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MAINTENANCE MANUAL

FOR THE SAILPLANES

LAK - 17B, LAK - 17BT

Type: LAK-17A, LAK-17AT

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This sailplane is to be operated in compliance with the information and limitations contained herein.

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Record of revisions

Any revision of the present Manual, except actual weighting data, must be recorded in the following table and in case of approved Sections endorsed by responsible airworthiness authority.

The new or amended text in the revised page will be indicated by black vertical line in the left hand margin, and the Revision No. and date will be shown on the bottom left hand of the page.

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SECTION 1

General

Page

1.1 Introduction

This Maintenance Manual contains information for pilots, technicians and mechanics about safe and proper maintenance of the sailplanes LAK-17B and LAK-17BT. This information is given in accordance with requirements of CS 22.1529.

1.2 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes used in this manual.

Warning: Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

Caution: Means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

Note: Draws the attention to any special item not directly related to safety but which is important or unusual.

1.3 Description of sailplane

LAK-17B

The LAK-17B is a new generation of FAI 15m -18m class sailplane designed according to CS-22 requirements.

LAK-17BT

The LAK-17BT is a new generation self-sustaining sailplane of FAI 15m-18m class designed according to CS-22 requirements. Glider is equipped with sustaining retractable power-plant, powered by the Solo 2350 engine (26.28 HP at 5500 RPM) and propeller LAK-P4-90.

LAK-17B, LAK-17BT

The sailplane has flaps, T-shaped tail, retractable main gear wheel, water ballast tanks:

Water ballast tank	LAK-17B		LAK-17BT	
	15m	18m	15m	18m
Inner wings	158 ltr/41,7 US gal	158 ltr/41,7 US gal	158 ltr/ 41,7 US gal	158 ltr/ 41,7 US gal
Outer wings	0	30 ltr/ 7,9 US ga	0	30 ltr/ 7,9 US gal
Fuselage	55 ltr/ 14,5 US gal	55 ltr/ 14,5 US gal	0	0
Fin	8 ltr/ 2,1 US gal	8 ltr/ 2,1 US gal	8 ltr/ 2,1 US gal	8 ltr/ 2,1 US gal

The sailplane is made of composite materials. Wing shell is of three-layer construction (composite material – foam - composite material). Carbon rods GRAPHLITE SM 315 have been used in spar construction.

The airbrakes are located on the upper part of wing. The fuselage is of monocoque construction. Pilot seats and pedals of rudder control are adjustable. The cockpit canopy opens forward together with instrument panel. In case of emergency the canopy is ejected.

Main landing gear has a wheel of 5.00-5 size and a shock absorber.

The tow release is mounted near the main landing gear and (or) in front of pilot cockpit at the bulkhead.

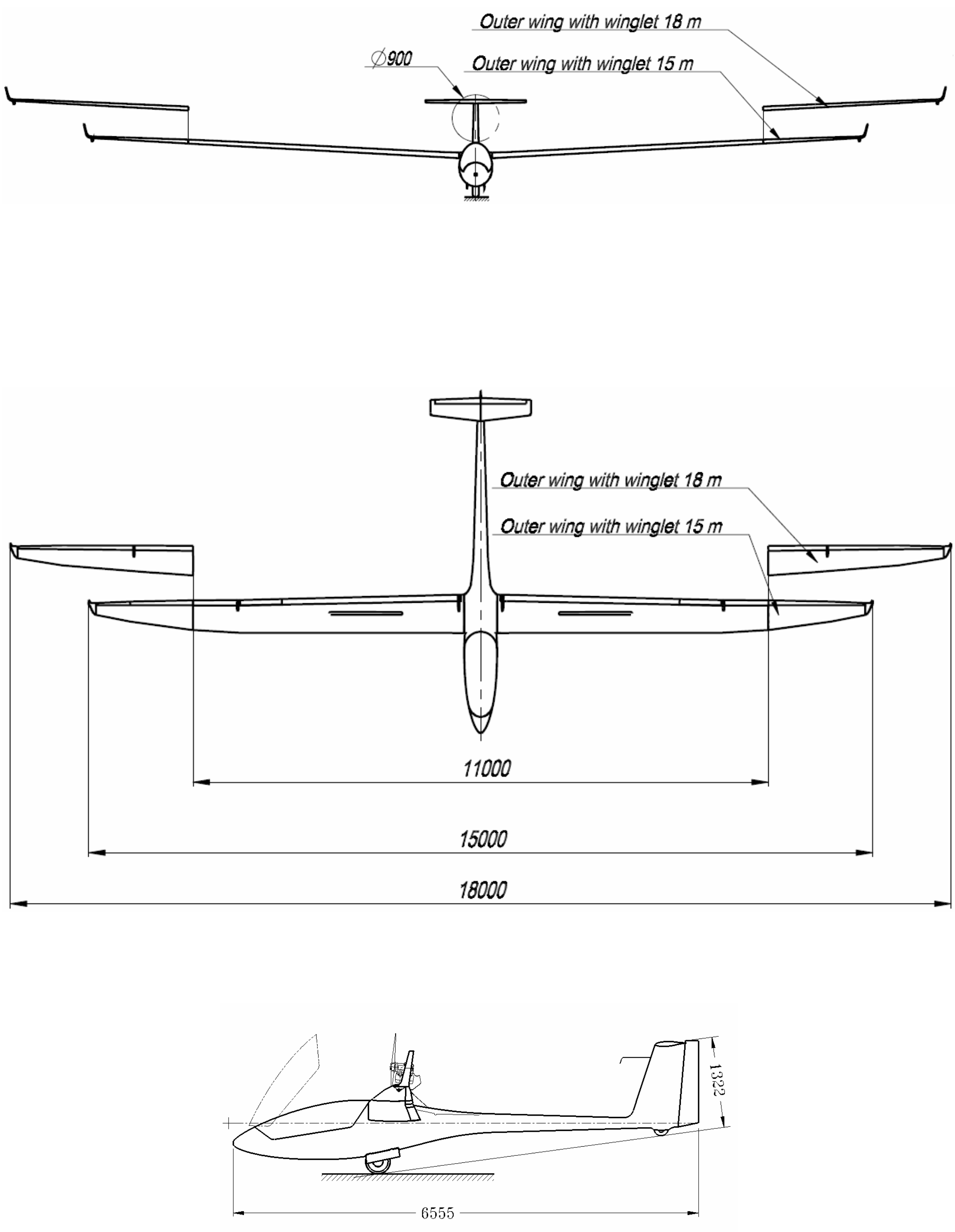
Technical data	**b=15 m**	**b=18 m**
Wing span	15 m (49,2 ft)	18 m (59,06 ft)
Wing area, m^2	9,18 m^2 (98,81 ft^2)	10,32 m^2 (111,08 ft^2)
Wing aspect ratio	24,51	31,39
Wing dihedral angle, degrees	3	3
Fuselage length, m	6,555 m (21,42 ft)	
Height, m	1,29 m (4,23 ft)	
Max airspeed in calm air, km/h	275	275
Max airspeed in rough air, km/h	190	190
Max flight mass, kg	550	600
Max wing loading, kg/ m^2	59,91	58,13
Min sink rate, m/s	yet not defined	0.53
Best L/D without ballast at 95 km/h	yet not defined	50.2
Best L/D with ballast at 115 km/h	yet not defined	50.2
g limits without water ballast	-2,65/+5,3	-2,65/+5,3
g limits with water ballast	-2,65/+5,3	-2,65/+5,3

1.4 Abbreviations

Abbreviations used in this document:

A - ampere,
Ah - ampere hour,
*C - degree Celsius,
C.G. - center of gravity,
cm - centimeter,
daN - decanewton,
g - gram,
h - hour,
kg - kilogram mass,
kG - kilogram force,
km - kilometer,
L/D - glide ratio,
ltr - liter,
m - meter,
mm - millimeter,
Mpa - megapascal,
V - volt.

1.5 Three view drawing



SECTION 2

Description of sailplane and systems

Page

2.1 Introduction

In this section there is given description of sailplane aggregates, systems, equipment, tables and markings and information about proper sailplane maintenance.

2.2 Airframe construction

2.2.1 Wing

Sailplane wings (fig. 2.2.1_01, fig. 2.2.1_02) made of composite materials consist of four parts: right inner wing (pos. 1), left inner wing (pos. 2) and two outer wings with winglets.

The outer wings are of two different lengths. For wingspan 18 m of length, the outer wings 3500 mm of length (pos. 3) are used. For span 15 m of length, the outer wings 2000 mm of length (pos. 4) with winglets are used.

The wing airfoils:

18m-

s (m)	c (m)	Profile
0.0	0.741	LAP7-150
1.2	0.711	LAP7-131/17
4.6	0.625	LAP7-131/17
6.5	0.5	LAP7-129/18
8.0	0.38	LAP7128/19
8.855	0.226	LAP93/148

15m-

s (m)	c (m)	Profile
0.0	0.741	LAP7-150
1.2	0.711	LAP7-131/17
4.6	0.625	LAP7-131/17
6.7	0.38	LAP7-128/19
7.355	0.226	LAP93/148

Construction of wings is of one spar monocoque type. Their spars are 2-T shape in section. Carbon rods GRAPHLITE SM 315 are used for spar shelves. Wing shells are stuck of two parts: an upper and lower shell parts. The shell is of three-layer construction. External and internal shell layers are made of carbon and glass fiber. Between them there is foam. Thickness of foam of wing shells is 6 mm.

Spars of right and left wings are joined together with the help of two pins. Spar panel of right wing is cut off pyramid-shaped. Spar panel of left wing is fork-shaped. An outer wing is connected to the wing with the help of outer wing spar pins. The pins are fixed by the help of special key.

There are an adjustable hubs in the wing root ribs to fasten the wings to the fuselage.

Wings have flaps and flap-aileron type ailerons. Their shell structure is analogical to the wing shells structure.

A flap has 6 hinges. Its length is 3.42 m, area 0.4 m^2.

Length of ailerons (wing 15m) is 3.55 m, area 0.32 m^2. With wing span of 18 m an aileron is extended to 5.05 m. Its area then is 0.445 m^2. As wing the outer wing is connected to the wing the part of an aileron on the outer wing is connected to an aileron on the wing automatically.

On an upper part of wing shell there are covers (pos. 16) of airbrakes. Their contour coincides with the wing surface.

2.2.2 Fuselage

The sailplane fuselage (fig. 2.2.2_01, 2.2.2_02) is made of composite materials, construction is monocoque. The fuselage is oval-shaped in section (fig. 2.2.2_02), slightly narrowing at top and turning into circle at the fuselage end part. The fuselage end part is cone-shaped turning into fin.

The fuselage shell is glued of two symmetric parts, right and left (pos. 2, 3). Shell gluing seams are in vertical plane (in upper and lower shell parts).

Glass and carbon fiber are used in shell construction. Kevlar T42-80 is used in the pilot cockpit zone.

The fuselage is reinforced by a metal girder (pos. 4) at wing attachment to the fuselage zone. Landing gear (pos. 5) is fastened to it. The gear is fully retractable. Its recess has an hermetic hood in order to avoid getting dirt and dust inside the body. As the gear is retracted the landing gear door is closed.

The tail wheel (pos. 6) is fixed at the fuselage end part. The pilot cockpit is covered with a canopy (pos.1) which opens upward.

2.2.3 Vertical tail

The vertical tail (fig. 2.2.3_01) consists of a fin (pos. 1) and a rudder (pos. 2).

The fin is made together with the fuselage. The fin shell is of monocoque three-layer construction. Its internal and external layers are molded of composite materials and between them there is foam 6 mm of thickness. The frame of the fin consists of a spar (pos. 3) of three-layer construction., a rear wall molded together with right fin shell (pos. 4) and 3 ribs going from nose till the spar, an upper, middle and lower (pos. 5, pos. 6, pos. 7).

A water ballast tank (pos. 8) of capacity 8 ltr is fitted inside the fin between nose and spar and between lower and middle ribs.

Along the spar forward side a container for batteries (pos. 9) is mounted between the middle and upper ribs.

The radio aerial (pos. 10) is fixed in a nose of the vertical tail.

An elevator push-pull rod (pos. 12) is in the space between fin spar and rear wall.

A rudder (pos. 2) is hung up on the right fin shell with 3 suspended brackets of composite materials with bronze hubs (pos. 13). Shells of the rudder like ones of the fin are of three-layer construction (an external layer, foam 3 mm of thickness, an internal layer).

The wall of the rudder (pos. 14) is of three-layer construction, as well.

2.2.4 Horizontal tail

The horizontal tail (fig. 2.2.4_01) consists of a stabilizer (pos. 1) and an elevator (pos. 2 and pos. 3).

The stabilizer is made of composite materials and construction of its shell is similar to wings shell construction.

The elevator consists of two parts: left (pos. 3) and right (pos. 2). Control surfaces are partially balanced and made of composite materials. Each part of the elevator is fastened to the stabilizer with 3 pins.

The horizontal tail is attached onto the upper fin part (fig. 3.1.6_05).

The elevator is joined to control system automatically.

2.2.5 Landing gear

The landing gear consists of a retractable main wheel (fig. 2.2.5_01, pos. 5) and fixed tail wheel (fig. 2.2.2_01, pos. 6).

Landing gear main wheel type TOST 045100 with Simplex shoe brake (or BERINGER wheel with brake) is attached to metal girder (fig. 2.2.2_02, pos. 4) by the help of stands (fig. 2.2.5_01, pos. 6, pos. 7) and a shock absorber (fig. 2.2.5_01, pos. 8). The opening for the wheel is covered with a main wheel box (fig. 2.2.5_01, pos. 9). It protects the fuselage internal space from dust and dirt.

With main wheel up the landing gear door (fig. 2.2.5_02, pos. 2) is closed.

Tail wheel (fig. 3.4.8_01) 6x1 1/4” (or 200x50) of size is attached to fuselage shell with help of an axle (pos. 4), bolt (pos. 3) and washer (pos. 1).

2.3 Control systems

2.3.1 Ailerons and flaps control system

In order to ensure required rigidity and reduce unsteadiness, ailerons and flaps control system (fig. 2.3.1_01, fig. 2.3.1_02, fig. 2.3.1_03) is made of metal levers and rods. The ailerons are suspended, i.e. with changing flaps position ailerons deflect as well.

Movement from the control stick (pos.1) is transmitted by help of rods and intermediate bellcranks (pos. 4, 5) to coaxial ailerons-flaps shaft (pos. 7) which transfers this movement by help of an automatic joint to shaft in the wing (pos. 9). Further the bell crank (pos. 10) turns rotational movement to forward movement and transmits it to summary mechanism (pos. 11). From this mechanism the movement is transmitted by help of rods and differential bellcranks (pos. 12, 13, 14) to an aileron and deflects it in required direction. There are three ailerons. Aileron 2 is connected to control rod. The movement of aileron 2 is transmitted to aileron 1 and aileron 3 by the help of root and tip ribs of the ailerons. Option: if the outer wing have control rod (fig. 3.4.1_01), the aileron 3 moves independently.

The control handle of the flaps (pos. 2) is attached to the left side of the cockpit. Movement by help of rods and a bell crank (pos. 6) is transmitted onto coaxial shaft (pos. 7) and by help of an automatic joint is transmitted to flaps shaft (pos. 15) in the wing. The movement from the shaft is transmitted onto the flaps by help of the bell crank (pos. 16), summary unit (pos. 11) and differential bell cranks (pos. 12, 13, 14) deflects the ailerons.

The position of flaps is fixed by a plate at control handle in the cockpit.

Ailerons and flaps deflection angles are given in table 2-1.

Position of flaps	Hanging up angle ±1°		Ailerons deflection angle ±2°
	Flaps	Ailerons	
-1	-3°	-3°	-15° +22°
0	0°	0°	-16° +21°
+1	5°	5°	-20° +20°
+2	10°	10°	-22° +18°
+3	15°	14°	-24° +14°
L	20°	17°	-25° +10°

2.3.2 An elevator control system

The elevator control system (fig. 2.3.2_01) consists of metal rods and bellcranks. In order to ensure rigidity the main rod in the fuselage is supported by guide rollers (pos. 5).

Movement from the stick (pos. 1) by help of rods and intermediate bellcranks (pos. 2, 3, 4) is transmitted to the elevator and deflects it in required direction.

2.3.3 Trimmer control system

An adjustable trimmer for the elevator (fig. 2.3.3_01) takes over long-lasting loads on the control stick from the pilot and levels the sailplane in all ranges of airspeeds, C.G. positions and allowed flap angles.

The trimmer is mounted on the left side of the cockpit in a molded trimmer box (pos. 1). It consists of:

- a handle (pos. 2) with a hub welded, a fixing edge and a plate for springs,
- a bronze bar (pos. 3) the handle is moving along,
- a ring (pos. 4) screwed to the elevator's rod,
- a fixing plate with teeth (pos. 5) riveted on trimmer box side,
- two springs of the same tension *16x1.6 mm (pos. 6). The front spring connects the trimmer handle to a plate (pos. 7) on control stick shaft and the end spring – the handle with a ring (pos. 4) on the elevator's rod.

The trimmer has two inspection hatches (pos. 8 and 9) covered with a glass fiber lid (pos. 10) and fastened by screw M4 (pos. 11).

Max motion of the trimmer handle is 80 mm. As the handle moves it pulls or pushes the stick in the same direction.

The trimmer's handle has a drop-shaped tip (pos. 12) painted in green.

The trimmer forces (force measuring place on stick -hand holding center):

Trimmer position	Force on control stick, daN
forward	2.0 ÷ 2.5
backward	2.0 ÷ 2.5

2.3.4 Rudder control system

The rudder control system (fig. 2.3.4_01, fig. 2.3.4_02, fig. 2.3.4_03) is of combined type: steel cable from pedals to a bellcrank in the middle part of fuselage and steel rod ϕ16x1 mm, from the bellcrank till the rudder.

Pedals are adjustable according to a pilot height. The control handle of pedals is mounted on the right side of cockpit, on the ailerons control rod hood.

Pedals junction (pos. 1) is mounted on longitudinal pipe with holes for fixing drilled on it. Pedals cross pipe leans upon cockpit floor by textolite disks. The disks are fixed with wire pins at the ends of the cross pipe.

The control rod (pos. 8) in the cylinder-shaped fuselage is supported by two guides (pos. 9) molded on frames. An adjustable rod tip is connected to the rudder.

Rudder control cables (pos.4) are stretched by two turn buckles (pos.3) of non-standard construction.

Motion of the rudder is restricted by a bellcrank (pos.6) in the fuselage which is supported by two non-adjustable supports (pos. 7) mounted at the center section girder.

2.3.5 Airbrakes control system

The airbrakes control system (fig. 2.3.1_01, fig. 2.3.5_01, fig. 2.3.5_02) comprises the control handle (pos. 3), attached to the left side of a cockpit and rigid rods and bellcranks.

Movement from control handle by help of an intermediate rod is transmitted to the shaft (pos. 8) which through an automatic joint transmits the movement to the shaft (pos. 17) in the wing. The bellcrank (pos. 18) transfers rotational movement into longitudinal one and through intermediate rods transmits it to lifting equipment consisting of a bell crank (pos. 19) and shoulders (pos. 20, pos. 21).

The airbrakes are fixed in the closed position by a over-center lock which prohibits spontaneous opening of the interceptors. Sudden breaking angle of the lock is adjusted by fixing bolt (pos. 22).

The airbrakes control handle also controls the hydraulic brake of the main landing gear wheel (fig. 2.3.9_02).

2.3.6 Water ballast control system

The water ballast control system (fig. 2.3.6_01, fig. 2.3.6_02, fig. 2.3.6_03, fig. 2.3.6_04) consist of integrated tanks in inner wings, outer wings and fin. The water ballast system of inner and outer wings is controlled by the handle (pos. 1) located at the right side of the cockpit. The movement of the handle is transmitted by rod (pos. 2) to a shaft in a fuselage (pos. 3). The movement of the shaft in a fuselage is transmitted by automatic joints to the wing shafts (pos. 4). The shaft in the wing lifts an arm (pos. 8) with a plug (pos. 6) and opens the water tank. The plug is sealed (pos. 7)

The movement of shaft (pos. 4) is transmitted by rod (pos. 8) to lever (pos. 9) and carbon rod (pos. 10). Adjustable rod end push the valve (pos. 14) of the inner wing tank water tap. The tank of the inner wing is filled through the opening located at the end of the inner wing, the front side of the rib.

The fin water ballast system is controlled by the handle (pos. 16) located at the right side of cockpit.

The movement of the handle is transmitted by the carbon rod (pos. 17) to the water tap of the fin tank (pos. 18). The fin water ballast tank is filled through the opening (pos. 19) at the top of the fin

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<u>Removable water ballast tank in the fuselage (fig. 2.3.6_05).</u>

The removable water ballast tank (pos. 1) is fastened by bolts (pos. 8, 9). The control handle (pos. 2) is located at the right side of cockpit. The movement of the handle is transmitted by rod (pos. 3) to lever (pos. 4). The lever push the valve (pos. 6) of the tank water-tap (pos. 5) and opens the tank. The tank is filled through the opening (pos. 7) located at the upper side of the tank.

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The wing and fin water ballast tanks have drainage systems and openings for drainage.

Warning: Before filling up the water tanks check that the drainage openings are not plugged up.

2.3.7 Tow release control system

A towing hook (fig. 2.3.7_01, fig. 2.3.7_02, pos. 6) is arranged in central part of fuselage at the main frame and (or) in pilot cockpit at the bulkhead. If mounted, both towing hooks are operated is with one handle.

Movement from the control handle (pos. 1) on the left side of a cockpit by steel cable (pos. 2) is transmitted to the shoulder (pos. 5) which opens the hook. The cable looseness is eliminated by an adjustment junction which comprises the junction (pos. 3) and fixing nut (pos. 4).

2.3.8 Main landing gear control system

The landing gear control system (fig. 2.2.5_01) controls retracting and releasing of the main wheel. It consists of a control rod (pos. 1) on the right side of cockpit , an intermediate rod (pos. 2) and a bellcrank (pos. 3). A gas spring (pos. 4) makes it easier to retract the wheel. The control handle in the retracted and released positions is fixed in the slots of plate (pos. 5).

2.3.9 Landing gear brake control system

The main wheel brake is of mechanical type, controlled by a handle (fig. 2.3.9_01, pos. 1) arranged on the control stick. Movement from the handle to the brake shoulder (pos. 5) is transmitted by the steel cable (pos.2). In order to eliminate loosening of the cable the adjustment junction is mounted on the cockpit floor under the pilot seat. The junction consists of cable support (pos. 3) and fixing nut (pos. 4).

The hydraulic brake (manufacturer: BERINGER) (**option**) is controlled by the air-brakes control handle (pos. 1) (fig. 2.3.9_02). The movement of air-brakes shaft (pos. 2) is transmitted to the master cylinder (pos. 4) by control rod (pos. 3). The master cylinder is connected to brake fluid reservoir. The brake fluid is transmitted by hoses (pos. 7) through the relief valve (pos. 6) to the piston caliper (pos. 5). To control the brake cylinder, only a half of the air-brakes control handle's travel is used.

To adjust the travel of the master cylinder, a threaded plate with slot (pos. 8) is used. The plate is fixed by nut (pos. 9).

The brake fluid DOT4 is used in the brake system. To fill the brake system recommendations of the manufacturer shall be used (www.beringer.fr).

2.4 Equipment and systems

2.4.1 Pitot and static system

Pitot and static system of the sailplane is shown in fig. 2.4.1_01. The system consists of:

1. Static pressure receiving ports (pos. 9) which are located at a two sections on a fuselage skin from the inside (distances from sailplane nose to the ports is given at fig. 2.4.1_01). Static pressure receivers consists of a glass fiber tanks with air inlet as a holes drilled through the fuselage skin.
   There are static pressure lines S1 and S2. The air gets from three receivers located on the fuselage skin every 120°.

Warning: During a sailplane preflight inspection the holes of static pressure receiver on the fuselage sides shall be checked for cleanliness.

2. Pitot (pos. 10) is a steel pipe mounted in the fuselage nose and right against the air flow. This line is marked by the letter D.
3. Compensated pressure receiver (pos. 11) is a special Nix pipe mounted in fin. This line is marked by the letter N.
4. Flexible polyvinylchloride pipes of different colors transmit air pressure from receivers to corresponding measuring instruments on the sailplane instrument panel. Each separate pressure line has pipes of different colors:
   - red – for total pressure line (D),
   - yellow – for static pressure lines (S1 and S2),

- green – for compensated pressure line (N).

2.4.2 Flight and navigation instruments

These flight and navigation instruments as option are mounted in the sailplane:

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OPTION A	OPTION B
1) air-speed indicator LUN-1106, scale 50-300 km/h, with range markings	1) air-speed indicator WINTER 6 FMS 421
2) altimeter BD-10K or VB-10PS with altitude corrector	2) altimeter WINTER 4 FGH 20
3) mechanical variometer LUN-1141	3) variometer BOHLI
4) side-slip indicator LUN-1211	4) electronic variometer FILSER LX5000 or FILSER LX7000
5) compass KI-13	5) fly computer display FILSER LX5000 or FILSER LX7000
	6) side slip indicator LUN 1211
	7) radio Becker AR 4201 or Filser ATR 600

LAK-17BT:

OPTION A	OPTION B
1) air-speed indicator WINTER 6 FMS 421, with range markings	1) air-speed indicator WINTER 6 FMS 423, with range markings
2) altimeter WINTER 4 FGH 10	2) altimeter WINTER 4 HM 6
3) mechanical variometer WINTER 5 STV-5	3) variometer WINTER 5 STVM 5-2
4) Electronic variometer Filser LX 160	4) electronic variometer FILSER LX5000
5) compass KI-13A	5) fly computer display FILSER LX5000
6) ILEC motor control unit MCU LAK17AT	6) side slip indicator LUN 1216
7) Radio ATR 600	7) radio Dittel FSG-2T
	8) ILEC motor control unit MCU LAK17AT
	9) Transponder Filser TRT 600

All the instruments, except for the compass KI-13A, are mounted in the instrument panel. The compass is attached to the canopy glass or on the instrument panel.

There is room left in the instrument panel for extra instruments (fig. 2.4.2_01).

It is possible to use other standard flight and navigation instruments and change instruments positions on the instrument panel (fig.2.4.2_01). These instruments must correspond with national regulations. Max instrument panel weight in flight - 4.1 kg.

2.4.3 Motor control unit MCU LAK-17BT

Motor control unit MCU LAK-17BT, manufactured by Industrie und Luftfahrtelektronik GmbH, Germany, controls operation of the power-plant. The detains of the instrument are given below.

MCU Operation

The MCU was designed to improve safety of engine use. This important MCU function can only obtained when MCU is always (continuous) switched on when operating the engine. Any other use is outside of manufacture agreed MCU operation mode.

If MCU is switched off during engine run, all safety in engine operation is lost.

To have a sure detection for use outside agreed operation, MCU stores error and operation information.

Caution: ***Keep MCU power supply always switched on during engine run! Do not switch to other battery during engine run (like MCU power supply off / power supply on)!***
Keep extract switch in top position during engine run!
If MCU inadvertently was switched off during engine run, stop engine first (ignition off), switch on MCU again and after start engine again!
Squeeze danger - be careful when retracting or extracting engine on ground! It is extremely dangerous to operate engine on ground (e.g. for tests)!

Disclaimer:

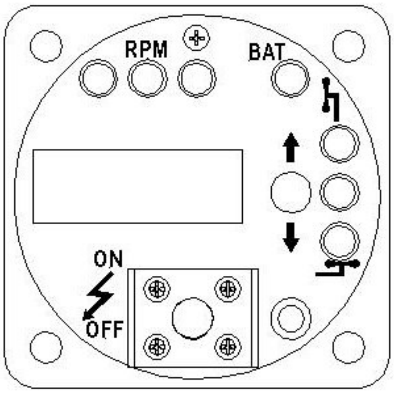
ILEC is not responsible for accidents and damages caused by MCU during engine run outside the as agreed operation mode.

Abbreviations

CHT	Cylinder Head Temperature
EEPROM	Electrically Erasable Programmable Read Only Memory
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Motor Control Unit
RPM	Rotations Per Minute

MCU Description

The MCU for LAK17BT sailplane has on its front side, seven LED showing the most important states of the engine during all operation time. Additional a LCD display gives more detailed information about the same states and other values. On the front side are also switches for ignition on/off, engine ex-/retract and a button for display choice. On the back side are two different connectors placed for signal/power interfacing and ignition.



Power up sequence

After powering up, MCU activates for two seconds all LED outputs, the buzzer output and the "88888888" display content. This procedure is for testing all indicators. The pilot should have a look during power up at MCU to recognize if all indicators work well.

LCD Display Description

The LCD display shows different information about engine, fuel tank, battery state and also advice during wrong handling. To change between different display pages simply press the white display button. Each short press on the button changes to the next display page. After last page, the first page comes again. When stopping on another page than the main page after a certain time the display switches automatically back to the main page. Also automatic switching to the most important display value is performed when engine parameters over or under run.

Pos.	Description	Run display example	Engine off/cold	Error
1	Rotations per minute (RPM) -main page	RPM 5500	RPM-----	RPM-----
2	Cylinder head temperature (CHT)	CHT230°C	CHT-----	CHT275°C (blinking)
3	Fuel tank level	FUEL 5L	FUEL 5L	FUEL ---
4	Battery voltage	BAT12,5V	BAT12,5V	BAT11,4V (blinking)
5	Engine hours	1,23h	1,23h	-
6	Fuel type correction		[100]	-
7	Fuel type calibration		Calibr.? (only retracted)	ERROR (after calibration)

The following handling errors are displayed automatically:

Display	Required handling to go on
IGNI.OFF	Switch ignition off
IGNI.ON	Switch ignition on
PROPSTOP	Change state of propeller stop
EXTRACT	Extract engine

The following system errors are displayed automatically:

Display	Reason	Possible Error reason
SWITCH R	Time overflow retract procedure	Limit switch retracted, wiring, spindle relays, spindle engine, fuse, battery voltage….
SWITCH E	Time overflow extract procedure	Limit switch extracted, wiring, spindle relays, spindle engine, fuse, battery voltage….
SWITCH O	Time overflow door open procedure	Limit switch door opened, wiring, door relays, door engine, fuse, battery voltage….
SWITCH C	Time overflow door close procedure	Limit switch door closed, wiring, door relays, door engine, fuse, battery voltage….

In retracted engine position the Display shows the following moving text:
ILEC MCU LAK17BT xxxxx Hy.yy Sz.zz

Explanation:
xxxxx: Serial number
Hy.yy: Hardware version
Sz.zz: Software version

Buzzer

The buzzer gives additional acoustic information to the pilot during handling errors, dangerous engine states or malfunction. After buzzer starting, reason is displayed on the LCD display!

Handling errors produce a pulsed buzzer tone.

High RPM, high CHT, low fuel level, low battery voltage and malfunction produce a continuous buzzer tone.

A continuous buzzer tone of low fuel level and low battery voltage can be switched off for a time of four minutes by pressing the display button, while a buzzer tone caused by High RPM and high CHT cannot be switched off. After four minutes the buzzer signal switches on again (when the alarm is still active). It is possible to switch it off (acknowledge) again by the display button.

All buzzer alarms are switched off, when engine is fully retracted in fuselage!

Reason	Buzzer	Display	LED	Remark
4500<RPM<5800	-	RPM	Green RPM on	
5800<=RPM<6500 (<5min)	-	RPM	Yellow RPM on	
5800<=RPM<6500 (>=5min)	continuous	RPM (blinking)	Yellow RPM blinking	
RPM>=6500	continuous	RPM (blinking)	Red RPM blinking	**MCU does not limit max. RPM!**
CHT>=275°C	continuous	CHT (blinking)	-	
Battery voltage<=11.5V	Continuous (reset able)	BAT (blinking)	Red BAT blinking	Acknowledge by white display button (4 min.)
Fuel<=2L	Continuous (reset able)	FUEL (blinking)	-	Acknowledge by white display button (4 min.)
Time overflow extract procedure	Continuous (reset able)	SWITCH E	-	Acknowledge by display button or extract/retract switch in center position
Time overflow retract procedure	Continuous (reset able)	SWITCH R	-	Acknowledge by display button or extract/retract switch in center position
Time overflow open door procedure	Continuous (reset able)	SWITCH O	-	Acknowledge by display button or extract/retract switch in center position
Time overflow close door procedure	Continuous (reset able)	SWITCH C	-	Acknowledge by display button or extract/retract switch in center position
Push retract switch while ignition is on.	Pulsed	IGNI.OFF	RED handling blinking	
Increasing RPM while ignition is off.	Pulsed	IGNI.ON	RED handling blinking	

Reason	Buzzer	Display	LED	Remark
Ignition is on and propeller is blocked by propeller stop.	Pulsed	PROPSTOP	RED handling blinking	
Push retract switch while ignition is off and propeller is unblocked by propeller stop.	Pulsed	PROPSTOP	RED handling blinking	
Push retract switch while propeller is not in retract position	Pulsed	PROP.POS	RED handling blinking	
Switch ignition on while engine is not fully extracted	Pulsed	EXTRACT	RED handling blinking	

Engine extract / retract

To extract the engine the switch on the right side of the LCD display has to be switched to top. First the door opens till the limit switch for opened door activates. After this the engine extracts till the limit switch for engine is activated and then the door closes back.

To retract the engine the same switch has to be switched down. First the door opens before engine retracts. Door opening is finished when limit switch of the door is activated. Engine retract stops when

the limit switch in full retract position is activated. After this the door closes till the limit switch of the closed door activates. Is the engine partly extracted, always the door opens before the engine extracts/retracts.

<u>**Caution:**</u> ***It is strongly recommended to let the re-/extract switch during engine run in top position after extract procedure!***

All tract operation stops when switching the ex-/retract switch to centered position.

Ignition switch

The manual ignition switch is placed under the LCD display. This ignition switch works independent from MCU electronic.

When switched to top – ignition is <u>on</u>.

In lower position - ignition is switched <u>off</u>.

LED

Above the LCD display three LED sign three RPM ranges.
Left green LED signs RPM of 4500 till 5800.
Middle yellow LED signs RPM of 5800 till 6500.
Right red LED (blinking) signs RPM above 6500.
On the right side of the RPM LED is the low battery LED which is blinking at battery voltage lower than 11,5V.
Extracted position green LED
Handling error red LED
Retracted position green LED

Engine hours

Engine hours counted at RPM higher than 2000 and stored in non-volatile EEPROM.

Cylinder head temperature

The MCU is calibrated for use with the hardened CHT sensor from Alfano. This sensor can be ordered via internet at http://www.alfano.be/englais/default.htm Part No: A- 211

The CHT sensor is shipped with a TNC connector which shouldn't be removed. The original cable length of the sensor is too short for connection to ILEC MCU, so it has to be connected via adapter.

Fuel tank sensor

The fuel tank sensor measures fuel level by capacitative method in a tube. Different fuel level results in different output frequency.

Remark:

Separate fuel sensor lines in wiring harness from ignition lines and power lines!

Calibration of fuel type

Two stroke engines use a mix of oil and gasoline. The share of oil but also gasoline of different company influences the fuel level sensor indications. With an easy procedure in MCU this trouble could be solved.

When you are sure that the fuel tank is total fulfilled. Choose the calibration page (press display button 6 times from RPM display) on MCU display. Press the display button for about five seconds. This procedure generates a new fuel type correction factor, which is displayed after five seconds.

Is the new correction factor outside 71% and 129%, an error message is displayed. This error must be acknowledged by pressing the display button. In this case old correction factor is restored.

Caution: ***It is absolutely dangerous to do a calibration with partly filled fuel tank, because MCU will measure and display wrong fuel quantity!***

The calibration procedure is only possible when engine is fully retracted!
Fuel type calibration should be made when using different gasoline and oil.
In best case do it after every filling fuel tank!

RPM sensor

The MCU is calibrated for use with INSOR IPCT1214 sensor. This sensor can be ordered via internet at: http://www.schoenbuch-electronic.de

This sensor is well suited for sensing the magnet in the flying wheel (one pulse per rotation).

The radial sensing distance is 2mm to 6mm to flying wheel. The sensing can be easily checked by the LED on the backside of the sensor. The output is on when the LED is on. For connection to MCU lengthen the cable you need for your glider.

Remark:

To reduce electrical interference, avoid mounting the RPM sensor in next distance to ignition coils!

Separate RPM sensor lines in wiring harness from ignition lines and power lines!

Technical Data

Voltage range	7 V to 15 V
Power consumption	40mA at 12V (without external sensors, one limit switch and LED active)
Temperature range operational	-20°C to +60°C
Max. Output current	2A
Current at each switch input	10mA
Fuse	2A built in (self restoring)

Note:
All switch inputs are switched in active state to GND. The propeller stop switch is active when propeller is <u>not</u> blocked for running. All outputs drive +12V in active state.

MCU Ignition Connector:

right	Ignition line 2
center	Ignition GND
left	Ignition line 1

Connector Fuel Tank Sensor:

blue	GND
pink	+5V
yellow	Fuel signal

Connections Buzzer:

black	GND
red	+12V

Connections RPM Sensor:

blue	GND
brown	+12V
black	RPM signal

2.4.4 Electric and radio equipment

The sailplane electric system is shown at fig. 2.4.4_02 and fig.2.4.4_05 (option). The sailplane may be equipped with other instruments (GPS or board computer) and an existing scheme enables to connect them easy. Electric wiring of type AWG is installed along the left sailplane side till sailplane forepart and further to the lift-able instrument panel.

In order to increase sailplane safety a possibility is foreseen to replace the accumulator feeding the radio station by one which feeds instruments by help of a switch.

Accumulator batteries of two types are used in sailplane. One of them consisting of three accumulators NP 2.1-12 is fitted in a special container. The container is located in the fin (fig. 2.2.3_01). Other batteries NP 7-12 are located in the landing gear box (fig.2.4.4_03).

The accumulators NP 2.1-12 and NP 7-12 are dry and hermetized, they don’t release any toxic and explosive gas. During recharging no dangerous gas appears. The accumulators shall be recharged outside the sailplane. The possible places to mount aerials for GPS, transponders, ELT are indicated at fig 2.4.4_04.

Warning: for the glider with power-plant installed and pilot weight less than 100 kg fin battery has to be removed. Only the baggage compartment batteries can be installed.

Note: if pilot weight is 100…110 kg (220,5…242 lbs), it is possible installing battery in the fin. This moves c.g. of the glider back by 32…34 mm. Re-weighing or re-calculation of the c.g. position is mandatory in this case.

2.4.5 Canopy ventilation system

The canopy ventilation system (fig. 2.4.5_01) creates the required micro climate for a pilot and optimal working conditions in the sailplane cockpit. Air enters through an opening (pos. 1) in the sailplane nose and flows through channels (pos. 2) on the right and left fuselage sides into the cockpit where it blows over the front part of canopy thus protecting it from covering with dew. The amount of air is valve-controlled, the valve (pos. 3) is located in the ventilation opening. The valve is handle-controlled, the handle (pos. 4) is attached to the instrument panel. The handle can be fixed in any position.

2.4.6 Cockpit canopy and its emergency jettison system

The cockpit canopy and its emergency jettison system is shown at fig. 2.4.6_01, fig. 2.4.6_02, fig. 2.4.6_03.

The cockpit canopy is fastened to a holder (pos. 8) by help of fixator (pos. 2).

The fixator is controlled by the cockpit canopy emergency jettison handle (pos. 1). It is located in the upper part of the instrument block.

The cockpit canopy is fixed in position ‘closed’ by two handles (pos. 5) located on the left and right sides of canopy frame.

The cockpit canopy is ejected in an emergency by one pull up movement of the emergency jettison handle (pos. 1). The fixator (pos. 2) sets free the cockpit canopy spring. The spring (pos. 3) throws the front part of the canopy upwards. The cockpit canopy under influence of the air stream turns and touches the support (pos. 9.1) with its end part and detaches from the fuselage finally. The pin (pos. 9.2) does not allow the canopy to slide aside.

Warning: The handle (Fig.2.4.6_01, pos.4) must be in the working position in flight.

2.4.7 Cockpit equipment

The cockpit equipment is:

- safety belts,
- a pilot seat,
- a pocket of fabric (on the right side) for small things, documents.

The safety belts (4 point static harness restrain system – Carl F. Schroth GmbH. Shoulder belts) are attached to a supporting girder of a pilot shoulders width at the central fuselage part. The lap belts are attached to the anchor points located on a armrest on the left and right sides.

The pilot seat is made of glass fiber reinforced plastic with cuttings for a head supporter, a pipe glued for pulling through of an adjustment cable and a pipe for fixing of the seat in sockets which are in hoods of cockpit rods.

The back supporter of the seat is may be moved “forward-backward” on the ground and its inclination angle can be changed in flight by help of a fixable adjustment cable.

There are three positions at the upper part of a seat for adjustment of the head supporter according to pilot height.

Warning:- ***seat back must be properly fixed!***

A small pocket of the same decorative material as cockpit sides is on the right side to keep small things.

2.4.8 Fastening of baggage

Baggage is fastened in the central fuselage part on a partition wall above the landing gear recess and is fixed by rubber absorbers. Max allowed baggage weight is 7 kg.

2.5 Power plant (LAK-17BT)

2.5.1 General layout

General layout of the power-plant system can be found at fig.2.5.1_01. Detailed description of the power-plant systems can be found below.

2.5.2 Power-plant extension/retraction system

Power-plant extension/retraction system is shown at fig.2.5.2_01. Engine retracts in to the power-plant bay in the fuselage and is attached to the engine frame box (pos.12). Engine (pos.1) is mounted on the engine frame (pos.3) which pivots on a mounts (pos.4) and is actuated by electrical spindle mechanism (pos.8) throughout the system of push-rods (pos.7) and shaft (pos.5). To assist electrical mechanism, gas spring (pos.9) is installed in a retraction system. To support engine from moving forward, support cable (pos.11) is installed.

2.5.3 Fuel system

Fuel system is shown at fig.2.5.3_01. It consists of the fuel tank (pos.1) located in a central part of the fuselage. Fuel tank has 7.5 ltr capacity. Fuel level sensor (pos.7) installed in it. Fuel is filled through the fast connection (pos.9) located on a right side of the power-plant box. Fuel tank breather (pos.12) is provided. Breather exits in to the main wheel well. Fuel drain (pos. 6) also exits in to the main wheel well and can be reached when landing gear is extended.

Engine fuel feeding line consists of: fuel strainer (pos.5) located in a fuel tank; fuel shut-off valve (pos. 4) located on a right hand side of the fuselage shell in a power-plant box and is controlled from the cockpit by the handle (pos. 8); fuel filter (pos.10); electrical fuel pump (pos. 2), vacuum fuel pump (pos. 3) located on the engine. Fuel strainer (pos. 5) can be removed for cleaning unscrewing it from a fuel tank.

The optional fuel tank may be installed (fig. 2.5.3_02). Capacity of the additional tank is 4.7 ltr. The tank (pos. 2) is connected to the main fuel tank (pos. 1) by the hoses through couplings (pos. 3, 4, 7). Both tanks are filled through the fast connection (pos. 8). The additional tank is attached to the main wheel box by the fastening belt (pos. 9)

To fill the fuel, special filling system with electrical fuel pump is provided.

2.5.4 Propeller brake

Propeller brake scheme is provided at fig. 2.5.4_01. The brake is mounted on an engine frame (pos. 1). The brake is actuated by the cable (pos. 3) with the handle (pos. 9) located on a right side of the cockpit wall. Brake handle and it’s functions are identified with the placard. Brake is fixed in “on” and “off” position by locking handle in the guiding palate (pos. 8). On an engine frame, next to the propeller brake limit switch is located which is pressed “on” when propeller brake is on and free when propeller brake is off. This limit switch gives signal to the MCU which is controlling power-plant extension/retraction process.

2.5.5 Controls of cylinders de-compressing valves

Cylinders de-compressing valves controls are shown at fig.2.5.5_01. De-compressors are controlled by the handle (pos. 1) located forward of control stick. The handle and it's functions are identified with the placard. Actuating cable (pos. 4) runs in a bowden (pos. 6) up to the engine and actuates arm (pos. 3) which presses on a plate (pos. 8) which consequently presses and opens the de-compression valves. Pull on a handle (pos. 1) to "open" and release to "close".

2.5.6 Power-plant bay door

Power-plant bay door and their actuating system is shown at fig.2.5.6_01, fig. 2.5.6_02, fig. 2.5.6_03. Door consist of two main doors and two small forward doors. Door is actuated by the electrical spindle mechanism (pos. 19) which is controlled by MCU. Spindle mechanism has internal limit switches which should be adjusted so that spindle mechanism is switched off when door is closed or open. Electric spindle mechanism actuates system of pushrods and levers which open and closes the door.

The push-rods (pos. 2) has springs inside for allowing some tensioning in a system and so guarantying proper closing of the door with pretension.

2.5.7 Engine support cable

Construction of engine support cable is given at fig.2.5.7_01. One end of the engine support cable (pos. 3) is attached to the engine through the turn-buckle (pos. 12). The other end in extended position is bottoming at the cable guiding sleeve (pos. 1). When engine is retracted cable is pulled in to the fuselage by rubber bungee (pos. 8) which is pretension and guided by the guide (pos. 2). Guide is hang on a mount (pos. 4) at the rear and fixed with the bolt (pos. 7).

2.6 Placards and marking of controls

Each cockpit control (with exception of the primary flight controls) is marked (fig. 2.6_01, fig. 2.6_02, fig. 2.6_03, fig. 2.6_04, fig. 2.6_05, fig. 2.6_06) according to their purpose and operation mode.

A tables of limitations are shown at fig. 2.6_03, fig. 2.6_04, fig. 2.6_05, fig. 2.6_06.

Layout of placards inside the sailplane is shown in fig. 2.6_01.

2.7 Data for rigging

2.7.1 Allowed clearances in connections of aggregates

Allowed clearances for connections of inner wing and fuselage, inner wing and outer wing, wing spars are given in fig. 2.7.1_01 fig. 2.7.1_02, fig. 2.7.1_03, fig. 2.7.1_04.

Max allowed gaps in connections of aggregates between openings and diameters of pins are given in table 2-2.

Table 2-2

Connection	Connected parts	Max allowed gap (mm)
Wing - fuselage	Spars connection pin (pos. 1)-spar hub (pos. 2)	0.32
Wing - fuselage	Fuselage lateral pin (pos. 3) - wing hub (pos. 4)	0.27
Stabilizer – fuselage	Fin pin (pos. 5) – stabilizer hub (pos. 6)	0.055
Stabilizer – fuselage	Stabilizer fixing pin (pos. 7) – fin hub (pos. 8)	0.055
Wing – wing tip	Wing lateral pin (pos. 10) – wing tip hubs (pos. 9)	0.046
Wing – wing tip	Clearance of opening of wing tip holder (pos. 11)	0.015

2.7.2 Allowed clearances in control systems

Clearances for the stick are defined according to schemes a) and b) of fig. 2-1 by measuring motion of the stick upper part. The elevator, ailerons and flaps shall be fixed in neutral position.

Clearances for ailerons, flaps and the elevator are defined according to scheme c) of fig. 2-1 by measuring motions of their rear edges (the root section of corresponding control). The control stick and flap control handle shall be fixed in neutral position.

Allowed motions are shown in table 2-3.

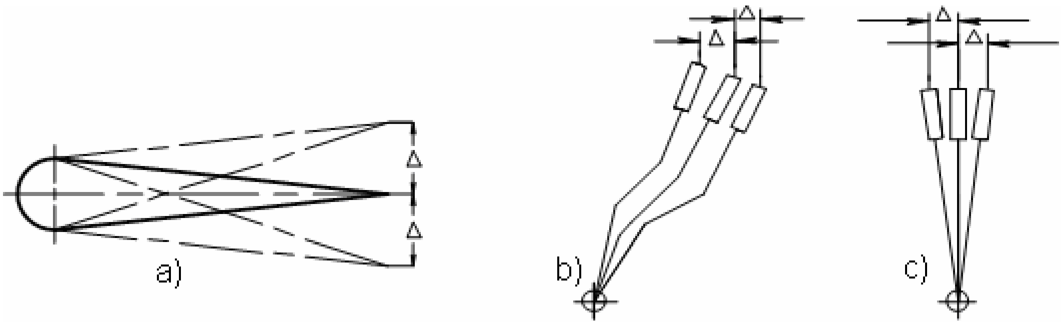


Fig. 2-1. Free play setting

Table 2-3

Pos. No	Measured motion	Motion Δ (mm) less than
1	Stick, forward - backward	2.0
2	Stick, left – right	2.0
3	Edge of left aileron	2.0
4	Edge of right aileron	2.0
5	Edge of left flap	2.0
6	Edge of right flap	2.0
7	Edge of left elevator	2.0
8	Edge of right elevator	2.0
9	Edge of rudder	1.5

2.7.3 Allowed forces in control systems

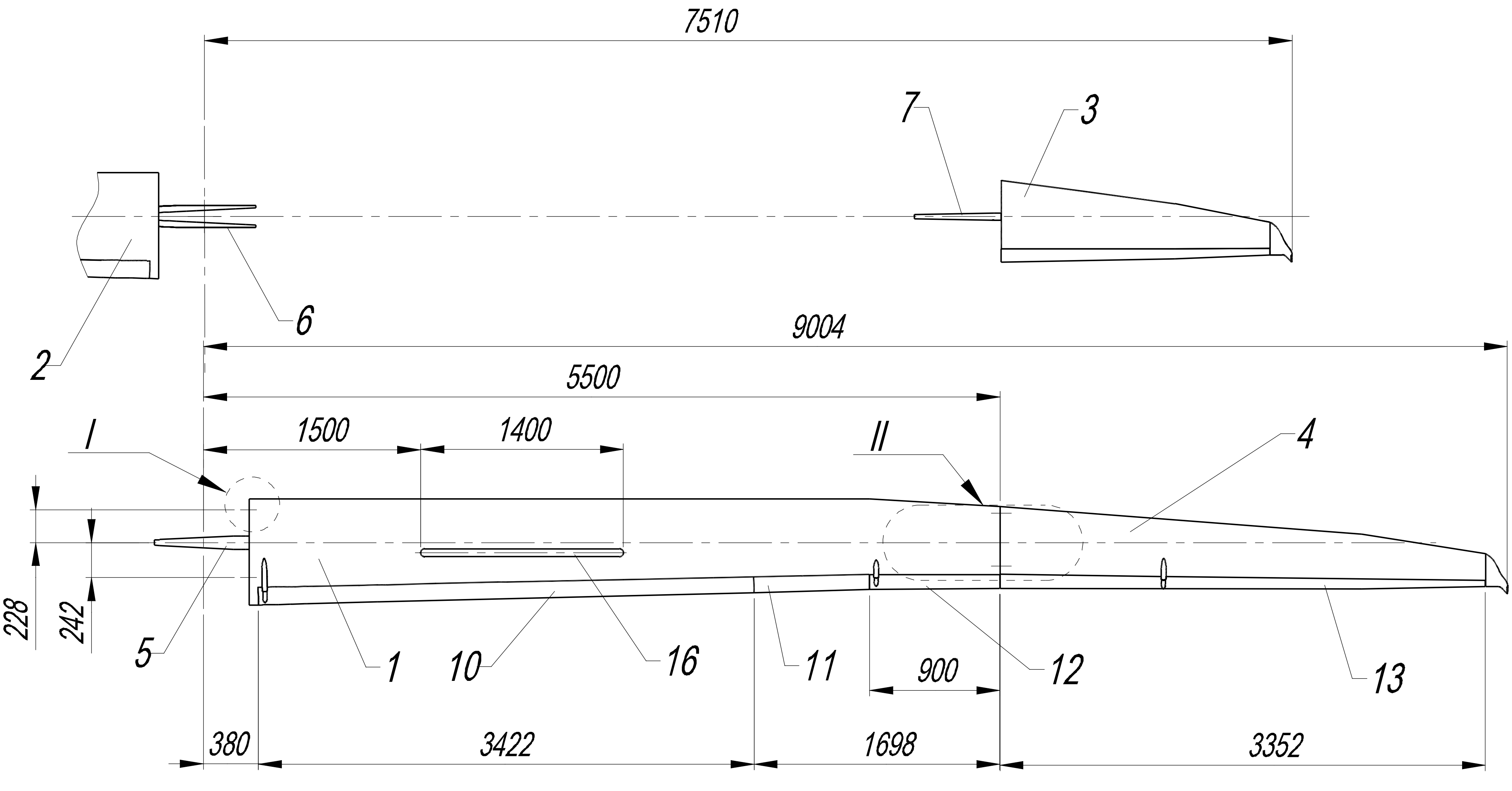
Allowed forces in control systems are given in table 2-4. Forces are measured by checked dynamometers.

Note: Force of an elevator control system is measured with trimmer control handle in neutral position.

