Zakład Remontów i Produkcji Sprzętu Lotniczego
Edward Margański

Bielsko-Biała
Poland

TECHNICAL DESCRIPTION
TECHNICAL SERVICE MANUAL
PERIODIC WORKS
of
MDM-1P „FOX P”
WITH INTERCHANGEABLE WING TIPS
EXTENDING WING SPAN TO 16,15 M

ISSUE I / DECEMBER 1998

Factory Nº	
Registration Nº	

Elaborated by: .....

Accepted by: *Edward Margański*

This is translation of the original Polish text agreed with Civil Aircraft Inspection Board (Polish Aviation Authority)

Translated by:
Stanisław Podstawny
.....

0. ISSUANCES

0.1 LIST OF REVISIONS

Any revisions of the present Manual must be indicated with Revision Number in the heading and with a vertical line in the left-hand margin of the amended text.

Item	Page	Revision	Date	Signature
1	41, 42	Changes in Schedule of periodic works (Table No 3), positions 14, 15 added to Periodic works list (Bulletin No BO-18/2011)	30.11.2011	
2	2A, 3	Page No 2A added *Applicable to gliders with no TL-3424 (electronic) accelerometer installed.*	10.10.2012	
	2B, 3A, 4A, 28A, 31A, 32A, 33A, 41A, 42A	Change to glider equipment - accelerometer. *Applicable only to gliders with TL-3424 (electronic) accelerometer installed.*		
3		*removed pages No 2A, 2B, 28A, 41A, 42A, introduced with earlier revisions;* *where used, indexed page No identifies:* *-i,ii, .. added, new page of Manual, not present in the original issue,* *-A,B, .. alternative variant of Manual page, appropriate for equipment installed;*	25.11.2020	
	2, 2i, 2iA 3, 3A, 4, 4A,	List of revisions, Table of content, List of figures - updated, pg. 2, 2i, 2iA, 3, 3A, 4, 4A;		
	6	supplemented description of the technical data, pg. 6;		
	9,11,13,15, 17,19,21,	legend now directly in Figures No 2 – 8, pg. 9, 11, 13, 15, 17, 19, 21		
	22,	highlighted entry on control cable replacement, pg. 22;		
	28,	supplemented description of glider equipment, pg. 28;		
	30A,31A 32A, 33A	update of instrument pneumatic system, and electrical system diagrams and to arrangement of front/rear seat, pages 30A, 31A, 32A, 33A;		
	40,41,42,	suppl. description of the periodic works, pages 40, 41, 42;		
	47A,48, 48A,49, 49A, 50	update to Placards and markings, correction of V_{NE} values – pages 47A, 48, 48A, 49, 49A;		
	5,8,10,12, 18,20,23, 24,25,29, 30,38, 43,44,46,	*numerous translation fixes (English version only);*		

3 0.2 LIST OF EFFECTIVE PAGES

Section	Page	Date of Issue	Section	Page	Date of Issue
0	1	December 1998	2	32	December 1998
	2	November 2020		33	December 1998
	2i	November 2020		34	December 1998
	3	November 2020		35	December 1998
	4	November 2020		36	December 1998
				37	December 1998
1	5	November 2020		38	November 2020
	6	November 2020		39	December 1998
	7	December 1998		40	November 2020
			3	41	November 2020
2	8	November 2020		42	November 2020
	9	November 2020		43	November 2020
	10	November 2020		44	November 2020
	11	November 2020		45	December 1998
	12	November 2020		46	November 2020
	13	November 2020		47	December 1998
	14	December 1998		48	November 2020
	15	November 2020		49	November 2020
	16	December 1998		50	November 2020
	17	November 2020			
	18	November 2020			
	19	November 2020			
	20	November 2020			
	21	November 2020			
	22	November 2020			
	23	November 2020			
	24	November 2020			
	25	November 2020			
	26	December 1998			
	27	December 1998			
	28	November 2020			
	29	November 2020			
	30	November 2020			
	31	December 1998			

3 0.2 LIST OF EFFECTIVE PAGES

Section	Page	Date of Issue	Section	Page	Date of Issue
0	1	December 1998	2	32A	November 2020
	2	November 2020		33A	November 2020
	2iA	November 2020		34	December 1998
	3A	November 2020		35	December 1998
	4A	November 2020		36	December 1998
				37	December 1998
1	5	November 2020		38	November 2020
	6	November 2020		39	December 1998
	7	December 1998		40	November 2020
			3	41	November 2020
2	8	November 2020		42	November 2020
	9	November 2020		43	November 2020
	10	November 2020		44	November 2020
	11	November 2020		45	December 1998
	12	November 2020		46	November 2020
	13	November 2020		47A	November 2020
	14	December 1998		48A	November 2020
	15	November 2020		49A	November 2020
	16	December 1998		50	November 2020
	17	November 2020			
	18	November 2020			
	19	November 2020			
	20	November 2020			
	21	November 2020			
	22	November 2020			
	23	November 2020			
	24	November 2020			
	25	November 2020			
	26	December 1998			
	27	December 1998			
	28	November 2020			
	29	November 2020			
	30A	November 2020			
	31A	November 2020			

3

0.3 TABLE OF CONTENTS

3

0.3 TABLE OF CONTENTS

3

0.4 LIST OF FIGURES

3

0.4 LIST OF FIGURES

1. TECHNICAL DESCRIPTION

1.1. Glider description

Wings:

Two-panel planform of considerable taper. Monospar structure with an auxiliary spar and sandwich type skin. Main spar of double C-section.

Monoplate air brake extended on upper wing surface only.

Large span, constant chord Friese type ailerons, split in two panels, mass-balanced and suspended on 7 hinges.

Overlapping type spar connection with two horizontal bolts, extending up to rear fittings and connecting also wings to fuselage.

Interchangeable wing tips permitting easy extension of wing span from 14,0 m to 16,15 m {i.e. from 45,9 ft to 53,0 ft}.

Fuselage:

Monocoque, sandwich structure with integral fin. Seat pans bonded permanently. Two piece, side hinged canopy opening sidewards to the right.

Total pressure port and air intake for air vent located in the fuselage nose. Static pressure ports further aft on both sides of the fuselage nose.

Transceiver antenna installed in the fin.

Aero-towing hook installed in the fuselage nose part.

Winch-launching hook installed in front of the main undercarriage.

Tail unit:

Stabiliser, elevators and rudder of sandwich structure, control surfaces aerodynamically- and mass-balanced.

Control systems:

Combined type. For rudder and towing hook a cable system is employed. For wheel brake - a cable/ hydraulic one, while for elevator and aileron a push rod type system is used.

In elevator control system a spring trimming device is provided. It is operated with a lever located at the base of control stick at front seat.

The control systems of aileron, air brake and elevator couple automatically, when the wings and elevator are rigged.

Undercarriage:

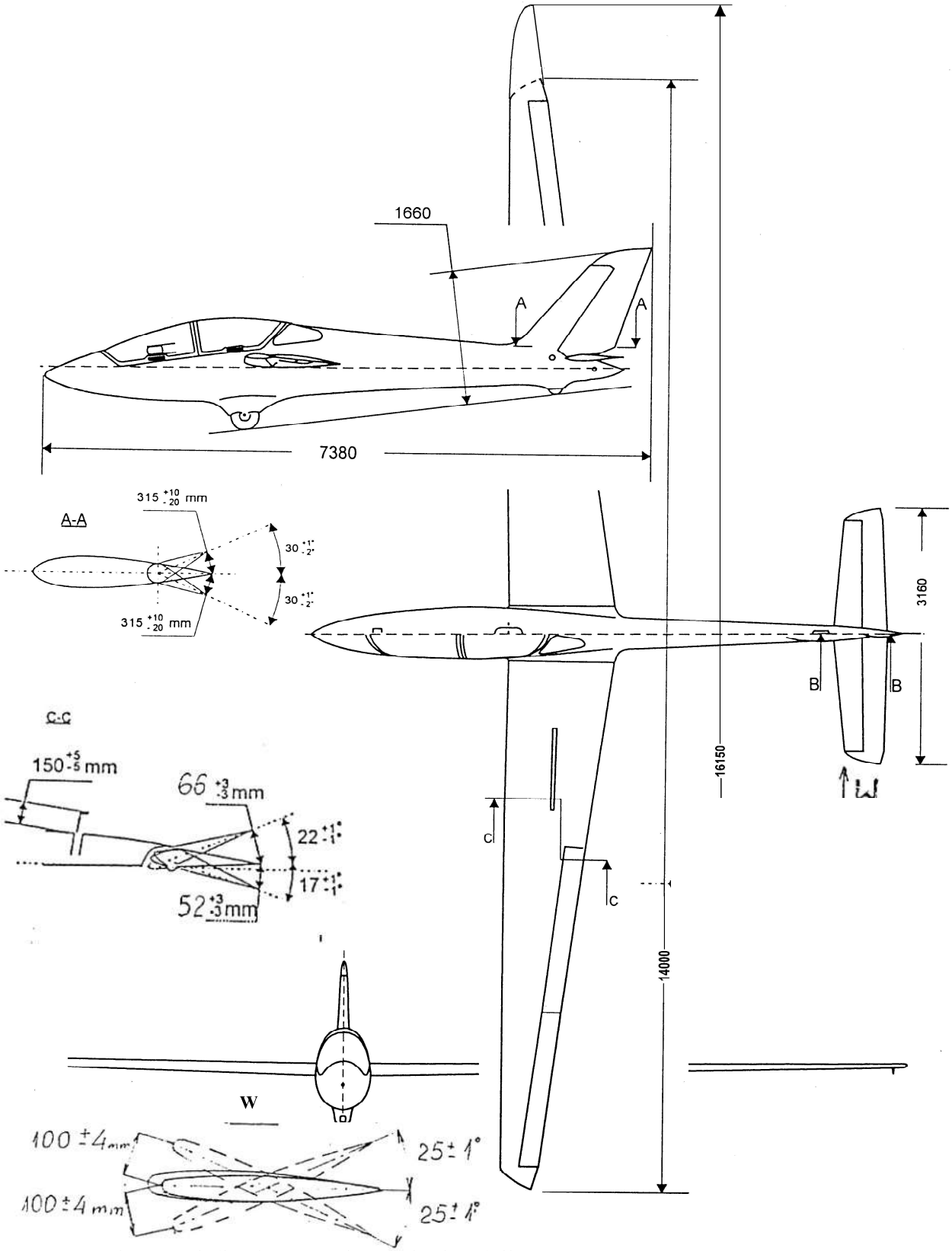
Faired, fixed undercarriage (with main and tail wheels). Hydraulic disc brake on main wheel, actuation coupled with air brake.

1.2. Main technical data

Version:	Aerobatic		Utility	
Wing span	14,00 m	45,9 ft	16,15 m	53,0 ft
Length (up to rudder top edge)	7,38 m	24,2 ft	7,38 m	24,2 ft
Height (in flight attitude)	2,25 m	7,4 ft	2,25 m	7,4 ft
Wing dihedral	0 deg		0 deg	
Wing area	12,34 sqm	132,8 sqft	13,09 sqm	141,0 sqft
Aspect ratio	15,88		19,92	
Root chord	1,308 m	4,29 ft	1,308 m	4,29 ft
3 Mean Standard Chord (MSC)[1]	0,971 m	3,186 ft	0,938 m	3,077 ft
Wing profile	NACA 64_1 412		NACA 64_1 412	
Tailplane span	3,16 m	10,37 ft	3,16 m	10,37 ft
Tailplane area	1,873 sqm	20,2 sqft	1,873 sqm	20,2 sqft
Tailplane profile	NACA 63_1 012 ÷ 63006 mod		NACA 63_1 012 ÷ 63006 mod	
Fin and rudder area	1,123 sqm	12,0 sqft	1,123 sqm	12,0 sqft
Fin and rudder profile	NACA 63_2 015 ÷ 63_1 012		NACA 63_2 015 ÷ 63_1 012	
3 C.G. position (empty glider) (aft of Datum Plane[2])	620÷645 mm	24,4÷25,4 in	620÷645 mm	24,4÷25,4 in
Nominal empty weight				
- without balancing weights	350,0 kg	772,0 lb	355,0 kg	783,0 lb
- with balancing weights (2 × 5,5 = 11,0 kg) {2 × 12,1 = 24,2 lb}	361,0 kg	796,0 lb	366,0 kg	807,0 lb
Maximum weight of structural non-lifting parts				
fuselage without wings	165,0 kg	364,0 lb	165,0 kg	364,0 lb
C.G. position (in-flight) (aft of Datum Plane)	213÷379 mm	8,4÷14,9 in	213÷379 mm	8,4÷14,9 in
Max. in-flight weight	530,0 kg	1168,0 lb	535,0 kg	1179,0 lb

3 [1] Mean Standard Chord (MSC) - chord of aerodynamically equivalent rectangular wing
[2] Datum Plane (DP) - vertical plane passing through the wing leading edge

Fig. 1. Three-view drawing, main dimensions, control surfaces deflections



To measure elevator deflection, use the method as follows:
With elevator in neutral position, mark reference points on tailplanes leading edge and on the forward protruding part of the elevator where they are directly adjacent to each other. Measure elevator deflection between these reference points.

2. TECHNICAL SERVICE MANUAL

2.1. Glider rigging and de-rigging

It is convenient to rig the glider with 5 persons. In case the special workshop supports are available, it is possible to rig the glider with 4 or even 3 persons.

Before rigging, all mating surfaces of the rigged components should be cleaned with a cloth and greased.

The main bolts and mating bushings in wings and fuselage should be covered with a grease.

Graphite grease is recommended.

2.1.1. Wings rigging (Fig. 2.)

1. Immobilise fuselage with a shore (or hold this by hands).
2. Open cockpit canopy and set:
   - control stick neutral,
   - air brake control handgrip in „retracted” position,
   - securing device (2) of main bolts, downward.
3. Retracting the air brake, by skipping beyond a dead point, facilitates the wing rigging. Prior to wing de-rigging, the air brake should be retracted. Overcoming the over-centre locking force on de-rigged wing requires appropriate tools and caution, to prevent damage to the coupling.
4. Align the left-hand wing with fuselage and insert the spar root (7) in the sleeve of fuselage well. While sliding the wing further in, to a contact between ribs, hold the aileron neutral and pay close attention to coupling in aileron and air brake controls. Move control stick or air brake control handgrip, if necessary.
5. Repeat the above with right-hand wing. Make sure a proper coupling in aileron and air brake control systems has been gained.
6. Unload the wing tips, insert the duralumin assembly pin / end of assembly wrench (9) into one of the fittings and align the openings precisely, by slightly rotating the wing at its root. Insert a bolt (8) into the other fitting, and press it home with advancing-rotary motion of assembly wrench (9).
7. Insert and press down the second bolt (8) the same way.
8. Check unrestricted, full deflections of aileron and air brake.
9. Secure the wing bolts by rotating the securing elements (2) vertically upwards.
10. Complete the procedure by inserting safety pins (10) into securing elements.

NOTE: Rigging the wings with long wing tips installed is not recommended.

De-rigging requires the reverse sequence.

Prior to de-rigging retract and lock the air brakes.

3

Fig. 2. Wings rigging

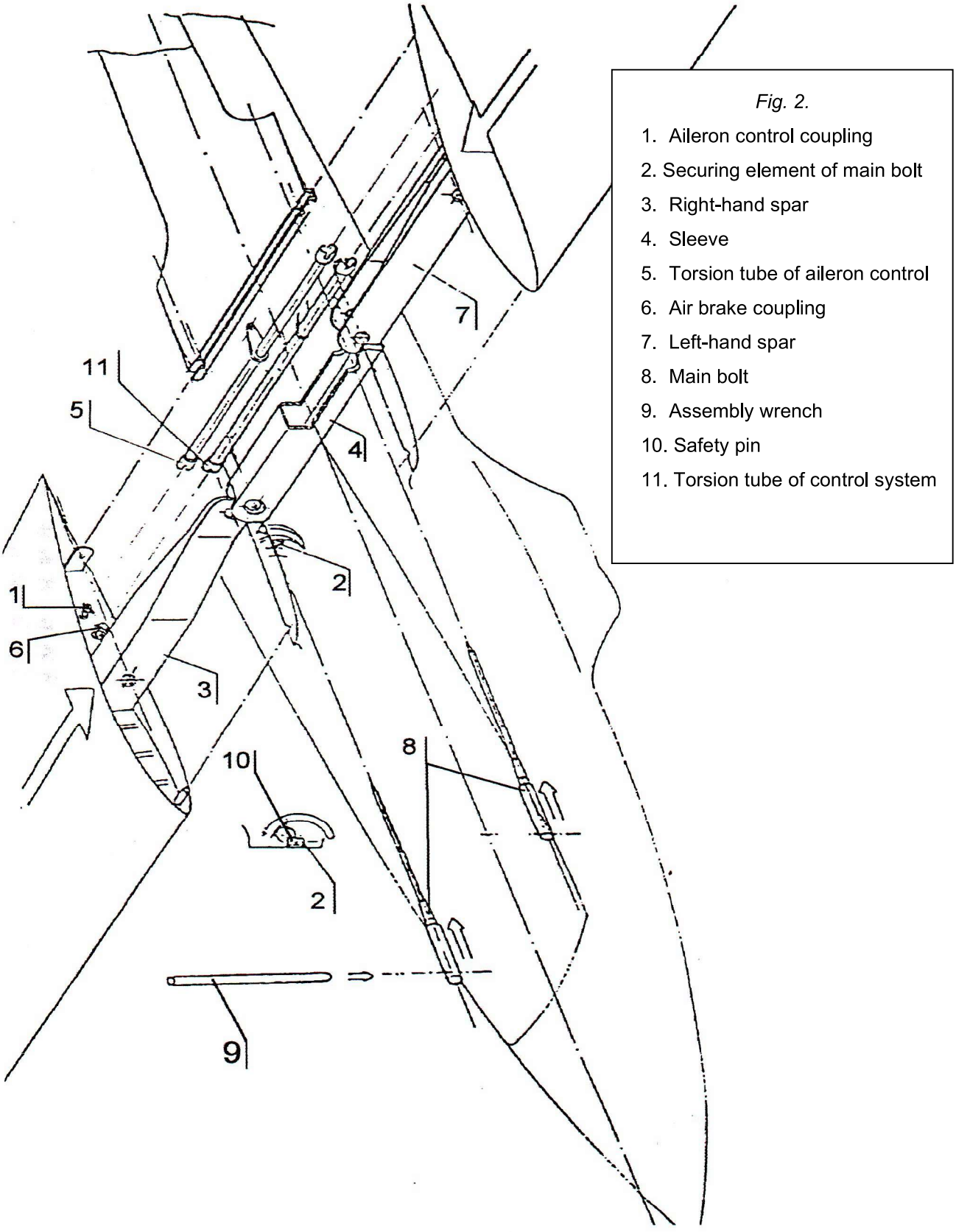


Fig. 2.

