

CHAPTER

55

STABILIZERS

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GENERAL

The tail unit is of cantilever, all-metal structure provided with duralumin skin. The controls are partially mass and aerodynamic balanced. The elevator is provided with manually controlled pitch trim tab. The rudder is provided with fixed balance tab.

EFFECTIVITY: All

55-00-00

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STABILIZER

DESCRIPTION AND OPERATION

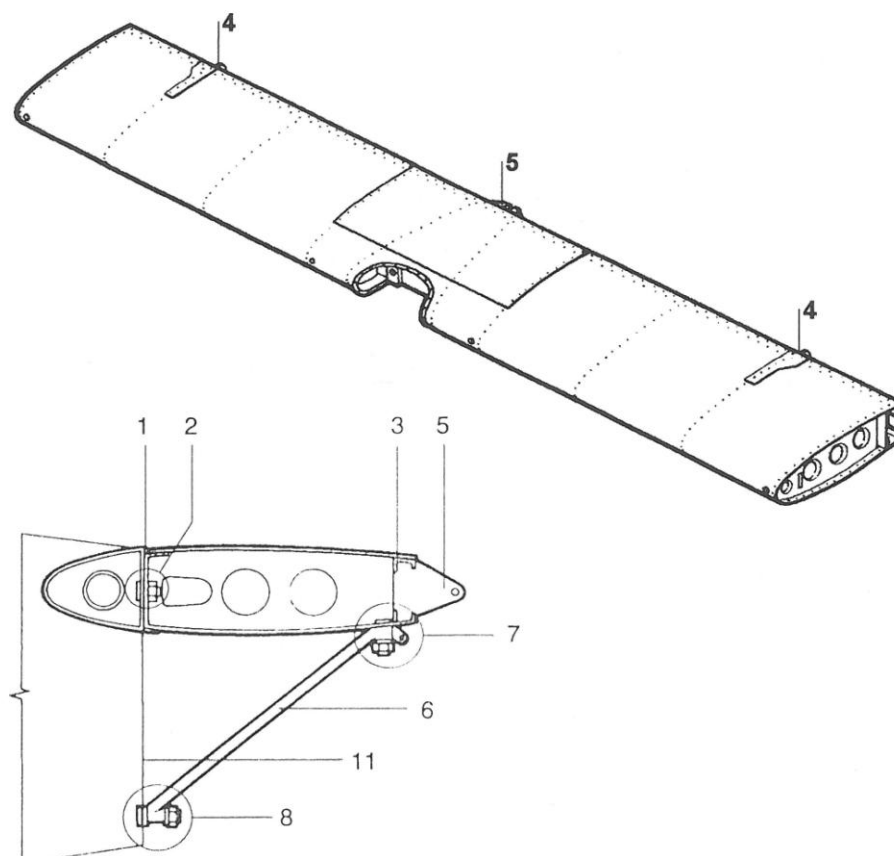
The stabilizer installation mount joining the stabilizer to rear fuselage section (Fig. 55-1, item 2) are upon the fwd stabilizer spar (1).

The rear stabilizer spar (3) carries external (4) and middle (5) hinges of elevator.

The stabilizer braces (6) are joined to suspensions upon the bottom of stabilizer (7) and to suspensions upon rear fuselage section (8).

NOTE

In order that the correct stabilizer angle of incidence may be set the spacers are inserted between stabilizer and stabilizer braces.



- 1 ... fwd stabilizer spar
- 2 ... joining the stabilizer to rear fuselage section (Fig. 55-2, detail A)
- 3 ... rear stabilizer spar
- 4 ... external hinges of elevator
- 5 ... middle hinge of elevator
- 6 ... stabilizer braces
- 7 ... joining the stabilizer brace to stabilizer (Fig. 55-2, detail B)
- 8 ... joining the stabilizer brace to rear fuselage section (Fig. 55-2, detail C)

For information only:

- 11 ... rear bulkhead of rear fuselage section

Fig. 55-1 Stabilizer

EFFECTIVITY: All

55-10-00

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MAINTENANCE

REMOVAL / INSTALLATION

REMOVAL OF STABILIZER

CAUTION

SOME AIRPLANE ARE PROVIDED FOR SETTING THE PROPER STABILIZER ANGLE OF INCIDENCE WITH SPACERS BETWEEN STABILIZER BRACES AND STABILIZER. TAKE IN MIND DURING STABILIZER REINSTALLATION IT IS NECESSARY TO PLACE THE SAME NUMBER OF THE SAME SPACERS TO THE SAME PLACE AS ORIGINALLY.

Preparatory works

- a) Remove elevator (section 55-20-00).
- b) Disconnect bondings between stabilizer and rear bulkhead of rear fuselage section.
- c) Remove divided bolt (Fig. 55-7, item 1) of pitch trimming as follows:
 - remove bolt (11) and remove spacer (12) from the divided bolt (1)
 - unscrew the pushrod (2, 3) and divided bolt (1) assembly backward by turning the assembly anti-clockwise and mark mutual position of pushrods and stabilizer at the moment of unscrewing to enable reinstallation.
 - remove pushrods (2) with divided bolt (1) from the stabilizer.

Removal of stabilizer

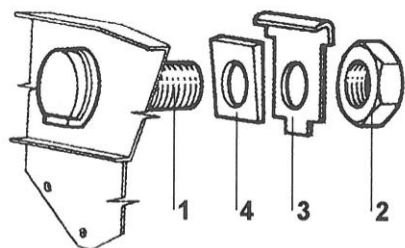
- a) Remove two fitted bolts fixing the stabilizer braces to stabilizer (Fig. 55-2, detail B) as follows:
 - unbend tab washers (7)
 - unscrew nuts (6) and remove tab washers (7)
 - remove bolts (5) and spacers, if used.
- b) Remove two fitted bolts fixing the fwd spar of stabilizer to rear fuselage section (detail A) as follows:
 - unbend tab washer (3)
 - unscrew nuts (2) and remove tab (3) and tapered washers (4)
 - remove fitted bolts (1).
- c) Remove stabilizer from the airplane and store it in stand.
- d) Remove if necessary the stabilizer braces (detail C) as follows:
 - unbend the tab washers (10) and unscrew nuts (9)
 - remove tab washers (10) and fitted bolts (8).

In case the airplane is equipped with towing mechanism it is necessary to remove two bolts of towing mechanism (detail B) upper brace (12) as follows:

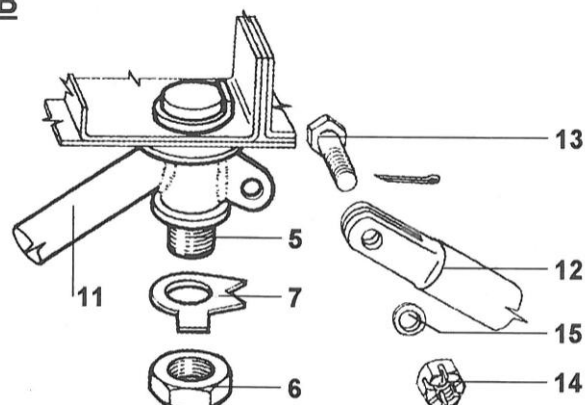
- remove cotter pins and unscrew nuts (14)
- remove washers (15) and bolts (13).

EFFECTIVITY: All

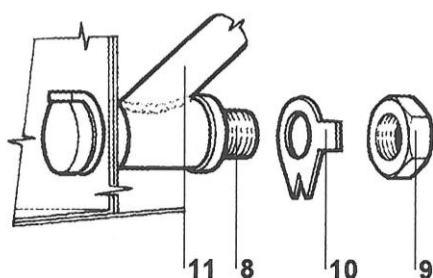
A



B



C



A ... joining the fwd stabilizer spar to rear fuselage section

B ... joining the stabilizer brace to stabilizer and upper brace of towing mechanism (12)

C ... joining the stabilizer braces to rear fuselage section

1 ... fitted bolt

2 ... nut

3 ... tab washer

4 ... tapered washer

5 ... fitted bolt

6 ... nut

7 ... tab washer

8 ... fitted bolt

9 ... nut

10 ... tab washer

For information only:

11 ... L, R brace of stabilizer

12 ... upper brace of towing mechanism

13 ... bolt

14 ... nut

15 ... washer

Fig. 55-2 Fixing the stabilizer

EFFECTIVITY: All

55-10-00

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INSTALLATION OF STABILIZER

CAUTION

INSERT DURING STABILIZER REINSTALLATION ORIGINAL SPACERS BETWEEN STABILIZER AND STABILIZER BRACES (IF USED) IN ORIGINAL NUMBER.

CHECK STABILIZER SETTING AFTER NEW STABILIZER INSTALLATION AND INSERT SPACERS (section 08-20-00) IF NECESSARY.

