
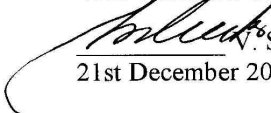



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JSC "Sportinė aviacija"
General Director
 S. Skalskis
26th January, 2004

Service Bulletin No. 012.5.Re.002A

**SERVICE WORKS FOR THE GLIDER LAK-12
AFTER 15 YEARS OF OPERATION**

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21st December 2003

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2003

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Introduction

This service bulletin applies for the gliders LAK-12, calendar service time of which reached 15 years and, according to requirements for service life described in conclusions for service life of the glider, is done:

- 1) wings changed (serial numbers of the gliders Nr.601-Nr.657);
- 2) wing spar fittings changed (serial numbers of the gliders Nr.601-Nr.6137);
- 3) elevator control belcrank in a vertical fin is changed (serial numbers of the gliders Nr.601-Nr.6137).

After the works described in the service bulletin No. 012.5. Re002A are accomplished, calendar service time for the glider LAK-12 is extended by 5 years from the date when service bulletin works are completed.

Works according the service bulletin No. 012.5.Re002A should be done by national CAA licensed specialists.

The copies of the service bulletin No. 012.5.Re002A are sent to:

1. Civil Aviation Administration of the Lithuanian Republic (CAA) – 1 copy;
2. Aviation authorities of countries, which issued Type Certificates for the LAK-12 - 1 copy;
3. For the known owners of LAK-12 or administration of organizations (clubs) having LAK-12 gliders – 1 copy.

After completion of the works described in bulletin No. 012.5.Re002A, in a logbook of the glider LAK-12 the following entries should be made:

“Service works according to the service bulletin No. 012.5.Re002A accomplished.
Glider calendar service time extended by 5 years. Established glider technical service life is 3000 flight hours”.

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REQUIRED SERVICE WORKS AFTER 15 YEARS OF OPERATION

The following works have to be performed:

1. Works according to service bulletin No. 012.5. Re 001A “Service of the LAK-12 sailplane after 500 flight hours or 5-year operation” must be performed.
2. Inspect the flap hinges located on the flap. The flaps hinges are inspected as follows:
 - a) disconnect and remove wings from fuselage;
 - b) place the wings on the supports so, that it is possible to deflect flap down as much as possible (see sketch No.1);
 - c) using magnifying lens x 4 visually inspect external surface of the flap hinges for cracks;
 - d) in a case if cracks are found on a surface of hinge, the opening of $\varnothing 20$ mm diameter has to be made (see sketch No.2 section A-A). Remove hinge bracket LAK-10A 37 00 06 00 M;
 - e) the hinge bracket LAK-12 37 03 00 00 M is removed by unscrewing mounting bolts, which connect hinge bracket with flap controls coupling LAK-12 37 05 00 00 M (see sketch No.2 view A);
 - f) the hinge brackets having cracks must be replaced with the new ones LAK-10A 37 00 06 00 M, LAK-12 37 03 00 00 M;
 - g) the hinge brackets LAK-10A 37 00 06 00 M are attached to the structure by bolts 3021A-5-18, nuts 3373A-5 and washers 3405A1.5-5-12;
 - h) the opening of $\varnothing 20$ mm diameter in the top skin should be repaired as described in the “Sailplane LAK-12 Maintenance Manual”.
3. Inspect the surface of the mounting plates LAK-12 37 06 00 00 M for mounting flap controls connection coupling LAK-12 37 05 00 00 M. The surfaces are inspected as follows:
 - a) the opening of $\varnothing 15$ mm diameter in the top skin of the flap has to be made (see sketch No.2 section B-B);
 - b) using inspection light, inspect the surface of the plate LAK-12 37 06 00 00 M;
 - c) in a case if corrosion damaged surface is found, corrosion has to be removed with sand paper grid 120;
 - d) paint sanded area with the primer F-809 and gray paint 7001 Urki-Nox.
4. Inspect the aileron hinges located on the aileron. The aileron hinges are inspected as follows:
 - a) deflect the aileron down and remove the shafts LAK-10A 20 50 00 03-02, LAK-10A 20 50 00 03-03 from both aileron control units (see sketch No.3);
 - b) remove the aileron by first removing cotter pins 1.5x10-002 and pulling out pins LAK-10A 20 50 00 02 (see sketch No.3 section C-C);
 - c) using magnifying lens x 4 visually inspect aileron hinge brackets LAK-12A 35 00 04 00 SB. Inspect for the cracks on external surface of the hinge bracket.

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- d) In a case if crack is found on the aileron hinge bracket LAK-12A 35 00 04 00 SB, make the opening of $\varnothing 20$ mm diameter (see sketch No.3 section C-C) in the tip skin of the aileron and remove hinge bracket LAK-12A 35 00 4 00 SB;
- e) hinge bracket LAK-12A 35 00 4 00 SB is removed by unscrewing mounting bolt 3003A-5-14 (see sketch No.3 section C-C);
- f) aileron hinge brackets having cracks must be replaced with the new ones LAK-12A 35 00 4 00 SB;
- g) hinge brackets LAK-12A 35 00 4 00 SB are attached to the structure by bolts 3003A-5-14, nuts 3310A-5 and washers 3405-1-5-10;
- h) the opening of $\varnothing 20$ mm diameter in the top skin should be repaired as described in the “Sailplane LAK-12 Maintenance Manual”.

5. Inspect the aileron and flap hinges on a wing:

- a) using magnifying lens x 4 visually inspect flap and aileron mounting hinges LAK-10A20 50 12 00 M (see sketch No.3 section C-C);
- b) in a case if corrosion damaged surface is found, it is necessary to remove corrosion with sand paper grid 120, paint with primer F-809, after primer has dried - paint with paint 7001 Urki-Nox;
- c) flap and aileron mounting hinges on a wing having cracks must be replaced by new ones LAK-10A 20 50 12 00 M;
- d) inspect lamination to the structure of the aileron and flap mounting hinges LAK-10A 20 50 12 00 M, in a case if de-lamination of plies is found, remove old plies and lay-up new plies of fabric (see sketch No.3 section C-C).

6. Inspect flap hinges LAK-12 20 50 00 01 which are at the root of the wing (see. sketch Nr.1):

- a) with the magnifying lens x4 inspect the hinges LAK-12 20 50 00 01, if corrosion areas are found, it is necessary to remove corrosion with sand paper grid 120, paint with primer F-809, after primer has dried - paint with paint 7001 Urki-Nox;
- b) flap hinges having cracks must be replaced with new ones LAK-12 20 50 00 01;
- c) hinges LAK-12 20 50 00 01 are mounted to the structure by bolts 3213A-4-12, nuts 3374A-4 (see sketch No.1).

7. Inspect the surface of the mounting plates LAK-12A 35 00 05 00 SB of the aileron push-rod connection brackets LAK-12A 35 00 00 01, LAK-12A 35 00 00 02 (see sketch No.3):

- a) make the opening of $\varnothing 15$ mm diameter in the top skin of aileron, in a place where bracket is mounted (see sketch No.3);
- b) in a case if corrosion is found on a surface of the plate LAK-12A 35 00 05 00 SB, it is necessary to remove corrosion with sand paper grid 120, paint with primer F-809, after primer has dried - paint with paint 7001 Urki-Nox;

8. Inspect lamination of the aileron aft hinge LAK-12A35 00 03 00 SB to the structure (see sketch No.3 section D-D), in a case if de-lamination of plies if found, remove old plies and lay-up new plies of fabric.

9. Inspect bonding seam of the top and bottom skins of the aileron (see sketch No.3 View B). In a case if de-lamination is found, repair bonding seam as described in the “Sailplane LAK-12 Maintenance Manual”.

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10. Inspect the root rib of the flap LAK-12 37 00 00 01 (see sketch No.1):

- a) in a case if flap root rib de-lamination from the flap skin is found, repair as described in the “Sailplane LAK-12 Maintenance Manual”;
- b) paint damaged areas of the flap root rib made of plywood LAK-12 37 00 00 01. Paint as described in the instruction VIAM Nr.891-66;
- c) with the magnifying lens x 4 inspect the flap controls connection coupling LAK-12 37 05 00 00 M and the surface of the rib LAK-12 37 00 00 01;
- d) in a case if crack found, flap controls connection coupling LAK-12 37 05 00 00 M and root rib of the flap LAK-12 37 00 00 01 must be replaced with the new ones.

11. Inspect the main aileron control unit (see sketch No.4):

- a) through the opening L = 80 mm in the aft wall of the wing, lighting with the flash light, inspect guide of the controls LAK-12 20 50 11 00 M;
- b) aileron controls guides having cracks must be replaced with new guides LAK-12 20 50 11 00 M;
- c) inspect surface of the control lever LAK-10A 20 50 08 00 M in the area of rivets 3515A-4-24 (see sketch No.4) connecting control lever LAK-10A 20 50 08 00 M with part LAK-10A 20 50 05 02-02. In a case if crack is found, levers has to be replaced with new ones LAK-10A 20 50 08 00 M;
- d) inspect the aileron control unit guide LAK-12 20 50 11 00 M for de-lamination from structure (see sketch No.4, View C), in a case if de-lamination is found, remove old plies of fabric and make a new lamination to the structure;
- e) inspect the main aileron control unit levers LAK-10A 20 50 08 00 M connection to the push-rods LAK-10A 20 50 07 00 M, LAK-10A 20 50 09 00 M. In the case if corrosion damaged hardware is found, replace them with new bolts 3027A-6-24-3, nuts 3346A-6, washers 3405A1-6-10 and cotter pins 1.6x12-002. To do this make openings of Ø30 mm diameter in the top and bottom skins of the wing (see sketch No.6);
- f) with the help of flash light through the opening l=80 mm in the aft wall of the wing (see sketch No.4) and opening of Ø30 mm diameter in the top and bottom skins of the wing (see sketch No.6) inspect the main aileron control unit LAK-10A 20 50 08 00 M connecting hardware: bolts 3051A-3-20, nuts 3350A-3 and washers 3401A1.5-3-10, which connect the guides LAK12 20 50 11 00 M with the plates LAK-10A 20 50 11 01. In a case if hardware is damaged by corrosion, replace with the new hardware;
- g) with the help of flash light, through the opening of Ø30 mm diameter in the top and bottom skins of the wing (see sketch No.4), inspect the main aileron control lever LAK-10A 20 50 08 00 M in a zone A at a length l = 8 mm from both sides of the lever. In a case if surface damages or cracks are found in a zone A, lever has to be replaced with the new one LAK-10A 20 50 08 00.

12. Inspect the outboard aileron control units (see sketch No.5):

- a) through the opening l=80 mm in the aft wall of the wing, with the help of flash light, inspect the aileron control unit push-rod LAK-10A 20 50 09 00 M adjustable rod end LAK-10A 20 50 09 01 lock nut 3820A-8 for tightness. If the nut is loose, tighten the nut 3820A-8 and paint with the primer F-809;

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- b) inspect surfaces of the control guides LAK-12 20 50 13 00 M, if cracks are found, they must be replaced with the new guides LAK-12 20 50 13 00 M. In a case if local humidity damage to the plywood parts are found, plywood surfaces has to be painted according to requirements of the instruction VIAM Nr.891-66;
- c) inspect surface of the controls levers LAK-10A 20 50 10 00 M in the area of rivet heads 3515A-4-24 (see sketch No.5) connecting control levers with the parts LAK-10A 20 50 05 02-03. In a case if cracks are found, levers has to be replaced with the new ones LAK-10A 20 50 10 00 M;
- d) inspect the aileron control unit guide LAK-12 20 50 13 00 M bonding to the structure (see sketch No.5). If de-lamination of bonding plies is found, remove old plies and make the new lamination;
- e) inspect the outboard aileron control levers LAK-10A 20 50 10 00 M connection to the push-rod LAK-10A 20 50 09 00 M, if corrosion damaged hardware is found (bolts 3027-6-24-3, nuts 3346A-6, washers 3405A1-6-10 and cotter pins 1.6x12-002), replace them with the new ones through the Ø30 mm diameter openings in the top and bottom skins of the wing (see sketch No.7);
- f) lighting with the flash light through the opening l=80 mm in the aft wall of the wing (see sketch No.5) and through the opening Ø30 mm in the top and bottom skins of the wing (see sketch No.7) inspect the aileron outboard control LAK-10A 20 50 10 00 M hardware: bolts 3051A-3-20, nuts 3350A-3 and washers 3401A1.5-3-10 connecting guides LAK-12 20 50 13 00 M with plates LAK-10A 20 50 00 01. In a case if corrosion damaged hardware is found, they must be replaced with the new one.

