SZD-48-1
JANTAR STANDARD 2
SAILPLANE

Flight Manual
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PRZEDSIĘBIORSTWO DOŚWIADCZALNO-PRODUKCYJNE

SZYBOWNICTWA "PZL - BIELSKO"

43-300 Bielsko-Biała ul.Cieszyńska 325 POLAND

F L I G H T M A N U A L

SZD-48-1 " JANTAR STANDARD 2"

SAILPLANE

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Signed by dr inż.W.Stafiej

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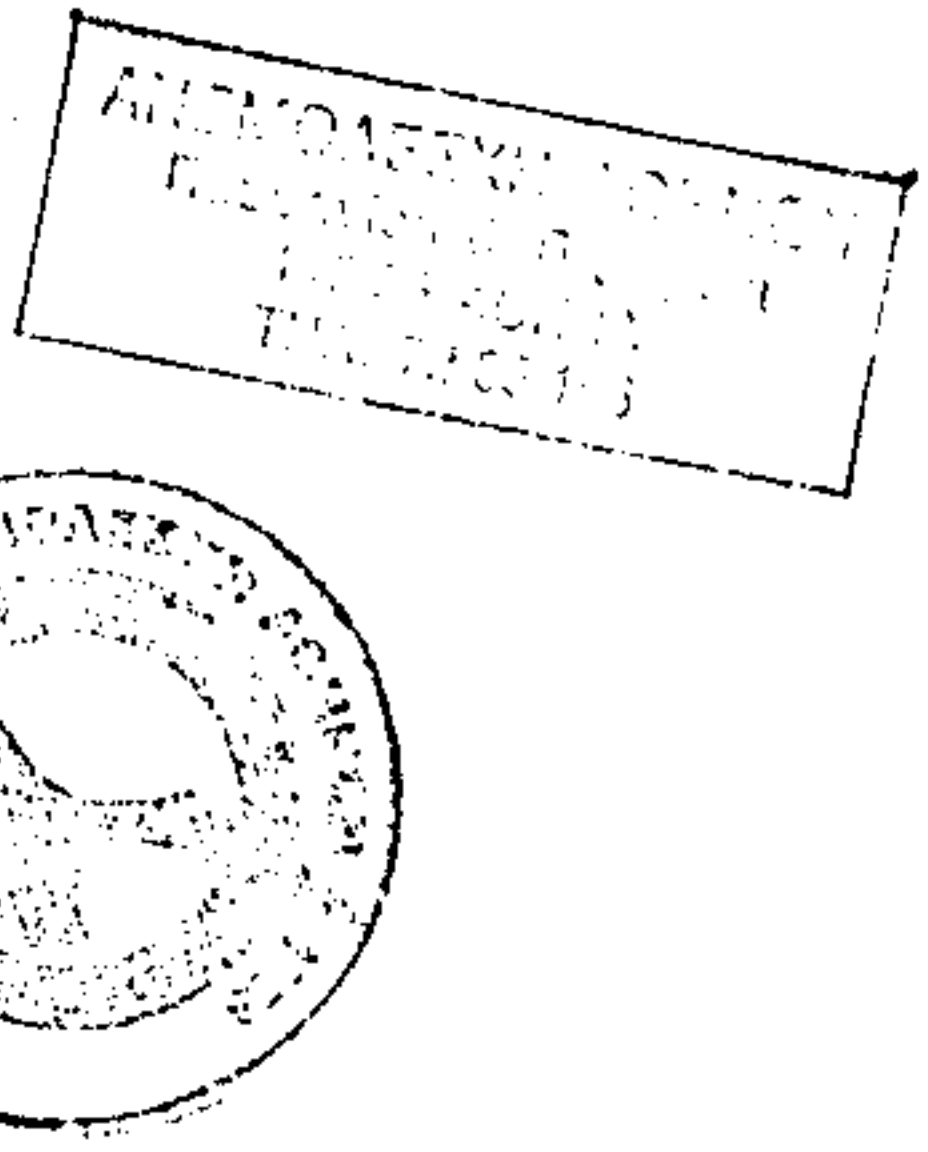


LIST OF THE INTRODUCED CHANGES

NOTE: Items in which the change has been introduced are marked with vertical line on the left side of text and with the number of change.

Item	Page	Change	Date	Signature
1	10,12 13	The change have been introduced ref. of the weight.		INSPEKTOR KCS inż. Witold Niespał

Item	Page	Change	Date	Signature

CONTENTS:

1. DESCRIPTION OF SAILPLANE

1.1. General description /fig. 1./

SZD-48-1 "JANTAR STANDARD 2" is monoplace, highperformance sailplane of Standard Class, All the structure is of glass-fibre /epoxy.

Wing - in two pieces, trapez outline, NN8 aerofoil amployed. Box-type spar with glass fibre /foam/glass fibre. Glass fibre rear web. No ribs. Semi-integral water ballast tanks in wing.

Aileron - 20 per cent, individed, without mass balance, hinged in 5 points, actuated in 1 point. Sandwich glass fibre structure.

Air brake: extended, duraluminium sheet plates with caps controuring to wing surface.

Fuselage:all glass fibre structure, fin included. The central part comprises the sheel framework to which the wings and undercarriage are attached.

Undercarriage - retracted, without shock-absorber with the wheel of ⌀ 350 x 135 /138 x 53 in/ size, equipped with disc brake. Tube pressure is of 2,0 at /410 lb/ft^2/

Rear wheel of 200 mm /7,88 in/diameter. Whell br indopendent of air brake.

Cockpit - covered with windshield and canopy removable, or when ordered hinged, opened backwards. Semi-reclined pilot's position, back-rest adjusted on ground. Pedals adjusted in flight. Column type instrument panel. Adjustable air-conditioning providing the air flow on front part of perspex.

Tail-unit: "T" arrangement. The rudder, elevator and stabilizer of sandwich structure. The elevator in 2 parts, each one suspended in 3 poin Both elevator parts are equipped with fixed tabs for increasing of hinge moment. Rudder completely mass-balanced, suspended in 2 points.

Equipment: instruments/listed in item 1.3/ sanitary installation and first aid kit. The fixed aerial/ in the fin/ allows for transceiver connection.

Towing hooks:- front: TOST EUROPA G 72 type with self-releasing mechanism or TOST E 72 without self-releasing mechanism /hook type acc. to customer's order/.

The front hook is accessible when the instrument panel and its base are disassembled.

- c.g. hook : TOST EUROPA G 72 type for winch-launching, incorporated on the undercarriage arm /when ordered by the customer/.

Both the hooks have the common control system.

The hooks are opened when the releasing handle is pulled, and closed automatically under the spring tension when the handle is released.

During winch-launching, when the angle of towing cable position reaches the defined maximum value the cable is released automatically out of the hook G 72.

The hook type is defined on the Limitation Placard.

Moveable equipment - wing rigging lever, rubber hose with funnel for water ballast filling, screwdriver, covers for canopy and for the all sailplane.

Board documents

Sailplane Log-book, Flight Manual and Technical Service Manual.

1.2. Main technical data

Span	15,00 m	/49'2,56"/
Length	6,71 m	/22'0,186"/
Height	1,51 m	/4'11,46"/
Dihedral	1,5°	
Wing area	10,66 m^2	/114,75 ft^2/
Aspect ratio	21,1	
Root chord	0,95 m	/3'1,37"/
Mean Standard Chord	0,742 m	/2'5,19"/
Wing aerofoil	NN8	
Ballast installation capacity /water/	ab. 150 l	/331 lb/
Empty glider mass with standard equipment	271,4x261x4 kg	598,6 /575,5x8,82/ lb
Maximum allowable all-up mass		
without ballast	385 kg	/848,925 lb/
with ballast	535 kg	/1179,675 lb/

1.3. Board instrument installation /Fig. 2/

Installation comprises:

- instrument panel,
- total pressure port on the fin,
- 2 static pressure ports on the fuselage front part,
- additional nest for total pressure port for special instruments,
- total pressure duct drainage units accessible

in front of the instrument panel and through the inspection hole on lower part of fin,
- static pressure duct drainage units before instrument panel.

The instrument panel is fixed to the base with the screw on the front instrument panel wall and shadowed with the cover fixed to the fuselage.

The standard equipment consists of the following instruments:

- airpseed indicator PR-400 S
- altimeter W-10S or W-12 S
- variometers WRs-5D and PR-03 with compensator KWEC-2 and bottles,
- slip and turn indicator EZS-3
- compass BS-1 or KI-13A

Place for the other special instruments provided on the panel.

All the instruments are accessible when the front screw is removed and the panel shifted back.

1.4. Water ballast/FIg.3./

The ballast installation consists of:

- 2 semiintegral tanks in the wing root front box of about 150 l capacity /331 lb/,
- filling and jettisoning valve positioned behind the undercarriage housing actuated by the

lever on the left board /black ball/,
- water ducts connecting tanks with the valve and orifice,
- ventilating ducts for 2 tanks with independent orifices.

Filling of the tanks is performed through the jettisoning orifice by means of rubber ducts with funnel.