NOTE

In case of new stabilizer installation adapt the stabilizer embedding in the rear fuselage section. Chamfer the cut edges of sheet and provide them with glued rubber border (Fig. 55-3, item 2). Drill 1 mm (0,04 in) holes at the 40 mm (1,6 in) distance all along the periphery of rubber border and lock the border with safety wire.

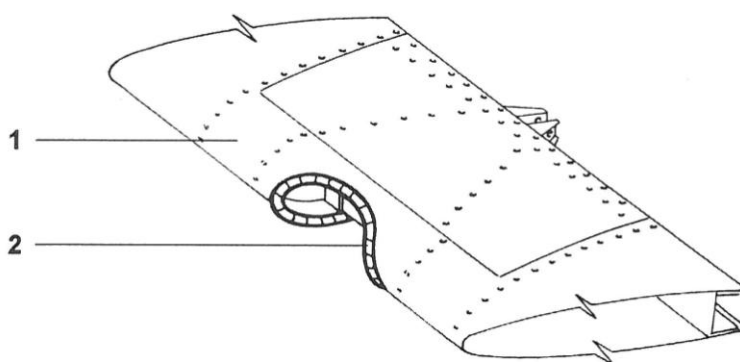


Fig. 55-3 Adaptation of new stabilizer

Stabilizer installation

- a) Install stabilizer braces (Fig. 55-2, item 11) to rear fuselage section (detail C) as follows:
 - insert fitted bolts (8) into the bottom suspensions of rear fuselage section
 - fit the braces (11) and tab washers (10) upon the bolts (8)
 - screw nuts (9) on but neither tighten not lock them.
- b) Fit the stabilizer upon the rear fuselage section.
- c) Install two fitted bolts of fwd stabilizer mounts to rear fuselage section as follows (detail A):
 - insert bolts (1) into the upper suspensions of rear fuselage section
 - provide bolts (1) with tapered washers (4) with narrow ends downwards and with tab washers (3)
 - screw nuts (2) on but neither tighten not lock them.
- d) Install two fitted bolts of stabilizer brace fixing to stabilizer (detail B) as follows:
 - insert pertinent spacers between stabilizer and each stabilizer brace (if originally used)
 - insert bolts (5) into the suspensions in the bottom of stabilizer and stabilizer braces (11)
 - provide bolts (5) with tab washers (7)
 - screw the nuts (6) on.

EFFECTIVITY: All

- e) Tighten the nuts (2, 6, 9) with 44 to 49 Nm (32 to 36 lbft) torque and lock them with tab washers (3; 7; 10).
- f) Join with two bolts the upper braces (12) of towing mechanism (if installed) (detail B) as follows:
 - insert bolts (13) into the fork of upper brace (12) and into the suspension eye of stabilizer brace (11)
 - provide bolts (13) with washers (15) and screw the nuts (14) on
 - tighten the nuts (14) and lock them with cotter pins.

Final works

- a) Installation of divided bolt (Fig. 55-7, item 1) of pitch trimming:
 - grease the divided bolt (1) with grease for drive screws, e.g.. MOLYKA R
 - grease the spacer (12) and insert it into the divided bolt (1) so that it may fit properly by turning according to center punch (13)
 - check middle setting of pitch trim control wheel
 - set pushrods (2, 3) according to marking made during removal of divided bolt, i.e. at the moment of unscrewing and screw the divided bolt (1) into the drum (21) such a way that the distance „a“ correspond to that recorded during removal
 - make sure the bell cranks (4) are directed upwards.

NOTE

The divided bolt (1) is double threaded and therefore the two positions of bell cranks (4) are during check of divided bolt (1) assembly with bell crank (2, 3) setting possible if the bell cranks (4) are directed downwards unscrew the divided bolt (1) from the drum (21) and mark out the pushrod position at the moment of unscrewing. Turn the divided screw set with pushrods through 180° and screw the divided bolt into the drum.

- screw the divided bolt (1) as much as possible into the drum (21) and set the spacer (12) according to center punch (13), center punch upon spacer with respect to center punch upon the half of divided screw.
 - insert the bolt (11) into the hole in divided bolt (1) and spacer (12) and provide bolt with washer, screw the nut on and lock the tightened nut with cotter pin
 - turn with the divided bolt (1) in the drum (21) to set the distance „a“ recorded during removal.
- b) Connect bonding between stabilizer and last bulkhead of rear fuselage section.
 - c) Install elevator (section 55-20-00).

APPROVED REPAIRS

REPAIR OF STABILIZER

Fault	Remedy
1) Faulty skin as cracks, deformation and/or punctured skin.	Repair faulty skin and fwd stabilizer spar according to instructions issued in section 57-10-00 concerning the „REPAIR OF MECHANICAL DEFECTS OF WING SKIN, RIBS AND LONGERONS“
2) Faulty fwd stabilizer spar as cracks.	
3) Faulty stabilizer braces as cracks and deformations	Replace stabilizer braces if cracks are detected or the braces are bent for more than 1 mm. The braces bent less should not be leveled.
4) Faulty suspensions of stabilizer as cracks and dented holes of suspensions.	Replace suspensions with cracks. Repair dented holes according to subsection „REAMING OF HOLES IN STABILIZER SUSPENSIONS“

REAMING OF STABILIZER MOUNT HOLES

CAUTION

CHECK POSITIONING OF STABILIZER AFTER REAMING THE STABILIZER SUSPENSION HOLES (section 08-20-00).

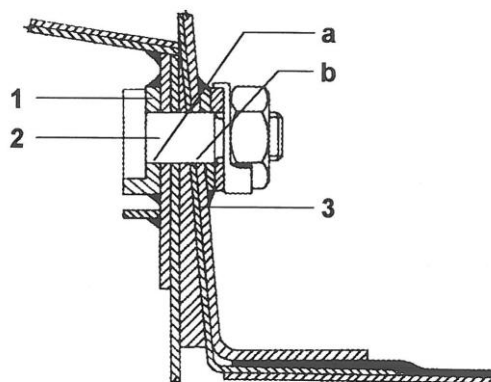
General instructions for hole reaming is issued in subsection 20-21-00.

Suspension hole (Obr. 55-4, poz. 1; 3; 4; 6; 7; 9)		Recommended reamer	Recommended caliper
Original dimension	Ø 10 H8	-----	-----
Dimensions after reaming	Ø 10,1 H8	Ø 10,1 H7 000-224-5009	Ø 10,1 H7 000-511-1012
	Ø 10,2 H8	Ø 10,2 H7 000-224-5010	Ø 10,2 H7 000-511-1013
	Ø 10,3 H8	Ø 10,3 H7 000-224-5011	Ø 10,3 H7 000-511-1014
	Ø 10,4 H8	Ø 10,4 H7 000-224-5012	Ø 10,4 H7 000-511-1015

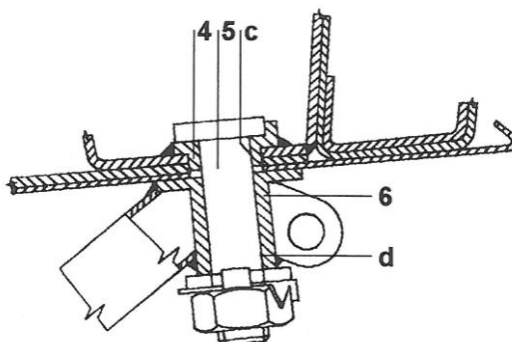
Suspension bolts (Fig. 55-4, items 2; 5; 8)		Bolt No. (Fig. 55-4)		
		item 2	item 5	item 8
Original dimension	Ø 10 h7	Z 42.3100-00.11	L 242.3100-00.10	Z 42.1300-00.12
Dimensions after repair	Ø 10,1 h7	Z 42.3100-00.47	L 242.3100-00.43	Z 42.1300-00.52
	Ø 10,2 h7	Z 42.3100-00.48	L 242.3100-00.44	Z 42.1300-00.53
	Ø 10,3 h7	Z 42.3100-00.49	L 242.3100-00.45	Z 42.1300-00.54
	Ø 10,4 h7	Z 42.3100-00.50	L 242.3100-00.46	Z 42.1300-00.55

EFFECTIVITY: All

Joining the fwd spar of stabilizer to rear fuselage section



Joining the stabilizer brace to stabilizer



Joint	Note	Name	Dimensions (mm)				
			Original			Operation	Repaired
			D1	T1	V min./max.	T2 max.	D2 max.
a	1	Suspension upon rear fuselage section	Ø 10 H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	2	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7
b	3	L, R suspension	Ø 10 H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	2	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7
c	4	L, R rear suspension	Ø 10 H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	5	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7
d	6	Bushing	Ø 10H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	5	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7