Table 2-4

Control system	Force measuring place	Force, kg
Elevator	On stick – hand holding center	max 0.3
Ailerons	On stick – hand holding center	max 0.5
Flaps – flaps upward	On flaps control handle - hand holding center	max 1.0
Flaps – flaps downward	On flaps control handle - hand holding center	max 1.0
Rudder	On pedal upper cross pipe center	max 2.0
Airbrakes - airbrakes opening	On airbrakes control handle – hand holding center	max 15
Airbrakes - airbrakes closing	On airbrakes control handle – hand holding center	max 18
Towing hook – without loading	On towing hook opening handle	max 10
Cockpit canopy emergency jettison	On canopy emergency jettison handle – hand holding center	min 5 max 13
Landing gear – releasing	On gear control handle - hand holding center	max 20
Landing gear – retracting	On gear control handle - hand holding center	max 14

2.8 Illustrations



1. Right inner wing
2. Left inner wing
3. Right outer wing with winglet 15 m
4. Right outer wing with winglet 18 m
5. Right inner wing spar
6. Left inner wing spar
7. Right outer wing spar
8. Wing skin upper
9. Wing skin lower
10. Flap
11. Aileron No. 1
12. Aileron No. 2
13. Aileron of outer wing
14. Lateral pin
15. Adjustable hub
16. Air brake

Fig. 2.2.1_01. Wing

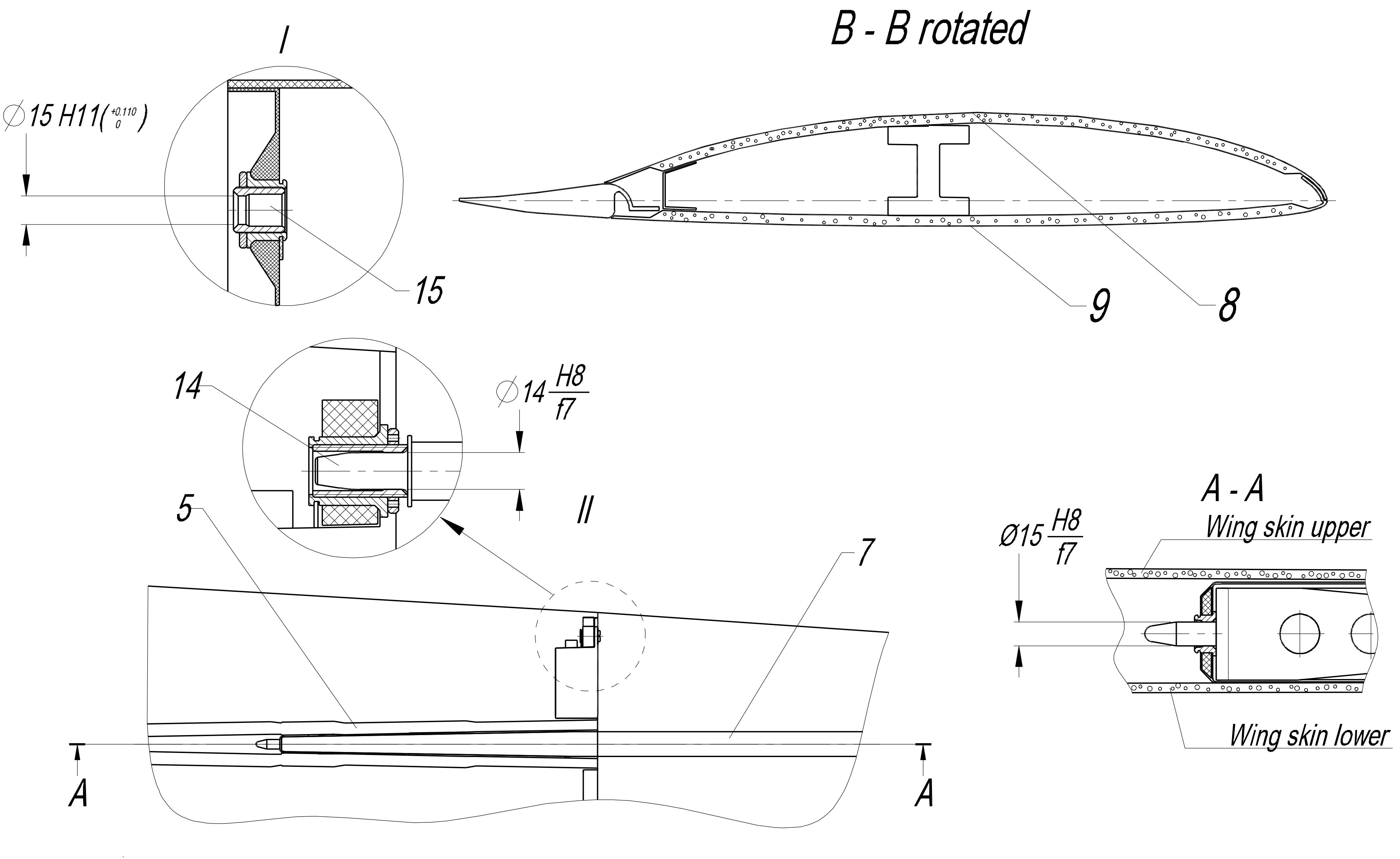
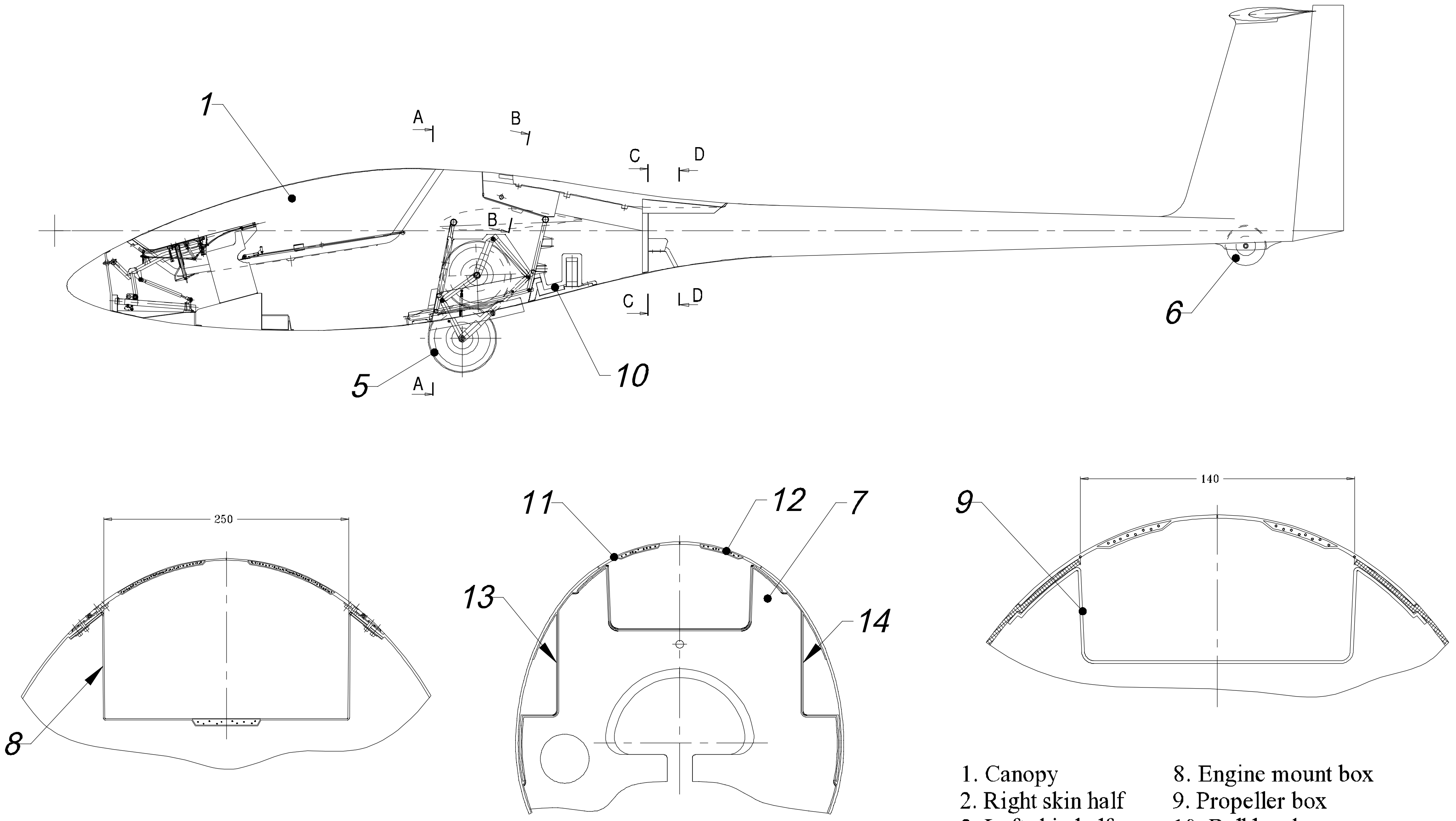


Fig. 2.2.1_02. Wing



1. Canopy
2. Right skin half
3. Left skin half
4. Girder structure
5. Main gear wheel
6. Tail wheel
7. Bulkhead
8. Engine mount box
9. Propeller box
10. Bulkhead
11. Door right
12 .Door left
13. Beam right
14. Beam left

Fig. 2.2.2_01. Fuselage

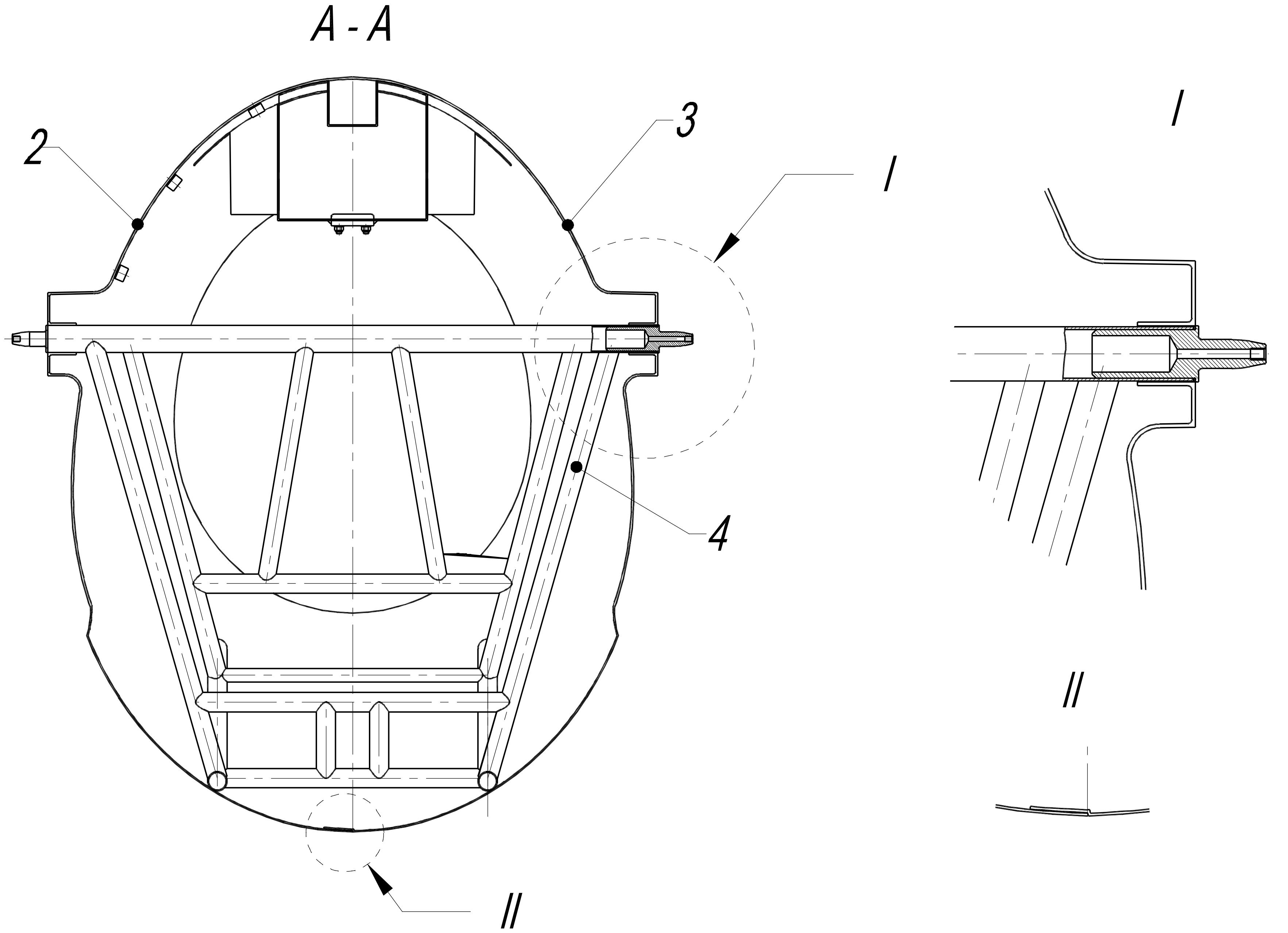
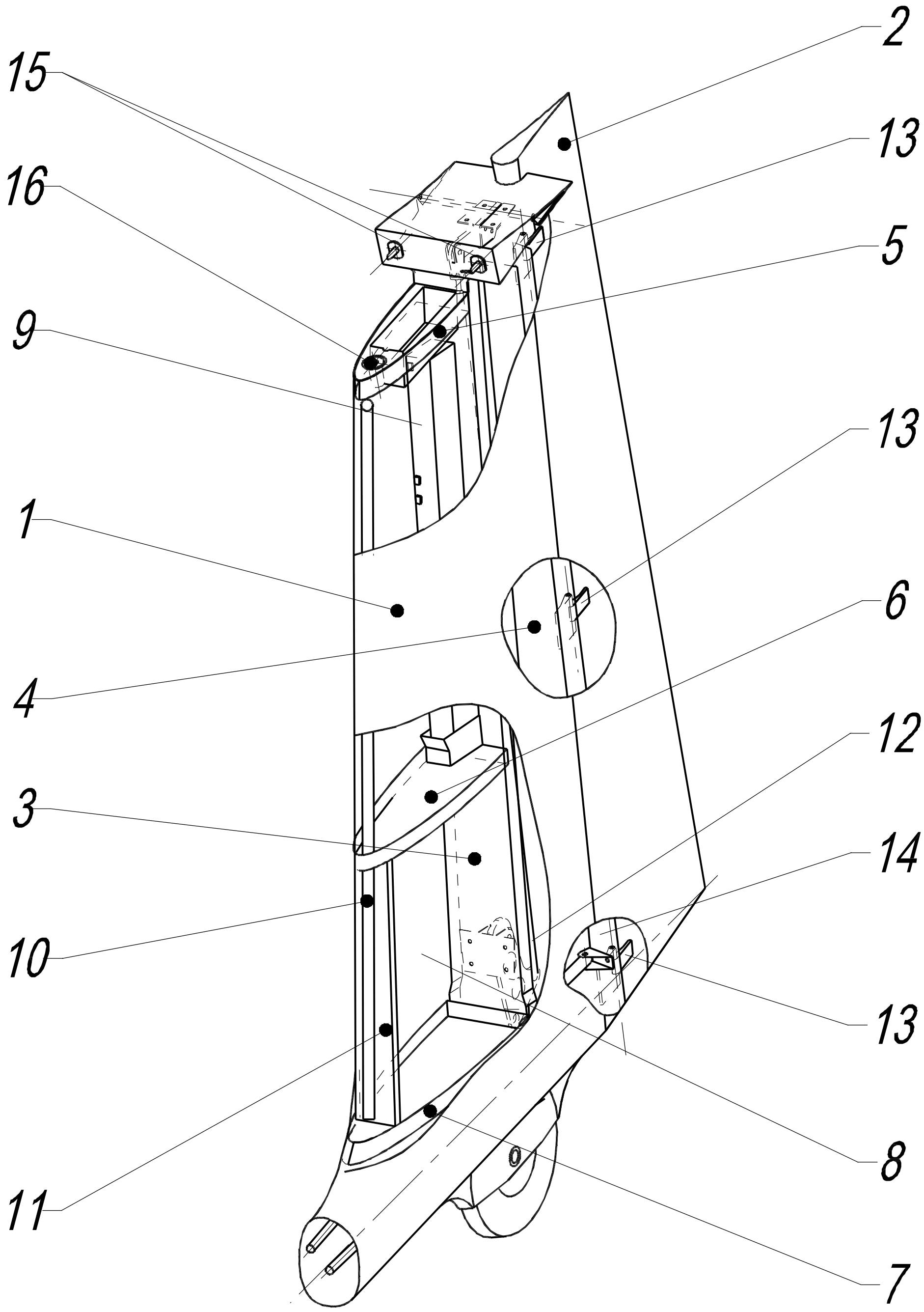
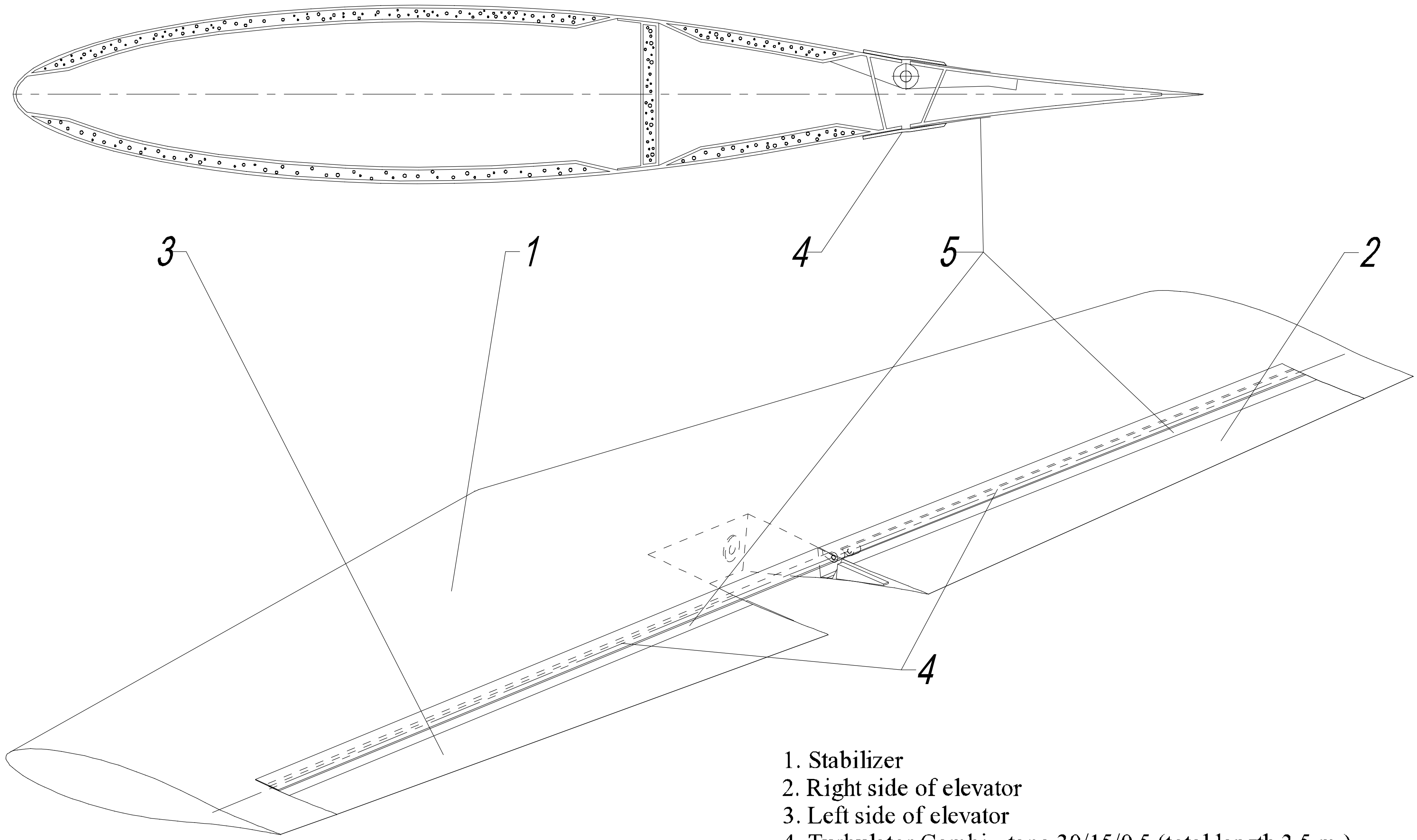


Fig. 2.2.2_02. Fuselage



1. Fin
2. Rudder
3. Spar of fin
4. Rear wall
5. Upper rib
6. Middle rib
7. Lower rib
8. Water ballast tank
9. Battery container
10. Radio aerial
11. Wall
12. Elevator control rod
13. Rudder hinges
14. Rudder wall
15. Connection pins of stabilizer
16. Stabilizer fixing hub

Fig. 2.2.3_01. Vertical plane



1. Stabilizer
2. Right side of elevator
3. Left side of elevator
4. Turbulator Combi - tape 30/15/0.5 (total length 3.5 m.)
5. Teflon tape 30, adhesive (total length 3.5 m.)

Fig. 2.2.4_01. Horizontal plane

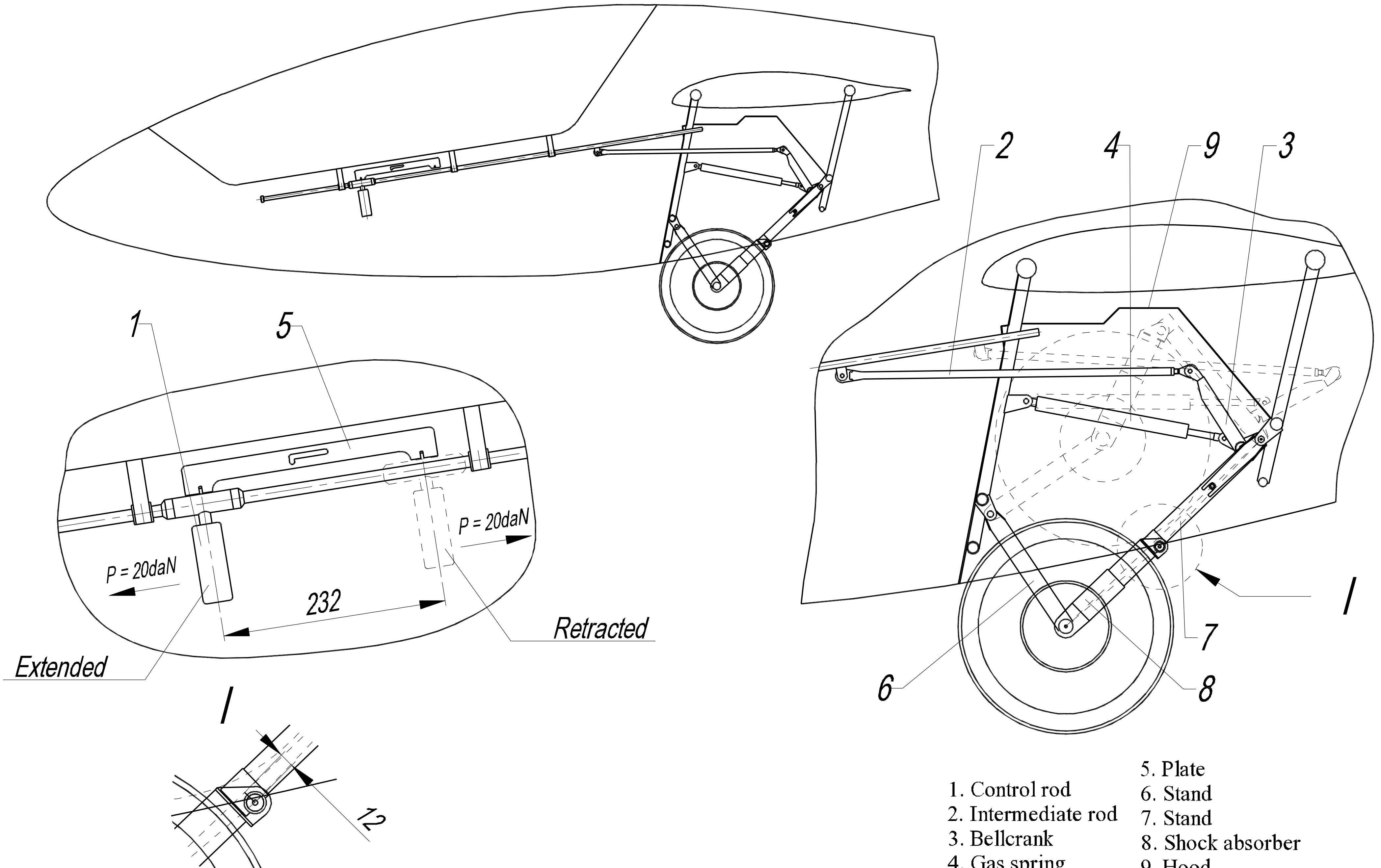
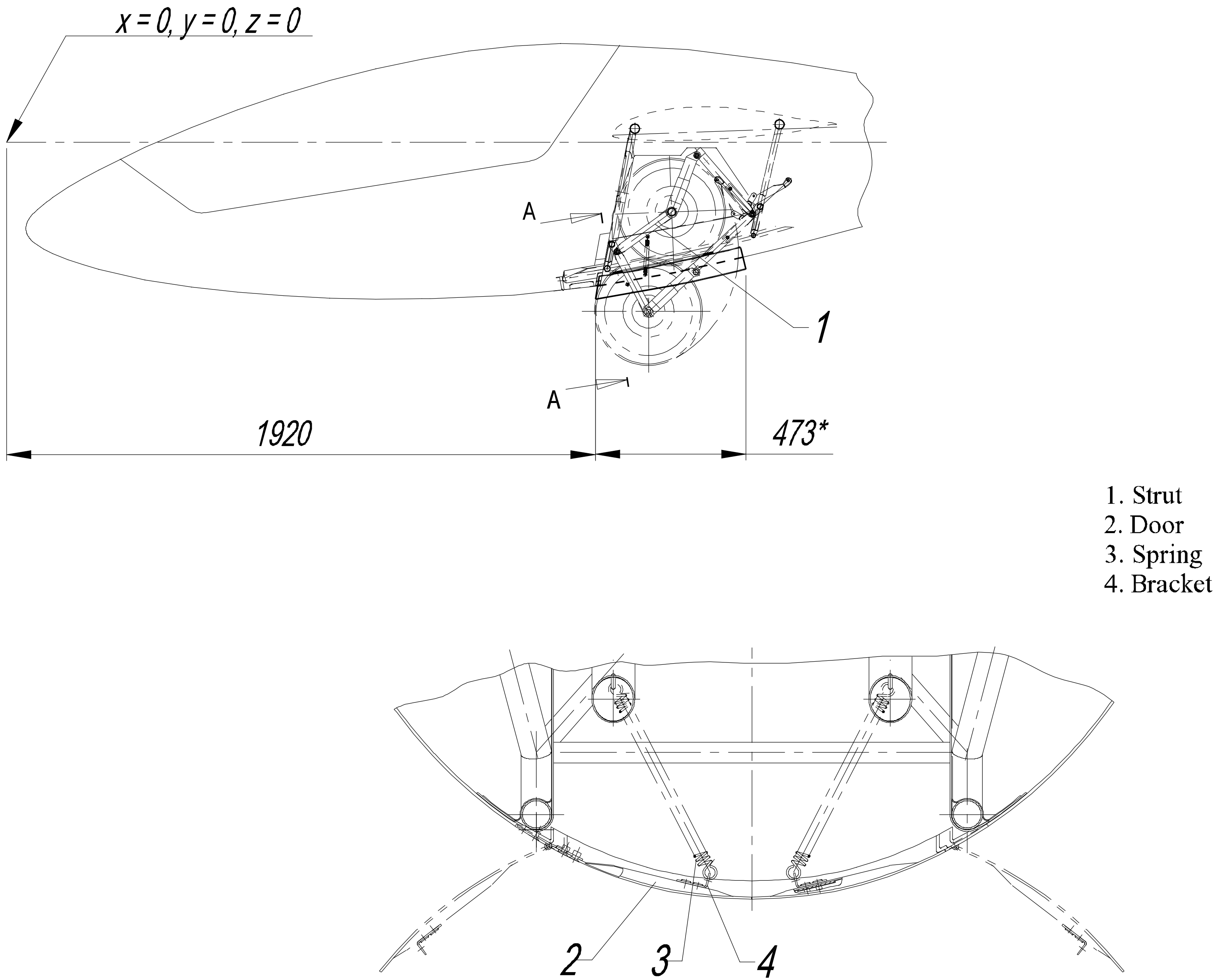
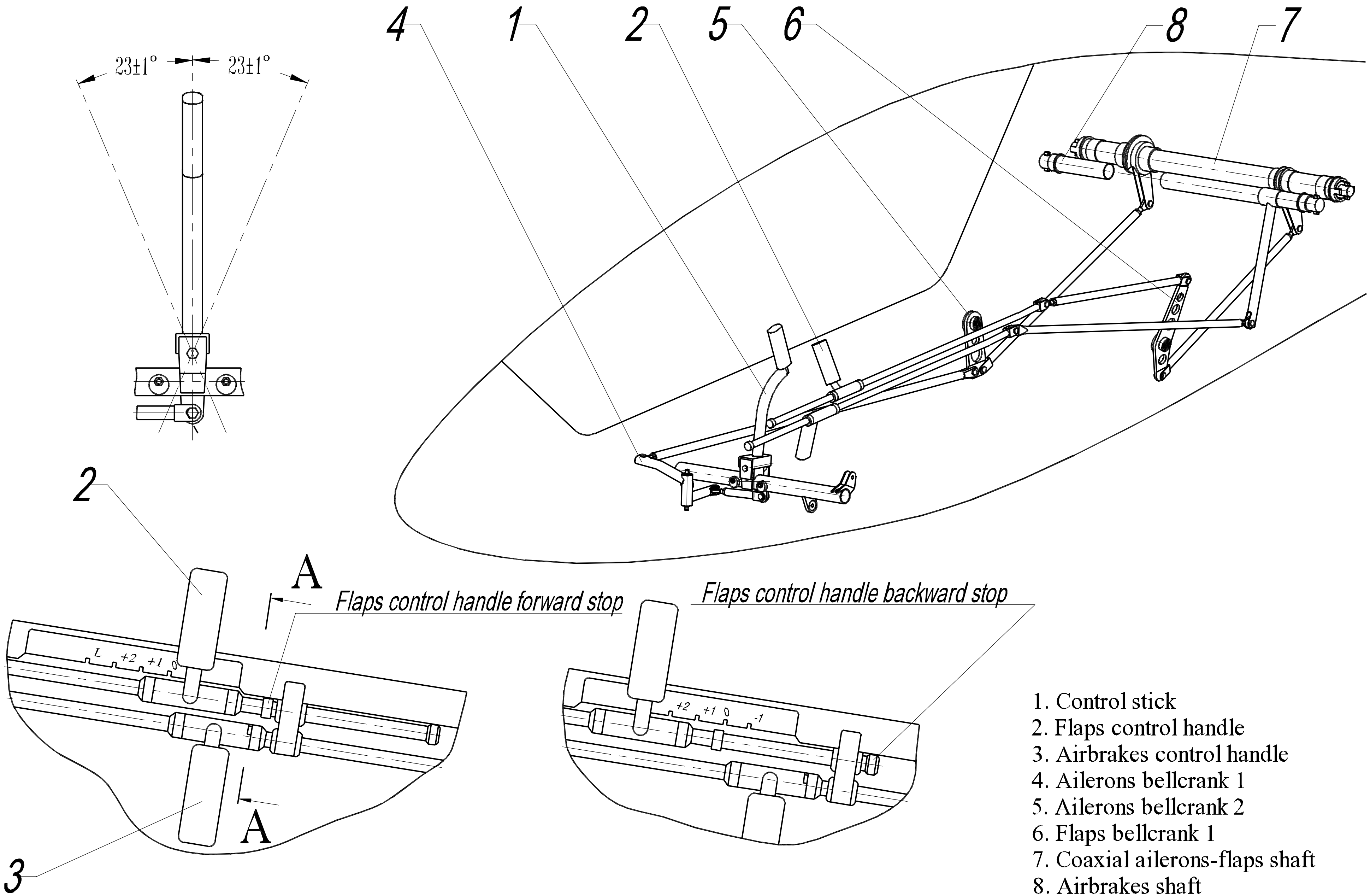


Fig. 2.2.5_01. Landing gear control



1. Strut
2. Door
3. Spring
4. Bracket

Fig. 2.2.5_02. Landing gear door



1. Control stick
2. Flaps control handle
3. Airbrakes control handle
4. Ailerons bellcrank 1
5. Ailerons bellcrank 2
6. Flaps bellcrank 1
7. Coaxial ailerons-flaps shaft
8. Airbrakes shaft

Fig. 2.3.1_01. Control system of ailerons, flaps and airbrakes

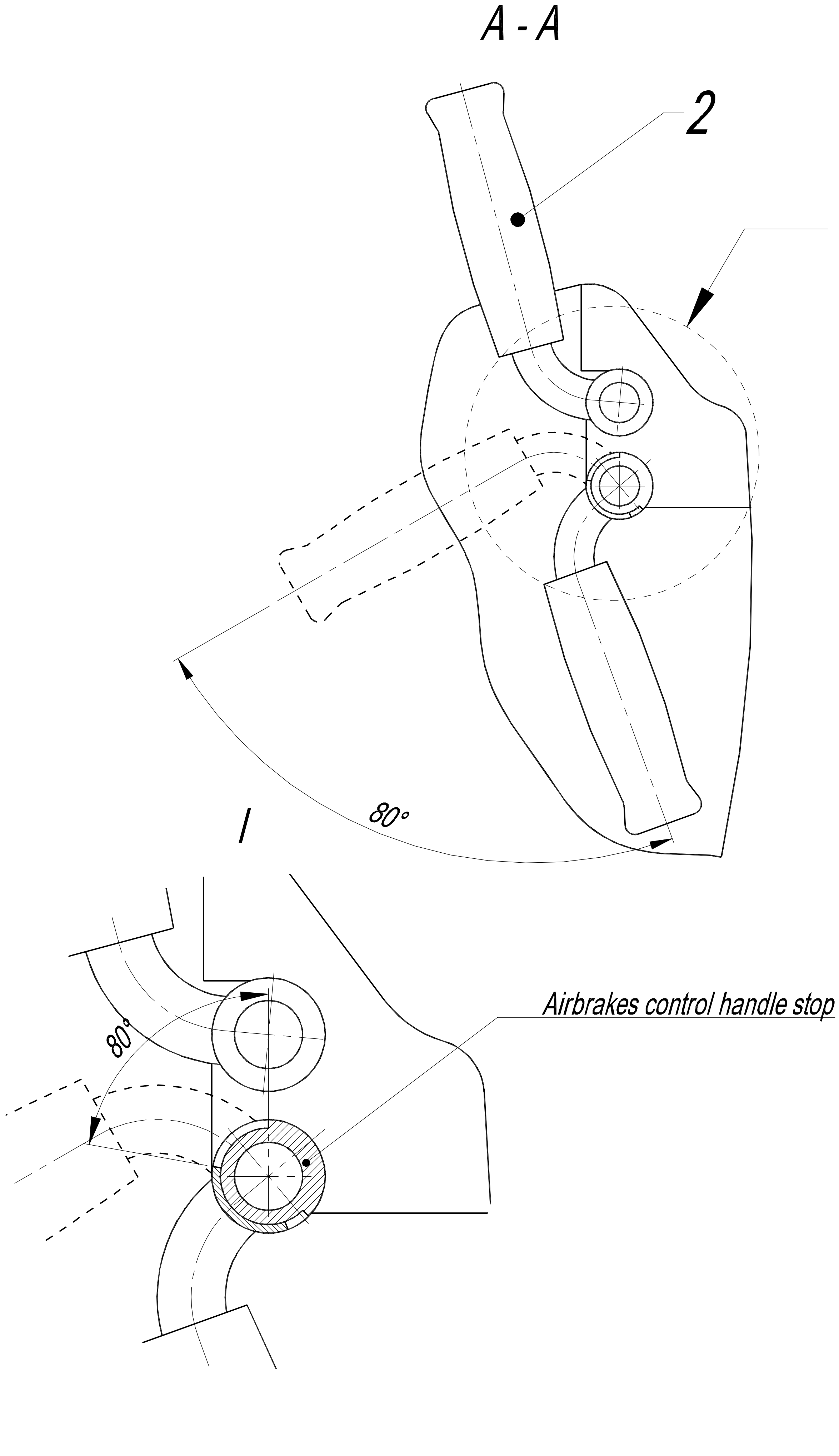
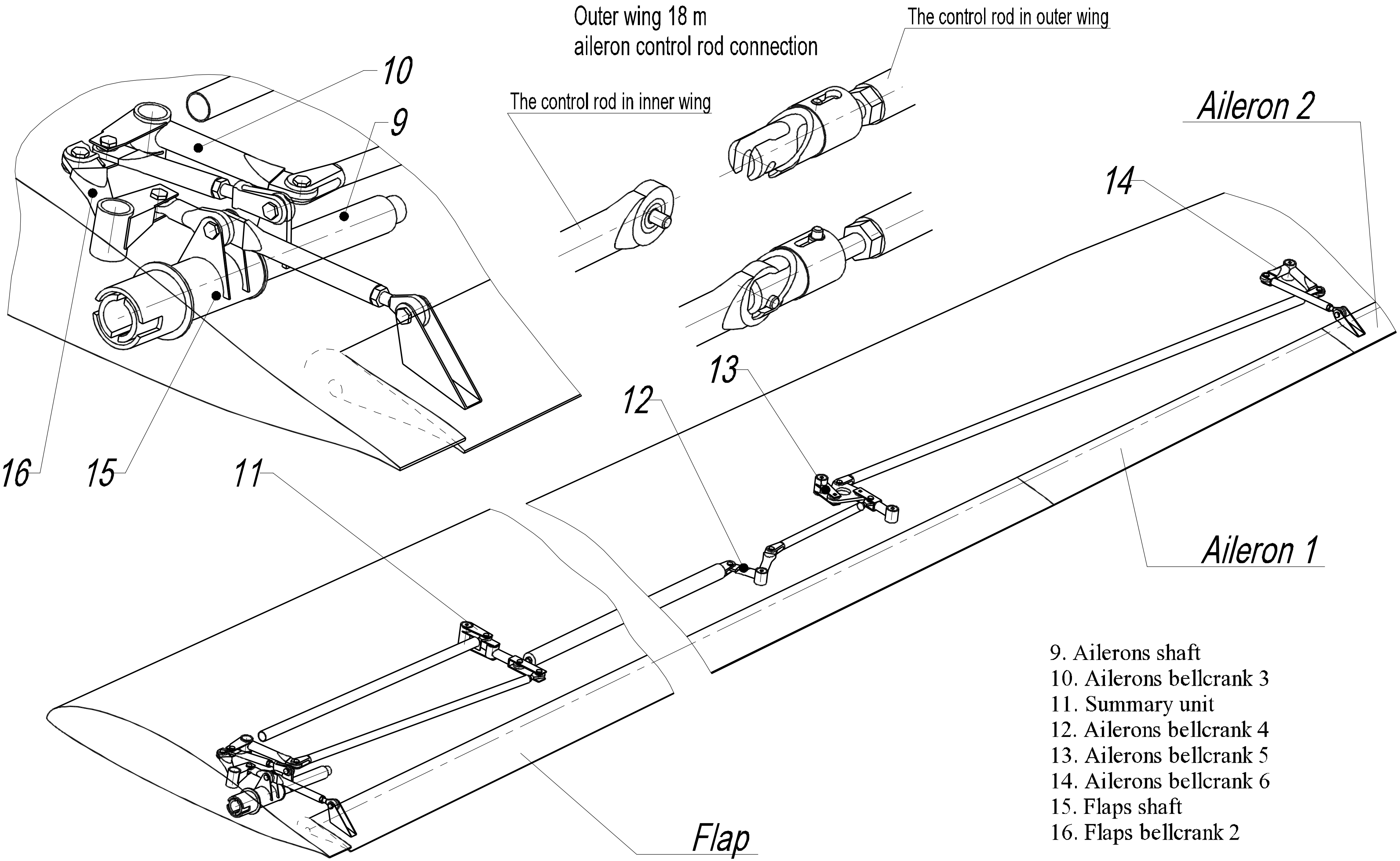
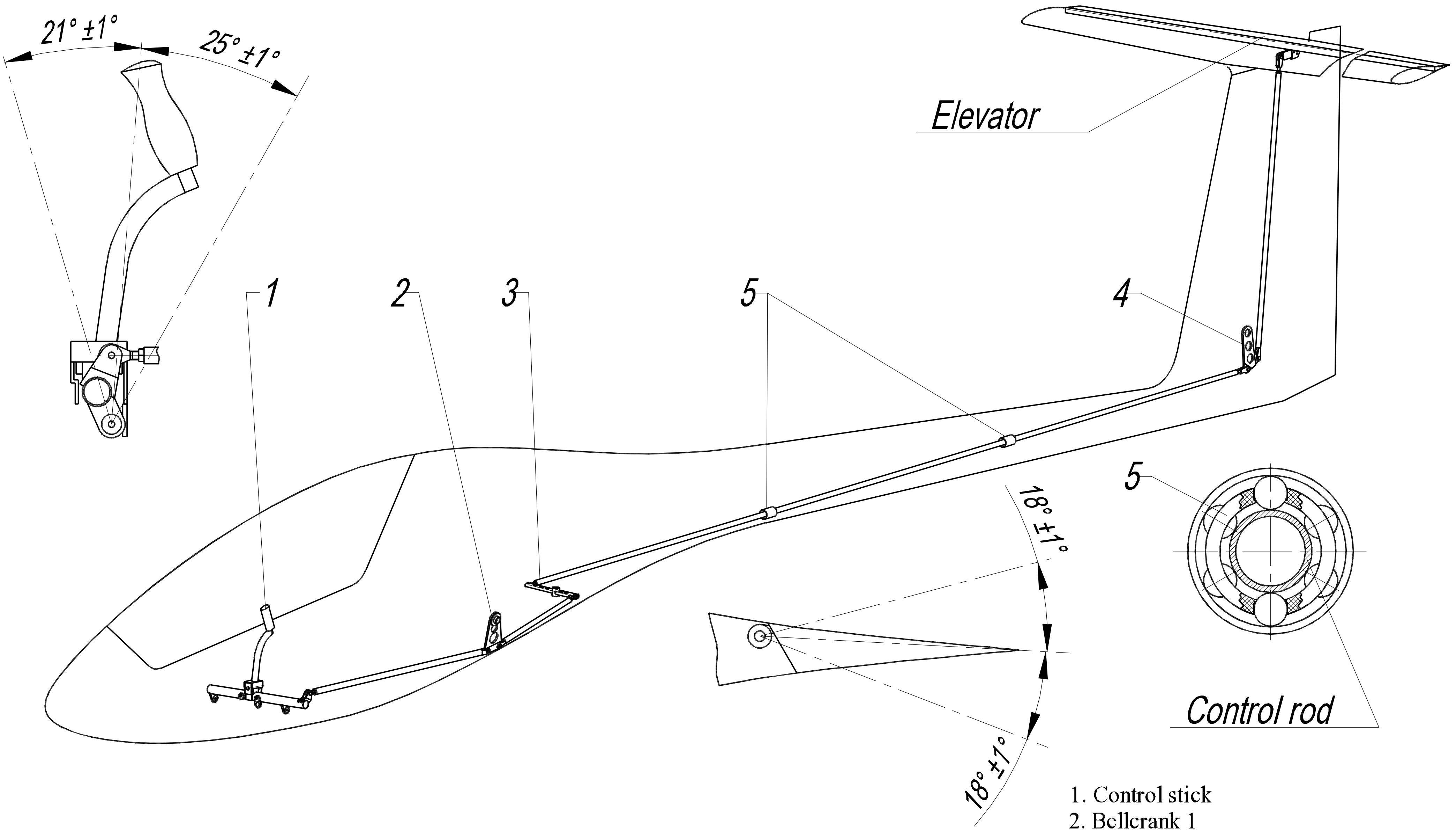


Fig. 2.3.1_02. Control system of ailerons, flaps and airbrakes



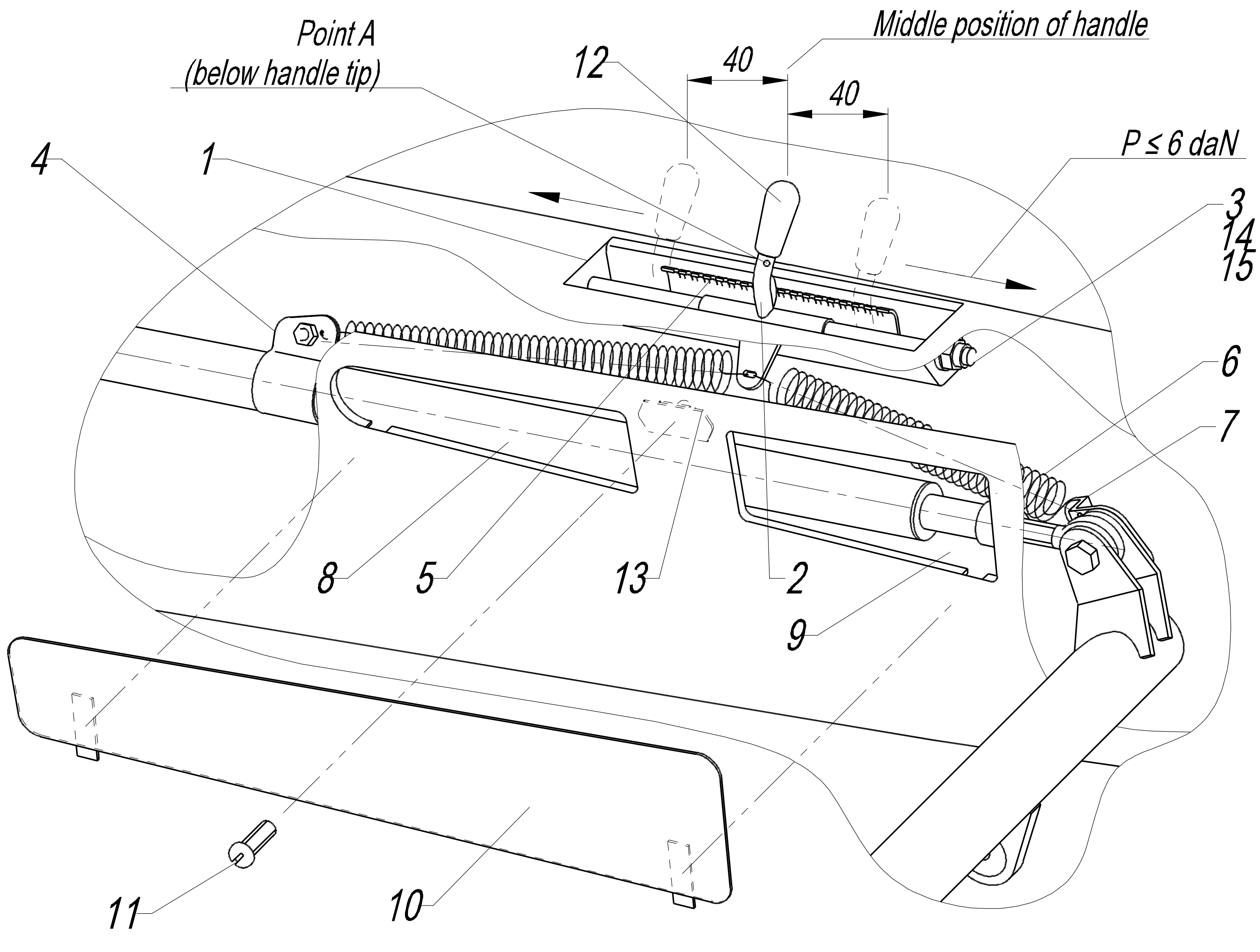
9. Ailerons shaft
10. Ailerons bellcrank 3
11. Summary unit
12. Ailerons bellcrank 4
13. Ailerons bellcrank 5
14. Ailerons bellcrank 6
15. Flaps shaft
16. Flaps bellcrank 2

Fig. 2.3.1_03. Control system of ailerons, flaps and airbrakes



1. Control stick
2. Bellcrank 1
3. Bellcrank 2
4. Bellcrank 3
5. Guide

Fig. 2.3.2_01. Elevator control



1. Trimmer box
2. Handle
3. Bar
4. Ring
5. Fixing plate
6. Spring
7. Plate of shaft
8. Rear hatch
9. Front hatch
10. Cover
11. Screw M4
12. Tip
13. Anchornut M4
14. Nut M6
15. Washer

Fig. 2.3.3_01. Trimmer control

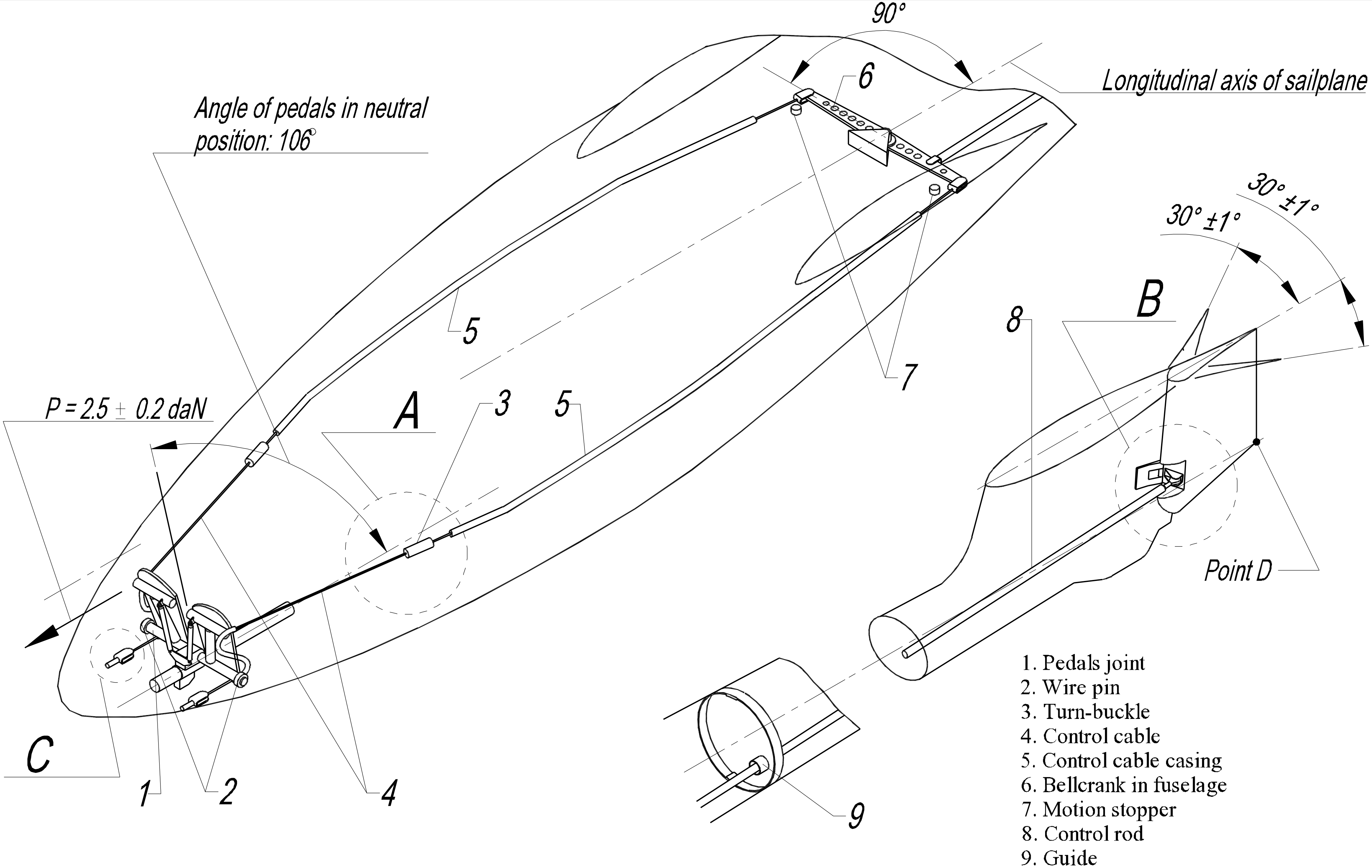
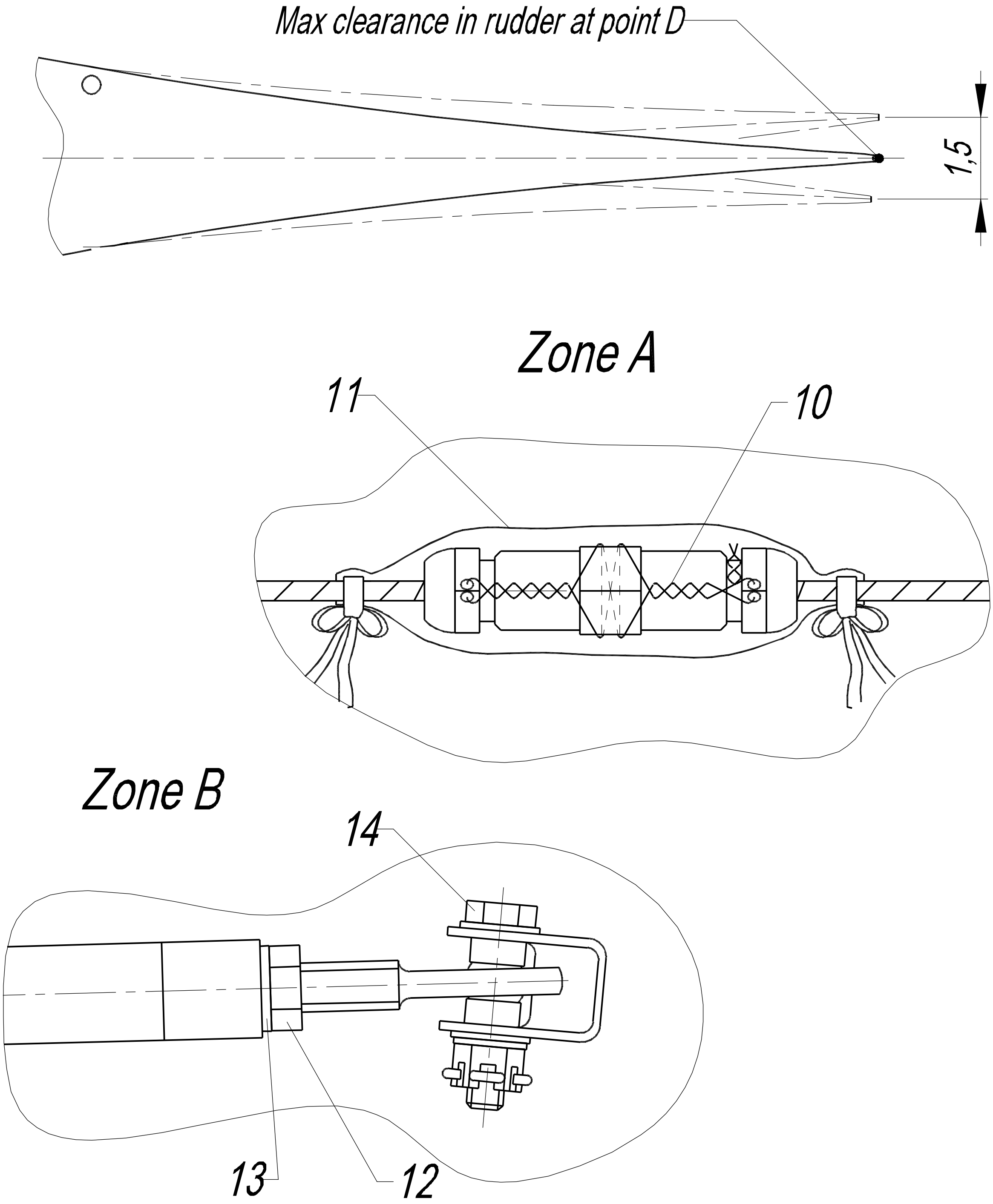
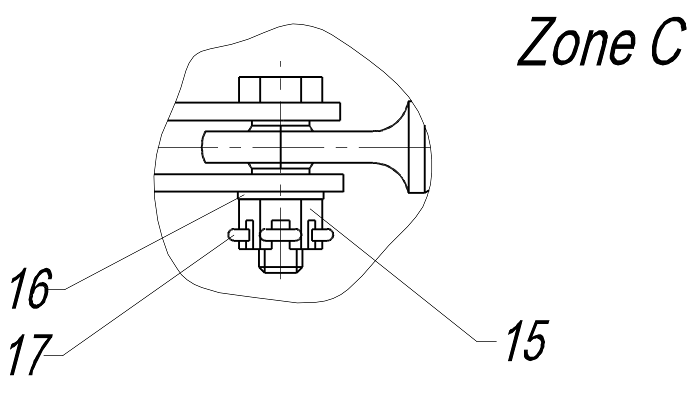