2. FLIGHT LIMITATIONS

	SZD-48-1 "JANTAR STD 2 sailplane	
	without	with water ballast
1. Max. empty glider mass with the standard equipment	271,4 kg /598,6584 lb/	415 kg /915 lb/
2. Allowable load mass	114 kg/251,7 lb/	120kg/265 lb/
-maximum in cockpit	110 kg /242 lb/	110 kg /242 lb/
-minimum in cockpit	55 kg /121 lb/	55 kg /121 lb/
3. Water ballast mass	-	150 kg/331
4. Maximum all-up mass	385 kg /845 lb/	535 kg /1180 lb/
5. Limit load factor	+5,3/-2,65	+5,3/-2,65
6. Ultimate load factor	+7,95/-3,98	+7,95/-3,98

7. Distance between the c.g. point and wing root chord leading edge for the sailplane with standard equipment and sailplane attitude acc. to item 6 of Technical Service Manual

53 ± 2 cm
/20,875" ± 0,812"/

8. Allowable in flight c.g. position range

from 20,0 to 45,3 per cent of MSC

9. Loading plan

Maximum load mass	114 kg	251,7 lb/
Minimum pilot's cockpit load	55 kg	121 lb/
Maximum pilot's cockpit load	110 kg	242 lb/

/see page 14/

Pilot's cockpit load mass	instrument panel load mass	Front luggage compartment load mass	Rear luggage compartment load mass
55-65 kg /121-143 lb/. Pilot of 55-60 kg /121-132lb/ mass with back-rest location in position 1-3	max. 4 kg /8,8 lb/	max.25 kg /55 lb/	max. 7 kg/15.4 lb/ providing that for each 1 kg/2,2 lb/ of rear luggage compartment load the mass of 0,6 kg/1,3 lb/ is inserted into instrument panel
65-70 kg /143-154 lb/	max. 4 kg /8,8 lb/	max.25 kg /55 lb/	max. 10 kg/22 lb/ providing that for each 1 kg/2,2 lb/ of rear luggage compartment load the mass of 0,4 kg /0,9 lb/ is inserted into instrument panel
70-110kg /154-242 lb/	max. 4 kg /8,8 lb/	max. 25 kg /55 lb/	max. 10 kg /22 lb/

In case the glider is loaded in other way than listed above /e.g. when pilot's mass is different of allowable for cockpit load/ the sailplane must be weighed to define the all-up mass and c.g. location.

Flight limitations cover:

	Sailplane without water ballast IAS airspeeds			Sailplane with water ballast IAS airspeeds		
	km/h	mph	kts	km/h	mpl	kts
tako-off and aerotowed flight at ground wind of 18 m/m /35 kts/ with airspeed up to:	150	93	81	150	93	81
winch-launching at ground wind of 12 m/s /23,3 kts/ with airspeed up to	125	77	67	125	77	67
diving with airspeed up to:						
- for smooth air	285	177	154	285	177	154
- for gusty air	200	124	108	200	124	108
extending of and flight with air brake extended						
- for smooth air	285	177	154	285	177	154
- for gusty air	200	124	108	200	124	108
free flight at the wind of velocity	20 m/s /38,8 kts/			20 m/s /38,8 kts/		
cloud flying/no lightnings/ with airspeed up to	200	124	108	200	124	108
rough controlling with the airspeed up to:	170	105	92	-	-	-
aerobatic manoeuvres:	looping, stall turn,			-	-	-
	quick half-roll-half			-	-	-
	loop, spiral, spinning			-	-	-

1/altitude flight,when the efficient oxygen equipment provided.

11. Restrictions:

The sailplanes is not allowed for:

- night flying,
- aerobatic manoeuvres with water ballast.

12. Additional statements:

a/ When steel tow-cables are used the safety link of nominal strenght of 690 ± 10 per cent kG/1521 ±10%/ shall be used/acc. to standard BN-65/3833-55/.

b/ Before the first-on-type take-off the pilot should be familiar with Flight Manual. The first-on-type flight should be made without water ballast.

c/ Towed position below the aircraft is not recommended because of the cable to fuselage friction.

d/ Flight in the iceing condition should be limited to unavoidable cases only.

e/ Do not allow the water to be frozen in water ballast installation. In altitude flight release the water soon. It is not allowed to take-off with water, when the air temperature on the airfield is below +10°C./50°F/

f/ It is recommended to release the water before landing. Field landing without water ballast only.

g/ The storage of water in tanks/e.g. in hangar/ is prohibited.

h/ Before the prolonged hangaring release the water ballast completely /especially important in winter/.

3. PERFORMANCES /Fig. 4/ The standard condition of the sailplane wit; out speci
finish

	Sailplane	
	without water ballast	with water ballast
For all-up mass	320 kg/706 lb/	535 kg/1177 lb/
For wing loading	30 kg/m^2 /6,15 lb/ft^2/	50 kg/m^2 /10,25 lb/
Minimum sinking speed	0,60 m/s /118 ft/min/ 1,16 kts	0,77 m/s /151 ft/mi 1,49 kts/
at the airspeed	75 km/h/46,5mph, 40,5 kts/	97 km/h/60mph,52 k
Maximum gliding ratio	38 : 1	38 : 1
at the airspeed	95km/h/59mph;51kts/	123km/h /76mph;66k

Sinking speeds at the airspeeds

km/h	mph	kts	m/s	ft/min	kts	m/s	ft/min	kts
100	62	54	0,75	150	1,46	0,78	153	1,5
120	74	65	1,08	213	2,09	0,88	173	1,7
150	93	81	1,85	364	3,59	1,28	252	2,4
180	112	97	2,95	581	5,73	2,00	394	3,8
200	124	108	4,04	795	7,85	2,60	512	5,0
220	136	119	5,65	1112	10,97	3,30	650	6,4
250	155	135				4,69	923	9,1

4. OPERATION OF SAILPLANE

4.1. Pre-flight inspection

Before the flight check:

- integrity of structure and covering,
- locking of rigging elements and control system connections,
- operation of controls,
- operation of towing hook,
- undercarriage condition, rolling of the main and tail wheels, operation of wheel brake, wheel tube pressure/by eye/, cleannes of undercarriage housing/,
- pilot's belts,
- total and static pressure ports/clean if necessary/,
- operation of instruments.

4.2. Start handling

4.2.1. Opening and closeing of canopy

The canopy is locked by two independent lever locks/ left and right/ accessible from outside through the window. To lock put the levers forwards. The hinged canopy is equipped with automatic latch locking in the opened position / upper/. To release the latch pull forwards the handle /behind pilot's head/.

4.2.2. Locking of tow-cable

1. Pull the releasing handle full.
2. Insert the small ring of cable end into the hook and release the handle.
3. CHECK THE LOCKING OF CABLE PULLING IT FIRMLY SEVERAL TIMES !

The sailplane can be equipped with two hooks /see page 8,9, and Limitation Placard/

4.2.3. Transportation on the airfield

The sailplane with canopy locked can be towed by motor-car or tractor with the speed up to 10 km/h. Cable length no shorter than 4 m.

NOTE: MANOEUVRING THE SAILPLANE ON SLIMY GROUND-ESPECIALLY ROLLING-BACK, MAY CAUSE THE TIRE TO FENDER JAMMING AND STOP THE WHEEL.

4.2.4. Anchoring

1. Put the sailplane in position to have the back-side wind.
2. Anchor the sailplane in the following places:

WING: The wind side wing tip should be supported at 30-50 cm/12-20 in/ height, covered with seat pillow and fixed with anchoring cord onto the picket or bitt , in distance of about 50 cm/20 in/ from the tip.

FUSELAGE: Fix the tail part to the pickets or bitts on both sides, girding the fuselage tube with cord. For front part fixing use the front or bottom towing-hook.

NOTE: THE ANCHORED SAILPLANE SHOULD HAVE AIR-BRAKE EXTENDED !

4.2.5. Procedure when sailplane gets wet.

In respect to stucture/glass-fibre/the sailplane is moisture resistant.

In case of havy wetting e.g. after landing on the water or after prolonged field condition influence it is recommended to dry the sailplane by opening inspection holes , opening the canopy and extending air brake. After drying, clean the surface with flanel.

NOTE: IN CASE THE EXCESSIVE WET OF STRUCTURE INSIDE IS FOUND THE SAILPLANE SHOULD BE DRIED.

4.2.6. Removing the water from pneumatic installation of instruments

After flight in prolonged rain-fall/or in cloud/ it is necessary to:

1. Remove the instrument panel cover.
2. Disconnect the total and static pressure ducts out of the instruments.
3. Dry the drainage units, remove the drainage unit plugs.

4. Blow/using wheel tube pump/ the ducts of total and static pressure ports.

NOTE: BEFORE BLOWING BE SURE THAT THE PANEL WITH INSTRUMENTS HAS BEEN COMPLETELY DISCONNECTED FROM THE BLOWN INSTALLATION . DANGER OF FAILURE OF INSTRUMENTS!

5. Screw up the drainage unit plug, connect the installations, check their tightness, put on the instrument panel cover.

4.2.7. Slip and turn indicator charging-rigging the batteries.

Slip and turn indicator EZS-3 is charged with 4,5 V D.C. from 3 round batteries R-20 type. The batteries are housed in longitudinal round container located /from top/ into the bracket on right hand part of instrument panel, accessible after removing the panel cover.

NOTE: THE NEGATIVE POLE OF BATTERY SET SHOULD BE DIRECTED FORWARDS!

NOTE: THE USED BATTERIES CANNOT REMAIN IN THEIR NEST!

4.3. Pilot in the cockpit

The parachute or bach-pillow thickness cannot be lower than 12 cm/4,7 in/. The cockpit allows for pilot of 1,85 m /6 ft 1 in/ height with the back-parachute. The position is adjusted by means of changing the bach-rest location/ 6 positions/ and pedals /5 positions/.

The position must allow for convenient realisation of the full movements of elevator and rudder and access to towing-hook releasing handle.

The back-rest pivots shall be locked symmetricaly in their proper slots. The head-rest is mounted on the back-rest, adjustable on ground and in flight.

The control levers of control surfaces and air brake are operated in the conventional way.

The wheel brake is operated with the lever on the air brake control hand grip.

1. The elevator trimming spring is controled with lever on the left side of the stick /step regulation - 6 locations/.
2. Undercarriage retracting lever is on the right board.

   Front position: - undercarriage extended, rear position: - retracted.

   The control lever has the locking latch painted red. The undercarriage extended or retracted is locked when the latch protrudes out of the

hand grip contour. To release the latch press it down. The undercarriage housing door is closed automatically by means of spring.

3. Canopy opening /end emergency jettisoning/ depends on pulling both the locking levers/red/ back. In hinged version the canopy in opened position is locked automaticilly. To release the lock pull the locking device forwards.

4. Hand grip of pedals locking latch is on the right hand side of instrument panel/painted brown/. When grip is pulled full, the pedals can be shifted with legs. After releasing the grip the latch locks the pedals in the nearest of 5 adjusting positions.