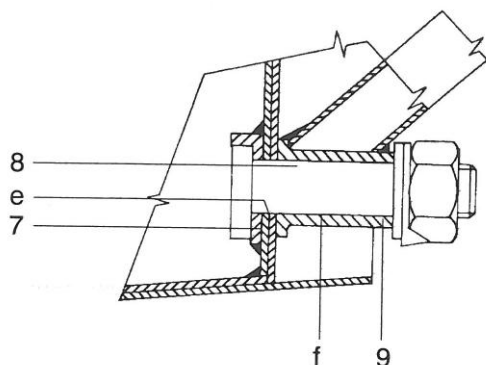
*Fig. 55-4 Dimensions, allowances and plays in stabilizer suspensions
(page 1 of 2)*

EFFECTIVITY: All

55-10-00

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Joining the stabilizer brace to rear fuselage section



Joint	Note	Name	Dimensions (mm)				
			Original			Operation	Repaired
			D1	T1	V min./max.	T2 max.	D2 max.
e	7	Suspension upon rear fuselage section	Ø 10 H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	8	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7
f	9	Bushing	Ø 10 H8	+ 0,022 0	$\frac{0}{0,037}$	+ 0,030	Ø 10,4 H8
	8	Fitted bolt	Ø 10 h7	0 - 0,015		- 0,020	Ø 10,4 h7

Fig. 55-4 Dimensions, allowances and plays in stabilizer suspensions
(page 2 of 2)

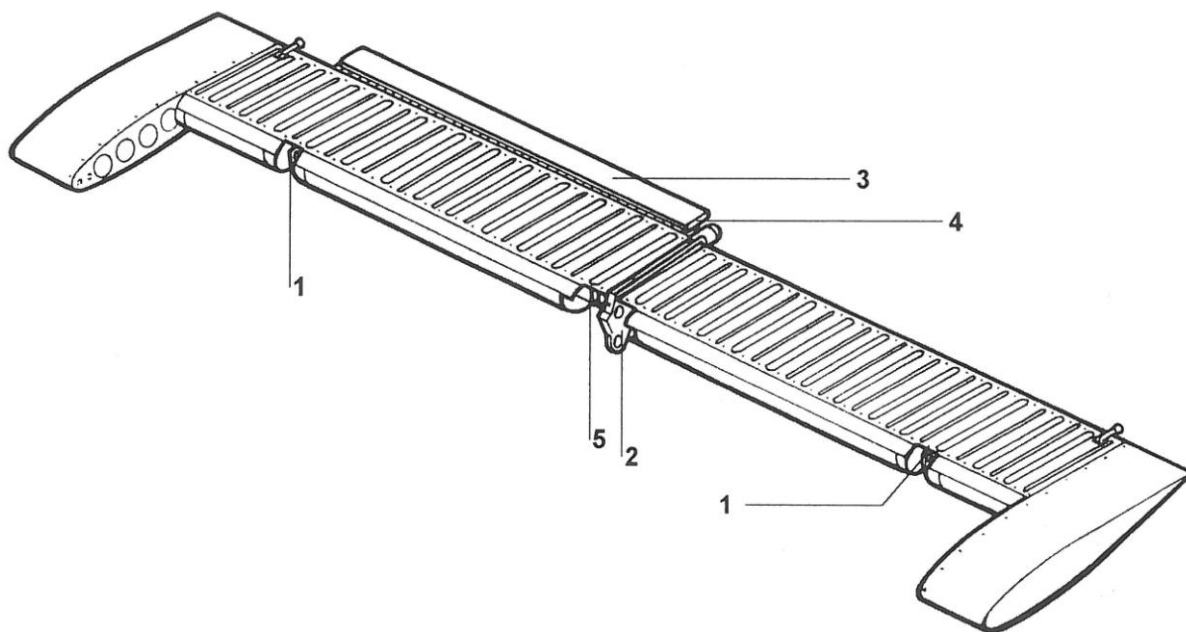
ELEVATOR

DESCRIPTION AND OPERATION

The elevator is hinged to external (Fig. 55-5, item 1) and middle (2) hinges to stabilizer. The elevator control pushrod is joined to the elevator control bell crank (2).

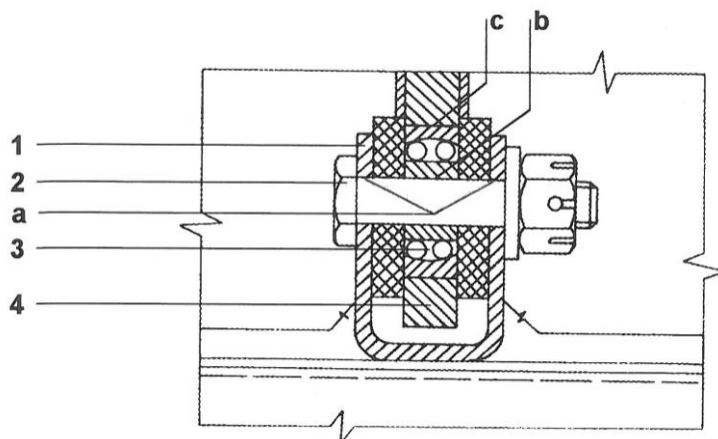
The elevator is equipped with pitch trim tab (3).

The pushrods of pitch trim tab are joined to bell crank (4) of trim tab and bell crank (5) that is upon fwd part of elevator.



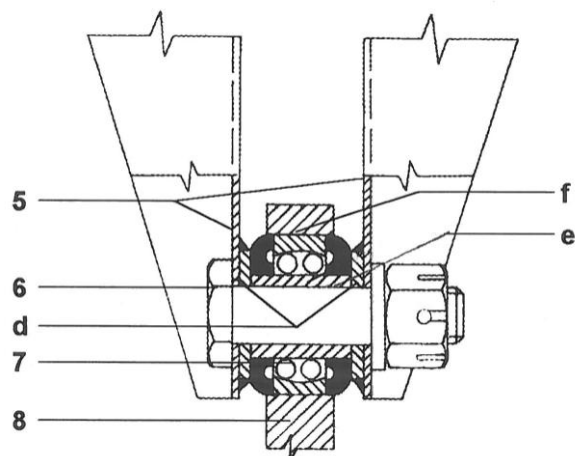
- 1 ... external hinges
- 2 ... elevator control bell crank (middle hinge)
- 3 ... trim tab
- 4 ... trim tab bell crank
- 5 ... bell cranks for joining the trim tab control pushrods

Fig. 55-5 Elevator



Joint	Item	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
a	1	External hinge	Ø 6 H8	+ 0,018 0	$\frac{0,010}{0,046}$	+ 0,025
	2	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035
b	3	Bearing	Ø 6	+ 0,002 - 0,010	$\frac{0}{0,030}$	+ 0,010
	2	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035
c	4	External hinge upon stabilizer	Ø 19 K6	+ 0,002 - 0,010	R	
	3	Bearing	Ø 19	+ 0,002 - 0,011		

Fig. 55-6 Dimensions, allowances and plays in elevator hinges
 (page 1 of 2)



Joint	Poz.	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
d	5	Middle elevator hinge upon stabilizer	Ø 6 H8	+ 0,018 0	$\frac{0,010}{0,046}$	+ 0,025
	6	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035
e	7	Bearing	Ø 6	+ 0,002 - 0,010	$\frac{0}{0,030}$	+ 0,010
	6	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035
f	8	Middle hinge	Ø 19 K6	+ 0,002 - 0,010	R	
	7	Bearing	Ø 19	+ 0,002 - 0,011		

*Fig. 55-6 Dimensions, allowances and plays in elevator hinges
(page 2 of 2)*

EFFECTIVITY: All

55-20-00

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MAINTENANCE

REMOVAL / INSTALLATION

REMOVAL OF ELEVATOR

Preparatory works

- a) Remove rear fuselage panel (Fig. 52-5, item 13), rear covers of upper fuselage cover (19) and elevator (34).
- b) Disconnect pushrod from the bell crank (Fig. 27-14, joint G) of elevator control including bonding.
- c) In order that the reinstallation is enabled the setting of divided bolt (Fig. 55-7, detail A) of trim tab control should be checked as follows:
 - set pitch trim tab wheel in cockpit to the middle position
 - measure and record the distance „a“ of divided bolt (1) face from the face of drum (21) of pitch trim upon the last bulkhead of rear fuselage section. This dimension should be about 23 mm (0,9 in).
- d) Disconnect the feeding conductor of tail position light. Disconnect the bonding between elevator and stabilizer.

1) Removal of pitch trim tab control

- a) Remove bolt (7) fixing the bell cranks (Fig. 55-7, item 4) from the hinges of elevator.
- b) Remove screws (8, 9) to dismantle one of bell cranks (5) from the trim tab (6).
- c) Unscrew bolts (10) to remove two pushrods (3) from the bell cranks (5).