Fig. 2.3.4_01. Rudder control





10. Lock wire
11. Turn-buckle casing
12. Nut
13. Spring washer
14. Bolt
15. Crown nut
16. Washer
17. Wire pin

Fig. 2.3.4_02. Rudder control

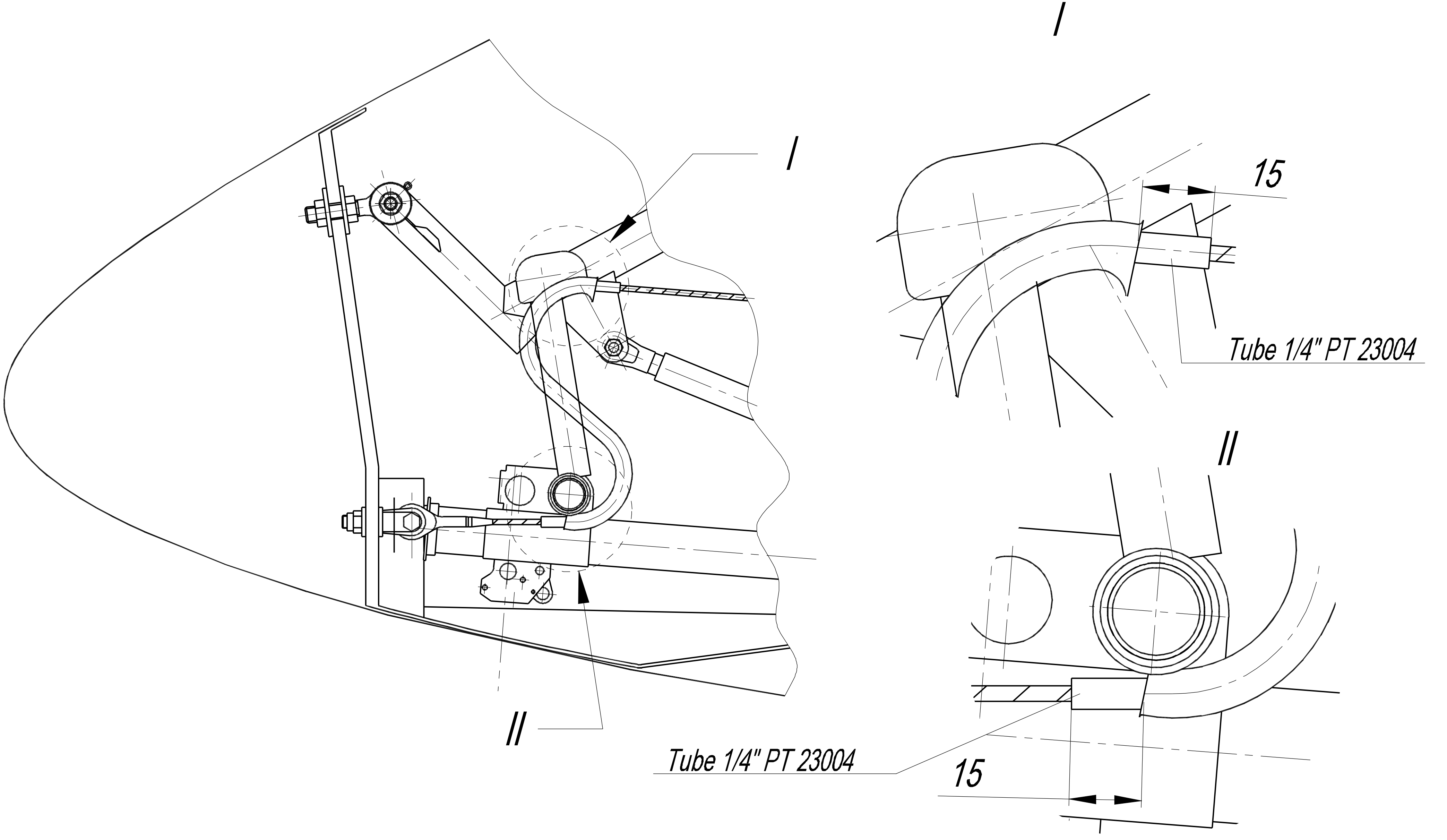


Fig. 2.3.4_03. Rudder control

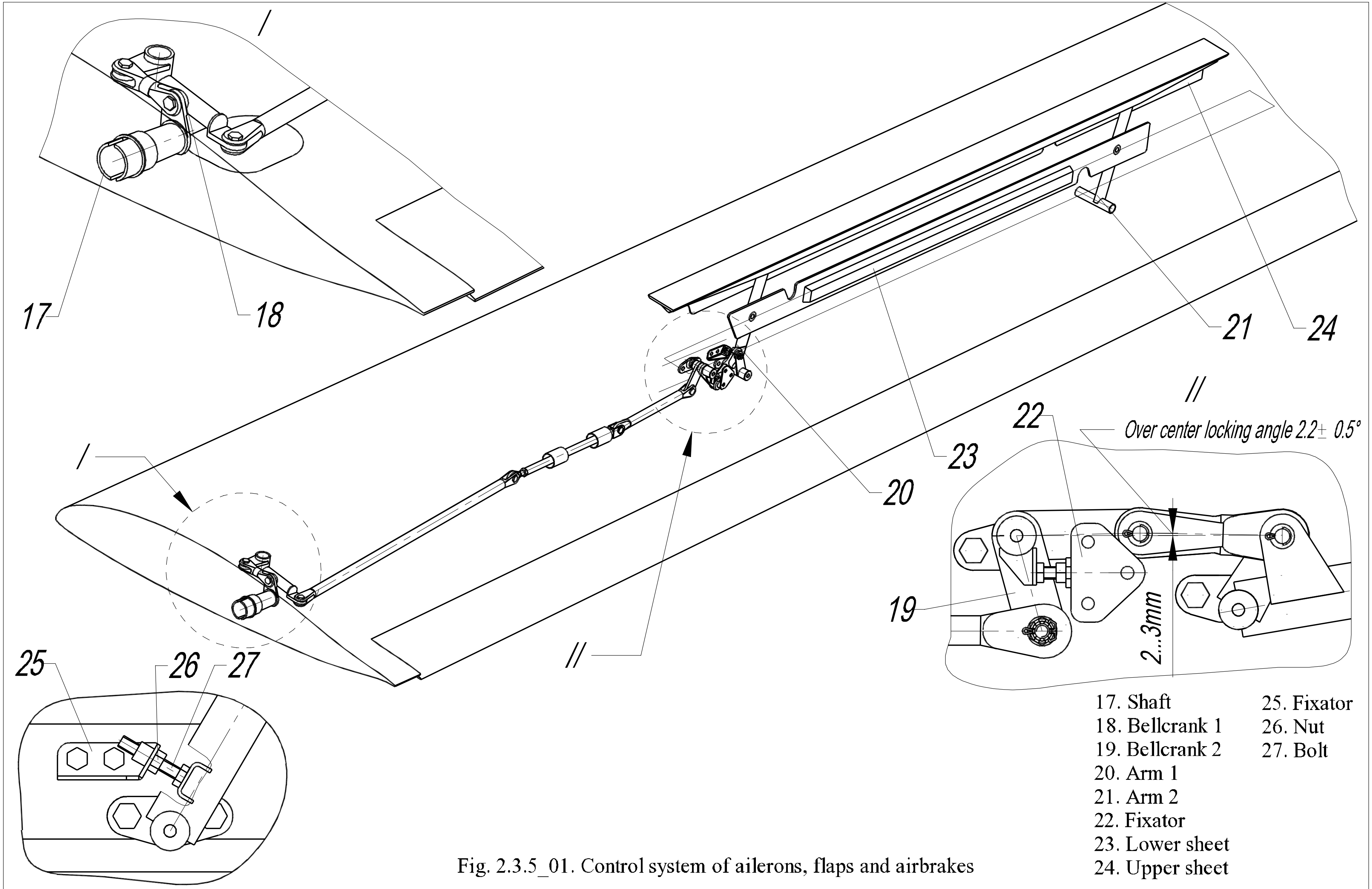


Fig. 2.3.5_01. Control system of ailerons, flaps and airbrakes

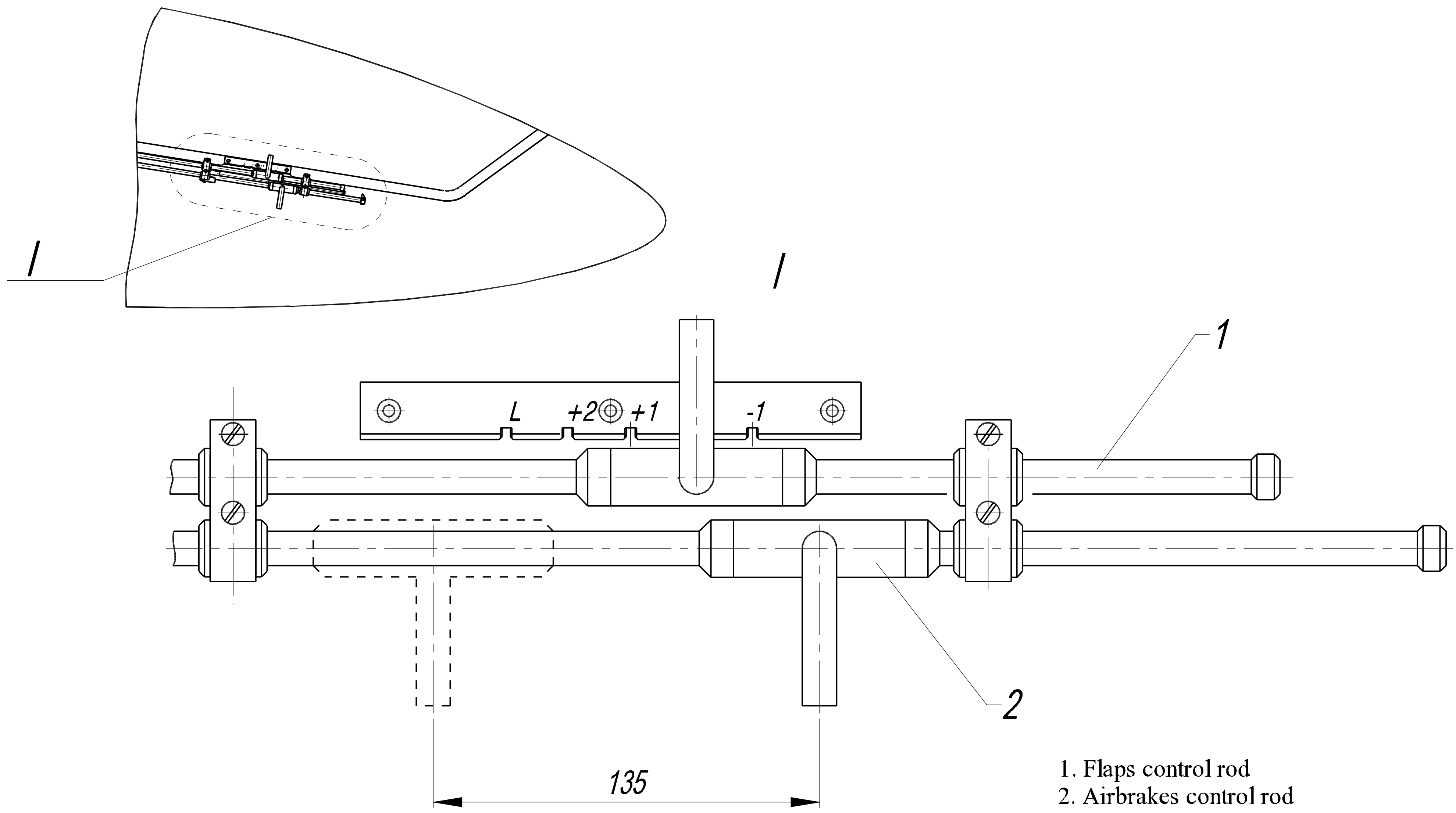


Fig. 2.3.5_02. Airbrakes control system

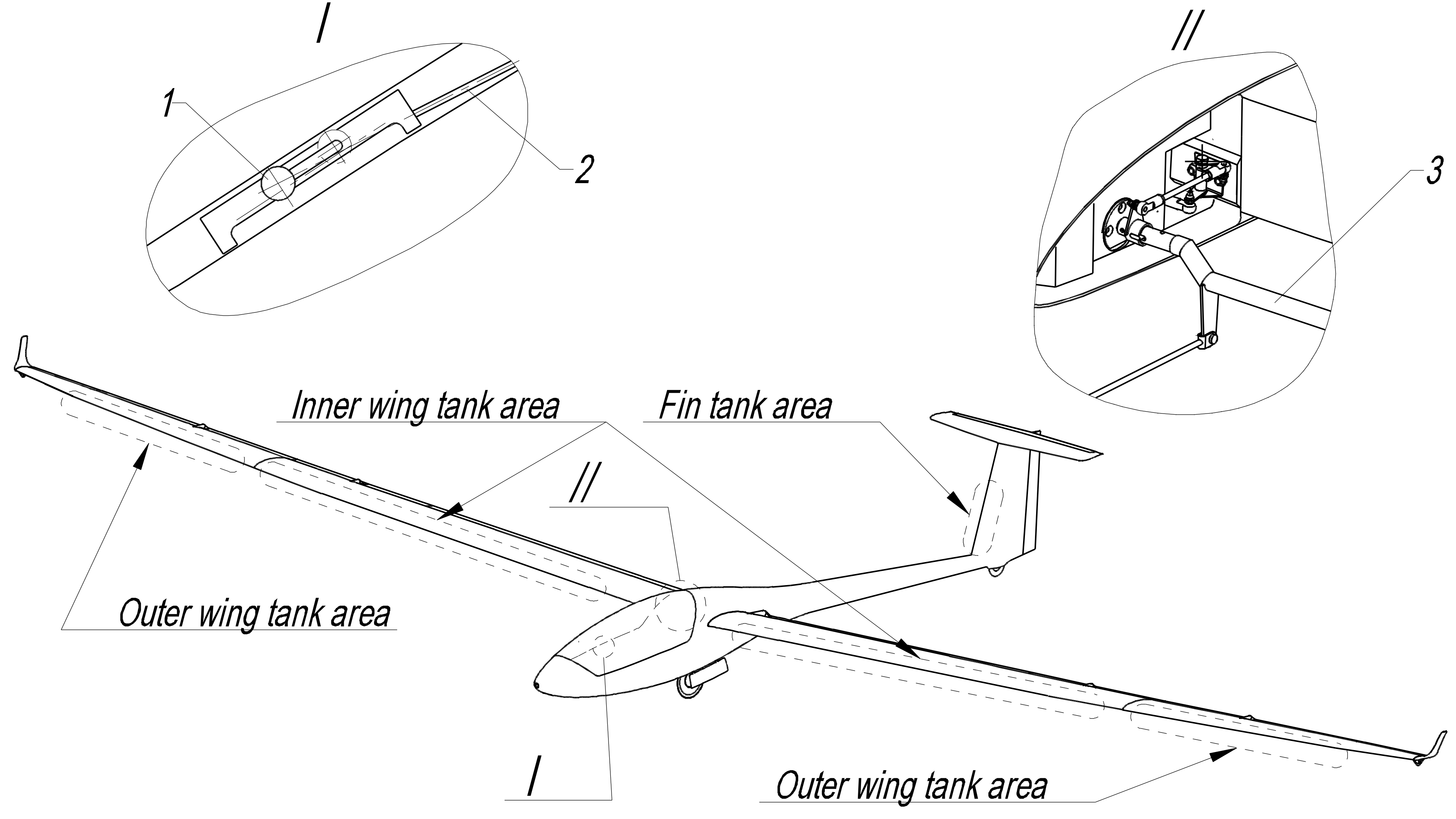


Fig. 2.3.6_01. Water ballast control system

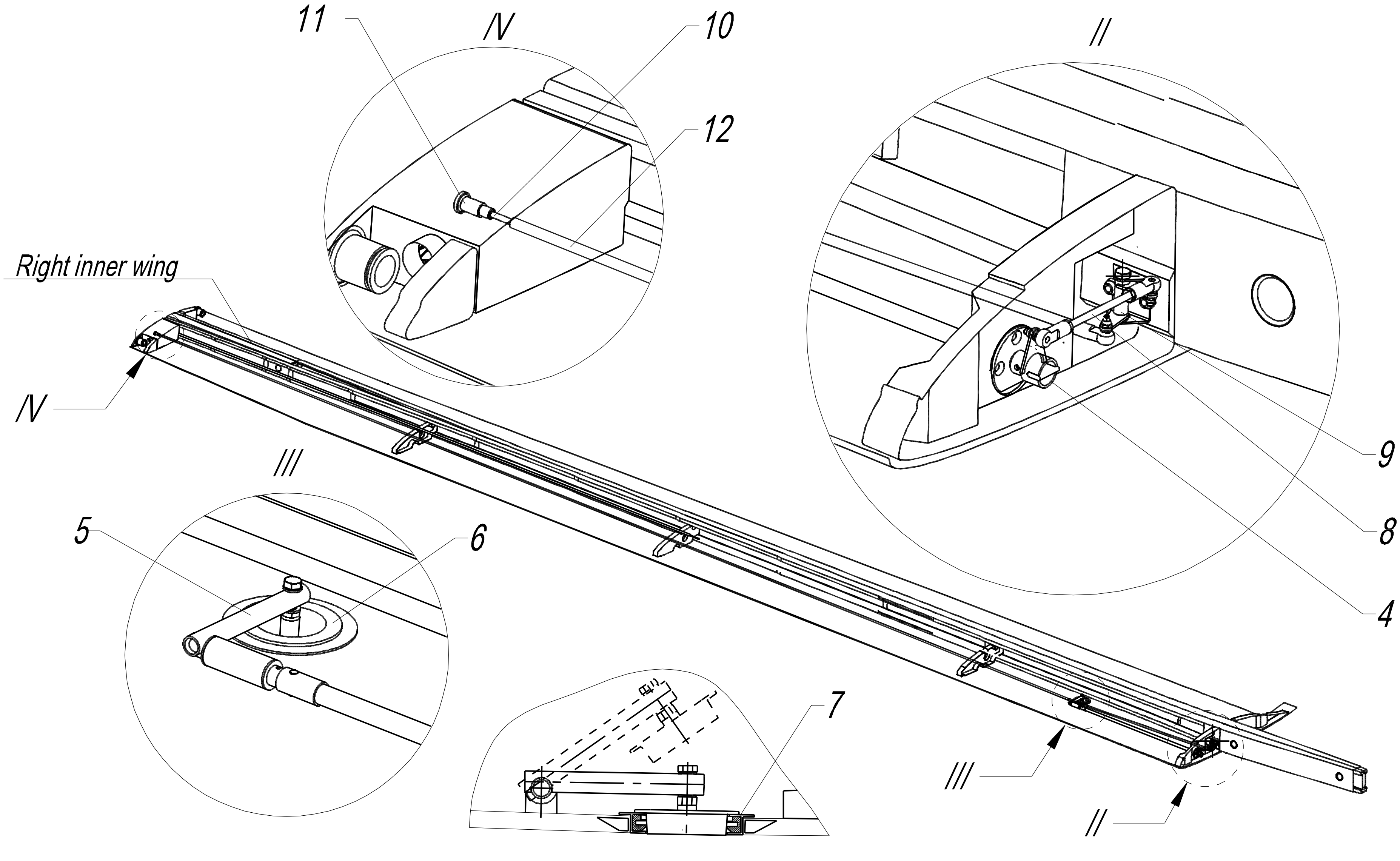


Fig. 2.3.6_02. Water ballast control system

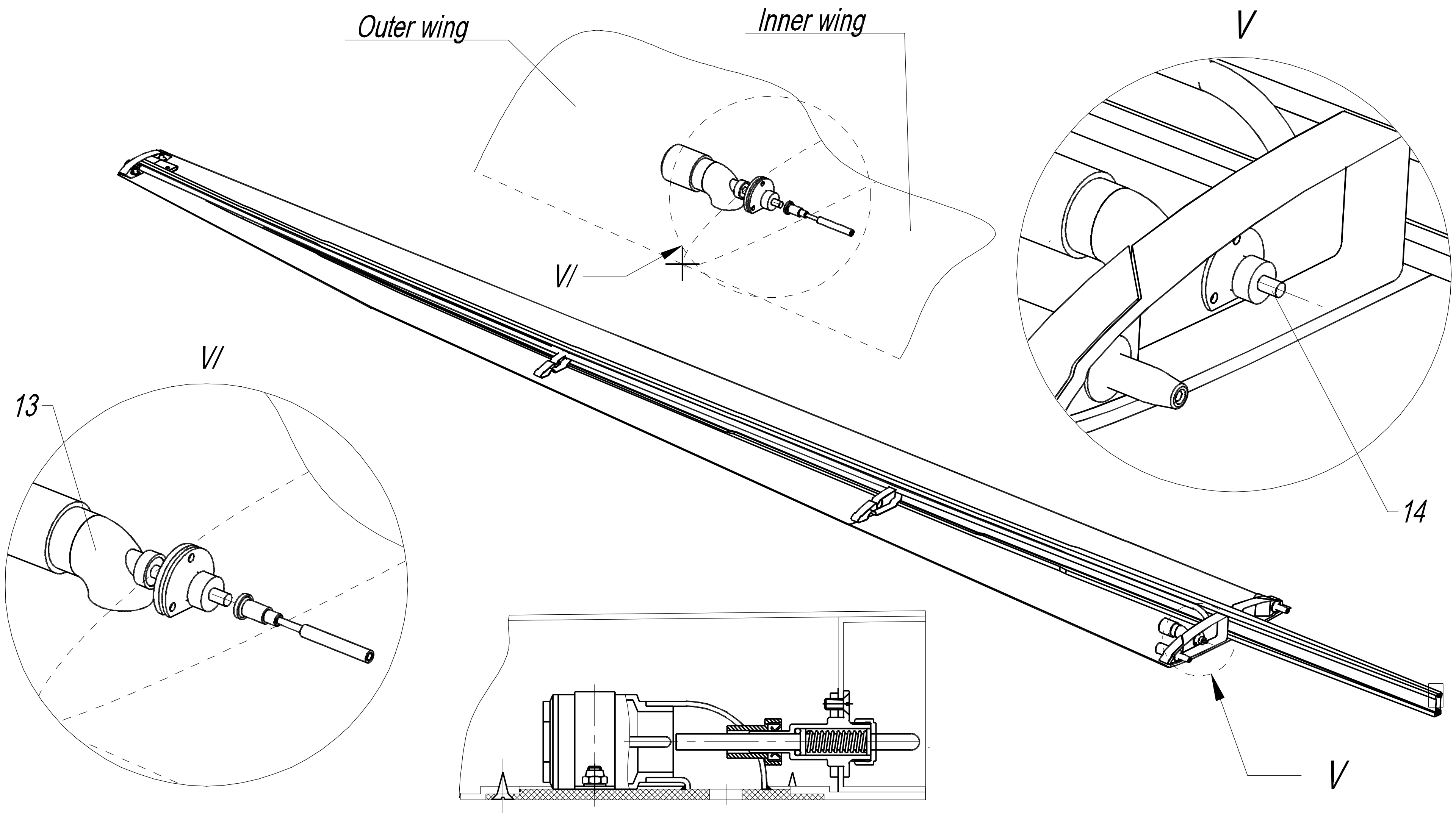


Fig. 2.3.6_03. Water ballast control system

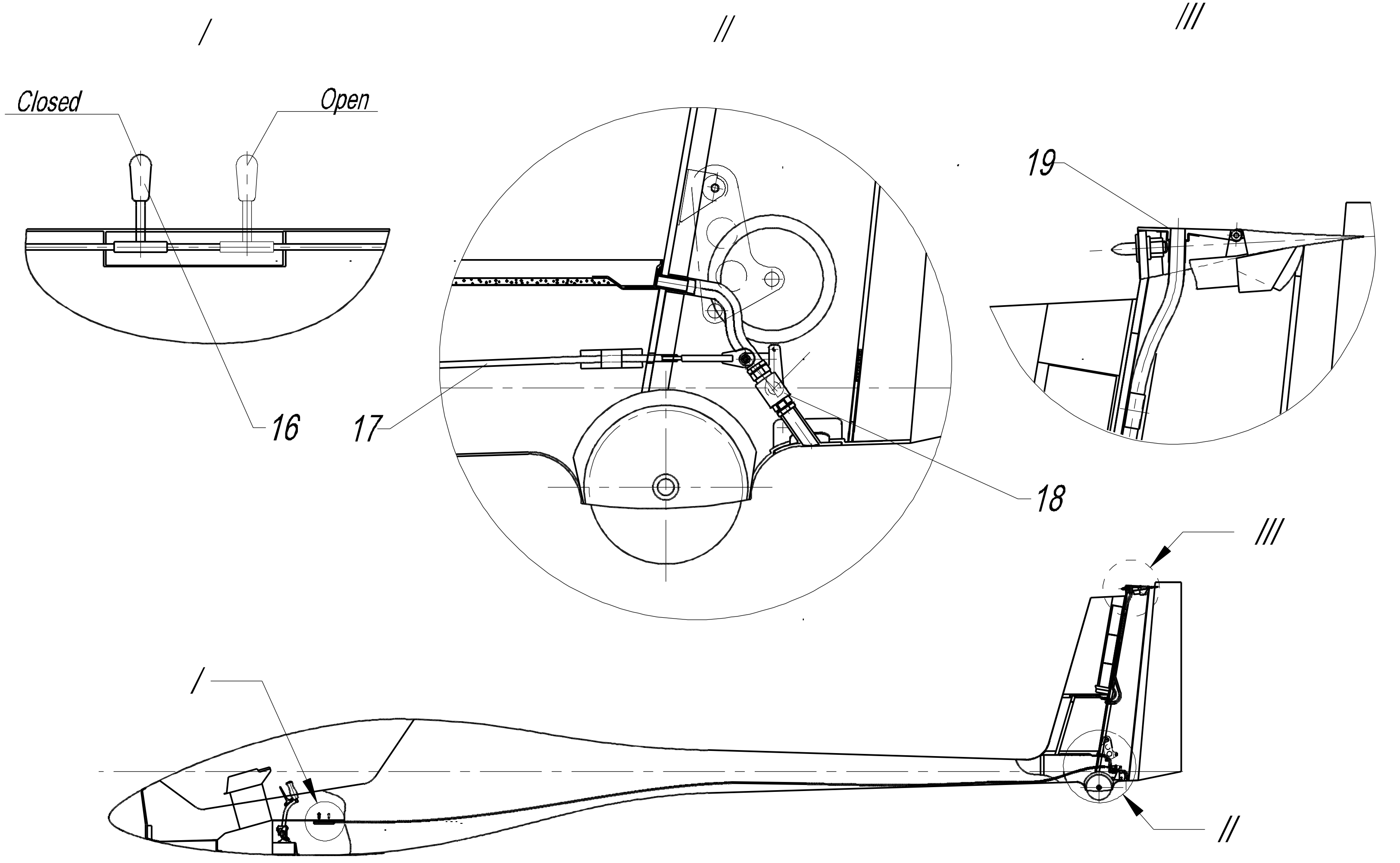


Fig. 2.3.6_04. Water ballast control system (option fin tank)

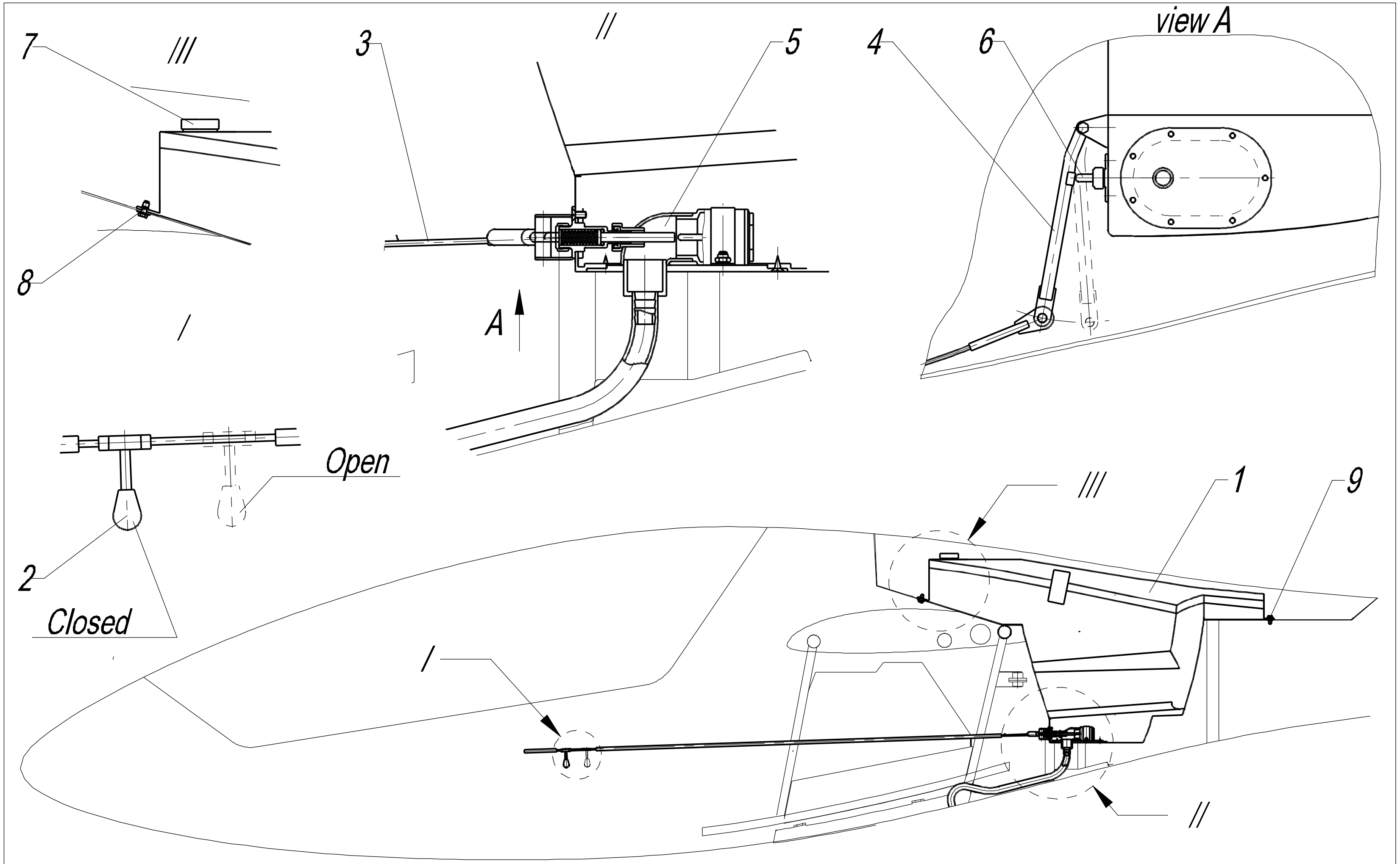
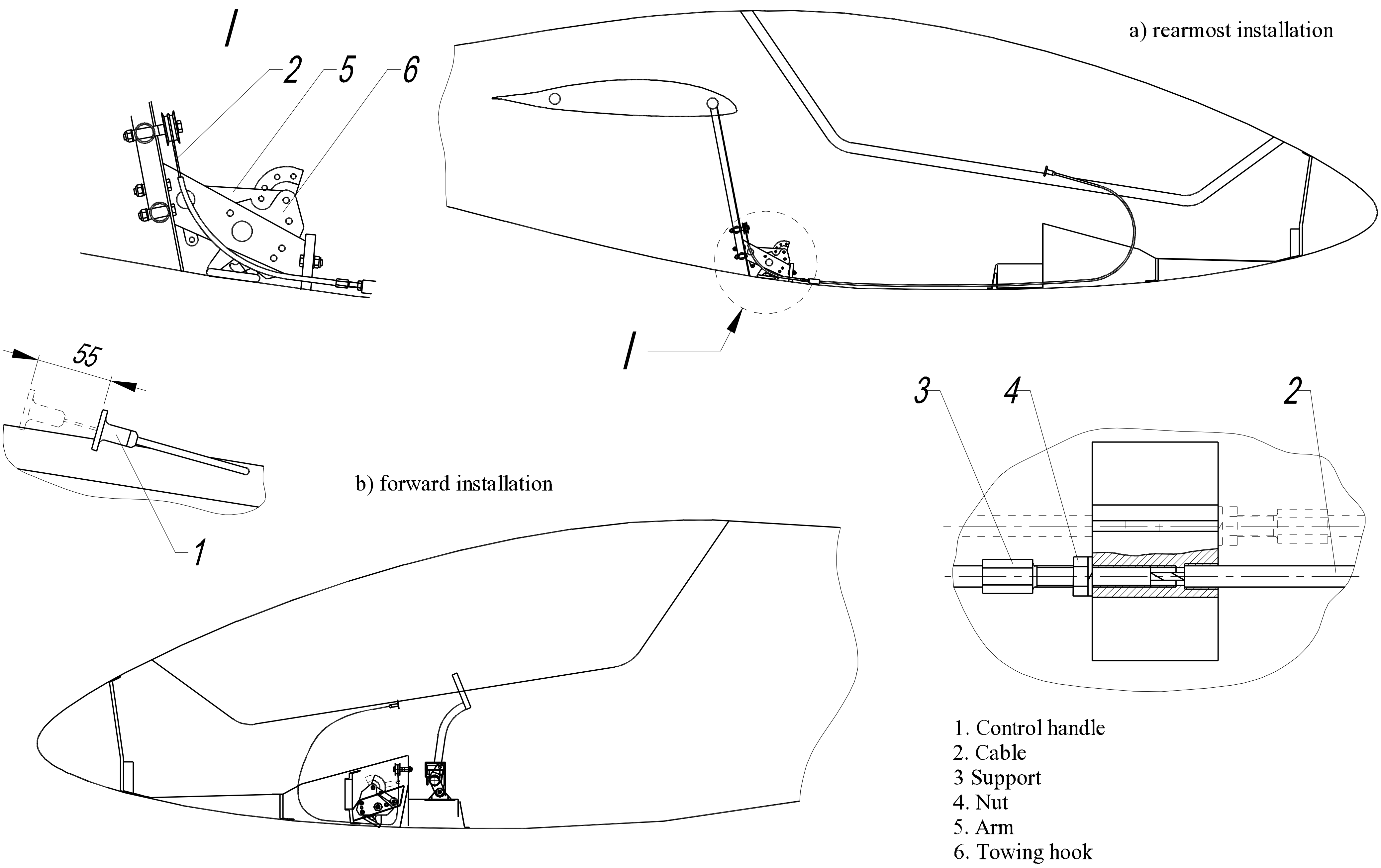
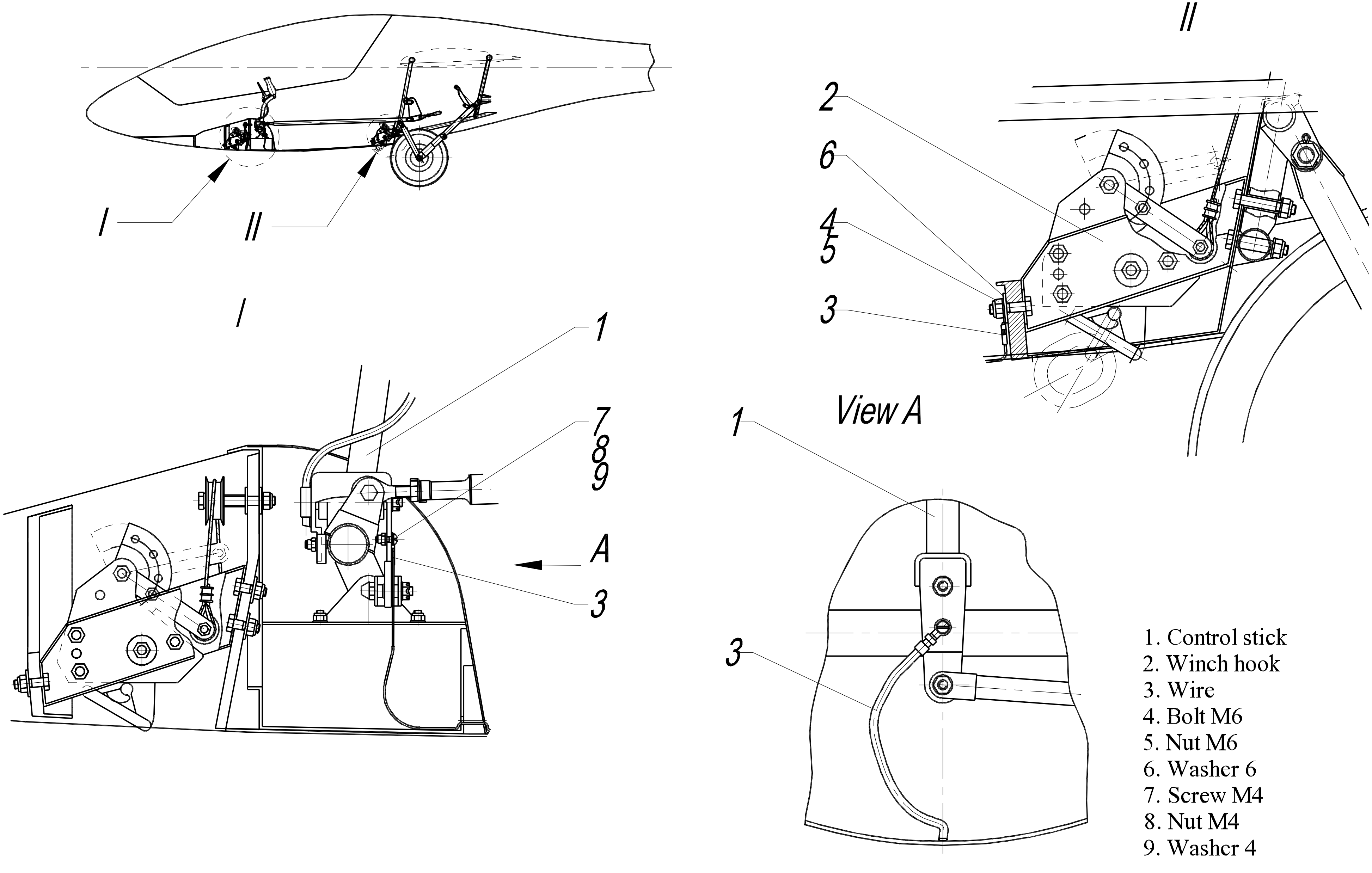


Fig. 2.3.6_05. Water ballast control system



1. Control handle
2. Cable
3 Support
4. Nut
5. Arm
6. Towing hook

Fig. 2.3.7_01. Towing hook control



1. Control stick
2. Winch hook
3. Wire
4. Bolt M6
5. Nut M6
6. Washer 6
7. Screw M4
8. Nut M4
9. Washer 4

Fig. 2.3.7_02. Towing hook control (electrical bonding)

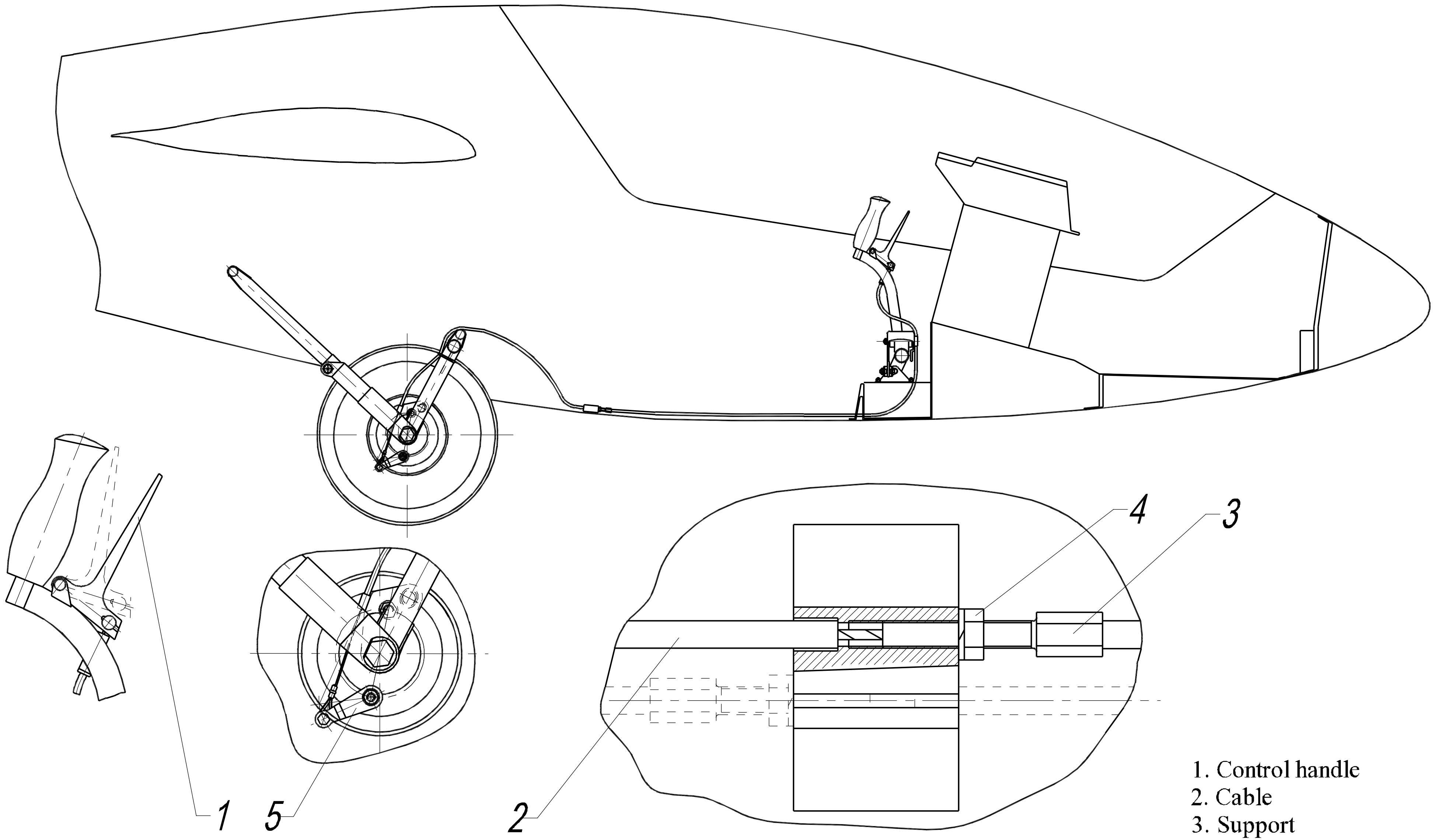


Fig. 2.3.9_01. Landing gear brake control

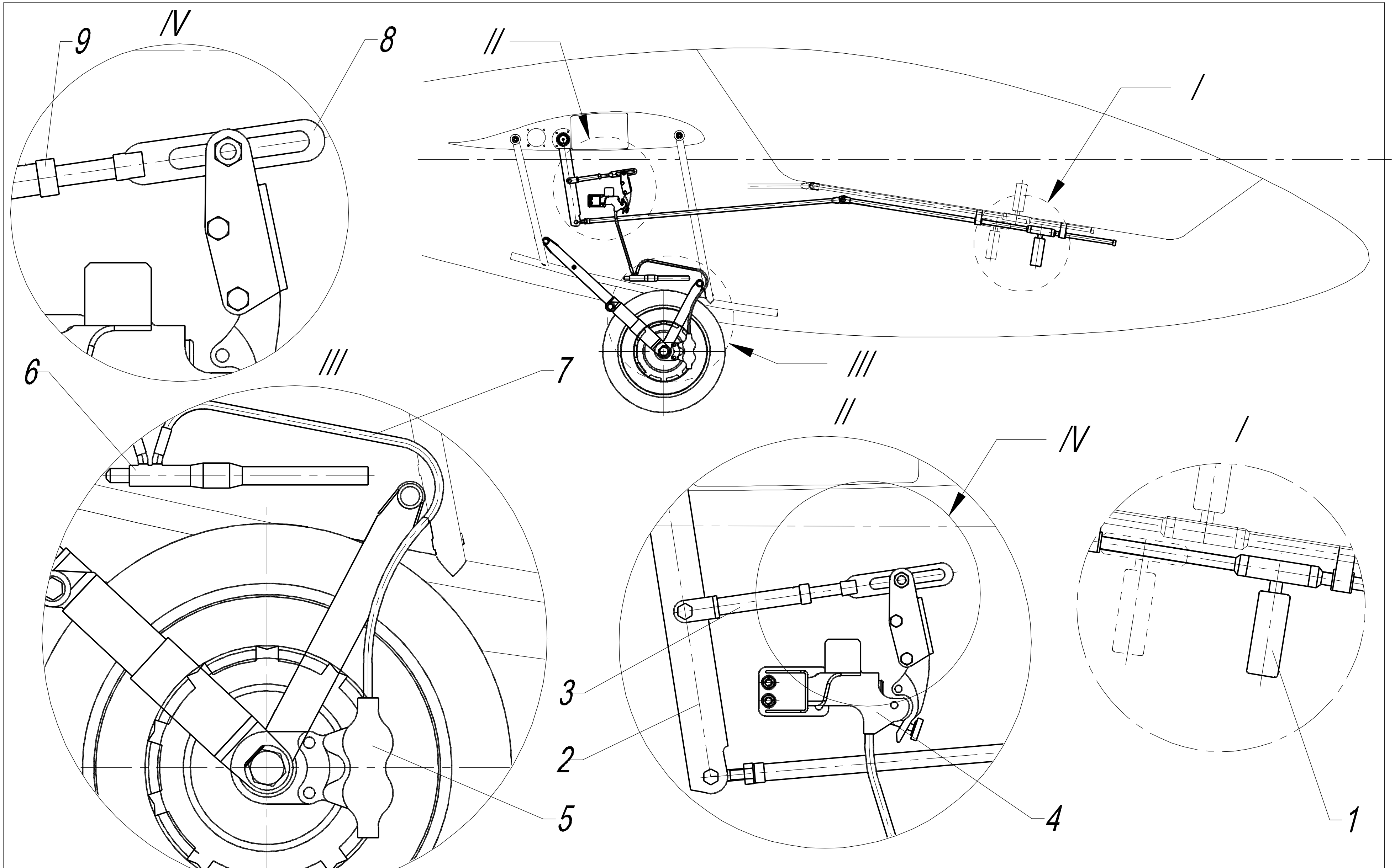
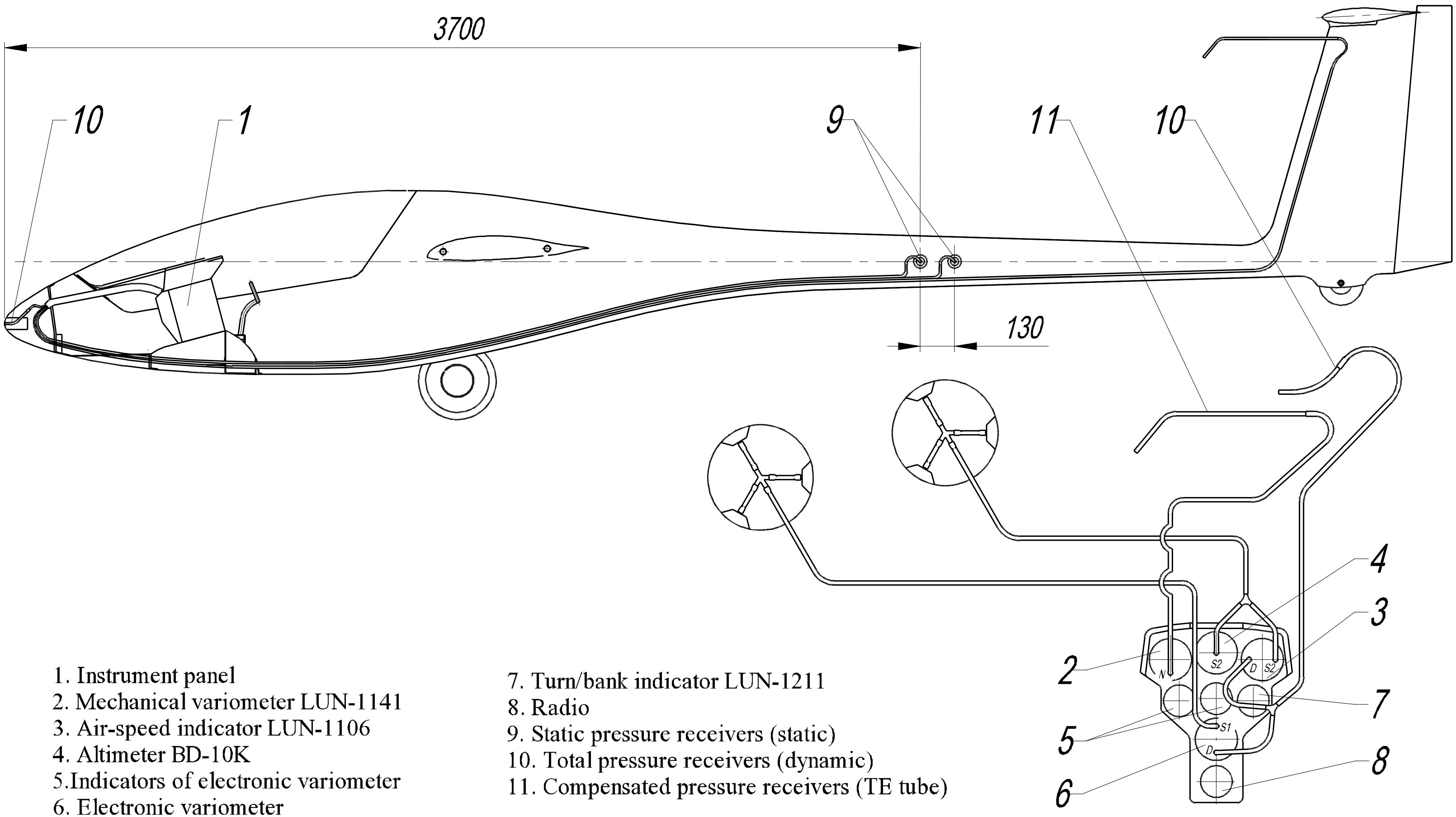


Fig. 2.3.9_02. Landing gear hydraulic brake control



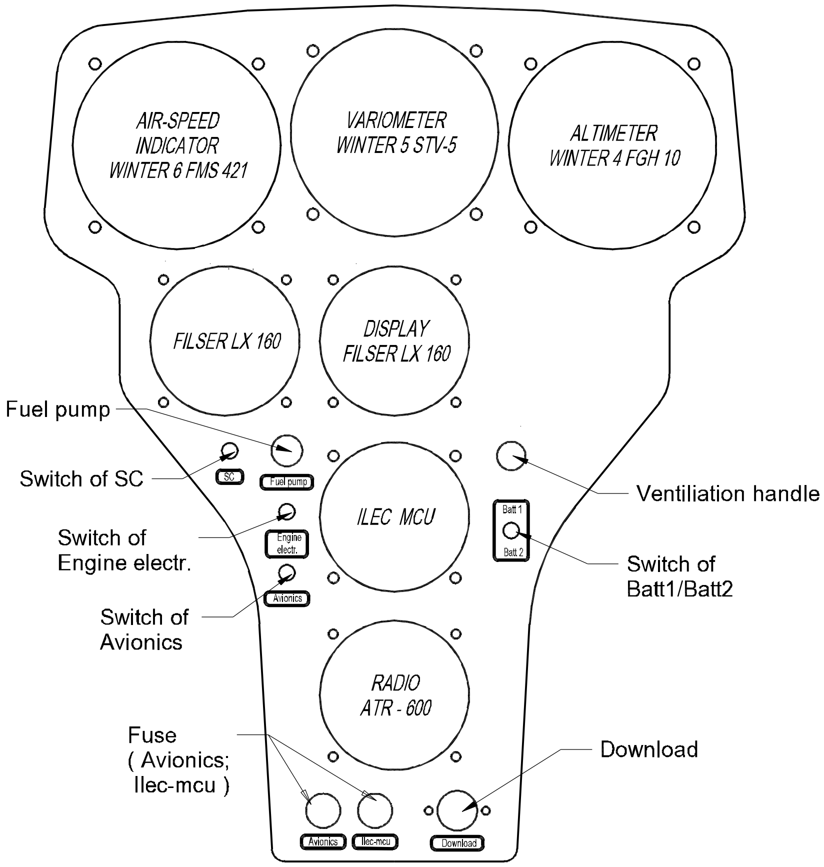
1. Instrument panel
2. Mechanical variometer LUN-1141
3. Air-speed indicator LUN-1106
4. Altimeter BD-10K
5.Indicators of electronic variometer
6. Electronic variometer

7. Turn/bank indicator LUN-1211
8. Radio
9. Static pressure receivers (static)
10. Total pressure receivers (dynamic)
11. Compensated pressure receivers (TE tube)

Fig. 2.4.1_01. Sailplane static and dynamic pressure system

INSTRUMENT PANEL

OPTION A



OPTION B

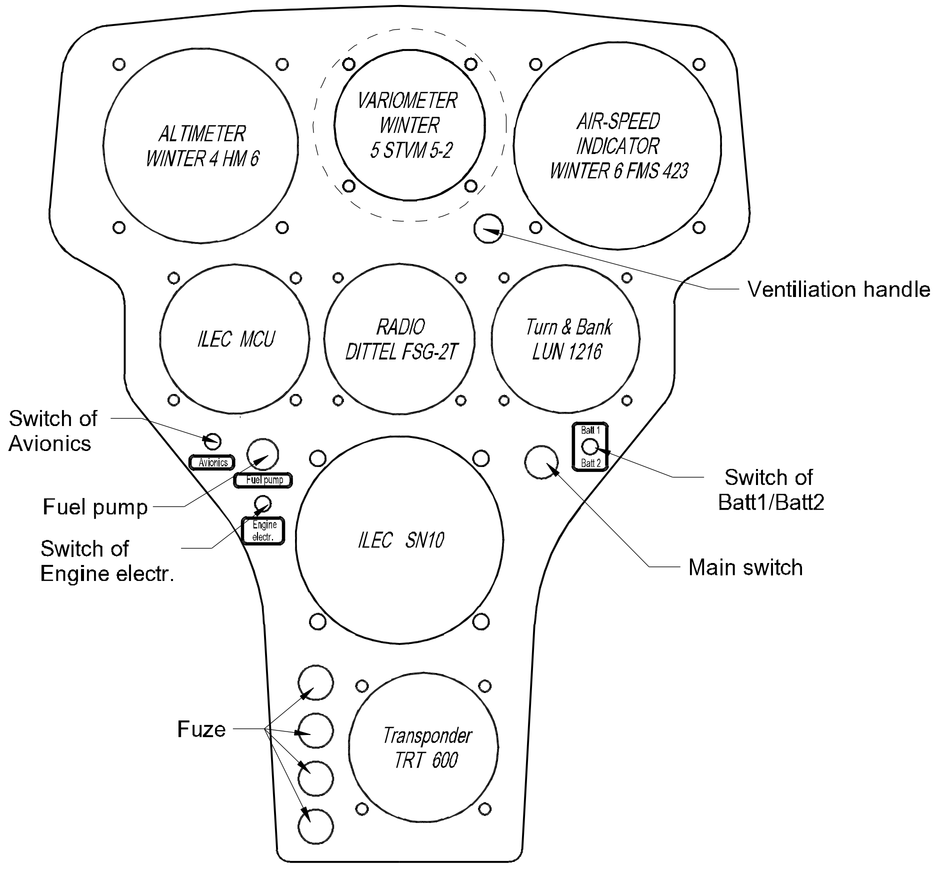
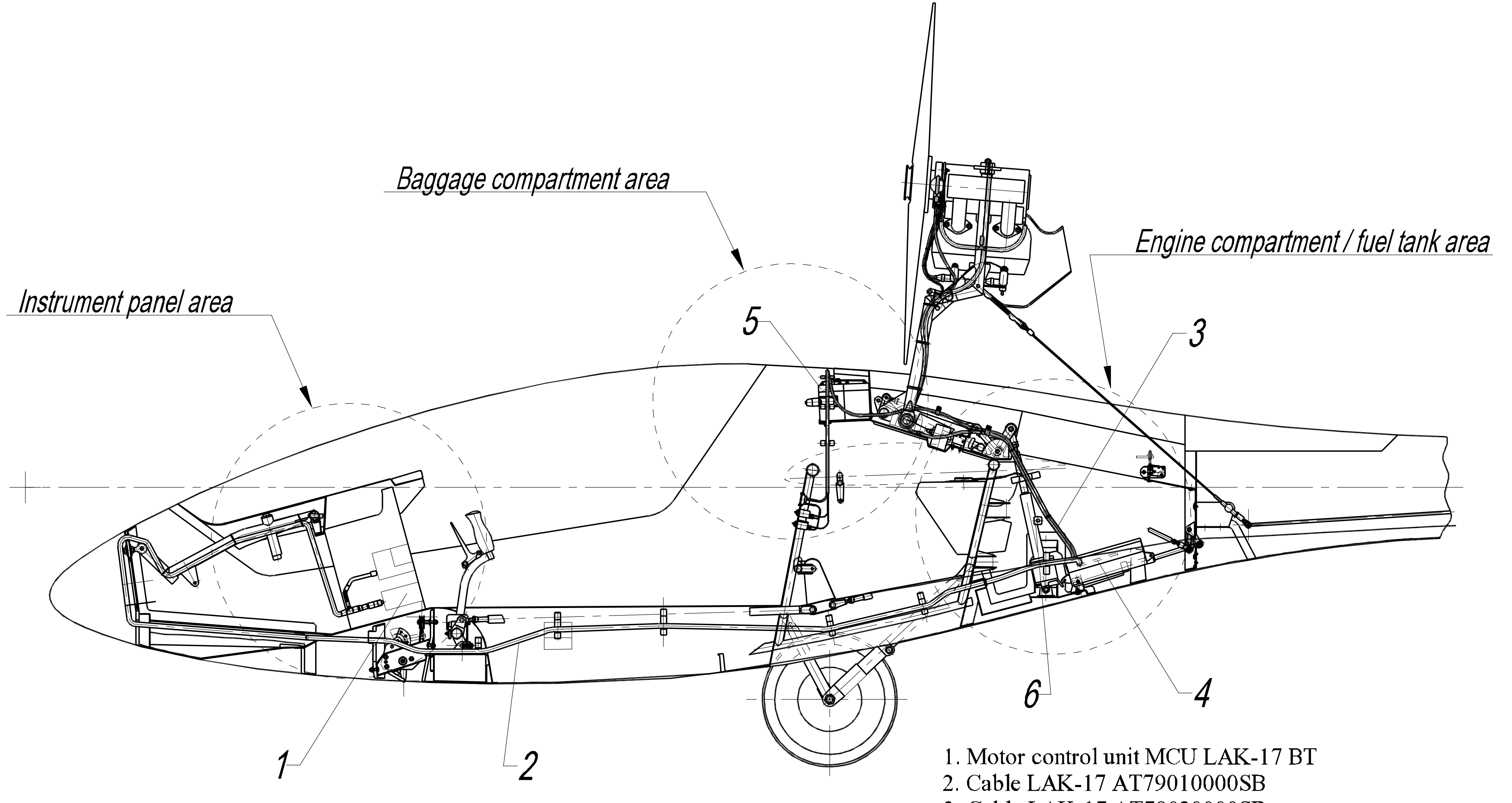
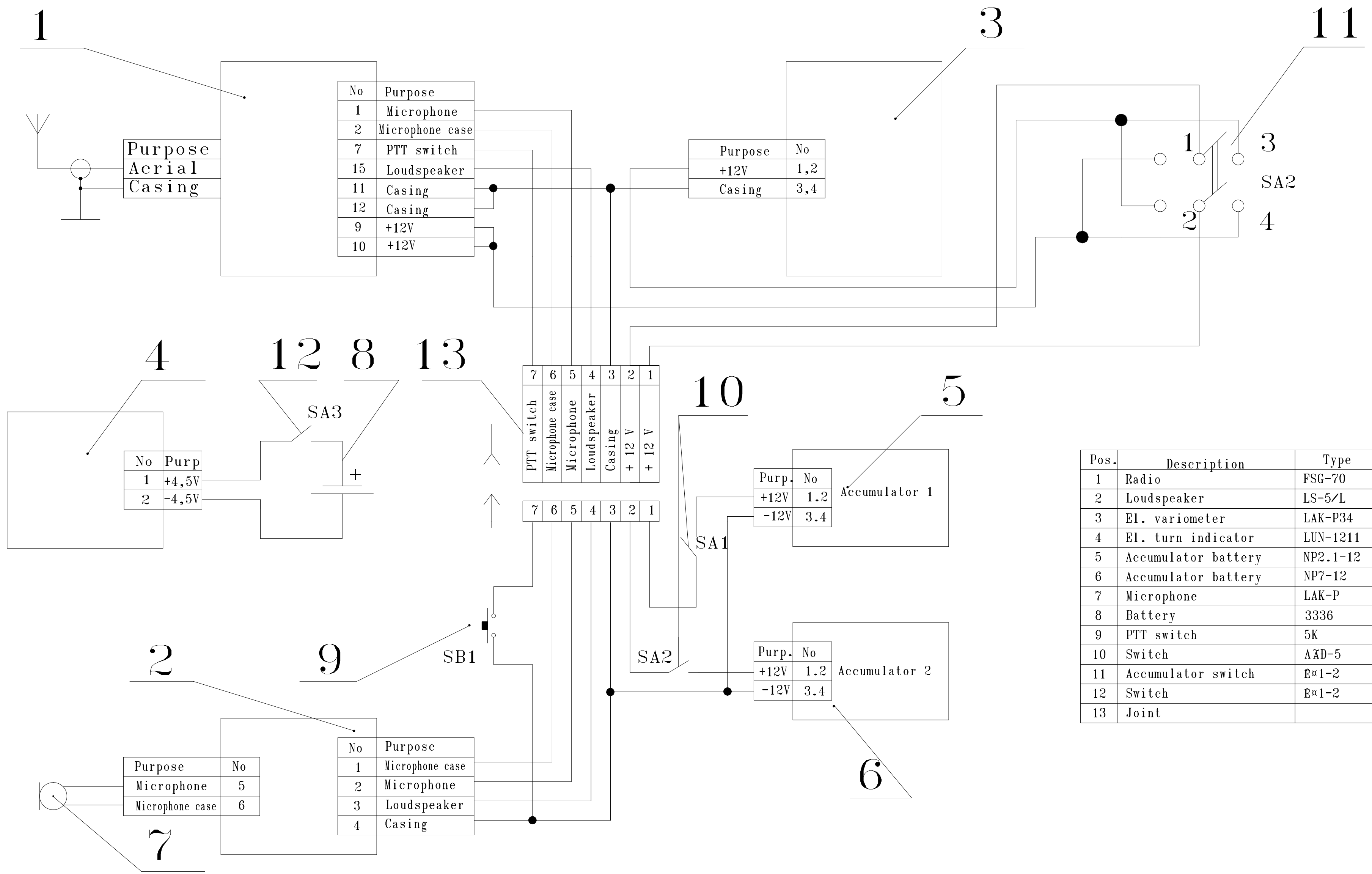


Fig. 2.4.2_01. Options of flight control and navigation instruments



1. Motor control unit MCU LAK-17 BT
2. Cable LAK-17 AT79010000SB
3. Cable LAK-17 AT79020000SB
4. Relay block LAK-17 AT79030000SB
5. Battery NP7-12
6. Main ground point LAK-17 AT79060000SB

Fig. 2.4.4_01. General layout of electric system



Pos.	Description	Type	Location
1	Radio	FSG-70	Instrument panel
2	Loudspeaker	LS-5/L	Cockpit
3	El. variometer	LAK-P34	Instrument panel
4	El. turn indicator	LUN-1211	Instrument panel
5	Accumulator battery	NP2.1-12	Sailplane fin
6	Accumulator battery	NP7-12	Baggage compartment
7	Microphone	LAK-P	Cockpit
8	Battery	3336	Instrument panel
9	PTT switch	5K	Control stick
10	Switch	AXD-5	Cockpit
11	Accumulator switch	E¤1-2	Instrument panel
12	Switch	E¤1-2	Instrument panel
13	Joint		Instrument panel

Fig. 2.4.4_02. Electric system (LAK-17B).

