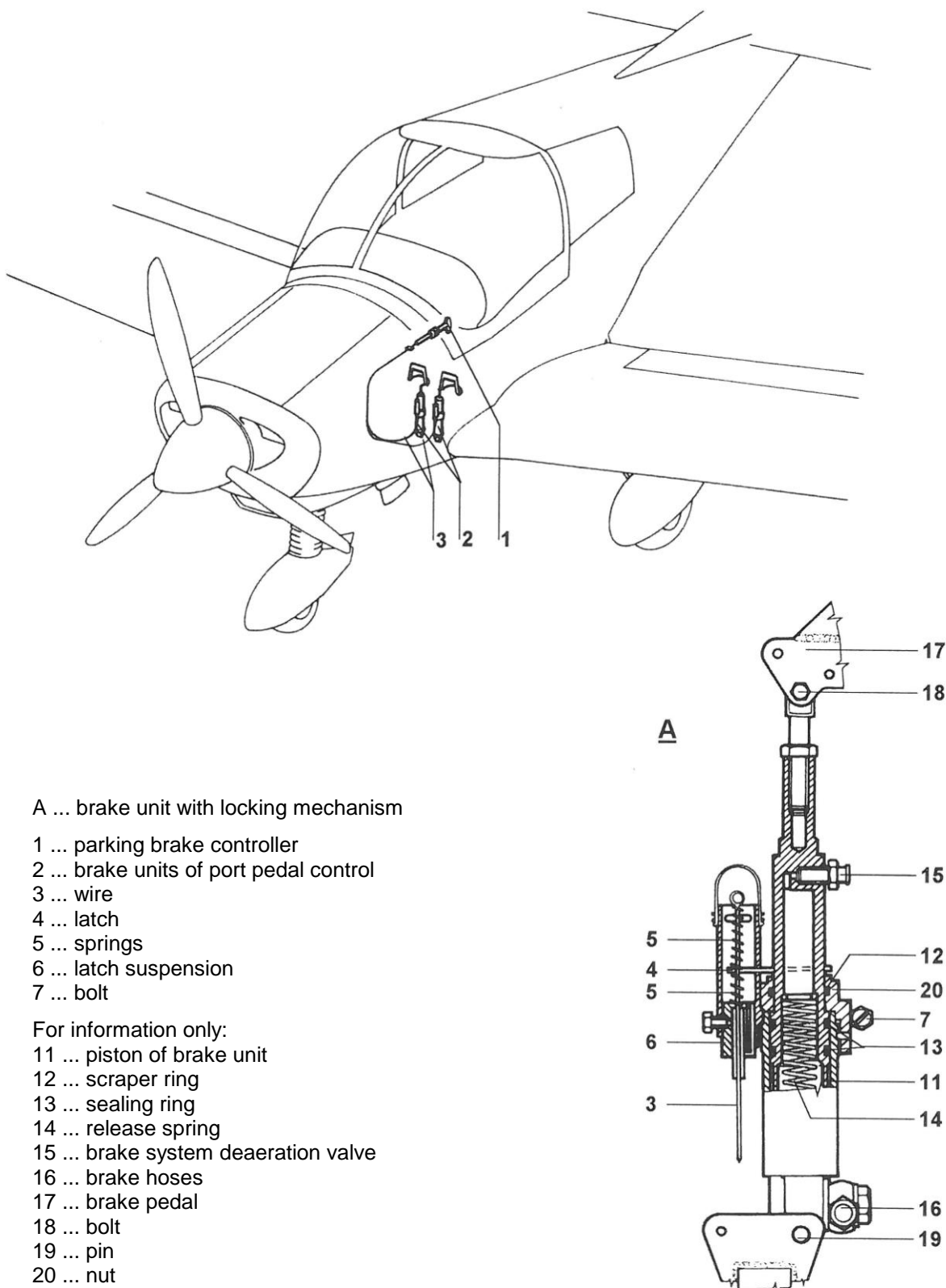


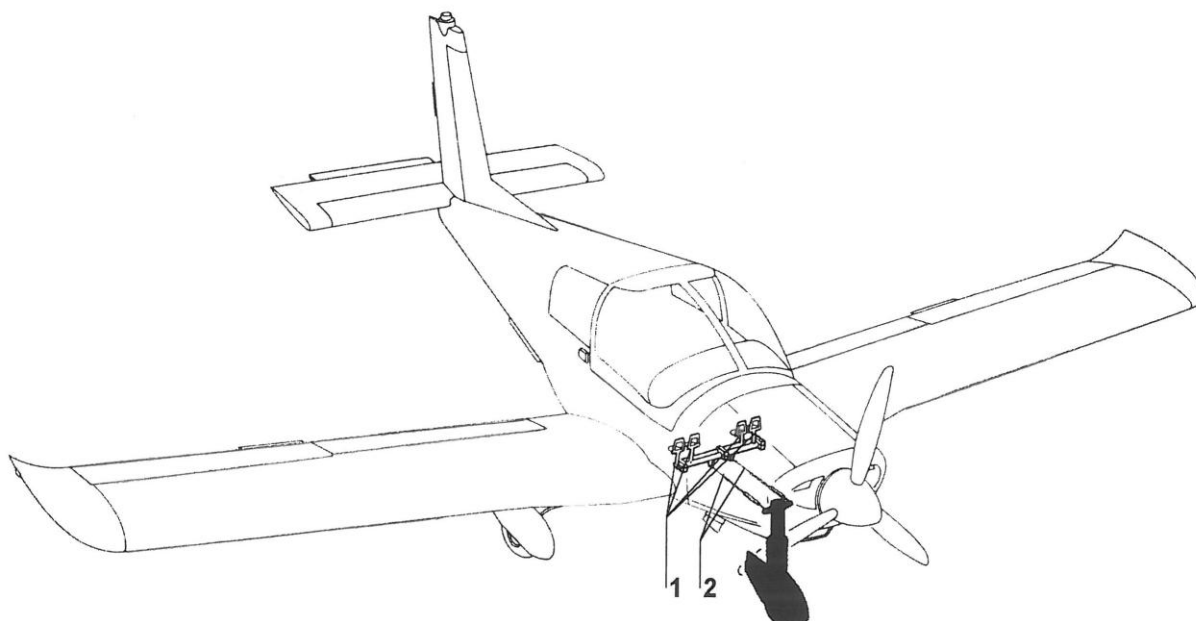
Fig. 32-30 Parking brake

# NOSE WHEEL STEERING

## DESCRIPTION AND OPERATION

The nose landing gear is directionally controllable by pedal controls (Fig. 32-31, item 1). The control pedal movement drives via cable steering system (2) the oleo shock absorber with nose wheel within the range of oleo shock absorber suspension that is  $\pm 15^\circ$ .

When turning the airplane in the curves of small radius the nose wheel steering is used together with braking the internal wheel of main landing gear. In this case the spring mechanism (bungees) installed in cable system (2) enables the maximum deflection of oleo shock absorber with wheel up to  $\pm 38^\circ$ .