13. Inspect the airbrake control belcrank located in the wing airbrake box (see sketch No.8):

- a) un-lock and open airbrakes;
- b) inspect the airbrake control belcrank LAK-12 20 38 02 00 SB, with the help of flash light. Pay special attention to the rivets 3521A-2.6-14 connecting parts LAK-12 20 38 02 01, LAK-12 20 38 02 02 in the zones B and C, (see sketch No.8). If cracks are found in the part LAK-12 20 38 02 01 zones B and C, the belcrank LAK-12 20 38 02 00 SB has to be replaced with the new one;
- c) the airbrake controls belcrank LAK-1 20 38 02 00 SB is replaced as follows:
 - make the opening of Ø20 mm diameter in the aft wall of the wing when the wing is removed off the fuselage (see sketch No.8 View L);
 - using hexagonal head wrench S=10 mm unscrew the bolt 3027A-6-54;
 - disconnect the belcrank LAK-12 20 38 02 00 SB from the push-rods LAK-12 20 38 01 00 M, LAK-12 20 38 06 00 M by removing: pins LAK12 20 38 00 01, LAK12 20 38 00 01-01, washers 3405A1-6-10 and cotter pins 1.5x10-002 (see sketch No. 8);
 - after belcrank is replaced with the new one LAK-12 20 38 02 00 SB, when bolt 3027A-6-54 is screwed in, to lock the bolt, punch-in the bushing LAK-12A 20 38 05 02-01 in a two places (see sketch No.8 View L);
 - openings of Ø20 mm diameter must be fixed according to the procedures described in the "Sailplane LAK-12 Maintenance Manual".
- d) inspect the airbrake control push-rod LAK-12 20 38 01 00 M in the area of the wing root rib zone D (see sketch No.9). If small local corrosion areas are found, clean them with the sand paper grid 120, paint with primer F-809 and after primer had dried, paint with gray paint 7001 Urki-Nox. In a case if big corrosion caused damages are found, the push-rod has to be replaced with the new one

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LAK-12 20 38 01 00 M by removing following hardware: pin LAK-1220 38 00 01, washer 3405A-1-6-10 and cotter pin 1.5x10-002 (see sketch No.8, page 20);

- e) inspect hardware of the airbrake caps LAK-12 20 38 08 00 M (see sketch No.8): springs LAK-12 20 38 00 10, washers 3405A-05-4-7 and nuts 3373A-4. If corrosion damaged parts are found, they have to be replaced with the new one;
- f) open the airbrakes and with the help of flash light inspect the main airbrake control levers LAK12A 20 38 03 00 M (see sketch No.8) and secondary levers LAK12A 20 38 04 00 M. If small local corroded areas are found, clean them with the sand paper grid 120, paint with primer F-809 and after primer had dried, paint with the gray paint 7001 Urki-Nox;
- g) in a case if big corrosion damages or if cracks are found, parts have to be replaces with the new ones LAK-12 20 38 03 00 M, LAK-12A 20 38 04 00 M;
- h) the airbrake control levers LAK-12A 20 38 03 00 M, LAK-12A 20 38 04 00 M are replaced as follows:
 - flap does not need to be removed. Make the opening of $\varnothing 20$ mm diameter in the aft wall of the wing (see sketch No.8 View R);
 - using hexagonal head wrench S=10 mm unscrew the bolt 3027A-6-54;
 - disconnect the lever LAK-12A20 38 03 00 M from the push-rod LAK-12A 20 38 06 00 M (see sketch No.8) by removing pin LAK-12 20 38 00 01 -02, washer 3405A-1-6-10 and cotter pin 1.5x10-002;
 - after lever is replaced with the new one, bolt 3027A-6-54 has to be screwed in and locked by punching-in the bushing LAK-12A 20 38 05 02 -01 at two points through the opening of $\varnothing 20$ mm diameter in the top skin (see sketch No.8 View L);
 - openings of $\varnothing 20$ mm diameter must be fixed according to procedures described in the "Sailplane LAK-12 Maintenance Manual".

14. Inspect the root ribs of the wing (see sketch No.10):

- a) inspect the openings for the aileron and airbrake push-rods in the root ribs, in a case if paint is damaged, those areas has to be painted according requirements of the instruction VIAM NR. 891-66;
- b) inspect the openings for the airbrake push-rods (see sketch No.10, area I, view L). If de-lamination is found, repair must to be done following the procedures approved by JSC “Sportinė aviacija”;
- c) inspect the wing root ribs at the area of flap hinge LAK-12 20 50 00 01 (see sketch No.10, view M, section K-K). To inspect, apply to the hinge the downward force of $P \approx 2$ kg. If de-lamination is found, repair has to be done following the procedures approved by JSC “Sportinė aviacija”;
- d) on a wing root rib, using magnifying lens x4 inspect external rings of the spar pin support bearing Š-15 GOST3635-54 (see sketch No.10, area II.). In the case if crack in the external ring is found, support LAK-10A 10 02 00 00 SB with the bearing has to be replaced following the procedures approved by JSC “Sportinė aviacija”;

15. Measure the electric resistance between the spar caps and water ballast. This is done for the purpose of:

- to check if there is no damage to the spar cap sealing material, sealing spar from the water ballast;
- to check if after hard landing there is no damage to the spar. In such a case water has direct contact with the spar cap and gets through the spar cap to the aft section of the wing where control systems are located;

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The measurements are performed as follows:

- a) place the wing on the supports (see sketch No.11);
- b) remove the paint from the spar cap at the end of the spar (see view indicated by the arrow N);
- c) connect the plastic tube to the wing water ballast tank and fix it to the support (see sketch No.12);
- d) fill the water ballast tank with the water;
- e) measure the electric resistance between the spar cap and water ballast tank (wire of the tester place into the tube). Allowed electric resistance is $50 \text{ kOhm} < R = \infty$,
- f) after the measurements are finished, paint the spar caps at the points where measuring was done.

16. Make the leakage test for the water ballast tanks. The test is made as follows:

- a) place the wing on the supports, plug and seal the drain holes;
- b) connect testing equipment to the water ballast tank (see sketch No.13);
- c) slowly blow air into the tube of leakage testing equipment and create $l=100 \text{ mm}$ level difference in the manometer tube;
- d) if water level does not change during 5 minutes after pressure is created and blowing is stopped and tube sealed, this indicates that water ballast tank has no leakage.

17. Inspect the base frame of the control stick LAK-12 50 00 05 08 (see sketch No.14).

Inspection is made with the magnifying lens x4. Possible areas of cracks are shown at the sketch No. 14. In a case if crack is found, base frame has to be replaced with the new one LAK-12 50 00 06 08.

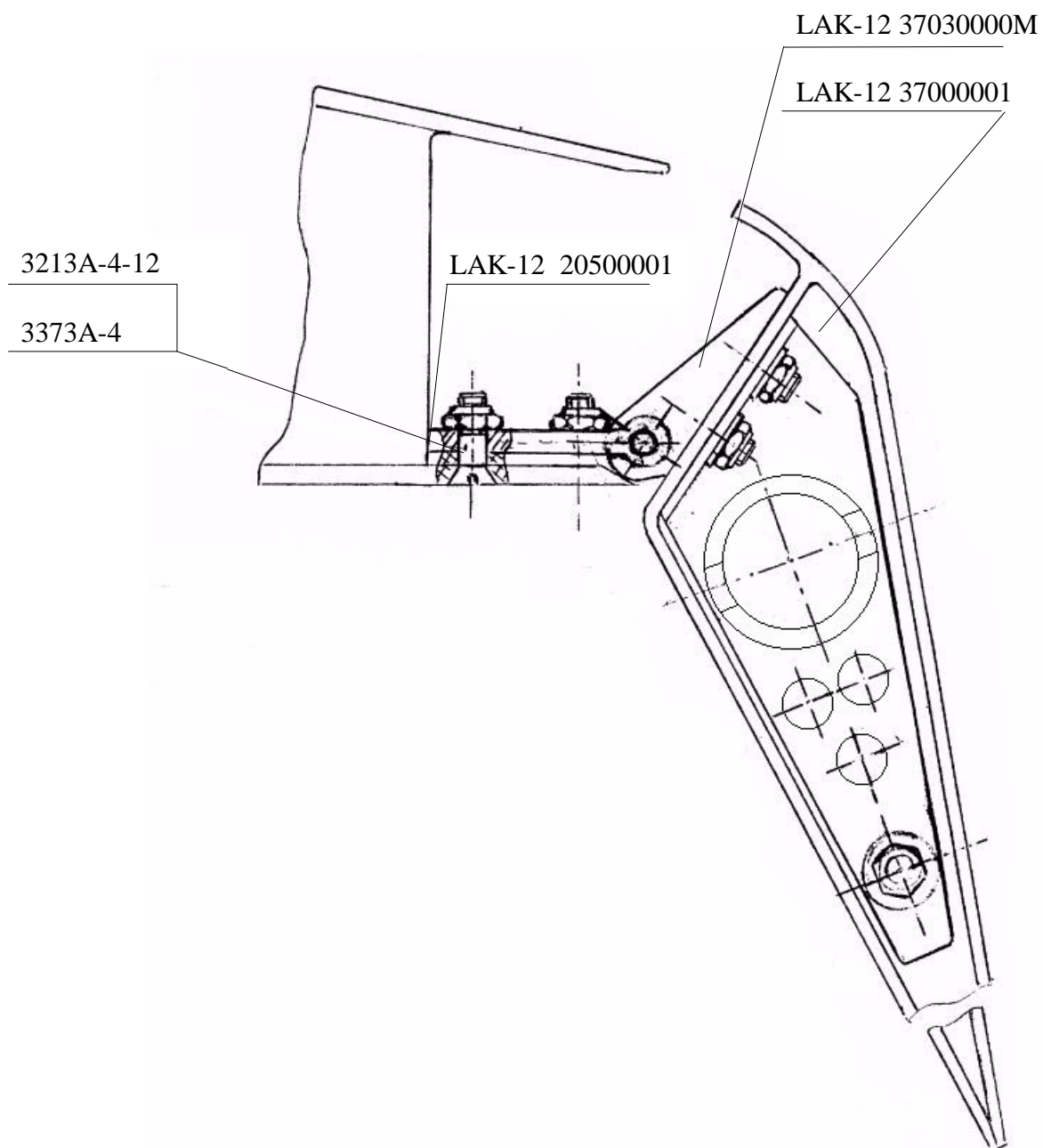
18. Inspect the stabilizer mounting unit (see sketch No.15). Inspection is made with the magnifying lens x4. Inspections required to make sure that there is no de-lamination between the tube LAK-12 34 01 02 00 M and fuselage skin (see section L-L). Inspection has to be made from the both sides of the vertical fin. In a case if de-lamination between the tube LAK-12 34 01 02 00 M and fuselage skin is found, repair has to be made following the procedures approved by JSC “Sportinė aviacija”;

19. Inspect the stabilizer front attachment pin assembly LAK-12 34 01 03 02 (see sketch No. 15, section M-M). Inspection has to be made in a zone D at a interval 3 mm. In a case if corrosion damage areas are found on a tube LAK-12 34 01 03 02, it should be replaced with the new one following the procedures approved by JSC “Sportinė aviacija”;

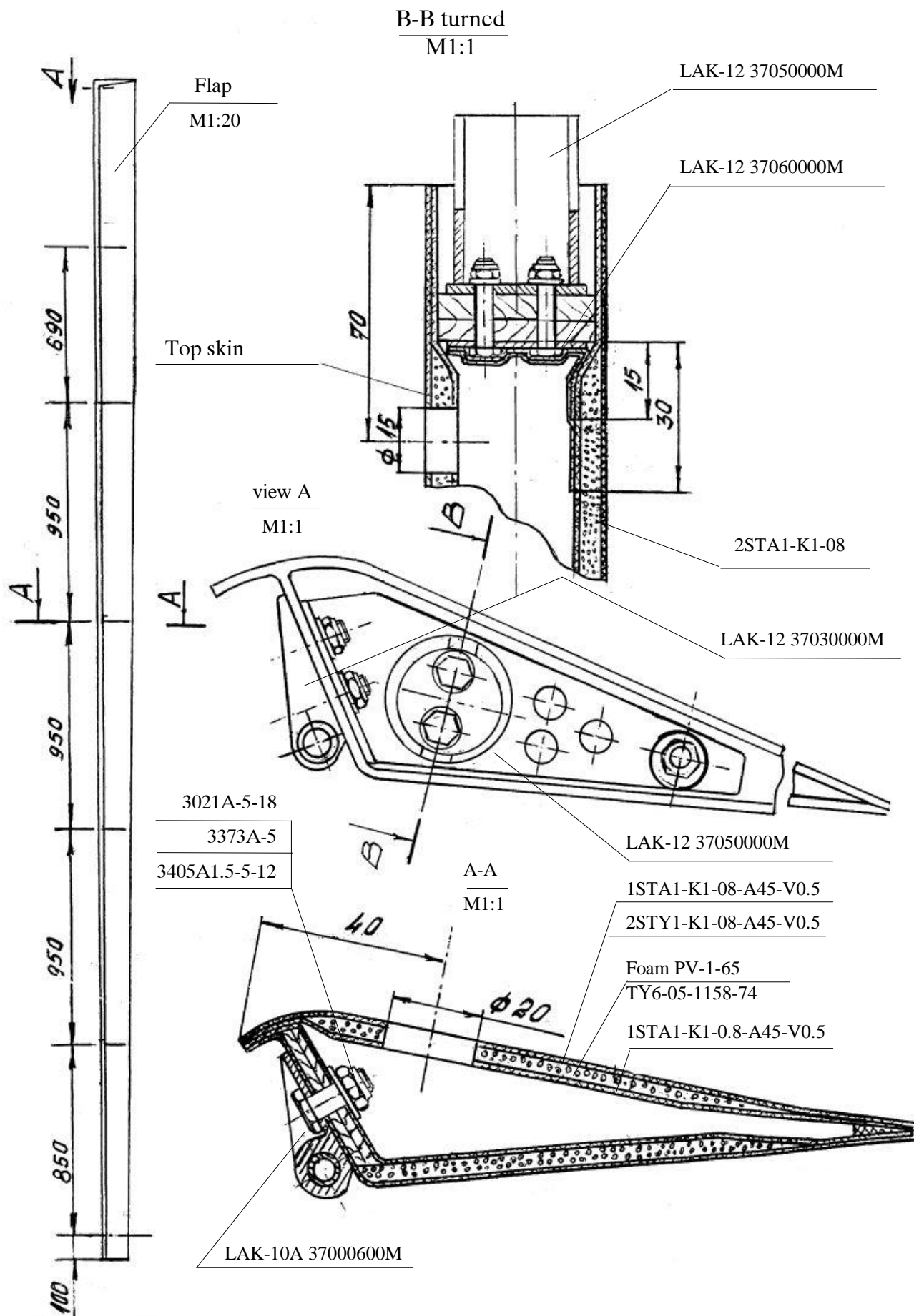
20. Check the weights and static moments of the flaps and ailerons. Checking is done after local repairs or local or complete re-painting of the surface. Ailerons are balanced according to the scheme shown at the sketch No.16. Flaps are balanced according to the scheme shown at the sketch No.17. Allowed weights and moments for the ailerons and flaps are given in the tables No.1, 2.