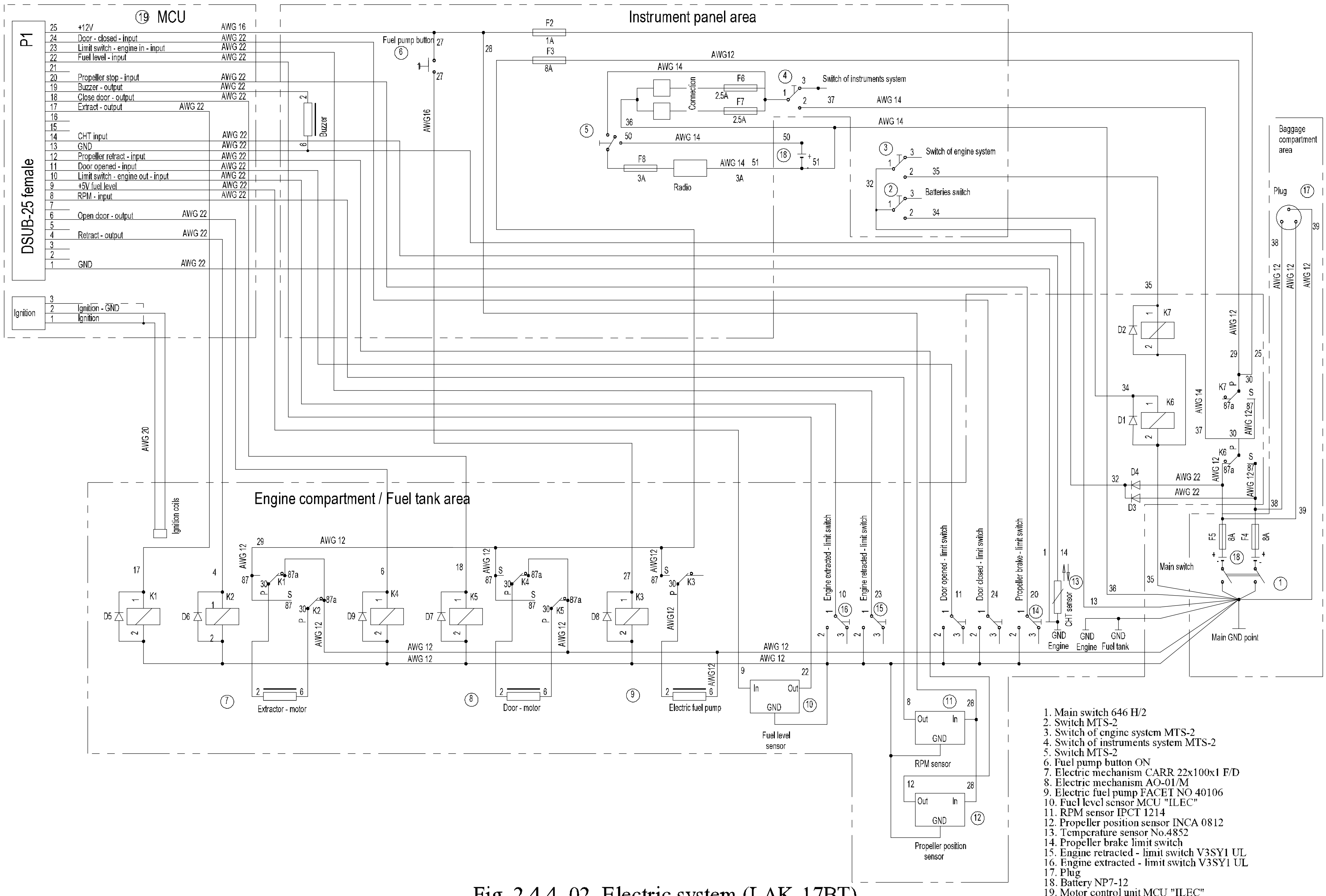
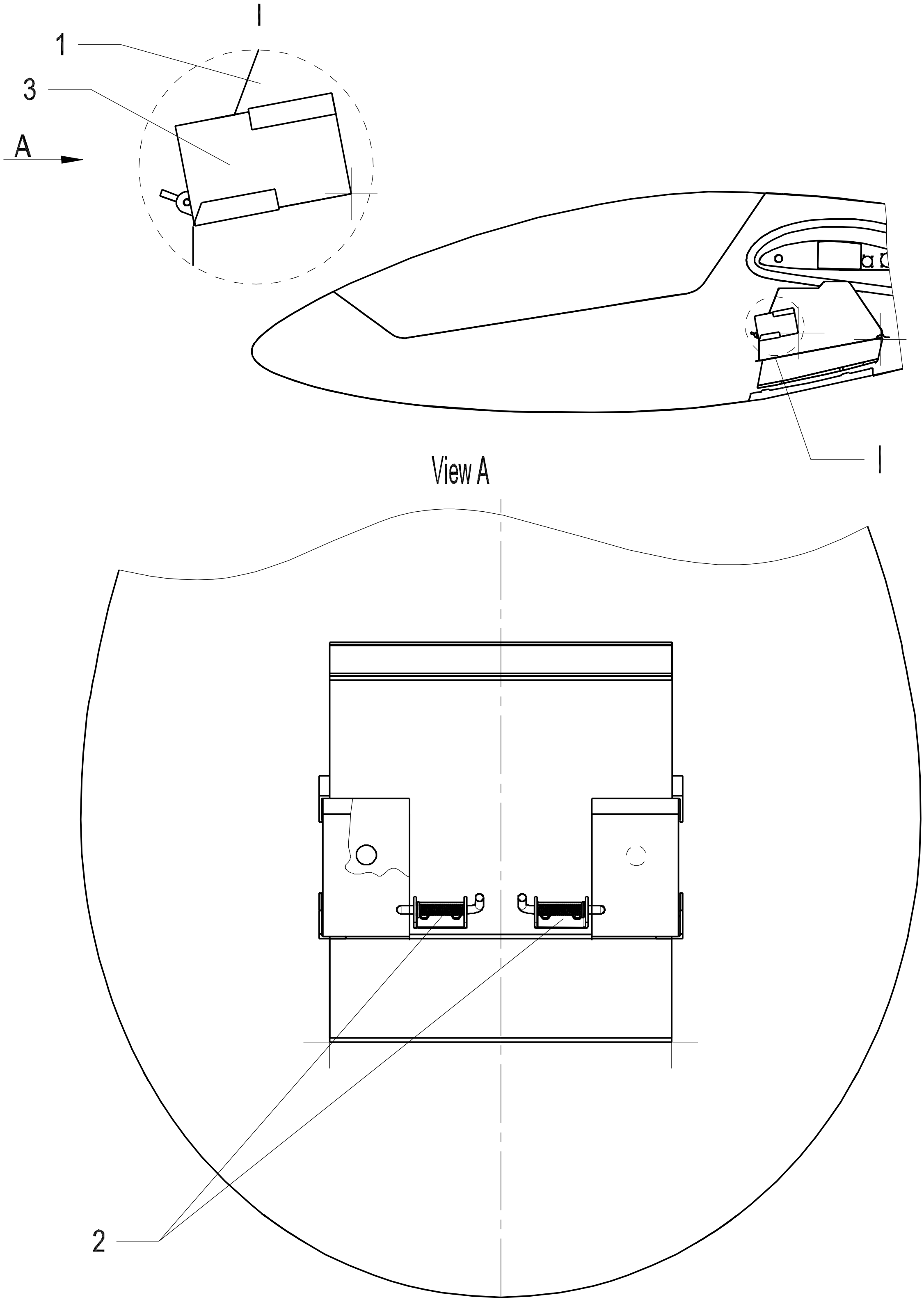


Fig. 2.4.4_02. Electric system (LAK-17BT)



1.Box LAK-17A 10000008
2.Latch LAK-17B 72 10 01 00SB
3.Battery NP7-12

Fig. 2.4.4_03.Electric system (LAK-17BT)

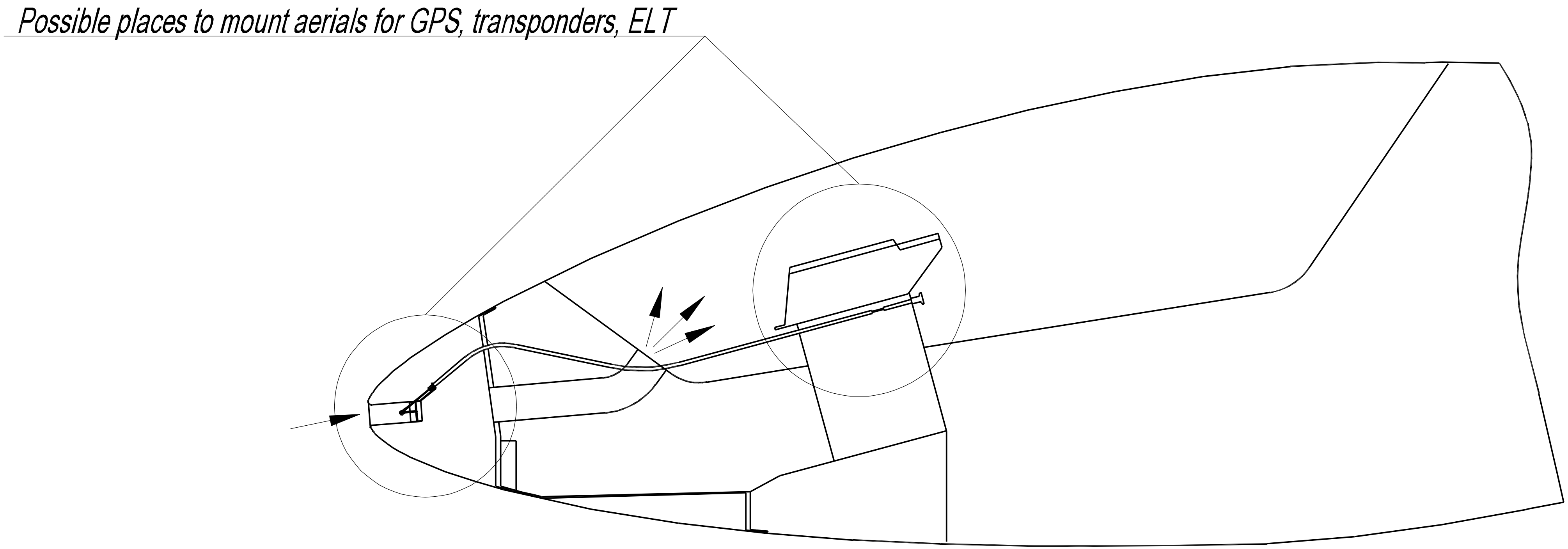


Fig. 2.4.4_04. Possible places to mount aerials for GPS, transponders, ELT

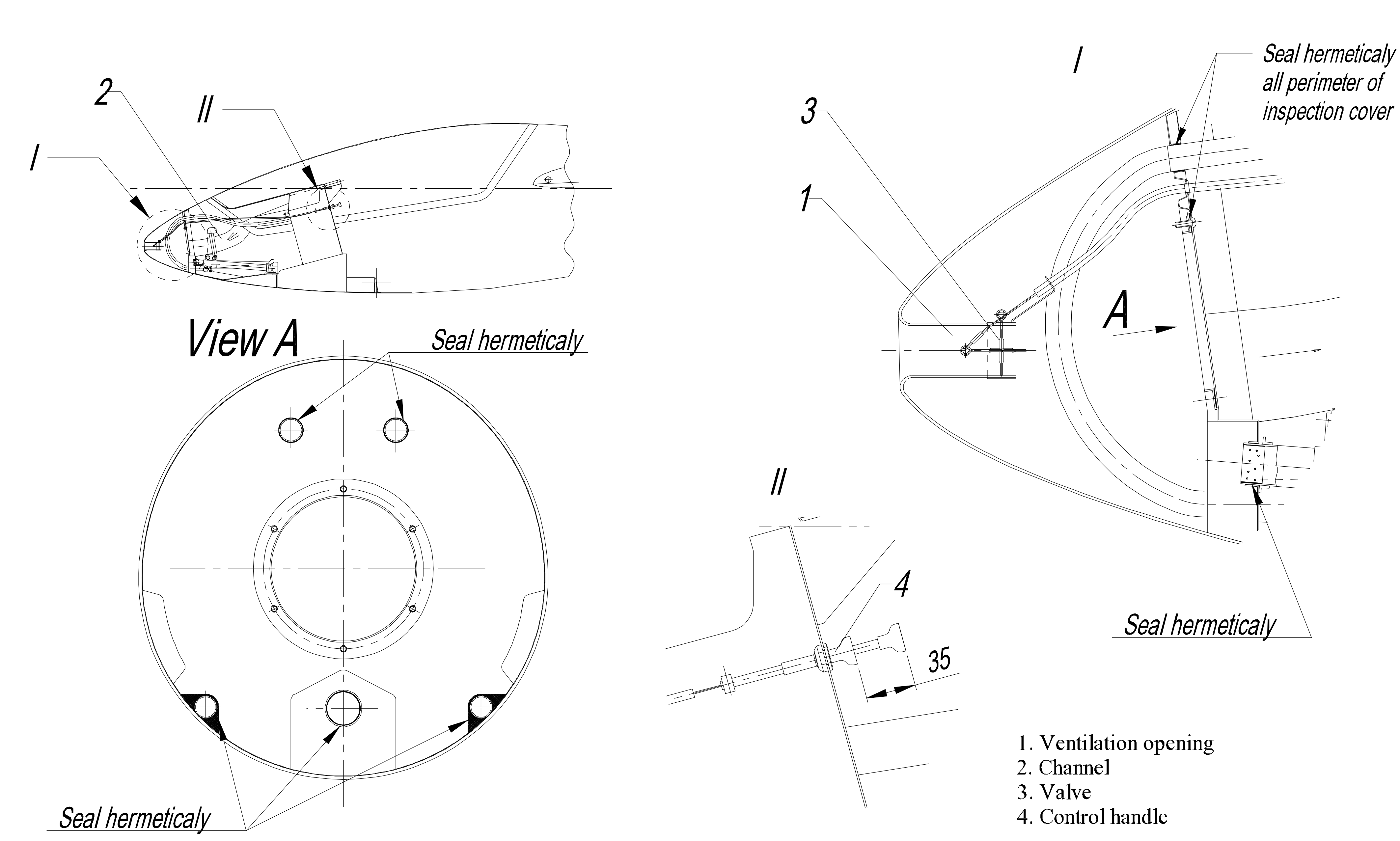
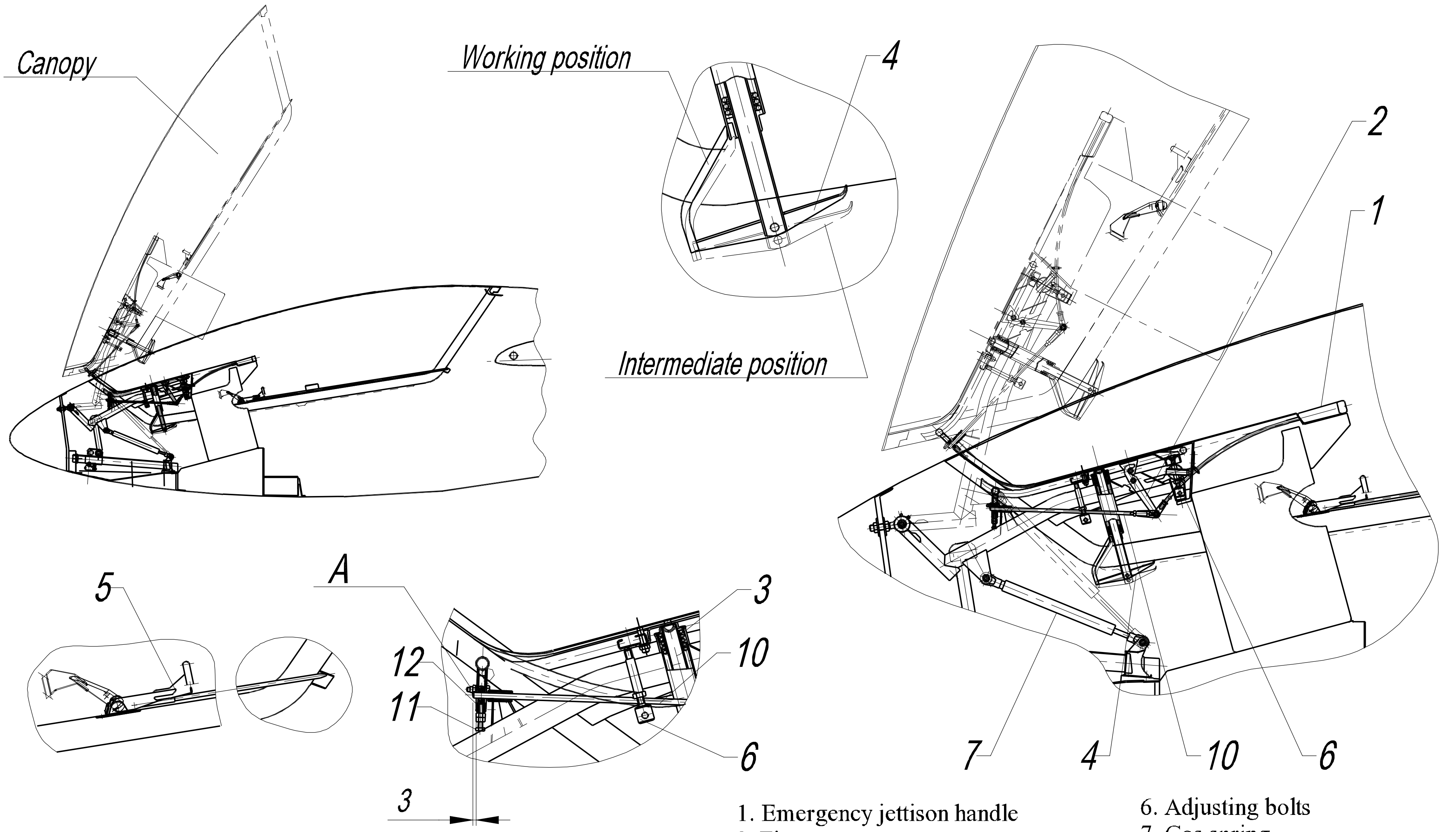


Fig. 2.4.5_01. Ventilation system



1. Emergency jettison handle
2. Fixator
3. Spring
4. Handle of spring type mechanism
5. Opening handle
6. Adjusting bolts
7. Gas spring
8. Canopy holder
9. Support
10. Pins
11 Adjusting bolt
12. Fixator

Fig. 2.4.6_01. Cockpit canopy

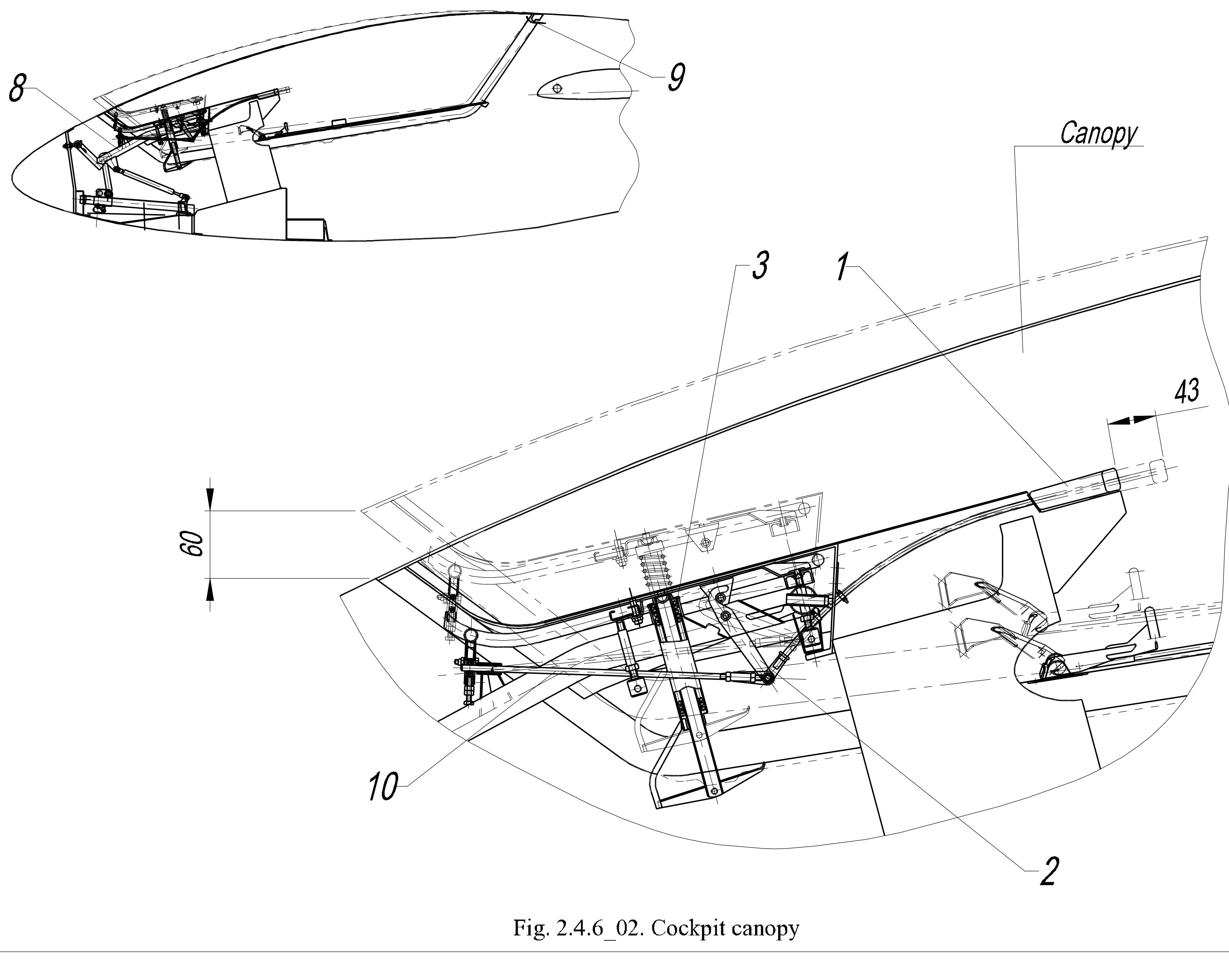
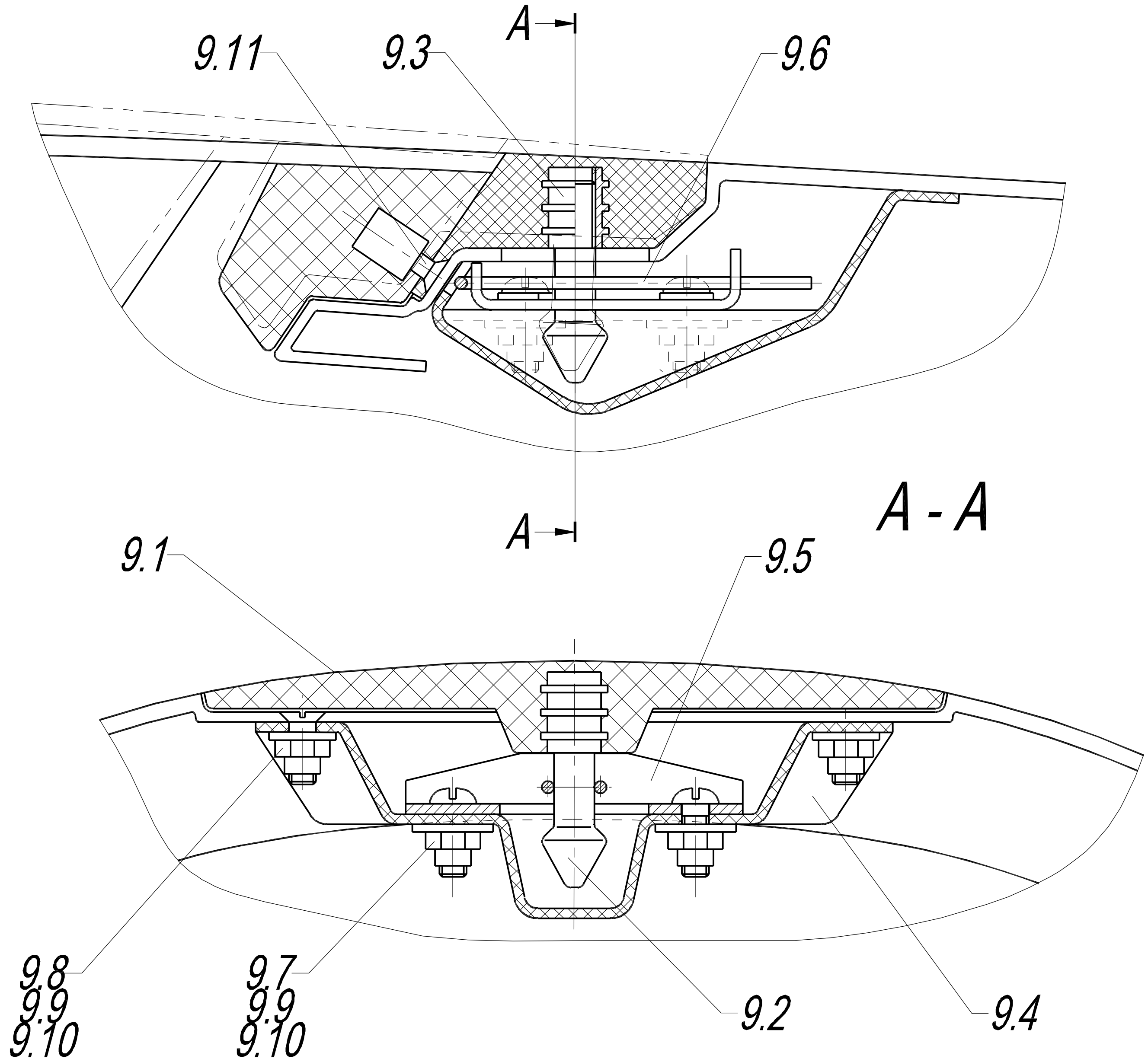


Fig. 2.4.6_02. Cockpit canopy



9.1. Support
9.2. Pin
9.3. Hub
9.4. Box
9.5. Plate
9.6. Spring
9.7. Bolt
9.8. Bolt
9.10. Washer
9.11. Bolt

Fig. 2.4.6_03. Cockpit canopy

1. Engine SOLO 2350
2. Propeller LAK-P3-90
3. MCU LAK-17BT
4. Relays block
5. Batteries
6. Fuel tank
7. Power-plant extension/retraction system
8. Propeller brake
9. Propeller brake controls
10. De-compressor valves
11. De-compressor valves controls
12. Fuel shut-off valve
13. Fuel drain
14. Power-plant bay door system
15. Engine retaining cable

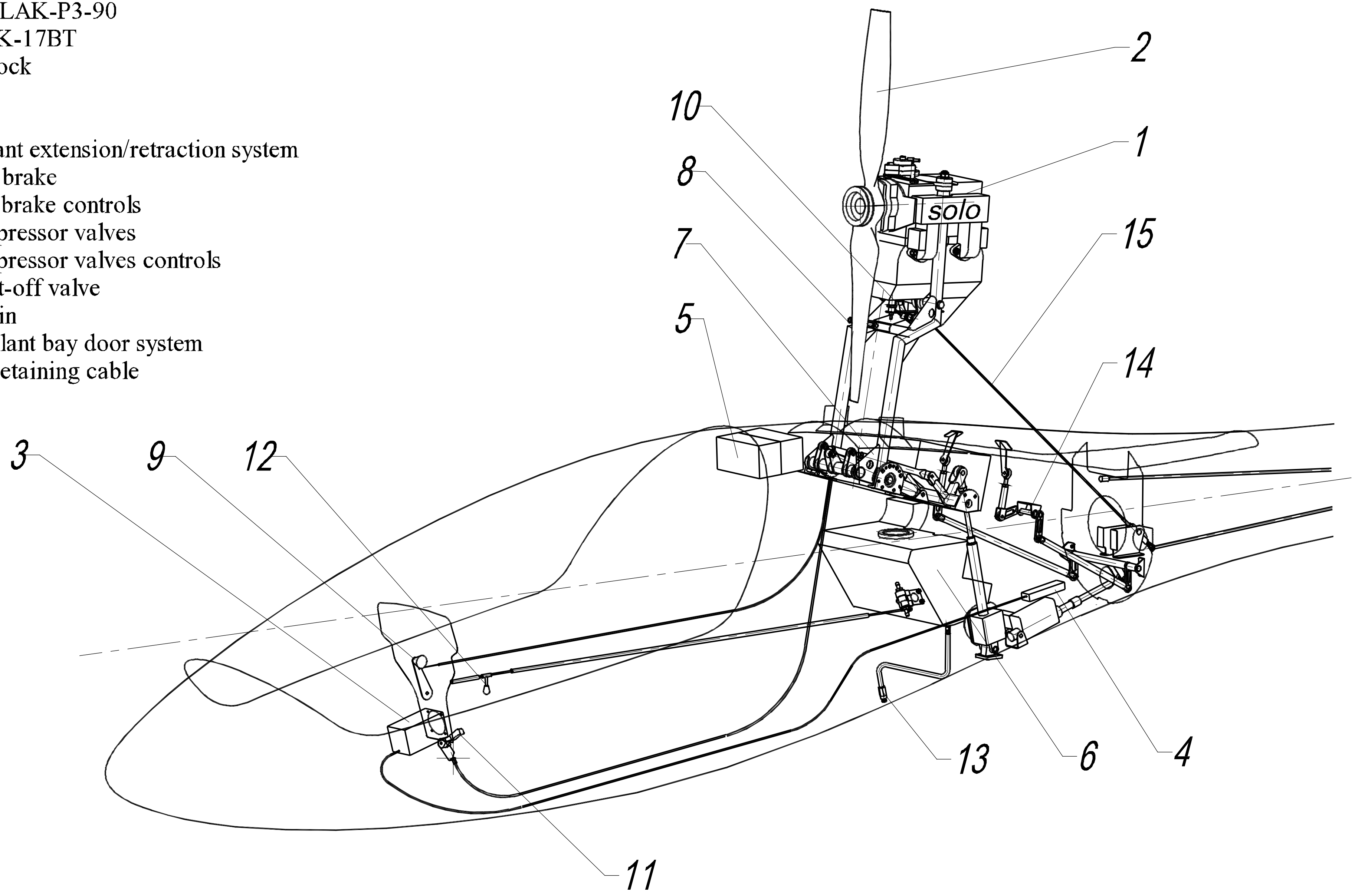


Fig. 2.5.1_01. General layout

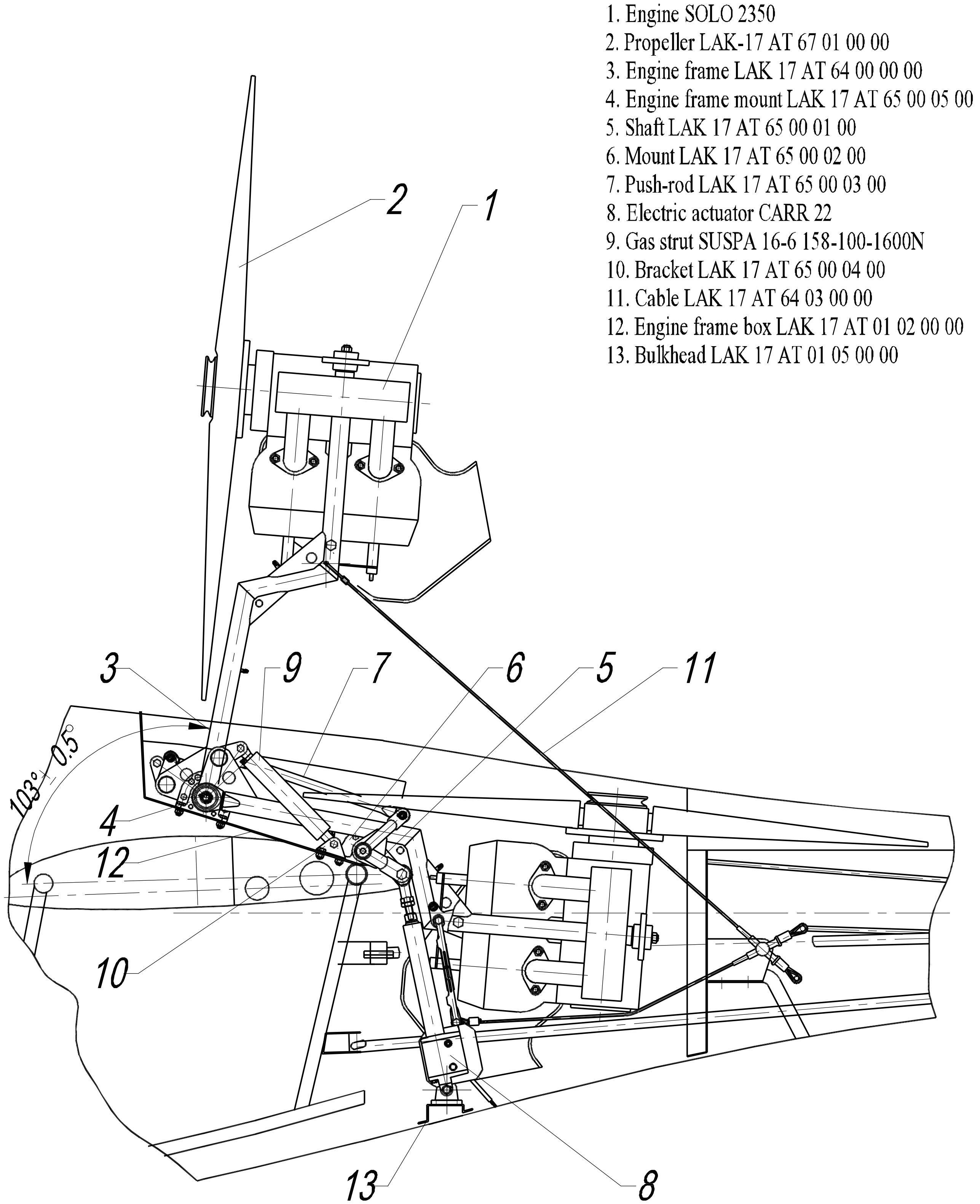
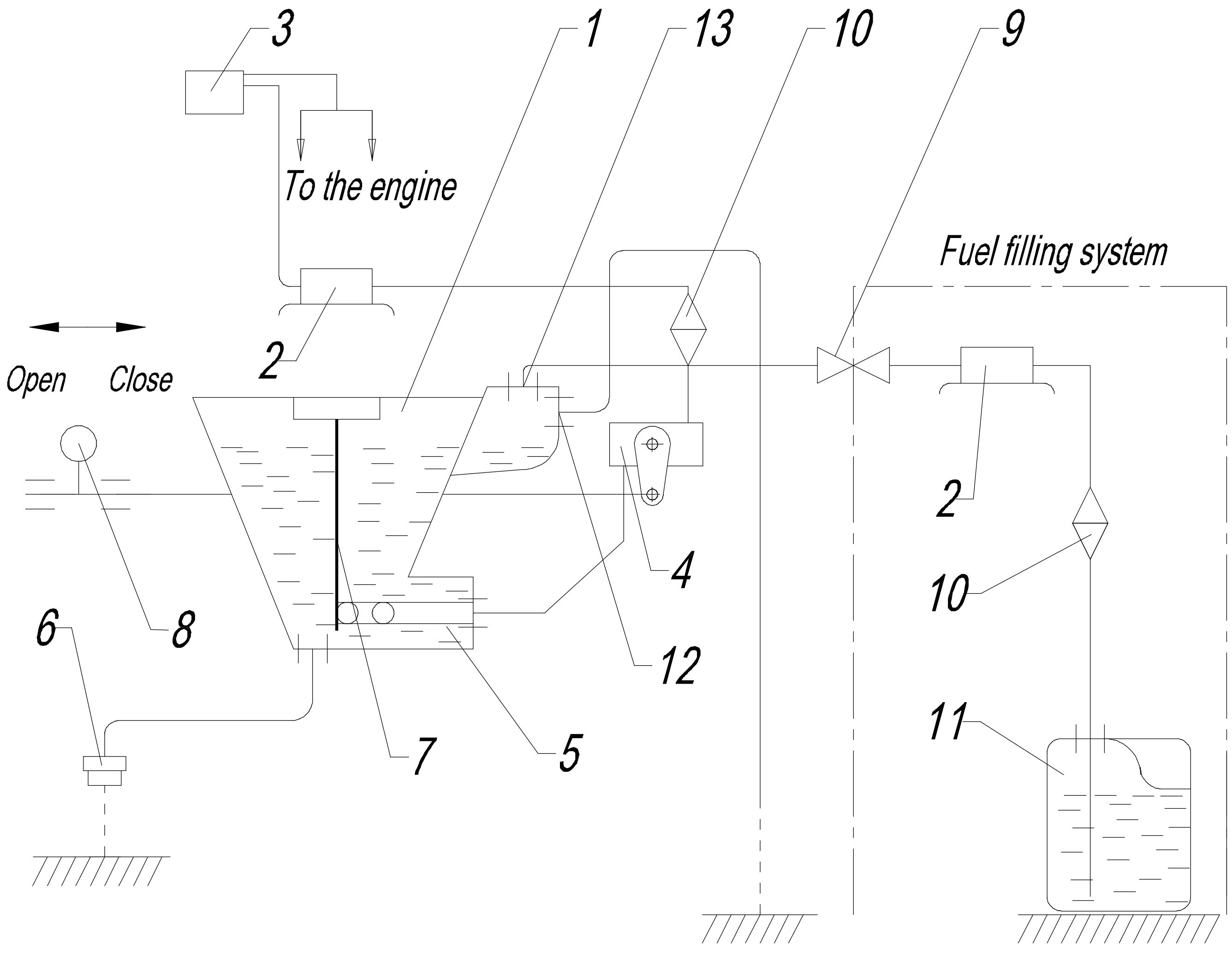
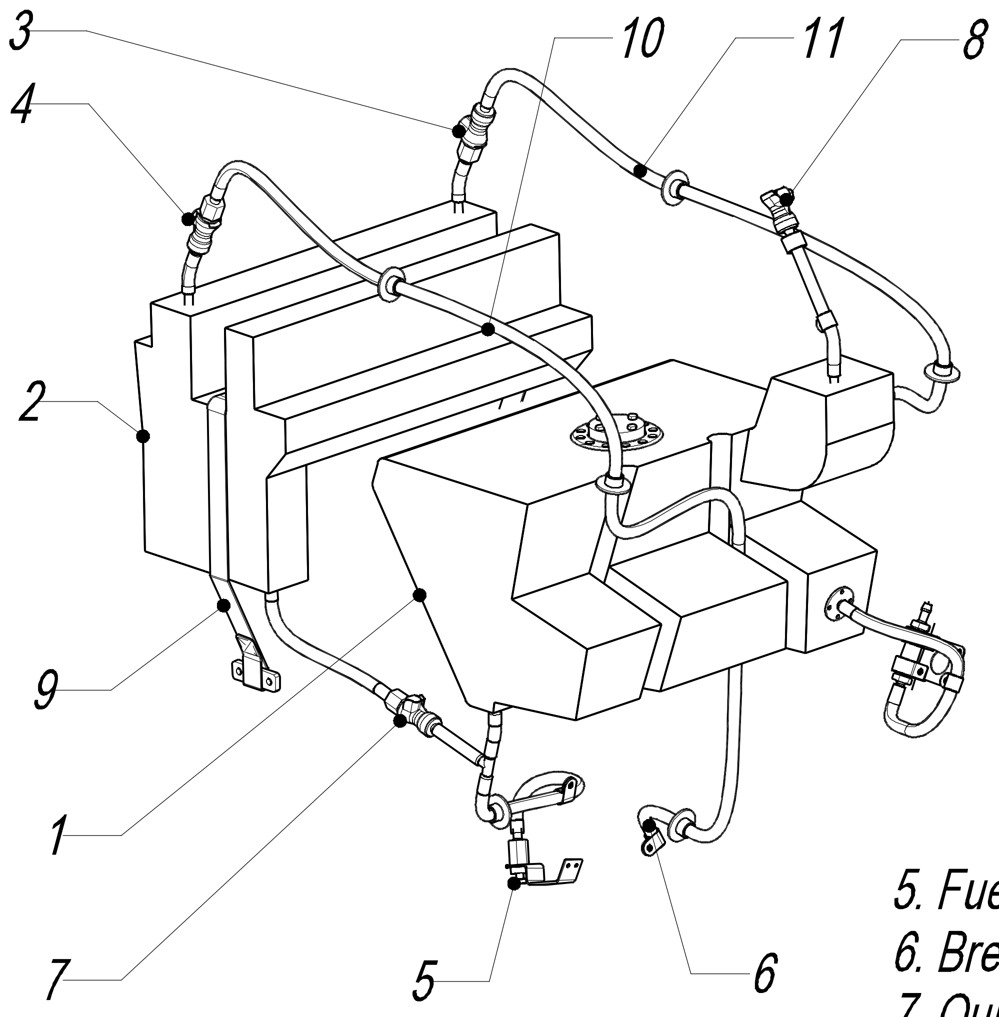


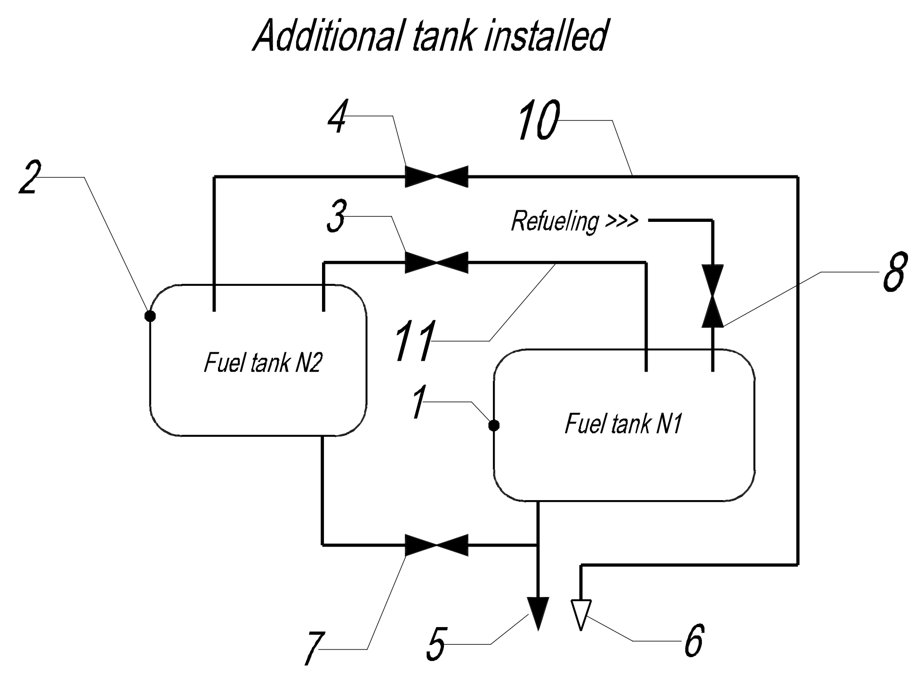
Fig. 2.5.2_01. Engine extraction/retraction system

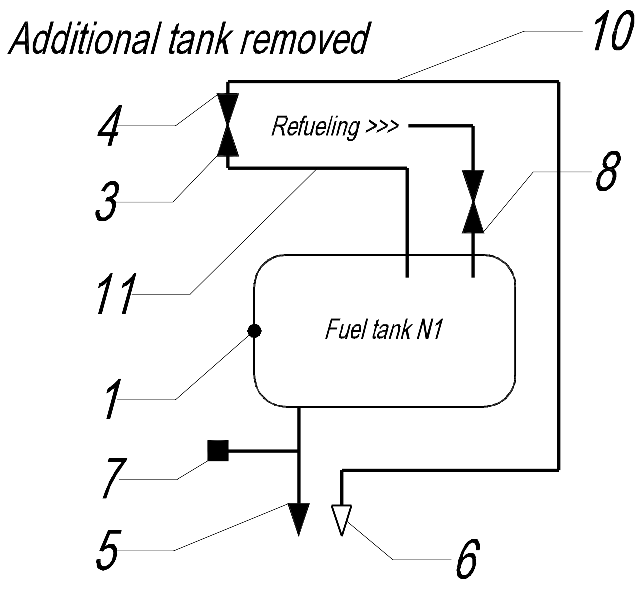


1. Fuel tank LAK 17 AT 61 00 01 00 SB
2. Electric fuel pump LAK 17 AT FACET NO 40106
3. Vacuum fuel pump Bing 80 - 203A
4. Fuel shut-off valve ASS&C P/N 05 - 23325
5. Fuel strainer LAK 17 AT 61 00 02 01
6. Fuel drain ASS&C CAV - 110 P/N 05 - 17700
7. Fuel level sensor MCU 'ILEC'
8. Fuel valve control handle LAK 17 AT 61 00 02 02
9. Fast connection ASS&C P/N QD001
10. Fuel filter ASS&C P/N FUF01
11. Fuel can
12. Fuel breather nipple LAK 17 AT 61 00 02 03
13. Fuel filling nipple LAK 17 AT 61 00 02 03

Fig. 2.5.3_01. Fuel system (LAK-17BT)