1. Aileron control coupling
2. Securing element of main bolt
3. Right-hand spar
4. Sleeve
5. Torsion tube of aileron control
6. Air brake coupling
7. Left-hand spar
8. Main bolt
9. Assembly wrench
10. Safety pin
11. Torsion tube of control system

2.1.2. Wing tips rigging (Fig. 6.)

Wing tips can be rigged by one person equipped with one or two wrenches size „10”.

The process should be made in the following order:

- if the closing tips are installed on wings, remove safety pin (15) from castellated nut (14), unscrew nut using wrench, remove washer (13) and pull-out bolt (12) and remove the closing tip; oscillatory movements around tip’s roll axis help to remove it from the wing;
- protect the safety pin, nut, washer and bolt against the loss;
- install the long wing tip in place of closing tip;
- align holes in the wing and tip fittings for the coupling bolt (12);
- insert the bolt (castellated nut towards the wing tip), put on washer and nut, lightly tighten the nut with a wrench and insert the safety pin.

Replacement of long wing tip with a closing tip analogically to the method described above.

2.1.3. Tailplane rigging (Fig. 3.)

The tailplane rigging should be performed by two persons.

First, set the lever of trimming device to its rear-most position. One person deflects the rudder fully to one side. The second person holds stabiliser with both hands at lower surface, allowing the elevators to fall down free. Put the tailplane behind the glider in its plane of symmetry, lined up in extension of chord plane.

Shove the tailplane forwards into the well between the fin and fuselage. Pay attention that both elevator control levers (1) entered leading groove of the fuselage wall (2) and the pin (5) entered its socket (6).

The elevator controls are connected automatically, still check visually through the inspection panel if the levers (1) have coupled with the external surfaces of bearing (3).

Align the axes of front bolt sleeve (7), insert the bolt (8) from left-hand fuselage side, screw on the nut (9) and secure it in place with safety pin (10).

NOTE: If incorrect coupling of elevator control occurs, de-rig the tailplane and repeat rigging process, strictly following the above instruction.

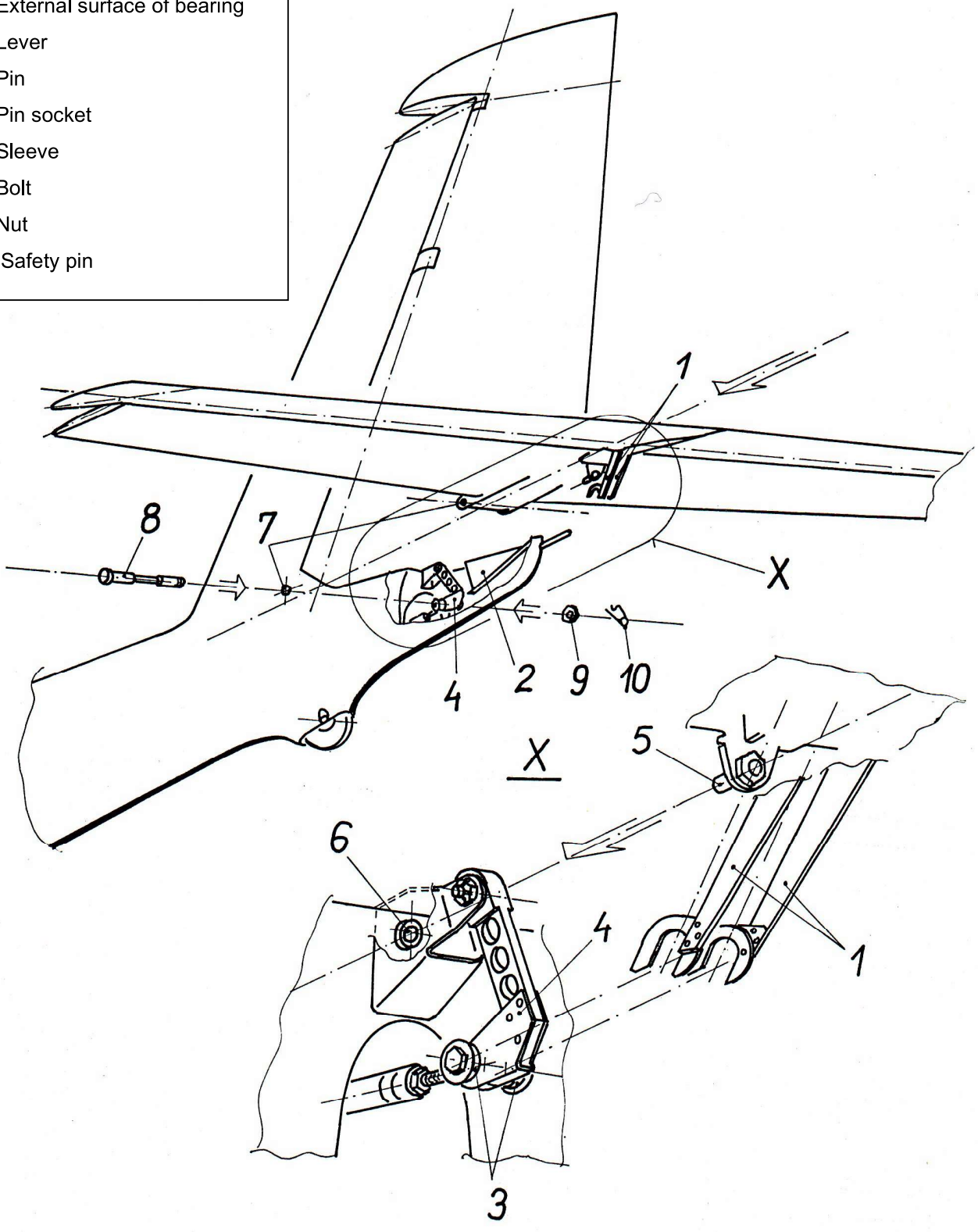
De-rigging requires the reverse sequence.

Fig. 3. Tailplane rigging

3

Fig. 3

1. Elevator control lever
2. Case of lever 1 guide
3. External surface of bearing
4. Lever
5. Pin
6. Pin socket
7. Sleeve
8. Bolt
9. Nut
10. Safety pin



2.1.4. Rudder rigging (Fig. 4.)

1. Insert the pins (1, 2 and 3) of rudder hinge into the nests (4, 5 and 6).
2. Put washer (13) on pin (3), screw on the nut (14) and secure with a safety pin (15).
3. Remove the covers of inspection hole (7) on fuselage both sides .
4. Put the connectors (9), connected with rudder control cables, on both arms of lever (8), pass the bolts (10) through at the top, put washers (11) on the bottom side and screw on self-locking nuts (12).
5. Re-attach the inspection hole covers (7).
6. Adjust cable tension (12 kg {27 lbf}) using turnbuckles located in front of the rear seat pedals.

Rudder de-rigging requires the reverse sequence.

NOTE: When de-rigging the rudder, first loosen cables with turnbuckles located in front of the pedals.

3

Fig. 4. Rudder rigging

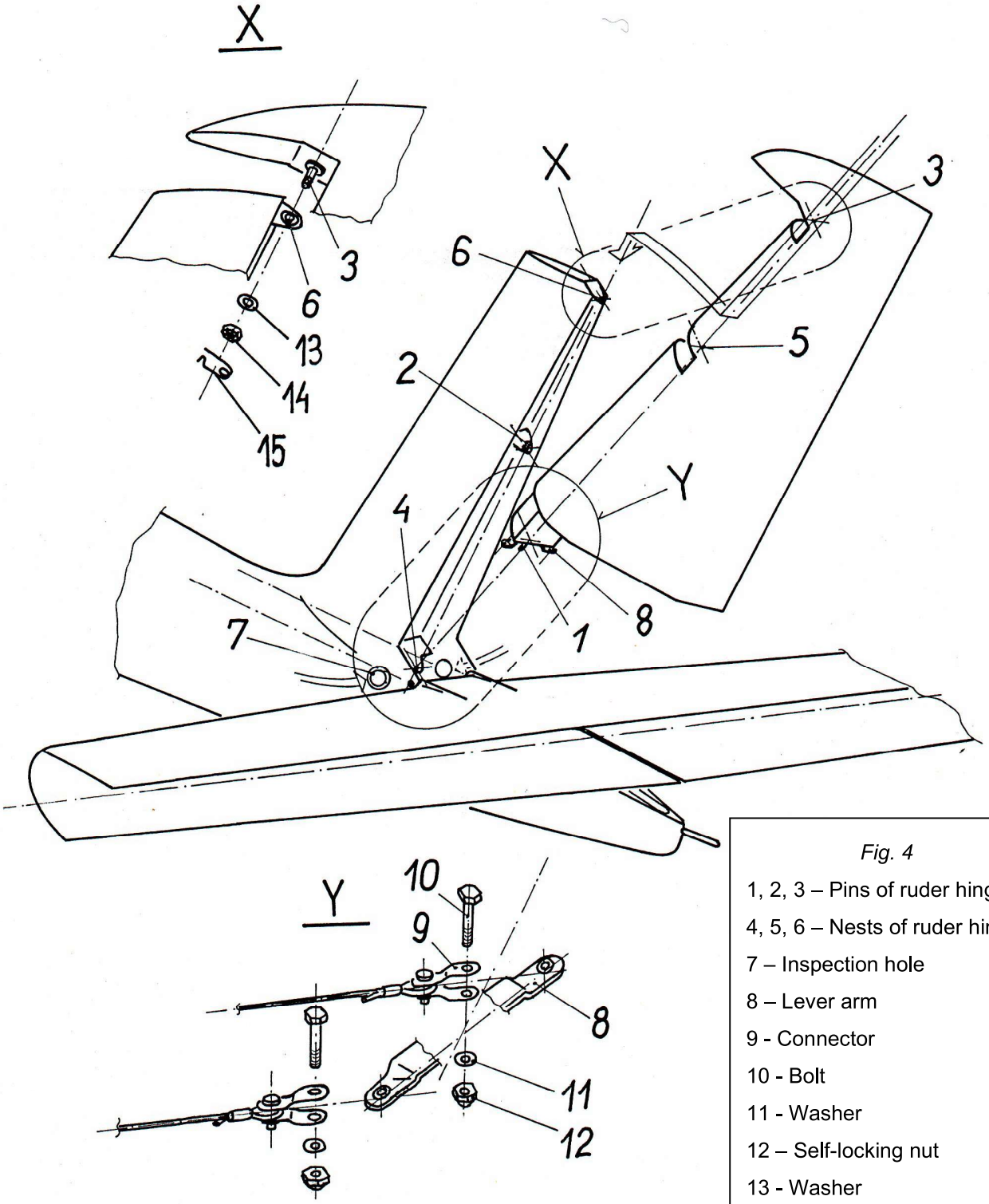


Fig. 4

1, 2, 3 – Pins of ruder hinge

4, 5, 6 – Nests of ruder hinge

7 – Inspection hole

8 – Lever arm

9 - Connector

10 - Bolt

11 - Washer

12 – Self-locking nut

13 - Washer

14 – Castellated nut

15 – Safety pin

2.1.5. Rigging and de-rigging of elevator (Fig. 5.)

Assembly and disassembly of both elevator halves is to be performed with the tailplane dismounted from the glider, positioned horizontally, upside down.
Bring the elevator nose into the stabiliser well, inserting the hinge pins (1) and (2) in the nests of hinge (3).
Install the second half of elevator on the same way, inserting the trailing edge pin (7) in the corresponding nest (8). The order of elevator halves installation is not critical.
Put on special washers (4) and screw on nuts (5). After locking the elevator halves on rear fitting pin (2), secure the nuts with safety pins (6) or with split pins.

Elevator disassembly requires the reverse sequence.

Fig. 5. Elevator rigging

3

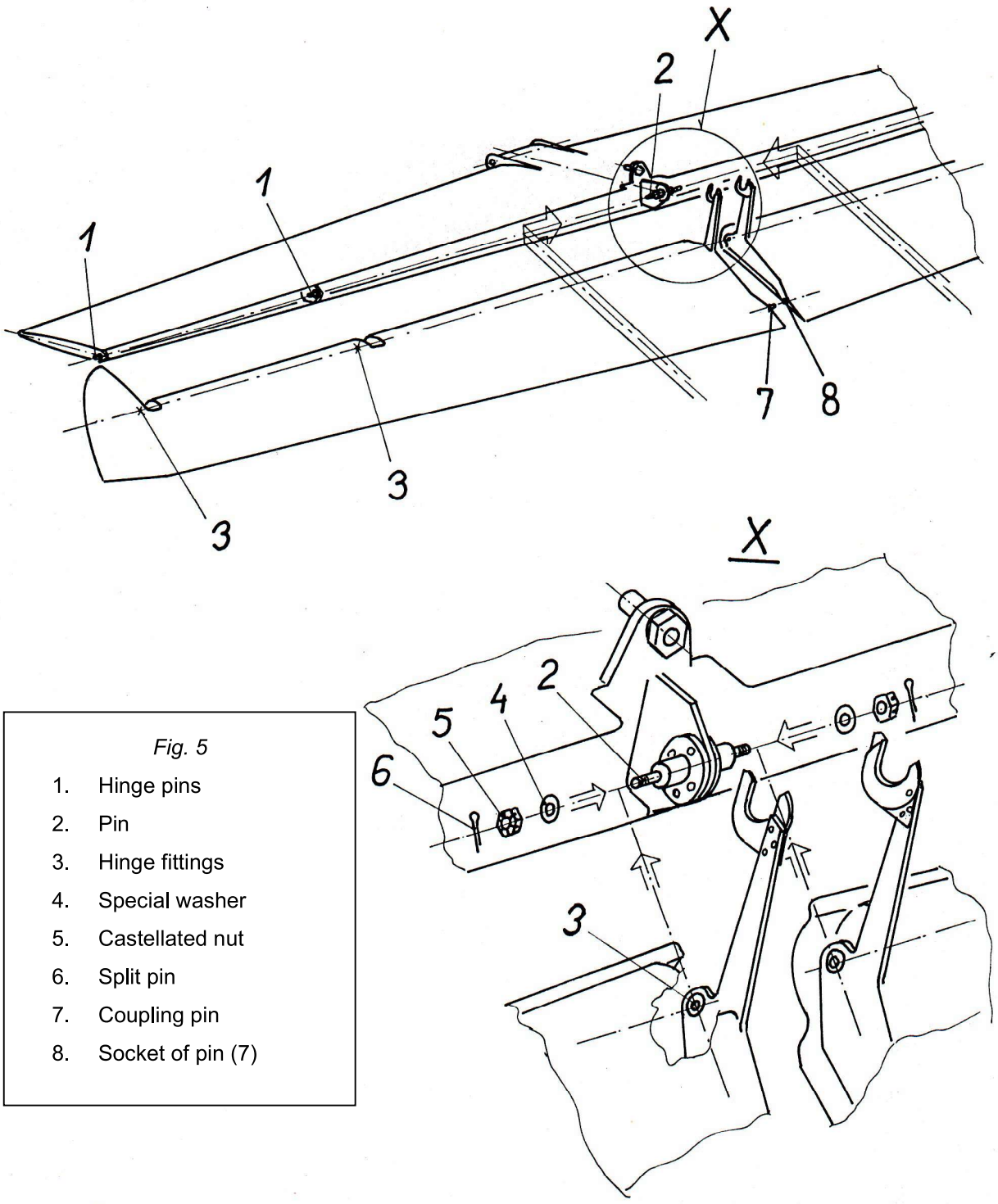


Fig. 5

1. Hinge pins
2. Pin
3. Hinge fittings
4. Special washer
5. Castellated nut
6. Split pin
7. Coupling pin
8. Socket of pin (7)

2.1.6. Aileron rigging (Fig. 6.)

1. Suspend the aileron on wing-side hinges (Fig. 6A). Insert the bolts (9), put on the washers (7) and self-locking nuts (6).