21. Check the elevator weight and static moment. Checking is done after local repairs or local or complete re-painting of the control surface. Elevator is balanced as it is indicated at a scheme, sketch No.18. Allowed weights and moments for the elevator are given in the table Nr.3.

22. Check the weight and static moment for the rudder. Checking is done after local repairs or local or complete re-painting of the control surface. Elevator is balanced as it is indicated at a scheme, sketch No.19. Allowed weights and moments for the elevator are given in the table Nr.4.

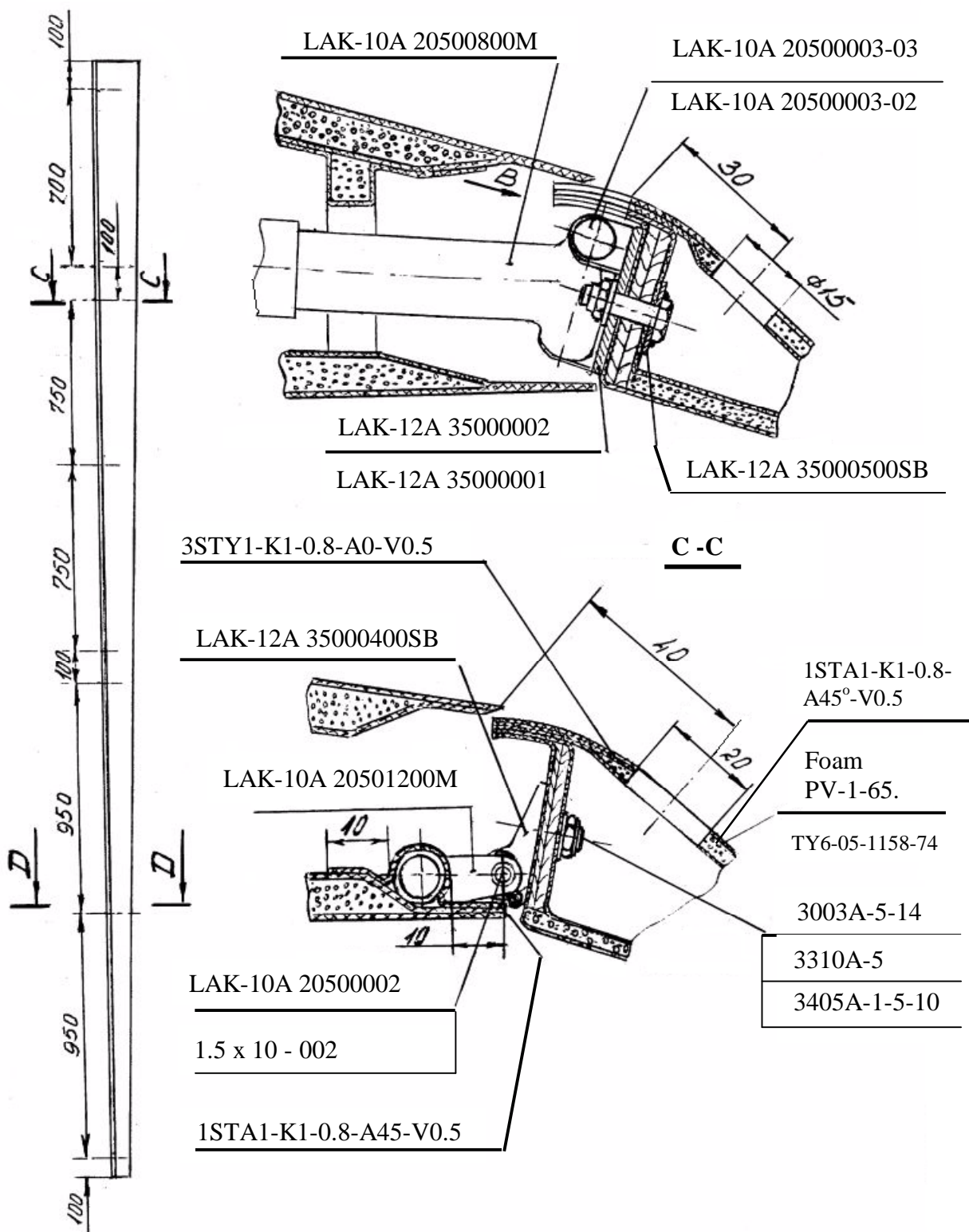


Sketch No.1



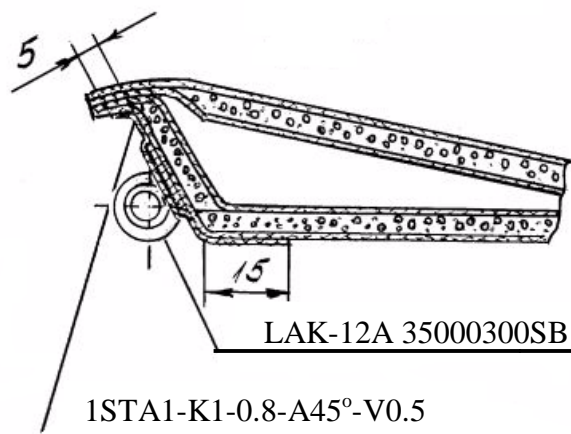
Sketch No. 2

Aileron
M1:20

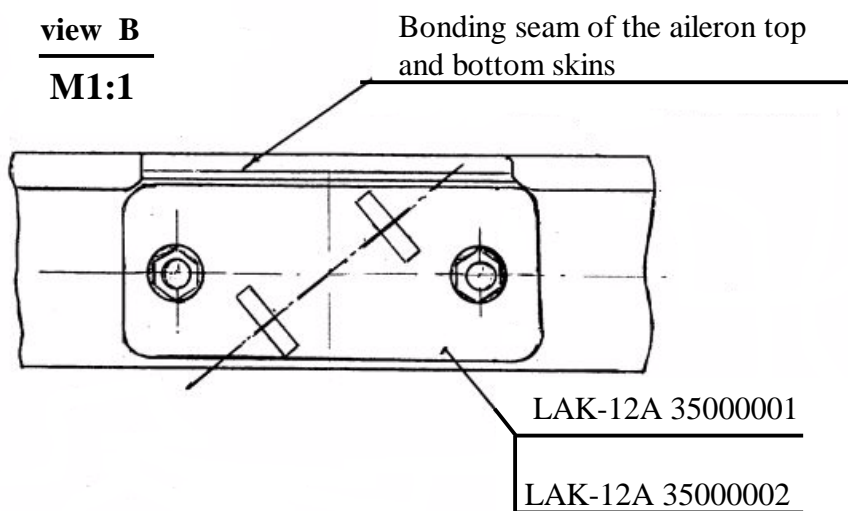


Sketch No.3

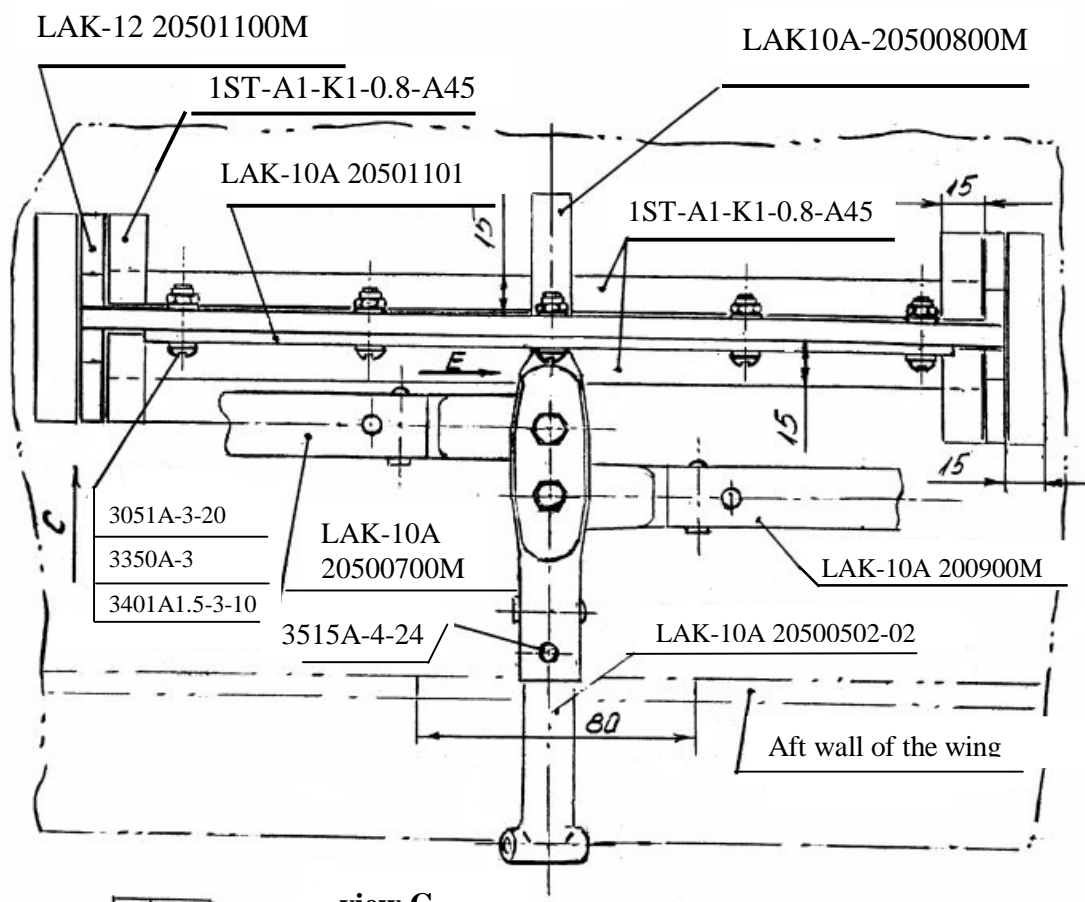
D-D
M1:1



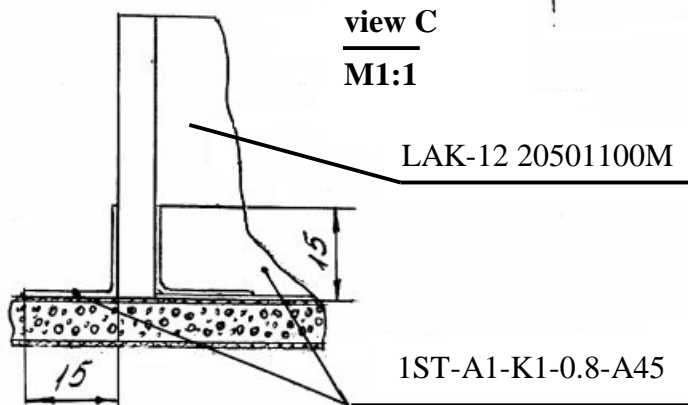
view B
M1:1



M 1:2

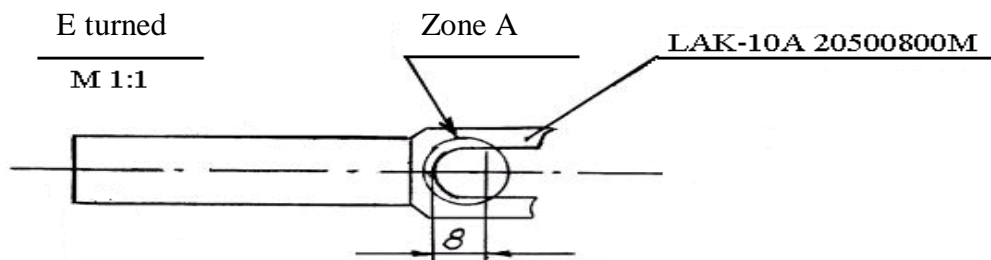


view C
M1:1

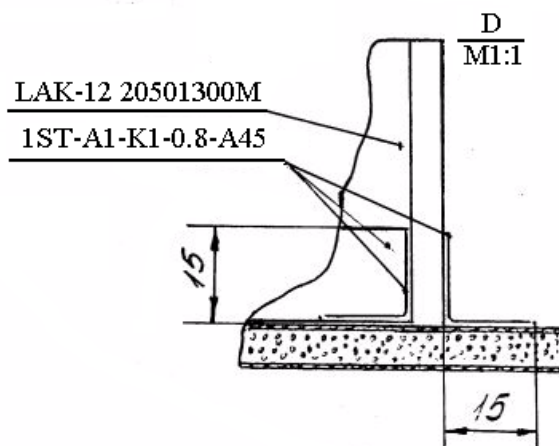
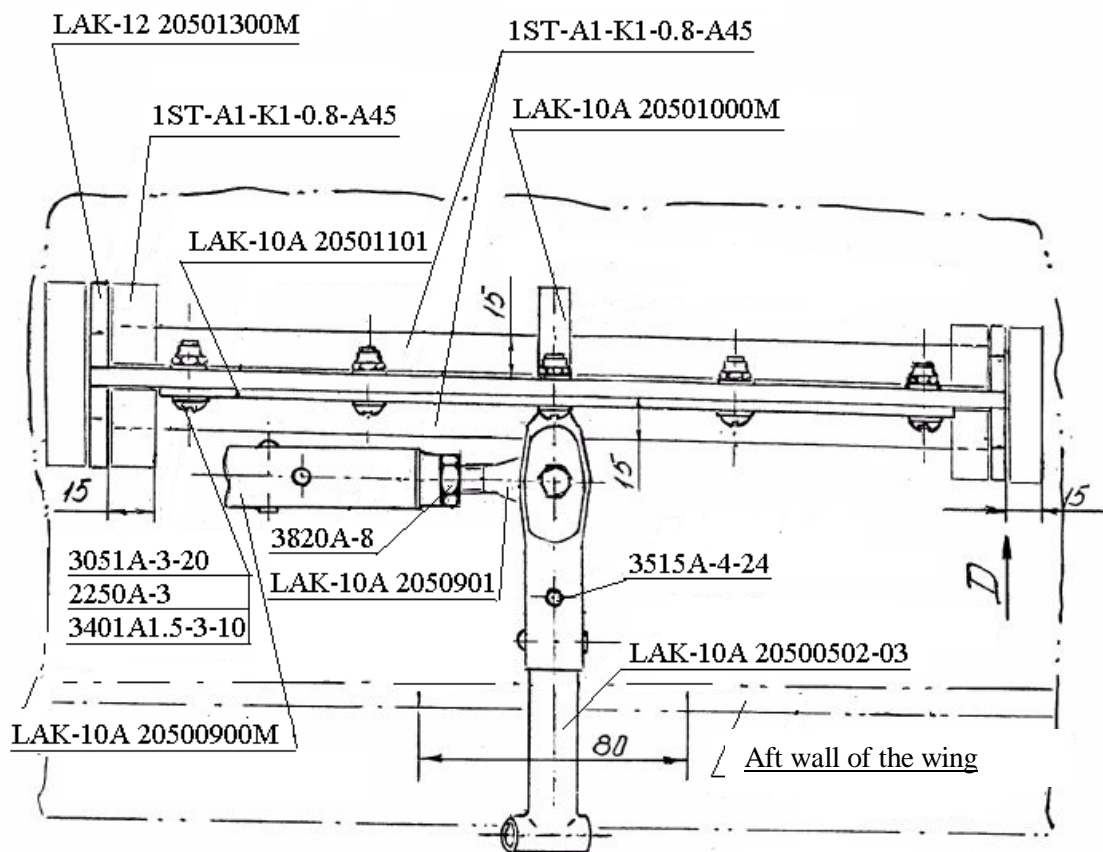