5. Water ballast jettisoning hand grip is on the left board /painted black/. The grip when slided back opens the water orifice .
The grip when slided forwards stops the jettisoning of water. When the water tanks are empty the grip should be in rear position.

NOTE: THE REAR BACK REST POSITIONS ARE INTENDED ONLY FOR HAVY PILOTS! LIGHT PILOT SHOULD USE THE FRONT POSITIONS. /See table 9 "Loading plan"/.

4.4. Procedures before take-off

1. Check the complete of board equipment/log-book, Flight Manual, tools, anchoring facilities covers, ground-towing cable/.
2. Check the parachute opening rubber cords. Put on the parachute.
3. Adjust the back rest, take place in the cockpit adjust the pedals, fasten the belts, adjust the head rest.
4. Realize the full movements of control surfaces and air brake. Put the trimmer lever into the position "2" /light pilot/ to "5" /heavy pilot/ counting from front.
   For winch-launching "2" to "4" respectively.
5. Check the slip and turn indicator operation.
6. Put on and lock the canopy, check the correct locking.
7. Connect the towing cable and check the correct locking in the hook.

4.4. Controlling

4.5.1. Take-off and aerotowed flight.

Before take-off with water ballast the towing plane pilot should be instructed on the different take-off technique.

The increased sailplane wing loading results the aeroplane airborning sooner than the sailplane.

Passing to climb of aeroplane-sailplane pair requires the airspeed at least 120 km/h /74 mph; 65 kts/

Before the take-off, trimmer spring should be positioned on slot: from "2" /light pilot without water ballast/ to "5"/heavy pilot with water ballast/. Retract the undercarriage at the altitude above 150 m/490 ft/. Recommended towing airspeed in climbing is no less than 100 km/h/62 mph; 54 kts//without water ballast/ and 120-115 km/h/74-71 mph;65-62 kts/ /with water ballast/

NOTE: TAKE-OFFS WITH WATER TANKS PARTIALLY FILLED WITH WATER IS PROHIBITED !

4.5.2. Winch launching take-off using the front hook:

Before launching put the trimmer lever on slot "2" /light pilot/ to "5" /heavy pilot/ position. During steep climbing slightly pull the stick. The best launch airspeed range: 100-110 km/h/ 62-68 mph; 54-59 kts/.

Before releasing the cable by pilot, it is recommended to push slightly the stick to loosen the cable. In case of intented self-releasing the stick should be pulled till the hook releases, then pass into glide. Using the winch of 120 PS engine and 700 m/2300 ft/cable length the releasing hight in windless condition is about 150-170 m/500-600 ft/ lower when compa-

On the glider being equipped with TOST E 72 hook without the self-releasing mechanism, the winch-launching is not recommended.

- Take-off using the c.g. hook

Before take-off put the trimmer lever on "1" /light pilot/ to "2" /heavy pilot /position. On the steep climb the stick force can be compensated with trimmer. Untrimmed force is lower than 1,5 kG/3,3 lb/. At end of climb pull the stick to gain the maximum altitude. Optimum airspeed for climb is 100-110 km/h /62-68 mph; 54-59 kts/ without water ballast/ and 110-120 km/h /68-74 mph; 7 -65 kts/ with water ballast/. Take-off technique with water ballast is the same except of passing into climb at 120 km/h /74 mph; 65 kts/ airspeed. The trimming is the same. Before releasing by the pilot pull slightly the stick to loosen the cable. The high altitude is gained using the long towing cable. For the winch of 120 PS engine and 700 m/2300 ft/ cable length the maximum altitude gained in windless condition is 180-220 m /591-715 ft/ /without water ballast/ and 180-210 m/591-689 ft//with water ballast/

After releasing the rope the handle in cockpit. should be pulled several times, than retract the undercarriage

4.5.3. Stalling

The stalling in straight flight takes place with nose high above horizon and considerable elevator up deflection. Before stalling the distinct fuselage oscillations appear when the airspeed drops down to about 68 km/h/42 mph; 37 kts//light pilot without water ballast/or 82 km/h/51 mph;44 kts//heavy pilot with ballast/. During dropping of sailplane the lateral balance can be retained. Recovery by releasing of stick is sure and easy. The stalling in circling appears as a tendency for dimishing the circling radius and is accompanied with th flow separation on wing, resulting the sail-plane buffeting.

In 30° banked turn the stalling airspeed is about 71 km/h /44 mph; 38 kts//light pilot without water ballast/ and about 83 km/h /51 mph;45 kts/ heavy pilot with water ballast/.

During dropping down the lateral balance can be retained. Recovery is standard, without trouble. The hight loss in stalling, at turn with water ballast, does not exceed 50 m. /164 ft/

4|5.4. Spinning/For the front limit and rear limit c.g. locations the spinnings are unsteady/.Peroming of spinning is allowed without water ballast only. For the front c.g. location/pilot of 110 kg /242 lb/mass and special equipment in the instrument panel of 4 kg/8,8.1b/ mass/ the spinning is prohibited.

Recommended aileron deflection in spinning:

for light pilot - opposite to the rotation /deflection favourable for the longitudinal oscillation damping/,

for average pilot-no aileron deflection,

for heavy pilot - in accord to rotation/deflection helps to perform spinning/,

In most cases the spinning is associated with longitudinal oscillations of 1 1/2 turn cycle. For the light pilot the tendency for "flat-sweeping" appears and the airspeed indication drop down for a moment to zero. For recovering the aileron should be deflected opposite to rotation to accelerate the break of rotation. In all cases the recovery from the "steep" phase/associated with oscillations/ appears with the delay lower than 1/2 turn.

The height loss during recovery is of about 100 m /328 ft/. For lazy recovery action it may exceed 100 m /328 ft/

4.5.5. Circling

Circle with 80-95 km/h /50-59 mph; 43-51 kts/ airspeed, depending on bank and all-up weight. Circling direction change $45^{\circ}/45^{\circ}$ requires about 3,6 sec /without water ballast/ and 4,0 sec /with water ballast.

4.5.6. Air brake

High efficiency of air brake allows for precise approach angle controlling. The air brake can be extended and retracted at the airspeeds up to 285 km/h /177 mph; 154 kts/ above 200 km/h /124 mph; 108 kts/ extend gently/. In diving at flying path inclined on 60°, the extended air brake limits the airspeed to about 285 km/h /177 mph; 154 kts/ with water ballast, Q = 535 kg/1180 lb/

The flying path inclination in respect to horizon at V_{NE} = 285 km/h /177 mph 154 kts/ and air brake extended is more than 45°.

4.5.7. Aerobacy / without water ballast/

Before performinh the aerobatic manoeuvres the sailplane should be trimmed for 120-150 km/h /74-93 mph; 65-81 kts/ airspeed and air brake as well as undercarriage locking checked. The sailplane performs corectly and smartly the looping and stall-turn/initial airspeed 180-200 km/h/112-136

spiral /120-130 km/h/74-81 mph; 65-79 kts/ , quick half-roll-half-loop /95 km/h;59 mph; 51 kts/, controlled half-roll-half-loop/180 km/h; 112 mph; 97 kts/
Performing of these manoeuvres is standard.

4.5.8. Landing

Before landing on altitude no less than 200m/650ft/ above the ground the water ballast should be jettisoned /put the controlling handle back, jettisoning time: 5 minutes/ and undercarriage extended /put the controlling handle forwards and check the sure locking/. Approach with 100-110 km/h/62-68 mph, 54-59 kts/ airspeed and control the flying path angle with air brake. Touch ground with two points. On ground rolling the undercarriage wheel can be braked. The yellow mark on the airspeed indicator shows the recommended approach airspeed.

4.5.9. First flight

Before the first flight the pilot should be familiar with flight limitations. It is recommended to make the first flight in thermics and without water ballast. Perform the circling stalling in straight and turn flight , flight at up to 250 km/h /155 mph;135 kts/ airspeed/in smooth air/ and check several times the undercarriage

retracting and air brake operation. When flying with water ballast take into account the considerable mass increment/150 kg/331 l water/ and airspeed increment /see item 4.5.

4.6. Service and use of water ballast

To open the valve put back the black ball of the control lever on left board. To close the valve forward the black ball.

Filling the tanks with water:

1. Open the valve
2. Connect the filling duct into the jettisoni orifice on the fuselage bottom surface.
3. Put the wings level, press the tips slightl up and support them. Lift the funnel above the fuselage top and pour the water. The installation is full, when from the ventilating orifices under the wings the steady water stréam flows.
4. Close the valve and disconnect the filling duct.
5. Check the lateral trim of the sailplane.
6. Check the tightness of connections
7. Check the lack of water flow through ventilating holes near the wing root rib /before the spar and near the trailing edge/.

NOTE: a/ USE CLEAR WATER ONLY

b/ FILLING THE TANKS IMMEDIATELY FROM WATER SUPPLY IS PROHIBITED. THE WATER PRESSURE MAY DAMAGE THE TANKS.

To jettison the water in flight put the control handle full back. Full jettisoning requires about 5 minutes. It is recommended to put the handle back when the tanks are empty.

NOTE. VER ALLOW THE WATER TO BE FROZEN. IN ALTITUDE FLIGHT JETTISON THE WATER SOON. TAKE-OFFS WITH WATER AT AIRFIELD TEMPERATURE BELOW + 10°C /+50°F/ ARE PROHIBITED.