NOTE: **When rigging ailerons, do not over-tighten self-locking nuts (6). Ensure perceptible play between the aileron fittings (8) and wing-side hinges (10), as well as between the aileron fittings (8) and bolts (9) with nuts (6). The nut (6) secures the bolt (9) only against shifting out.**

2. Shift the push-rod end (5) into the aileron fitting (3) (Fig. 6B.), insert the bolt (4), put on washer (2) and nut (1).
3. Assemble the opposite aileron half in the same way.

Aileron de-rigging requires the reverse sequence.

2.1.7. Balancing weights installation

The balancing weights consist of two lead plates, installed on lugs screwed in the floor at front seat pan (Fig. 11.).
De-rigged weights should be removed from the glider, and preserved against the loss.

3

Fig. 6. Aileron (left) and wing tips rigging

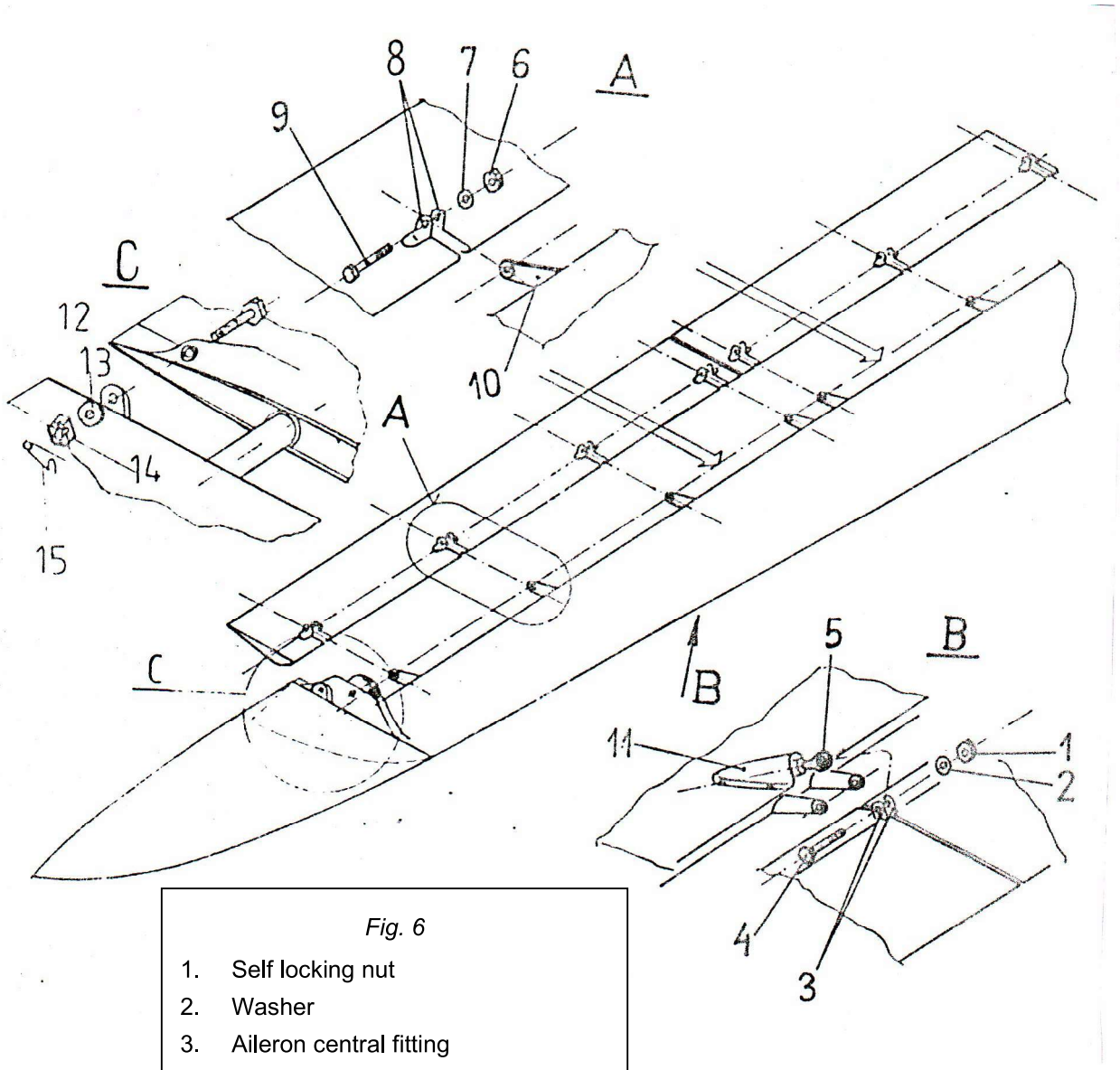


Fig. 6

1. Self locking nut
2. Washer
3. Aileron central fitting
4. Screw
5. Push rod end
6. Self locking nut
7. Washer
8. Aileron fittings
9. Screw
10. Wing-side hinge
11. Fairing
12. Bolt
13. Washer
14. Castellated nut
15. Pin

2.2. Control systems and their adjustment

2.2.1. General information

On the glider, a push-rod type elevator and aileron control system, as well as combined push-rod/ cable system for air brake control have been employed. The rudder and towing hooks are actuated with cable type system. For wheel brake a cable actuated hydraulic system is provided.

Access to control systems adjustment is provided by means of:

- removable cover on front seat control column,
- removable floor, in a recess behind the rear seat,
- inspection holes in fuselage tail portion.

Adjustment is to be performed when excessive deviations of the measured control surfaces deflections are stated from the values given in Fig. 1., or after repairs involving the disassembly and replacement of any control systems elements or their support.

When adjusting push-rod ends, ensure that the check-hole is enclosed by the thread of push-rod end.

After adjustment, secure the adjusted elements against rotation.

2.2.2. Aileron and elevator control system (Fig. 7.)

Adjust the aileron control system by means of end (2) of short push-rod (3), actuating directly the aileron as well as with adjustment to the travel limit stops of front control column (1).

Correct deflections of aileron (Fig. 1.):

down 17° ± 1 (or 52 ± 3 mm {2.05 ± 0.12 in})

up 22° ± 1 (or 66 ± 3 mm {2.60 ± 0.12 in})

NOTE: Check the range of aileron deflections following significant changes in operational temperatures (transition from winter to summer operation). Make appropriate adjustments if necessary.

Elevator deflections should be adjusted by means of the „R” ends of the push-rod, by checking that the push-rods are perpendicular to the lever with the elevator neutral and by adjusting the height of travel limit stop at front control column (7) and (8) .

Correct deflections of elevator are (Fig. 1.):

down 25° ± 1 (or 100 ± 4 mm {3.9 ± 0.16 in})

up 25° ± 1 (or 100 ± 4 mm {3.9 ± 0.16 in})

On completing the adjustment, check if the elevator does not interfere with rudder or with fuselage when fully deflected.

3

Fig. 7. Aileron and elevator control system

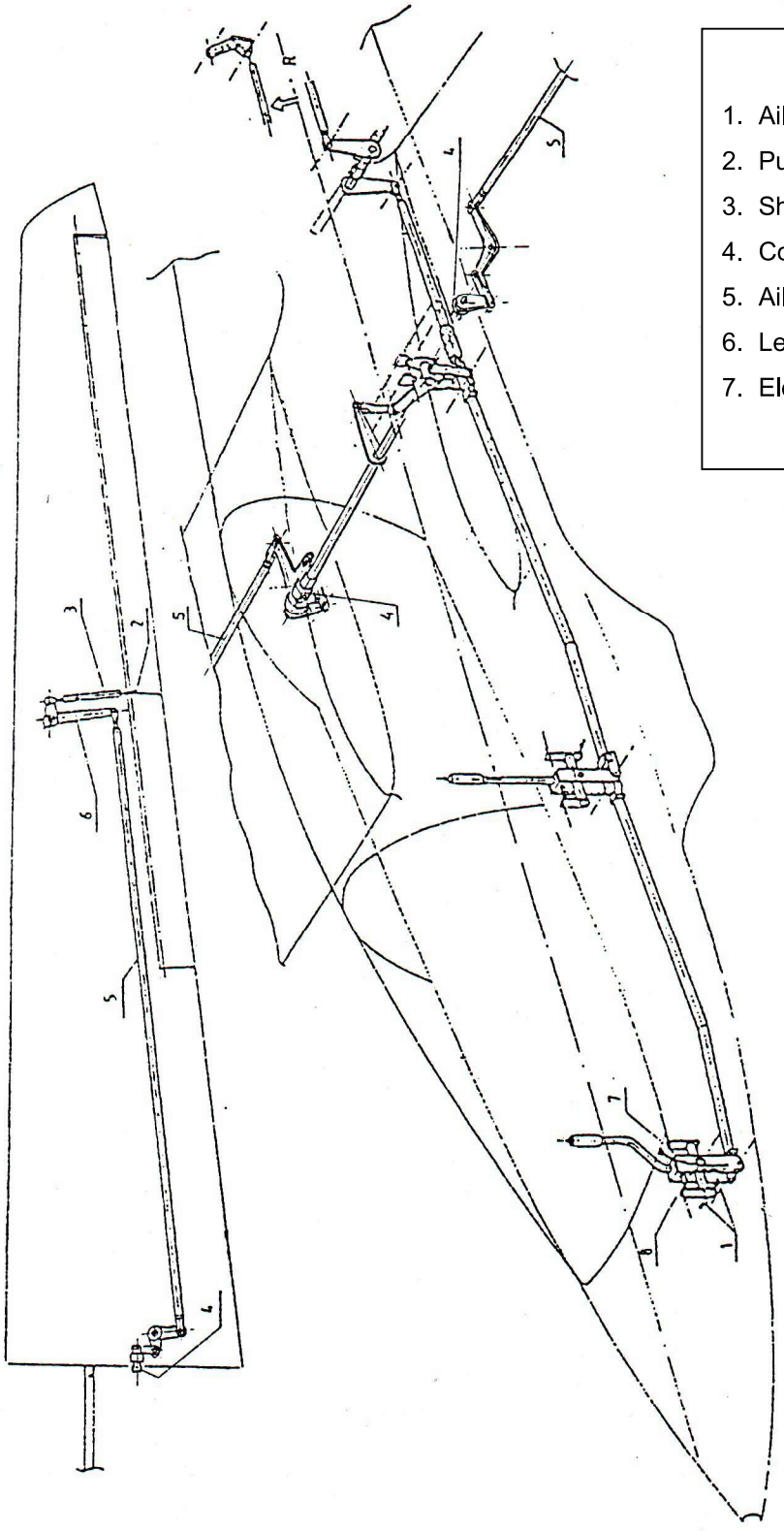


Fig. 7

1. Aileron stops
2. Push-rod ends
3. Short push-rod
4. Coupling in aileron control
5. Aileron push-rod
6. Lever
7. Elevator travel limiting stops

The spring of trimming device (item 18, Fig. 11) is not adjustable.

In case of incorrect operation the spring should be replaced.

Elevator stick force, for an elevator trimmed in neutral position should be:

stick completely aft 4,0 ± 0,1 kg {9,0 ± 0,22 lbf}

stick completely forward 2,0 ± 0,1 kg {4,5 ± 0,22 lbf}

2.2.3. Rudder control system (Fig. 8.)

The rudder control system is adjusted by means of turnbuckles (3) and rudder stops (1) and (2) (on pedals and on lever arms — item 8, Fig. 4).

In case of control system cables replacement, make sure that neutral rudder corresponds to pedals neutral, and that pedals are positioned correctly (see detail „A”, Fig. 8.).

The correct value of tension on cables should be 12 ± 2,0 kg {27,0 ± 4,5 lbf}.

In the fuselage rear portion the cables are attached to the lever arms (item 8, Fig. 4.) at the base of the rudder, by means of connectors (item 7, Fig. 4.).

To adjust the pedals position to pilot’s height, squeeze the adjusting grip (item 11, Fig. 11.) until the locking pin is disengaged from the guide, and slide the pedals along the guide tube (12) to the required position.

Ensure the locking pin re-engages in the new position.

2.2.4. Air brake control system (Fig. 8.)

The correct locking (skip beyond a dead point) of air brake plates (5) is adjusted within the air brake box at the push-rod end (4). This becomes accessible by removing the air brake plate (6). To do so, the split pins (7) of plate fixing bolts (8) are removed, the bolts taken out and the plate disassembled.
The fitting of the air brake cap (9) to the wing contour is done by adjusting the spring load tension with nuts (10).
It is recommended to adjust the right hand air brake plate, while the left hand wing is de-rigged and vice-versa.
The wheel brake control is coupled with actuation of air brake. The wheel brake is actuated by cable (11), led to a pump (13 detail „B”) and next, with a hydraulic system line (14) to the brake caliper (9, Fig. 9b).
Procedures relating to wheel brake verification and adjustment are described in paragraph 2.3. „Undercarriage”.

Fig. 8. Rudder and air brake control system

3

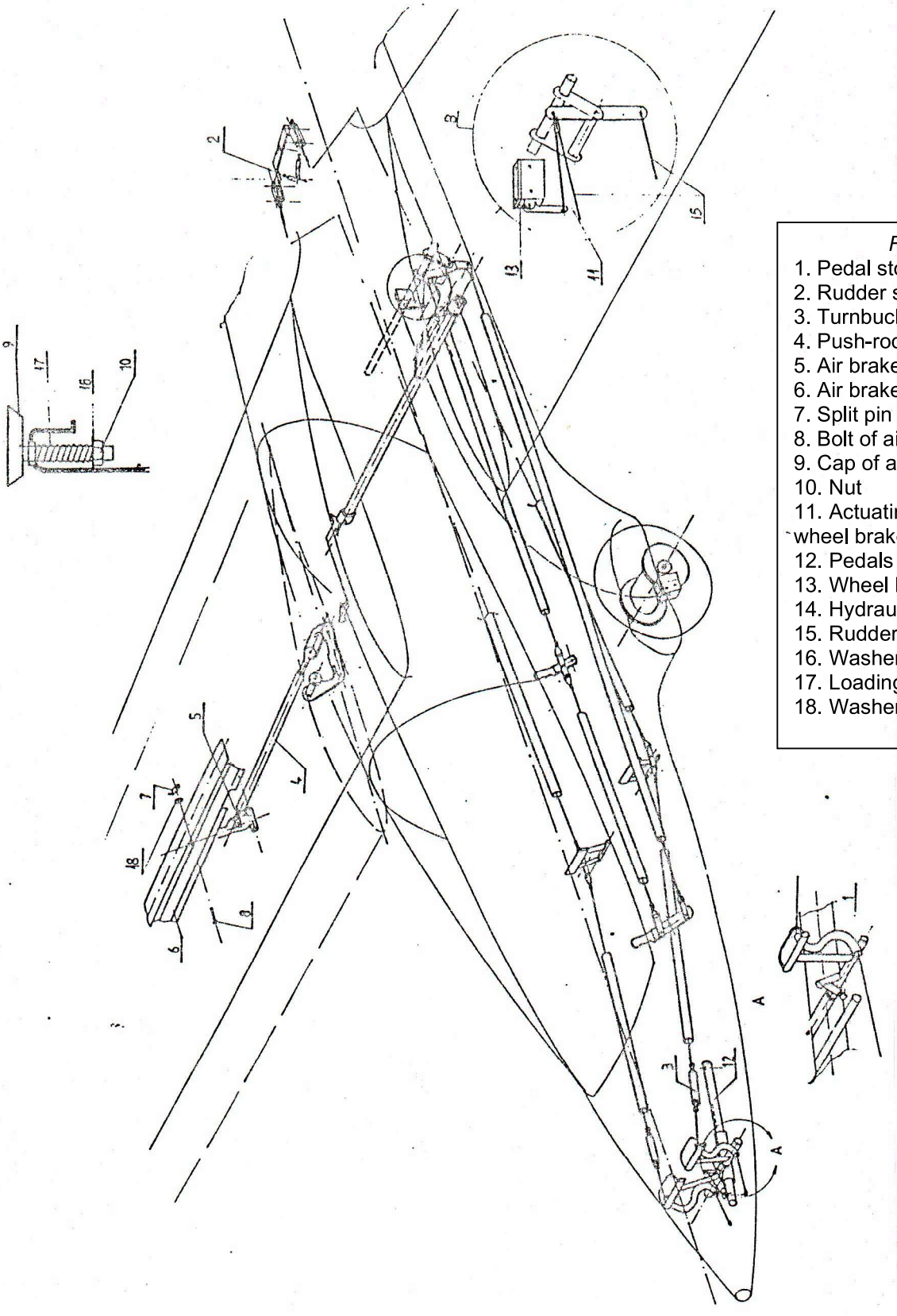


Fig. 8

1. Pedal stops
2. Rudder stops
3. Turnbuckle
4. Push-rod
5. Air brake
6. Air brake plate
7. Split pin
8. Bolt of air brake plate
9. Cap of air brake plate
10. Nut
11. Actuating cable of wheel brake pump
12. Pedals guide tube
13. Wheel brake pump
14. Hydraulic line
15. Rudder control cables
16. Washer
17. Loading spring
18. Washer

2.2.5. Allowed play at control stick

The play allowed value, measured at the control stick end is:

with aileron fixed	$d_h = \pm 3$ mm {0,12 in}
with elevator fixed	$d_l = \pm 3$ mm {0,12 in}

2.2.6. Allowed friction forces in control systems

The allowed values of the friction force in control systems, measured at the centre of stick hand grip (pedal foot), control surfaces neutral, are:

for aileron	0,2 ÷ 1,0 kg {0,45 ÷ 2,25 lbf}
for elevator	0,2 ÷ 1,8 kg {0,45 ÷ 4,05 lbf}
for rudder	5,0 kg {11,24 lbf}

2.2.7. Specifications for cable in glider control systems

Following diameters of aircraft-grade steel cables (with steel core) have been used:

rudder control	∅ 3,2 mm {0,125 in}
air brake control	∅ 3,2 mm {0,125 in}
towing hooks control	∅ 2,5 mm {0,10 in}
pedals adjustment tension member	∅ 2,5 mm {0,10 in}
wheel brake pump control	∅ 2,5 mm {0,10 in}

3 **NOTE: Cables should be replaced every six years or whenever more than one strand is broken or friction damaged.**

The correct value of cable tension should be within the range 12 ± 2 kg {27,0 ± 4,50 lbf}

Cable ends are factory spliced, but it is allowed to clamp the cable end employing method approved by the airworthiness Authority.