E turned

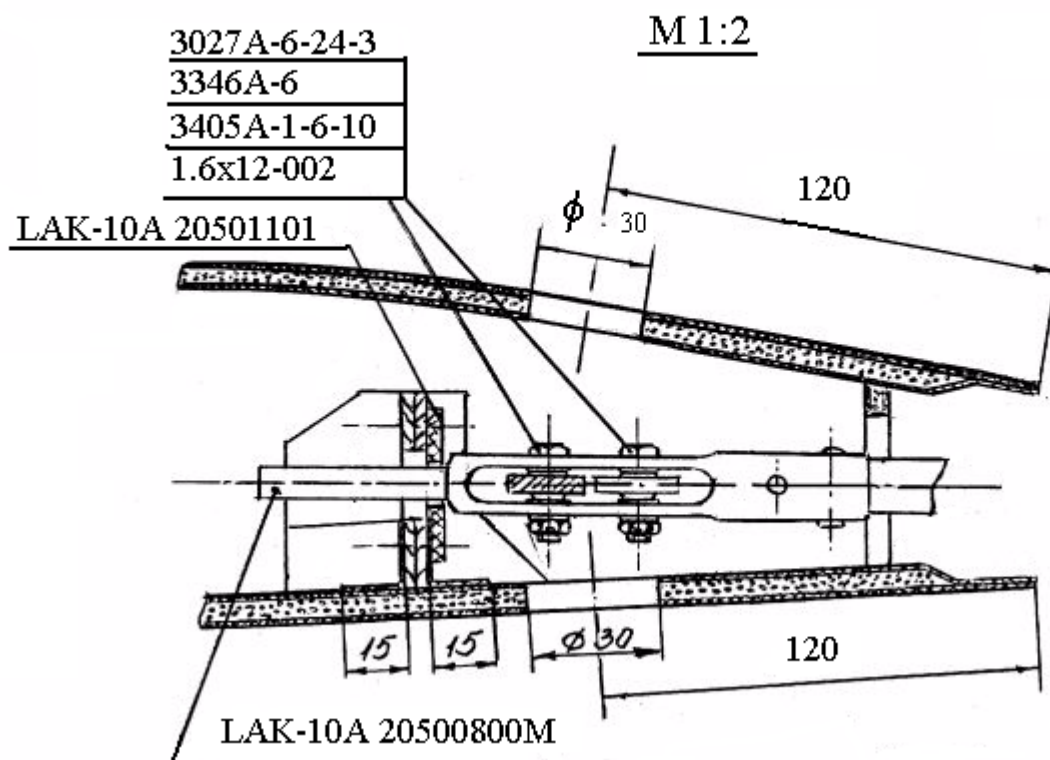
M 1:1



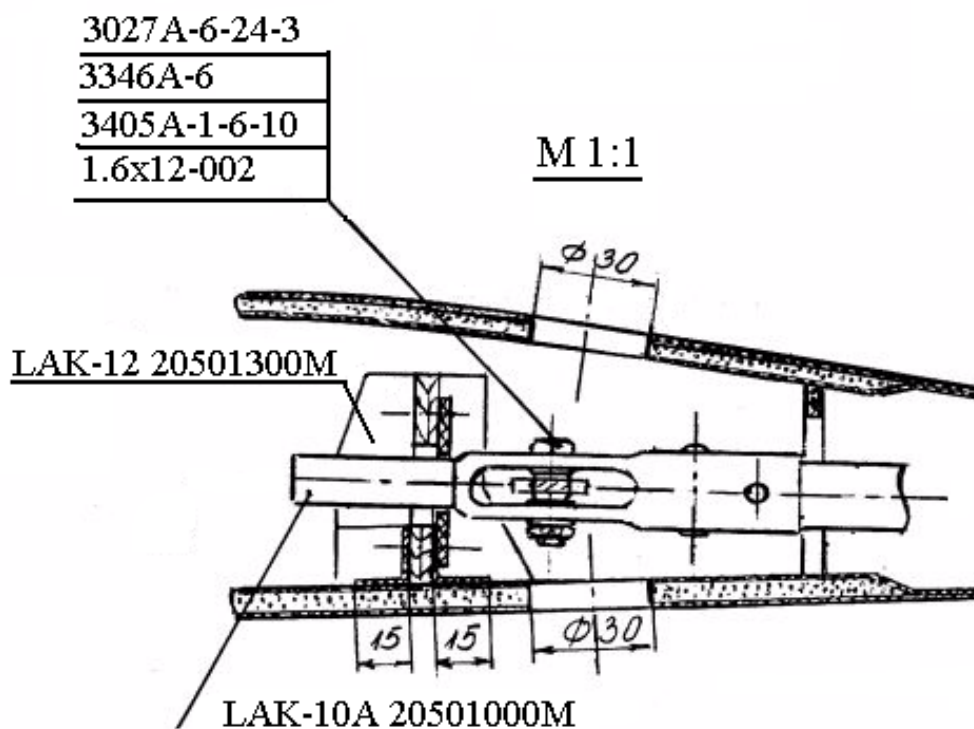
M 1:2



Sketch No.5

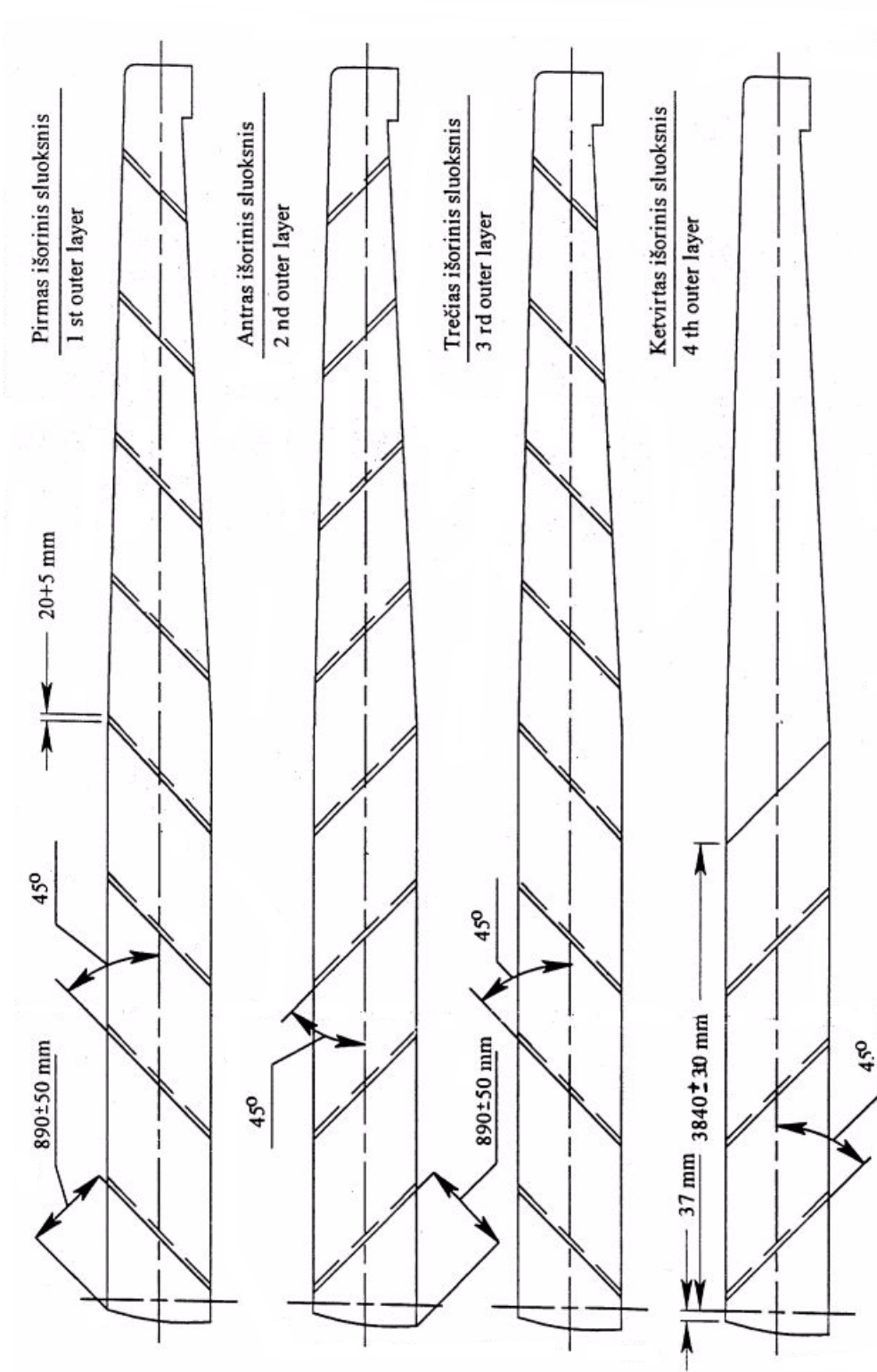


Sketch No.6

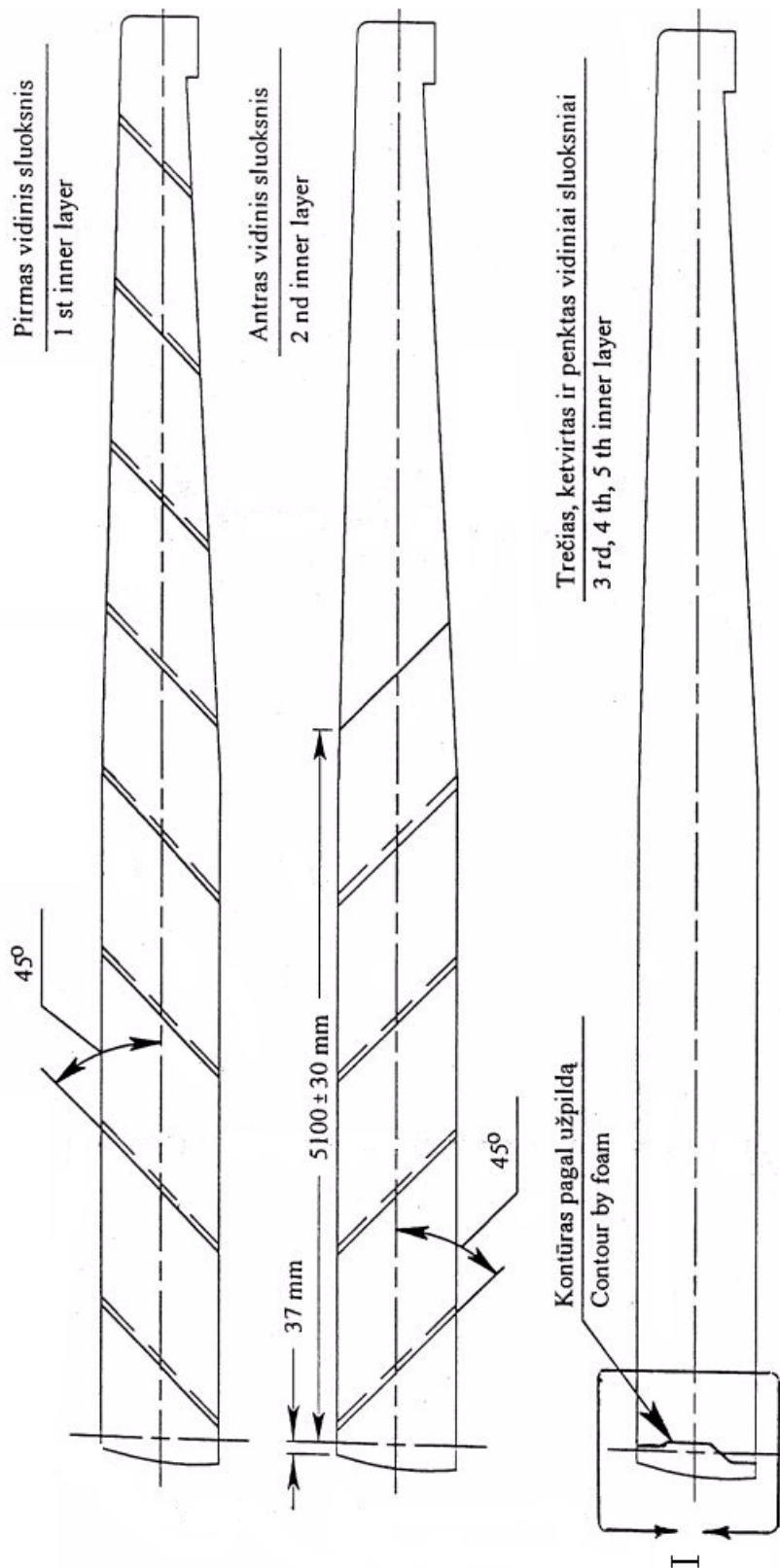


Attention: fixing-up the openings Ø30 mm in the top and bottom skins of the wing, refer to the wing internal and external fiberglass layers lay-up schedules given at the Pages 16,17,18.