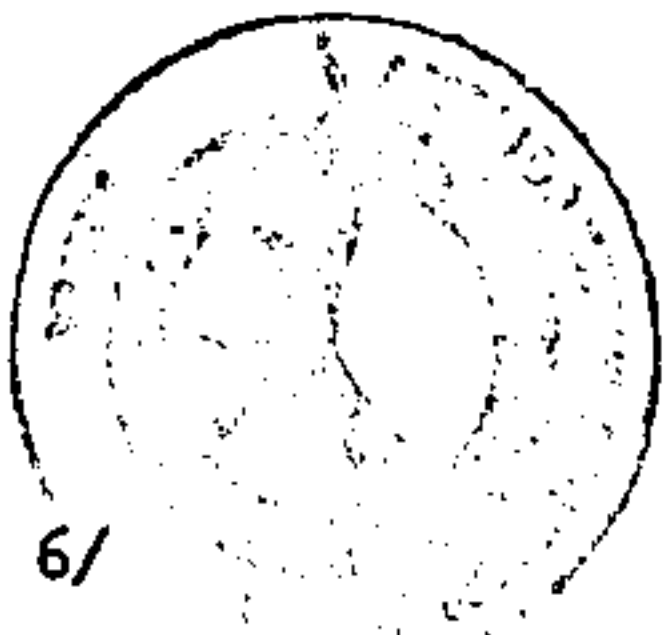
4.7. Procedures after flights

1. Check the slip and turn indicator and all electrical devices to be switched off.
2. Remove the used batteries of slip and turn indicator, if necessary.
3. Remove the water of instrument installation, if necessary /acc. to item 4.2.6./
4. Clean the cockpit and whole sailplane.
5. Check the: undercarriage condition, rolling of main and tail wheels, cleannes of under-carriage housing / clean and grease the guides, if necessary/, wheel-brake operation.

6. Make the inspection of sailplane /the same as before the flight acc. to item 4.1./ and remove the faults.
7. Put the covers /only on dry and clean sailplane/.

4.8. Rigging and derigging

4.8.1. Rigging tools



1. Rigging lever
2. Screwdriver

4.8.2. Rigging of wings /Fig. 6/

1. Retract the air brake and lock the cockpit control lever.
2. Insert the spar roots into the guides of spar housing in fuselage till the spar pivots engage the ball nest on root ribs.
3. Pull the wings into position with the rigging lever hitched on the foots of spar ends. Insert the bolt into the spar sleeves. In case of troubles move the torque tube /in fuselage, after the spar/ connecting the air brake control system of left and right wings.
4. Lock the bolt with pin, and the pin with safety pin.
5. Connect the aileron control system /air brake

control system is connected automatically/.

6. Check the spar joining and control system ope ration.
7. For rigging and derigging three persons are necessary.

4.8.3. Derigging of wings

1. Disconnect the aileron control system.
2. Support the wing tips, unlock and take off the bolt.
3. Shift the wings out of the fuselage one after other.

4.8.4. Rigging of horizontal tailplane /Fig. 7/

1. Put the trimming spring into "nose heavy" position /1/.
2. Put the horizontal tailplane onto the fin inserting the fittings into their nests and connect the push-rod with elevator lever /when connecting the elevator should be deflected up/.
3. Lock the fittings with bolt inserted through the hole in fin leading edge.
4. Lock the bolt rotating it 90° till the red line on bolt and on fin make a straight line.

4.8.5. Derigging of horizontal tailplane

Perform the procedures in reverse sequence when compared with rigging /rotate the bolt 90° till the red line of bolt and fin will perpendicular/.

4.9. Ground transportation

To prepare the derigged sailplane for ground transportation it is necessary to:

1. Check the complete of derigged sailplane and equipment.
2. Immobilize the cockpit and luggage compartm contents.
3. Immobilize the stick, using pilot's belts.
4. Immobilize the moveable control circuits joints in the fuselage /tie with cord/.
5. Lock the ailerons and rudder /put on the fixators/.
6. Put on and lock the canopy, shut the window.
7. Put on the covers on canopy, wings, fuselage, tailplane, and secure against the dust the water installation joints as well as opened control system bearings and fittings of wing and tailplane /with paraffin paper or rags/. The sailplane sets can be fixed on trailer as follows:

- on external surfaces using the wide contour

supports upholtered with soft material, or by means of strips,

- wings: on the spar end,
- fuselage: on the main and tail wheels.

4.10. Directions for McCready ring

a/ Scale for all-up mass 320 kg /706 lb/ without ballast/.

Initial scale mark "75".

Ring	km/h	mph	kts	Variometer m/s	ft/min	kts
"75"	46	40		0	0	0
100	62	54		1,00	194	1,94
120	74	65		2,33	453	4,53
130	81	70		3,01	585	5,85
140	87	76		3,76	731	7,31
150	93	81		4,49	873	8,73
160	99	86		5,38	1046	10,46
170	105	92		6,40	1244	12,44
180	112	97		7,46	1450	14,50
190	118	103		8,70	1691	16,91
200	124	108		10,13	1969	19,69

b/ Scale for all-up mass 535 kg/1177 lb/ with water ballast/. Initial scale mark "97"

Ring km/h	mph	kts	Variometer m/s	ft/min	kts
"97"			0	0	0
100	62	54	0,77	150	1,50
120	74	65	0,87	169	1,69
130	81	71	1,47	286	2,86
140	87	76	2,20	428	4,28
150	93	81	2,88	560	5,61
160	99	86	3,55	690	6,90
170	105	92	4,19	814	8,14
180	112	97	4,85	943	9,43
190	118	103	5,55	1079	10,79
200	124	108	6,35	1234	12,34
210.	130	113	7,29	1417	14,17
220	136	119	8,80	1711	17,11

Parametrs of cross-country flight in thermic without downwinds -/ see page -39/-.

a/ All-up mass 320 kg /without water ballast/ (706 lb)

Average climb m/s			Interthermal airspeed km/h			Cross-country speed km/h		
0,5	97	0,97	105	65	57	40	25	22
1,0	194	1,94	113	70	61	58	36	31
1,5	291	2,91	123	76	66	70	43	38
2,0	388	3,88	135	83	73	79	49	43
2,5	486	4,86	148	92	80	86	53	46
3,0	583	5,83	158	98	85	93	58	50
3.5	680	6,80	164	102	89	98	61	53
4,0	777	7,77	172	107	93	104	65	56
4,5	874	8,74	180	112	97	109	68	59
5,0	971	9,71	187	116	101	113	70	61

b/ All-up mass 535 kg /with water ballast/ (1177 lb)

0,5	97	0,97	130	81	70	44	27	24
1,0	194	1,94	138	86	75	66,5	41	36
1,5	291	2,91	148	92	80	80,5	50	43
2,0	388	3,88	160	99	86	92	57	50
2,5	486	4,86	170	105	92	100	62	54
3,0	583	5,83	184	114	99	108	67	58
3,5	680	6,80	196	121	106	114	71	62
4,0	777	7,77	204	126	110	121	75	65
4,5	874	8,74	212	131	114	126	78	68
5,0	971	9,71	220	136	119	132	82	71

5. DANGER AND EMERGENCY CONDITIONS

5.1. Landing in high plantation

When landing in high corn or grass it is possibl do damage the sailplane, because when the wing tip or air brake hitches the plantation the sailplane tends to make the ground-loop.

In unavoided cases the landing must be precise as far as possible , assuming the plantation surface as the ground surface. Just before landing retract the air brake.

5.2. Landing with undercarriage retracted

If the full extending and locking of undercarriage is impossible it should be retracted /put the control lever back/. For landing choose, if possible, the flat and smooth grassy or ploughed ground. Touch the ground tail first.

5.3. Break or unintended towing cable releasing

In case the towing cable breaks or releases unintended on the small altitude it is necessary to:

1. Release the towing hook /in case the cable remained locked/.
2. Extend the undercarriage.
3. In case of having water ballast, jettison it immediately /open the valve by putting the control handle back/.

4. Fasten the back belts.
5. Choose the place for landing.
   If the collision with the obstacle is unavoided,
   DO NOT ALLOW FOR FACE CRASH!

5.4. Emergency exit and parachute use

The emergency exit is the only rescue way when the sailplane cannot return on ground in the controlled manner in case of:

- fire or damage of ship making the flight impossible,
- serious pilot's misdisposition /e.g. injured eyes/
- clouds ranging ground, unabling the return to ground.

5.4.1. Procedures for emergency exit

1. Release the stick.
2. Unlock the canopy with both hands and push it "forwards-and-up".
3. Release the safety harness.
4. Leave the cockpit towards centre of eventual rotation.
5. If the altitude allows, open the parachute with delay. On altitude below 200 m /650 ft/ open the parachute immediately.

5.4.2. Procedures in special cases

1. In case of troubles in canopy jettisoning try to damage the perspex, beginning from the window, help with legs.
2. If the cockpit leaving must be made on high altitude it is necessary to take into account:

a/ possibility of climbing on the parachute opened, in the strong gusts /inside a cloud/ and the danger of lack of oxygen, or iceing of parachute,

b/ possibility of use of the oxygen equipment installed on the sailplane,

c/ air temperature,

In respect to above it is recommended /if sailplane condition allows for/ to remain in the cockpit till the altitude drops to 4500-4000 m /15000-13000 ft/ or below.

5.5. In case the water is jettisoned of one wing tank only it is necessary to:

a/ on high altitude make the lateral oscillations using the control surfaces to jettison the water through the main orifice.

b/ on low altitude:

- land on the airfielf with the opposite bank and use the wheel brake as far as possible,
- in the field landing procede as above, but do not extend the undercarriage.