2.3. Undercarriage

2.3.1. General

Glider undercarriage consists of fixed main and tail wheels.

The main undercarriage is mounted to steel fittings, embedded in the fuselage structure.

The pressure in main wheel tyre is 0.2 MPa {29 psi}, which corresponds to approx. 2.5 cm {1,0 in}of tyre deflection for the empty glider (length of tyre trace chord is approx. 18 cm {7 in}).

The tube valve is accessible from the right hand side — use the valve stem extension (see special tools) when inflating the tyre.

2.3.2. Wheel brake (Fig 9 a, b, c, d)

The wheel brake caliper is actuated hydraulically (self-adjustable, floating saddle type, Fig. 9.). The master brake cylinder (pump) (31) is located on the left hand side of fuselage, under the removable access cover behind the rear seat.

Coupling between the wheel brake action and air brake actuation is to be adjusted by loosening the locking nut (33), adjusting the regulation screw (32) engagement length, the ones installed on brake cylinder lever (34), connected by means of cable (item 11, Fig. 8.) to air brake control system.

There is a rubber membrane in the compensating pot under the screwed-on cover. The main brake cylinder should be filled so, as to avoid forming of air bubbles under the membrane. A damaged membrane should be replaced immediately.

NOTE: The hydraulic fluid is chemically active and may affect i.e. lacquer coating. When filling, avoid splashing and keep the vicinity clean. Use DOT4 brake fluid only.

To replace the worn brake pads (minimum thickness 2,6 mm {0,10 in}) perform the operations specified under items 1 through 4 of paragraph 2.3.3.

Do not disconnect the flexible hydraulic hose.

To remove the worn brake pads, re-bore rivets (28) fastening these to plates (26) and (29) and rivet-in the new pads.

Brake assembly requires the reverse sequence.

Tightening torque on screw (30) is 7,5 ÷ 8 Nm {5,5 ÷ 5,9 lbf*ft}.

The piloting bolts (18) of floating saddle can not be seized.

The condition of hydraulic hose (10) is to be verified periodically.

Thickness of brake disc should be at least 4,3 mm {0,17 in} (measure this minimum at several locations). Inspect the brake disc against cracks, severe abrasion, grooves, corrosion or deformation. The axial play should not exceed 0,2 mm {0,008 in}.

Corrosion or small notches can be smoothed with abrasive paper of 400 grade. For more severe corrosion the disc should first be cleaned with a wire-brush, than with abrasive paper of 200, and finally of 400 grade.

Hydraulic fluid should be exchanged every two years, at minimum. When the fluid was replaced or hydraulic hose disconnected (which should be avoided) the brake system should be deaerated.

To do this, affix a piece of tight-fitted, transparent plastic hose over the end (23) and dip its free end into the pot filled with hydraulic fluid. Loosen the bleed-air valve (24), while the assisting person is moving the lever (34) of master cylinder.

This procedure should be repeated several times, until fluid in the hose is completely free of air bubbles. Check regularly the hydraulic fluid amount and replenish, if necessary.

Finally, gently tighten the bleed-air valve (23) and put on the cap (22).

To facilitate this procedure, the brake bleeding kit is available from TOST factory.

2.3.3. Assembly and disassembly of main wheel (Fig. 9 a, b, c, d)

1. Undo the nuts (3) and remove the screws (2) and clamps (1), which fasten the wheel to fuselage. Do not allow the wheel to fall down and stress the hydraulic hose.
2. Shift the wheel out of undercarriage well, while pulling out approx. 100 mm {4 in} of hydraulic hose (10) at the same time.
3. Remove wheel axle (4), distance sleeve (5) and brake anchor lever (8) together with clamp (9). The latter is to be suspended to avoid undue stress on the flexible hose.
4. Unscrew both screws (30), connecting the housing of clamp (9) with back plate (29) and dismount remaining elements (21), (8), (9), (26) and (29).
5. Discharge air from tyre.
6. Undo the screws (12), connecting the hub halves (11) and brake disk (13).

   Remove the tyre and tube, as well as the inner spacer sleeve (15).

NOTE: When assembling or disassembling the main hub halves, the tube inflation valve should be screwed out entirely.

Wheel assembly requires the reverse sequence.

Pay attention to the correct connection between the brake anchor lever (8) and the pin located in a recess on the wheel fitting.

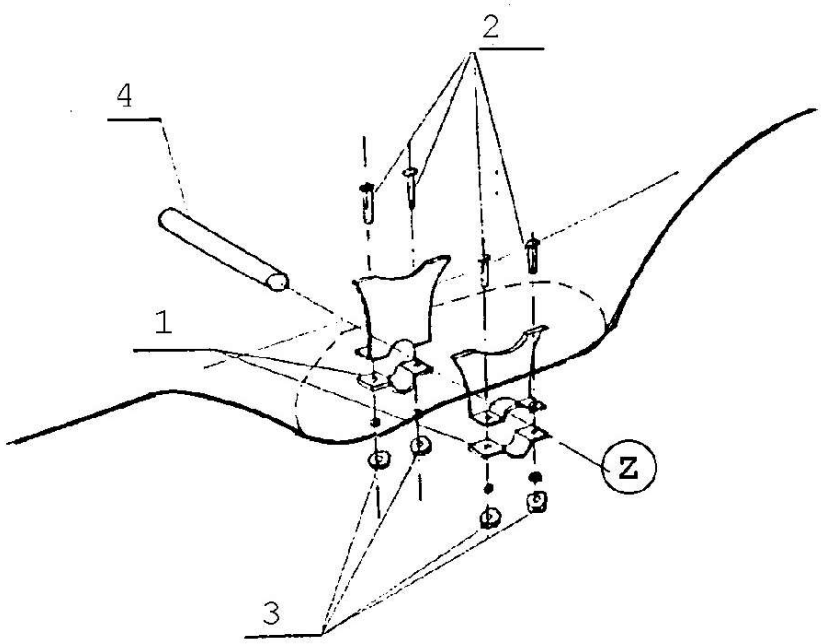
The screws (30) that connect clamp housing (9) with back-plate (29) should be tightened with a torque of 7,5 ÷ 8 Nm {5,5 ÷ 5,9 lbf*ft}.

2.3.4. Tail wheel

Tail wheel ∅ 200 x 50 mm or ∅ 210 × 65 {8x2 in or 8,25x2,5 in dia}with integral hub, is mounted on a wheel axle installed in fuselage by means of nut secured with special washer.

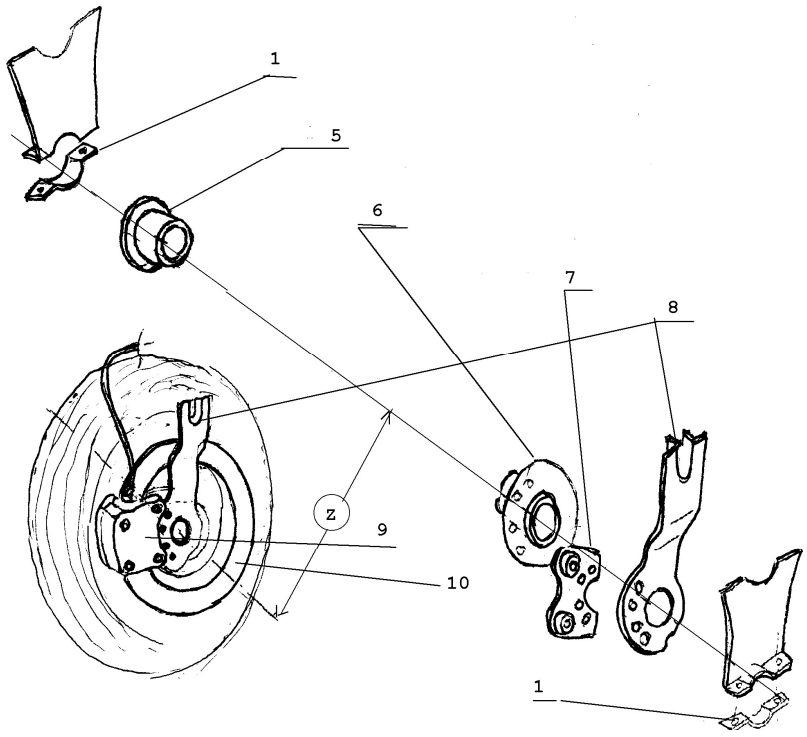
The tail wheel pressure of 0,15 MPa {22 psi} corresponds to tyre deflection approx. 1,0÷1,5 cm {0,4÷0,6 in} (length of the tyre trace chord is approx. 10 cm {4,0 in}.

Fig. 9. Main landing gear with brake



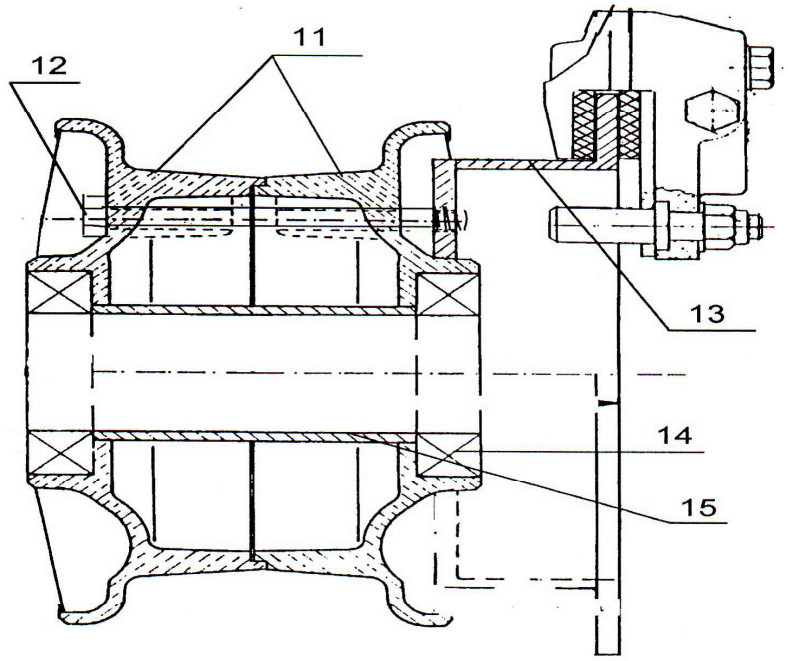
a) Wheel mounting well

1. Axle clamps
2. Mounting screws
3. Nuts
4. Wheel axle



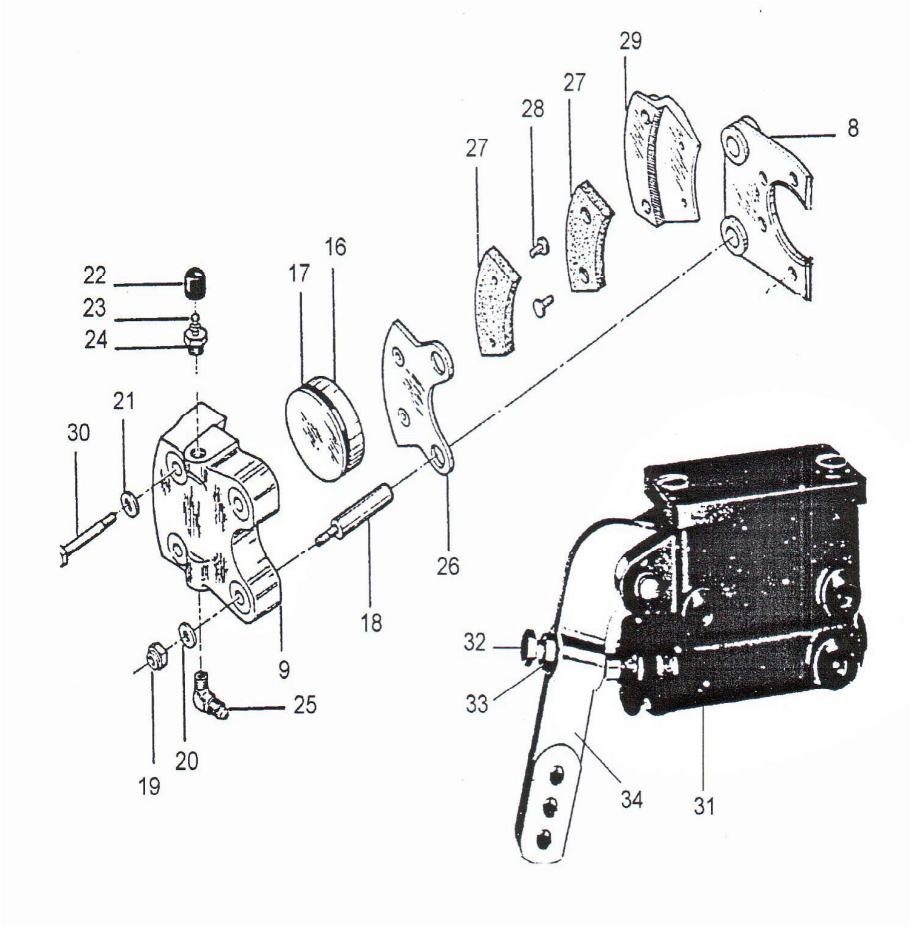
b) Wheel with brake

1. Axle clamps
5. Right distance sleeve
6. Left distance sleeve
7. Brake anchoring plate
8. Brake anchoring lever
9. Caliper
10. Brake pipe



c) Hub (section)

11. Hub halves
12. Connecting screws
13. Brake disc
14. Wheel bearings
15. Inner spacer sleeve



d) Assembly of brake cylinder clamp

9. Clamp housing
16. Piston with sealing
17. 0-ring
18. Piloting bolts
19. Nuts
20. Washers
21. Washers
22. Cap
23. Nipple
24. Bleed-air valve
25. Pipe coupling
26. Plate with brake pad
27. Brake pad
28. Pad rivet
29. Rear plate with pad
8. Brake anchoring plate
30. Screw
31. Brake cylinder
32. Adjusting screw
33. Securing nut
34. Brake cylinder lever

2.4. Instrument panel and glider equipment

2.4.1. Standard equipment

Glider standard equipment consists of:

front seat instrument panel, with following instruments (Fig. 11):

- airspeed indicator (1)
- altimeter (2)
- variometer (3)
- accelerometer (4)
- compensator (item 7, Fig. 10)
- compensation bottle (item 8, Fig. 10)
- bank & slip indicator (5)
- compass (6)

Moreover, to the standard equipment belong:

- 5-point safety harness
- front towing hook TOST E85
- seat cushion

Minimum equipment

3 Minimum equipment of the glider depends on the intended type of operation and consists of the components, location and range of indication (where specified). Specific equipment models listed in the table below have been verified by the manufacturer, but are not mandated by the manufacturer as the only acceptable types.

component & location	range of indication	remarks
Type of operation:	**normal /soaring flight**	
airspeed indicator, *at front seat*	300 [km/h] (160 [kts])	PZL PR 400s or Winter 6 FMS 5
altimeter, *at front seat*		PZL PW-12, W-12s or Winter 4 FGH 10
5-point safety harness, *at front-, and at rear seats*		SZD CT.J5.00.00 or Hooker Harness 1022430 1H423903/ 1CS924-J
parachute or back cushion, *for each crew member*		
Type of operation:	**aerobatic flight** (in addition to the above)	
accelerometer, *at front seat*	9/-6 g	AM-10, MGL INFO-1 or TL Elektronic TL-3424
for dual aerobatic instruction, an accelerometer required in both instrument panels		

The glider is equipped with instrument panel mounted to the fixed windshield at front seat (Fig. 11.). Direct access to airspeed indicator (item 1, Fig. 11.) and to variometer (item 3, Fig. 11.) is ensured (available by hand from bottom side). To disassemble any of remaining instruments, the whole instrument panel must be removed from glider.The procedure (see Fig. 11.) is as follows:

1. Remove 4 screws fastening the panel from top side to the fixed windshield.
2. Shift the panel back as far as the pneumatic ducts allow for.
3. Disassemble required instrument.