2) Removal of elevator

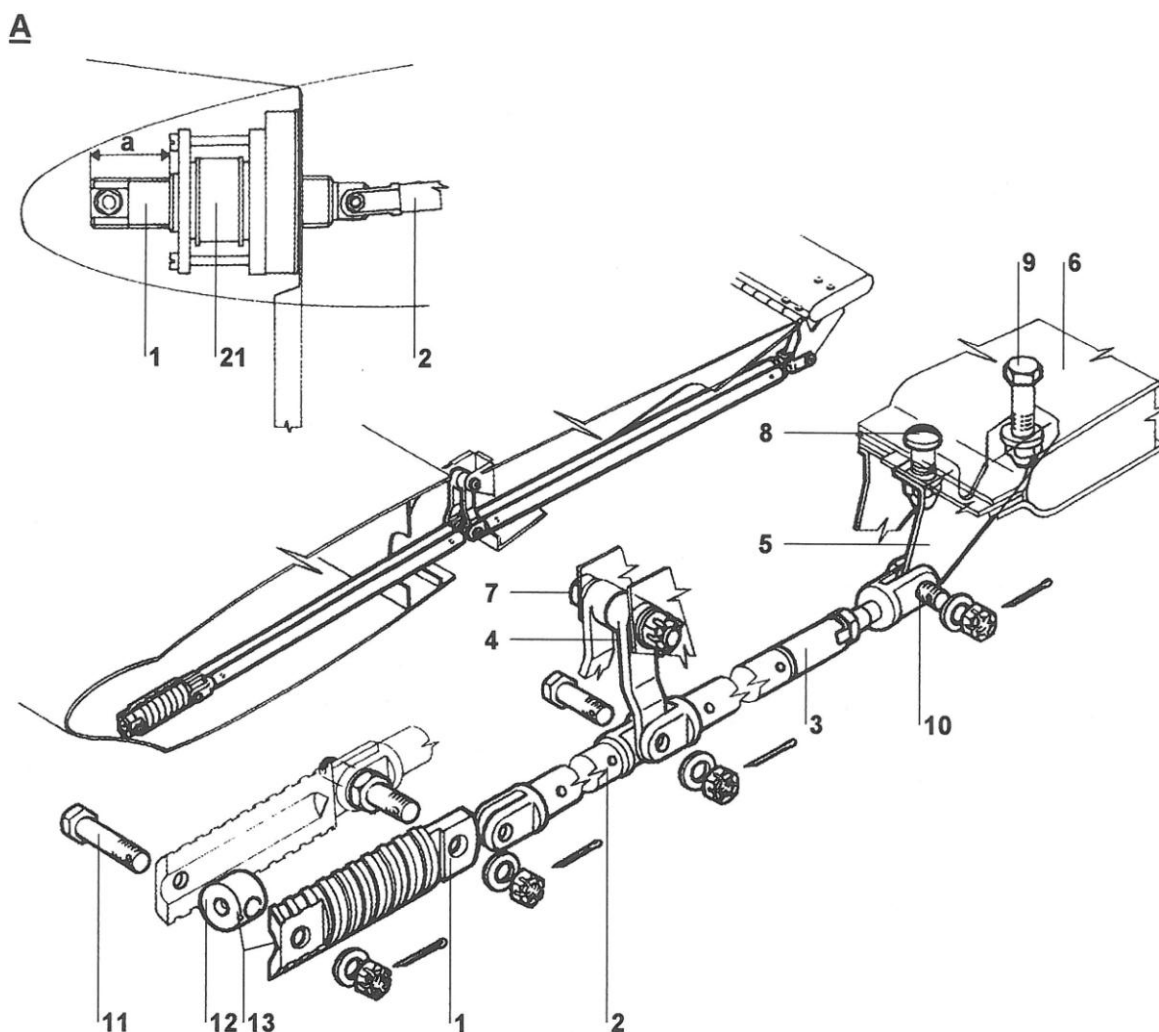
- a) Remove two fitted bolts (Fig. 55-6, page 1 of 2) from the external hinges and fitted bolt (Fig. 55-6, page 2 of 2) of elevator middle hinge.
- b) Remove elevator from the airplane and store in stand.

NOTE

In case the pushrods (Fig. 55-7, item 3) of trim control are not to be removed it is necessary to join them with safety wire to stabilizer braces.

3) Removal of pitch trim tab

- a) Remove cotter pin from the outboard side of pin (Fig. 55-8, item 4) of trim tab hinge.
- b) Pull the hinge pin (4) from the hinge (1; 2).



A ... setting of divided bolt (1)
a = about 23 mm (0,9 in)

- 1 ... divided bolt
- 2 ... pushrod (2 pcs) in stabilizer
- 3 ... pushrod (2 pcs) in elevator
- 4 ... pushrod (2 pcs)
- 5 ... bell crank (2 pcs)
- 6 ... trim tab
- 7 ... fitted bolt
- 8 ... bolt
- 9 ... bolt

- 10 ... fitted bolt
- 11 ... fitted bolt
- 12 ... spacer
- 13 ... center punch marking

For informatio only:
21 ... drum (upon rear bulkhead)

Fig. 55-7 Pitch trimming in stabilizer

EFFECTIVITY: All

55-20-00

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INSTALLATION OF ELEVATOR

1) Installation of pitch trim tab

CAUTION

IN CASE OF NEW TRIM TAB INSTALLATION THE HINGES (Fig. 55-8, detail A) SHOULD BE ADAPTED BY FILING TO ENABLE FREE MOVEMENT OF TRIM TAB IN ITS HINGES. WHEN RIVETING NEW HINGES FIT THE RIVET ALTERNATELY FROM UPWARDS AND FROM DOWNWARDS (detail B).

- a) Fit the trim tab to its hinge (Fig. 55-8, item 1) upon elevator.
- b) Grease the pin (4) of hinge and insert it into the hinges. Lock the pin at both ends with cotter pin.

2) Installation of elevator

- a) Check setting of trim tab control as follows:
 - set pitch trim tab control wheel in cockpit to middle position
 - check the distance (Fig. 55-7, dimension "a") between face of bolt (1) and face of drum (21) of pitch trim.
- b) Grease bearings in elevator bell crank control and external elevator hinges (subsection 05-21-00).
- c) Install the elevator, greased spacers and dust covers upon the stabilizer and fit in the fitted bolts, washers and nuts as follows:
 - upon external hinges (Fig. 55-6, page 1 of 2)
 - upon middle hinge (Fig. 55-6, page 2 of 2).
 Lock the nuts cotter pins after the external hinges are tightened with 9,5 to 11,5 Nm (7,5 to 8,5 lbft) torque and middle hinge with 23 to 29 Nm (17,0 to 21,4 lbft) torque.
- d) Join the pitch control pushrod into the elevator bell crank (Fig. 27-14, joint G) provided with dust covers. Insert fitted bolt into the hole of joint and screw the nut on it. Lock the tightened nut with cotter pin. Connect pertinent bondings.
- e) Make sure the elevator is in the middle position when the control stick is centered in neutral position. Setting the elevator to neutral position is made by shifting (screwing in and out) the adjusting fork of elevator control pushrod.

3) Installation of trim tab control

CAUTION

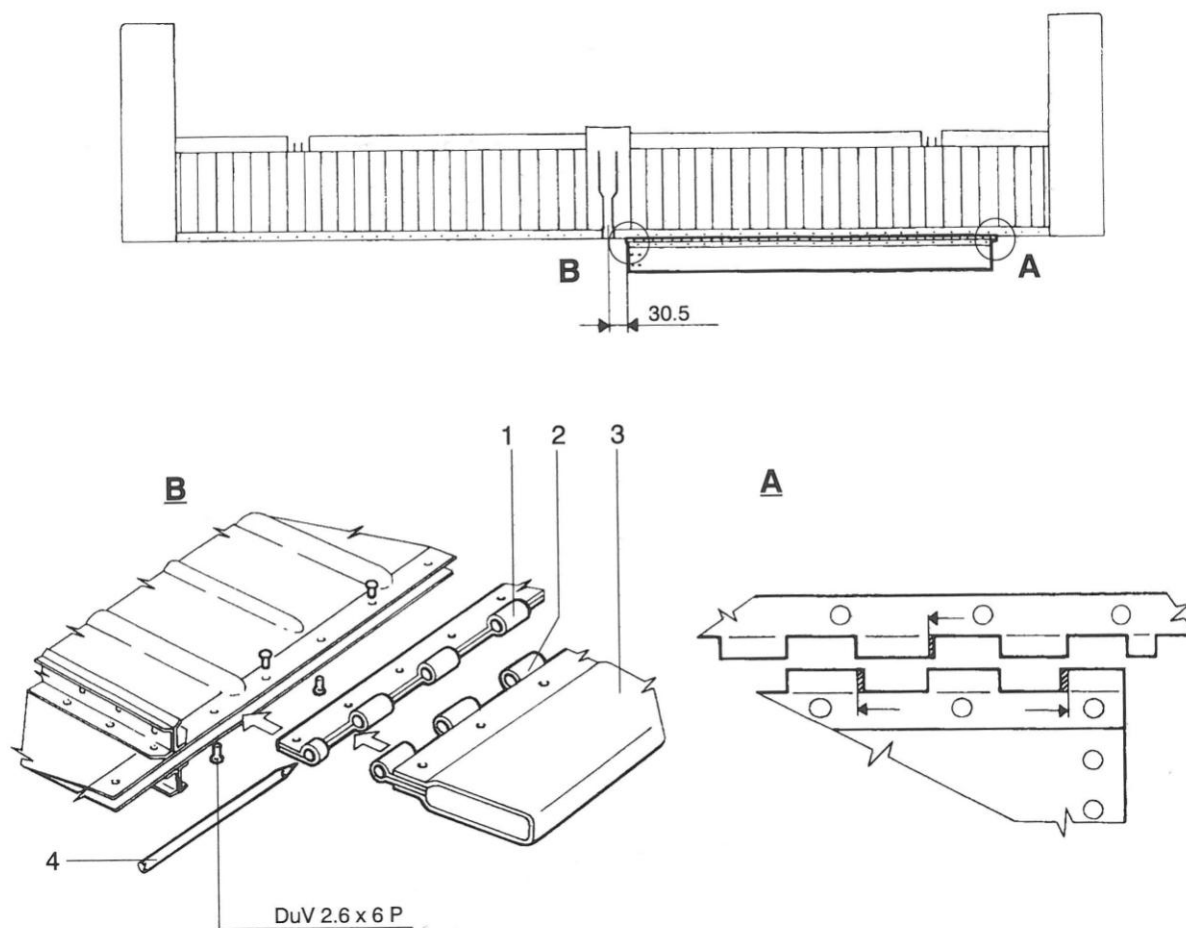
THE BOLT HEADS (Fig. 55-7, item 10) SHOULD BE UPON THE INTERNAL SIDE OF FORK (3) ONE OPPOSITE THE OTHER.