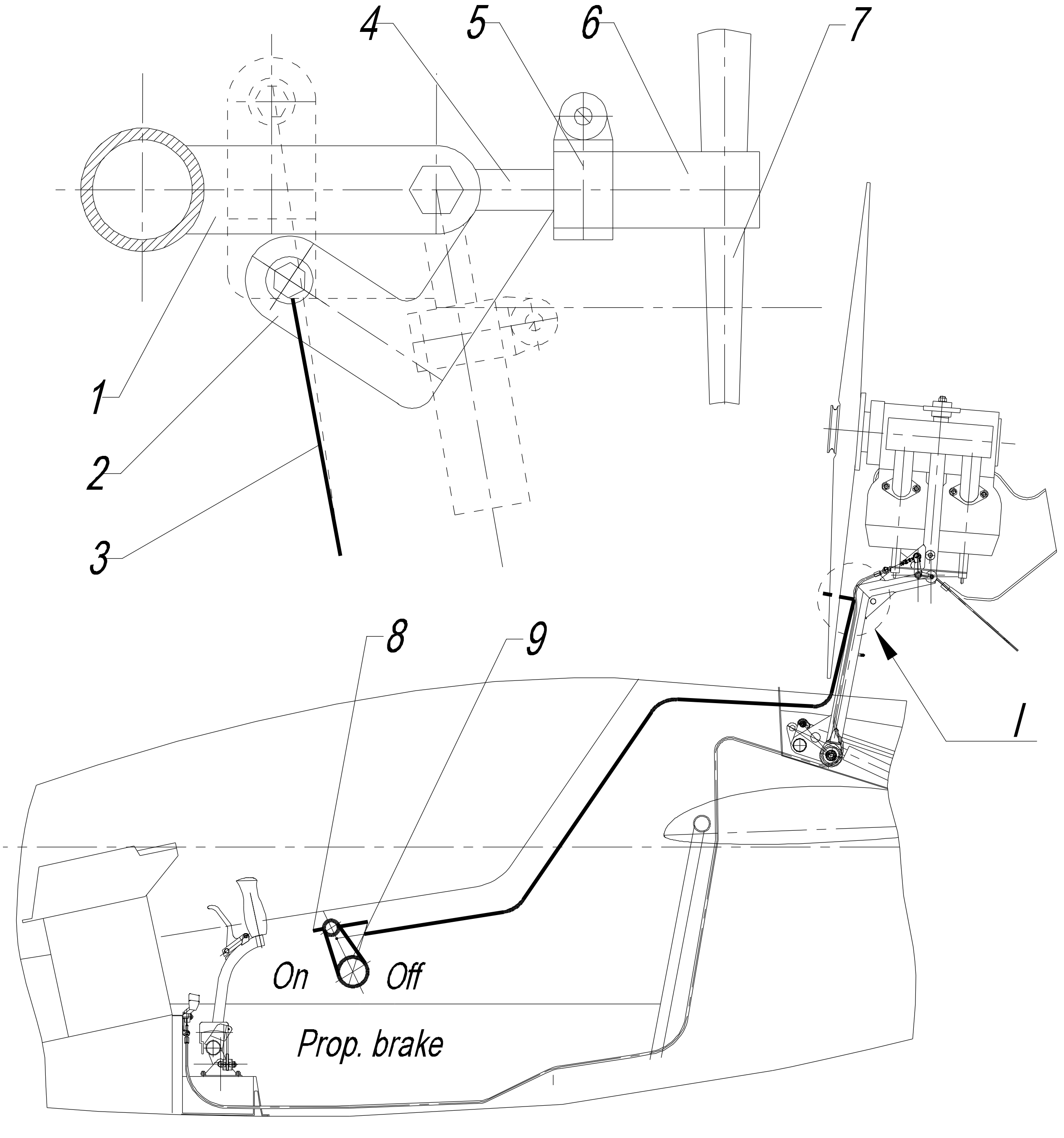






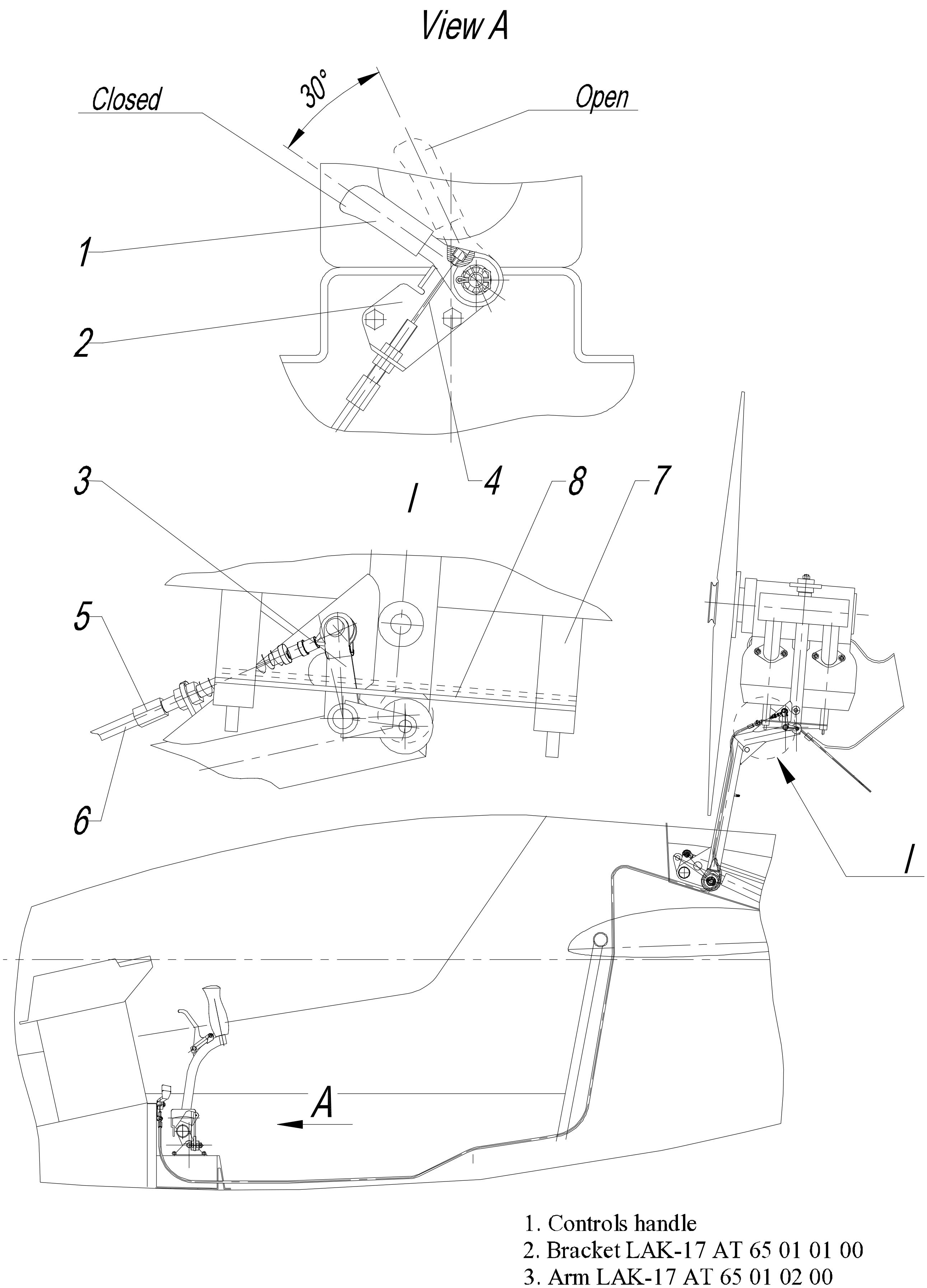
1. Main fuel tank
2. Additional fuel tank
3. Quick - disconnect coupling
4. Quick - disconnect coupling
5. Fuel drain
6. Breather
7. Quick - disconnect coupling
8. Filler coupling
9. "VELCRO" fastening belt
10. Vent line N2
11. Vent line N1

Fig. 2.5.3_02. Fuel system scheme (additional fuel tank installed)



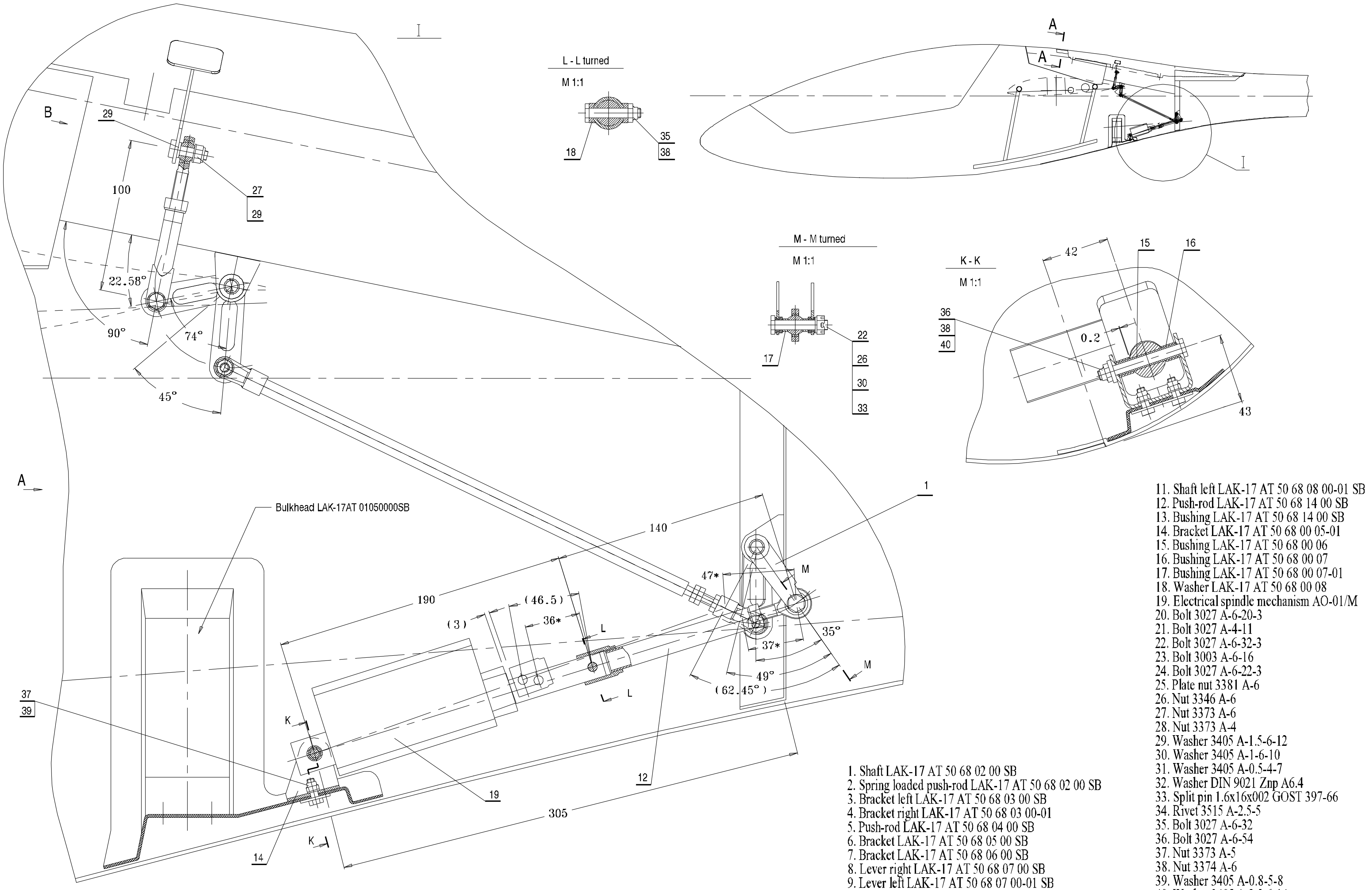
1. Engine frame
2. Arm
3. Cable
4. Brake rod
5. Clamp
6. Rubber hose
7. Propeller P3 LAK 17 AT 67 01 00 00 SB
8. Propeller brake handle fixig plate
9. Propeller brake handle

Fig. 2.5.4_01. Propeller brake



1. Controls handle
2. Bracket LAK-17 AT 65 01 01 00
3. Arm LAK-17 AT 65 01 02 00
4. Cable LAK-17 AT 65 01 03 00
5. Bowden end LAK-17 A 58 01 01 04
6. Bowden 3 OSt 1 10173-71
7. De-compressor
8. De-compressor plate

Fig. 2.5.5_01. Controls of de-compressing valves



1. Shaft LAK-17 AT 50 68 02 00 SB
2. Spring loaded push-rod LAK-17 AT 50 68 02 00 SB
3. Bracket left LAK-17 AT 50 68 03 00 SB
4. Bracket right LAK-17 AT 50 68 03 00-01
5. Push-rod LAK-17 AT 50 68 04 00 SB
6. Bracket LAK-17 AT 50 68 05 00 SB
7. Bracket LAK-17 AT 50 68 06 00 SB
8. Lever right LAK-17 AT 50 68 07 00 SB
9. Lever left LAK-17 AT 50 68 07 00-01 SB
10. Shaft right LAK-17 AT 50 68 08 00 SB
11. Shaft left LAK-17 AT 50 68 08 00-01 SB
12. Push-rod LAK-17 AT 50 68 14 00 SB
13. Bushing LAK-17 AT 50 68 14 00 SB
14. Bracket LAK-17 AT 50 68 00 05-01
15. Bushing LAK-17 AT 50 68 00 06
16. Bushing LAK-17 AT 50 68 00 07
17. Bushing LAK-17 AT 50 68 00 07-01
18. Washer LAK-17 AT 50 68 00 08
19. Electrical spindle mechanism AO-01/M
20. Bolt 3027 A-6-20-3
21. Bolt 3027 A-4-11
22. Bolt 3027 A-6-32-3
23. Bolt 3003 A-6-16
24. Bolt 3027 A-6-22-3
25. Plate nut 3381 A-6
26. Nut 3346 A-6
27. Nut 3373 A-6
28. Nut 3373 A-4
29. Washer 3405 A-1.5-6-12
30. Washer 3405 A-1-6-10
31. Washer 3405 A-0.5-4-7
32. Washer DIN 9021 Znp A6.4
33. Split pin 1.6x16x002 GOST 397-66
34. Rivet 3515 A-2.5-5
35. Bolt 3027 A-6-32
36. Bolt 3027 A-6-54
37. Nut 3373 A-5
38. Nut 3374 A-6
39. Washer 3405 A-0.8-5-8
40. Washer 3405 A-2.5-6-14

Fig. 2.5.6_01. Power-plant bay door

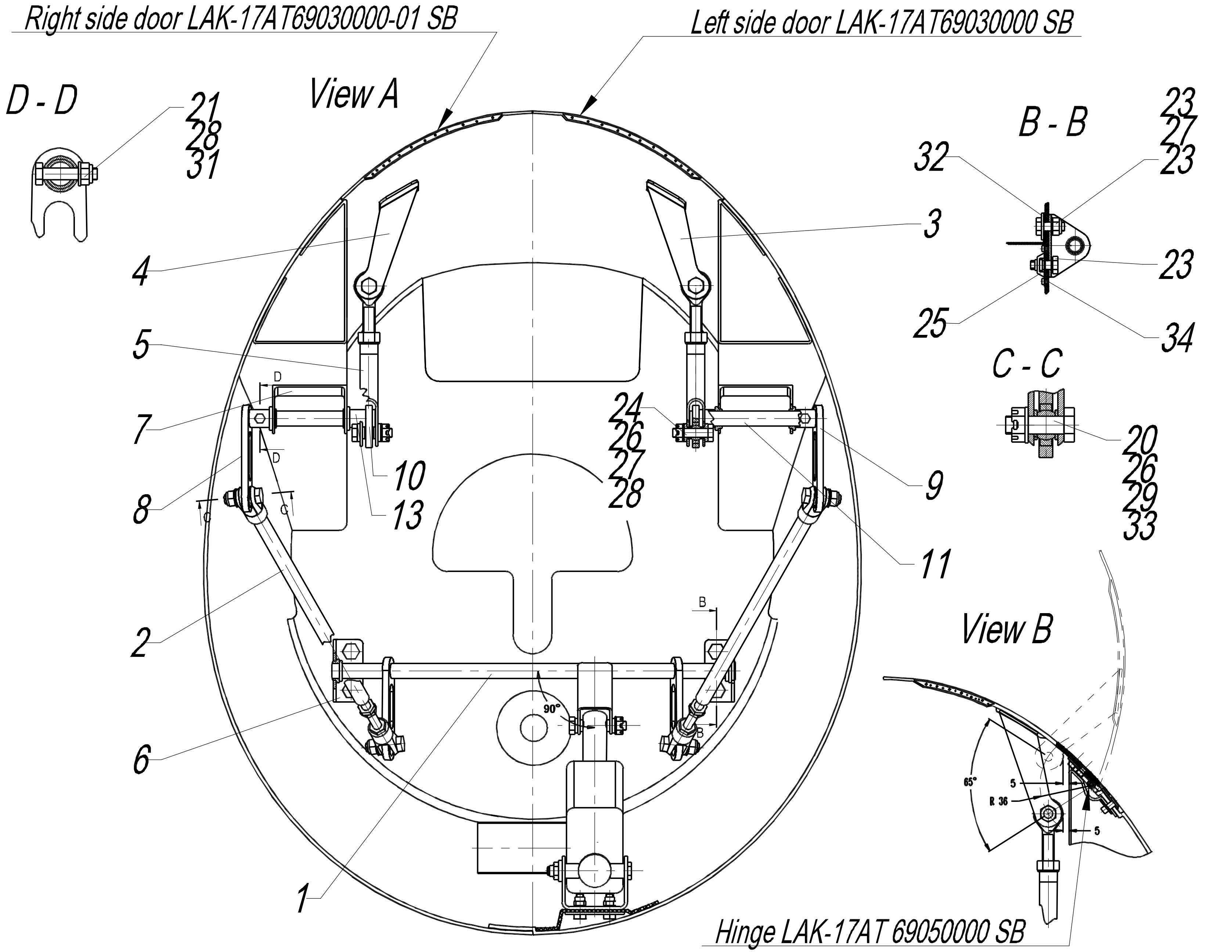


Fig. 2.5.6_02. Power-plant bay door

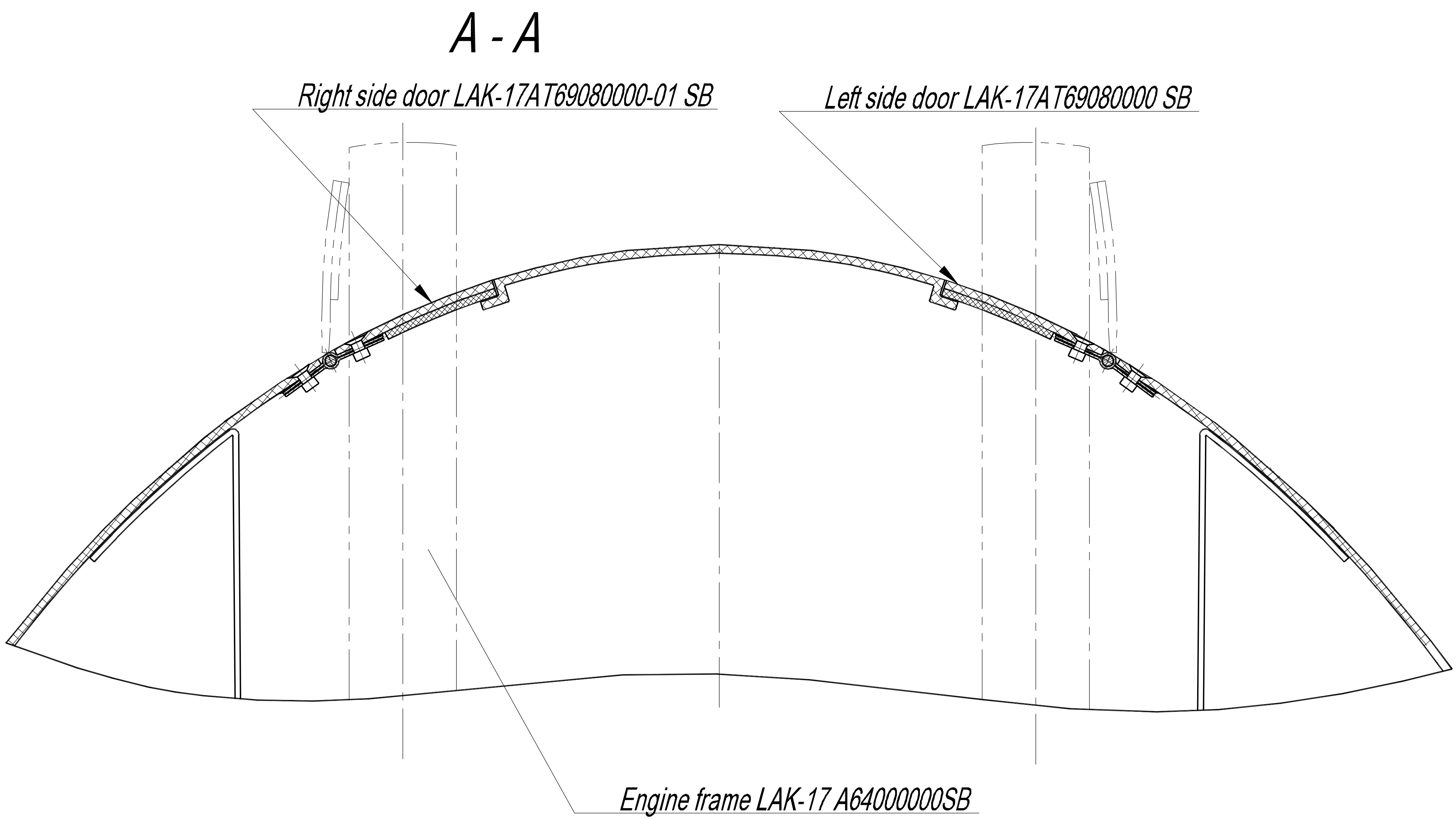


Fig. 2.5.6_03. Power-plant bay door

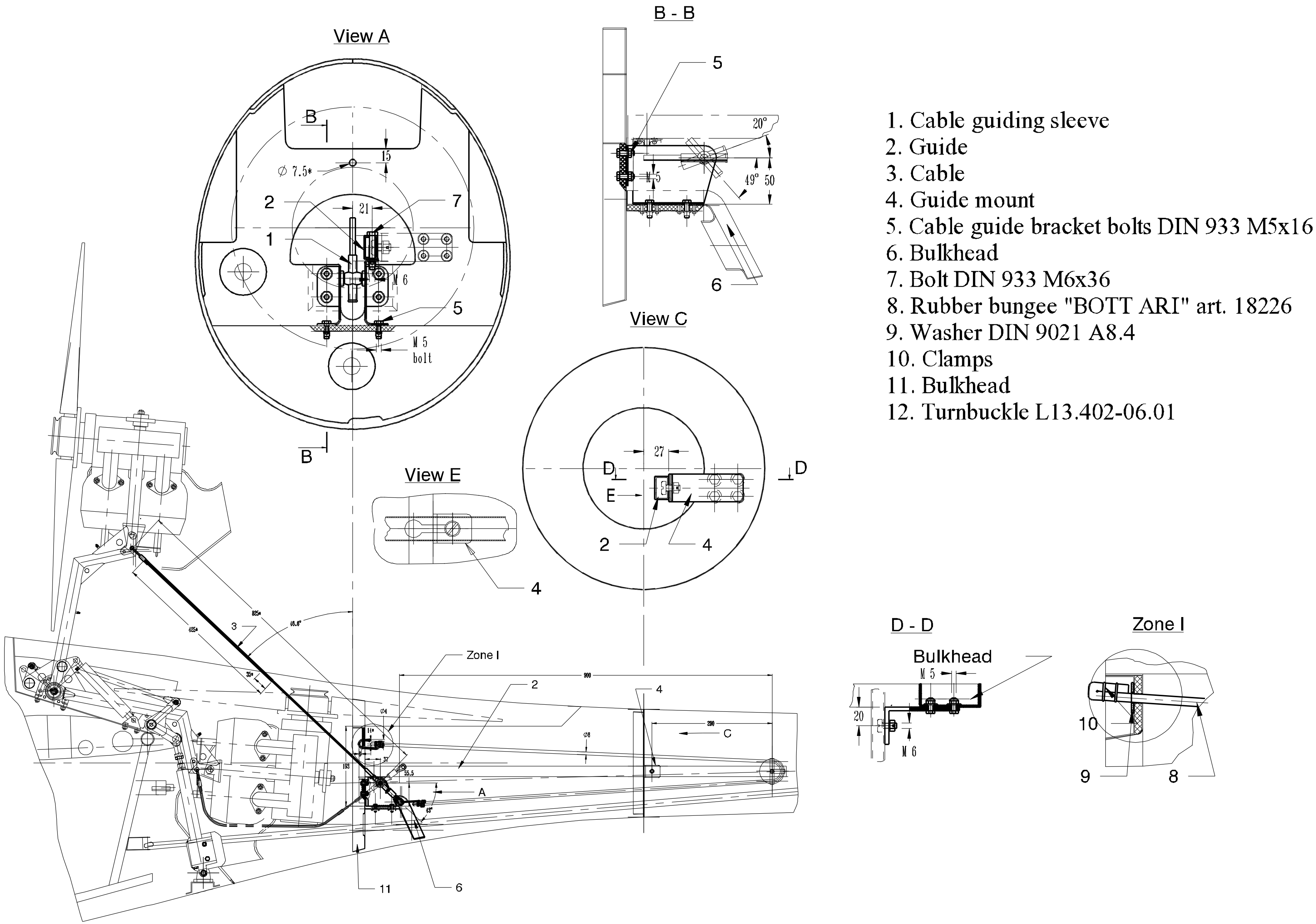


Fig. 2.5.7_01. Engine support cable

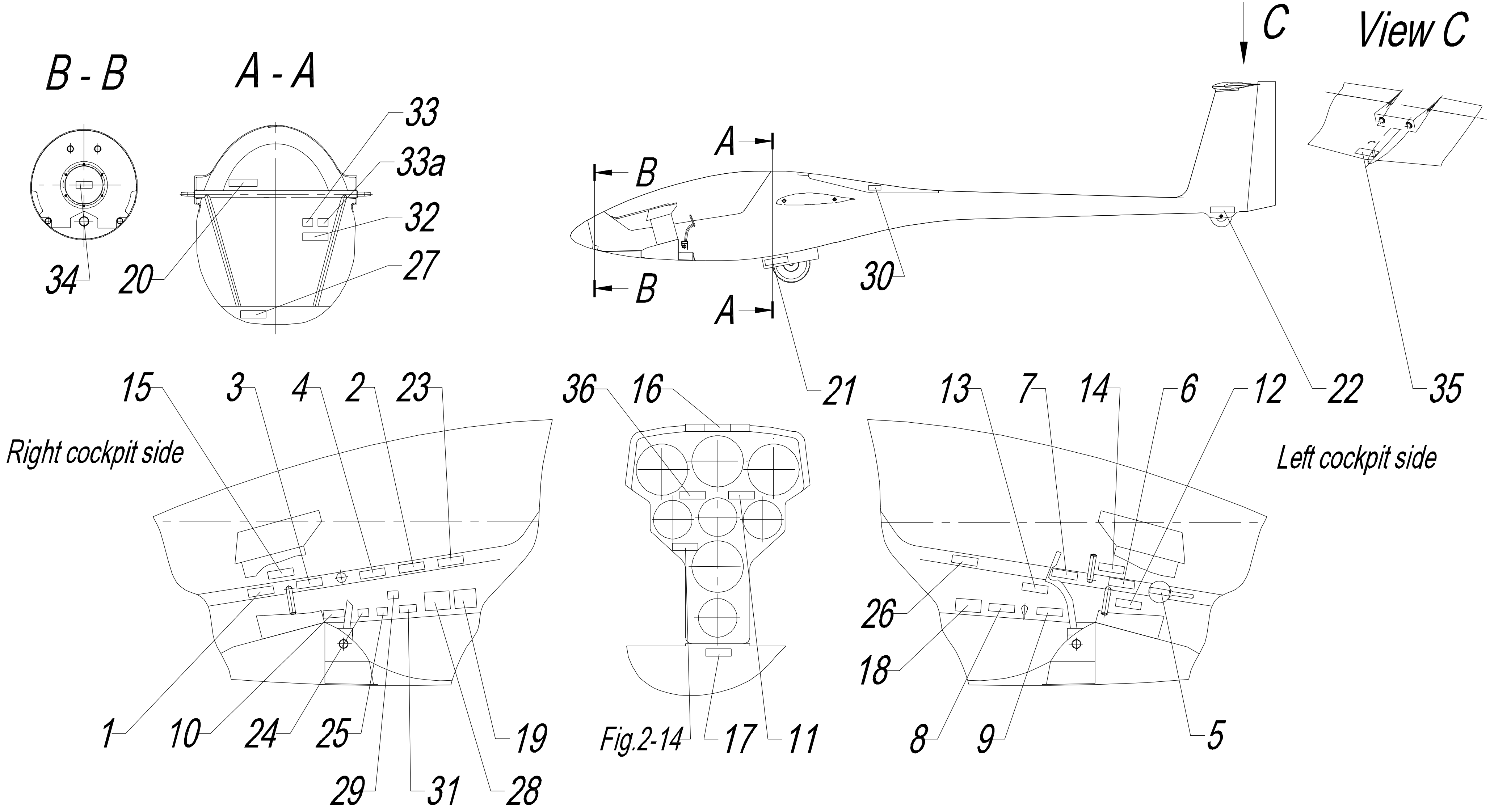
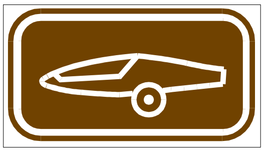
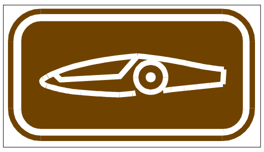


Fig. 2.6._01. Placards and marking of controls

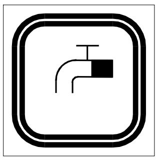
1.Landing gear extended



2.Landing gear retracted

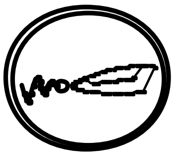


3.Water ballast closed

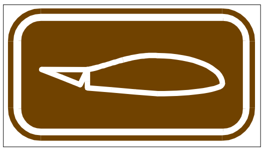


4.Water ballast opened

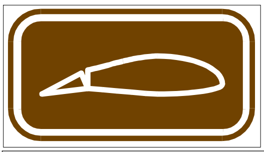
5.Tow release



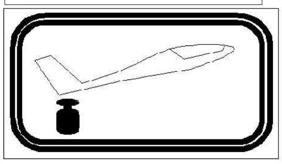
6.Negative flaps position



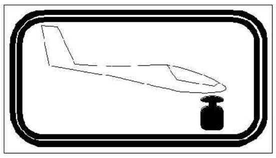
7.Positive flaps position



8.Trimmer in pitching position

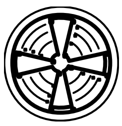


9.Trimmer in diving position



10.Pedals adjustment

11. Cockpit ventilation



12.Air brakes retracted

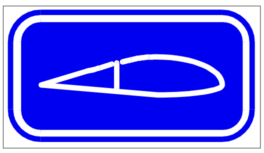
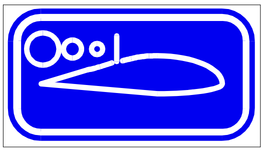
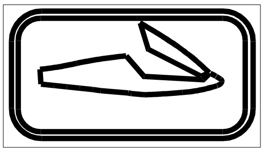


Fig.2.6_02. Placards and marking of controls

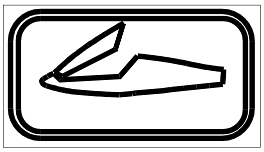
13. Air brakes extended



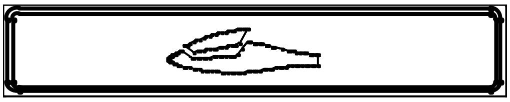
14. Canopy opening handle



15. Canopy opening handle



16.Canopy emergency jettison



17. De-compressor valve

De-compressor → Open

18. Before Take Off Check List

Before take-off checklist
• Preflight inspection completed
• Lead ballast (for correct cockpit weight)
• Tail dolly removed
• Canopy jettison unlocked
• Seat back and rudder pedals adjusted
• Safety harness secured
• All controls in reach
• Positive control check
• Altimeter set
• Air brakes closed and locked
• Trim set
• Fuel Valve Closed
• Canopy closed and latched
• Wind direction
Check list for powered flight
• Fuel quantity checked
• Engine installation checked

19. Table of operational limitations

LAK-17A 18m - AIR SPEED DATA & LOADING PLACARD / SALES DESIGNATION LAK-17B						
Speed IAS:		km/h	kts	**Masses and loads**	kg	lbs
Never exceed	V_{NE}	275	148	Max. mass with water ballast	600	1322.8
Rough air	V_{RA}	190	102	Maximum cockpit load	110	242
Manoeuvring	V_A	190	102	Minimum cockpit load		
Aerotow	V_T	160	86			
Winch-launch	V_W	140	76	Recommended weak link	780 daN	1753 lbs
Landing gear oper.	V_L	205	110			
				Aerobatic manoeuvres are not permitted		

LAK-17AT 18m - AIR SPEED DATA & LOADING PLACARD/SALES DESIGNATION LAK-17BT						
Speed IAS:		km/h	kts	**Masses and loads**	kg	lbs
Never exceed	V_{NE}	275	148	Max. mass with water ballast	600	1322.8
Rough air	V_{RA}	190	102	Maximum cockpit load	110	242
Manoeuvring	V_A	190	102	Minimum cockpit load		
Aerotow	V_T	160	86			
Winch-launch	V_W	140	76	Recommended weak link	780 daN	1753 lbs
Landing gear oper.	V_L	205	110			
Power-plant oper.	V_{PE}	160	86			
Max. engine ext/ret	V_{POmax}	110	60	**Aerobatic manoeuvres are not permitted**		
Min. engine ext/ret	V_{POmin}	90	49			

Fig.2.6_03. Placards and marking of controls

20. Baggage limitation table

Max baggage weight 7 kg (15,4 lbs)

21. Table of main wheel tyre pressure

Pressure in a main wheel tyre from 2,3 to 2,5 bar

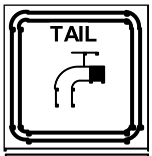
22. Table of tail wheel tyre pressure

Pressure in a tail wheel tyre from 1,8 to 2,0 bar

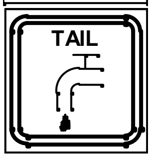
23. The airspeed limitation placard

m - **Altitude** - ft		km/h - **V_{NE}, IAS** - kts	
4000	13100	275	148
5000	16400	260	140
6000	19680	245	132
8000	26250	220	119
10000	32800	195	105

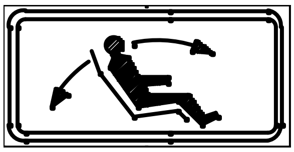
24. Fin water ballast closed (optional)



25. Fin water ballast open (optional)



26. Seat back adjustment



27. Manufacture data plate

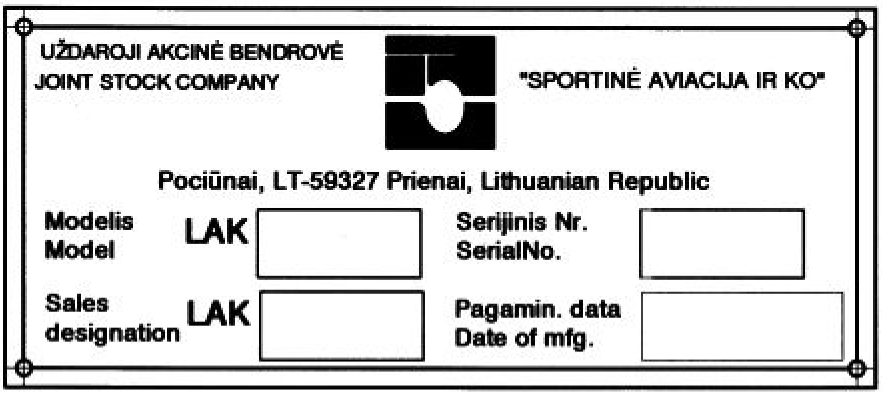
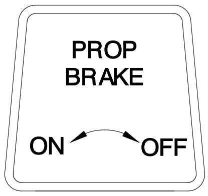


Fig. 2.6_04. Tables and marking of controls

28. Engine extract / /start

Engine extract / start
• **Engine electr.** switch ON
• **Extract** the engine switch ON
• **Fuel Valve** OPEN
• Check if engine is extracted
• Remove **Propeller Brake** OFF
• Switch the **Ignition** ON
• Press **Fuel Pump** for few sec.
• **De-compressor** valve OPEN
• Increase the speed.
Stop / retract the engine
• **Ignition** OFF
• **De-compressor** OPEN and release. Repeat if needed.
• **Propeller Brake** ON
• Close **Fuel Valve**
• Check prop is in right position
• **Retract** the engine switch ON
õ Engine electr. switch OFF

29. Propeller brake



30. Fuel type

Fuel - two stroke mixture: Min. 95 RON; AVGAS 100LL / two stroke oil Castrol Super TT **30:1**
Fuel tank capacity = 7.5 ltr. (2 US gal.) Usable amount of fuel = 7.2 ltr. (1.9 US gal.)

31. Fuel valve

Fig.2.6_05. Placards and marking of controls

32. Batteries charge

Charge
Batt 1; Batt 2

33. Battery fuse

Fuse-Batt 1

33a. Battery fuses

Fuse-Batt 2

34. Nose ballast (optional)

Nose ballast max. permitted 6 kg (13.2 lbs)	
Reduction of the min. cockpit load by:	**Lead weight required**
5 kg (11 lbs)	2,0 kg (4,4 lbs)
10 kg (22 lbs)	4,0 kg (8,8 lbs)
15 kg (33 lbs)	6,0 kg (13,2 lbs)

35. Stabilizer bolt

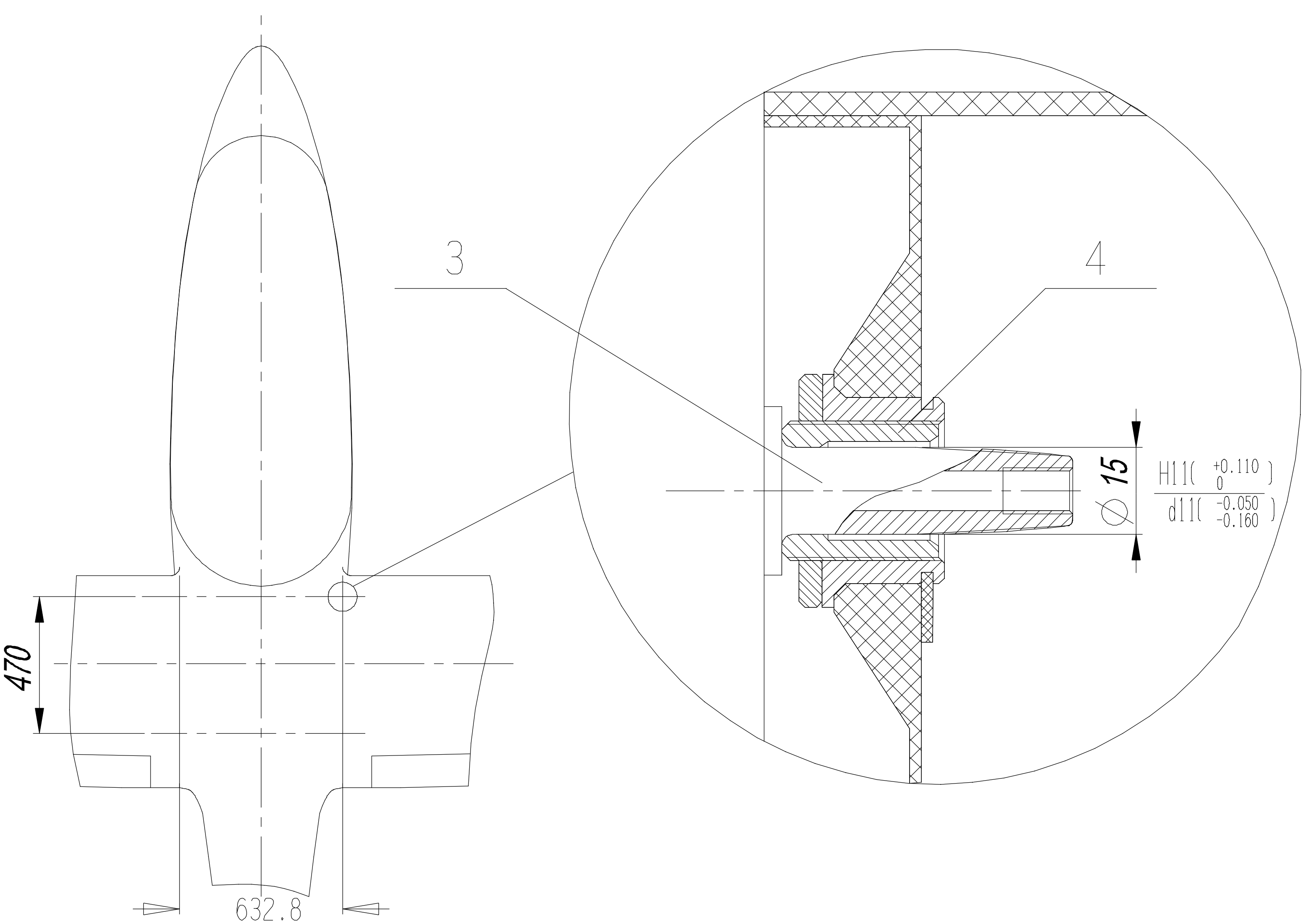
Pull-out bolt locking pin ⇩ first!

36. RPM indication (LED) meanings

located as close as possible to MCU:

RPM indications	
Green	4500…5800
Yellow	5800…6500
Red	> 6500

Fig.2.6_06. Placards and marking of controls



1. Connection pin of wings spars
2. Spar hub
3. Pin of fuselage
4. Wing adjustable hub
5. Fin pin
6. Stabilizer hub
7. Stabilizer fixing hub
8. Fin hub
9. Wing tip hub
10. Pin of wing end rib
11. Holder of wing tip

Fig. 2.7.1_01. Alowed clearances of connection of sailplane aggregates

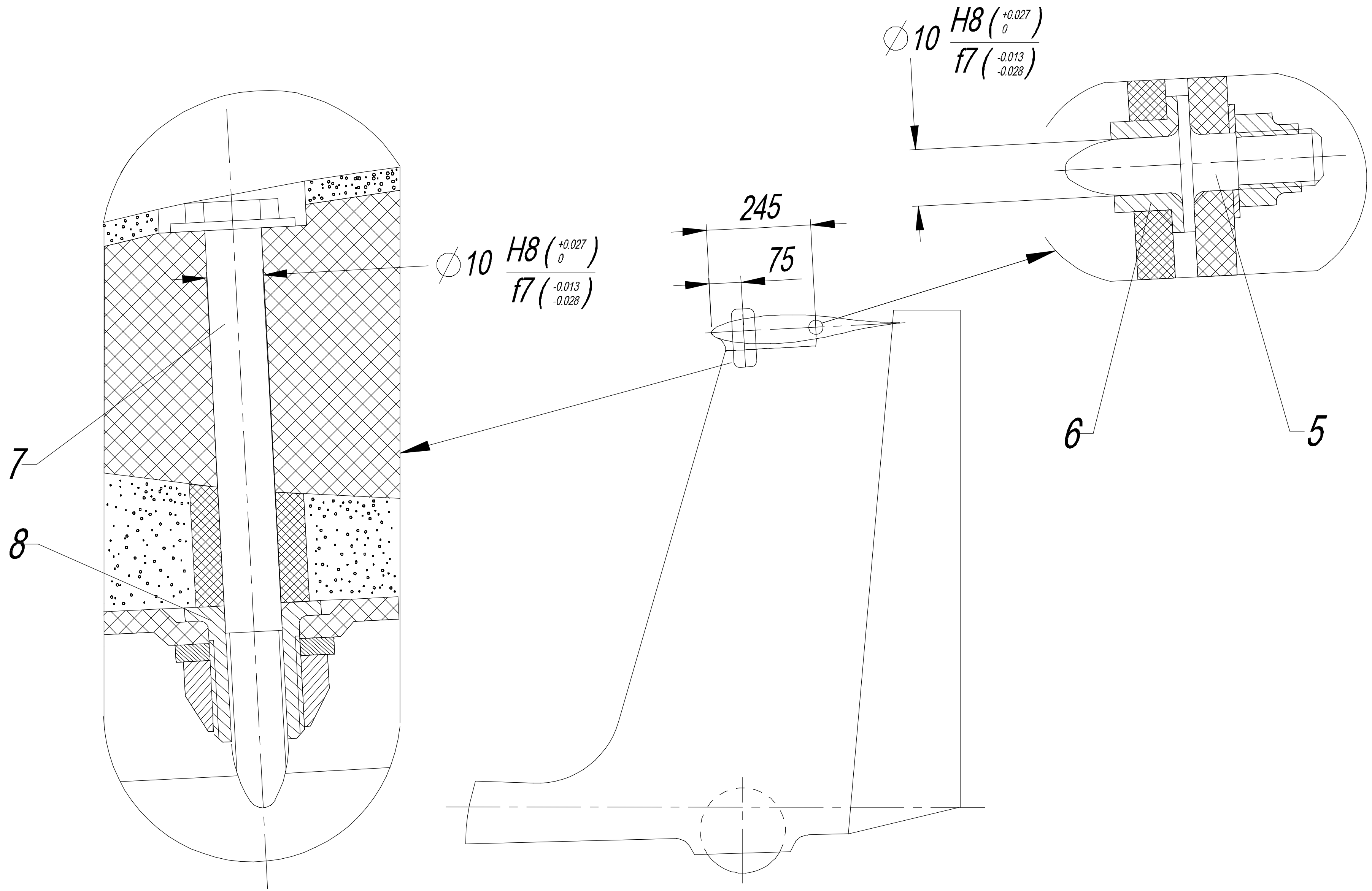


Fig. 2.7.1_02. Allowed clearances of connections of sailplane aggregates

SECTION 3

Sailplane maintenance

Page

3.1 Sailplane current maintenance

3.1.1 Daily inspection

Note: Check the sailplane technical log-book and airworthiness certificate.

The daily inspection must be performed each day and is essential for flight safety (refer to the fig.3.1.1_01).

1. Check the sailplane fore part of fuselage.
2. Check the cockpit:
   - the cockpit canopy glass,
   - operation of cockpit canopy lock, canopy jettison system,
   - wings connection pins fastening,
   - operation of towing hook,
   - operation of water ballast system,
   - operation of control systems of ailerons, flaps, an elevator, rudder and airbrakes,

- operation of control system of pilot cockpit ventilation,
- operation of the trimmer,
- operation of flight instruments,
- radio communication,
- safety belts.

3. Check the main wheel tire and operation of wheel brake.
4. Check the left wing:
   - upper and lower wing surfaces,
   - leading edge,
   - upper and lower surfaces of ailerons and flaps,
   - deflections of ailerons and flaps and their clearances,
   - airbrakes for proper function and locking,
   - fixing of ailerons and flaps attachment to wing,
   - outer wings and winglets or installed, locked and secured,
   - clearance in respect of the fuselage.
5. Check function of control systems (of an aileron, flap, airbrake), their connections to corresponding control systems in the fuselage.
6. Check the fuselage surface.
7. Check the stabilizer, elevator and rudder:
   - surfaces,
   - deflections and clearances of controls,
   - fixing of joint of the stabilizer attachment to the fin,
   - clearance of the stabilizer with respect to the fin.
8. Check the right wing (analogically as for the left wing according to i.4).
9. Check the power-plant installation (LAK-17BT):
   - all bolted, screwed connections and their securing,
   - function of decompressor, fuel cock and propeller brake,
   - ignition system incl. wires and the spark plug connectors for tight fit,
   - engine retaining cable for wear and its connections to the engine and fuselage structure,
   - fuel lines, electrical wires, bowden cables and structural parts for wear and kinks,
   - exhaust muffler, propeller flange and accessories for tight fit and any cracking,
   - apply moderate pressure to the propeller in forward, backward and sideward direction to check if the bolted connection between the engine block and the propeller mount or anything else is loose or damaged. Check the rubber engine mounts,
   - visual check of the propeller,

Warning: make sure ignition is switched off before you turn propeller by hand.

- turn the propeller one revolution by hand listen for abnormal sounds which may indicate engine damage,
- check the fuel level,
- drain condensed water from the fuel tank. The drainer is located in the main wheel box on the rear wall,
- check the fuel tank vent line outlet for cleanliness, the outlet is located directly behind the landing gear box,
- check the fuel filter for dirt or sludge, the filter is located in the power-plant bay on a right side.

10. Check the extension-retraction mechanism by operating it in both directions. Extension and retraction time must not exceed 12 seconds.

Caution: After a hard landing or if high loads have been experienced a complete inspection according to the Maintenance Manual Section 5.5 must be performed. Contact the manufacture for assistance if required.

3.1.2 Post flight inspection

1. Check the sailplane according to subchapter 3.1.1 “Daily inspection” items.
2. Make records in a sailplane log-book.

3.1.3 Ground handling

It is necessary on the ground:

- to fasten the stick with pilot’s safety belts,
- to cover the glass of the closed pilot cockpit canopy with a cloth.

Ground-towing

- the sailplane is to be ground-towed by a car with a special rope ~ 10 m of length having metal rings,
- the end of the rope with rings is to be attached to towing hook,
- max ground-towing speed in aerodrome is 6 km/h,
- during ground-towing the stick shall be fastened with safety belts, power-plant retracted and a sailplane cockpit canopy shall be closed,
- for ground towing the engine has to be retracted.

3.1.4 Storing and transportation

During winter season or if a sailplane is not in use for a long time it is recommended to de-rig it. Sailplane metal surfaces of connection junctions shall be lubricated with oil. A sailplane shall be stored in a hangar or in a trailer.

If a sailplane is stored in a hangar it is recommended to support its wings.

A sailplane shall be transported just by a special trailer. During transportation of a sailplane its joints shall be protected from dust and dirt. A sailplane being stored in a hangar, trailer and transported shall be cloth-covered.

If the sailplane is planed to be stored for more as two months, engine must be specially preserved for such a storage (see SOLO 2350 engine manual).

Caution: make sure that there is no water in the fin and wing tanks before winter season.

3.1.5 Cleaning and keeping clean

Caution: Static pressure holes shall be protected with tape from water during washing.

Caution: Remove tape from static pressure holes after washing the sailplane.

Warning: After removal of tape check that the holes are not obstructed.

The sailplane shall be washed with clean water using a soft cloth. After washing check drainage openings are clear of water.

3.1.6 Rigging and de-rigging of a sailplane

Caution: It’s not allowed to rig or de-rig inner wings with outer wings installed. These must first be removed from the wing.

1. Use a sailplane rigging team of 2 persons (or 3 - if special rigging equipment isn’t used).

2. Rigging equipment: fuselage supporter (holder), wing tip supporter (holder `1.2 m of height).
3. Rigging procedures (fig. 3.1.6_01, fig. 3.1.6_02, fig. 3.1.6_03, fig. 3.1.6_04, fig. 3.1.6_05):

- clean and lubricate all pins, hubs and connection joint of control systems,
- put the fuselage onto supporters (in case of absence of them one person shall hold the fuselage). Open the cockpit canopy,
- fit the spar end (fork) of the left wing (pos. 1) into the fuselage window on the left side and push the wing along longitudinal axis so that pins on the fuselage (pos. 2) enter the connection (pos. 3) sockets in the wing rib. During this procedure the stick, control handles of flaps, airbrakes and water ballast shall be in such position that pins in control shafts of ailerons and flaps and in control shafts of airbrakes and water ballast (pos. 7, 8, 9) turn at an angle which coincide with cuttings of corresponding shafts end in the wing, thus control of ailerons, flaps, airbrakes and water ballast in the left wing connects automatically. Support the left wing end (if there is no supporter one person shall hold the wing end),
- water ballast shall be in such position that pins in control shafts of ailerons and flaps and in control shafts of airbrakes and water ballast (pos. 7.8.9) turn at an angle which coincide with cuttings of corresponding shafts end in the wing, thus control of ailerons, flaps, airbrakes and water ballast in the left wing connects automatically. Support the left wing end (if there is no supporter one person shall hold the wing end),
- fit the spar end of the right wing (pos. 4) into the fuselage window on the right side and push the wing along longitudinal axis so that the spar end of the right wing enters the fork of the left spar (pos. 1) and pins on the fuselage enter connection sockets in the wing rib. Connection of control systems of ailerons, flaps, airbrakes and water ballast is analogical to connection of the left side of the wing,
- place both spar fixation pins (pos. 5) into hubs (pos. 6) fully (after adjustment of hubs on the ends of the left and right spar) and fix pin handles with pin-fixators (pos. 10) which are fitted into special forks (pos. 11) on inside board of the fuselage. In order to improve the aerodynamic cleanness of the surface, the connection slot between fuselage and wing later is covered with sticky tape.

Note: Fixation pins of spars have to enter into spar hubs smoothly by pushing them with hands without applying any significant force or other devices. If pins stop interrupt assembling and check pins and hubs for proper cleaning and damage of their surfaces.

- to connect left and right outer wings: pull out the plugs located at the leading edges of inner wings,
- connect a special key (pos. 20) by turning handle (pos 21) clockwise,
- unlock the pin (pos. 22) of spar (pos 13) by turning the key until stop (the upper grip of key should move towards the fuselage). Pull the pin out of spar by pulling the key backwards until stop,
- fit spar ends of outer wings (pos. 13) into recesses correspondingly in end ribs of left and right inner wings and push them to the end until hubs in ribs of inner wings (pos. 15) push onto the corresponding them connection pins in end ribs of outer wings (pos. 14) and coverings of outer wings and inner wings ends come together without any slots. It is necessary to hold the ailerons of outer wings and inner wings in such position that tongues on ailerons ends of outer wings coincide with corresponding sockets on the ends of wing ailerons. **Option:** if aileron control system in the outer wing has control rod it shall be connected to aileron control rod in inner wing.

- in order to improve an aerodynamic cleanness of surface the connection slot between wing tips and wings later is covered with sticky tape,
- pull the pin (pos. 22) in to the spar by pulling the key towards the wing until stop. Lock the pin of spar by turning the key until stop (the upper grip of key should move towards the wing tip),
- unscrew the key by turning the handle (pos. 21) counter clockwise and pull in the plugs.

Caution: check the reliability of the winglets connections to the outer wing by trying to pull them out by their ends applying force of 10-20 kg. With fixators down they have to hold the winglets reliably not allowing any movement. If the winglets move or the slot between outer wings in their coverings connection place has increased separate the ends, find out the reason and eliminate it.

- when the stabilizer is being connected (fig. 3.1.6_06, fig. 3.3.6_07) the elevator shall be set in neutral position,
- put on the stabilizer with an elevator so that protrudes on the elevator's left and right sides (pos. 2) enter the recesses of control lever of the elevator (pos. 1) and the two hubs in spar of the stabilizer (pos. 4) push onto the pins (pos. 3) fully, thus control of the elevator connects automatically,
- insert the connection bolt (pos. 6) through the opening in the stabilizer from above and
- screw it into thread of hub (pos.5) fully with a 13 mm hexagonal wrench. Connecting the stabilizer the fixator (pos. 7) locks the connection bolt automatically.

Note: After the sailplane rigging is finished check the operation of control systems of the elevator, ailerons, flaps, airbrakes and water ballast. Also check the wings for looseness with respect to fuselage in plane of wing chords (forward – backward). If there is looseness wing shall be separated from fuselage and hubs in wing root ribs (fig. 3.1.6_01, pos. 3) shall be adjusted.

4. All the main de-rigging procedures of the sailplane shall be done in the opposite order.

Warning: Before unscrewing the connection bolt of the stabilizer unlock the bolt (fig. 3.1.6_07, pos.7).

3.2 Lubrication system

Lubricants:

- Grease - the greases we recommend are lithium based pressure-resistant anti-corrosion greases like AeroShell Grease 33 or lithium-soap greases (multi-purpose greases for rolling element bearings). The same greases can be used for long time preservation of the components.
- Oil - if needed, it is recommended to use oils conforming to the SAE 5W-40 requirements.

Do the lubrication as shown at the scheme fig. 3.2_01 annually as apart of inspection at the end of flight season:

1. Control stick joint.
2. Rudder pedals joint.
3. The canopy opening and emergency jettison system.
4. Shafts of ailerons, flaps and airbrakes and hinges of rods.
5. Levers and hinges of airbrakes.
6. Hinges of flaps and connection joint of lever.

7. Hinges of ailerons and connection joint of lever.
8. Hinges of ailerons of outer wing.
9. Hinges of elevator and connection joint of lever.
10. Hinges of rudder and connection joint of lever.
11. Towing hook.
12. Main landing gear.
13. Tail wheel.
14. De-compressor, propeller brake mechanisms (LAK-17BT).
15. Hinged connections of the power-plant extension/retraction system (LAK-17BT).
16. Power-plant door hinges and actuating system hinged connections (LAK-17BT).

When re-lubricating, clean old oil or grease before applying new.

3.3 Adjustment

3.3.1 Adjustment of airbrakes

If airbrake (fig. 3.3.1_01, pos. 1) extension occurs unexpectedly in flight it is necessary to tighten the springs of the lids (pos. 2) by help of nuts (pos. 3). Check the springs proper tightening by lifting the lid upward. The lid has to lift up with force not less than 13.5 kg.

3.3.2 Adjustment of main wheel brake control system

The control system of the main wheel brake (fig. 2.3.9_01) is adjusted with help of these procedures:

- take away a pilot seat,
- loosen the nut (pos. 4),
- turn support of wire (pos. 3) into required position,
- fix the support screwing up the nut (pos. 4).

If there is no enough travel of a wire adjuster (pos.3), than it is necessary to change position of brake shoulder (pos. 5).

Note: Excessive cable loosening increases idle motion of the handle (pos. 1) and decreases brake effectiveness (increases sailplane braking distance).

Too small cable loosening decreases idle motion of the handle (pos. 1) and increases brake effectiveness (decreases sailplane braking distance).

<u>Adjustment of hydraulic brake system (fig. 2.3.9_02).</u>

To adjust the travel of the master cylinder, a threaded plate with slot (pos. 8) is used. The plate is fixed by nut (pos. 9).

The brake fluid DOT4 is used in the brake system. To fill the brake system, recommendations of the manufacturer shall be used (www.beringer.fr).

3.3.3 Adjustment of cockpit canopy emergency jettison system

The cockpit canopy emergency jettison system (fig. 2.4.6_01, fig. 2.4.6_02) is adjusted by help of bolts (pos. 6). By screwing of the bolts the frame contour of the cockpit canopy is coincided with the contour of the fuselage cockpit frame. The cockpit canopy has to lay on the fuselage without any protrusions. The gap between the canopy frame and the fuselage frame shall be 0.5…1 mm along all of the perimeter.