6. DRAWINGS AND DIAGRAMS

Fig. 1. SZD-48-1 "JANTAR STANDARD 2 SAILPLANE

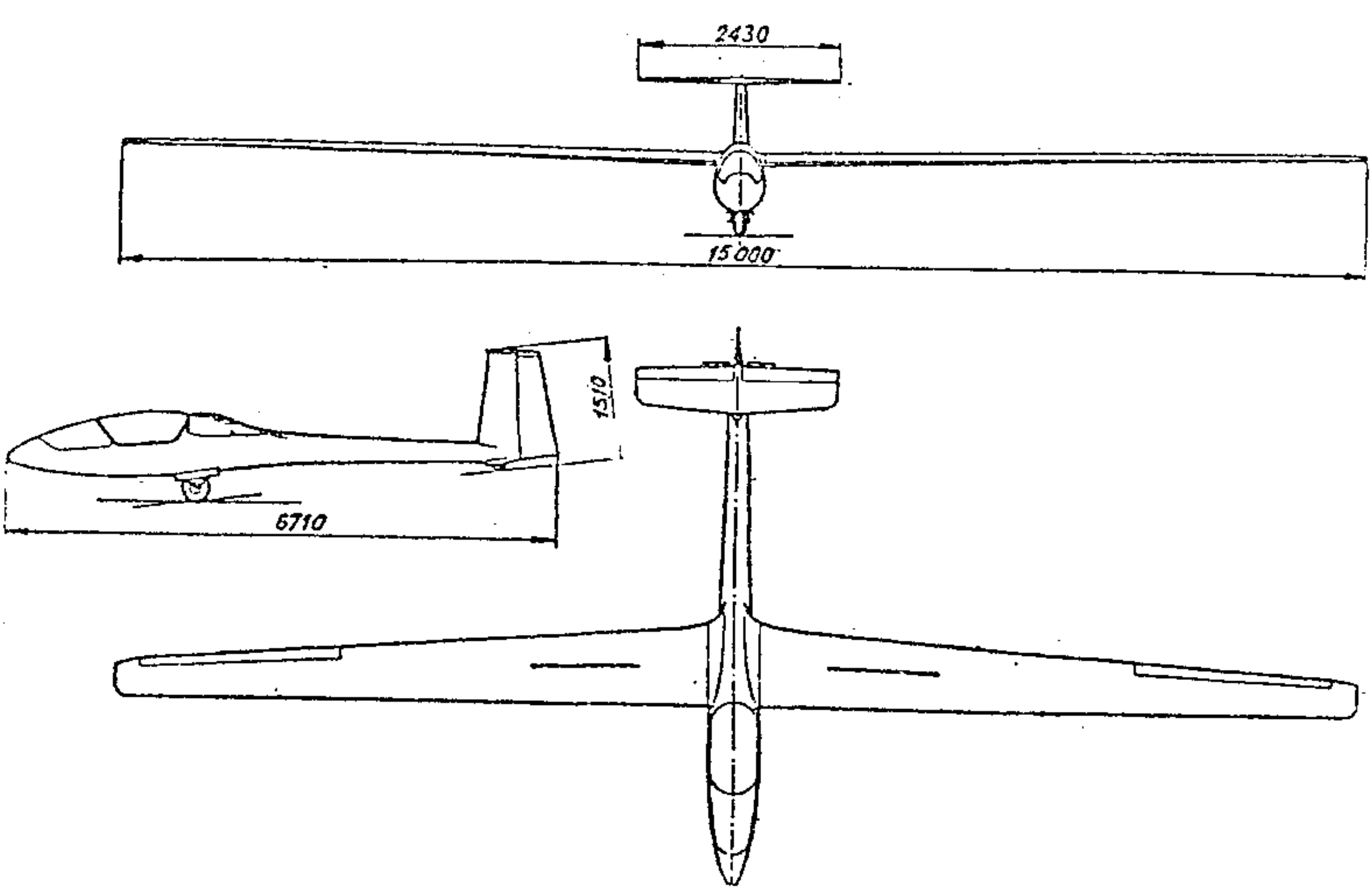

2430
15000
1510
6710

Fig. 2. Board instrument installation

1. Airspeed indicator PR-400 S
2. Altimeter W-10S /or W-12S/
3. Variometer WRs-5D
4. Var'-meter PR-03/ or WRs-5D/
5. Compass BS-1 /or KI-13/
6. Slip and turn indicator EZS-3
7. Static pressure port /panel end of duct red/
8. Total pressure port/panel end of duct green/
9. Nest for the additional port of total prossure/duct end yellow/
10. Kompensator KWEC
11. Batteries
12. Switch
13. Drainage unit
14. Pneumatic connector

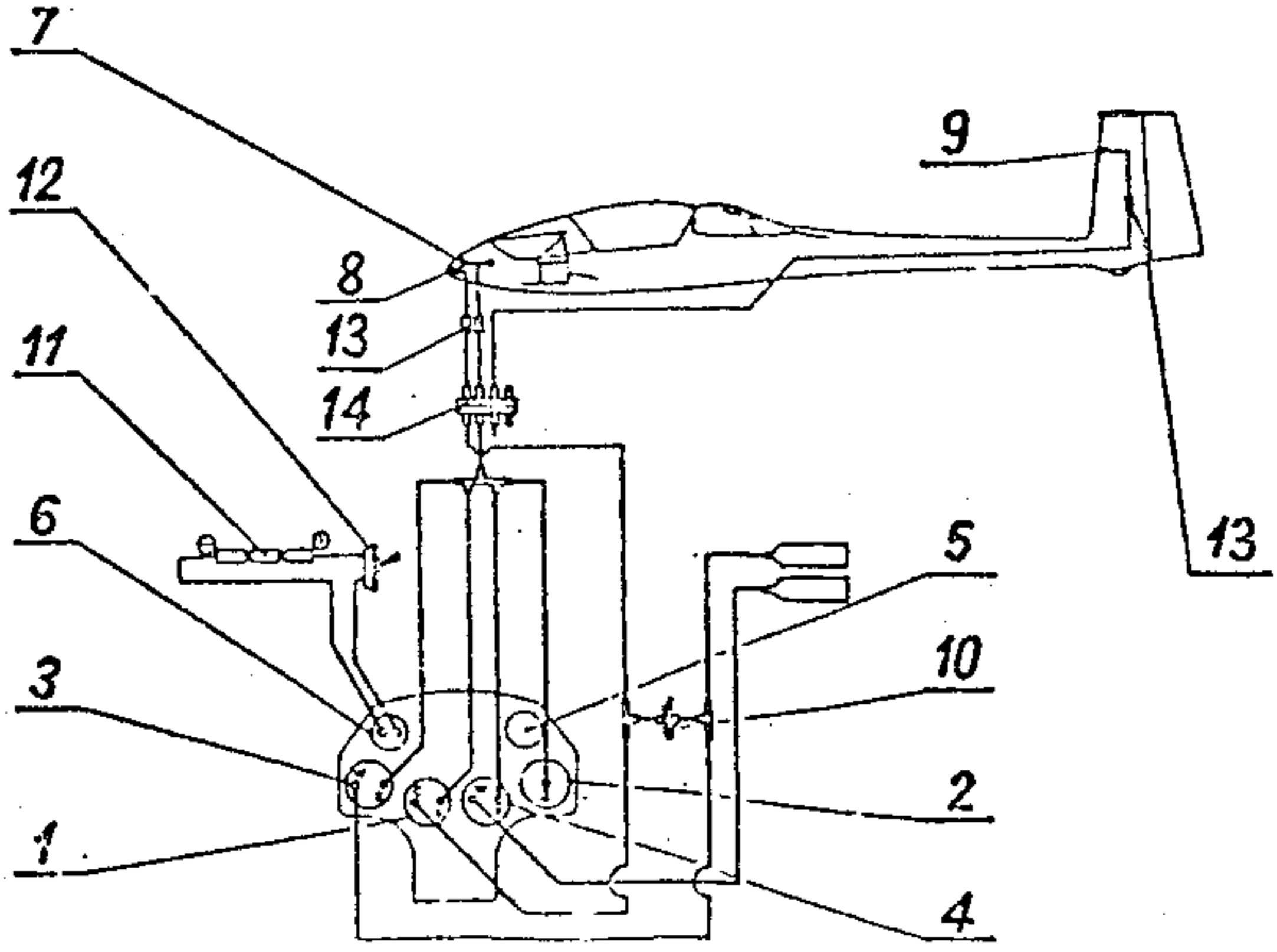

7
12
11
6
3
1
8
13
14
9
13
5
10
2
4

Fig. 3. Ballast installation

1. Tanks
2. Water ducts with joints
3. Ventilating ducts with joints
4. Valve
5. Ball of valve lever
6. Filling duct
7. Funnel