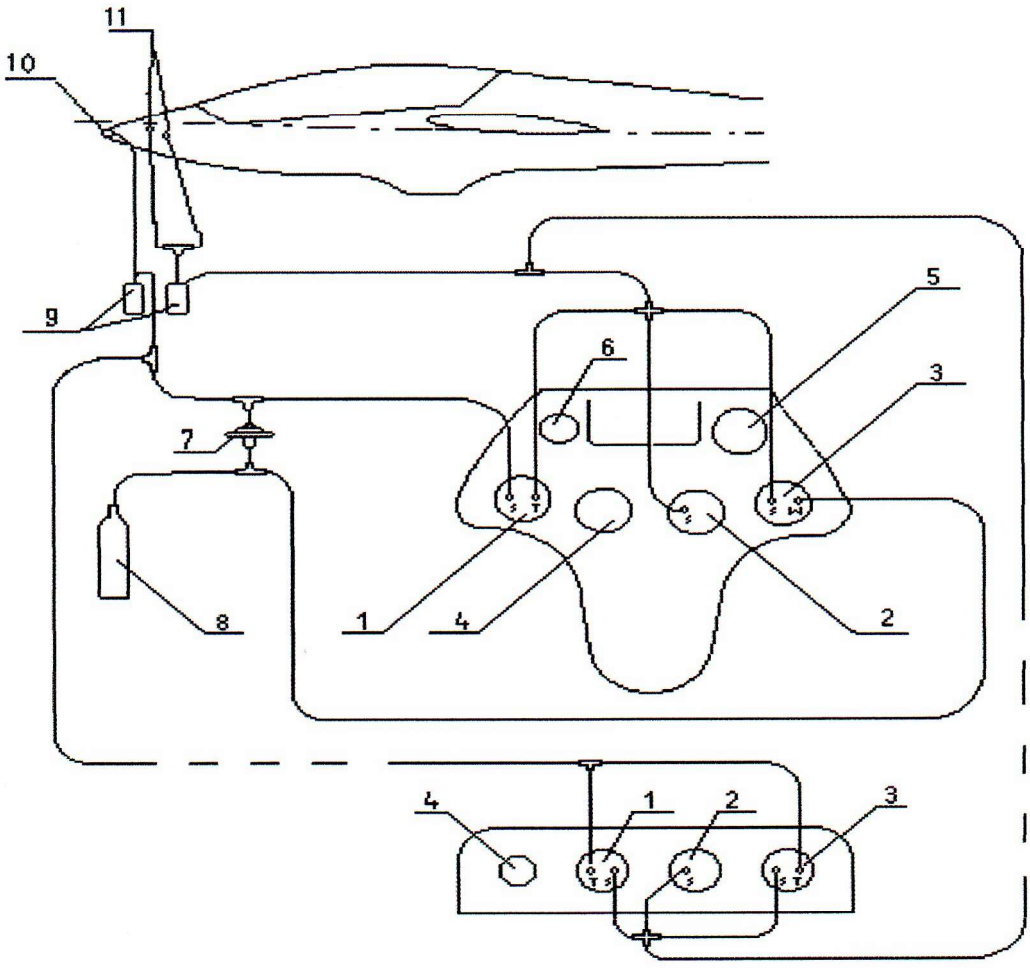
The central portion of the panel contains space for a board computer or aerobatic program chart. The rear seat instrument panel is installed on a lateral tube (Fig. 12.). Disassembly of rear panel instruments is available by removing the cover fastening screws.

3 The glider is adopted for installation of Becker transceiver type AR 6201 or earlier and an additional lap belt J5.10.00. (transceiver and additional belt do not belong to the standard equipment). To customer order, and by prior arrangement with the producer, the glider can be adopted for installation of other type of equipment elements different from those specified in standard equipment list. In case of essential changes in the installation, appropriate information will be provided in the specially prepared Supplement to this Manual.

When using the glider for cross-country flights, and necessary installation of ELT emergency radio, the recommended location is a pan in fuselage between the main and rear spars. When installing the ELT, ensure a secure installation and observe the glider weight & balance limitations.

2.4.2. Board instrument pneumatic system

Fig. 10. Board instrument pneumatic system



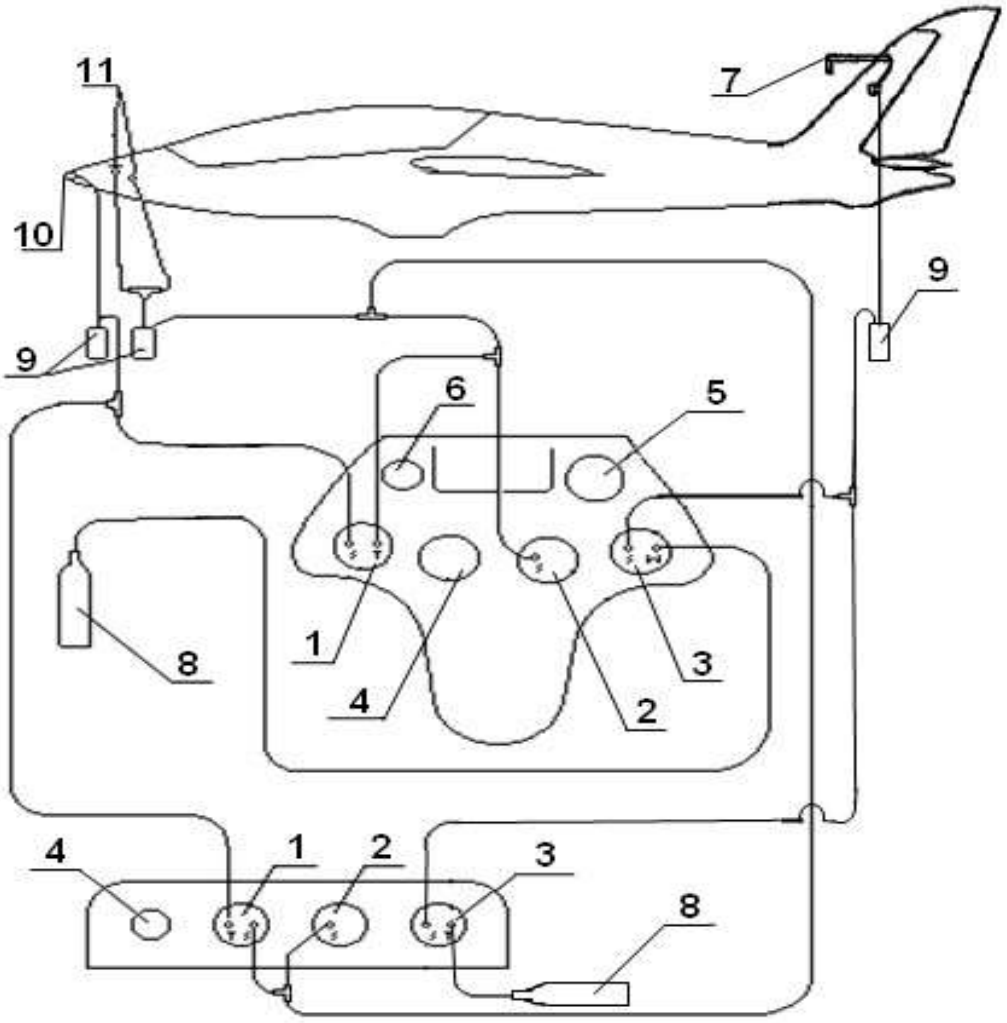
Legend to Fig. 10:

1 - airspeed indicator
2 - altimeter
3 - variometer
4 - accelerometer
5 - bank &slip indicator
6 - compass
7 - total energy compensator
8 - compensation bottle
9 - drainage units
10 - total pressure head
11 - static pressure ports

NOTE: After flying in rain, or if water is suspected to have entered the pressure ducts, disconnect the tubing from the instruments and blow out with compressed air.

2.4.3. Board instrument pneumatic system in case of installation of TE probe

Fig. 10A. Alternative board instrument pneumatic system with TE probe



Legend to Fig. 10A:

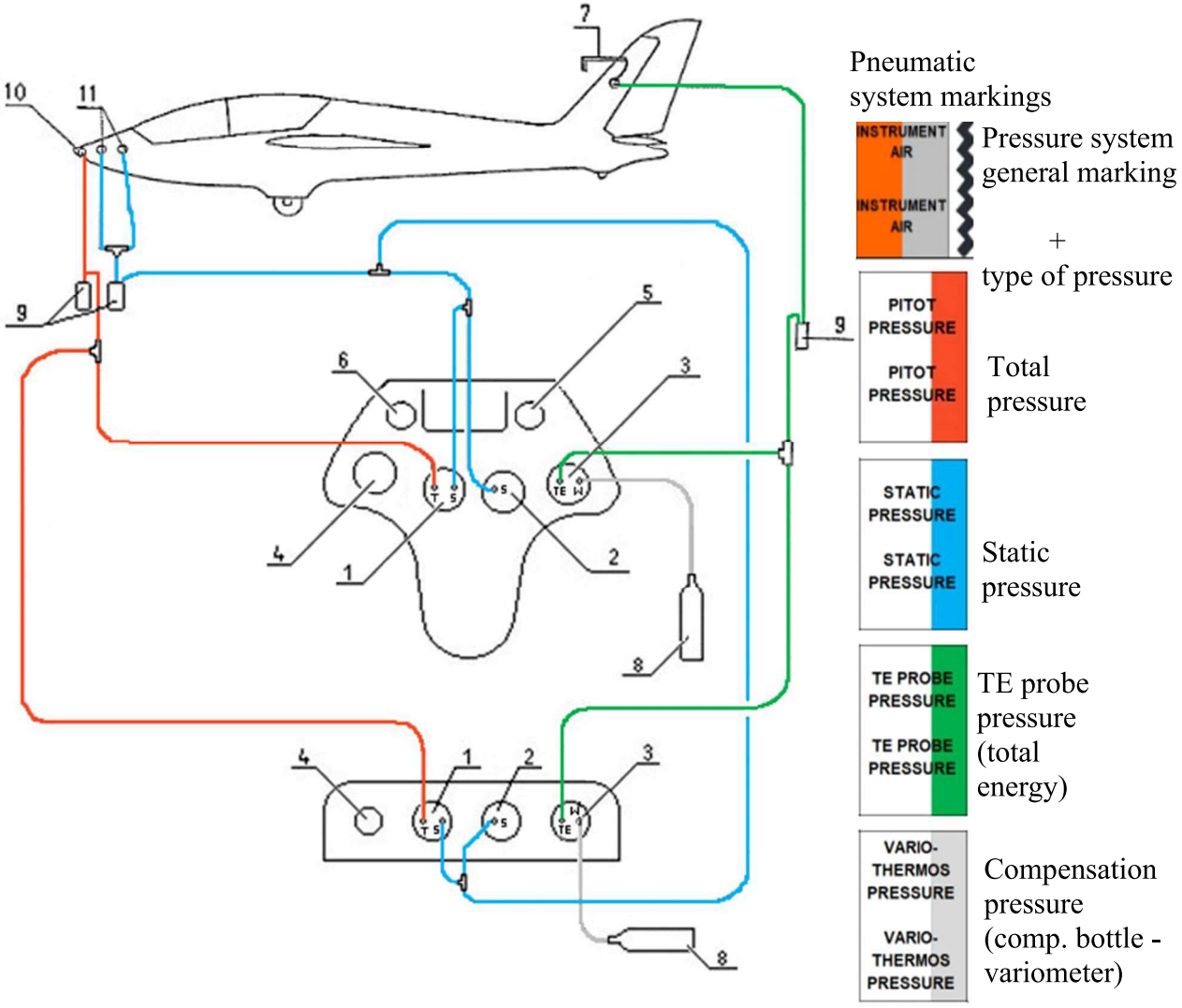
1 - airspeed indicator
2 - altimeter
3 - variometer
4 - accelerometer
5 - bank & slip indicator
6 - compass
7 - TE probe
8 - compensation bottle
9 - drainage units
10 - total pressure head
11 - static pressure ports

The factory built-in TE probe pneumatic duct terminates under the front instrument panel on the right hand side. In lack of connecting ducts between front and rear variometers, these are to be added inside a tunnel located underneath right-hand side contour of cockpit, where other pneumatic and electric installations are to be found. Compensation bottle is to be fitted in a holder beneath back seat on the right, drainage unit is to be fitted in a holder in front of the glider next to factory built-in ones. In lack of holders for compensation bottle and/or drainage units, contact the manufacturer of the glider for the necessary elements. TE probe pneumatic ducts should be blown with air prior to connecting it to the instruments.

3

2.4.3. Alternative board instrument pneumatic system in case of installation of TE probe

Fig. 10A. Board instrument pneumatic system with TE probe



Legend to Fig. 10A:

1 - airspeed indicator
2 - altimeter
3 - variometer
4 - accelerometer
5 - bank & slip indicator
6 - compass
7 - TE probe
8 - compensation bottle
9 - drainage units
10 - total pressure head
11 - static pressure ports

The factory built-in TE probe pneumatic duct terminates under the front instrument panel on the right hand side. In lack of connecting ducts between front and rear variometers, these are to be added inside a tunnel located underneath right-hand side contour of cockpit, where other pneumatic and electric installations are to be found. Compensation bottle is to be fitted in a holder beneath back seat on the right, drainage unit is to be fitted in a holder in front of the glider next to factory built-in ones. In lack of holders for compensation bottle and/or drainage units, contact the manufacturer of the glider for the necessary elements. TE probe pneumatic ducts should be blown with air prior to connecting it to the instruments.

2.4.4. Towing hooks

As a standard, the glider is equipped with a TOST E85 nose hook in the forward fuselage, in front of the control stick. The hook is accessible after removing the cover, and disassembling right balancing weight (item 13, Fig. 11.) as well as opening right inspection hole in floor.

To an order a TOST G88 model C.G. hook can be installed. In the place where a nose hook is mounted, the SZD III A56P model can be installed as well.

2.4.4. Towing hooks

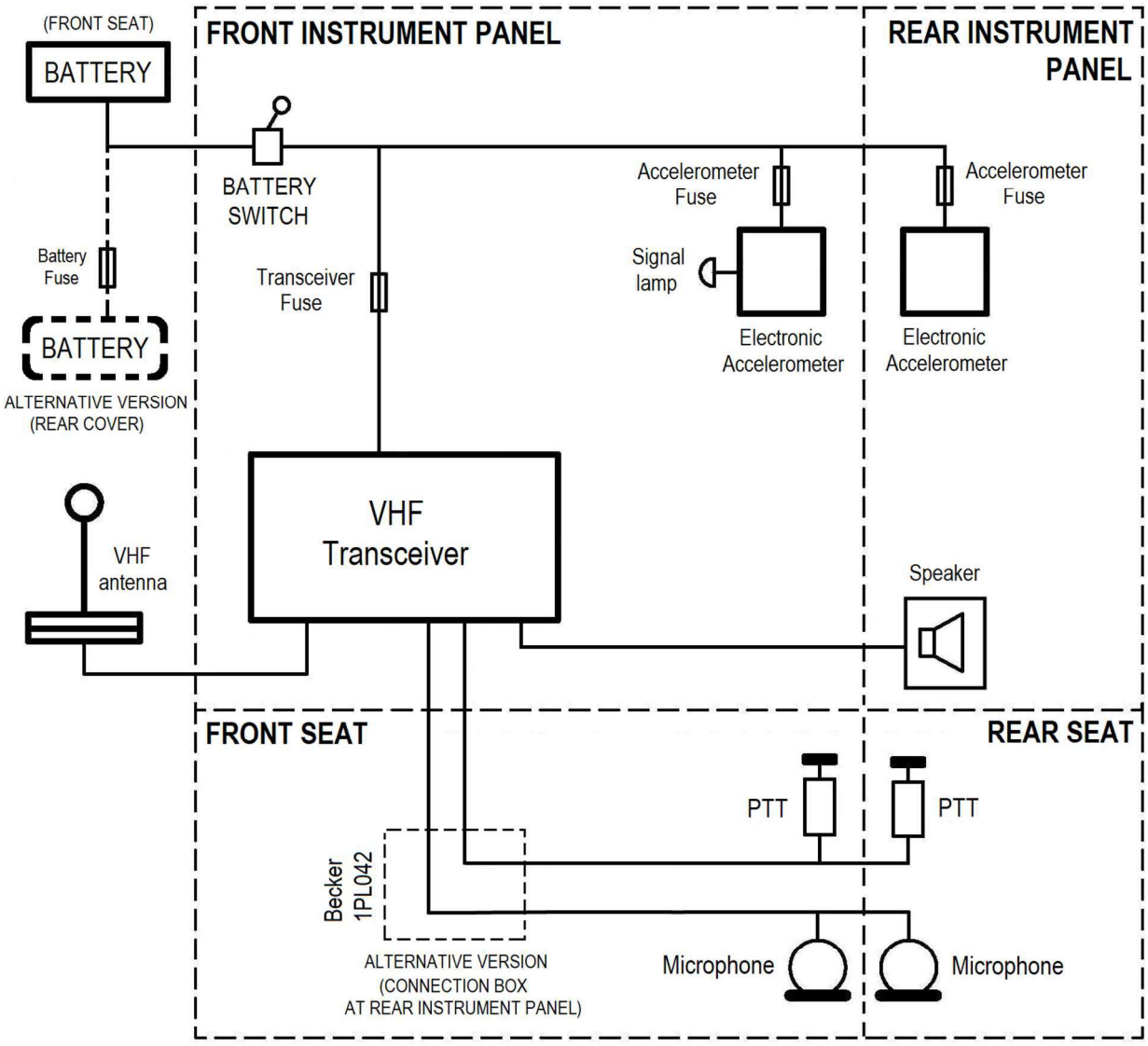
3

As a standard, the glider is equipped with a TOST E85 nose hook in the forward fuselage, in front of the control stick. The hook is accessible after removing the cover, and disassembling right balancing weight (item 13, Fig. 11.) as well as opening right inspection hole in floor.