- a) Fit the pushrod (4) into the hinge in the elevator spar. Install fitted bolt (7), washer and nut. Tighten the nut with 6 to 7,2 Nm torque and lock it with cotter pin.
- b) Join the pushrods (3) to the bell cranks (5) by fitted bolts (10). Provide fitted bolts with washers and screw the nuts upon them. Lock the nuts after their tightening with 6 to 7,2 Nm (4,4 to 5,3 lbft) torque with cotter pins.
- c) Join bell crank (5) to the trim tab by means of bolts (8, 9) with washers and self-locking nuts.
- d) Check if the adjustment of trim tab control when the trim tab control wheel in cockpit is set to middle position and if the trim tab is in neutral position. The elevator should be set to neutral position. Shifting the adjusting forks of pushrods (3) may carry out the trim tab control adjustment.

EFFECTIVITY: All

Final works

- Connect feeding conductor of tail position light and fix it by fixing stripe to left stabilizer brace.
- Connect bondings between elevator and stabilizer.
- Reinstall the rear fuselage panel (Fig. 52-5, item 13), rear upper fuselage panel (19) and elevator cover (34).



- A ... adapting the hinge by filing during installation
B ... riveting of hinges and pitch trim tab (3) installation
- 1 ... hinge upon the elevator
 - 2 ... hinge upon the trim tab
 - 3 ... trim tab
 - 4 ... hinge pin

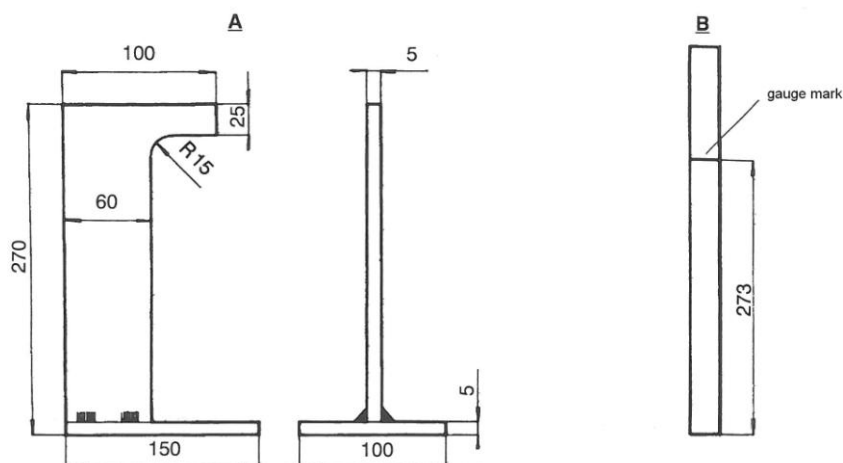
Fig. 55-8 Trim tab

INSPECTION / CHECK

CHECK OF STATIC BALANCING OF ELEVATOR

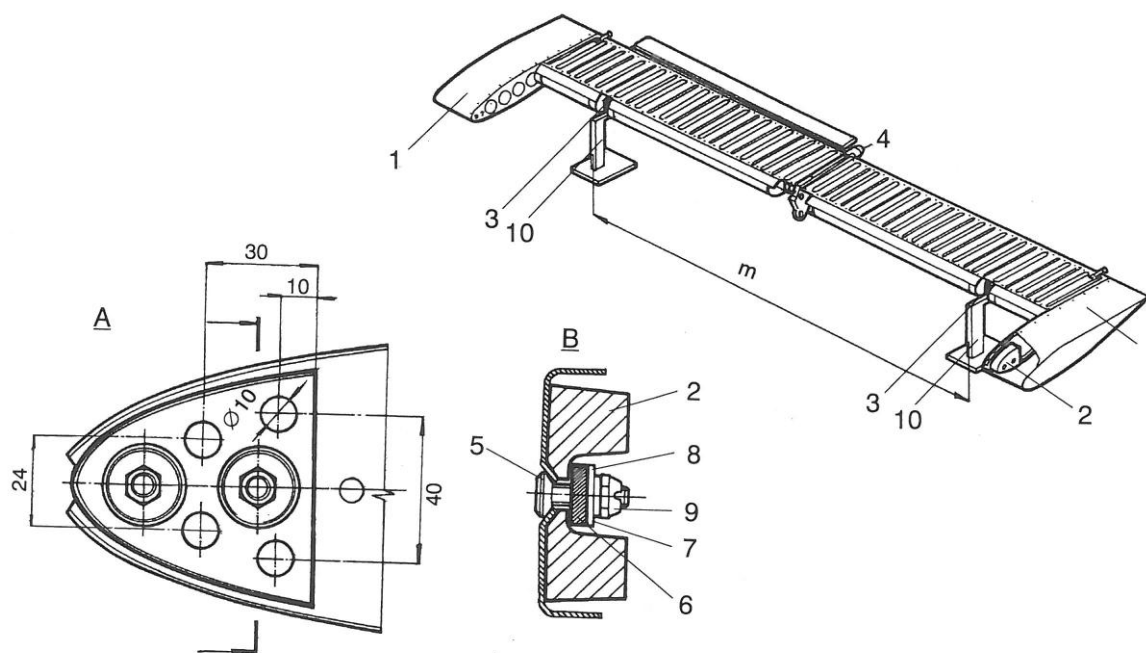
- 1) Process of check
 - a) The static balance of elevator should be checked:
 - after the repair that may cause change of position of elevator
 - after the paint renewal (section 51-72-00).
 - b) Do not remove trim tab and tail light from elevator.
- 2) Necessary equipment
 - a) jacks 2 pcs (Fig. 55-9, item A)
 - b) gauge 1 pc (Fig. 55-9, item B)
 - c) adjustable support, height about 85 mm, 1 pc
 - d) commercial scale
- 3) Procedure
 - a) Fit the jacks upon the flat surface as bench (Fig. 55-10, item 10) at the distance of external elevator hinges (m) so that the planes of jacks are parallel.
 - b) Insert the fitted hinge bolts into the hinges of elevator. Place the elevator with the inserted hinge bolts upon the prepared jacks so that axis of elevator hinges is perpendicular to plane of supporting jacks.
 - c) Place under the rear part of elevator in the middle of elevator span the commercial scale with adjustable support. Support the elevator 10 mm (0,4 in) from the trailing edge at the navigation light (see Fig. in Record on static balancing of elevator).
 - d) Set by, suitable adjustment of adjustable support, the elevator to horizontal position. Check the elevator position by gauge (Fig. 55-9, item B): gauge mark of gauge opposite to trailing edge of elevator.
 - e) Subtract the mass of adjustable support from the measured mass and compare the received mass (G_B) with the prescribed mass (G_A) issued in the Record on elevator static balancing measurement.
 - f) Remove, if the received mass (G_B) is not within prescribed mass G_A , the elevator tips (Fig. 55-10, item 1) and adjust the mass of weights (2) located in leading parts of elevator and ribs.
 - if measured mass (G_B) is less that prescribed (G_A): drill off the excess mass uniformly from both weights (Fig. 55-10, item A).
 - if measured mass (G_B) is in excess of that prescribed (G_A): unscrew nuts (9) of weight fixing bolts and insert under the original washer (*) the necessary number and thickness of lead washers, (item 9), uniformly to both weight. Replace the bolts (5), if necessary for the longer ones.
 - repeat the elevator static balance check according to paragraphs a) through e) of this procedure.
 - g) Fill the Record on static balancing of elevator.
 - h) Install the elevator tip (1) and elevator to the airplane.