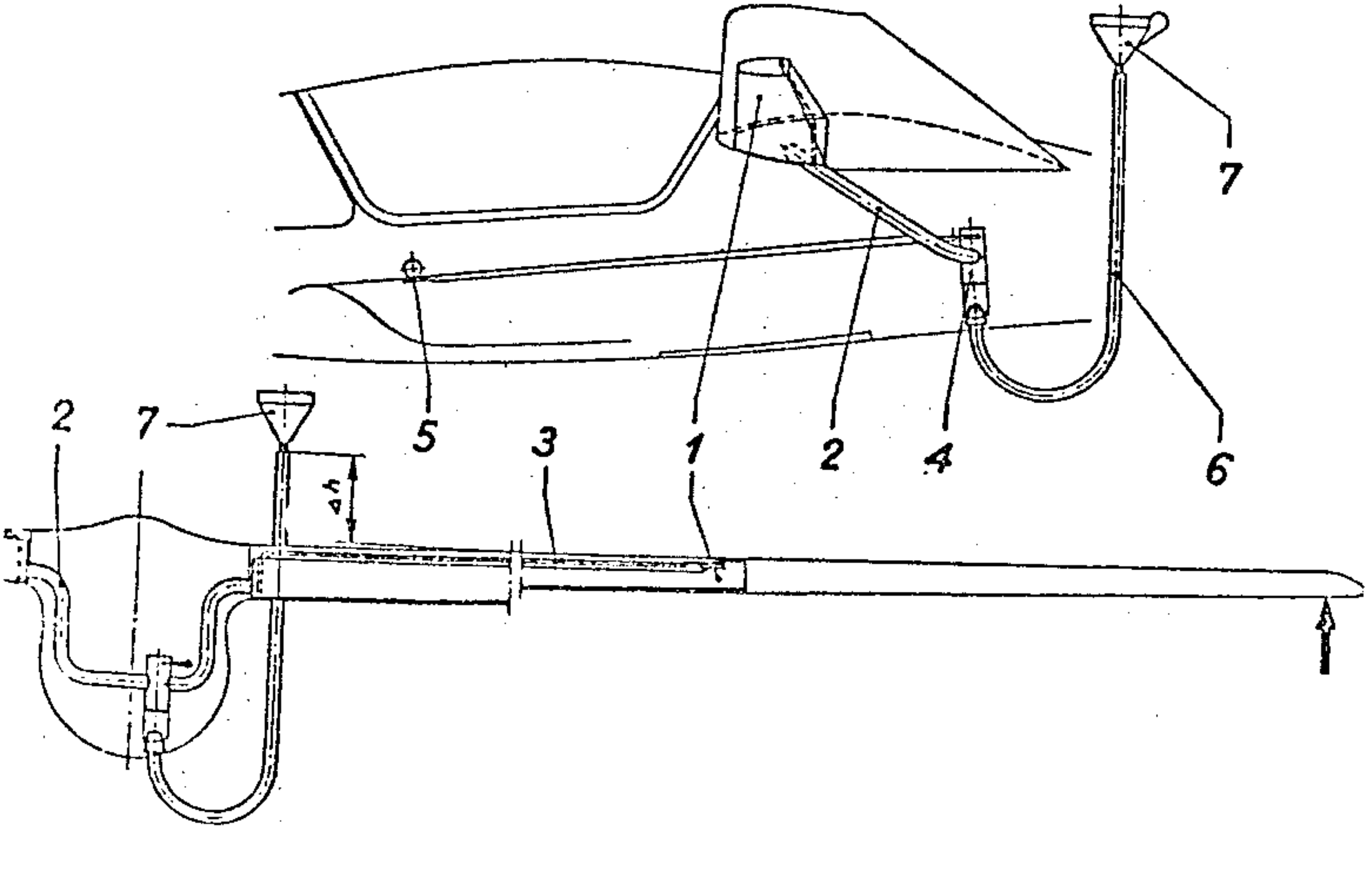

7
2
7
5
3
1
2
4
7
6
Δh

Fig. 4. Performances of SZD,48-1 "JANTAR Std-2"

/standard condition without special finish/

a/ Speed polar for the sailplane without water ballast Q = 320 kg /706 lb/,
wing loading 30,0 kg/m^2/6,15 lb/ft^2/

b/ Speed polar for the sailplane with water ballast Q = 535 kg/ 1177 lb/,
wing loading 50,0 kg/m^2/10,25 lb/ft^2/

a´b´- gliding ratio curves with and without water ballast

h - speed polar for flight with air brake extend Q = 535 kg /1177 lb/

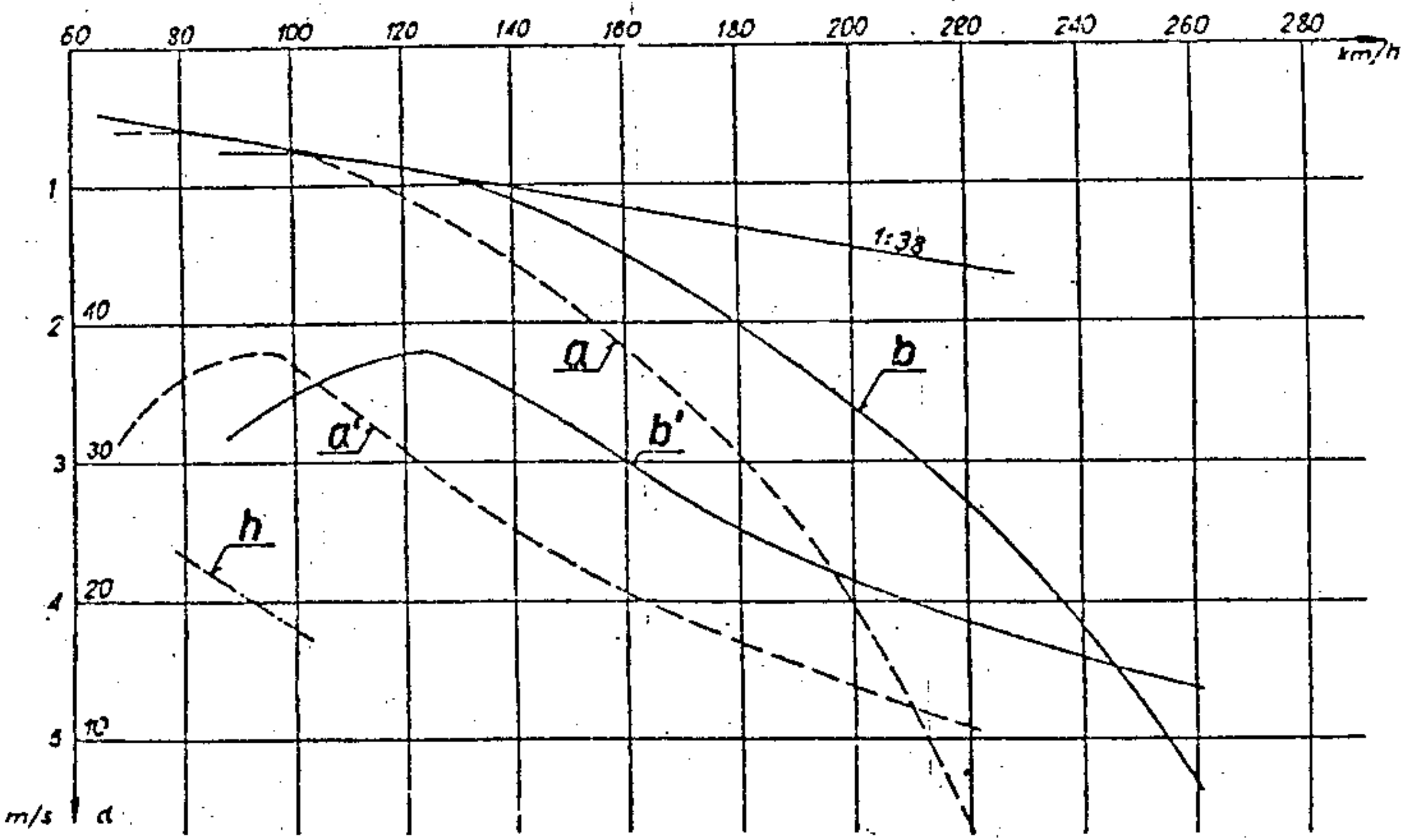

60
80
100
120
140
160
180
200
220
240
260
280
km/h
1
2
3
4
5
m/s
40
30
20
10
a
1:38
a
b
a'
b'
h