Sketch No.7



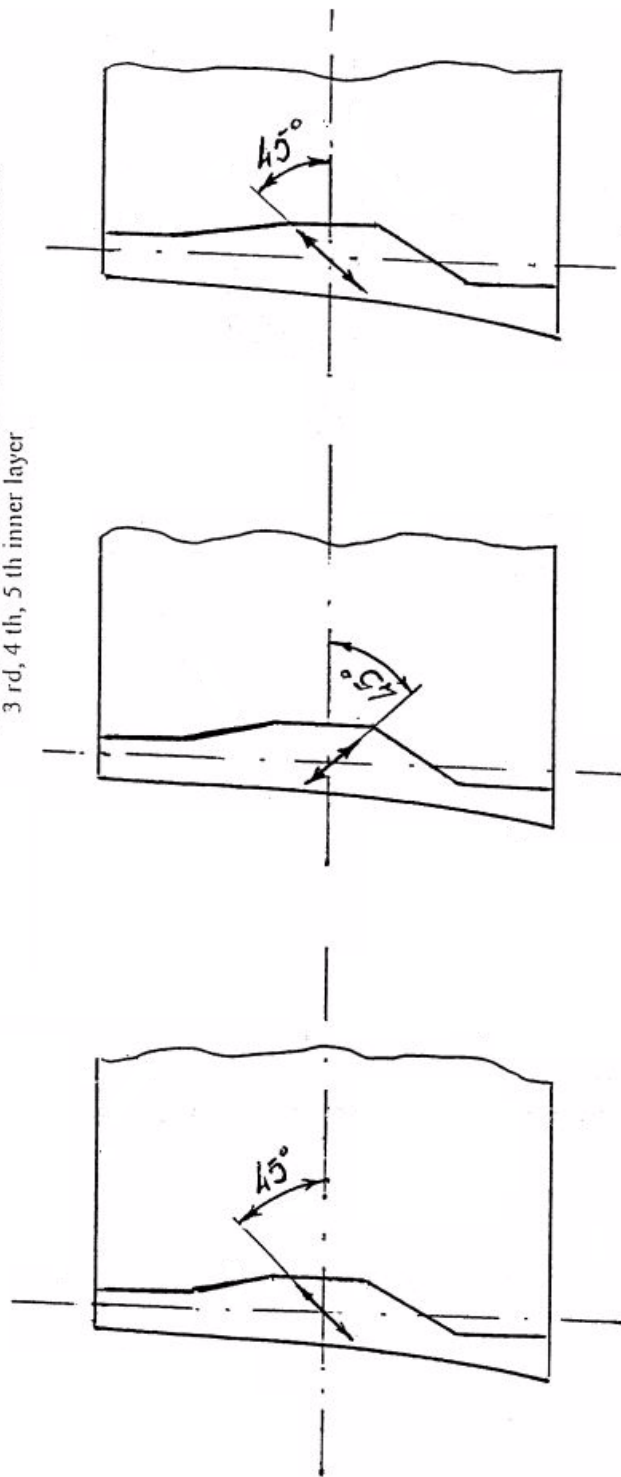
Fiberglass TSU-8/3VM-78 outer layer laying scheme
Stikloaudinio TSU-8/3VM-78 išorinių sluoksnių išdėstymo schema



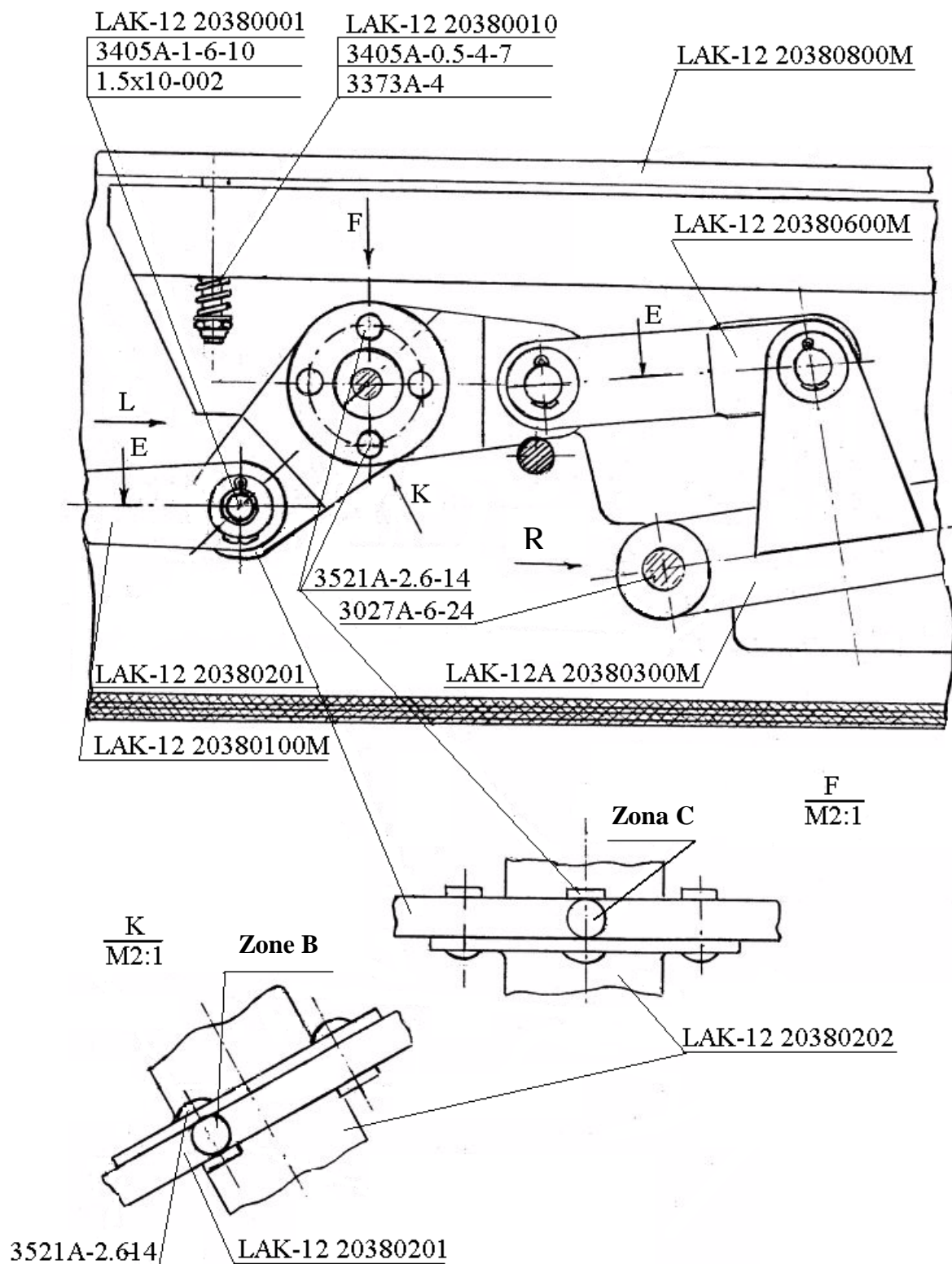
Fiberglass TSU-8/3VM-78 inner layer laying scheme
Stikloaudinio TSU-8/3VM-78 vidinių sluoksnių išdėstymo schema