EFFECTIVITY: All



A ... dimension of struts, material, weldable steel sheet
B ... gauge with gauge mark, material, wood

Fig. 55-9 Struts and gauge



A ... adaptation of weight mass by drilling up to the 10 mm (0,4 in) depth
B ... adaptation of weight mass by using the load plates
m ... distance between external hinges of elevator: $m = 1893 \text{ mm (72,53 in)}$

1 ... elevator end-tip
2 ... weight (1 pc upon both end ribs)
3 ... elevator hinge
4 ... tail light
5 ... bolt

6 ... lead plate (adapt balance weight)
7 ... steel washer
8 ... elastic washer
9 ... self-locking nut
10 ... support

Fig. 55-10 Setting the elevator upon jacks and weight mass adaptation

EFFECTIVITY: All

55-20-00

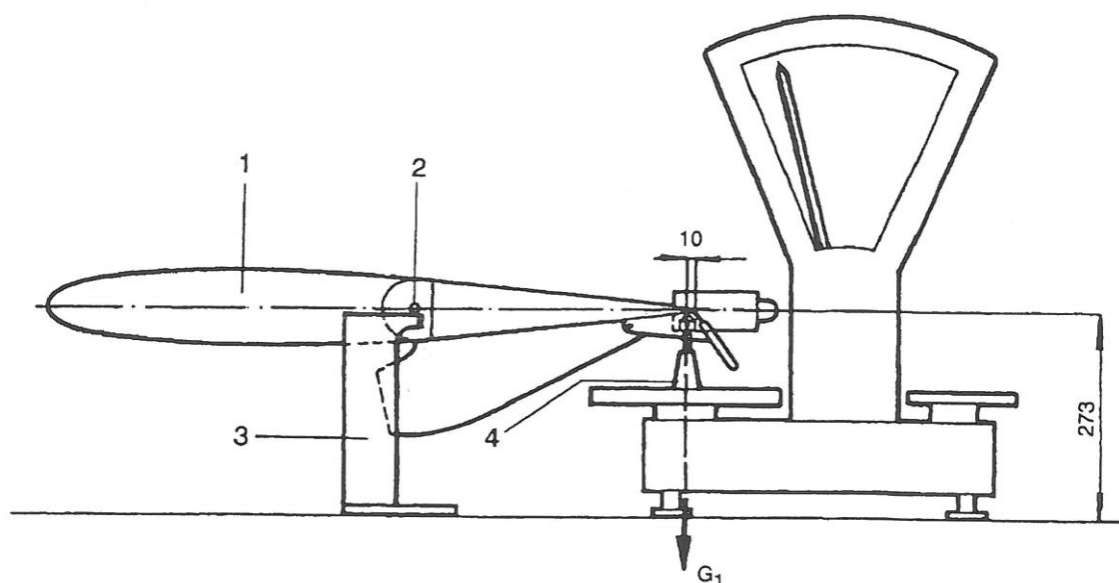
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RECORD OF ELEVATOR STATIC BALANCING CHECK

Airplane production No: _____ Production No. of elevator: _____

Mass G *			
prescribed G_A		balanced G_B	
kg	lbs	kg	lbs
0,290 – 0,390	0,298 – 1,455		

* The mass G_B is difference between overall mass G_1 received by weighing and mass of adjustable support G_2 ($G_B = G_1 - G_2$ kg).



1 ... elevator
2 ... fitted suspension bolts

3 ... fixed suspensions (2 pcs)
4 ... adjustable suspensions

Date of measurement

Weighing made out by

Date of check

Check carried out by

Result of check: SUITABLE – NOT SUITABLE
(delete what is not applicable)

EFFECTIVITY: All

APPROVED REPAIRS

REPAIR OF ELEVATOR

Fault	Remedy
1) Faulty skin as cracks, deformations or punctured skin.	Repair faulty skin according to instructions issued in section 57-10-00 "REPAIR OF MECHANICAL DEFECTS OF WING SKIN, RIBS AND LONGERONS".
2) Play in trim tab hinge exceeding 1 mm (0,04 in).	Remove play by reduction of diameter by tightening the eyes of hinges (Fig. 55-8, item 1, 2) by suitable tool. Check the tightened eyes of hinge and replace the hinge if cracks are detected.
3) Loose mass balances upon end ribs of elevator.	Tighten the faultless nuts and replace corrosive or faulty nuts.
4) Faulty hinges of elevator as cracks.	Replace cracked hinges.

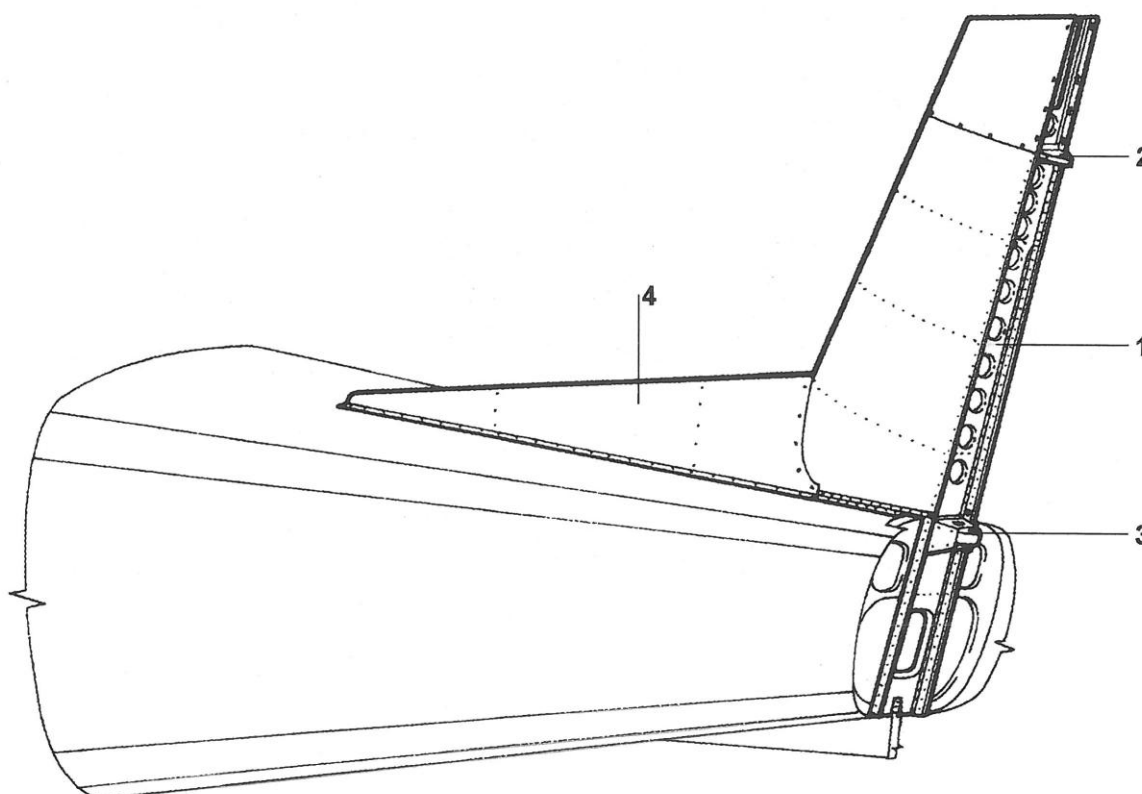
EFFECTIVITY: All

FIN

DESCRIPTION AND OPERATION

The fin is a part of rear fuselage section (section 53-20-00).

The fin spar (Fig. 55-11, item 1) carries upper (2) and lower (3) hinge of rudder.



- 1 ... fin spar
- 2 ... upper rudder hinge
- 3 ... lower rudder hinge
- 4 ... dorsal fin

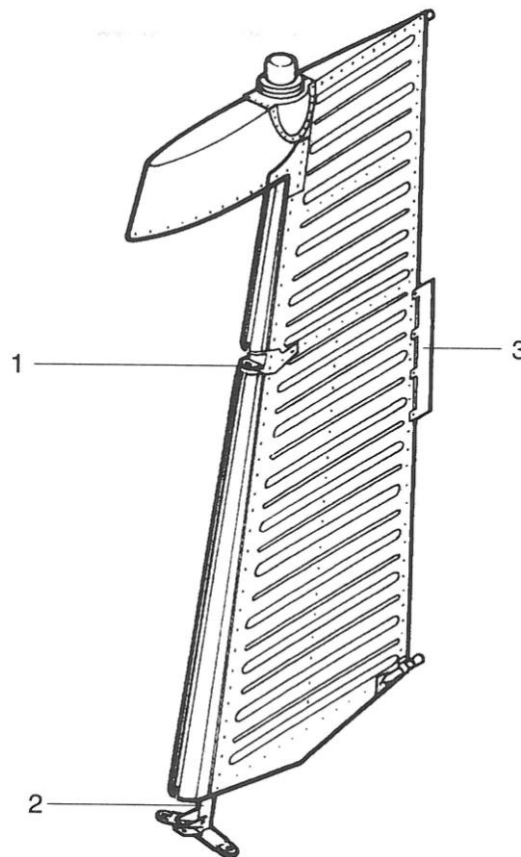
Fig. 55-11 Fin

RUDDER

DESCRIPTION AND OPERATION

The rudder is hinged in upper (Fig. 55-12, item 1) and lower (2) hinges of fin. The rudder cable controls are joined to rudder bell crank (2).

