Original

WYTWÓRNIA SPRZĘTU KOMUNIKACYJNEGO
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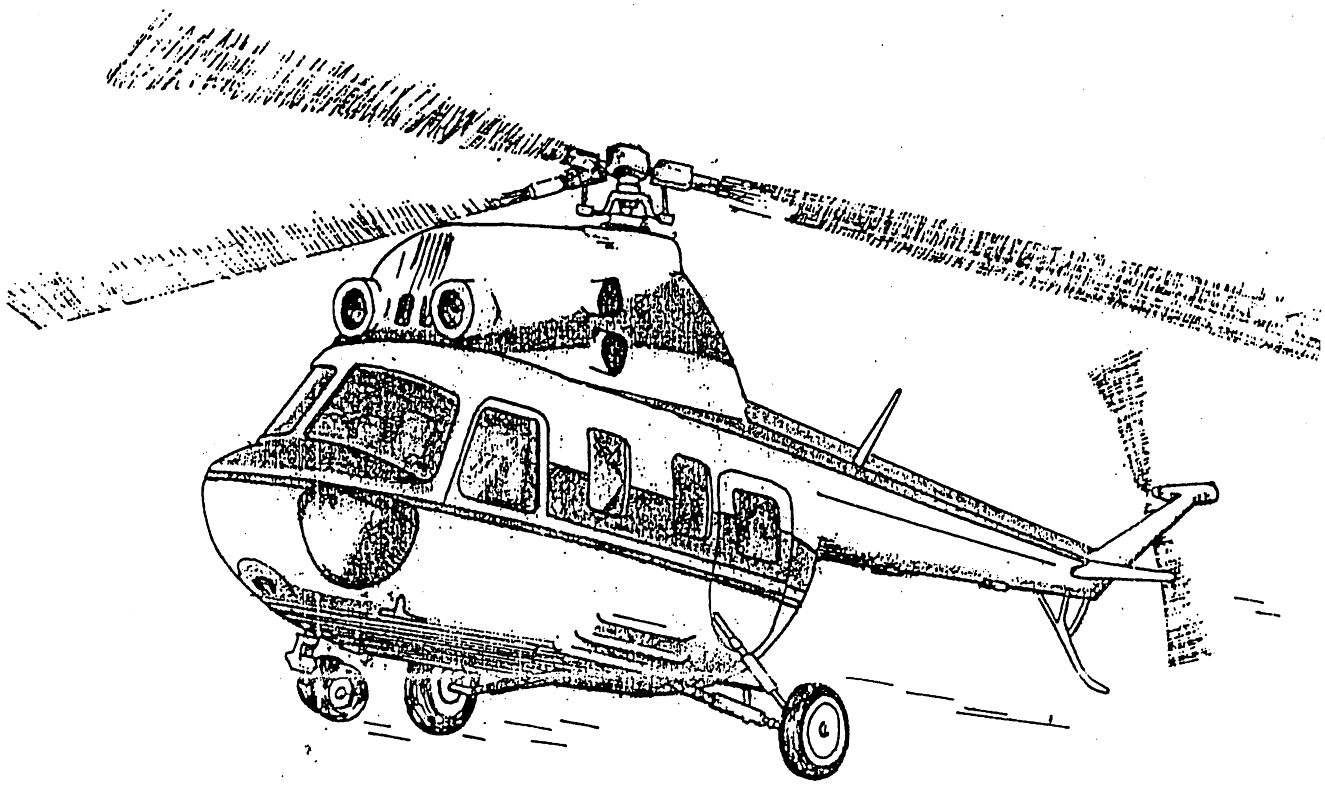

HELICOPTER Mi-2

MAINTENANCE MANUAL

It is in congruence with the Polish version this Manual approved by the Civil Aviation Authority in Warsaw 7.04.1972

Doc.No 50.211.083/A

Swidnik 1978

TABLE OF CHANGES

The place where the next has been changed is marked by a vertical line on the page margin.

Item	Page	Notes		Date	Signature
1.	31; 44	Revision	On the basis of bulletin 14/Mi-2/78	29.09.78	Dylant
2.	307	pages which have changed	On the basis of bulletin 19/Mi-2/78	10.12.78	Dylant
3.	1÷22; 43÷52; 55; 56; 59÷88; 91; 92; 95; 96; 109; 110; 123÷126; 167; 168 171÷174; 191÷194; 207; 208; 211÷216; 219÷222; 225; 226; 281; 282; 307÷310; 313; 314; 315÷326; 353; 354.	pages which have changed	On the basis of bulletin 2/Mi-2/79	20.12.79	Dylant
	226a/226b 314a/314b	pages which have been added			
	22÷28	pages which have been cancelled			
4.	83; 84; 359; 360	Pages which have changed	On the basis of bulletin 4/Mi-2/80	03.03.82	[illegible]
5.	54, 55, 56, 57, 60, 61 62, 85, 86, 89, 182, 235, 238 316, 317, 319, 353/354, 361.	Pages which have changed	On the basis of bulletin 4/Mi-2/82	01.10.82	[illegible]
	182a, 182b.	Pages which have been added			