I

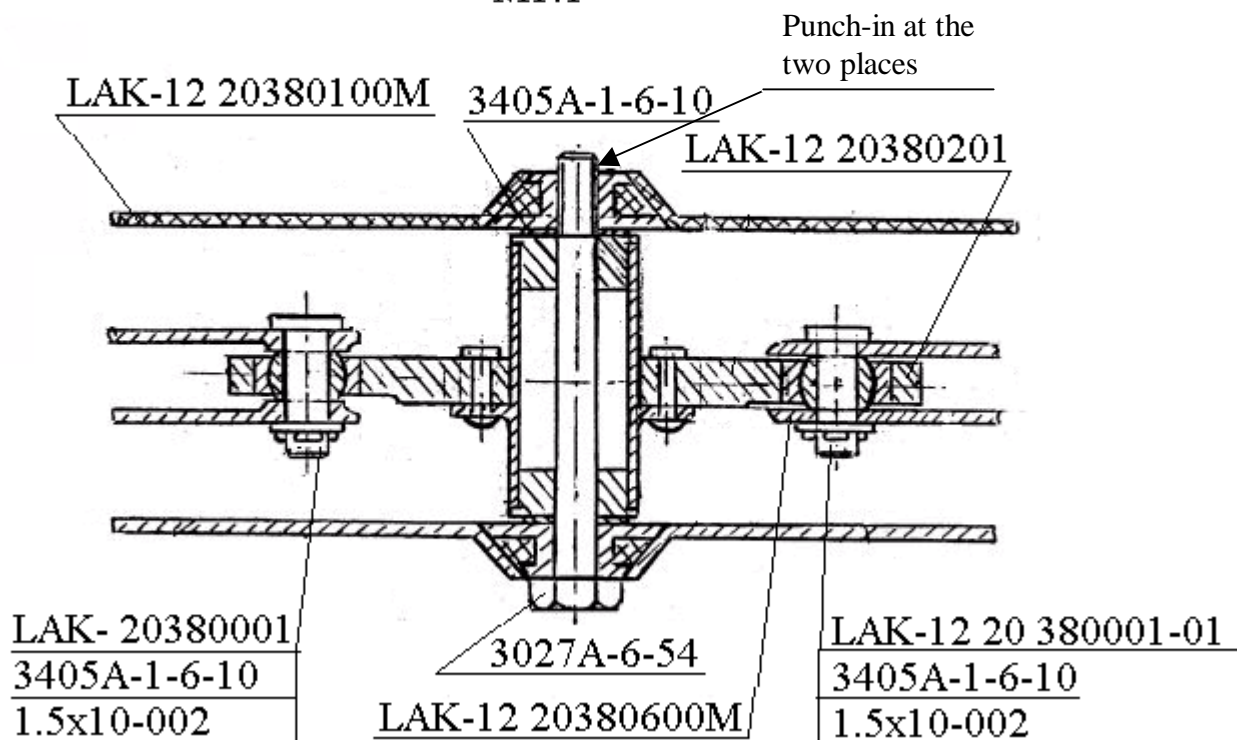
Trečias, ketvirtas ir penktas vidiniai sluoksniai
3 rd, 4 th, 5 th inner layer



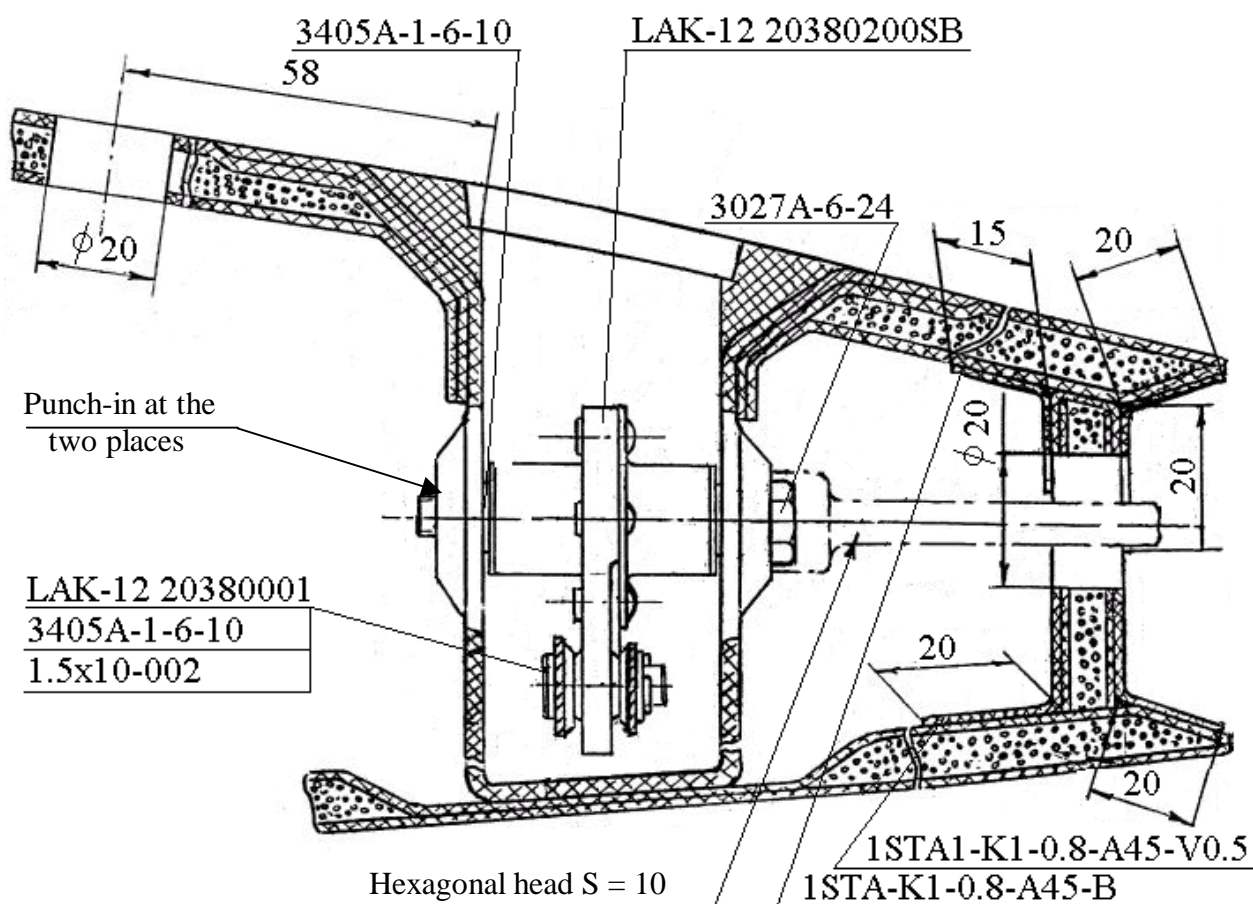
M1:1



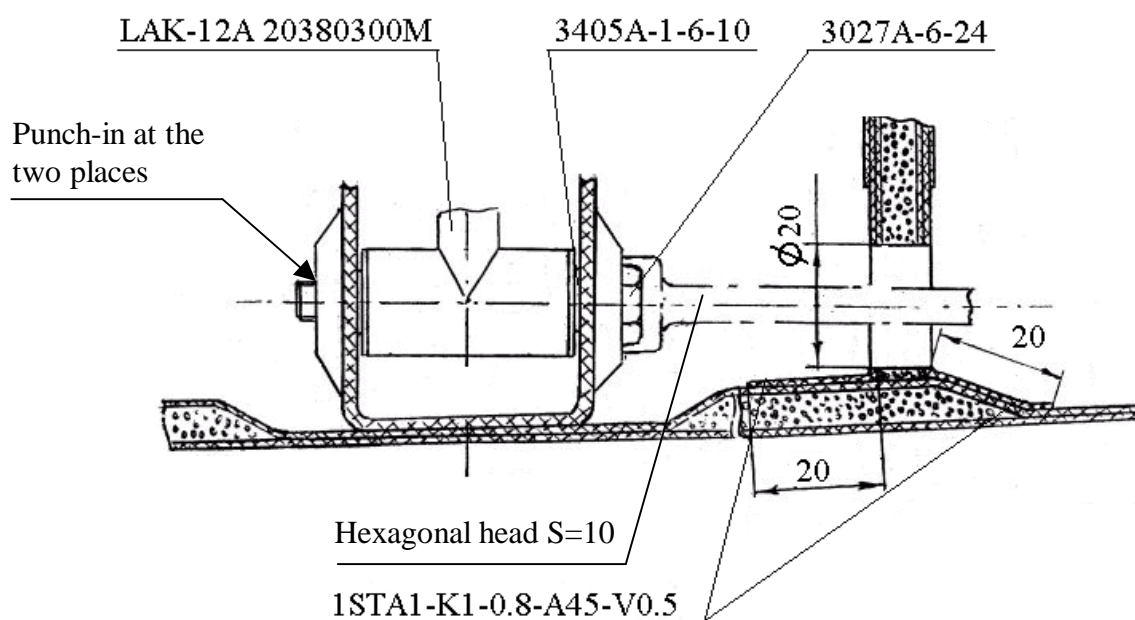
E - E
M1:1



L
M1:1

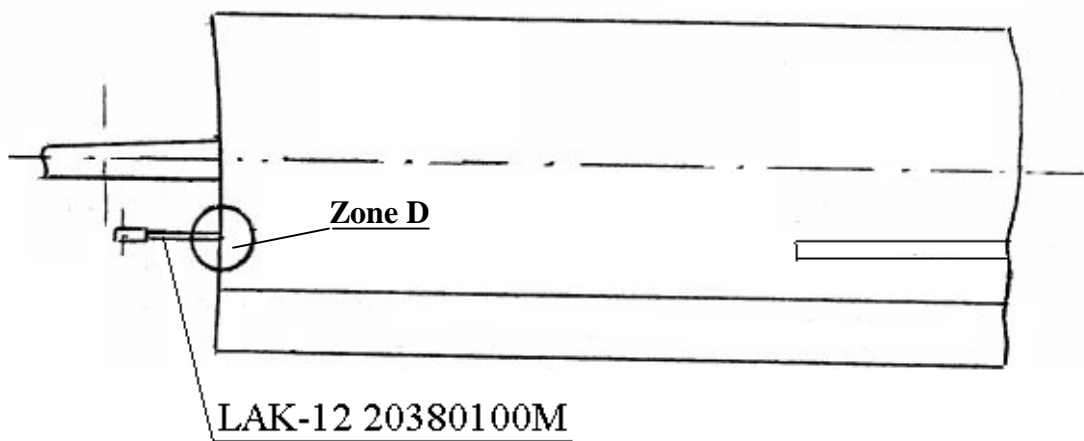


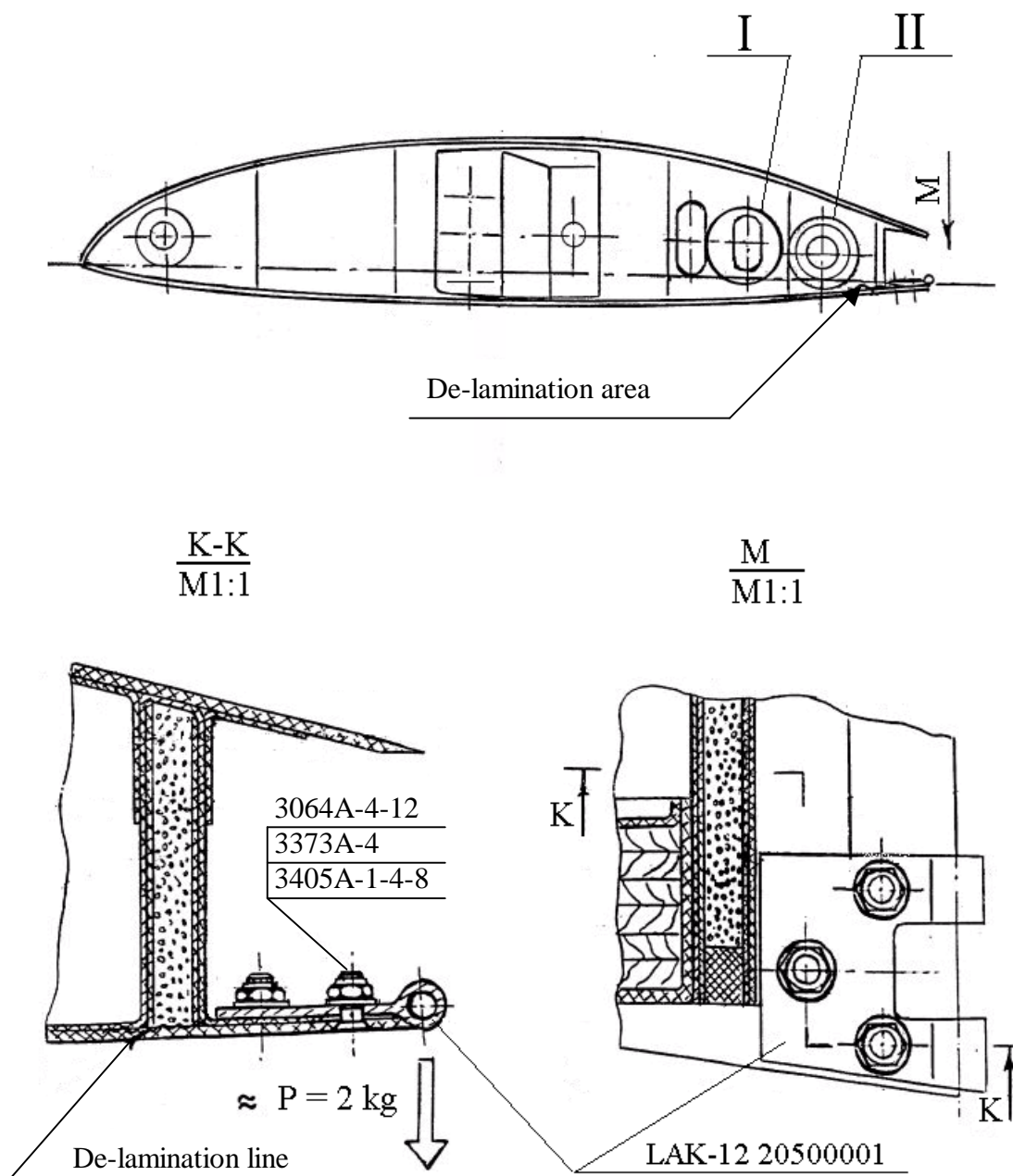
R
M1:1



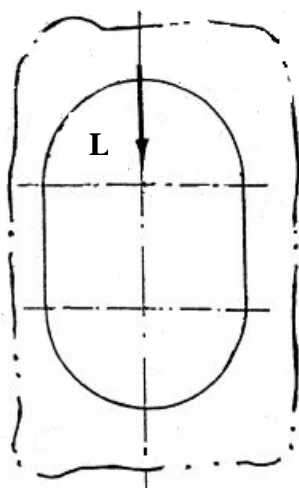
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M1:20