The rudder is provided with fixed balance tab (3).



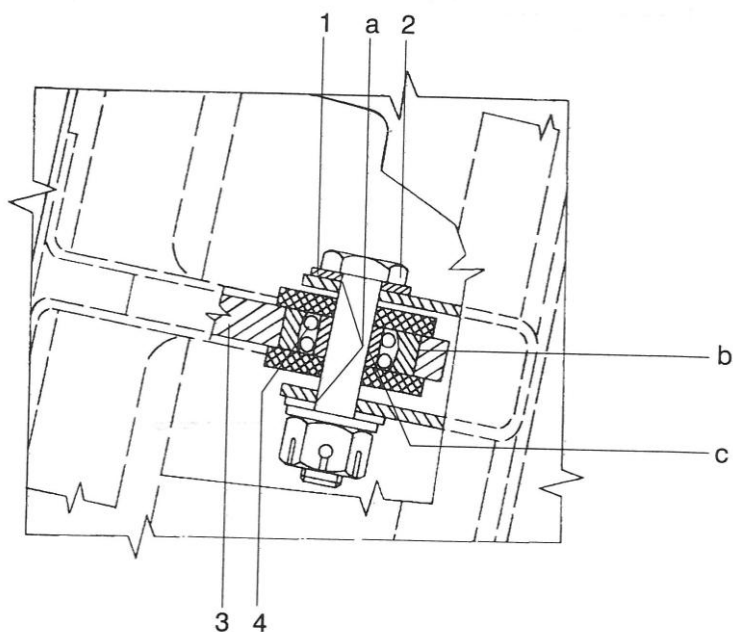
- 1 ... upper hinge
- 2 ... rudder bell crank (lower hinge)
- 3 ... balance tab

Fig. 55-12 Rudder

EFFECTIVITY: All

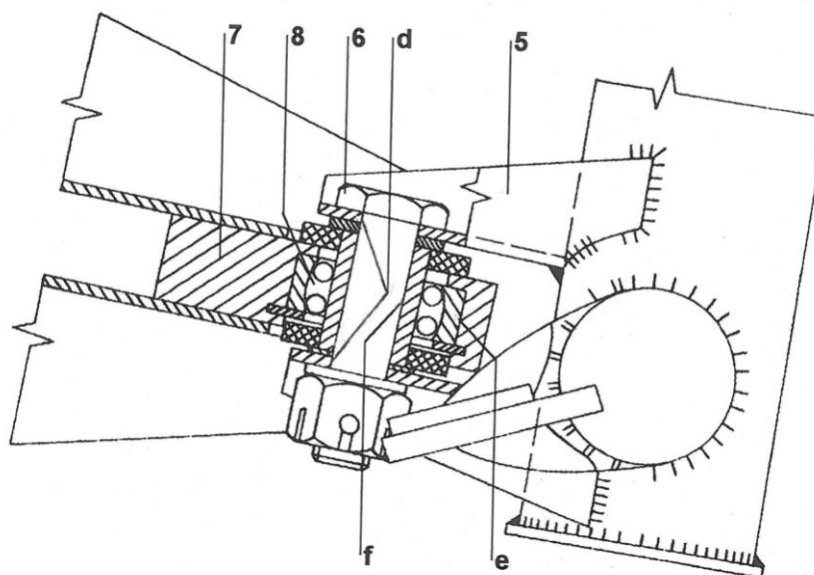
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Joint	Item	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
a	1	Upper hinge	Ø 6 H8	+ 0,018 0	$\frac{0,010}{0,046}$	+ 0,025
	2	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035
b	3	Upper hinge upon fin	Ø 19 K6	+ 0,002 - 0,010	R	
	4	Bearing	Ø 19	+ 0,002 - 0,011		
c	4	Bearing	Ø 6	+ 0,002 - 0,010	$\frac{0}{0,030}$	+ 0,005
	2	Fitted bolt	Ø 6 f8	- 0,010 - 0,028		- 0,035

*Fig. 55-13 Dimensions, allowances and plays in rudder hinges
(page 1 of 2)*



Joint	Item	Name	Dimensions (mm)			
			Original			Operation
			D1	T1	V min./max.	T2 max.
d	5	Lower hinge	Ø 8 H8	+ 0,022 0	<u>0,013</u> 0,057	+ 0,035
	6	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,045
e	7	Lower hinge in fin	Ø 22 K6	+ 0,002 - 0,010	P	+ 0,005
	8	Bearing	Ø 22	+ 0,002 - 0,011	0,013	- 0,020
f	8	Bearing	Ø 8	+ 0,002 - 0,010	<u>0,023</u> 0,037	+ 0,005
	6	Fitted bolt	Ø 8 f8	- 0,013 - 0,035		- 0,045

*Fig. 55-13 Dimensions, allowances and plays in rudder hinges
(page 2 of 2)*

EFFECTIVITY: All

MAINTENANCE

REMOVAL / INSTALLATION

REMOVAL OF RUDDER

Preparatory works

- a) Remove fin tip (Fig. 52-5, item 9), rear upper fuselage fairing (19), rear fuselage cover (13) and bottom fuselage panel (24).
- b) Disconnect feeding conductor of anti-collision beacon and bonding at the lower rudder hinge.
- c) Unlock and unscrew one turnbuckle (Fig. 27-10, item 2) of rudder control cables.
- d) Disconnect the rudder control cables (1) from the bell crank (5) of the rudder as follows:
 - remove cotter pins and unscrew nuts (11)
 - remove screws (8), spacers (10) and washers (12).

Removal of rudder

- a) Remove fitted bolt (Fig. 55-13, page 1 of 2) from the upper hinge and fitted bolt (Fig. 55-11, page 2 of 2) from the lower hinge of rudder.
- b) Remove rudder from the airplane and store it in stand.

INSTALLATION OF RUDDER

- a) Grease the bearings of upper and lower rudder hinges in fin (subsection 05-21-00).
- b) Grease the rudder including spacers and fit it to fin. Install the fitted bolts with washers and nuts to:
 - upper hinge (Fig. 55-13, page 1 of 2)
 - lower hinge (Fig. 55-13, page 2 of 2).Lock the nuts with cotter pins as soon as the nut of upper hinge is tightening with 9,5 to 11,5 Nm (7,0 to 8,5 lbft) torque and lower hinge is tightened by 23 to 29 Nm (17,0 to 21,4 lbft) torque.