Item	Page	Notes	Reference	Date, Signature
6.	359, 360, 361, 362, 363	pages which have changed	On the basis of bulletin 6/Mi-2/85	86.03.11
	364, 365	pages which have been added		
7.	79, 210, 211/212, 213, 216, 219, 220, 221	pages which have changed	On the basis of bulletin 3/Mi-2/89	89.01.20
	221a, 221b	pages which have been added		
8.	146, 147,	pages which have been cancelled.	On the basis of Revision Sheet 2D-3965	90.10.20
	1, 2, 3/4, 8÷13, 15, 16, 17, 20, 46, 51, 51c, 54÷63, 67÷71, 73, 74, 75, 77÷80, 81, 85, 86, 89, 91, 92, 94, 95/96, 101, 104, 105, 107, 109, 112, 113, 126, 133, 140, 141, 145, 148, 153÷155 158÷179, 180, 181, 182, 182a, 182b, 183, 188, 189, 194, 196, 198, 199, 201, 206, 207, 227, 289, 303/303a, 304, 305a, 316, 317, 321, 322, 324÷335, 336÷349, 353/354, 355÷358, 362, 363.	pages which have changed		
	80a, 80b, 179a, 179b, 180a, 180b, 181a, 181b, 183a. 183b. 188a, 188b, 202, 202a, 303b, 305b 307a÷307e, 335a/335b, 352a/352b, 352c/352d, 358a, 358b	pages which have been added.		
9	318, 323, 353/354	pages which have been added	On the basis of Revision Sheet 2D-3993	91.06.05
10	Name page, 54, 55, 56, 85÷89 126, 316, 317, 324, 329÷335, 335a/335b, 353/354.	pages which have changed	On the basis of Revision Sheet 2D-3997 (Bulletin 1/Mi-2/91)	91.06.14
	55a, 56a, 63a, 63b	pages which have been added		
	127, 128	pages which have been cancelled		

CONTENTS

Item	Page	Notes	Reference	Date Signature
11.	55a, 56, 56a	pages which have been changed	On the basis of 2D-4044 Revision Sheet	1992.06.06
	55b, 55c, 56 b/c	pages which have been cancelled		
12.	1, 81, 82, 83, 84	pages which have been changed	On the basis of 2D-4067 Revision Sheet (Bulletins: 2/Mi-2/85, 2/Mi-2/92).	1992.11.12
	82a, 82b, 82c, 82d 83a$_1$ + 83a$_{42}$	pages which have been added		
13.	83a7, 324, 353/354, 359, 360	pages which have been changed	On the basis of 2D-4103 Revision Sheet (Bulletin: 2/Mi-2/94).	1994.03.14
14.	83a8 / 83a9	pages which have been changed	On the basis of 2D-4123 Revision Sheet (Bulletin: 6/Mi-2/94).	1994.12.15

1. Running Maintenance of Helicopter

1.1. Preliminary Preparation

Preliminary preparation is the elementary preparation before a flight. Preliminary preparation should be completed on the day of the preparation of helicopter for every one or two flying days. It depends on the experience of the service crew of helicopter. When there are some long out-of - operation periods preliminary preparation should be done at least once a week. Preliminary preparation consists, among the others, of post-flight inspection which is the primary part of preparation.

1.1.1. Preliminary Actions

1. Visual inspection of helicopter
2. Prepare necessary tools and equipment
3. Check the grounding of helicopter
4. Remove lines anchoring the blades of the main rotor as well as all the canvas covers.
5. Remove plugs from intake ducts aud outlet pipes of the engines.
6. Open fairings of the engines and the main rotor gearbox.
7. Clean the skin of helicopter removing dust, soot, snow,ice.
8. Check the spy - holes for lubrication of engines and helicopter.
9. Be sure there are no useless objects in the neighbourhood of helicopter.
10. Open the pilot's cockpit and be sure whether :
    - current taking installations are switched off.
    - fire - plugs are turned off.

1.1.2. Post-flight Inspection

Carry out post-flight inspection according to the inspection route diagram / fig. 1.1./.

Fig. 1.1.