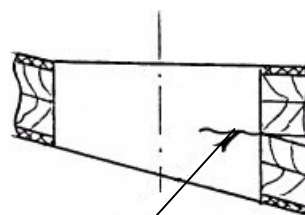




I
M1:1

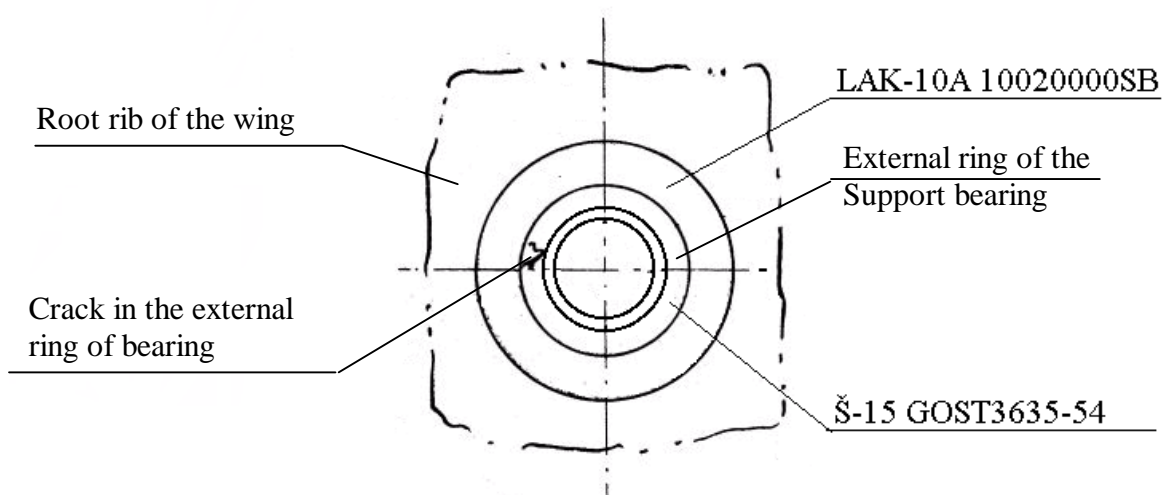


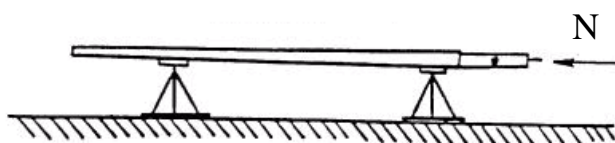
L
M1:1



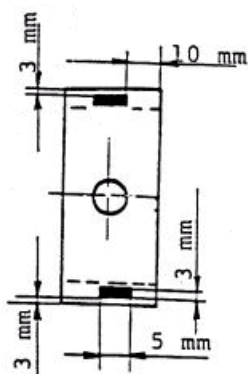
De-lamination line

II
M1:1



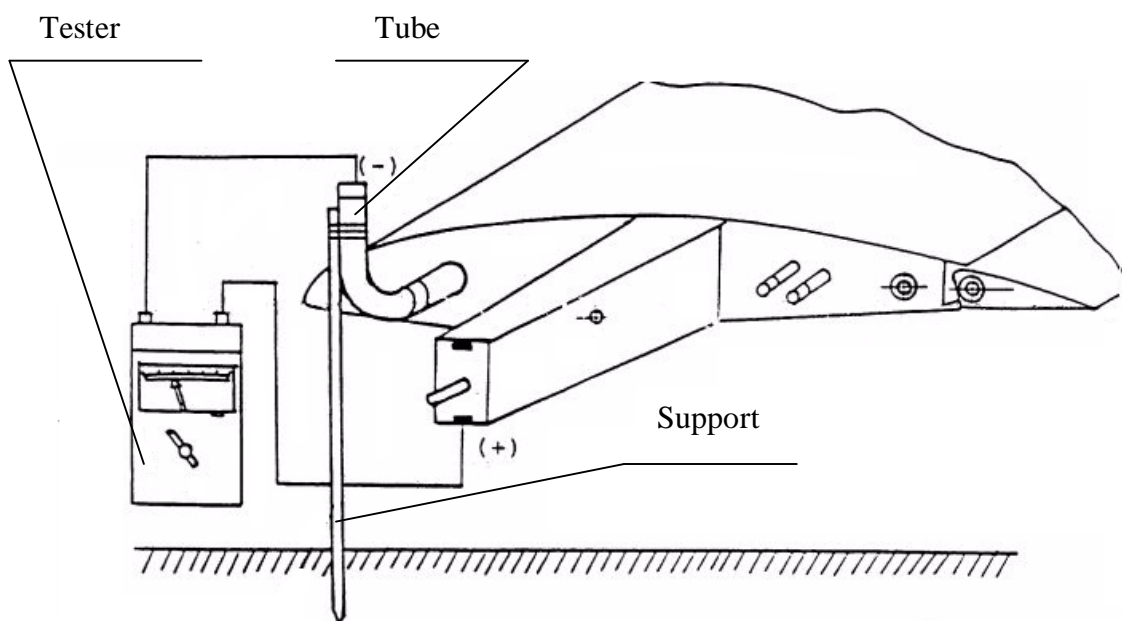


View N



Points for measuring

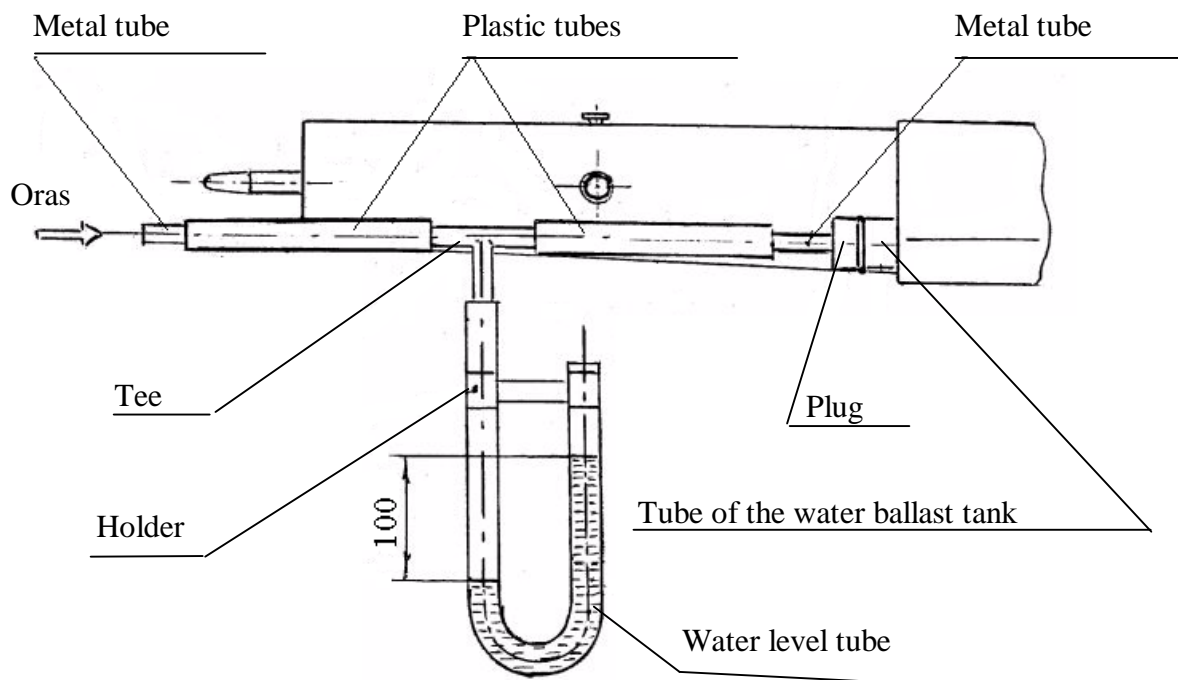
Sketch No. 11



Sketch No. 12

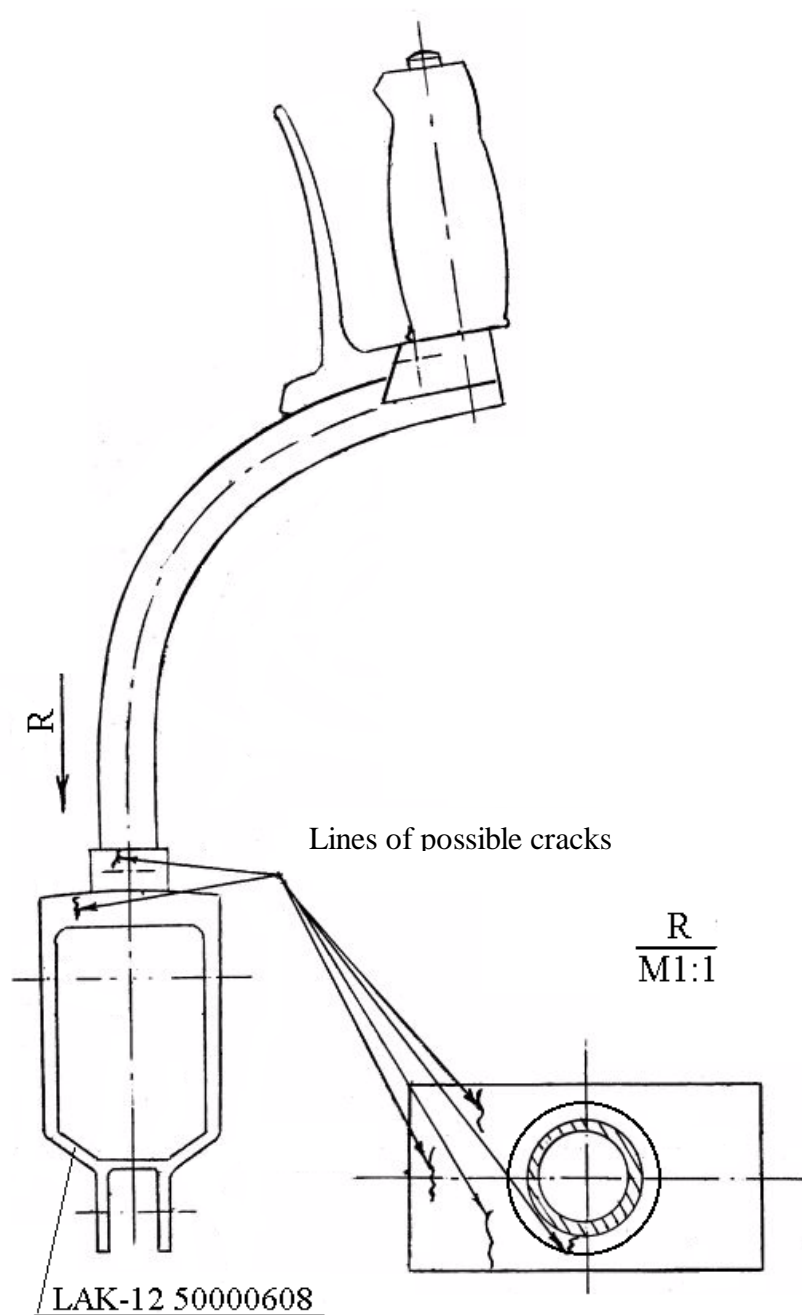
General scheme of the water ballast tank leakage test equipment