Fig. 5. McCready ring for SZD-48-1 "JANTAR STD 2" sailplane
/standard condition/

a/ Scale for all-up mass Q = 320 kg/706 lb/
/ without water ballast/

b/ Scale for all-up mass Q = 535 kg / 1177 lb
/with water ballast/

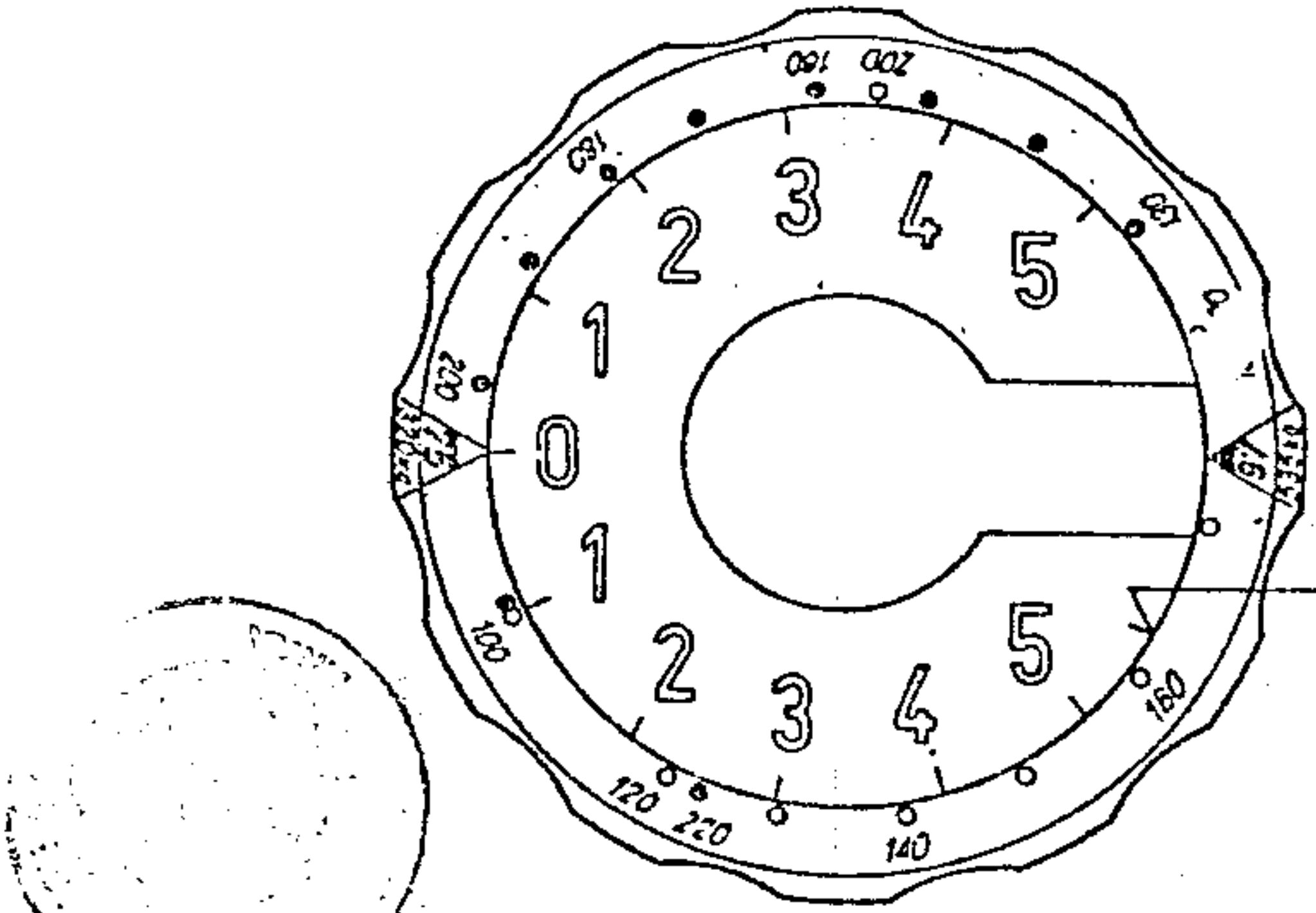

JANTAR
STANDARD 2

Fig. 6. Rigging of wing

1. Main bolt
2. Safety pin
3. Framework pivots
4. Bal. nests
5. Spar sleeves
6. Spar foots
7. Rigging lever

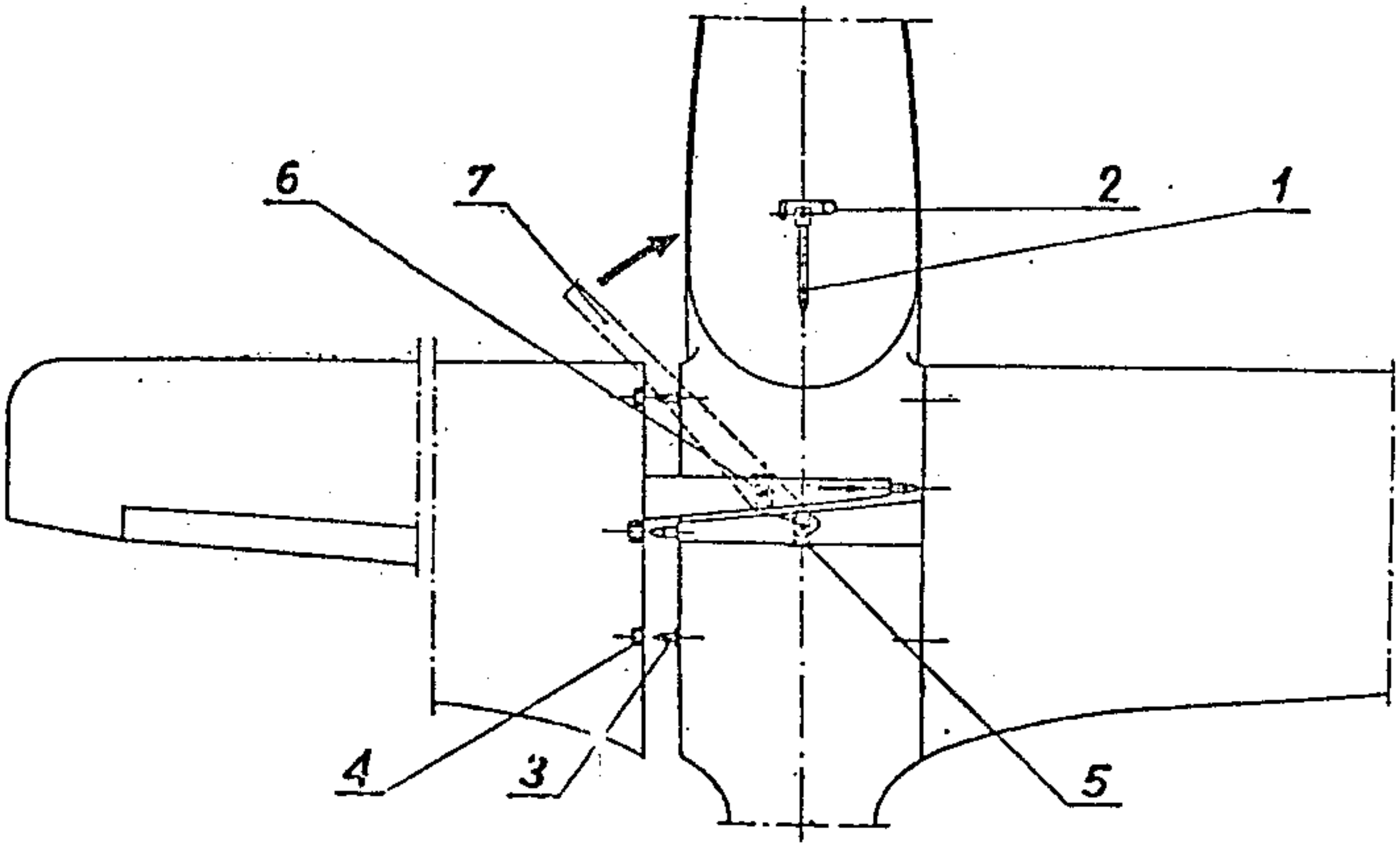

6
7
2
1
4
3
5