Final work

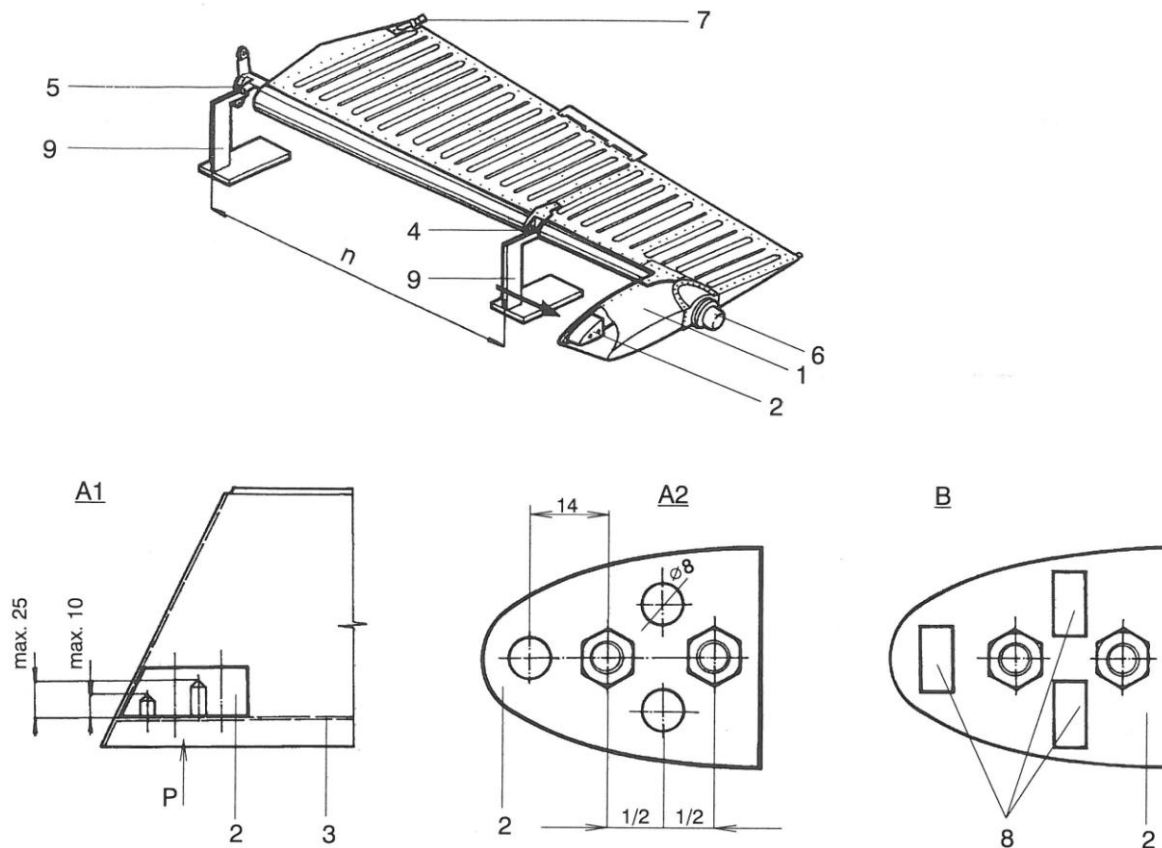
- a) Join rudder control cables (1) to the rudder bell crank (Fig. 27-10, item 5) as follows:
 - provide articulated bearings (6) with spacers (10) and shaped cable sheets at the end of cables (1)
 - install fitted bolts (8) provided with washers (12) and nuts (11)
 - lock the nuts after tightening with cotter pins.
- b) Join turnbuckle (2) and tighten the control cables (1) of rudder control to 350 to 450 N. The rudder should be after cable tightening set to neutral position (0°) as well as the pedals. Lock the turnbuckles (2) with locks (3) and cotter pins (15).
- c) Connect the conductor of anti-collision beacon feeding and bonding at the lower hinge of rudder.
- d) Install fin tip (Fig. 52-5, item 9), rear upper fuselage cover (19), rear fuselage cover (13) and bottom fuselage panel (24).

INSPECTION / CHECK

CHECK OF RUDDER STATIC BALANCING

- 1) Process of inspection
 - Check static rudder balancing
 - after the repair that may cause change of rudder
 - after the paint renewal (section 51-72-00).
- 2) Necessary equipment (the equipment is similar to check of static balancing of elevator)
 - a) jacks 2 pcs (Fig. 55-9, item A)
 - b) gauge 1 pcs (Fig. 55-9, item B)
 - c) adjustable support, height about 85 mm (3,4 in) 1 pc
 - d) commercial scale
- 3) Procedure
 - a) Place the jacks (Fig. 55-14, item 9) upon the flat plane (bench) to have the planes of jacks parallel at the distance of rudder hinges (m) so that the planes of jacks are parallel.
 - b) Insert the fitted bolts (4, 5) into the rudder hinges and place hinge bolts upon the jacks to have the rudder hinge axis perpendicular to plane of jacks.
 - c) Set the commercial scale with adjustable support under the rear part of bottom end rib 10 mm (0,4 in) from the trailing edge (Fig. In Record on rudder static balancing) at the screw fixing the static discharge wick (Fig. 55-14, item 7) to the bottom end rib.
 - d) Set the rudder by suitable adjustment of adjustable support to horizontal position. Check the elevator position by gauge (Fig. 55-14, item B): gauge mark of gauge opposite to trailing edge of rudder.
 - e) Subtract the mass of adjustable support from the received mass and compare the calculated mass (G_B) with the prescribed mass (G_A) that is issued in Record on rudder static balancing.
 - f) If the received mass (G_B) is not within the range of prescribed mass (G_A), adjust the mass of weight (Fig. 55-14, item 2) that is in leading edge of upper end rib:
 - if the received mass (G_B) is less than that prescribed (G_A): reduce mass of weight according to need by drilling new hole in front of fixing bolt, or other holes between fixing bolts (Fig. 55-14, item A2). Drill the holes through the rib to maximum depth according to Fig. 55-14, item A1. Paint the edges of holes with single layer of primer paint.
 - if the received mass (G_B) is in excess of prescribed mass (G_A): stick (Fig. 55-11, item B) necessary number of self-adhesive lead plates used for balancing the nose wheel (Fig. 32-22). Clean and degrease the spots of plate sticking.
 - repeat check of rudder balancing according to paragraphs a) through e) of this procedure.
 - g) Fill in the Record on rudder static balancing.
 - h) Install rudder to the airplane.

EFFECTIVITY: All



A1 ... adaptation of weight mass by drilling (front view) – maximum depth of drilling
A2 ... adaptation of weight mass by drilling (view front P direction) – location of drilled holes
B ... adaptation of weight mass by sticking the self-adhesive lead plates (view from P direction)

m ... distance between rudder hinges: $m = 1050,5 \text{ mm}$ (41,36 in)

- | | |
|---|-------------------------------|
| 1 ... end tip | 6 ... anti-collision beacon |
| 2 ... balance weight | 7 ... static discharge wick |
| 3 ... end rib | 8 ... self-adhesive lead wick |
| 4 ... upper hinge ($\varnothing 6 \text{ mm}$) | 9 ... support |
| 5 ... bottom hinge ($\varnothing 8 \text{ mm}$) | |

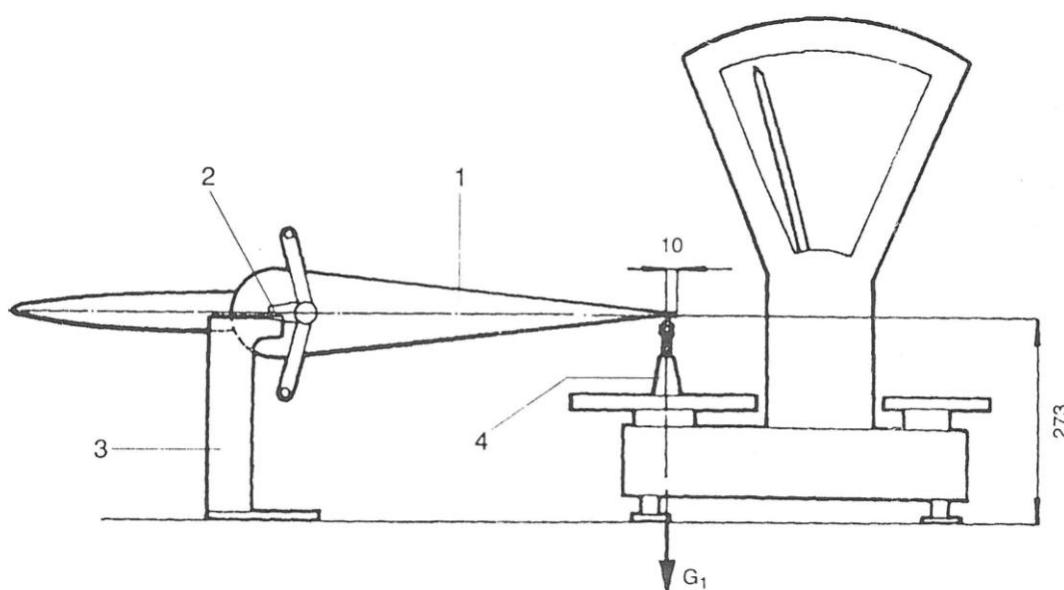
Fig. 55-14 Setting rudder upon jacks (supports) and weight adaptation

RECORD ON RUDDER STATIC BALANCING

Airplane production No.: _____ Production No. of elevator: _____

Mass G *			
prescribed G_A		balances G_B	
kg	lbs	kg	
0,450 – 0,530	1,000 – 1,170		

* Mass G is difference between overall mass G_1 received by weighing and mass of adjustable support G_2 ($G_B = G_1 - G_2$ kg).



1 ... elevator
2 ... fitted suspension bolts

3 ... fixed suspensios (2 pcs)
4 ... adjustable suspensions

Date of measurement

Weighing made out by

Date of check

Check carried out by

Result of weighing: SUITABLE – NOT SUITABLE
(delete what is not applicable)

EFFECTIVITY: All

APPROVED REPAIRS

REPAIR OF RUDDER

Fault	Remedy
1) Faulty skin as cracks, deformations and/or punctured skin.	Repair faulty skin according to instructions issued in section 57-10-00 "REPAIR OF MECHANICAL DEFECTS OF WING SKIN, RIBS AND LONGERONS".
2) Faulty rudder hinges as cracks.	Replace cracked hinges.