- 1 ... airplane pedal controls
- 2 ... cable system

*Fig. 32-31 Nose wheel control*

**EFFECTIVITY:** All

## **MAINTENANCE**

### **REMOVAL / INSTALLATION**

#### **REMOVAL OF NOSE WHEEL CONTROL CABLES**

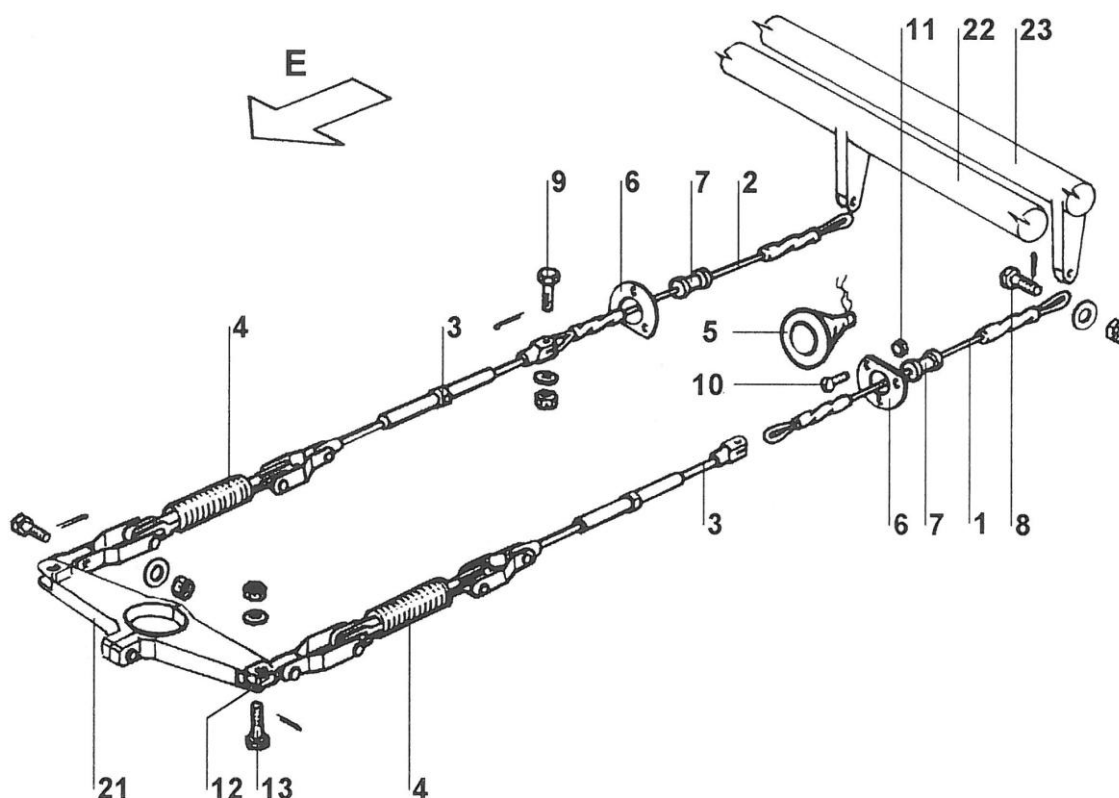
##### **Preparatory works**

- a) Remove fuselage bottom panel (Fig. 52-5, item 24).
- b) Remove engine cowling (section 71-10-00, REMOVAL / INSTALLATION).

##### **Cable removal**

- a) Release one turnbuckle (Fig. 32-32, item 3).
- b) Uncouple removing bolts (8), the cables joining from the pedal control mechanism (22, 23).
- c) Remove bolts (9) to disconnect cables from the turnbuckles (3).
- d) Unscrew bolts (10) to remove shims (6) from firewall.
- e) Remove cables (1, 2) with covers (5), shims (6) and bushings (7) from the airplane.





E ... direction of flight

- 1 ... left cable
- 2 ... right cable
- 3 ... turnbuckle
- 4 ... spring
- 5 ... cover
- 6 ... shim
- 7 ... bushing
- 8 ... fitted bolt
- 9 ... fitted bolt

- 10 ... screw
- 11 ... nut
- 12 ... block
- 13 ... fitted bolt

- For information only:
- 21 ... steering sleeve
  - 22 ... fwd mechanism
  - 23 ... rear mechanism

Fig. 32-32 Cables of nose wheel steering

**INSTALLATION OF NOSE WHEEL CONTROL CABLES****CAUTION**

THE LONGER STEERING CABLE (320 mm - 12,6 in) SHOULD BE INSTALLED IN THE PORT SIDE OF AIRPLANE AND SHORTER CABLE (280 mm - 11,0 in) TO STARBOARD SIDE.

**Cable installationn**

- a) Insert steering cables (Fig. 32-32, item 1; 2) through the passages in the lower part of firewall.
- b) Join the cables (1, 2) with fitted bolts (8) to pedal control mechanism (22, 23); screw the nuts on and lock them after tightening with 9,5 to 11,5 Nm (7,0 to 8,5 lbft) torque by cotter pins.
- c) Join fwd ends of cables (1, 2) with fitted bolts (9) to turnbuckles (3); screw the nuts on and lock them after tightening with 9,5 to 11,5 Nm (7,0 to 8,5 lbft) torque by cotter pins.
- d) Adjust steering cables (1, 2) by turnbuckles (3) so that the spring thread gaps (4) are 0,15 to 0,20 mm (0,006 to 0,008 in). The springs (4) should be able of 17 to 18 mm (0,67 to 0,71 in) elongation.
- e) Check nose wheel alignment with longitudinal axis of airplane before locking the turnbuckles (3). The rudder and pedal controls should be in neutral position. The nose wheel alignment may be carried out by turnbuckles (3).
- f) Fix the covers (5) with safety wire to the bushings (7).
- g) Screw the shims (6) together with covers (5) with three screws (10) to firewall.
- h) Lift airplane nose to have nose wheel at least 5 cm above the ground. Check free movement of nose wheel steering system by pressing the airplane pedal control to maximum deflection. The nose wheel should deflect from neutral position for  $\pm 15^\circ$ .  
Grease movable parts of nose wheel steering (subsection 05-21-00).

**Final works**

- a) Lower the airplane from jacks to ground.
- b) Install engine cowlings (section 71-10-00, REMOVAL / INSTALLATION) and bottom fuselage (Fig. 52-5, item 24).