To an order a TOST G88 model C.G. hook can be installed. In the place where a nose hook is mounted, the SZD III A56P model can be installed as well.

2.4.5. Electrical system

Fig. 10B. Electrical system *(with electronic accelerometer installed)*



The glider is equipped with battery for powering on-board receivers, stored in a special container in front of the front seat.

Battery specification:

- type – gel battery, AGM, LiFePO4;
- nominal voltage – 12V;
- nominal capacity – min. 5Ah;
- weight – 3.0 kg max;
- dimensions – suitable for installation in a special container, as above.

Fig. 11. Front seat arrangement

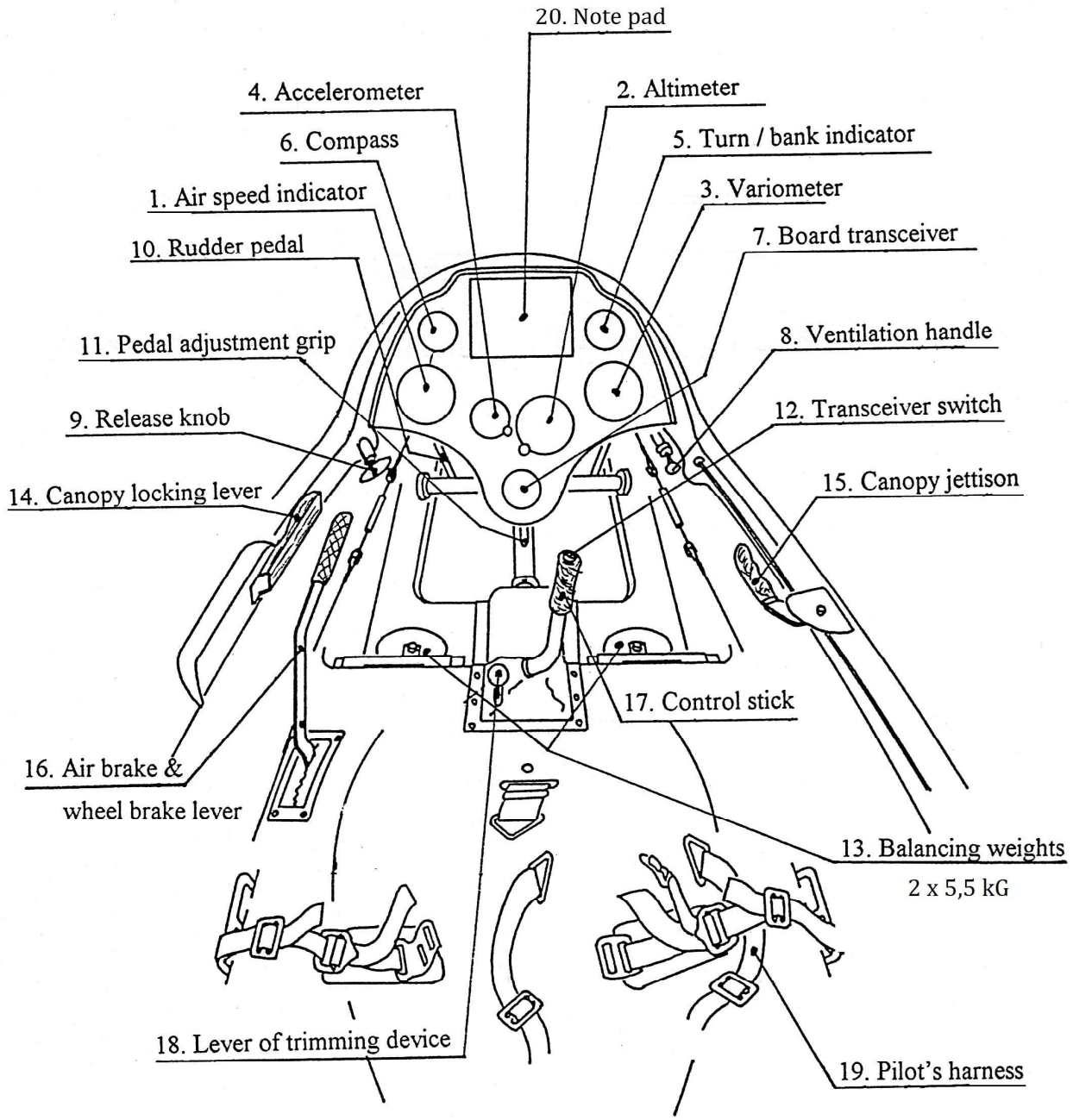


Fig. 11. Front seat arrangement

3

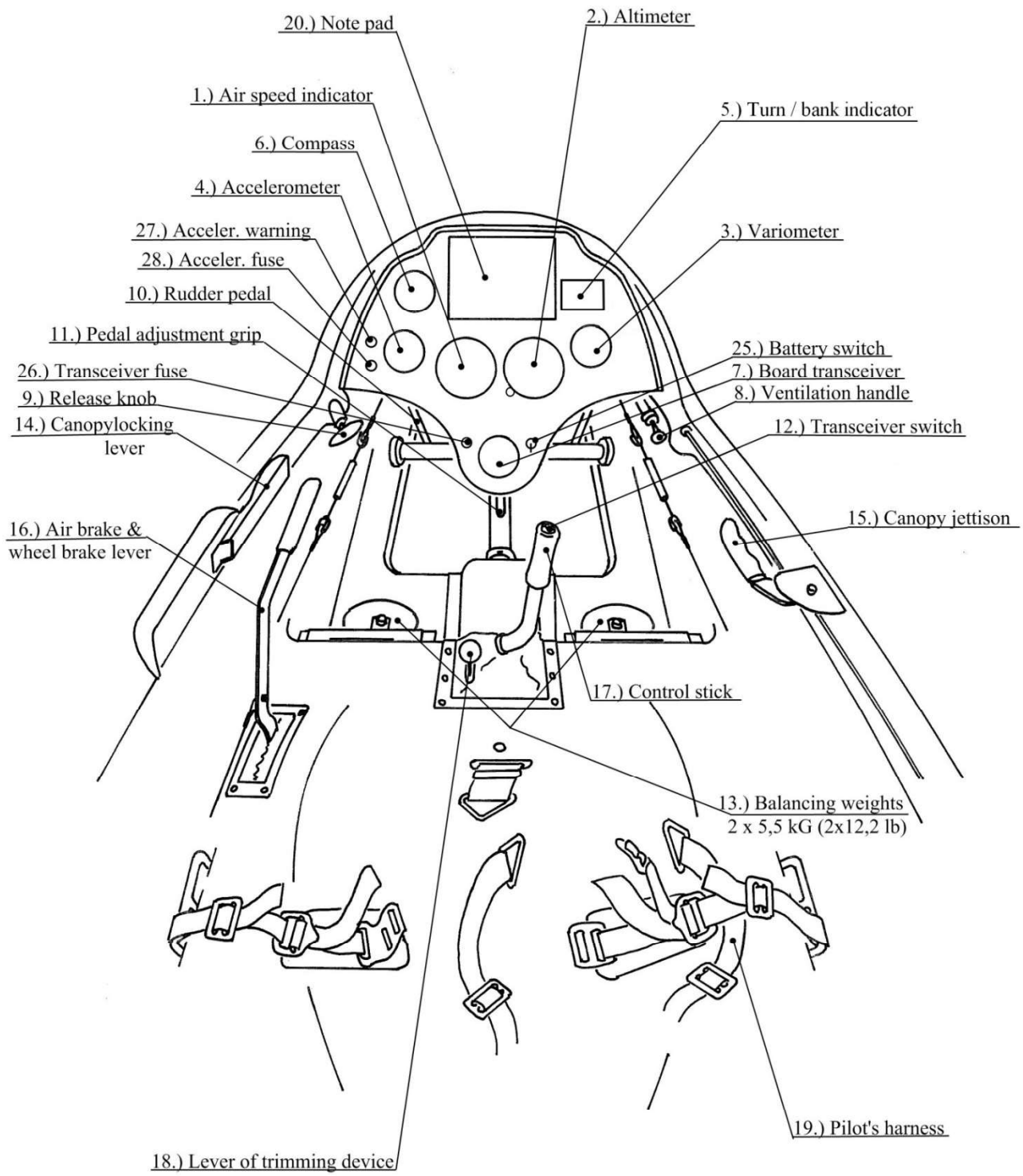


Fig. 12. Rear seat arrangement

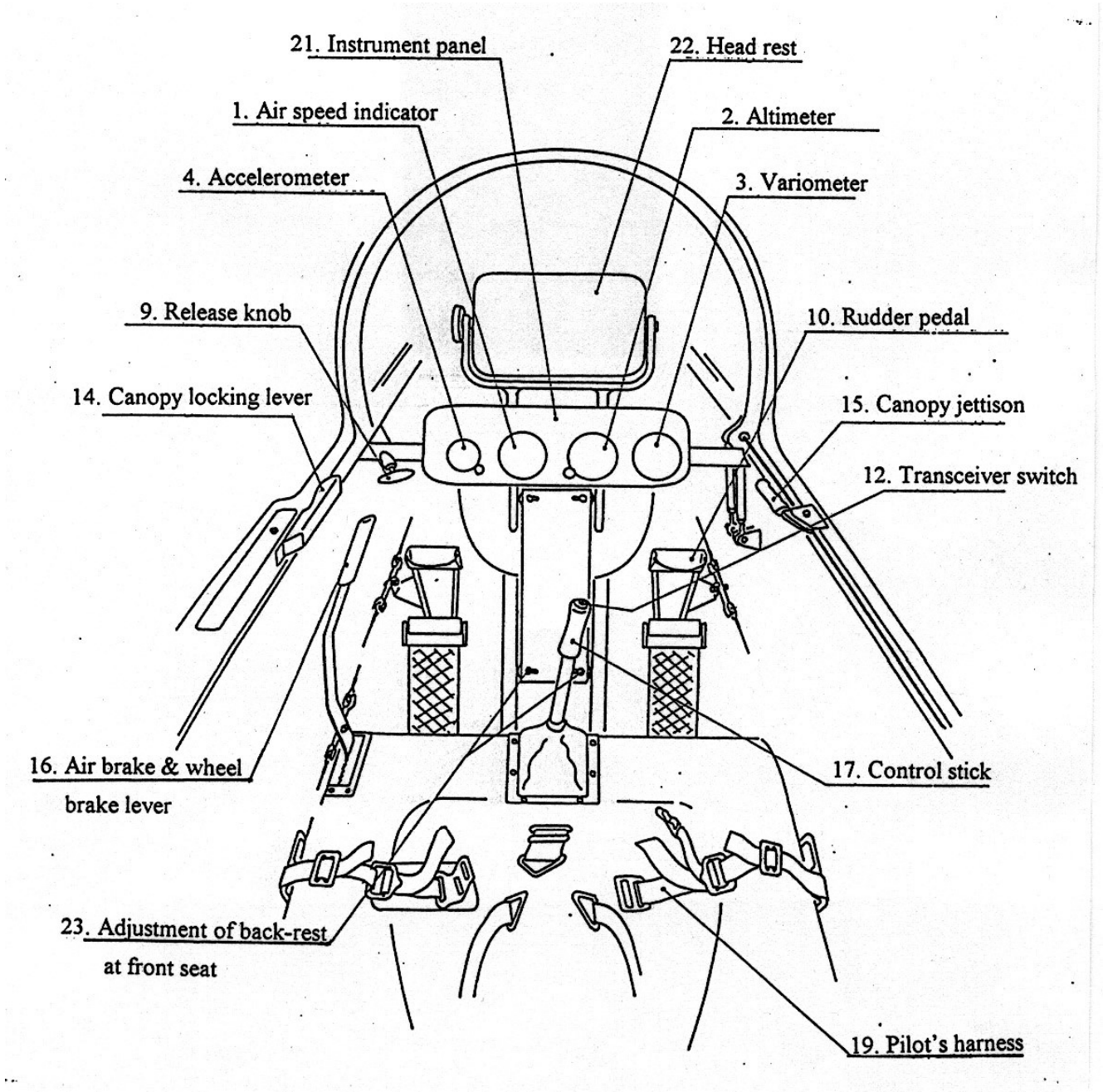
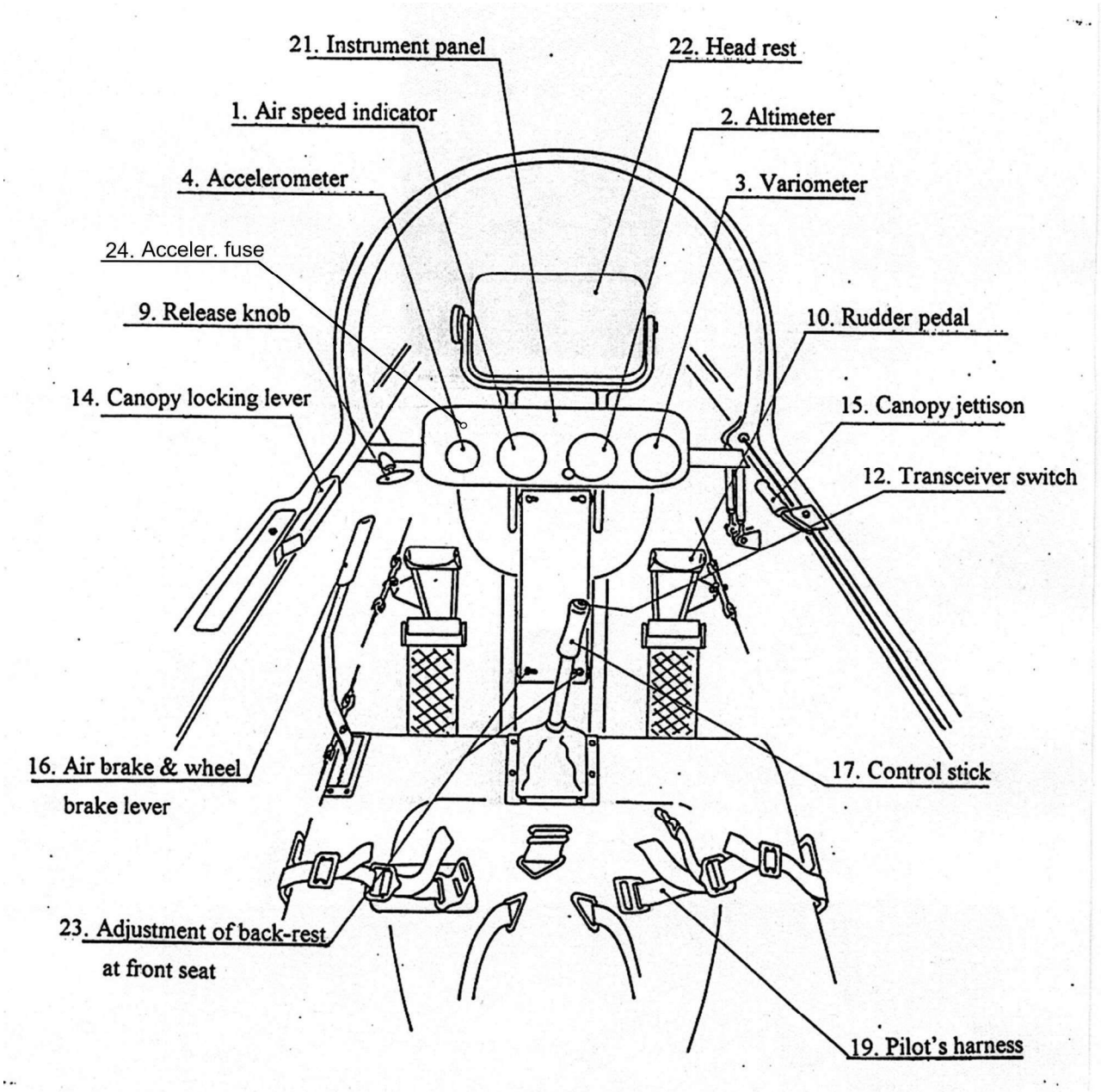
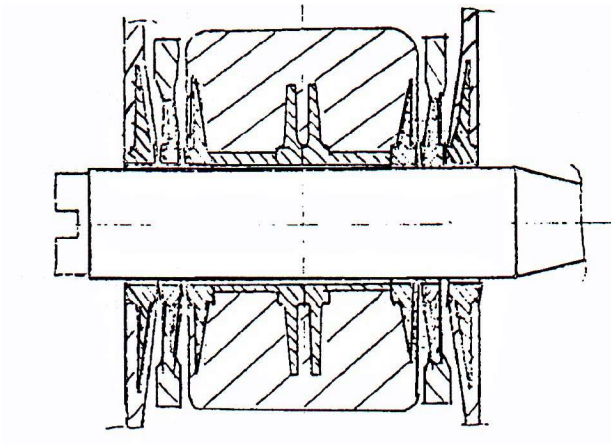
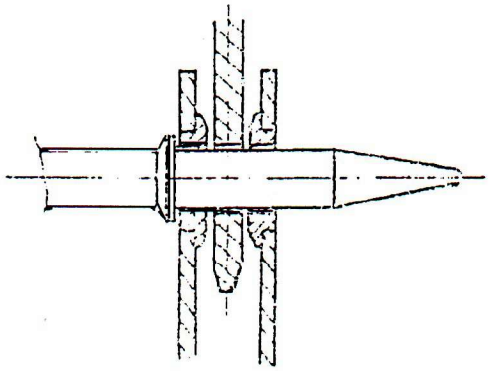
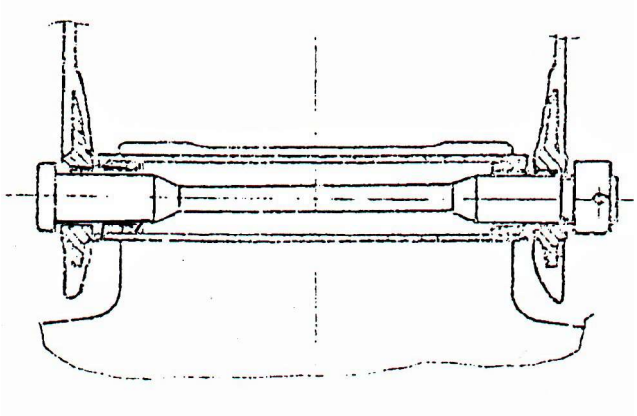