Force on the handle of the canopy emergency jettison (pos. 1) while opening the canopy shall be 4 … 9 daN.

3.3.4 Adjustment of rudder control system

Adjustment of cables (fig. 2.3.4_01, fig. 2.3.4_02). Control cables (pos. 4) are adjusted by help of turnbuckles (pos. 3) (zone A). Allowed turns out for each turnbuckle end –no more than 3 thread turns. Tension force of cable after adjustment is 1.5 ± 0.1 daN.

After adjustment of cables turnbuckles are locked with lock wire ϕ1.0 mm (pos. 10). Refer to fig. 2.3.4_02 (zone A).

Inclination angle of pedals in neutral position (106°) is checked with domestic goniometer by pressing its edge against pedal plane.

In order to avoid of differentiation of rudder deflection the axis of the bellcrank in the fuselage (pos. 6) shall be perpendicular to a sailplane axis.

Adjustment of the rod (pos.8): the rod is adjusted by turning of rod end. After adjustment make sure that the rod end doesn't screw out of bounds of control opening. The end nut (pos. 12) shall be screwed up and fixed with spring washer (pos. 13) and crown nut (pos. 15) for connection of the rod to the control shall be fixed with wire pin (pos.17). The force keeping the rudder pedals aligned (with rudder connected) as measured by dynamometer at the level of the pedals' upper cross pipes and at initial pedal motion moment, must be 2,5 ± 0,2 daN. Motion of pedals shall be smooth and even.

3.3.5 Adjustment of power-plant extraction/retraction and retaining cable (LAK-17BT)

The following power-plant items has to be checked and adjusted if out of allowable range:

1. The angle of power-plant extraction at the extended position.
2. Power-plant at the retracted position.
3. Power-plant retaining cable.

Adjustment of extension/retraction angles. End switches (p/n V3SY1 manufacture Saia Burgess) are located: for retracted position on a right side power-plant bay beam and is switched by the screw on the engine at the retracted position; for extracted position - switch is located on the engine mount box and is switch by the retraction system shaft. Moment of switching on end switches can be adjusted by adjustment screws. At extended position angle has to be 103°±0.5° (see fig 2.5.2_01). To measure this angle place the straight edge on the fuselage lift pins. Using protractor measure the angle of the pins to the horizon. Than measure angle of engine frame tube, as shown at the drawing, to the horizon. Subtract the angles. At retracted position engine has to bottom down on a cushions at a bottom of the engine bay.

Retaining cable together with the rubber bungee cord has to be checked for wear and adjusted so, that the tension on a cable when engine is in extended position is not more as if 3 daN (6,7lbs.), but sufficient enough to keep cable on a tension. At the same time cable has to be adjusted so that when engine is at extended position (engine stopped), the clearance between the sleeve at the aft end of the cable and the metal bushing p.1 (fig.2.5.7_01) has to be minimum 1 mm, but not more as if 3 mm.

3.4 De-rigging and rigging of sailplane parts

3.4.1 De-rigging and rigging of ailerons

De-rigging of ailerons (see fig. 3.4.1_01, fig. 3.4.1_02):

- loosen and remove the nut (pos. 6).

- take off washer (pos 5)
- pull the aileron towards the end of wing until the hinge pins (pos. 3) are separated from wing

Installation of the ailerons shall be done in reversed order

De-rigging of control rod (see fig. 3.4.1_01, fig. 3.4.1_02):

- remove the rivet (pos. 1)
- remove the intermediate hubs (pos. 2)

Connecting aileron control rod:

- set the rod into control bracket
- fit intermediate hubs (pos. 2)
- push through the new rivet and rivet it (pos. 1)

Note: riveting shall be done according to repair technology current acceptable practices using rivet ordered from manufacture

3.4.2 De-rigging and rigging of a flap

De-rigging of flap (see fig. 3.4.2_01):

- loosen and remove the nut (pos. 6).
- take off washer (pos 5)
- pull the flap towards the end of wing until the hinge pins (pos. 3) are separated from wing

Installation of the ailerons shall be done in reversed order

De-rigging of control rod (see fig. 3.4.2_01):

- remove the rivet (pos. 1)
- remove the intermediate hubs (pos. 2)

Connecting control rod:

- set the rod into control bracket
- fit intermediate hubs (pos. 2)
- push through the new rivet and rivet it (pos. 1)

Note: riveting shall be done according to repair technology current acceptable practices using rivet ordered from manufacture

3.4.3 De-rigging and rigging of a rudder

Note: Full disconnection of rudder from fin (see fig. 3.4.3_01, fig. 3.4.3_02) is possible just after peeling off tightening tapes (pos. 4, pos. 5, pos. 6).

A rudder is removed in such order:

- peel off tightening tapes (pos. 4, pos. 5),
- remove a pin from a rudder control rod,
- turn a rudder sideways, peel off plastic tape (pos. 6) from the rudder nose,
- remove wire split pins from three hinge pins of the rudder (pos. 7) and discard. While removing a wire split pin from the third hinge pin keep previous rudder axis,
- remove the rudder hinge pins.
- remove the rudder.

Assembling of a rudder shall be done in the opposite order.

Note: before sticking plastic tape (pos. 6) on again, surfaces to be taped shall be cleaned of old glue remainders. Use glue of 88 H type.

3.4.4 De-rigging and rigging of an elevator

1. Operations used for de-rigging of an elevator (fig. 3.4.4_01):
   - take away wire split pins (pos. 3) and discard,
   - take away washers(pos. 2),
   - pull out hinge pins (pos. 1).
2. Operations used for rigging of an elevator:
   - fit the elevator into the hinge brackets,
   - push through the hinge pins (pos. 1),
   - put on washers (pos. 2),
   - lock the hinge pins with wire split pins (pos. 3).

3.4.5 De-rigging and rigging of a trimmer

It is possible to de-rig and rig a trimmer (Fig.2.3.3_01) through the inspection hatch (pos.9). Disconnecting of springs is done when they are squeezed together as much a possible.

Other trimmer parts are not supposed to be de-rigged.

3.4.6 De-rigging and rigging of a cockpit canopy

1. De-rigging of the cockpit canopy (fig. 2.4.6_01, fig. 2.4.6_02):
   - release the cockpit canopy by pulling the canopy emergency jettison handle (pos. 1) up and keeping the canopy from falling down,
   - take away the cockpit canopy.
2. Rigging of the cockpit canopy:
   - squeeze the spring (pos. 3) by pulling the handle (pos. 4) down and fixing it in the intermediate position,
   - position on the cockpit canopy on the cockpit,
   - attach the cockpit canopy to the fixator (pos. 2) pushing the canopy emergency jettison handle (pos. 1) forward till canopy is engaged,
   - correct the cockpit canopy position with adjustment bolts (pos. 6),
   - release the spring (pos. 3) switching the handle (pos. 4) into working position.

Warning: After rigging of the cockpit canopy make sure the spring device is switched into working position.

3.4.7 Removal and installation of main landing gear wheel

Warning: deflate the tire before doing the disassembly of the main wheel.

These operations shall be done to remove the main landing gear wheel (fig. 3.4.7_01):

- unbend the edge of the washer (pos. 1) from the bolt (pos. 2) head,
- unscrew the bolt (pos. 2),
- take out the washer (pos. 1),
- disconnect the lever of wheel brake (pos. 3),
- pull out the axle of wheel (pos. 4) together with hub (pos. 5, pos. 6) and washer (pos. 7),

- remove landing gear wheel (pos. 8) with a tyre (pos. 13),
- to remove tire unscrew the nut (pos. 9) and take out bolts (pos. 12) joining halves of the wheel body, take away the tyre with an inner tube.

Assembling and attachment of the wheel shall be done in opposite order.

Note: when assembling wheel before screwing the bolts (pos. 12) joining halves of the wheel body it is necessary to move the tyre slightly from side to side.

3.4.8 Removal and installation of tail wheel

To remove the tail wheel (fig. 3.4.8_01) do these operations:

- unbend edges of the lock washer (pos. 1) from surfaces of the hub (pos. 2) and the bolt (pos.3),
- unscrew the bolt (pos. 3),
- pull out the axle of wheel (pos. 4),
- remove the wheel (pos. 5).

Installation of the wheel shall be done in opposite order.

3.4.9 Taking out and mounting of an instrument panel

Do the following operations to take out the instrument panel (fig. 3.4.9_01):

- unscrew four bolts (pos. 1) attaching the instrument panel (pos. 2) to the hood (pos. 3),
- disconnect pipes from the instrument panel,
- remove the instrument panel (pos. 2).

Mounting of the instrument panel shall be done in opposite order.

3.4.10 Taking out and mounting of pilot cockpit floor

The cockpit floor (fig. 3.4.10_01) consists of two removable parts: a stick hood (pos. 1) and a hood of cockpit bottom (pos. 2).

Removal of the stick hood:

- unscrew four bolts (pos. 3),
- take away the stick hood.

Removal of the hood of a cockpit bottom:

- unfasten studs (pos. 4),
- take away the hood of a cockpit bottom (pos. 2).

Mounting shall be done in an opposite order.

3.4.11 Removing and installing the fuel tank (LAK-17BT)

To remove fuel tank from the glider, drain all fuel from the tank first. Disconnect all fuel lines and fuel level sensor wires at the wires connection. Remove main wheel cover. When main wheel cover is removed, fuel tank can be removed through the cockpit side. To install it, follow the reverse order. If installed, the additional fuel tank shall be removed first.

To remove the additional fuel tank (fig. 2.5.3_02), disconnect fuel lines and loosen the belt (pos. 9). The fuel tank can be removed through cockpit side. To install it, follow the reverse order.

Warning: when flying with additional fuel tank removed, check that the vent lines (pos. 10, 11) are connected together.

3.4.12 Removing and installing the engine retaining cable (LAK-17BT)

To remove the engine retaining cable, disconnect retaining cable turnbuckle (pos.12) (fig.2.5.7_01) from the engine mount. Unscrew and remove guide (pos.2) fixing bolt (pos.7). Push guide toward the tail to disengage it from the guide mount (pos.4). Once you feel guide is disengaged, pull it out from the fuselage. To install it, follow the reverse order.

3.4.13 Removing and installing the engine (LAK-17BT)

Figure 3.1General view of the engine installation

To remove the engine from the engine frame, first clearly identify for yourself and make a record which wire, hose or sensor is connected where.

Disconnect turnbuckle of the retaining cable from the engine mount.

Unscrew and remove decompression valves from the engine.

Unscrew nut and remove decompression valves arm.

Disconnect all wires, lines and hoses from the engine which would be preventing for the engine to be removed.

Unscrew three mounting bolts which attach engine to the frame - two at the top of the engine and one at the bottom. Lift engine up to remove it from the frame.

To assemble engine back on glider, follow the reverse order.

After engine is reinstalled, check the following:

- all lines and wiring connected correctly and secured;
- no leakage in fuel lines connections;
- all bolted connections assembled correctly and secured;
- propeller brake function correctly;
- decompression valves function correctly;
- check engine extraction/retraction cycle (extension/retraction time should not exceed 12 sec.);
- check engine extracted and retracted position, adjust if needed;
- Start the engine on a ground and run for few minutes to check:
  - ignition is okay;
  - ILEC MCU is functioning properly;
  - on-ground RPM within limits. On the ground RPM should be 4850 ±100.

Warning: after the ground run do not retract engine immediately, let it to cool down.

Rubber parts such as fuel lines, shock mounts are lifetime restricted parts and have to be replaced periodically. Refer to the Section 6 of this manual.

3.4.14 Mounting and removal of the propeller (LAK-17BT)

For mounting and removal of the propeller refer to the propeller manual.
Mounting of a propeller must be checked by a licensed inspector.

3.5 Illustrations

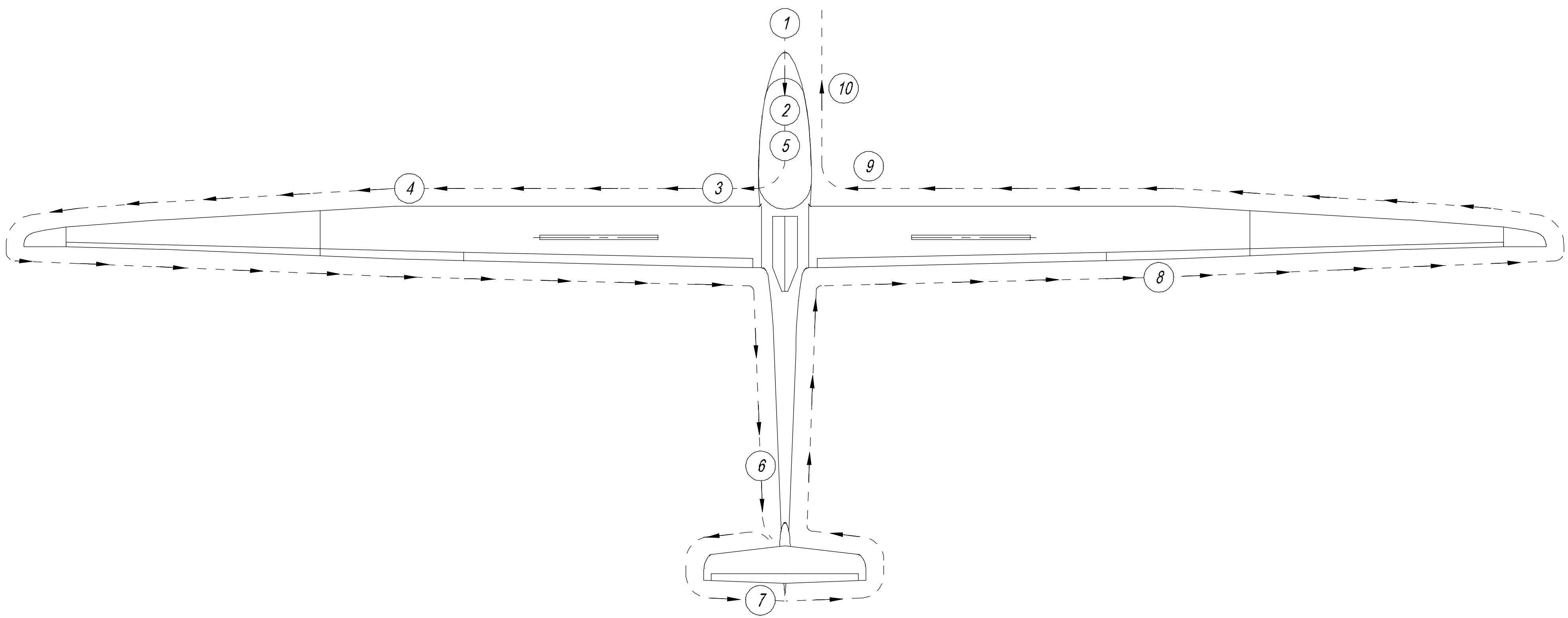
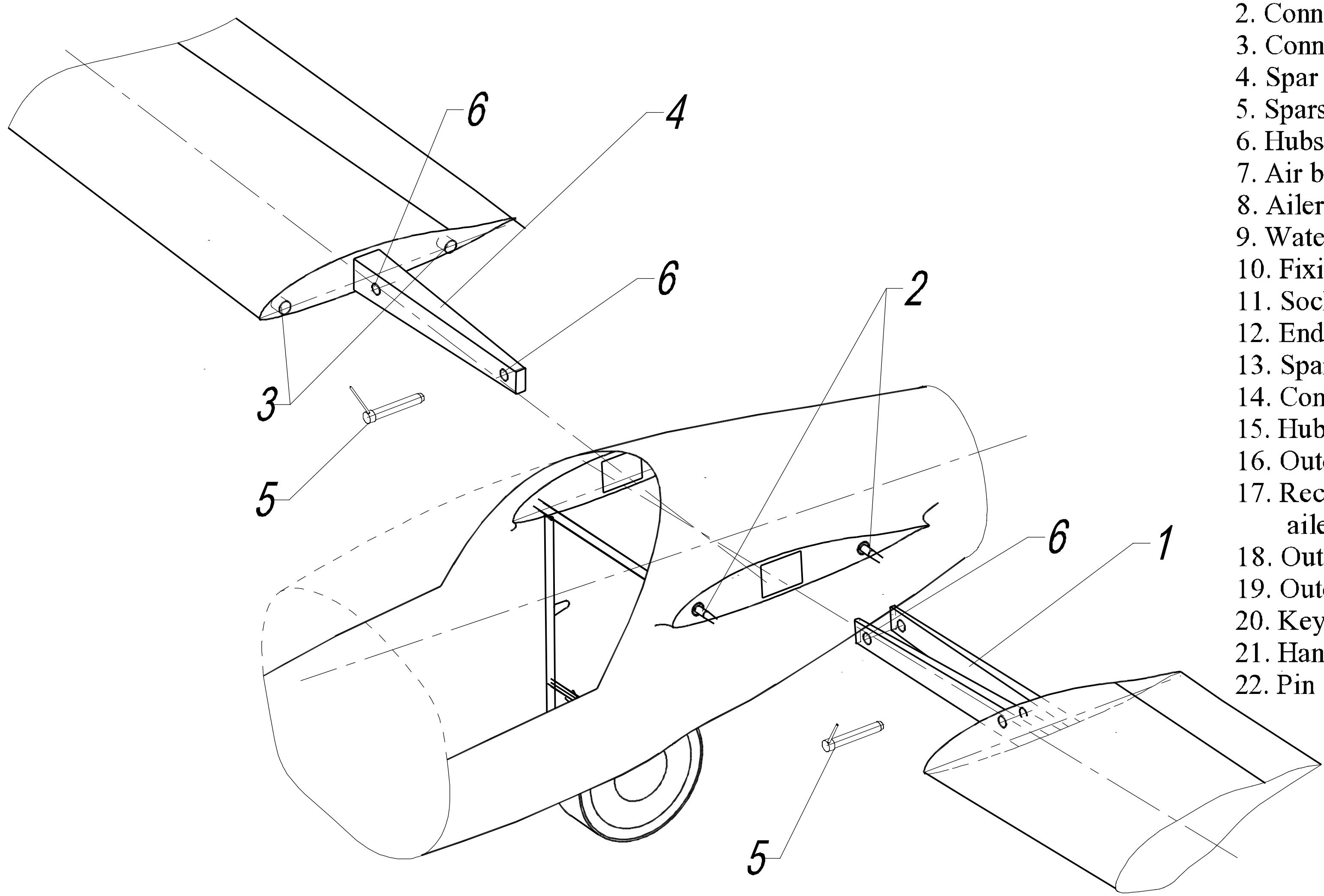


Fig. 3.1.1_01. Scheme of preflight inspection



1. Spar of left wing
2. Connection pins (on fuselage)
3. Connection sockets
4. Spar of right wing
5. Spars fixing pins
6. Hubs (in spars)
7. Air brakes control shaft
8. Ailerons and flaps coaxial control shafts
9. Water ballast system control shaft
10. Fixing stud for spar pin
11. Socket for fixing stud of spar pin
12. End of outer wing spar
13. Spar of outer wing
14. Connection pins of outer wing rib
15. Hubs of inner wing rib
16. Outer wing aileron control plate
17. Recesses for outer wings aileron control plate
18. Outer wing 15 m
19. Outer wing 18 m
20. Key
21. Handle
22. Pin

Fig. 3.1.6_01. Rigging of wing

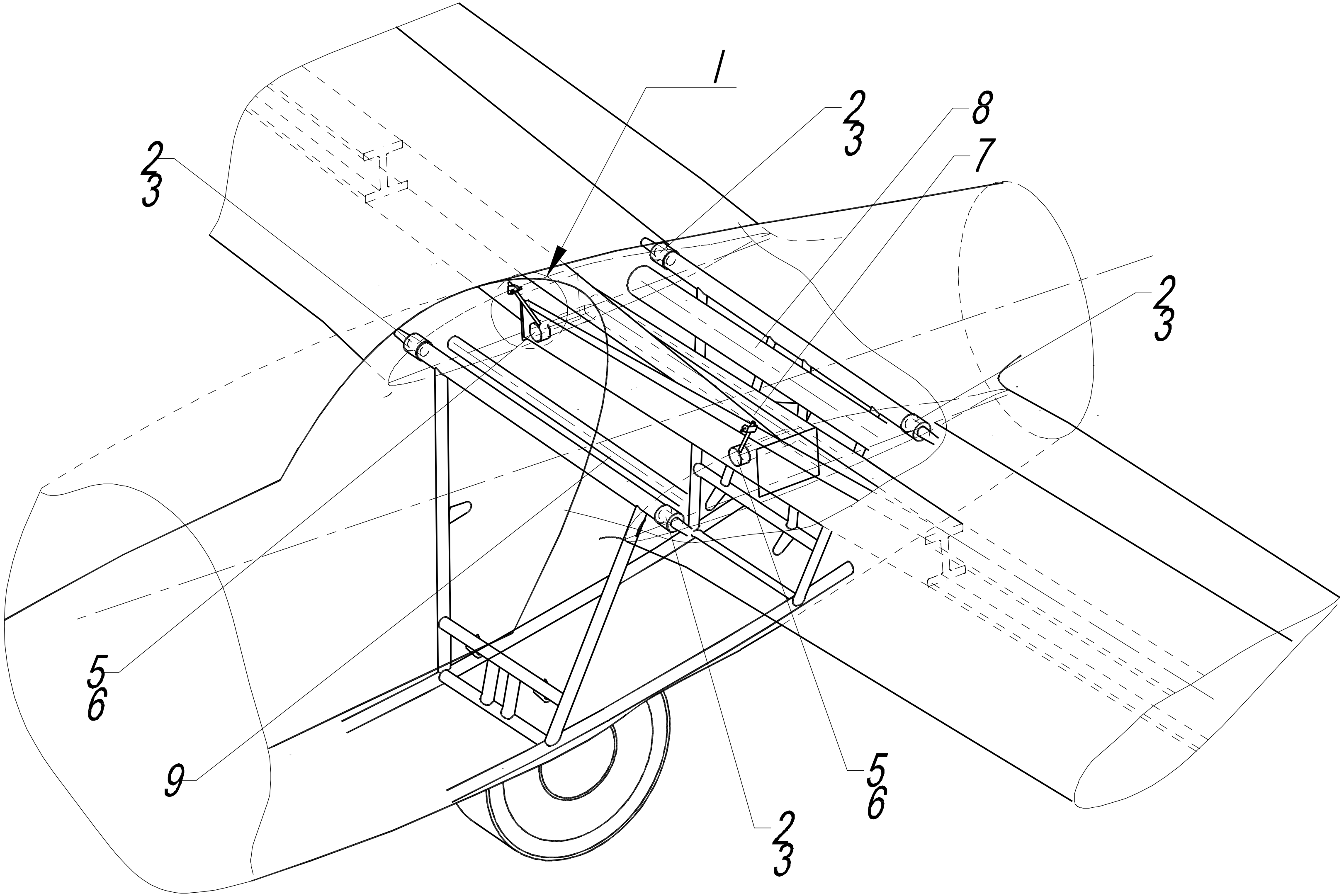


Fig. 3.1.6_02. Rigging of wing

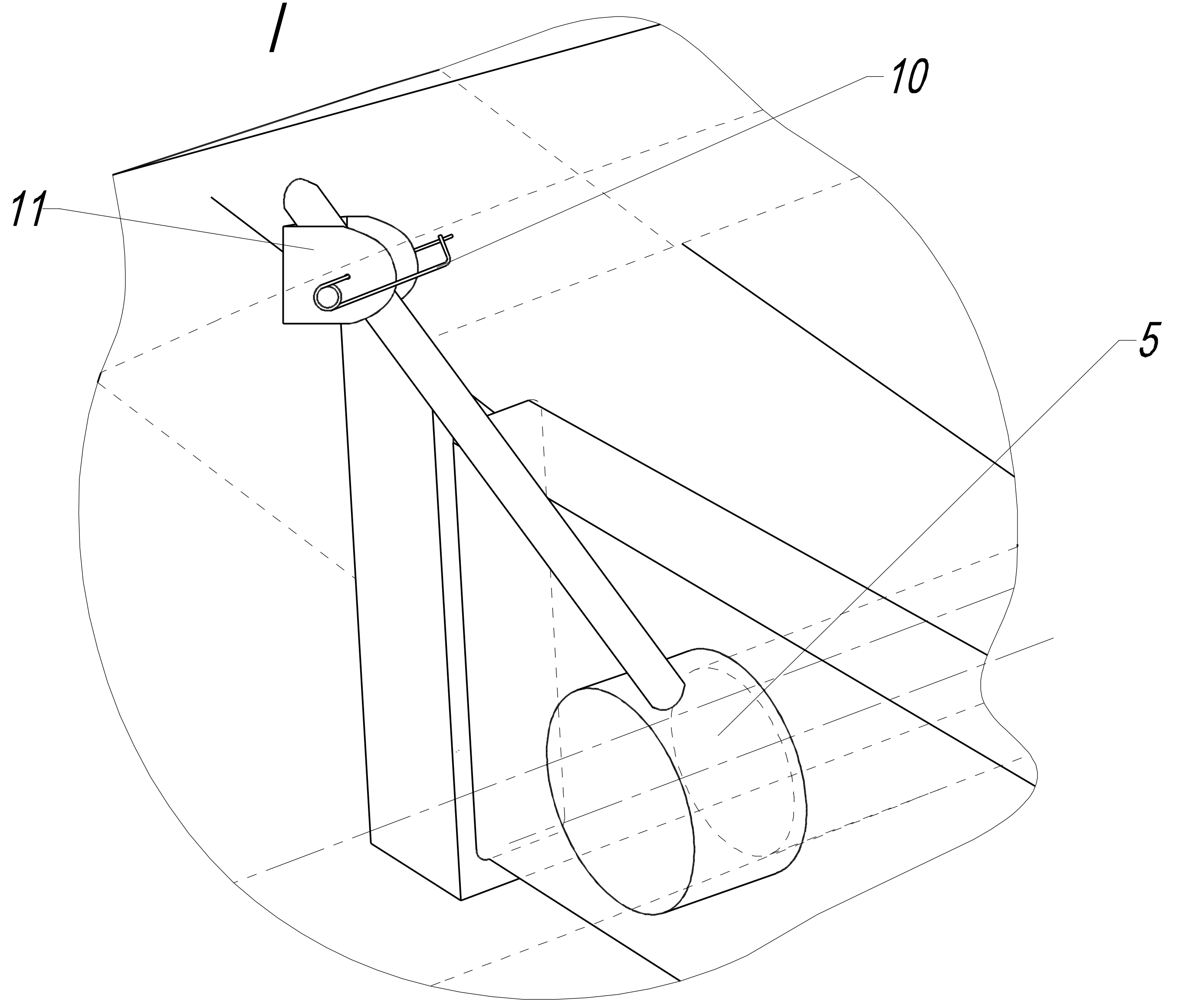


Fig. 3.1.6_03. Rigging of wing

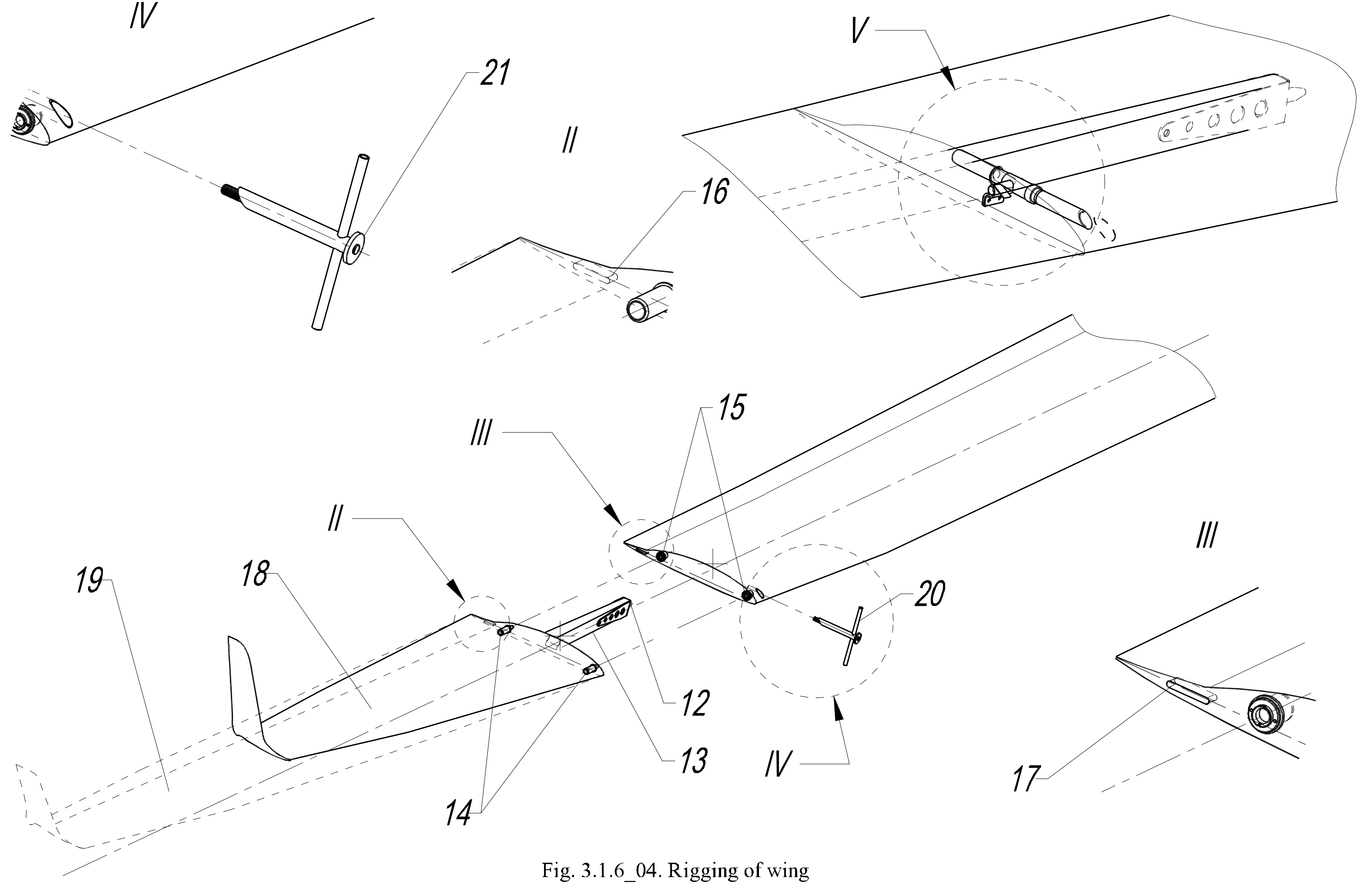


Fig. 3.1.6_04. Rigging of wing

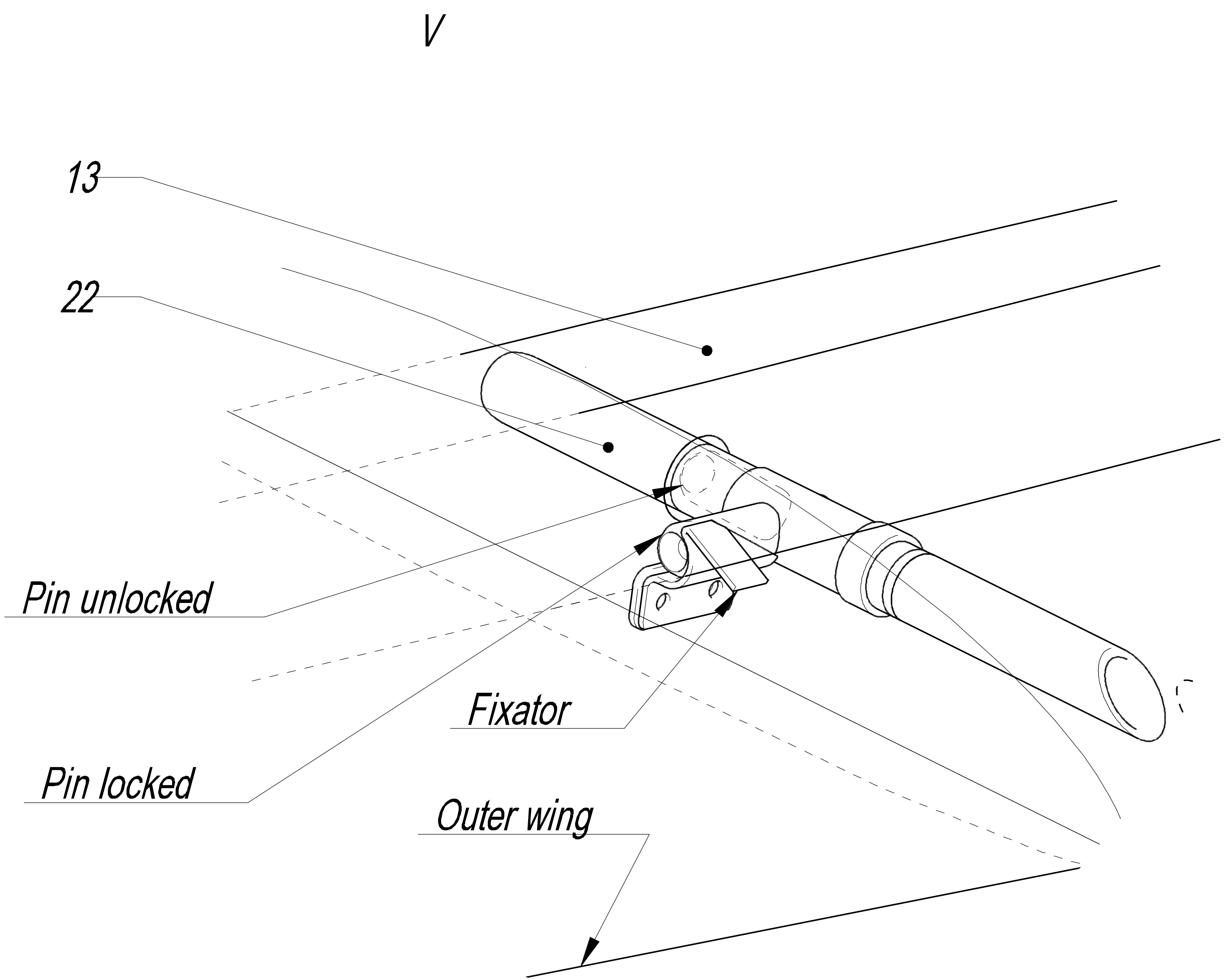
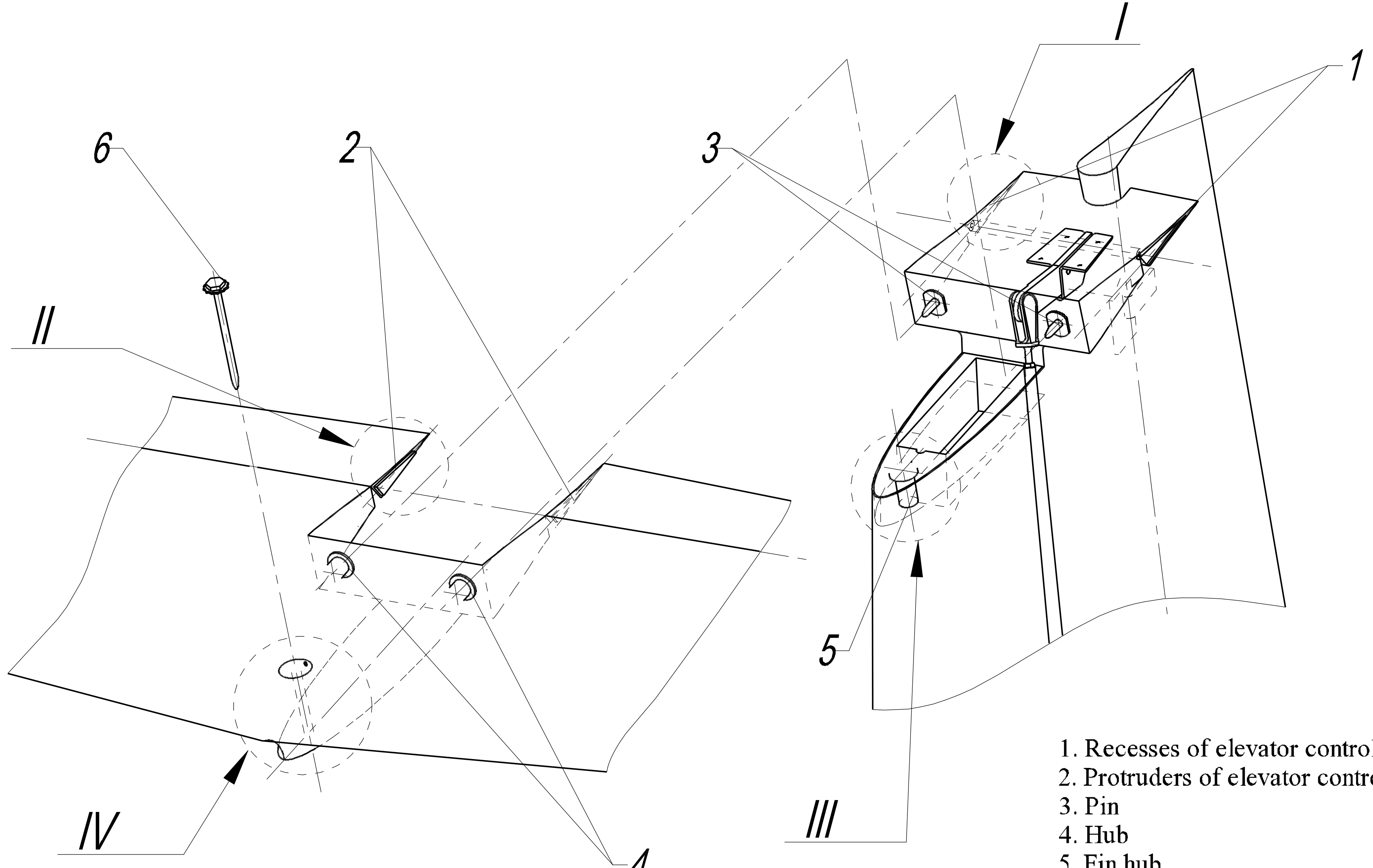


Fig. 3.1.6_05. Rigging of wing



1. Recesses of elevator control
2. Protruders of elevator control
3. Pin
4. Hub
5. Fin hub
6. Connection bolt
7. Fixator

Fig. 3.1.6_06. Mounting of stabilizer on fin

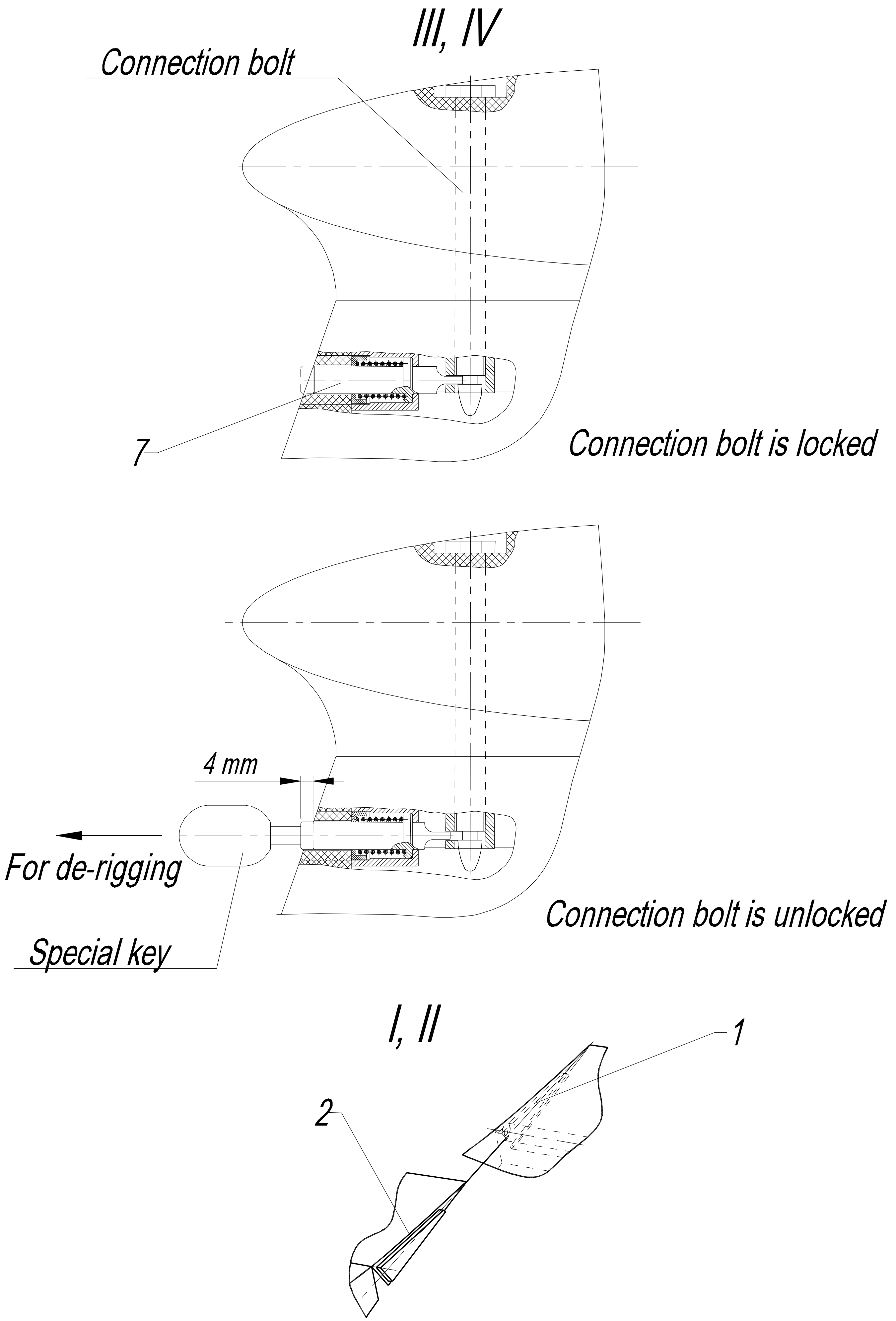


Fig. 3.1.6_07. Mounting of stabilizer on fin

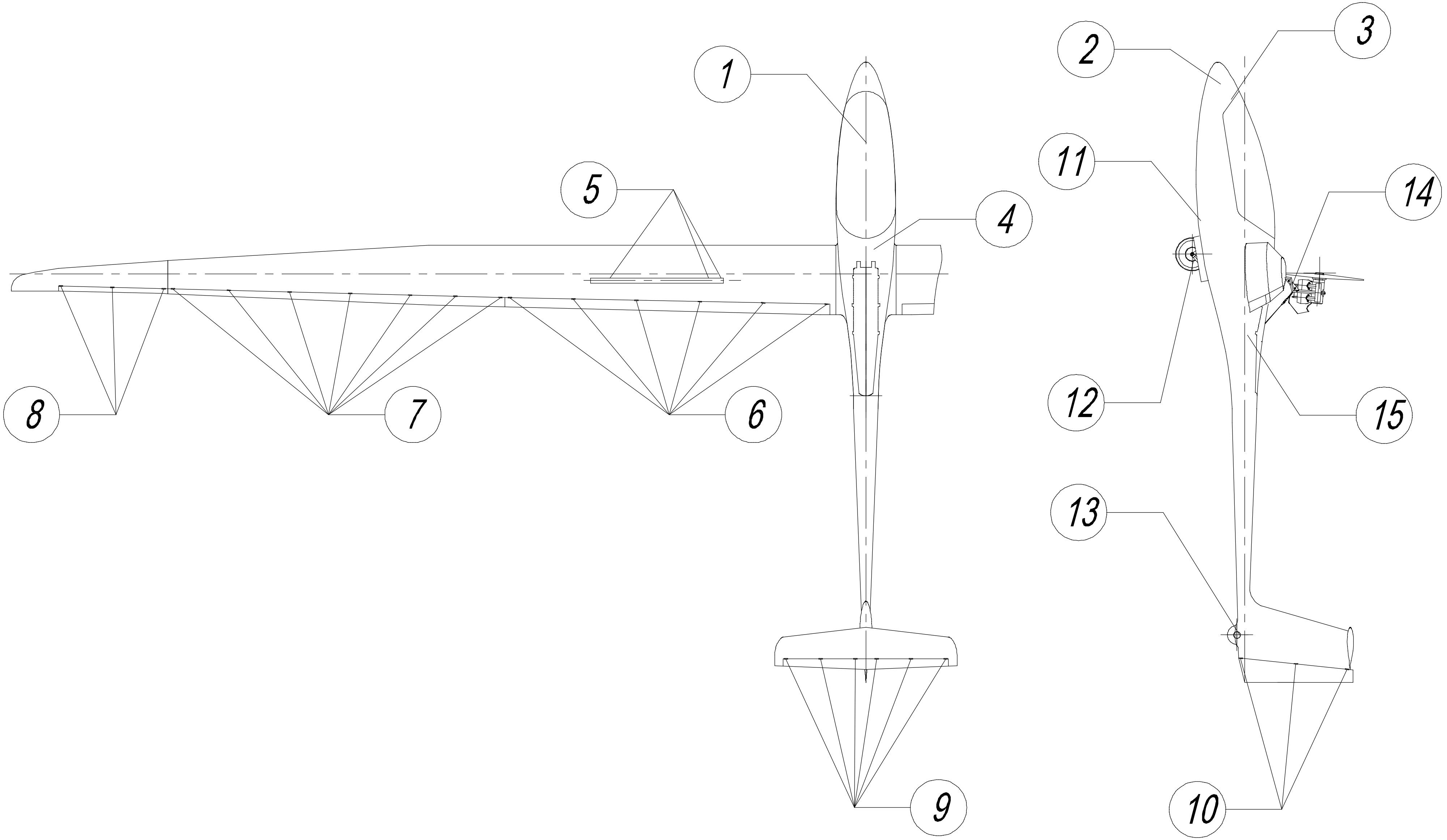


Fig. 3.2_01. Lubrication scheme

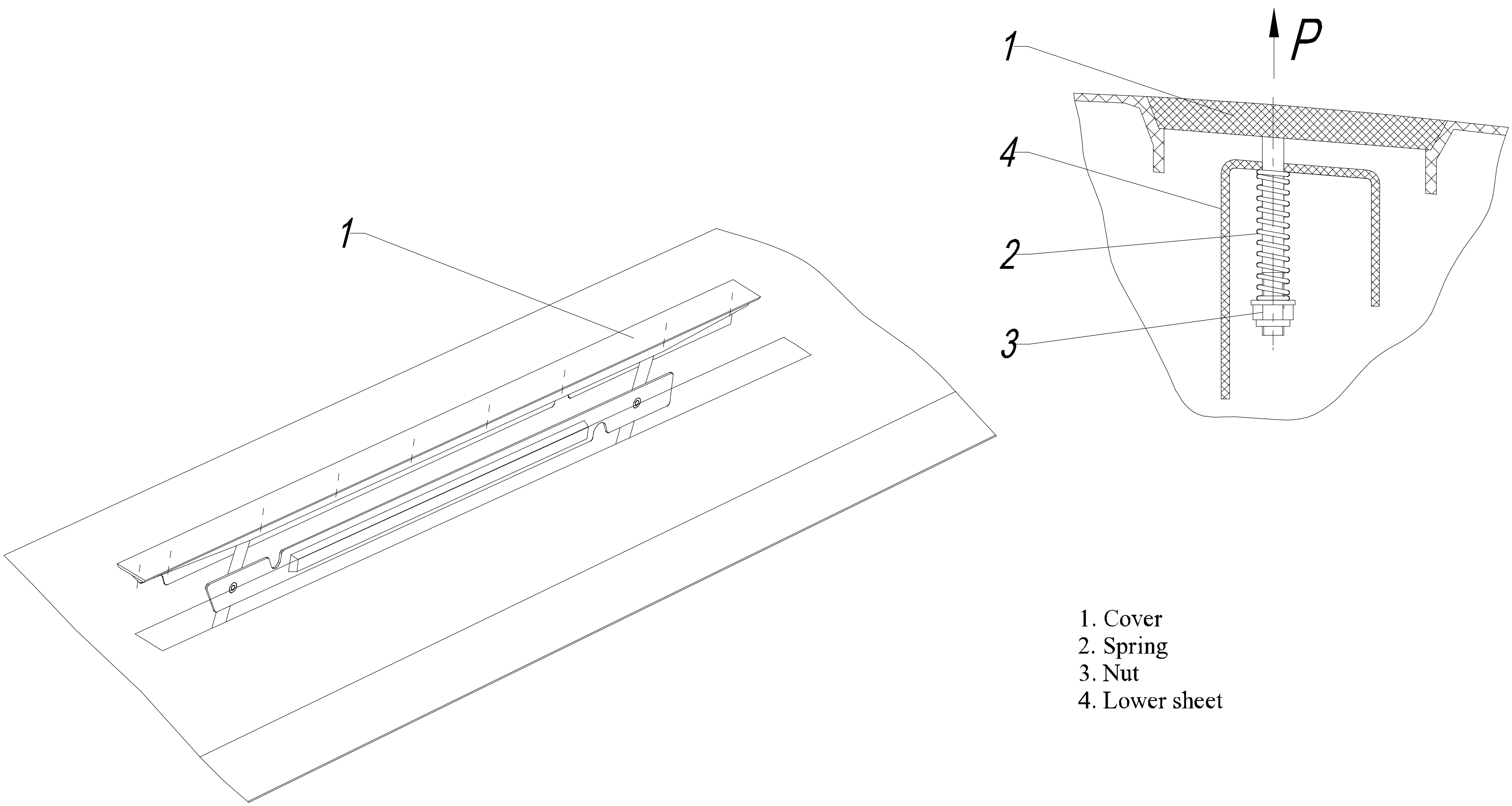
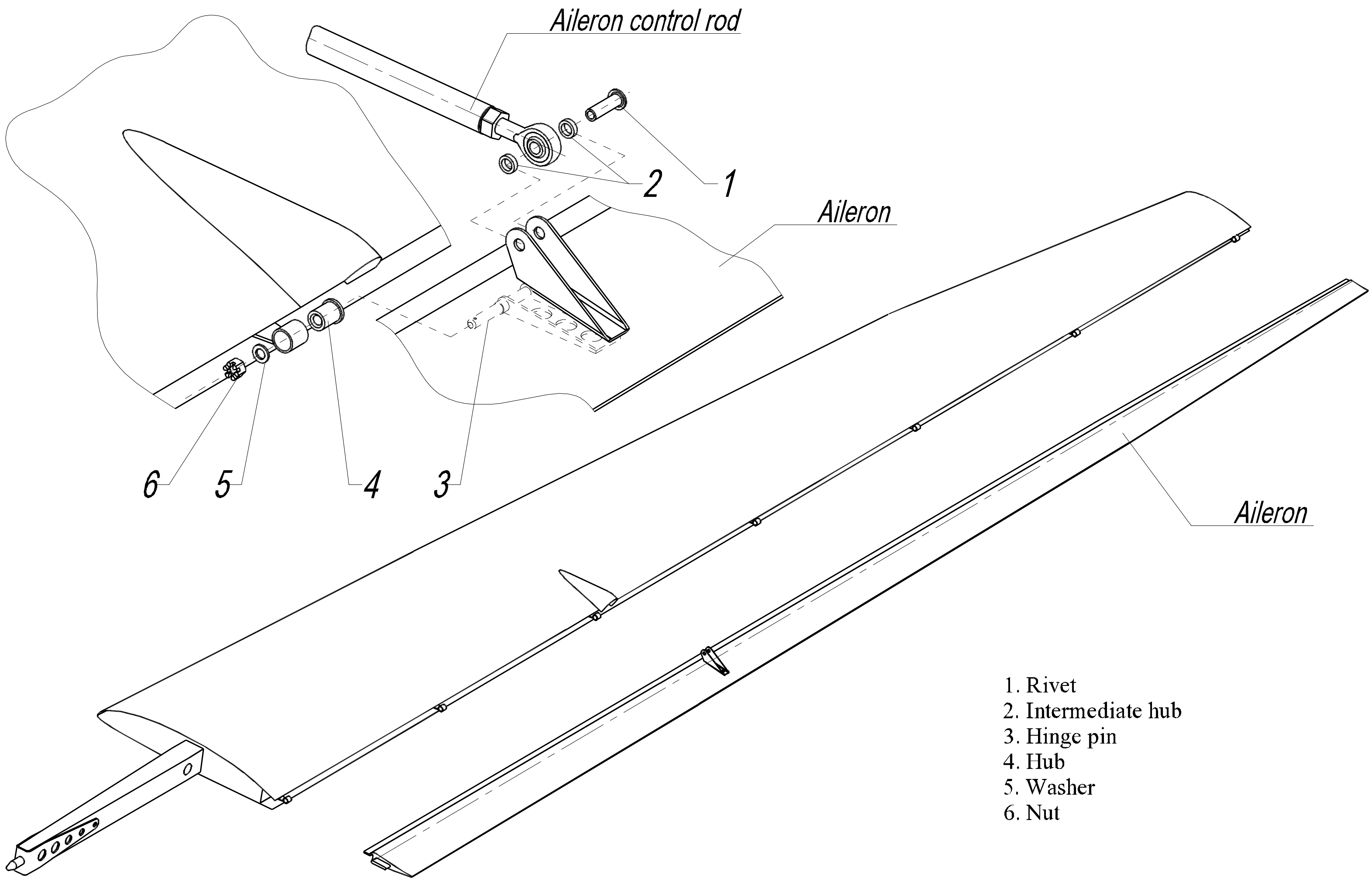
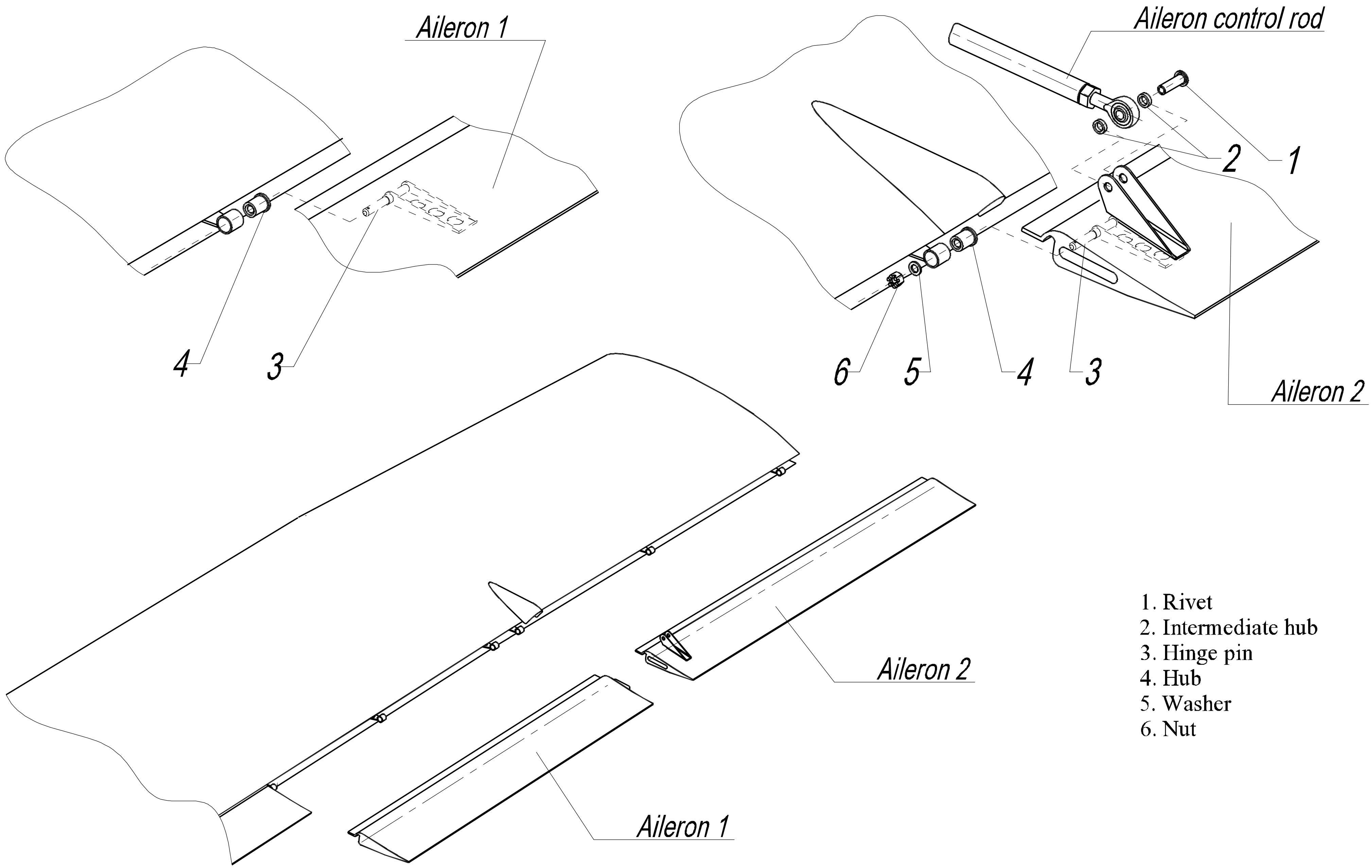