M1:5

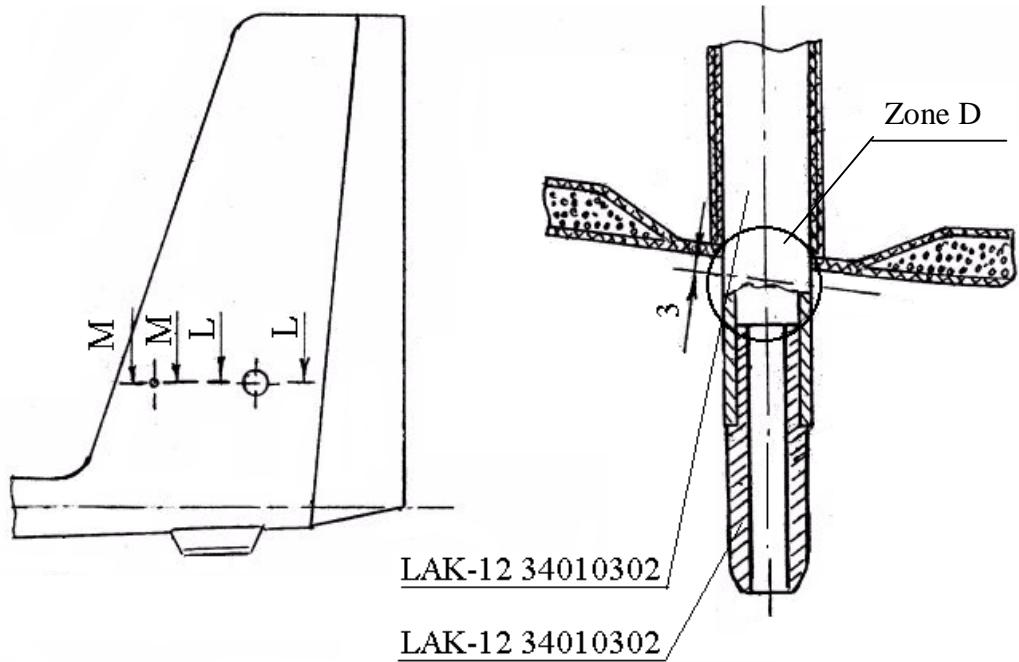
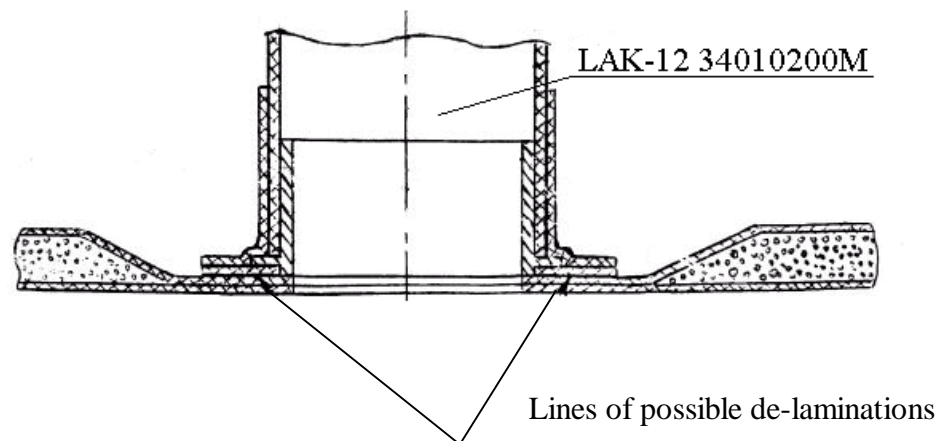


Remark: according to the typical technology LAK-12 2000000102.02. 12020.09 for repairs of the LAK-12 wings, water ballast tanks are checked for leakage with the altimeter LUN 1121-01 at the air pressure 0.05 ± 0.02 kg/cm² keeping it for 1 hour.

M1:2



M1:2

$$\frac{M - M}{M1:1}$$

$$\frac{L - L}{M1:1}$$


Aileron balancing scheme

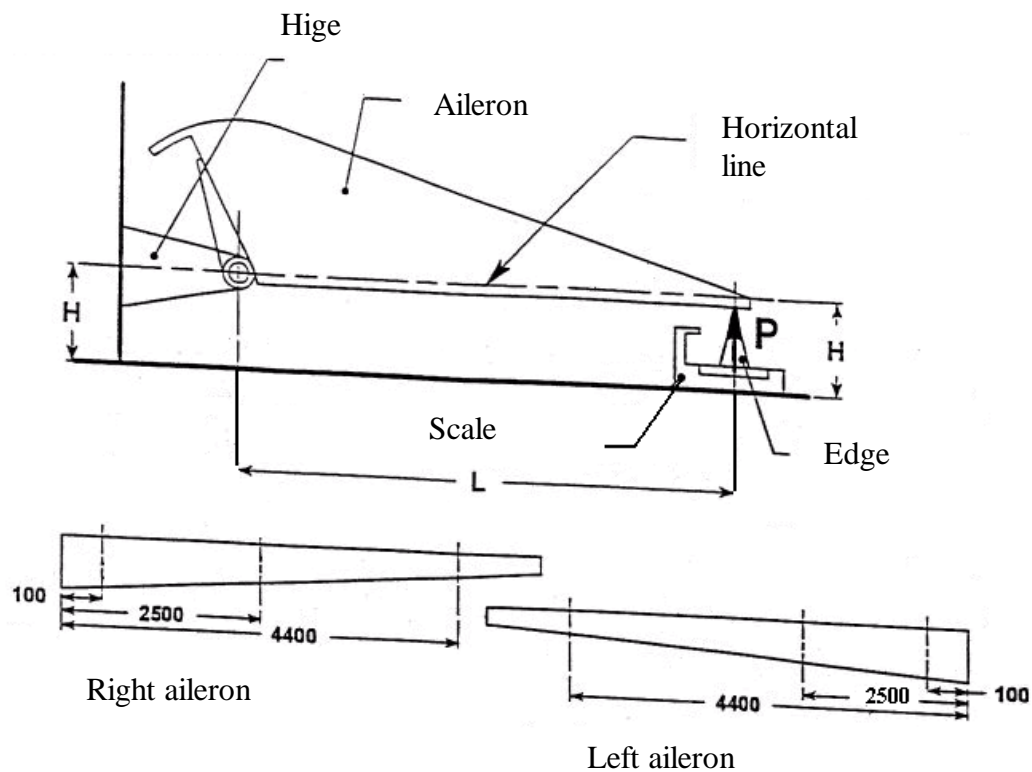
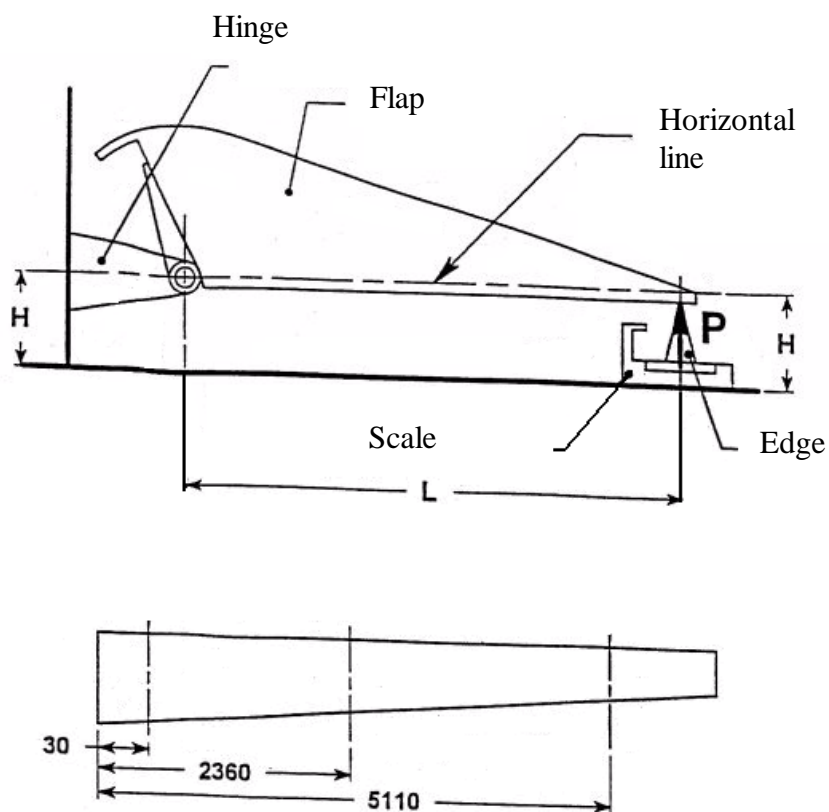


Table No.1

Parameter to control		Allowed limits
Mass of the aileron	G	2.80 ÷ 3.69 kg
Static moment of the aileron	$M = P \cdot L$	116.0 ÷ 168.0 kg*mm

Flap balancing scheme



The right flap; the left is mirror reflection

Table No.2

Parameter to control		Allowed limits
Mass of the flap	G	5.10 ÷ 6.40 kg
Static moment of the flap	$M = P \cdot L$	253.0 ÷ 360.0 kg*mm

Elevator balancing scheme

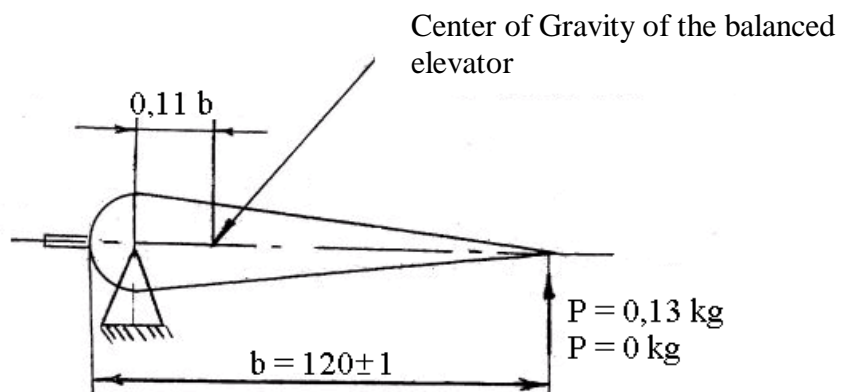


Table No.3

Parameter to control	Allowed limits
Mass of the elevator, G	1.9 ÷ 2.6 kg

Remark: the center of gravity of the balanced elevator must be at a distance of not more as the 11 % of the elevator cord measured from the elevators hinge line.

Rudder balancing scheme

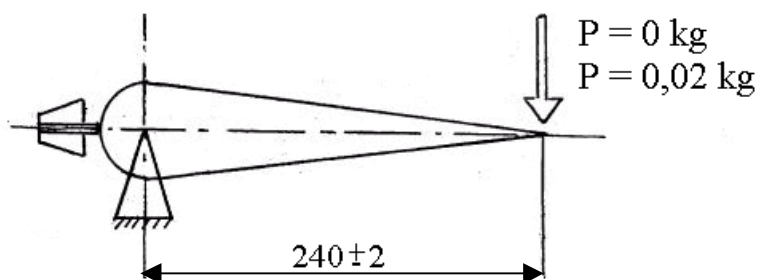


Table No.4

Parameter to control	Allowed limits
Mass of the rudder, G	5.8 ÷ 6.7 kg

ATTACHMENTS

Composite materials, glues and their substitutes used in production and repairs of the glider LAK-12

No.	Description	Russian Federation standard	German replacement
1.	Glass fabric	TCY 8/3 BM-78; TY6-11-292-72	92125 INTERGLAS
2.	Carbon fabric	ЭЛП-П0,08; TY6-06-И119-85	98131 INTERGLAS
3.	Epoxy resin	ЭД-20 GOST 10587-84	L-285 MG Scheufler
4.	Hardener (polietilenpoliamin)	PEPA index A T5-6-02-594-85	L-287 MG Scheufler
5.	Flexibilizer (dibutilftalat)	DBF GOST 8728-78	Included in L-285 MG Scheufler
6.	Foam	ПБ-1-65 TY6-05-1158-74	H60 of DIVINYCELL

Fiberglass composite manufacturing process and identification description scheme (instruction ST-78-1)

1 ST 2 - 3 - 4 - 5 - 6 - 7

1. – number of fiberglass fabric plies or number of yarns;
2. ST - fiberglass composite;
2. - filament material;
3. - matrix;
4. - filament material content in matrix;
5. - filament material direction angle;
6. - pressing method;
7. - pressing force (kg/cm²) or minimum vacuum level (kg/cm²).

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1. Pressing method

No.	Pressing method	Identification
1.	Mechanical	M
2.	No pressing	B
3.	Vacuum	V

2. Filament material direction angle

No.	Direction of fabric	Identification	Remarks
1.	The reference - symmetry line a) 0° b) 45° c) 90°	A0 A45 A90	Every second ply of fabric is laid at the 90° angle to the previous ply
2.	The reference - seam of fabric a) 0° b) 45° c) 90°	S0 S45 S90	

2. Filament material content in matrix

No.	Filament material content	Identification
1.	1 : 0.5	0.5
2.	1 : 0.6	0.6
3.	1 : 0.7	0.7
4.	1 : 0.8	0.8
5.	1 : 1	1

2. Matrix

No.	Composition of matrix	Identification	Drawing identification
1	ED-20+Db+PEPA	L-4-1	K1
2	ED-20+Db+10% ZnO+PEPA	L-4-20	K2
3	ED-20+Db+20% ZnO+PEPA	L-4-22	K3
4	ED-20+Db+40% ZnO+PEPA	L-4-24	K4
5	ED-20+Db+60% ZnO+PEPA	L-4-26	K5