Fig. 11. Front seat arrangement

3



2.5. Allowed assembly plays

CONNECTION	CONNECTION SCHEME	ALLOWED PLAY Δ
Wing spars to fuselage (main bolt)		Main fittings ∅ 35 mm Δ = 0,18 mm
		Rear fittings ∅ 16 mm Δ = 0,12 mm
Tailplane to fuselage (horizontal bolt)		Bolt ∅ 12 mm Δ = 0,10 mm

2.6. Weighing the glider

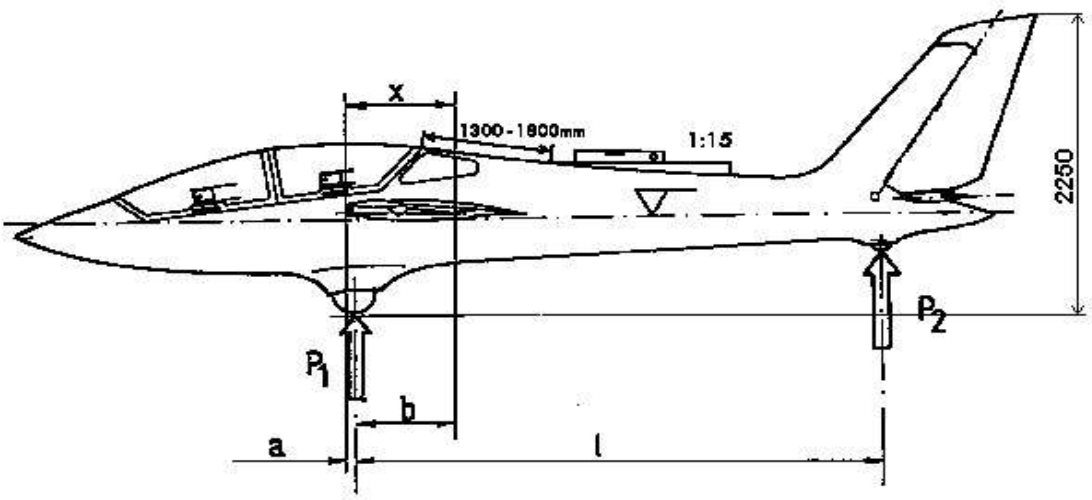
The glider should be re-weighed after every repair (especially this of tailplane and tail structure portion), painting or additional equipment installation.

The glider should be weighed with standard equipment (in accordance with paragraph 2.4.1) with neither balancing weights (item 13, Fig. 11.) nor rear seat instrument panel installed, on two balances of ± 0,2 kg {0,4 lb} accuracy.

Support the glider on the main and tail wheels. The difference between supports height should be selected so that the leading and trailing edges at wing root (levelling points) are on the same level, within a tolerance of ± 2 mm {0,08 in} or set the glider up in such attitude to obtain the dimension 2.250 mm {88,6 in} (see Fig. 13.).

Another way to ensure correct glider attitude is to put a wedge (height to length ratio 1:15) on top of the fuselage (as shown in Fig. 13.) with a levelling gauge on it. The gauge should be levelled by adjusting the support' height.

Fig. 13. Weighing the glider



$$Q = P_1 + P_2$$

$$X_{CG} = a + b = a + \frac{P_2 \times l}{P_1 + P_2}$$

where: „a" and „l" should be measured.
Weighing results, i.e. Q and X_{CG} values should be recorded in Table 2.

2.7. Allowed loading conditions

On the basis of weighing results, the allowed glider loading conditions should be determined by filling in Table 2, in accordance with the following instruction:

Record appropriately:

SI units	***Imperial units***
– in column 2 — weighing results: $Q = P_1 + P_2$ [kg]	$Q = P_1 + P_2$ [lb]
– in column 3 — results of formula: $X_{CG} = a + b = a + \frac{P_2 \times l}{P_1 + P_2}$ [cm]	$X_{CG} = a + b = a + \frac{P_2 \times l}{P_1 + P_2}$ [in]
– in column 4 — value calculated acc. to formula: $M_{4Max} = 530{,}0 - Q - 11{,}0$ [kg]	$M_{4Max} = 1168{,}0 - Q - 24{,}2$ [lb]
– in column 5 — value: $M_{5Min} = 110{,}0 - 11{,}0 = 99{,}0$ [kg]	$M_{5Min} = 242{,}5 - 24{,}2 = 218{,}3$ [lb]
– in column 6 — value calculated acc. to formula $M_{6Max} = 530{,}0 - Q$ [kg]	$M_{6Max} = 1168{,}0 - Q$ [lb]
– in column 7 — value: $M_{7Min} = 110{,}0$ [kg]	$M_{7Min} = 242{,}5$ [lb]
– in column 8 — value calculated acc. to formula: $M_{8Max} = 450{,}0 - Q - 11{,}0$ [kg]	$M_{8Max} = 992{,}0 - Q - 24{,}2$ [lb]
– in column 9 — value calculated acc. to formula: $M_{9Min} = \frac{X_{CG} \times Q - 1672{,}0 - 37{,}9 \times (Q + 11{,}0)}{132{,}9} \geq 55{,}0$	$M_{9Min} = \frac{X_{CG} \times Q - 1451{,}2 - 14{,}9 \times (Q + 24{,}2)}{52{,}3} \geq 121$
– in column 10 — value calculated acc. to formula: $M_{10Max} = 450{,}0 - Q \leq 100{,}0$ [kg]	$M_{10Max} = 992{,}0 - Q \leq 220{,}0$ [lb]
– in column 11 — value calculated acc. to formula: $M_{10Min} = \frac{(X_{CG} - 37{,}9) \times Q}{132{,}9} \geq 70{,}0$ [kg]	$M_{10Min} = \frac{(X_{CG} - 14{,}9) \times Q}{52{,}3} \geq 154{,}0$ [lb]

Table 2 Results of glider weighing, permitted loading conditions

Date	Empty weight	C.G. position of empty glider	Permited crew weight [kG]								S/N: …………	
			2-person crew				1-person crew				Approved	
			with balancing weights 2 x 5,5 kG		without balancing weights 2 x 5,5 kG		with balancing weights 2 x 5,5 kG		without balancing weights 2 x 5,5 kG		Date	Signed
			Total payload on front and rear seats		Total payload on front and rear seats							
	kG	cm	Max	Min	Max	Min	Max	Min	Max	Min		
1	2	3	4	5	6	7	8	9	10	11	12	13

2.8. Control surfaces mass-balance

After each reparation or re-painting of an elevator, aileron or rudder, the C.G. position of concerned element must be verified. To do this:

1. Weigh the concerned control surface (Q).
2. Suspend the control surface on hinges by a taught chord.
3. Apply the dynamometer at indicated position on trailing edge, and measure force (P) required to hold the chord of control surface horizontal.
4. Measure the distance of dynamometer application point from the hinge line (1).
5. Calculate the C.G. position of control surface

$$s = \frac{P \times l}{Q}$$

where:

l — distance between dynamometer application point and hinge line,

P — dynamometer reading,

Q — control surface weight.

Control surface C.G. location is acceptable, when:

for outboard aileron	s ≤ 14 mm {0,55 in},
for inboard aileron	s ≤ 14 mm {0,55 in},
for elevator	s ≤ 24 mm {0,94 in},
for rudder	s ≤ 11 mm {0,43 in}.

If „s” exceeds its given above limit value, the control surface should be mass-balanced with balancing weight installed at locations indicated with „B” (Fig. 14.):

1. Drill a 10 mm hole at, respectively:

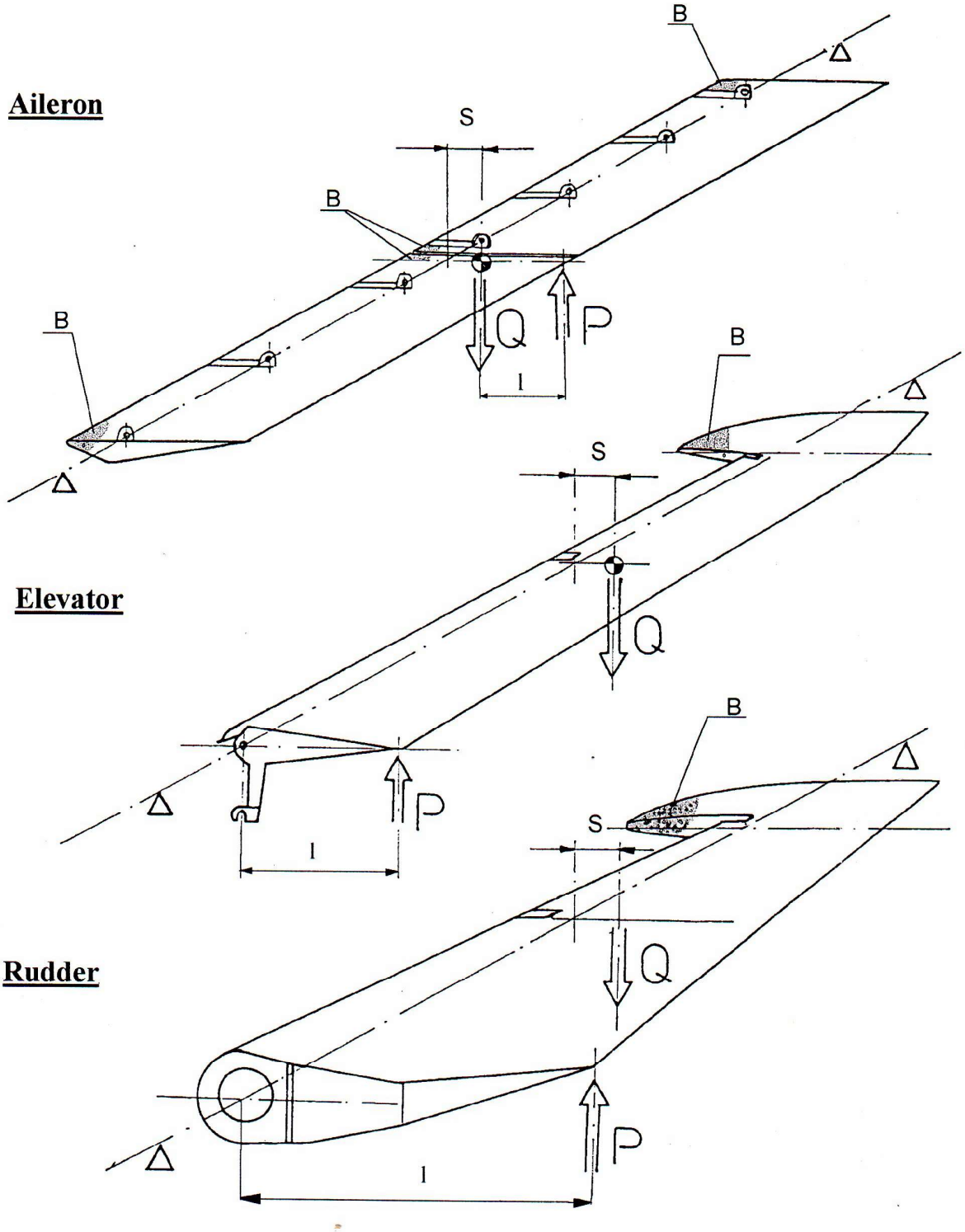
   for aileron — approx. 30 mm {1,2 in} from leading edge, inside enclosing web,

   for elevator and rudder — approx. 120 mm {5 in} from nose, in the web of control surface portion protruding forward.
2. Determine the required value of balancing weight.
3. Prepare a resin composition i.e. Ep53/Z-1 or L-285/H-286, pour in plumb shot and weigh the correct portion.
4. With the control surface held nose down, pour the weighed portion into the nose through the drilled hole.
5. After resin hardening, check the C.G. position and repair the drilled hole following the Repair Manual.

2.9. Towing cable safety link

The towing cable safety link of 677 kg (± 10 %) {1525 lb (± 10 %)} breaking strength shall be used.

Fig. 14. Control surfaces mass-balance.



B - position of control surface mass balance

3. PERIODIC WORKS

3.1. Pre-flight inspection

Prior to the flights, the followings should be checked:

1. Glider documents (verify and complete the required entries).
2. External inspection (structure integrity and condition of surface).
3. Security of assemblies and control systems joints (wing and tailplane main bolts, control systems where accessible, installation of balancing weights if present), wing tips mounting.
4. Correct operation of control systems.
5. Operation of towing hooks.
6. Condition of undercarriage, wheels’ rollability, operation of wheel brake.
7. Correct pressure in tyres (inspect visually), cleanness of the undercarriage well.
8. Pilot’s belts.

   The spring on belt clamp must neither be bent nor broken.
9. External condition of total and static pressure ports.
10. Operation of flight instruments and battery condition.
11. Condition of front seat back-rest and fixing bolts.
12. Operation of valve in air vent (visible through the nozzle on the fuselage nose).
13. Canopy and its locks condition.
14. Transceiver - communication test.

3.2. Post-flight inspection

After flights, make a post-flight inspection similar to this pre-flight one.

Complete entries to Glider Log Book.

The glider considerably wetted by rain should be wiped down with a flannel cloth, and allowed to get dry with the air brake extended.

On the next day, de-rig the glider, and re-grease all fittings and bolts.

After flying in rain, complete the followings:

- Empty the drainage-units by removing their drainage plugs,
- Disconnect the pneumatic ducts, and after disconnecting the instruments blow out the ducts with air, if necessary,
- After the ducts have dried, reconnect the system and perform **a system leak-check**.

3 **NOTE: If a glider load limit has been exceeded, in every case the glider must be de-rigged, and subjected to a detailed structural inspection, with special attention paid to:**

- **condition of the protruding wing spar portion (spar root), root rib and the connection between these (examine against white spots in composite),**
- **condition of the fuselage sleeve to which the extending spar roots are inserted, check against possible cracks of lacquer coat - especially at wing root and fuselage central part,**
- **condition of tailplane / fuselage connection,**
- **possible plays, degradation of stiffness or excessive friction in the control systems, not stated previously.**

To make sure, measure control surface deflections and compare these against earlier reference data

In case of any doubts, a contact with Producer is necessary.