Fig. 3.3.1_01. Adjustment of airbrakes covers



1. Rivet
2. Intermediate hub
3. Hinge pin
4. Hub
5. Washer
6. Nut

Fig. 3.4.1_01. Mounting of aileron of outer wing



1. Rivet
2. Intermediate hub
3. Hinge pin
4. Hub
5. Washer
6. Nut

Fig. 3.4.1_02. Mounting of ailerons of inner wing

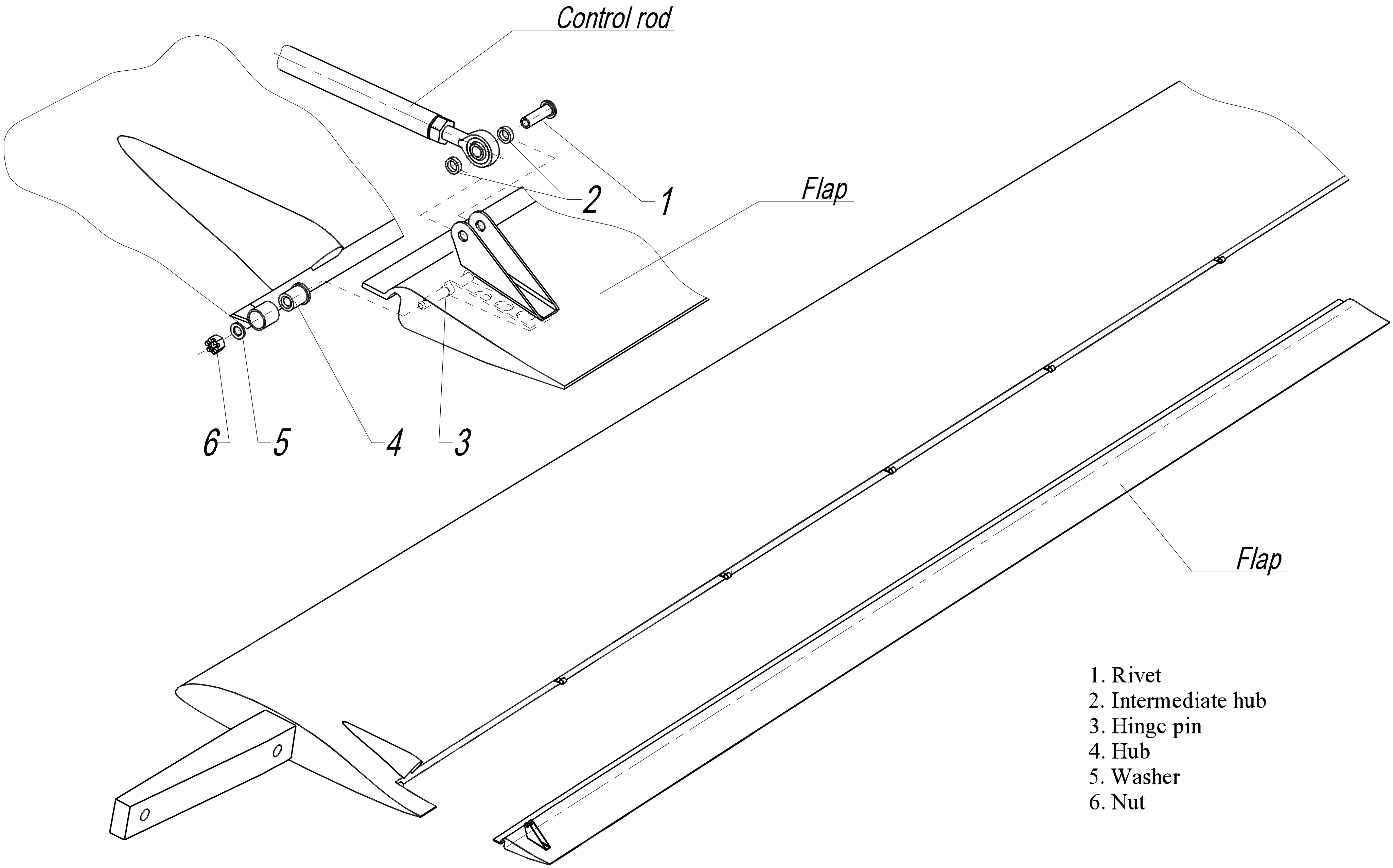


Fig. 3.4.2_01. Mounting of flaps

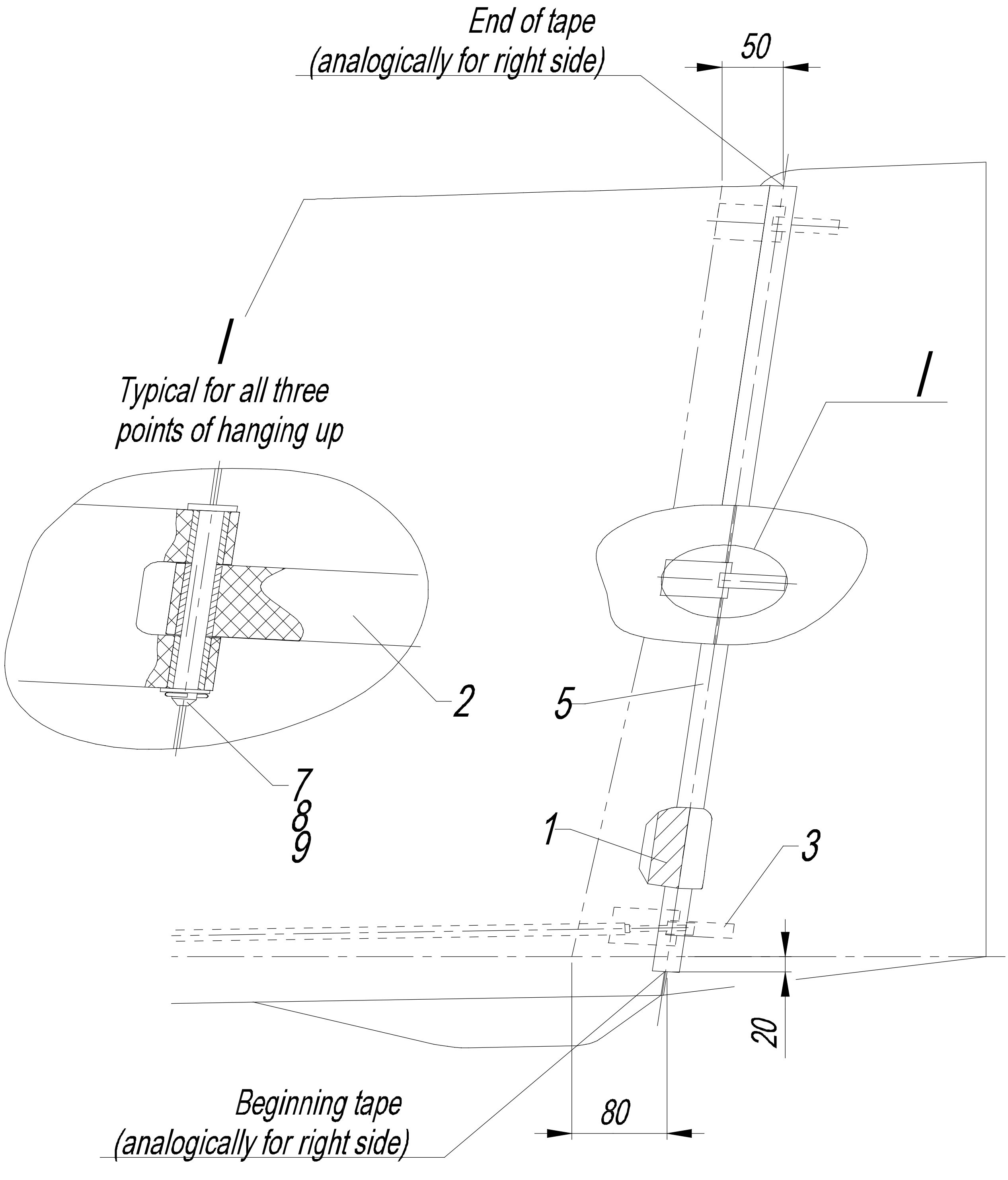


Fig. 3.4.3_01. Hanging of rudder

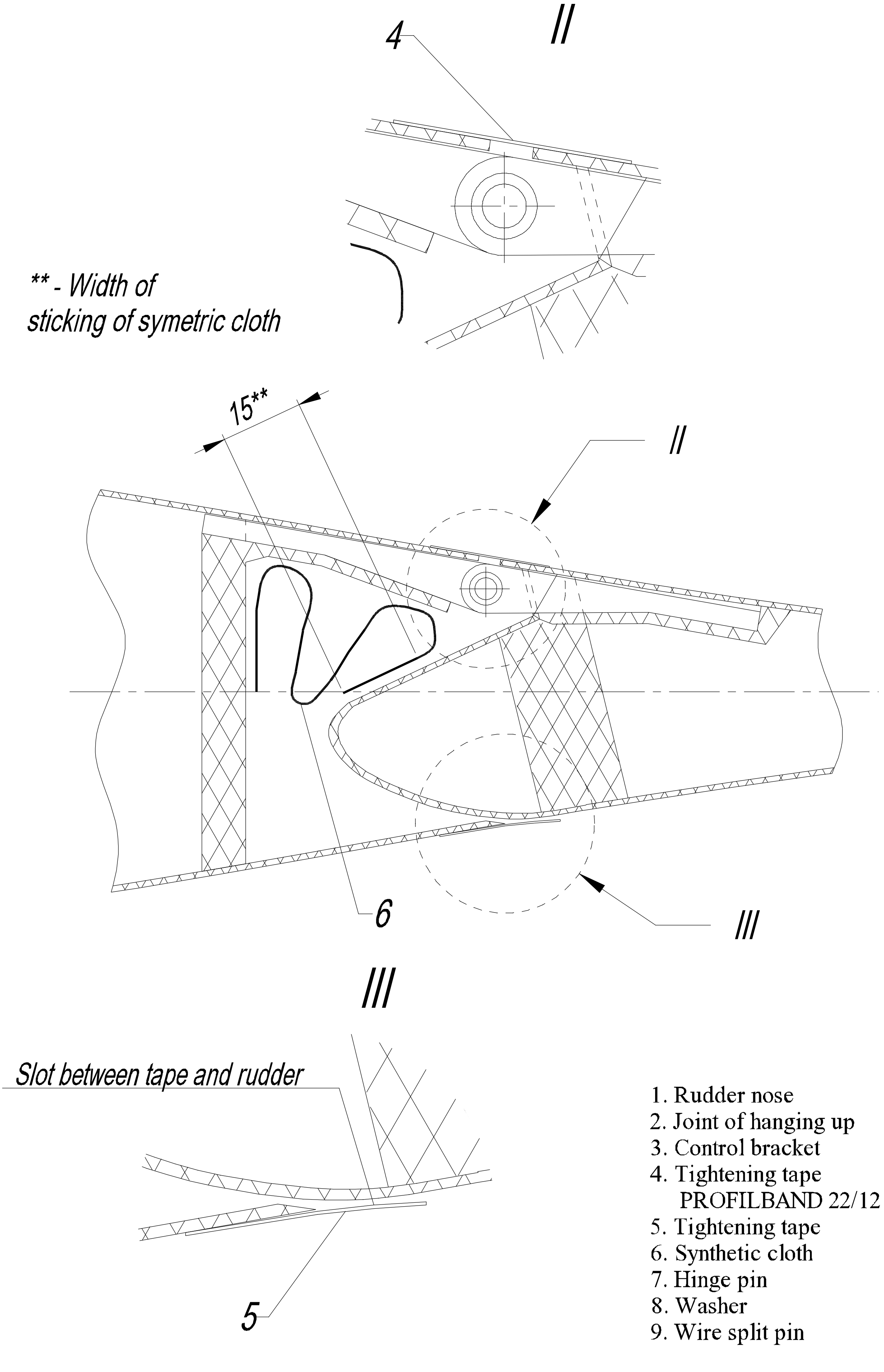
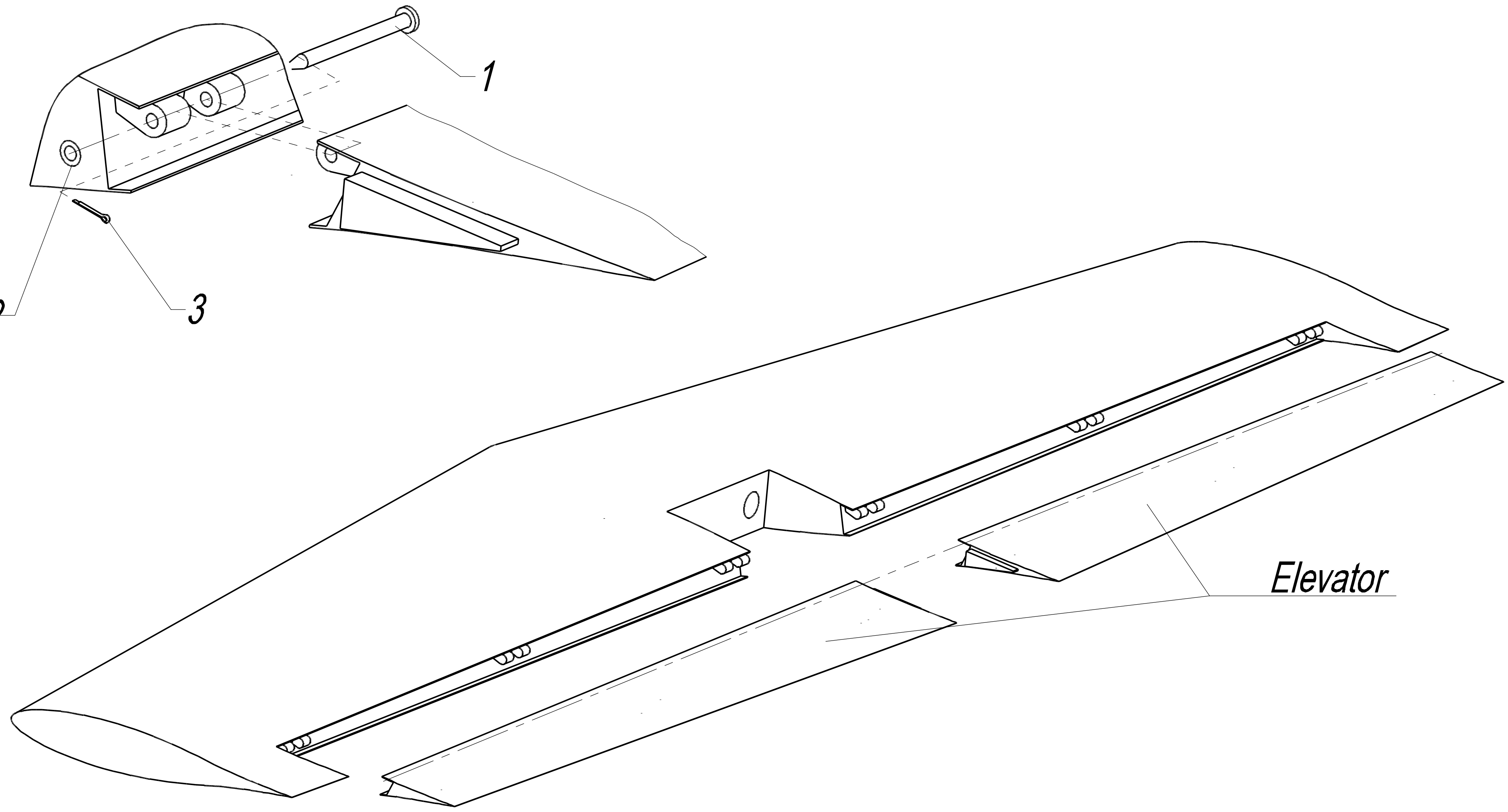
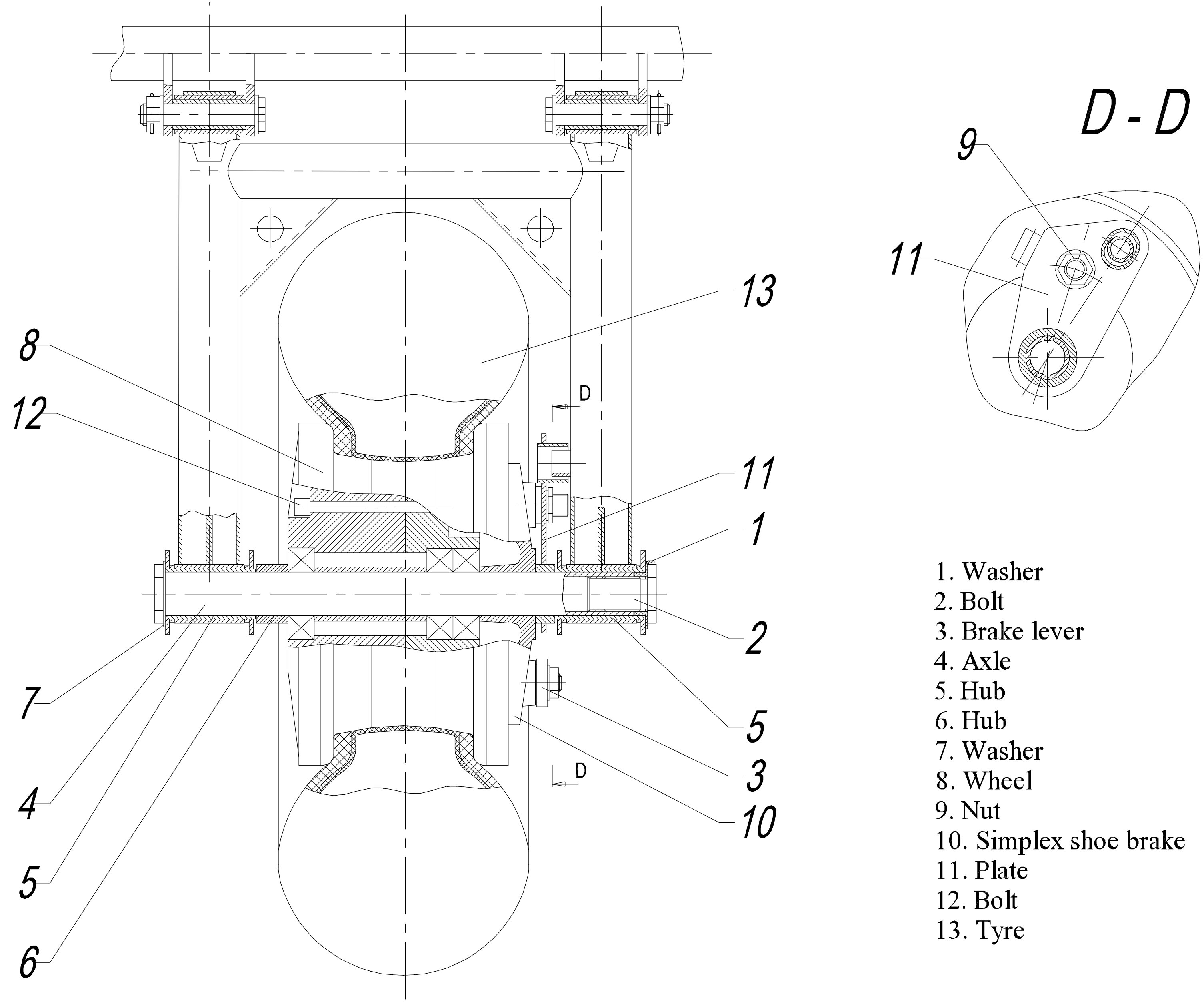


Fig. 3.4.3_02. Hanging of rudder



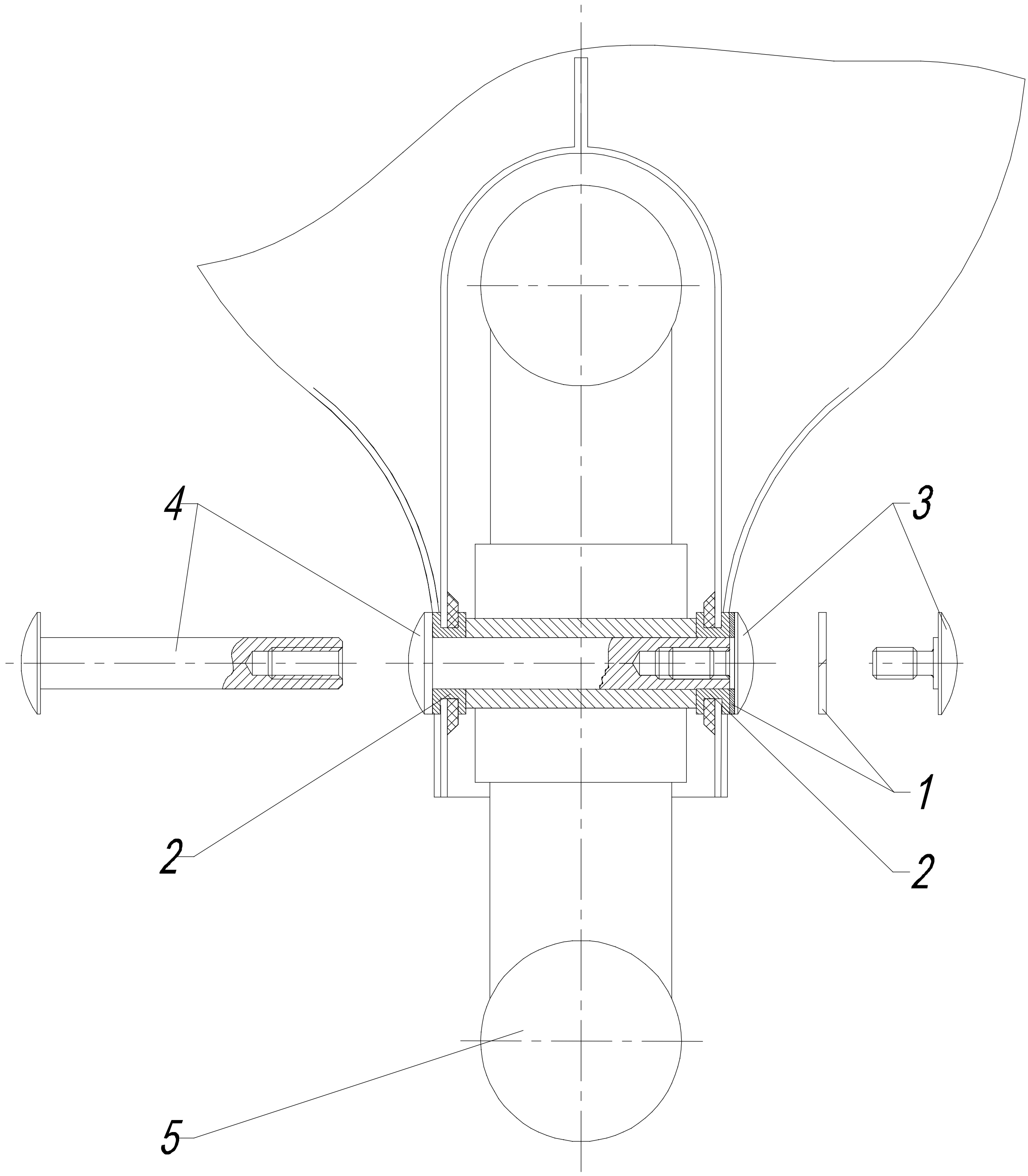
1. Hinge pin
2. Washer
3. Wire split pin LN94-10 010

Fig. 3.4.4_01. Rigging of elevator



1. Washer
2. Bolt
3. Brake lever
4. Axle
5. Hub
6. Hub
7. Washer
8. Wheel
9. Nut
10. Simplex shoe brake
11. Plate
12. Bolt
13. Tyre

Fig. 3.4.7_01. Main landing gear wheel



1. Washer
2. Supporting hub
3. Bolt
4. Wheel axle
5. Wheel

Fig. 3.4.8_01. Rigging and de-rigging of tail wheel

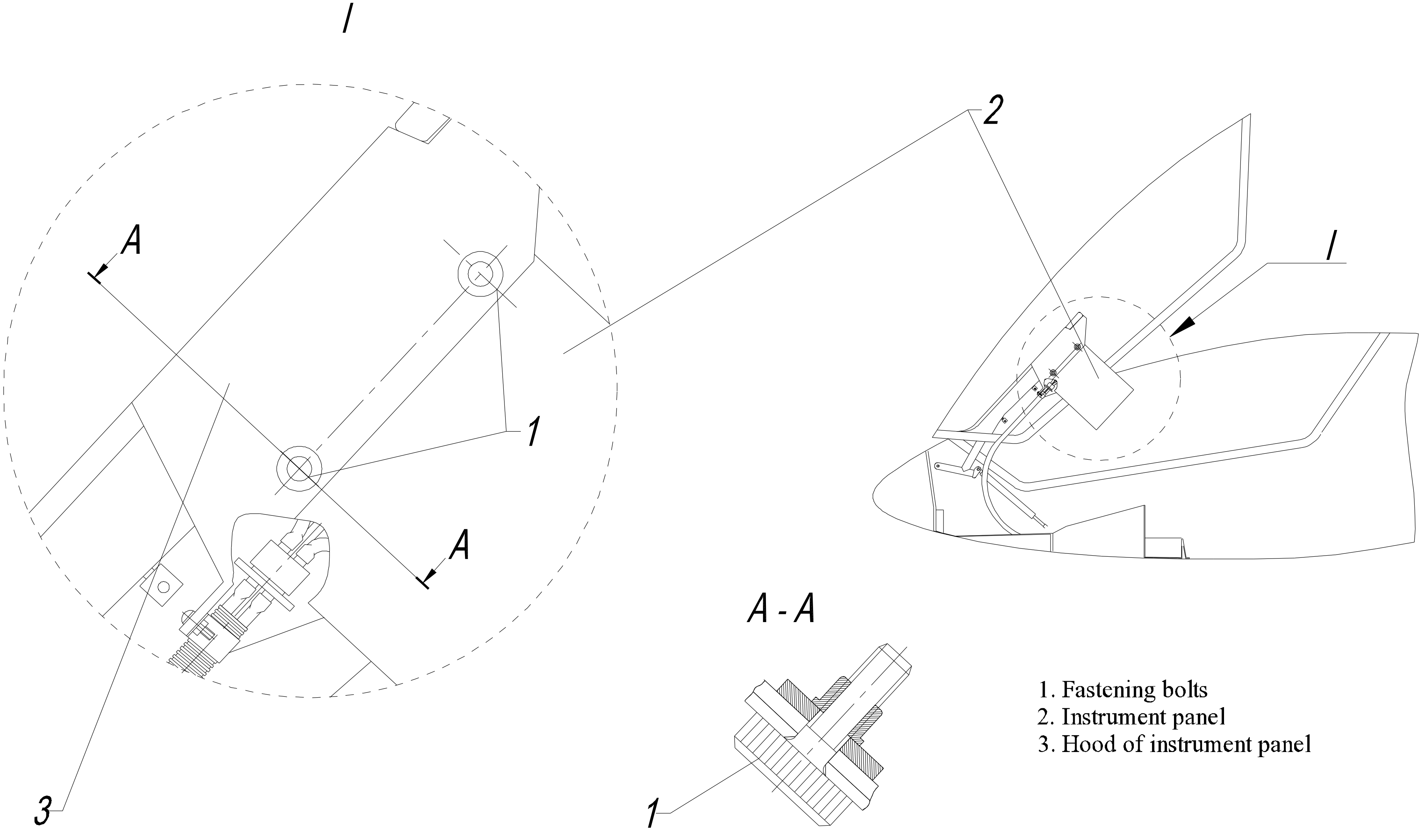


Fig. 3.4.9_01. Removal and mounting of instrument panel

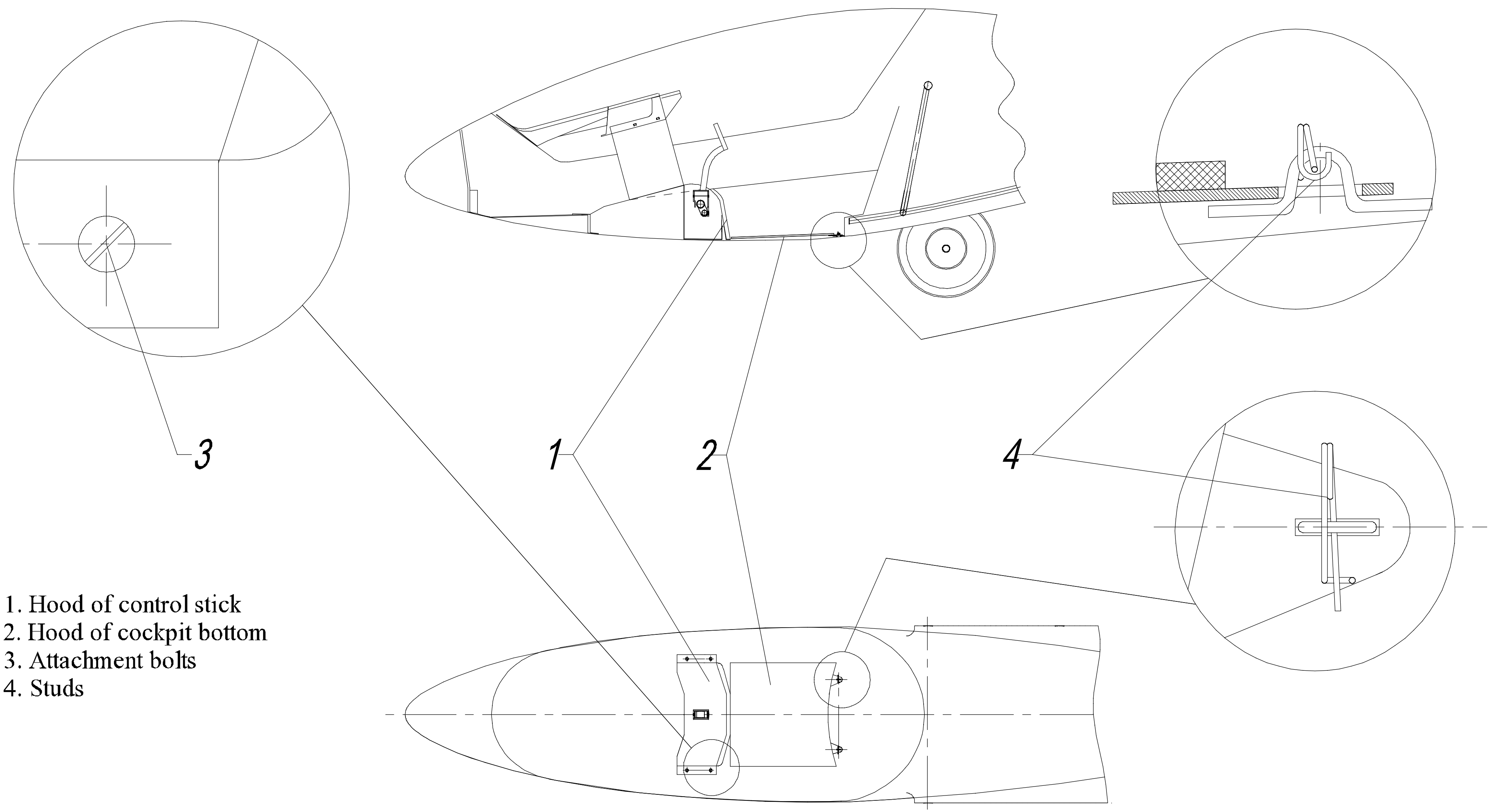


Fig. 3.4.10_01. Taking out and putting in of cockpit floor

SECTION 4

Maintenance of the sailplane instruments and equipment according to their own maintenance documents

4.1 Introduction

Here in this section is given the list of the sailplane instruments and equipment which service shall be done according to their own maintenance documents. Their servicing and repair shall be done independently of the sailplane maintenance requirements in Section 5.

4.2 List of the sailplane instruments and equipment which are serviced according to their own maintenance documents

No	Part	Type	Document
1	Air - speed indicator	LUN 1106, WINTER 6 FMS 421	Instrument maintenance instruction
2	Altimeter	WINTER 4 FGH 10; 4 HM 6 WD-10-C	Instrument maintenance instruction
3	Mechanical variometer	LUN-1141, WINTER 5 STV-5	Instrument maintenance instruction
4	Electronic variometer	FILSER LX5000, LX7000; LX 160	Operation manual
5	Fly computer display	FILSER LX5000, LX7000 ILEC SN10	Operation manual
6	Radio	Becker AR 4201, Dittel FSG-2T	Operation manual
7	Compass	KI-13A, C2400	Instrument maintenance instruction
8	Side - slip indicator	LUN-1216, Winter QM II Small Ball Bank indicator	Instrument maintenance instruction
9	Tow Release	TOST G 88	Certificate, Operating manual
10	4-point static harness restrain system	Carl F. Schroth GmbH	Certificate
11	Main gear wheel with mechanical brake / tyre or Main gear BERINGER wheel and brake system	TOST 045100 / Aero Trainer, 6 ply	Maintenance manual
12	Tail wheel	Barum Rubena T3 / V12s or TOST 200x50	Maintenance manual
13	Engine (LAK-17BT)	SOLO 2350	Manual for engine SOLO type 2350
14	Propeller (LAK-17BT)	LAK-P4-90	Operation and installation manual for propeller LAK-P4-90
15	Transponder	Filser TRT 600; TRT 800; Microair T2000; Becker ATC 4401	Instrument operator and installation instructions. Antennas types and installation as per manufacturer recommendations.

SECTION 5

Periodical inspections

Page

5.1 Introduction

In section 5 there is defined a list of inspections to ensure safe sailplane operation during its lifetime.

The periodical inspections shall be performed by qualified staff authorized to perform the work.

All inspections are general visual inspections unless specified otherwise.

Clean the sailplane prior conduction any inspections. Also to inspect the sailplane wings and horizontal stabilizer has to be removed.

5.2 Sailplane inspection periods

The sailplane inspections shall be performed :

1. After every 100 flight hours;
2. Annual inspection;
3. After rough landings, after ground loops;
4. At the end of flight season or before long storing in a hangar or in a trailer;
5. After every 1000 flight hours.

5.3 Inspection after every 100 flight hours

It is necessary to check thoroughly the sailplane after every 100 flight hours. A sailplane shall be checked by qualified staff having a license for those works.

Inspection after every 100 flight hours **Date………………..**

No	Checking	Conformity Yes / No	Signature
100	**Flight Manual and Maintenance Manual revision**		
101	Sailplane airworthiness certificates revision		
102	Sailplane log-book revision		
103	Sailplane airworthiness bulletins revision		
104	Sailplane technical bulletins revision		

Inspection after every 100 flight hours **Date……………….**

No	Checking	Conformity Yes / No	Signature
105	Sailplane weight, instruments in the instrument panel list and its' weights revision		
106	Sailplane instruments and equipment which are serviced according to their own maintenance documents revision		
200	**Wing inner, wing outer 15m and 18m, winglet**		
201	Surfaces of wings (paint cracks, pealing paint) condition		
202	Defects of skin (cracks, holes, etc)		
203	Joint adhesive tape condition		
204	Drainage and ventilation openings for cleanliness		
205	Spar ends (cracks, delaminations, hubs) state		
206	Root ribs		
207	End ribs		
208	Ailerons, its hinges, pins, clearances of the ailerons, control connections, tip ailerons control plates		
209	Flaps, its hinges, pins, clearances of the flaps, control connections		
210	Airbrakes, clearances of airbrakes, state of metal parts		
211	Water ballast tanks, ballast control system in the wings		
212	Wing fixators (connections)		
213	Spars fixing pins, hubs in spars		
300	**Fuselage**		
301	Surfaces of fuselage (painting, cracks,) condition		
302	Defects of skin (cracks , holes, etc)		
303	Joint adhesive tape condition		
304	Drainage and ventilation openings for cleanliness		
305	Attachment of cockpit canopy, cockpit canopy		
306	Cockpit canopy emergency jettison system		
307	Static and total pressure receivers state, tightness of connections		
308	Bulkheads, fuselage root ribs, landing gear box state		
309	Seat adjustment system, pilot seat state		
310	Connection pins on fuselage state		
311	Surfaces of fin (paint, cracks) condition		
312	Rudder, its hinges, pins, control connections		
313	Stabilizer and fuselage connection pins, bolts and bolt fixation		
314	Elevator automatic conection unit on the top of the fin		
315	Water ballast control system		
316	Condition of external surfaces of accessible metal parts (corrosion)		
317	Check for foreign objects inside of a fuselage.		
400	**Horizontal tail**		
401	Surfaces of horizontal tail (paint, cracks) condition		
402	Defects of skin (cracks, holes, etc)		
403	Bonding areas		
404	Elevator root ribs		

Inspection after every 100 flight hours **Date**

No	Checking	Conformity Yes / No	Signature
405	Stabilizer hubs		
406	Elevator, its hinges, pins, clearances of the elevator, control connections		
407	Elevator and stabilizer connection state		
500	**Rudder**		
501	Surfaces of rudder (paint, cracks) condition		
502	Defects of skin (cracks, holes, etc)		
503	Bonded areas		
504	Rudder, its hinges, pins, clearances of the rudder, control connections		
600	**Landing gear**		
601	Stands, shock absorbers, gas-spring and control system state		
602	Main wheel (pressure in wheel tire, cracks, corrosion)		
603	Main wheel retracting and releasing mechanisms - pay special attention to the condition of the retraction lever located at the wheel box.		
604	Landing gear brake		
605	Tail wheel (pressure in wheel tire, cracks)		
700	**Control systems**		
701	Elevator control system (movement, friction, clearances, fixings)		
702	Ailerons control system (movement, friction, clearances, fixings)		
703	Flaps control system (movement, friction, clearances, fixings)		
704	Airbrakes control system (movement, friction, clearances, fixings)		
705	Rudder control system (movement, friction, clearances, fixings)		
706	Pedals adjust system		
707	Trimmer control system operation		
708	Tow release control system (movement, friction, clearances, attachments)		
709	Attachment of cockpit canopy and its emergency jettison system operation		
710	Canopy ventilation control system		
711	Water ballast control system operation		
800	**Instruments**		
801	Instrument panel mounting		
802	Airspeed indicator system functioning		
803	Altimeter system functioning		
804	Accumulators batteries , electric wiring installation		
805	Radio station, navigation instruments mounting, operation		
806	Radio aerial, cable installation		

Inspection after every 100 flight hours **Date………………..**

No	Checking	Conformity Yes / No	Signature
807	Microphone, loudspeaker installation, operation		
808	Towing hook state, its life time according maintenance documents, springs, control cables		
809	Pilot harness restraint system, its life time according maintenance documents		
810	Baggage compartment		
811	Placards and markings		
812	C of G data		
813	MCU LAK-17BT instrument wiring and functioning		
814			
815			
900	**Sailplane rigged**		
901	Wing-fuselage connection reliability, clearances		
902	Horizontal tail- fuselage connection reliability, clearances		
903	All control systems neutral position, controls easy movement		
904	Control surfaces deflections, stops		
905	Friction in all control systems, clearances		
906	Rigged parts fixators state		
907	Main wheel brake operation		
908	Airbrakes functioning, forces on control handle		
909	Flaps operation, flap hinges		
910			
911			
912			
1000	**Power-plant installation (LAK-17BT)**		
1001	Inspect propeller as per propeller manual		
1002	Inspect engine as per engine manual		
1003	Check functioning of the decompressing valves		
1004	Check functioning of the propeller brake		
1005	Check mounting of the engine on a engine frame		
1006	Check fuel lines for leaks or wear		
1007	Check engine accessories such as fuel pump, sensor and etc.		
1008	Check all bolted connections		
1009	Check engine frame for possible cracks		
1010	Check power-plant bay doors and their system		
1011	Check retaining cable for wear		
1012	Check fuel valve operation		
1013	Perform ground test run of the engine		
1014	Engine extraction\retraction system Fig.2.5.2_01, special attention for inspection shaft pos.5,bracket 580-22 of electric actuator CARR 22 pos.8 and bulkhead pos. 13		
1015			
1016			

Inspection after every 100 flight hours **Date**

No	Checking	Conformity Yes / No	Signature
1100	**Conclusion checking**		
1101	Checking records revision		
1102	Maintenance manual changes revision		
1103	Jobs according airworthiness and technical bulletins revision		
1104	Sailplane log-book records revision		
1105			
1106			

5.4 Annual inspection

It is necessary to check the sailplane every 12 months in accordance with the 100 flight hours inspection. Also:

1. Check water ballast tanks for water leaks through the valves and water ballast control shaft.
2. Check technical condition of safety belts and their attachments.
3. Check technical condition and sealing of static, dynamic pressure pipes and moisture collection tanks.
4. Check fuel tank for leaks and clean the tank.

5.5 Inspection after rough landing, after ground loop

After rough landing, ground loop:

1. Check surfaces of sailplane wings, the fuselage, the stabilizer and controls. Pay special attention to wings root ribs, ends of wings spars, technical condition of connection junctions of wings and fuselage, stabilizer and fin;
2. Check friction forces of all control systems of the sailplane;
3. Check main landing gear wheel and tail wheel and operation of wheel brake;
4. Check the sailplane instruments and their operation.
5. Check the power-plant extension/retraction, especially if power-plant was extracted during rough landing.

5.6 Recommendations for extended storage

Before winter storage at the end of the flight season or before extended storage in a hangar or in a trailer:

1. Check for any technical bulletins that need to be implemented;
2. Check condition of external surfaces of accessible metal parts. Pay special attention to protect surfaces that can be damaged by corrosion;
3. Clean and lubricate bearings and sailplane connections according to requirements of section 3.2;
4. Ensure the water ballast tanks are fully drained.
5. Drain the fuel from a tank;
6. If needed, do conservation of the engine according to the engine manual Section 5.

5.7 Inspection of the sailplane after every 1000 flight hours

It is necessary to check thoroughly the sailplane after every 1000 flight hours or every 10 years whichever occurs first. The sailplane shall be checked by qualified staff having a license for those works.

It is necessary:

1. To check the sailplane according to "Inspections after every 100 flight hours" and "Annual inspection".
2. To measure existing clearances in connection joints of the fuselage and wings.

   Allowed clearances and tolerances:

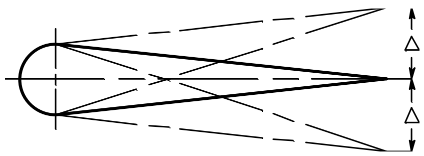
   a) between the wings connection pins and openings in spars consoles Δ = 0.32 mm (fig.2.7.1_04);
   b) between the fuselage pins and wing hubs Δ = 0.27 mm (fig.2.7.1_01);
   c) between the hubs of inner wings and lateral pins of outer wings Δ = 0.046 mm (fig. 2.7.1_03);
   d) tolerance of opening of fixation plate of winglet spar Δ = 0.015 mm (fig. 2.7.1_3);

3. To measure existing clearances in connection joints of fuselage and stabilizer

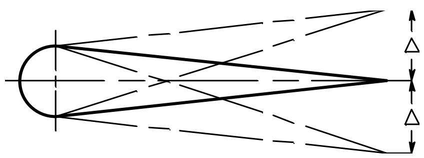
Allowed clearances:

   a) between the fin pins and hubs of the stabilizer Δ = 0.055 mm (fig. 2.7.1_02);
   b) between the stabilizer fixation pin and an opening of stabilizer Δ = 0.32 mm (fig. 2.7.1_02);

4. To measure the elevator's clearance with respect to rear elevator edge at root rib. Allowed clearance is Δ = ± 2 mm.



5. To measure clearances of the ailerons and flaps with respect to rear controls edges at their root ribs. Allowed clearance is Δ = ± 2 mm.



6. Measure wear in the hinges of the elevator, rudder, ailerons and flaps. Allowed radial clearance between the hole diameter and axis is Δ = 0.1 mm.
7. Measure play at the control stick upper part with an elevator and ailerons fixed. Allowed clearance is Δ = ± 2 mm (refer to paragraph **2.7.2**).
8. To measure clearance in attachment joint of the landing gear. Allowed clearance between an opening and axis is Δ = ± 0.15 mm.
9. To measure friction forces in the control systems:

   a) ailerons control – 0.5 daN,
   b) elevator control with trimmer in neutral position – 0.3 daN,
   c) rudder control (measure in upper point of pedals) – 2 … 2.5 daN,
   d) adjustment of pedals according to pilot height – 15 daN,
   e) airbrakes control:

      - at opening – 15 daN,
      - at closing - 18 daN,

f) ventilation control – 3 daN,
g) landing gear control:

- at expanding – 20 daN,
- at retracting – 14 daN,

h) towing hook control:

- without loading on towing hook – 10 daN,
- with loading on towing hook – 12 daN,

i) emergency opening of a canopy – 13 daN,
j) water ballast control – 4 daN.

Note: 1. Measurements according i.4 and 5 are taken with the control stick fixed.
2. Measurements according i.4, 5, 6, 7, 8, 9 shall be taken after cleaning and lubrication of movable surfaces of control systems.

10. To check balancing of ailerons, flaps, elevator and rudder according to the scheme shown in fig. 7.4_1 if repair or/and repainting of these control surfaces was done.
11. To check the trimmer condition.
12. To check the fuselage girder structure and its attachment to the fuselage. Pay special attention to:

- splits in glass fiber reinforced plastics,
- splits in sticking seams,
- condition of girder welding seams,
- deformations of the girder pipes,
- condition of attachment joints of landing gear,
- condition of attachment joint of the towing hook.

13. To check glass fiber reinforced plastics for cracks and splits around these metal parts and joints:

- spar hubs,
- hubs of wing root ribs,
- connection joints of stabilizer and fuselage,
- control and hinge joints of ailerons, flaps, elevator and rudder,
- attachment joints of safety belts,
- fastening joints of cockpit canopy.

Splits on glass fiber reinforced plastics shall be repaired.

14. To check surfaces of ends of wing spars (Fig.5.7_01), surfaces of external wing root ribs, paying special attention to connection zones of root ribs to spar ends and wing shells. If there are some splits or other damage on glass fiber reinforced plastics it is necessary to repair the damaged place.

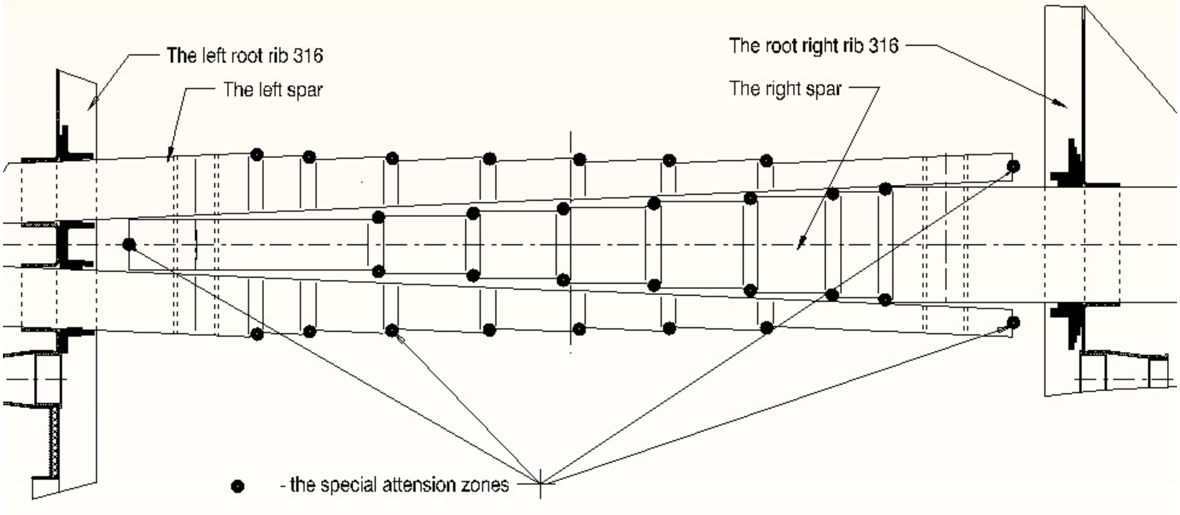
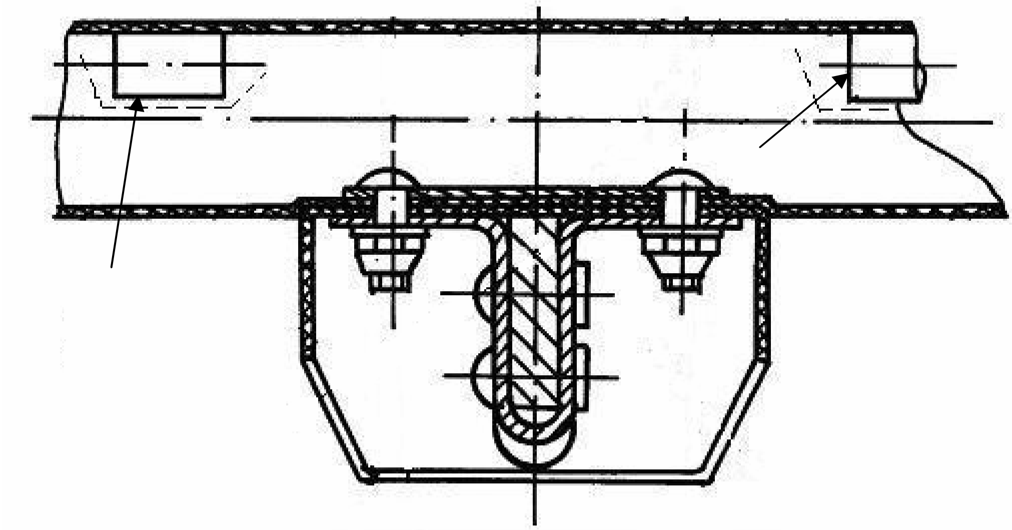


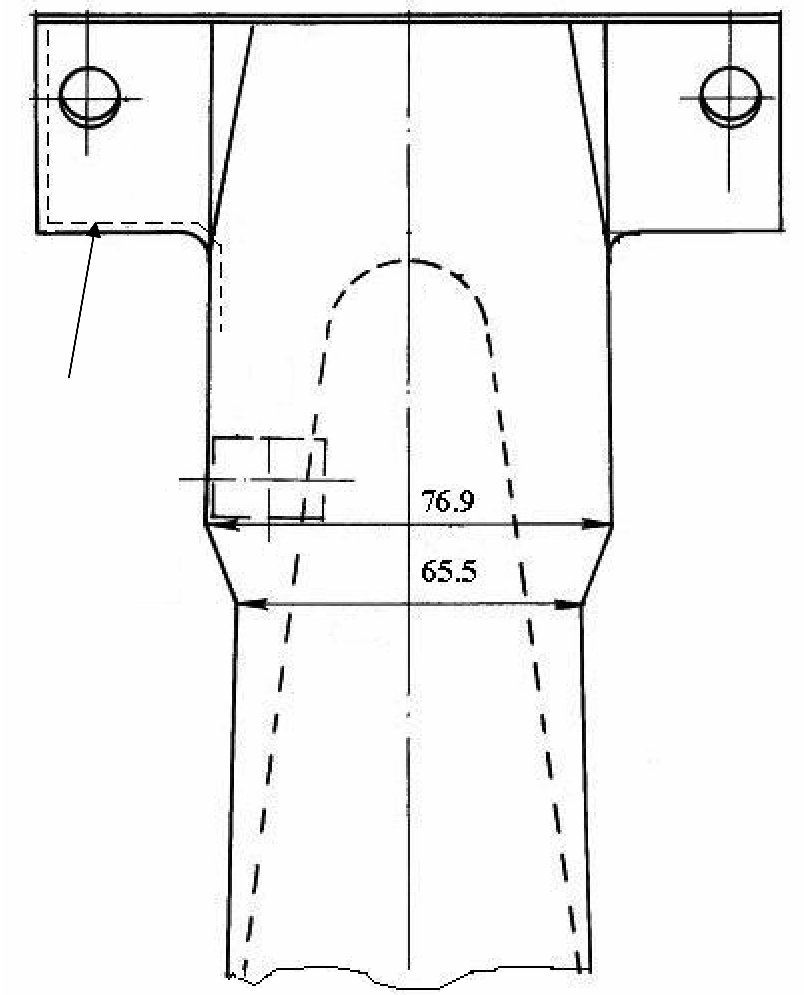
Figure 5.7_01. The wing spar

15. To check external surfaces of wings, ailerons, flaps, fuselage, stabilizer, elevators and rudder. The special attention zones:

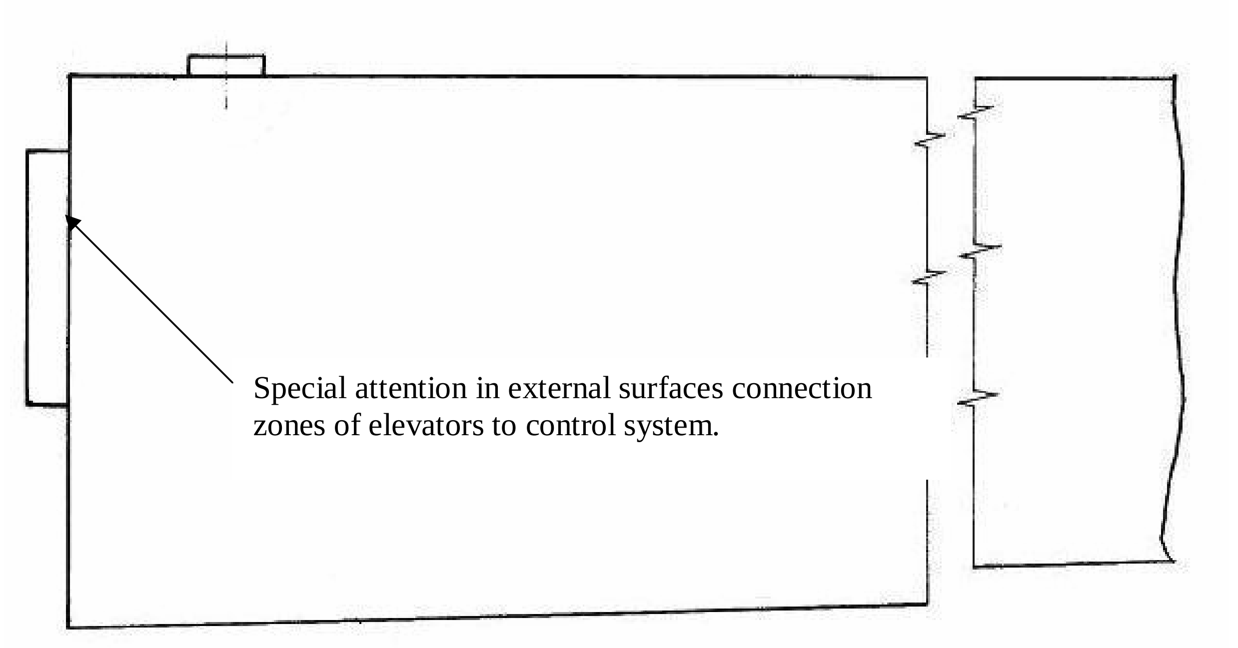
    a) the surfaces around hinge joints of control unit of elevators on the horizontal tail:



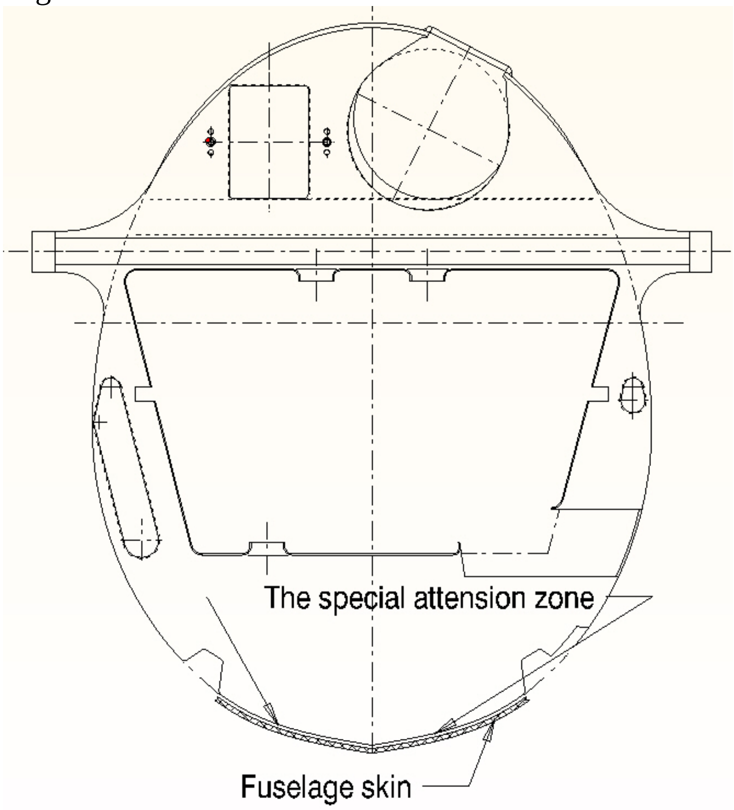
b) the glued zones of the vertical tail spar onto the upper fin part:



c) the elevator root rib:



d) the fuselage bulkhead:



In zones where paint has cracks it is necessary to clean off the paint and check glass fiber reinforced plastic for cracks and if necessary to repair the damage.