Fig. 7. Rigging of horizontal tailplane

1. Front fitting
2. Rear fitting
3. Bolt
4. Securing spring
5. Elevator push-rod
6. Elevator lever

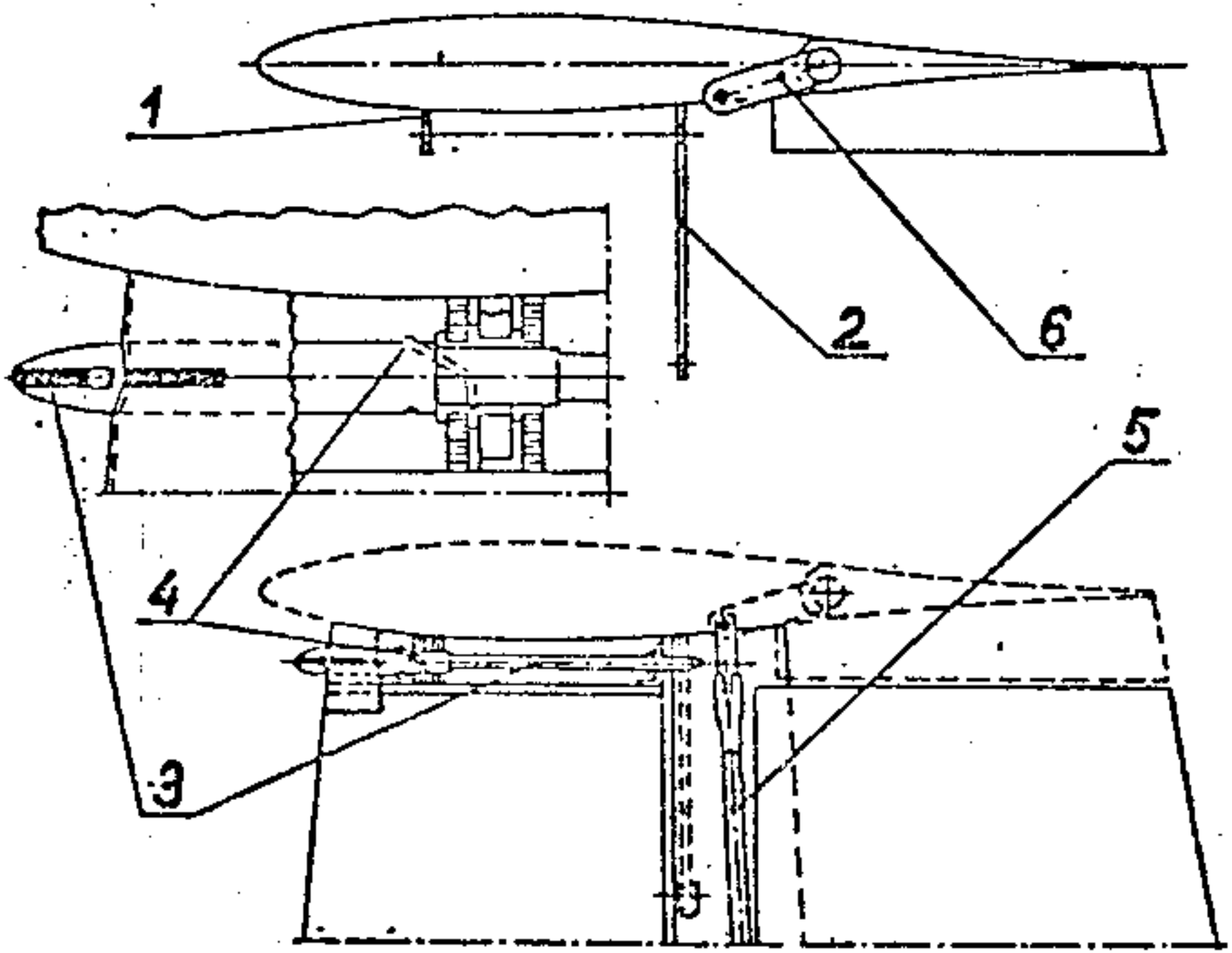
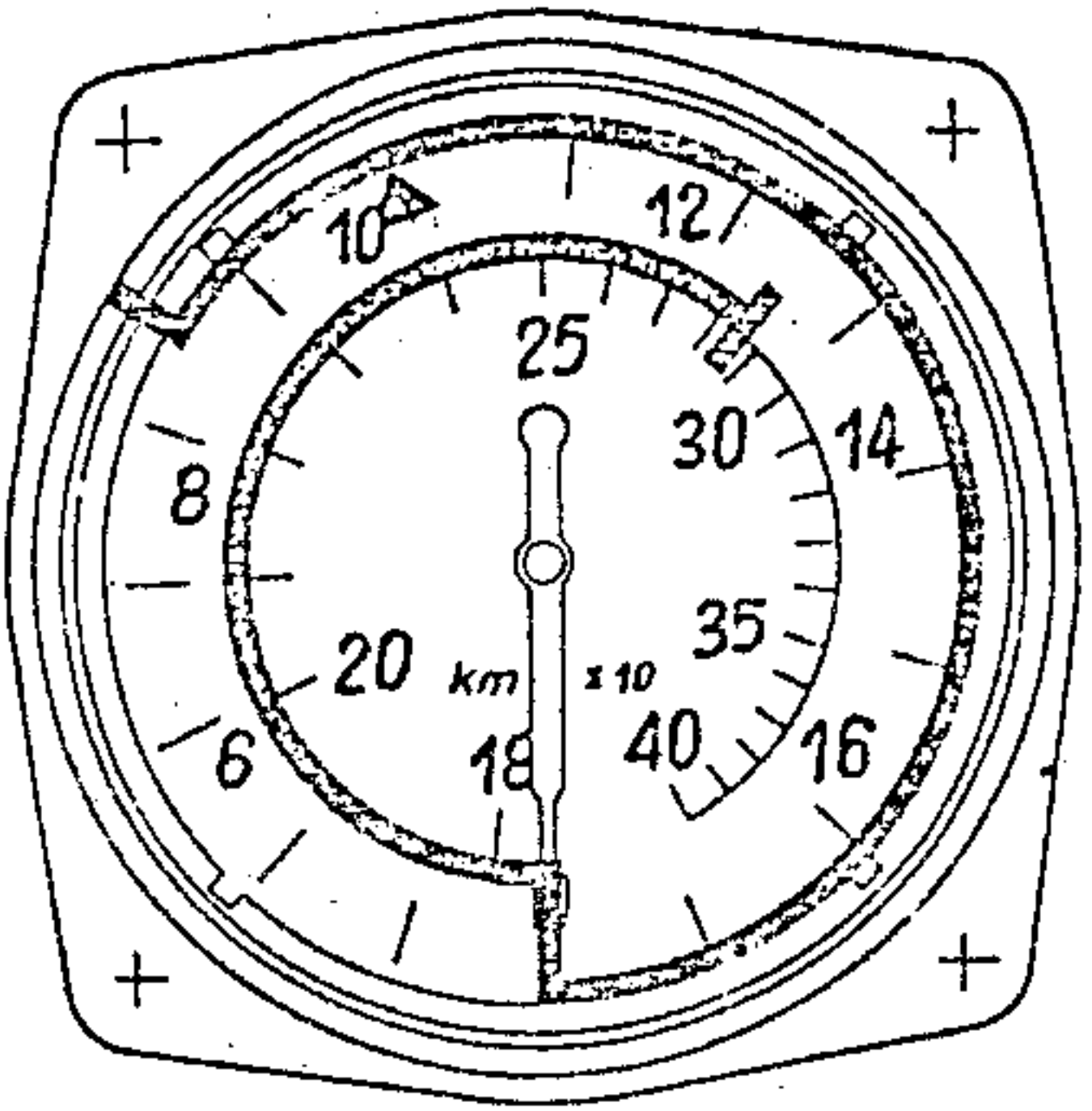
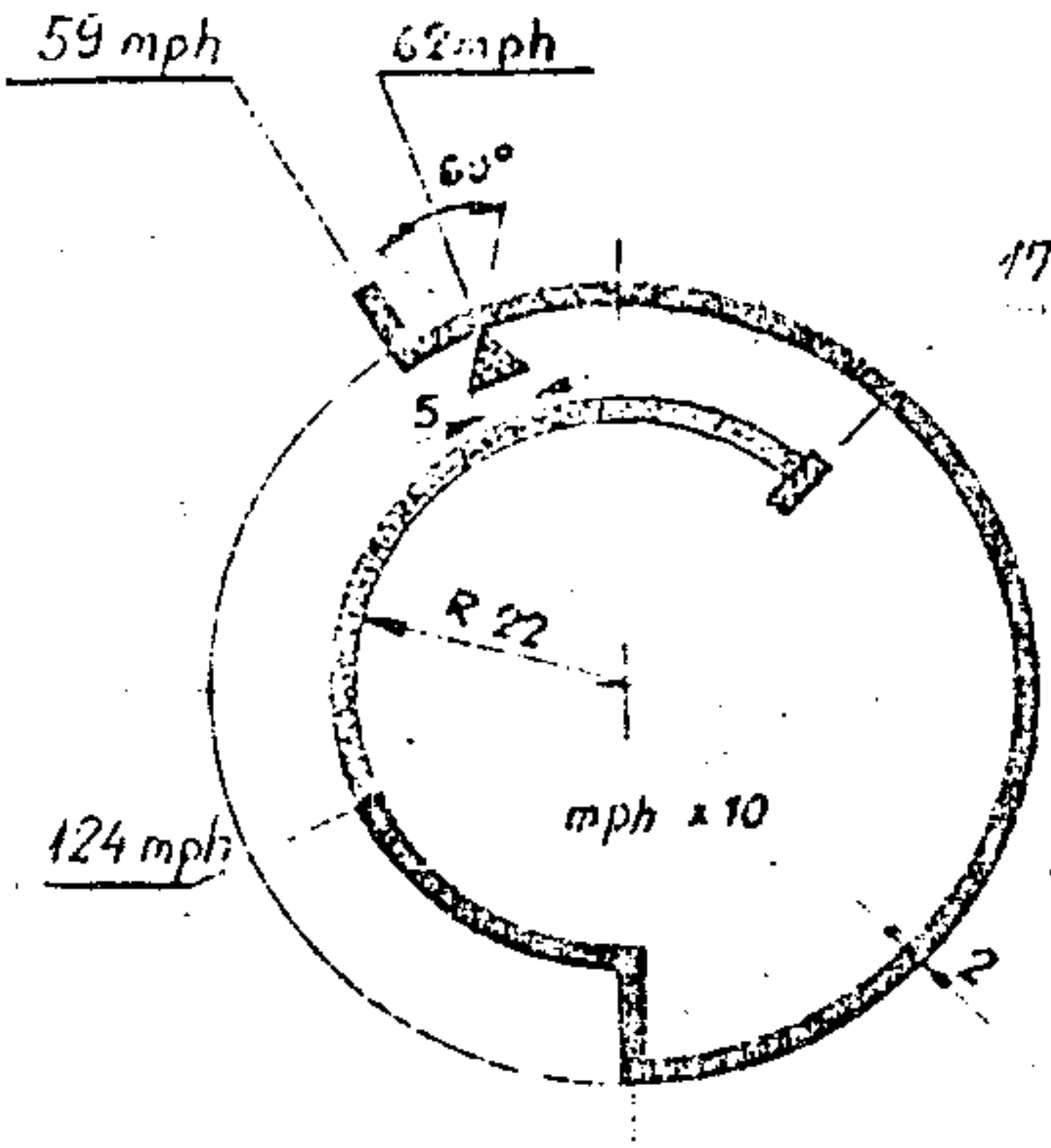

1
2
6
5
4
3

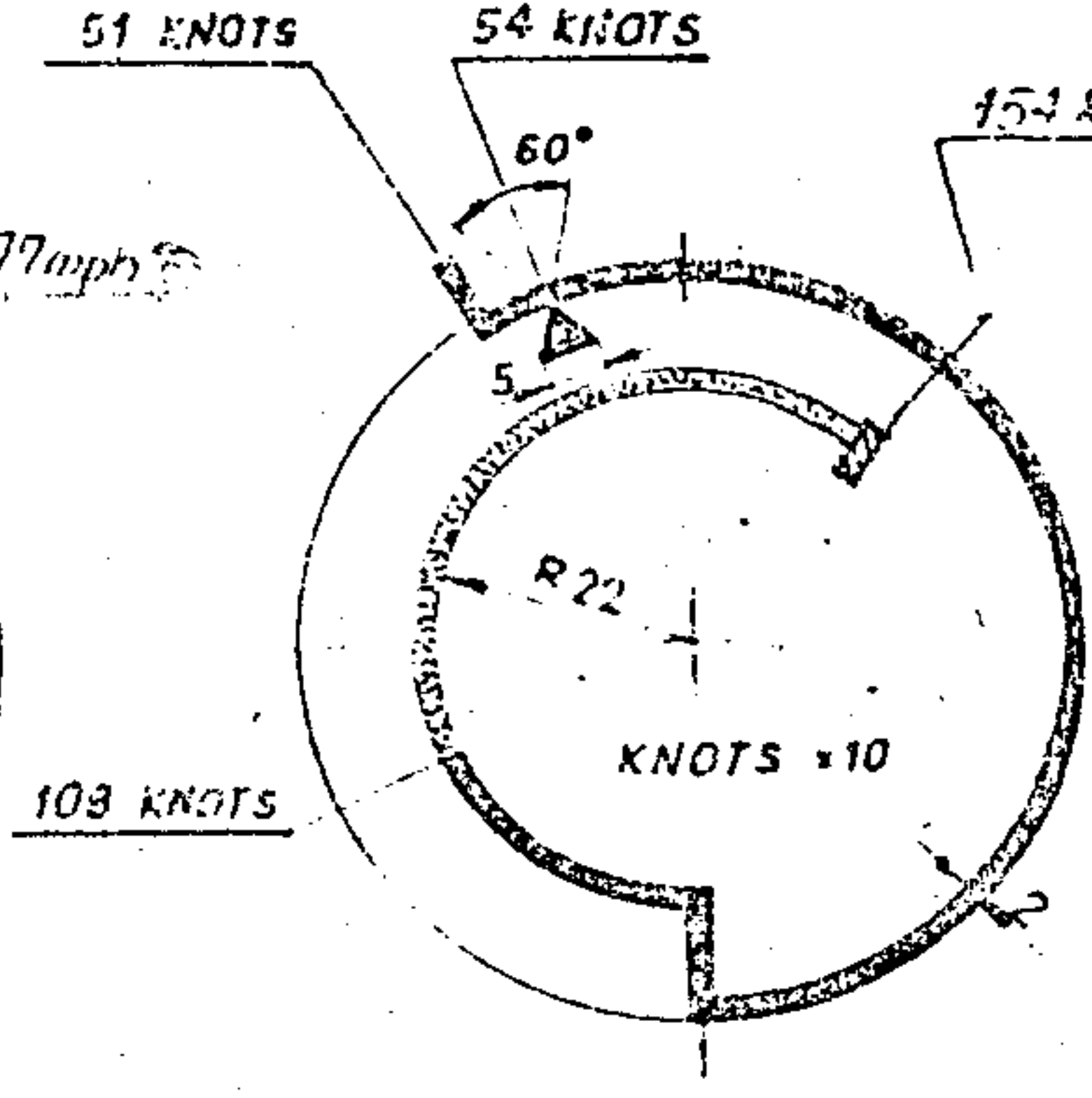
Fig. 8. Airspeed indicator color cod•



PR-400S

	Color
	red
	yellow
	green


59 mph
62 mph
60°
177 mph
5
R 22
mph x 10
124 mph
2


51 KNOTS
54 KNOTS
60°
5
R 22
KNOTS x 10
103 KNOTS
2