3.3. Periodic works

1. Check the condition of the structure, with special attention paid to those elements heavily stressed during take-off, flight and landing.
2. Check the condition of main fittings and bolts mating surfaces, as well as assembly plays.
3. Check reliable securing of the connections in glider main components, and control systems.
4. Check the reliable operation of canopy locking and emergency jettison systems.
5. Check the condition and correct operation of the tow hook(s), tow cable loaded by hand.
6. Check the condition of control surfaces and hinges of the elevator, rudder, aileron and air brake, as well as correct operation of the control systems.
7. Check the friction forces in control systems and device actuation force.
8. Check the condition of undercarriage - main wheel, tail wheel and wheel brake operation.
9. Check condition and correct operation of board instruments.
10. Check the condition of metal details protective coating, especially those exposed to mechanical damages and corrosion (cables, undercarriage elements).
11. Clean and lubricate with special grease the bearings and connecting elements acc. to the lubrication plan (Fig. 15.). In the event of bearing seizure, rinse it with a lubrication penetrant (e.g. WD-40) to restore smooth operation.
12. Check deflections of the control surfaces (Fig. 1.).
13. Check technical condition of aileron-drive fitting connected with actuating push-rod according to Bulletin No BO 11/98.
14. In aileron control circuit, verify the condition of lever console and its installation in a wing - according to Bulletin No BO-18/2011
15. In elevator control circuit, on the first push-rod (counting from control surface) verify the condition of external surface, and on the second push-rod verify the tube and installation of the push-rod ends - according to Bulletin No BO-18/2011.
16. Verify, in accordance with instrument manufacturer recommendation, calibration of the TL-3424 accelerometer– *if installed on the glider.*

3.4. Schedule of periodic works

Table 3. Schedule of periodic works

	Schedule	Operations
	At the start of flying season	1 ÷ 13
	After every 50 flying hours	1 ÷ 13
1	After every 100 flying hours or every year	1 ÷ 11, 13, 14, 15
	After every 500 flying hours	see Enclosure No 1 to this Manual
	After landing with damage to landing gear	1 ÷ 10
	After heavy landing	1, 2, 7, 9
1	After prolonged tail-slide with control stick snatched out of pilot’s hands	1 ÷ 15
	At the end of flying season, or before the prolonged hangaring	acc. to paragraph 3.6.
3	Every 3 years send TL-3424 to instrument producer for calibration verification (*if installed on the glider*)	16

3.5. Allowed glider service life

Allowed glider service life is 3000 flying hours.

The mandatory overhaul, every 500 flying hours, is imposed herewith.

The above does not concern:
- tow hooks,
- board instruments,

2 the life-times of which are specified in the equipment producer manuals.

3.6. Hangaring and transportation

In case a prolonged pause in glider operation is planned, glider disassembly is recommended.

Fittings and metal elements should be greased.

Main glider components should be protected with individual covers.

The fuselage should be shored with contoured supports in front of the undercarriage well and under fin. Shore the wings with chord vertically under the leading edge, at $^{2}/_{3}$ semispan, and under spar extending portion at the root rib.

Reduce pressure in tyres.

NOTE: Do not hangar the glider in wet covers.

To a separate order, producer delivers the closed COBRA-FOX trailer and instruction for loading the glider into trailer.

In case the glider is transported in a different type of trailer, the following procedure is recommended:

- fix the wings on spar roots near root rib and under leading edge at $^2/_3$ semispan location,
- the fuselage may be fixed on its wheels and stabilised at wing/fuselage connection pivots, provided the mating surfaces are adequately protected against scratch,
- tailplane should be fixed in the trailer with clamps,
- during transportation, the mating surfaces of fittings, inspection holes and bearings should be protected against dust and dirt,
- immobilise the control surfaces; protect the canopy with a flannel cover,
- in case that an open trailer is used, the external surfaces of the main glider components should be protected with individual covers and, in case of rain, with foil.

For ground rolling the „tail first” attitude is recommended.

Push on the wings leading edge close to fuselage, make turns with the tail lifted, using the provided handle. Loading the fuselage nose down by an assisting person is helpful.

To a separate order a detachable tail dolly can be delivered, facilitating the glider ground handling.

For a glider “nose-first” towing by a vehicle, use the nose tow hook, while for „tail-first” towing – a purpose-built hook installed in the fuselage rear part should be used.

NOTE: Prior to connecting the towing cable at the tail hook, fasten the control stick in a cockpit with pilot’s safety belts to lock the elevator in „upward” position.

3.7. Lubrication plan (Fig. 15.)

Table 4. Lubrication plan

Lubricated item	Agent
1. Aileron hinges and control links 2. Suspension of air brake plate and arms 3. Suspension of control column, push rod bearing and intermediate lever 4. Stabiliser fittings and elevator hinges 5. Rudder hinges 6. Elevator control coupling 7. Wheel bearings and axle 8. Rudder pedal suspension and guides 9. Canopy locks 10. Towing hook 11. Tail wheel axle 12. Coupling of air brake control	bearings grease i.e. ŁT 43
13. Bolts and openings of spar fittings	graphite grease
14. Air brake arm axle 15. Brake lever axle in a cockpit	compound oil

3.8. Cleaning and care

In case the external surfaces are soiled (i.e. with insects) it is recommended to wash these with water and a gentle detergent without abrasive agents.

Dry washed surfaces with a flannel cloth (chamois leather). Dry the wetted glider inside (air brake housing); ensure the drainage holes are clear.

The lifting surfaces should be polished time to time with a fat-free polish.

The canopy perspex should be rinsed with clear water with eventual aid of agent for perspex cleaning.

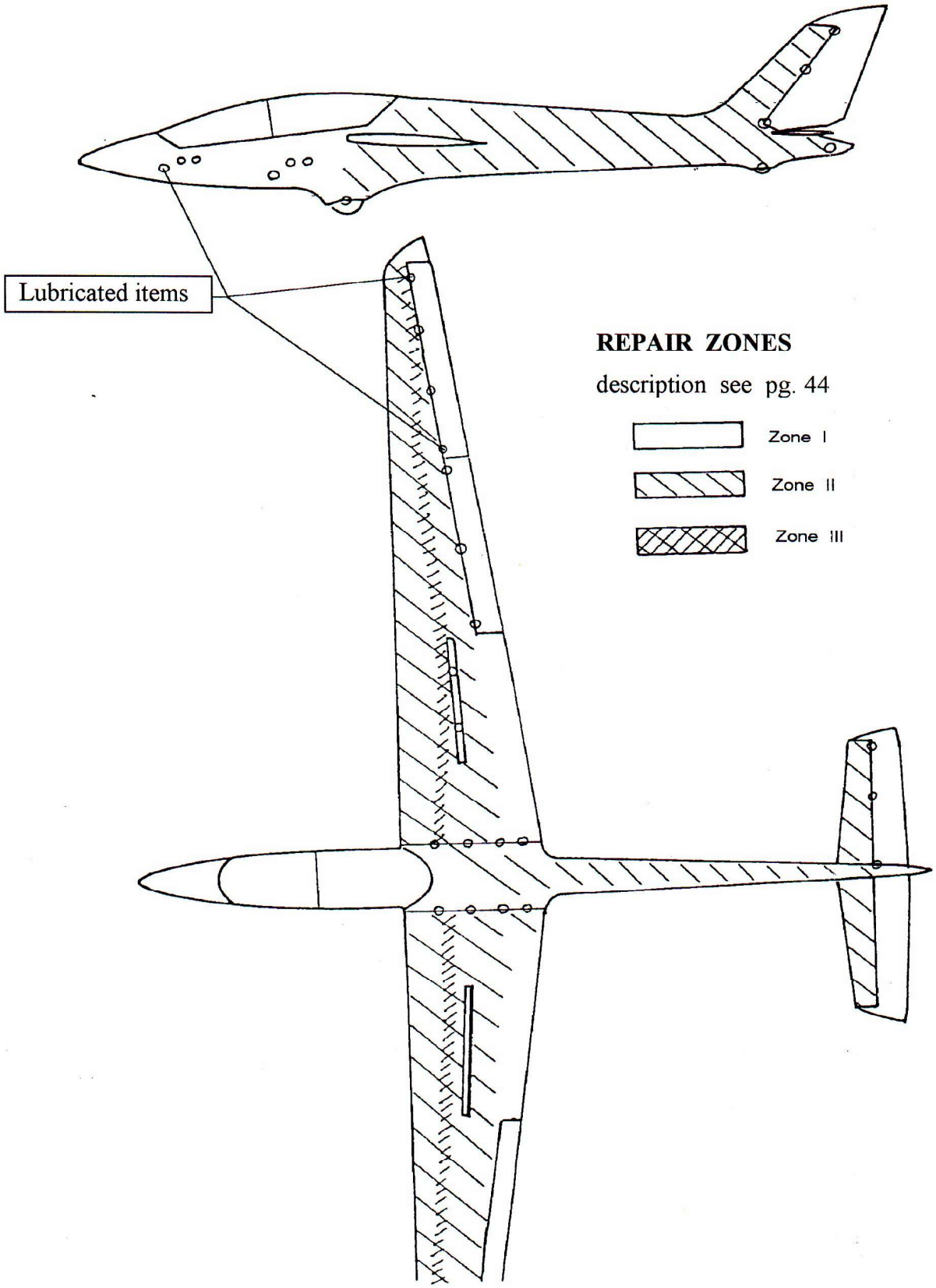
Protect perspex against dust and sun with flannel cover.

3.9. Special tools

Each glider is equipped with the following special service tools :

1. The brass or aluminium bar to align the wing and fuselage fittings
2. Extension pipe for inflating the main and tail wheel tyres with air.

Fig. 15. Lubrication plan & arrangement of structural repair zones.



3.10. Glider repairs

In case of minor damages to glider structure in Zone I, not affecting the structure strength, like local scratches, small indentations of outer surface, edges crumbling etc. the user can repair them himself.

The zones of glider structure allowed for the user's repair are shown in Fig. 15:

„I” — structure zones allowed for the user's repair;

„II” — structure zones allowed for repairs at producer or in authorised workshop only;

„III” — wing spar caps - not allowed for repair.

The repairs of composite structures should be carried on in accordance with recommendations contained in the „Repair Manual of Composite Glider” for SZD-48 „JANTAR Std” glider family.

The materials allowed for such repairs are specified below:

1. Glass fabrics produced by INTERGLAS.
2. L-285 resin and H-286 hardener.
3. Polyester lacquer Vorgelat T30 (T35) for external coating.
4. Renovation and acrylic lacquers for cockpit inside.
5. Fillers — Aerosil, chopped roving.

In case the excessive plays in holes for wing or tailplane main bolts appear, the holes should be reamed in assembly with the adjustable reamer, until the ovalisation is removed and the reaming traces are visible over the entire bearing surface. The new raw main bolts should then be polished until the play at mating surfaces ranges 60 ÷ 70 % of allowed play value, for the connection concerned (see Table 1, page 34).

In case of damage or wear to other metal parts, the concerned details should be replaced with new ones and adjusted to fit, as necessary.

To an order, producer supplies the user with the drawings of basic composite structures (free of charge), as well as with metal parts for replacement (wing and tailplane main bolts in raw condition) — against payment.

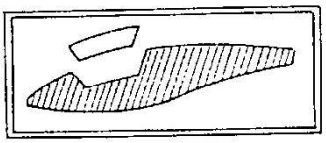
3.11. Additional equipment

To an order, producer delivers the following additional equipment:

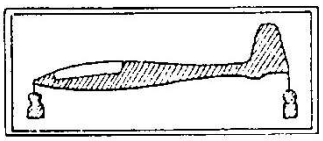
1. Closed COBRA-FOX trailer.
2. Complete set of covers (flannel canopy cover delivered with the glider).
3. Transportation tail wheel (tail dolly).

3.12. Placards and markings

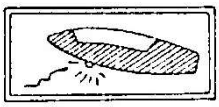
Fig. 16. Information placards



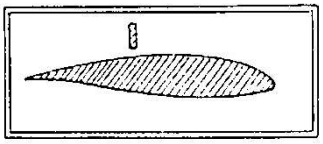
canopy emergency jettison



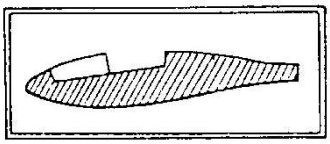
elevator trimming device



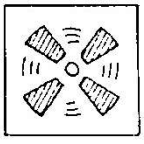
towing hook release



air brake



canopy lock



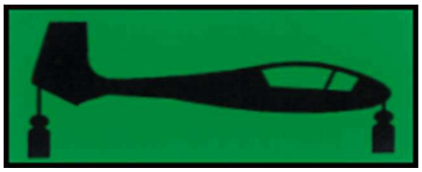
cockpit venting

3.8. Placards and markings

3

Fig. 16. Information placards

canopy emergency jettison



elevator trimming device

towing hook release

air brake
extended / retracted

canopy lock

cockpit venting

no smoking

Fig. 17. Operation placards

Placards located on the right hand side cockpit wall, close to canopy frame at front and rear seats:

LIMITATIONS
1. *Night flying — PROHIBITED.*
2. *Cloud flying — ALLOWED, provided pilot and glider meet National Regulations*
3. *Flying in anticipated icing conditions — PROHIBITED.*
4. *Aerobatics — ALLOWED, in accordance with Flight Manual, item 4.5.9.*

3

SPEED LIMITATIONS		
IAS	*[km/h]*	*[kt]*
V_{NE}	*282*	*152*
V_{RA}	*225*	*122*
V_A	*214*	*116*
V_T	*150*	*81*

BEFORE FLIGHT
– *Check cockpit, take a seat.*
– *Adjust pedals, back rest and balancing weights.*
– *Check full deflection of control surfaces, retract air brake.*
– *Set altimeter to zero reading.*
– *Fasten and tighten safety belts.*
– *Check setting of elevator trim.*
– *Lock both canopies, perform communication test.*

3

Flight altitude	*[m]*	0-3000	4000	5000	5500
V_{NE}	*[km/h]*	282	267	253	246

Flight altitude	*[ft]*	0-10000	13000	16000	18000
V_{NE}	*[kt]*	152	145	138	133

3

Fig. 16. Operation placards

Placards located on the right hand side cockpit wall, close to canopy frame at front and rear seats:

LIMITATIONS

1. Night flying prohibited.
2. Cloud flying allowed,
   provided pilot and glider meet National Regulations.
3. Flying in anticipated icing conditions prohibited.
4. Aerobatics allowed, according to Flight Manual item 4.5.9

SPEED LIMITATIONS

IAS	[km/h]	[kt]
V_{NE}	**282**	**152**
V_{RA}	**225**	**122**
V_{A}	**214**	**116**
V_{T}	**150**	**81**

For aerotowing, use 25÷60 m (80÷195 ft)
long nylon cable with safety link
of 677 daN {1525 lb} ± 10% strength

For winch launching,
use cable with safety link
of 677 daN {1525 lb} ± 10% strength

BEFORE FLIGHT

- Check cockpit, take on the place
- Adjust pedals, back rest and balancing weights
- Check deflection of control surfaces, retract air brake
- Set altimeter to zero reading
- Fasten and tighten safety belts
- Check setting of trimming device
- Lock both pieces of canopy, communication test

3

LOADING PLAN

Pilot with parachute weight						Balancing weights		Limit manoeuvring load factor	
front seat				rear seat					
minimum		maximum						Aerobatic	Utility
[kG]	[lb]	[kG]	[lb]	[kG]	[lb]	[kG]	[lb]		
55 70	121 154	89 100	196 220	0 0	0 0	2×5,5 0	2x12,1 0	+ 9,0 / - 6,0	
70 55 55	154 121 121	110 110 70	242 242 154	0 55 110	0 121 242	0 0 0	0 0 0	+ 7,0 / - 5,0	+ 5,3 /-2,65

- *Solo flying on front seat only.*
- *Installation of balancing weights acc. to FM item 7.2. and Fig 7.1*

Placard on fuselage left hand side, by front hook

For aerotowing, use 25÷60 m (130÷195 ft)
long nylon cable with safety link
of 677 daN (1525 lb) ±10 % strength.

Placard on fuselage left hand side, by C.G. hook

For winch-launching,
use cable with safety link
of 677 daN (1525 lb) ±10 % strength.

Placards located on the internal housing cover of front tow hook:

BALANCING WEIGHTS
< L R >

Removing balancing weights
1. Remove securing wire
2. Unscrew screws
3. Remove balancing weights

Placard located above main wheel axle, on fuselage right hand side:

0,2 MPa

Placard located above tail wheel axle, on fuselage right hand side:

0,15 MPa

3

LOADING PLAN

Pilot with parachute weight						Balancing weights		Limit maneuvering load factor [g]	
front seat				rear seat					
minimum		maximum							
[kG]	[lb]	[kG]	[lb]	[kG]	[lb]	[kG]	[lb]	Aerobatic	Utility
55	121	89	196	0	0	2x5,5	2x12,1	+ 9 / - 6	
70	154	100	221	0	0	0	0		
70	154	110	243	0	0	0	0		
55	121	110	243	55	121	0	0	+ 7 / - 5	+5,3/-2,65
55	121	70	154	110	243	0	0		
Solo flying on front seat only Installation of balancing weights according to item 7.2 and Fig. 7.1 - F.M.									

Flight altitude	[m]	0-3000	4000	5000	5500
V_{NE}	[km/h]	282	267	253	246
Flight altitude	[ft]	0-10000	13000	16000	18000
V_{NE}	[kt]	152	145	138	133

Placards located on internal housing cover of front tow hook:

BALANCING WEIGHTS	
< L	**R >**

Removing balancing weights

1. Remove securing wire.
2. Unscrew screws.
3. Remove balancing weights.

Placard located above the main wheel axle, fuselage right hand side:

0,2 MPa

Placard located above the tail wheel axle, fuselage right hand side:

0,15 MPa

Intentionally left blank