Initial clean off of paint shall be done with glass-paper No 180, No 220 finishing with No 320 or even finer.

16. To check external surfaces of galvanized coating of metal parts. Zones with damaged protective galvanized or paint coating, if they are not damaged by corrosion reducing strength, may be repaired. After careful cleaning off of the surface with glass-paper till metallic glitter and dust are removed, protective primer and enamel layers are put on following manual and directions of producers of these coatings.
17. To check towing hook, sailplane instruments and additional equipment following corresponding manufacturers' instructions.
18. To check technical condition and tightness of connections of static and dynamic pressure pipes and moisture collecting tanks.
19. To check technical condition of instrument markings and placards. Replace them if necessary.
20. Repair shall be done following guides given in Section 8 of this Manual. If damaged isn't included in it repair shall be done according to recommendations of manufacturer of the sailplane.
21. To check water ballast tanks in wings and fin for sealing.
22. Check the power-plant extracted/retracted position as indicated in Section 3.3.5 of this manual.
23. Check the completeness of the fire resistance paint. Repair damaged parts of the paint with the right material (see page 8/3 material list).
24. Check the power plant rubber parts and their service life (see Section 6).
25. Check the fastening torque of the engine (refer to the engine manual).
26. After doing all the work the sailplane shall be weighed and C of G shall be recorded.

SECTION 6

The sailplane life limits

Service life of sailplane is 6000 flight hours. The approved lifetime for turbo version temporary is 3000 flight hours.

LAK-17BT

The following power-plant rubber parts have 5 years limited service life:

- engine rubber shock mounts;
- all fuel lines;
- engine frame mount rubber shocks (see Fig.2.5.2_01, pos.4);
- engine retaining cable bungee cord (see Fig.2.5.7_01, pos.8).

LAK-17B, LAK-17BT

The continued airworthiness of the sailplane is ensured by prescribed inspections and technical maintenance works done during its use :

1. Annual sailplane inspection before starting the flight season according to requirements of Section 5 of “Maintenance Manual”;

2. Daily (before every flight day) and preflight sailplane inspection according to requirements of Section 4 of “Flight Manual” and Section 3 of “Maintenance Manual”;

3. Special sailplane inspection after a rough landings, ground loops, exceeding of allowed loadings and etc. according to requirements of section 5 of “Maintenance Manual”;

4. Inspection and works according to requirements of bulletins issued for the sailplane;

5. Inspection and works according to requirements of maintenance documents (Section 4 of “Maintenance Manual’) of parts with limited lifetime (towing hook, safety belts, instruments, engine, propeller and others);

6. Inspection after every 1000 flight hours according to requirements of Section 5 of “Maintenance Manual”;

Checking of a sailplane, maintenance and necessary repair works shall only be done by qualified staff having permission to do the work.

In the case of damage of the sailplane structure not included in the “Maintenance Manual” the repair shall be agreed to by the manufacturer of the sailplane.

SECTION 7

Weights and center of gravity

Page

7.1 Introduction

Information about weighing of the sailplane, definition of center of gravity after sailplane repair, repainting or mounting of additional instruments or equipment is given in this section.

Position of center of gravity is defined by the distance from the leading edge of wing root section (datum) towards the sailplane tail.

Positioning scheme of the sailplane during weighing and definition of C.G. is shown in fig.7.1_01.

Approved in flight positions of C.G.:

Pos. No	Parameter	Approved boundaries, mm	
		LAK - 17B	LAK – 17BT
1	Foremost C.G. limit	206	206
2	Rearmost C.G. limit	328	328

Warning: it is important to do weighing or calculation of c.g. for forward limit with **engine extracted** and for rear limit with **engine retracted** as engine position makes big influence for c.g. position.

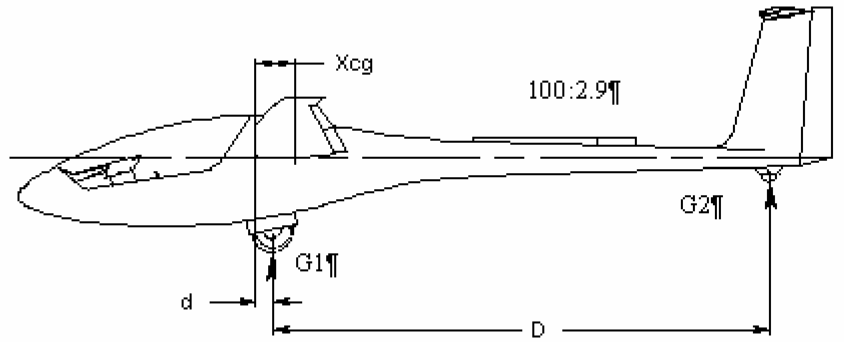
Empty weight center of gravity is defined for the 15m wing configuration, fuel tank empty (if the power-plant is installed), glider ready to fly, excluding weight of pilot and parachute.

Warning: for the glider with power-plant installed, fin battery has to be removed. Only the baggage compartment batteries can be installed.

Warning: due to flutter reasons it is not allowed to add additional masses to the fin battery or the fin battery compartment.

Note: if pilot weight is 100…110 kg (220,5…242 lbs), it is possible to remove one baggage compartment battery and replace it by installing battery in the fin. This moves c.g. of the glider back by 32…34 mm. Re-weighing or re-calculation of the c.g. position is mandatory in this case.

The permissible range of center of gravity position in dependence of glider’s empty weight, pilot weight and fin water ballast weight is given at the end of this section.



Center of gravity of sailplane:

$$Xcg = \frac{\boldsymbol{G}2 * \boldsymbol{D}}{\boldsymbol{G}1 + \boldsymbol{G}2} + \boldsymbol{d}, \text{ mm}$$

Fig. 7.1_01. Sailplane weighting and center of gravity definition scheme

The maximum approved take-off and landing weight is 550 kg (1212,5 lbs) for 15m wing and 600 kg (1322,8 lbs) for 18m wing.

Min pilot weight - see cockpit loading placard.
Max pilot weight -110 kg.

The given pilot weight includes parachute weight.

Abbreviations used:

DP – reference point (datum point): leading edge of wing root section,
DL –positioning line (datum line): upper side of fuselage boom placed at slope 1000 : 29.
Theoretical data of D and d: D=4007.2 mm, d=116.1 mm.

7.2 Definition of sailplane weight and C.G.

For definition the sailplane weight and C.G. it is necessary:

1. To weigh the sailplane parts separately:

Pos. No	Sailplane part	Marking	Weight, kg
1	Right inner wing with controls	Gw.in.r	
2	Left inner wing with controls	Gw.in.ll	
3	Fuselage with rudder	Gfz	
4	Stabilizer with elevator	Gst	
5	Outer wing /15 m right	Gw.out15m.r	
6	Outer wing /15 m left	Gw.out15m.l	
7	Outer wing /18 m right	Gw.out18m.r	
8	Outer wing /18 m left	Gw.out18m.l	
9	Winglet right	Gwl.r	
10	Winglet left	Gwl.l	

In order to define C.G. with a pilot - weigh the pilot and define his weight Gpil.

Empty sailplane weight:

a) wing of 15 m

Gemp = Gemp15m = Gw.in.r + Gw.in.l +Gw.out15m.r+Gw.out15m.l+Gwl.r+Gwl.l Gfz + Gst,

b) wing of 18 m

Gemp = Gemp18m = Gw.in.r + Gw.in.l +Gw.out18m.r+Gw.out18m.l+Gwl.r+Gwl.l + Gfz + Gst.

Weight of sailplane including a pilot Go:

a) wing of 15 m

Go = G15m = Gemp15m + Gpil,

b) wing of 18 m

Go = G18m = Gemp18m + Gpil.

2. To assemble the sailplane.
3. To place sailplane tail on weighing-machine. To position the sailplane with help of an auxiliary equipment according to requirements of fig. 7.1_01.

   To seat a pilot into a cockpit, if C.G. with pilot is being defined.
4. To define weight of the sailplane tail part weighting auxiliary equipment.
5. To measure the distance D (mm) from center of main landing wheel axle to tail wheel axis.
6. To measure the distance d (mm) from center of main wheel axle to reference point DP.

Note: The distances D and d are measured on the ground according to corresponding projections of measurement points.

7. To weigh an equipment of sailplane positioning and determine the weight of sailplane tail G2 by subtracting the weight of an auxiliary equipment from the weight of sailplane tail part with an auxiliary equipment.
8. To calculate C.G.:

a) C.G. of empty sailplane

$$Xcgemp = \frac{\boldsymbol{G}2 * \boldsymbol{D}}{\boldsymbol{Gemp}} + \boldsymbol{d}, \text{ mm}$$

b) C.G. of sailplane with a pilot:

$$Xcg = \frac{\boldsymbol{G}2 * \boldsymbol{D}}{\boldsymbol{Go}} + \boldsymbol{d}, \text{ mm}$$

Note: 1) weights G2, Gemp, Go are assumed for corresponding weighing variant.

Warning: it is important to do weighing or calculation of c.g. for forward limit with **engine extracted** and for rear limit with **engine retracted** as engine position makes big influence for c.g. position.

9. To check if position of C.G. is within an allowed range **for both engine extracted and retracted**.

If C.G. is outside the allowed boundaries position the sailplane C.G. shall be corrected by the help of lead ballast (Fig.7.2_01, Fig.7.2_02, Fig.7.2_03):

- required mass of lead for correction of C.G. position can be calculated or determined by actual balancing and checking the sailplane C.G.,

- lead ballast of required size can be supplied by Joint Stock Company “Sportinė Aviacija ir Ko”,
- depending on how position of C.G. shall be corrected, lead shall be attached on partition wall in fore body behind pedals joint or on rear wall of fin after removal of rudder.

7.3 Weight of non-lifting parts of the sailplane

Weight of non-lifting parts of the sailplane includes weight of pilot, fuselage, stabilizer with elevator, rudder, instruments and equipment.

Maximum weight of non-lifting parts of the sailplane is 276,3 kg (609,14 lbs).

The maximum approved take-off and landing weight is 550 kg (1212,5 lbs) for 15m wing and 600 kg (1322,8 lbs) for 18m wing. Max sailplane weight shall not be exceeded.

7.4 Checking of control weights and balancing

After repairs or repainting of controls their weights and position of C.G. shall be checked.

For this purpose a control being checked shall be removed from the lifting surface and positioned horizontally (fig. 7.4-01) by help of auxiliary equipment. Friction in supports must be minimal.

A component P of weight, kg, is to be defined by help of a appropriate scales. Shoulder r, mm, - the distance between rotation axis of the control and weighing point is to be measured by a ruler.

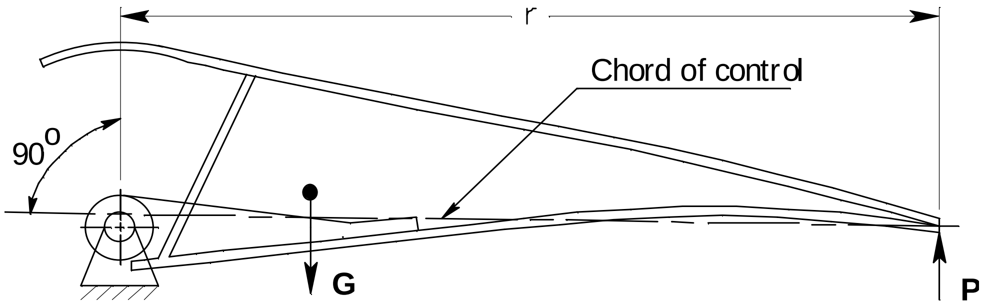


Fig. 7.4_01. Scheme of control positioning and weighting

Static moment of a control M = P * r; kg * mm

Note: reaction P is defined with plane of control chord positioned horizontally.

Approved boundaries for control weights and static moments:

Control	Approved boundaries of control weight. kg	Approved static moment of control, kg * mm
Inner wing ailerons: EL1 EL2	 0.55 ÷ 0.7 0.8 ÷ 0.98	 20.0 ÷ 24.0 24.0 ÷34.0
Flap	2.3 ÷ 2.9	78 ÷ 110
Outer wing aileron	1.5 ÷ 1.8	45 ÷ 56
Elevator	0.36 ÷ 0.43	15.8 ÷ 17.4
Rudder	2.5 ÷3.25	50 ÷ 90

If weight of a control and static moment are not within the approved tolerances, contact the company “Sportinė Aviacija ir Ko”.

7.5 Calculation of loading limits

Center of gravity position after loading glider (additional instruments, equipment, water ballast, pilot) is defined by

$$X_{CG} = \frac{\sum_n G_n * X_n}{\sum_n G_n}, \text{ mm}$$

Where: G_n = the glider component mass, kg;

X_n = distance between glider component mass C.G. and datum point (DP), mm;

- distance "-", if mass C.G. is ahead of the datum point;
- distance "+" if mass C.G. is behind of the datum point;

n = number of glider component masses;

ΣG_n = sum of glider all components masses;

$\Sigma G_n * X_n$ = sum moments of glider all components masses;

The C.G. calculation table

No	Component	Weight G_n kg	Distance from DP X_n mm	Moment =Weight *Distance; $G_n * X_n$ kg * mm
1.	Empty glider. Engine - retracted* - extracted*			
2.	Pilot			
3.	Battery in fin	3.5	4192	
4.	Battery in baggage compartment	2.6	157	
5.	Water ballast in wings		168	
6.	Water ballast in fin		4003	
7.	Instrument N1 in instrument panel		-1010	
8.	Instrument N2 in instrument panel			
9.				
-				
n-1	Removable ballast in fuselage nose		-1785	
n	Baggage weight			
	ΣG_n=		**$\Sigma G_n * X_n$=**	

**** - these data for columns Weight G_n and Distance X_n should be taken from current "Weight and balance record" table (glider Flight Manual paragraph 6.4) as G_n = "Empty weight of the sailplane" and X_n = "C.G. location".***

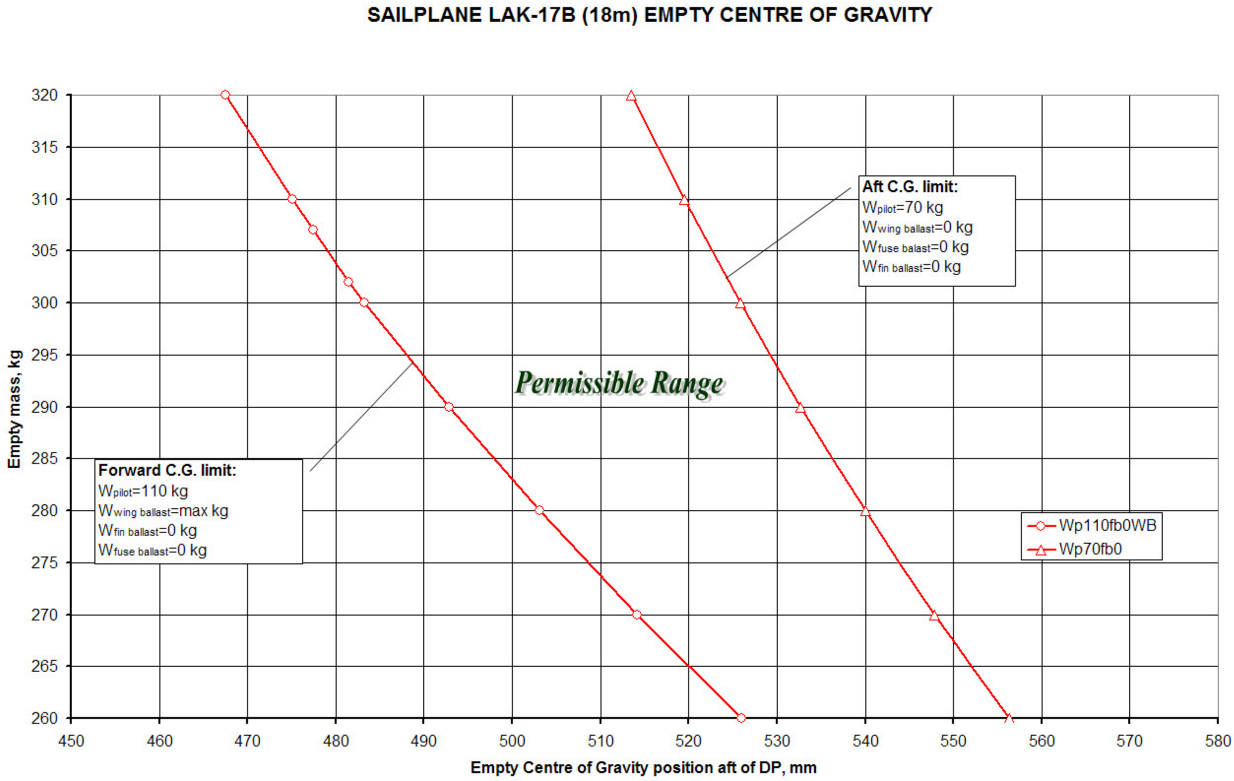
Note: The glider empty weight and empty weight center of gravity is defined by weighing data.

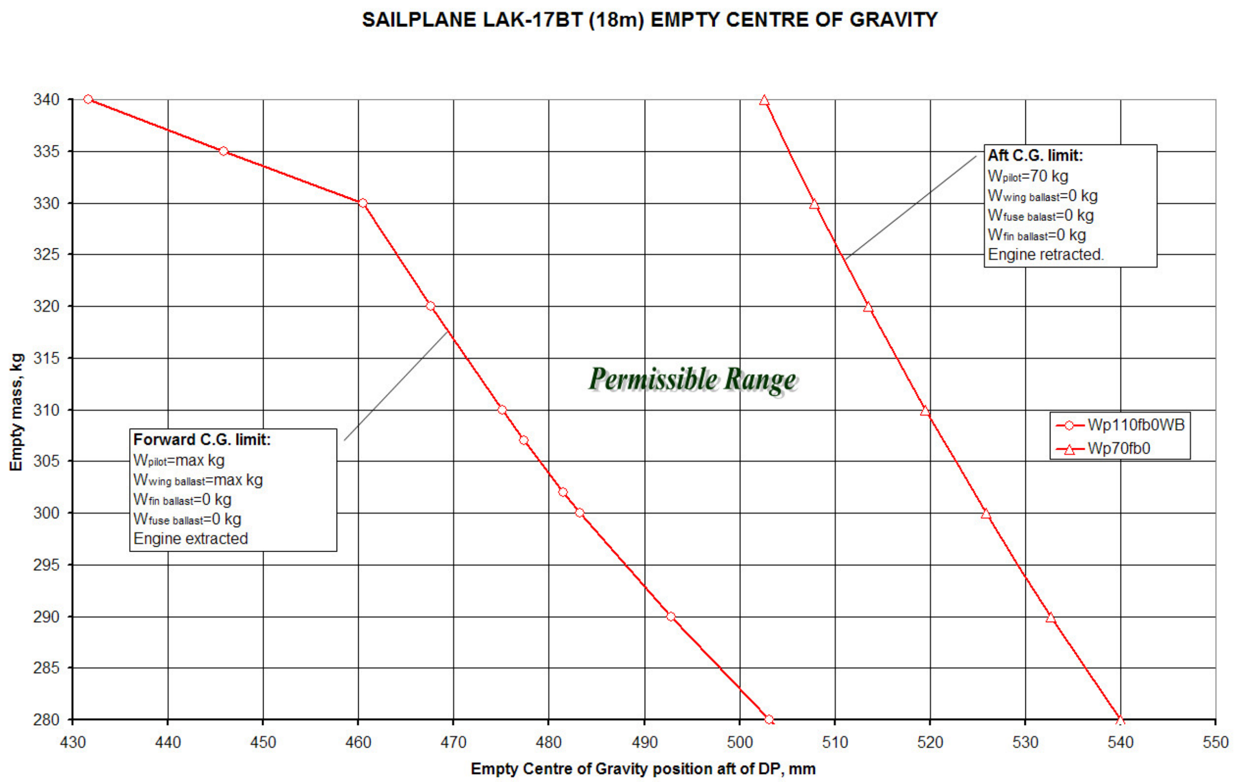
Warning: if the power-plant is installed, empty weight and center of gravity of the empty glider has to be determined for forward limit with **engine extracted** and for rear limit with **engine retracted** as engine position makes big influence for c.g. position.

- Pilot: actual pilot weight with parachute,
  distance from DP = -520, when pilot seat is in the rearmost position;
  distance from DP = -670, when pilot seat is in the foremost position.
- Water ballast in wings: actually filled water ballast weight.
- Water ballast in fin: actually filled water ballast in fin tank weight.

- Baggage weight: baggage in baggage compartment weight.

The permissible range of empty glider center of gravity is given below:





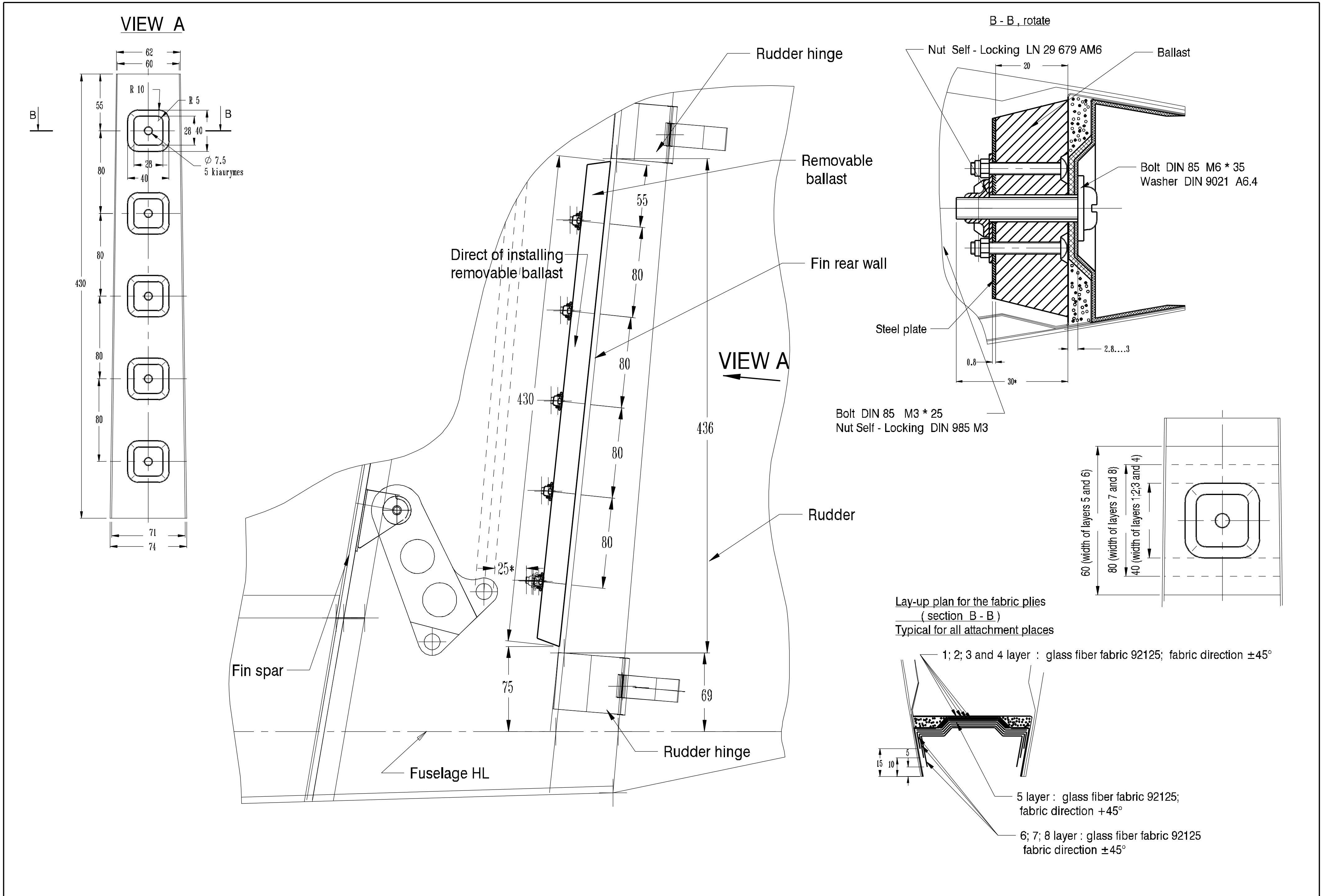


Fig. 7.2_01. Removable ballast weight fixing in the fin

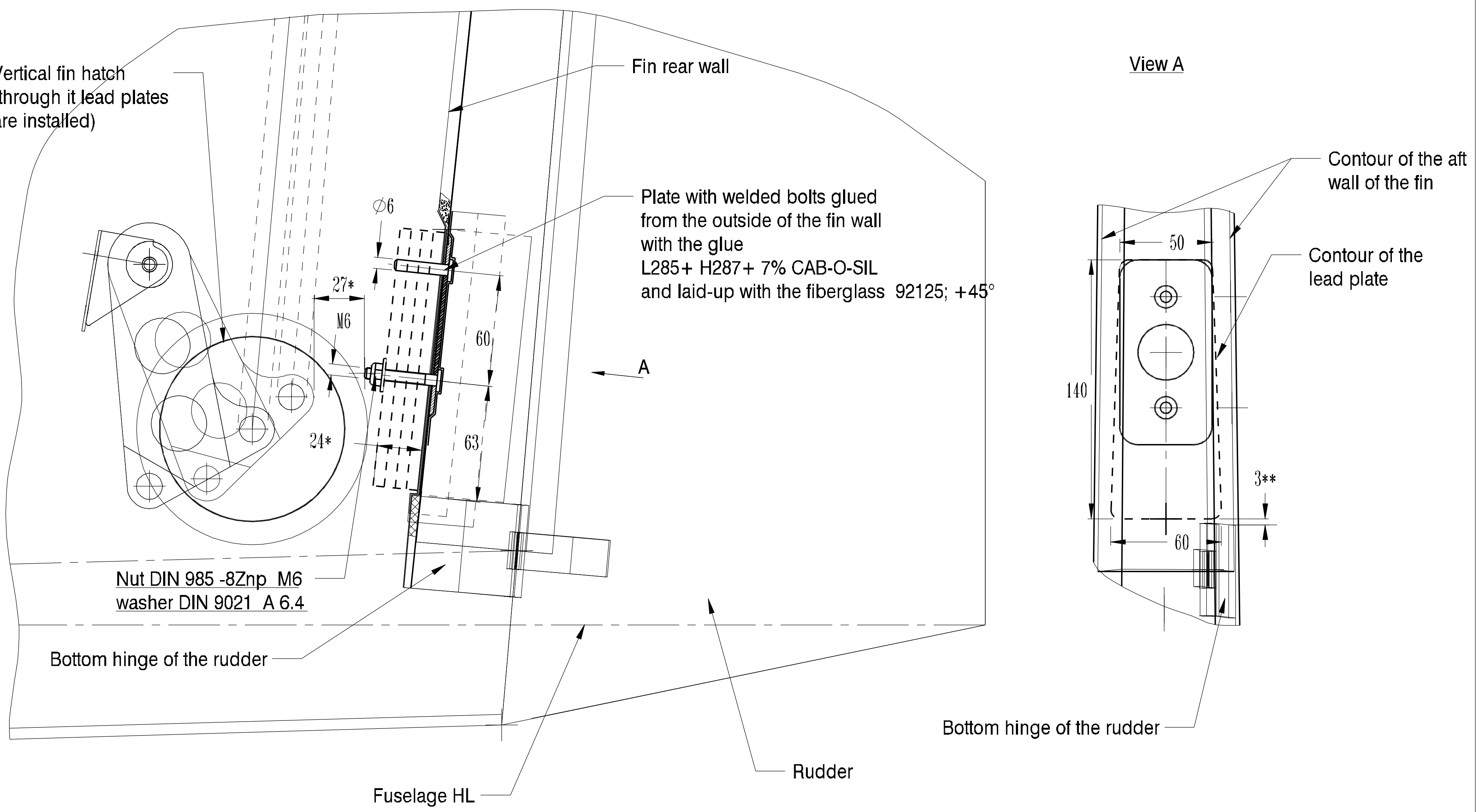


Fig.7.2_02. Removable ballast in the fin

Removable ballast in fuselage nose

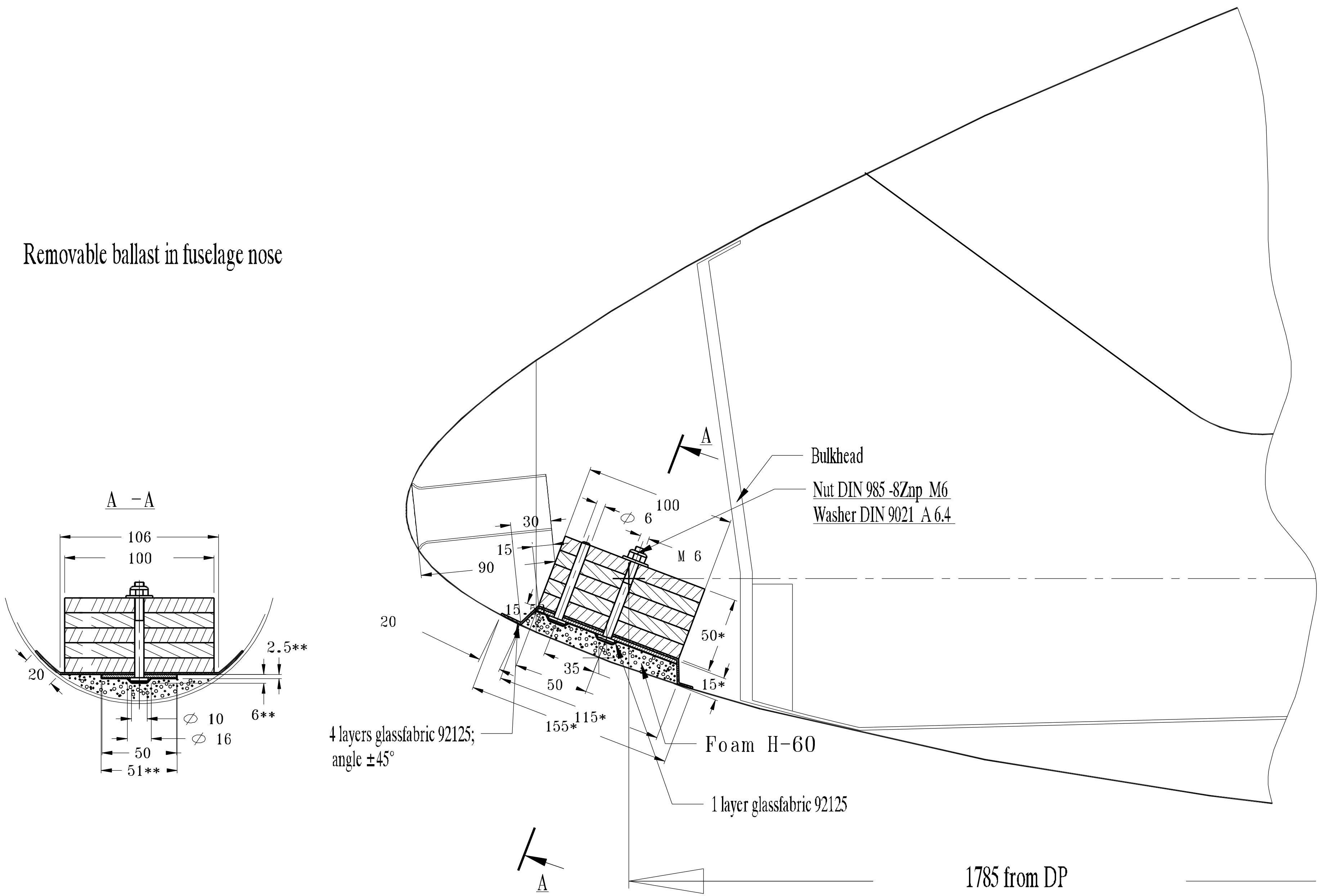


Fig. 7.2_03. Removable ballast in fuselage nose

SECTION 8

Repair

Page

8.1 Introduction

General requirements for repair of minor sailplane damage are given in this section.

8.2 Main requirements for repair work

1. Repair work shall be performed only by qualified and authorized staff.
2. Major repairs shall be agreed to by local CAA in order to avoid possible sailplane airworthiness violation.
3. If there are some doubts about repair classification (“major” or “minor”) contact the manufacturer of the sailplane.
4. In respect to the sailplane zone being repaired (fig. 8.2_01, fig. 8.2_03) work may be carried out by:
   - zone 1 – a person having corresponding permission,
   - zone 2 – repair factory certified by local CAA
   - zone 3 – the sailplane manufacturer.
5. After repair of controls, repainting of a sailplane it is necessary to check weights and positions of C.G. of controls having been repaired and C.G. of the sailplane.
6. No additional color marking on the white upper surface is allowed.

8.3 Repair of parts of advanced composites

8.3.1 Conditions for repair works

Premises where repair is carried out must be clean, warm and properly lighted. Temperature during repair must be ≥ + 20°C and humidity ≤ 65%.

The optimal processing temperature for resin- hardener systems lies in range between 20°C and 25°C. Heat treatment must be performed keeping temperature of 50-60°C for 15 hours.

Advanced composite repairs should only be performed by adequately trained and qualified trained and qualified repair persons.

8.3.2 Classification of damage

The sailplane construction is divided into three zones with allowed sizes of damage in them (fig. 8.2_1, fig. 8.2_3, table 8.3.2_01).

Table 8.3.2_01

Pos. No	Repair damage	Zone 1	Zone 2
1	An opening	∅ 100 mm	∅ 40 mm
2	Crack (split)	200 mm	100 mm
3	Damage of leading edge	100 mm – for ailerons, flaps 40 mm – for wings	40 mm – for fin, stabilizer
4	Damage of trailing edges	200 mm	
5	Damage of paint coating	Without restrictions	

It is allowed to repair these constructive damages in the certified repair station:

1) composite material delamination, cracks at structural joints,
2) damage of wing roots and end ribs,
3) cracks and fractures of metal constructions,
4) cracks and delamination of skins of fuselage, wings, stabilizer, controls, wings tips and damages in a structural parts.

For the above it is necessary to get corresponding technical information and recommendations from the manufacturer of the sailplane.

Damage of wings spars may only be repaired by the manufacturer of the sailplane.

8.3.3 Typical repair of sailplane aggregates skins

Typical repair works of sailplane aggregates skins are shown in fig. 8.3.3_01.

If a part of advanced composites is damaged partially not through (fig. 8.3.3_01,a) its repair must be performed as follows:

- make round edges of a damaged zone,
- take out foam of opening (fig. 8.3.3_01,b) and check the internal layer for damage,
- if an internal layer is not damaged, prepare an upper coating for repair (fig. 8.3.3_01,b),
- glue in foam,
- after glue polymerization, sand the repaired zone with sand paper and then lay-up on it the required number of repair layers of cloth at given angle of reinforcement (fig. 8.2_01, fig. 8.2_02, fig. 8.2_03).

Caution: During repair the required temperatures for processing of the resin- hardener systems must be kept.

If a part of advanced composites is damaged through (fig. 8.3.3_01,d) repair must be performed as follows:

- make round edges of a damaged zone,
- take out foam around the opening (fig. 8.3.3_01,e),
- prepare an upper coating for repair (fig. 8.3.3_01,e),
- glue in a plate on prepared internal layers according to requirements of fig. 8.3.3_01,e (if edges of internal layers are flexible, it is necessary to glue technological plate from bottom side),
- after glue polymerization, sand the repaired zone with sand paper and then, lay-up on it the required number of repair layers of cloth at given angle of reinforcement (fig. 8.2_01, fig. 8.2_02, fig.8.3.3_01,f).

Caution: During repair the required temperatures for processing of the resin-hardener systems must be kept.

8.3.4 Materials used for repair

The following fabric types are used for repair of parts of advanced composites:

Table 8.3.4_01

Type (Interglass No)	Weaving type	Mass g/m2	Cloth thickness, mm	Manufacturer
Glass fabric				
90070	Plain	81	0.1	Interglass AG
92110	Twill 2/2	163	0.18	Interglass AG
92125	Twill 2/2	280	0.35	Interglass AG
Carbon fabric				
98131	Twill 2/2	163	0.2	Interglass AG

Type (Interglass No)	Weaving type	Mass g/m2	Cloth thickness, mm	Manufacturer
98151	Twill 2/2	245	0.35	Interglass AG
469	Plain	93	0.15	C. Cramer & Co
Kevlar fabric				
98613	Twill 1/3	170	0.35	Interglass AG

For repair work resin- hardener systems Laminating resin L 285 - Hardener 285,286,287 are used.

Caution: resin and hardener must be stored in carefully sealed containers. Resin and hardener may crystallize at temperatures below +15°C. The crystallization is visible as a clouding or solidification of contents of the container. Before using the resin and the hardener must be heated in order to destroy the crystallization of them. Slow warming till 50°C - 60°C in vessels with water and stirring of them will make the content transparent without loss of their quality. Only fully transparent products must be used. Do not heat over an open flame! Use individual protective appliances while stirring (gloves, glasses, respirator).

Preparation of binding material:

Table 8.3.4_02

Mixture ratios	Resin L-285	Hardener 287/286/287
Parts by weight	100	38 ÷ 40
Parts by volume	100	47 ÷ 50

The given mixing ratio of components must be observed as exactly as possible. More or less hardener will not speed up or slow down the reaction – just cause only partial hardening which will not be corrected any way. Mixture of resin and hardener must be stirred thoroughly until there is no cloudiness in a vessel.

Pay special attention to walls and corners of the vessel.

The optimal processing temperature for resin- hardener systems lies in range between 20*C and 25*C. Higher temperature is possible but it will shorten an effectiveness duration of the resin. Temperature rise by 10*C makes an effectiveness duration twice shorter.

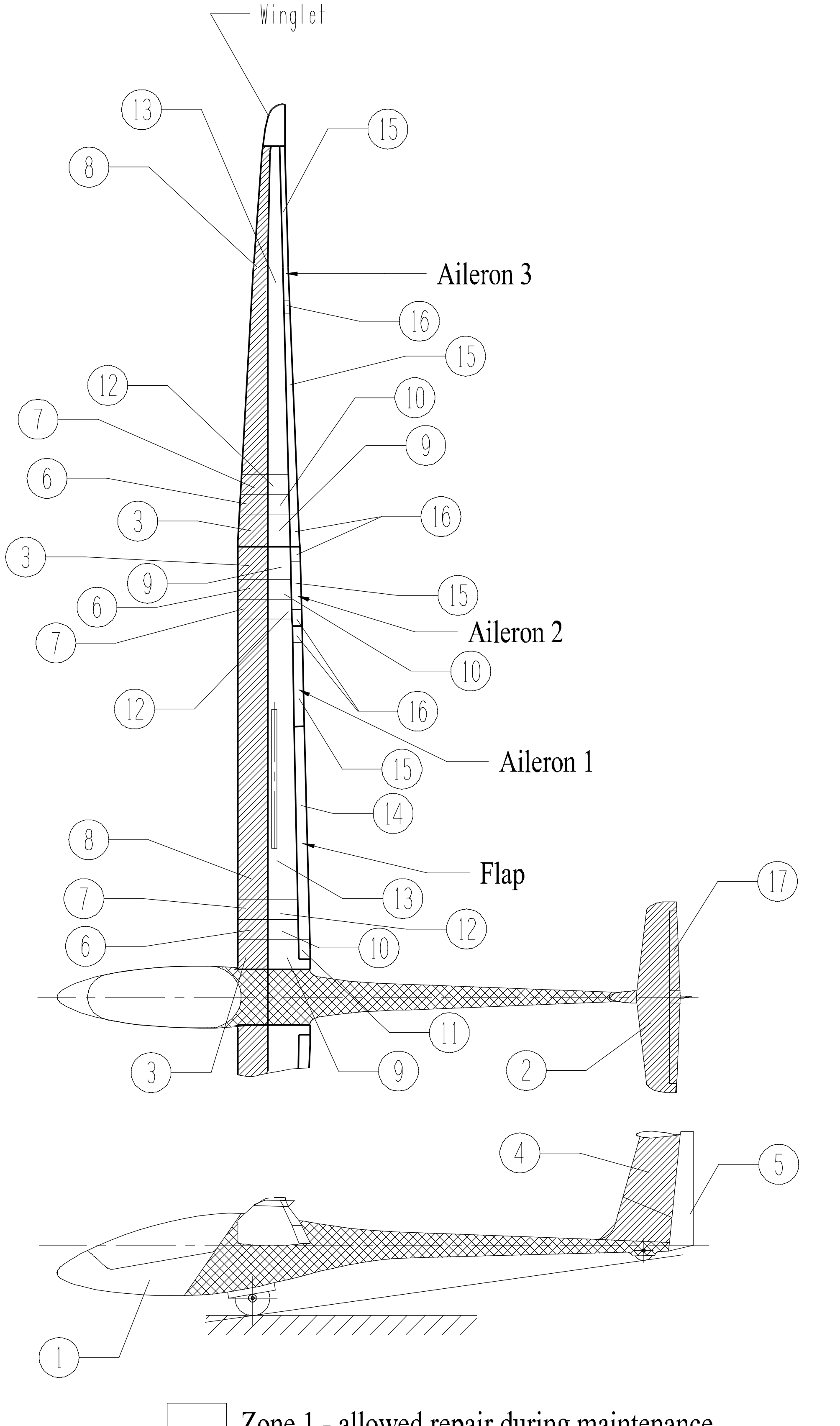
8.4 Repair of metal parts and paint

Damaged galvanized and paint coatings on metallic parts which are not damaged by corrosion, etc. affecting the strength of the part, may be restored by replacing the coating in accordance with manufactures' recommendations. Metallic parts damaged by corrosion, etc. may only be repaired in accordance with instructions obtained from the sailplane manufacture.

LAK-17BT

The engine compartment is painted with special fire protection paint of system Pyroplast-Primer L/ Pyroplast-Stahl L/ Pyroplast-Top L. The manufacture of the paint is Rutgers Organics GmbH (www.ruetgers-organics.de). Use this material if the paint was damaged and needs fixing.

8.5 Illustrations



Zone 1 - allowed repair during maintenance

Zone 2 - allowed repair in certified repair station

Zone 3 - allowed repair by the sailplane manufacturer

Fig.8.2_01. Repair zones of sailplane

1) 90070 ↔
92110 ⤢
3x98613 ↔
3x98131 ↔
92125 ↔

3) 90070 ↔
92110 ⤢
98131 ↔
98131 ⤡
92125 ⤢
92125 ⤡
92125 ⤢
H60
98131 ⤢
98131 ↔
92110 ⤡

4) 90070 ↔
92110 ⤢
92125 ⤡
H60
92125 ⤡

5) 90070 ↔
469 ⤢
469 ⤢
H60
469 ⤢

6) 90070 ↔
92110 ⤢
98131 ↔
98131 ⤡
92125 ⤢
92125 ⤡
H60
98131 ⤢
98131 ↔
92110 ⤡

7) 90070 ↔
92110 ⤢
98131 ↔
98131 ⤡
92125 ⤢
H60
98131 ⤢
98131 ↔
92110 ⤡

8) 90070 ↔
92110 ⤢
98131 ↔
98131 ⤡
H60
98131 ⤢
98131 ↔
92110 ⤡

9) 90070 ↔
92110 ⤢
98131 ⤡
92125 ⤢
92125 ⤡
92125 ⤢
H60
98131 ⤢
92110 ⤡

10)90070 ↔
92110 ⤢
98131 ⤡
92125 ⤢
92125 ⤡
H60
98131 ⤢
92110 ⤡

11)90070 ↔
92125 ⤢
98131 ⤡
H60
98131 ⤢
92125 ⤡

12)90070 ↔
92110 ⤢
98131 ⤡
92125 ⤢
H60
98131 ⤢
92110 ⤡

13)90070 ↔
92110 ⤢
98131 ⤡
H60
98131 ⤢
92110 ⤡

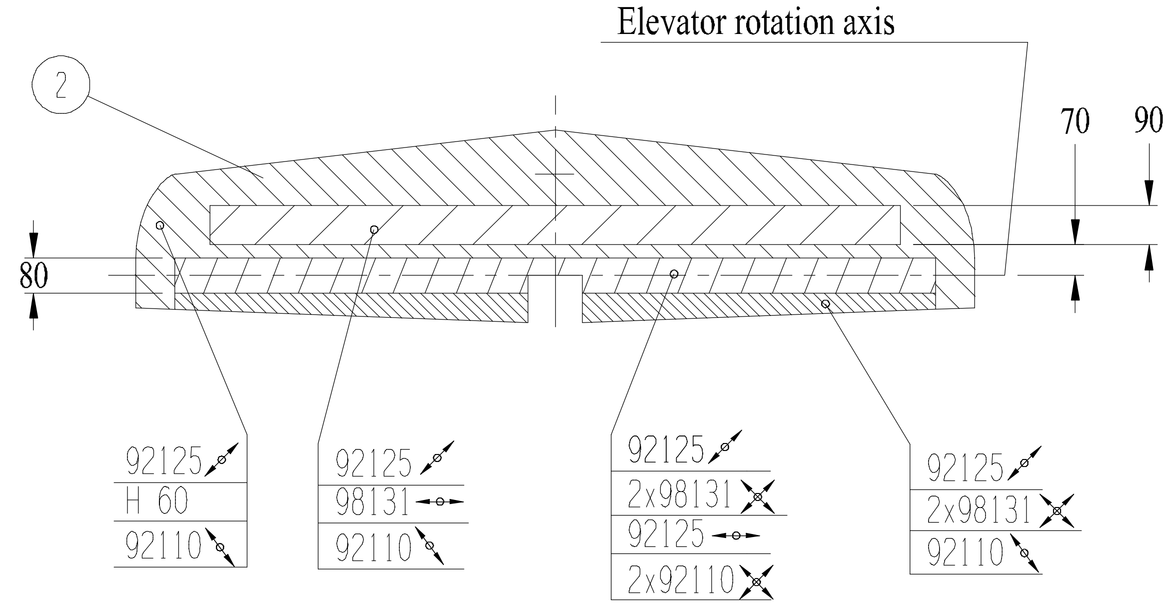
14)90070 ↔
98131 ⤡
H60
98131 ⤢

15)90070 ↔
98131 ⤢
H60
98131 ⤡

16)90070 ↔
98131 ⤡
98131 ⤢
H60
98131 ⤡
98131 ⤢

Fig.8.2_02. Repair zones of sailplane

An upper surface of stabilizer and elevator



A lower surface of stabilizer and elevator

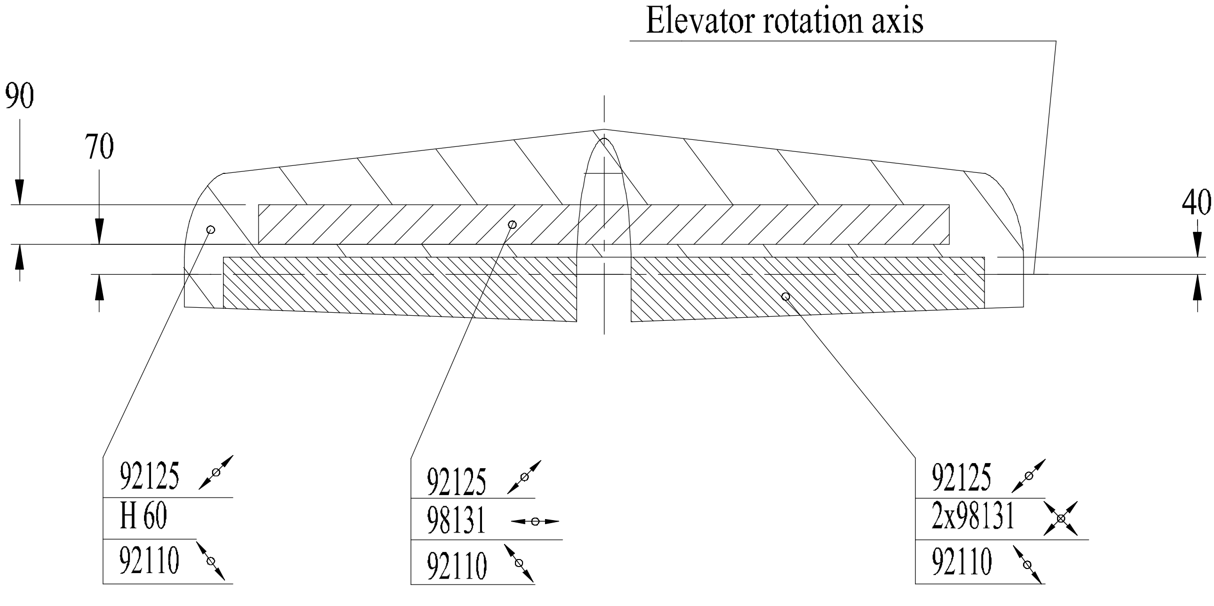


Fig.8.2_03 Repair zones of sailplane

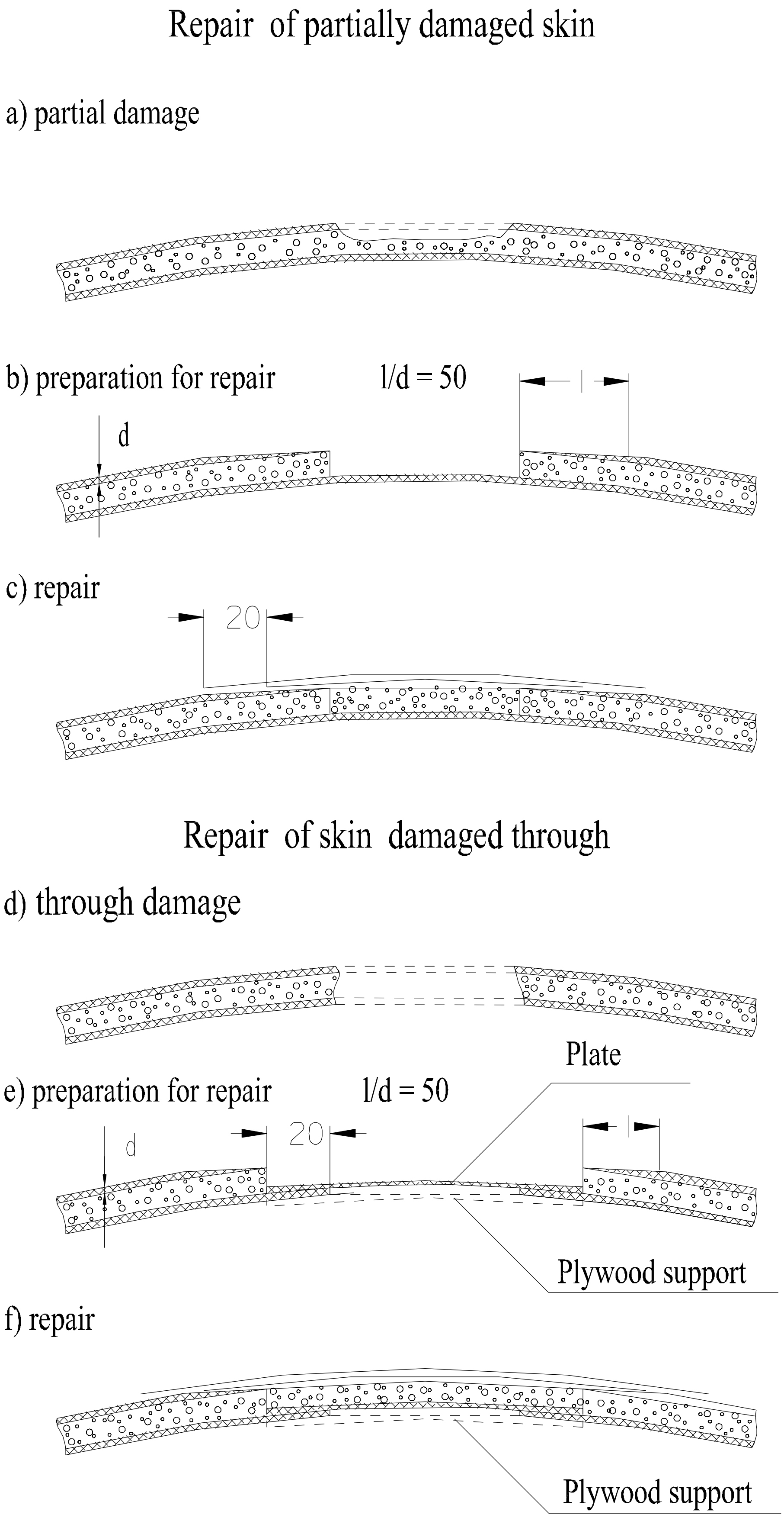


Fig.8.3.3_01 Typical repair of skin of composite skin sandwich