Post-flight inspection sequence diagram

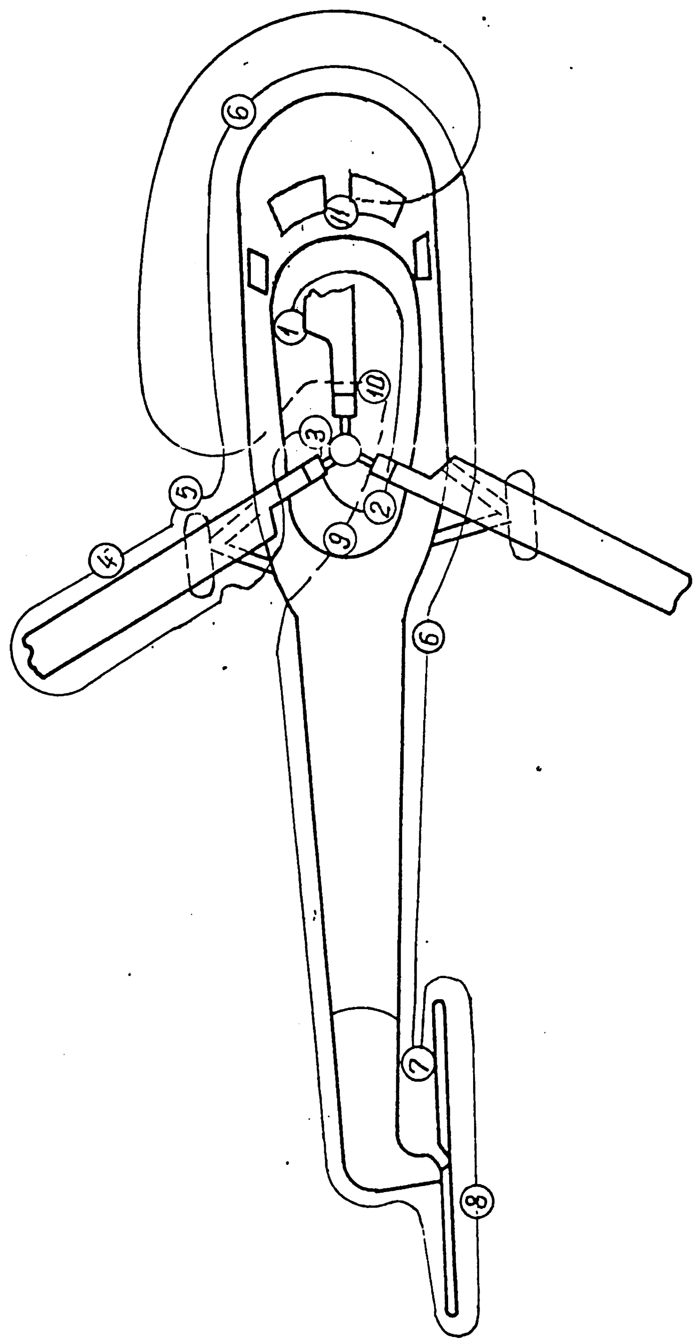

Fig. 1.1.

Engine Sections (1)

1. Inspect the engine cowlings for dents, cracks as well as for oil and fuel leaks. Check the locks condition and cowlings fastening on the fuselage.
2. Check the condition of the intake duct and the cowlings of the fan. Check for dents, cracks and rubber ring deformations.
3. Inspect the main rotor shaft, check needle bearings protection.
4. Check the condition of oil pipe connections-make sure they fixed properly and oil-tight.
5. Check the condition of engine oil tanks, make sure they are oil-tight.
6. Check the condition of the coolers of the engines and main gearbox, make sure they are oil-tight.
7. Inspect airventing pipes of the fuel and oil systems. Make sure that they are clean.
8. Inspect the engine controls and make sure that they are in proper condition.
9. After completing the procedure as listed above, place covers on to the intake ducts and plug the exhaust pipes of the engines.

NOTE: 1. Do not check intake duct condition and do not install ducts covers after inspections of the helicopter eqipped with air intake dust separators. (See para 2 and 9).

2. Check condition and attachments of air intake dust separators when inspecting oil tanks condition.

Main Gearbox Compartment (2)

1. Check the condition of main gearbox cowlings and make sure they are oil-tight. Check the conditions of the locks.
2. Inspect AK-50P-10 air compressor and the condition of air system. Inspect the attachment points of the compressor and air system. Check whether all connections are secured properly.
3. Check GB-2 hydraulic unit and pipes of the hydraulic system. Make sure that they are properly fixed and that there are no oil leakages.
4. Check the hydraulic boosters. Dust stems of boosters which are not secured with covers. Make sure that they are properly fixed, that their safeguards are not weakened and that there are no oil leakages.

5. Inspect main gearbox mounting and helicopter joints - make sure that the safeguards are not weakened.

6. Check cables , rollers, pull rods and rocker-arms controlling helicopter and main rotor blade (in accesible places) - make sure there are neither damages nor weekened safeguards. Check the condition of cables in the neighbourhood of rollers which control tail rotor and stabilizer. Make sure there are no abrasions and breaks of metal cords.

Main Rotor (3)

1. Inspect main rotor hub and swashplate - make sure there are neither damages nor oil leakages from rotor hub joints.

   If leaks are delected, perform the following:

   a/ Check oil level in the leakin hinges of main rotor hub. In case of overfilling, bring oil level to condition given in the Manual,

   b/ If, in spite of correct oil level, a minor oil leak is detected, that is, if the oil level decreases by the following value during 1 hour of flight and thus:

   - for the flapping and feathering hinge - 5 mm,
   - for the drag hinge - 10 mm.

   It is permissible to operate the hub the next periodical inspection, though it is necessary, before each flight, to check the oil level and replenish the oil in the leaking hinge to the level given in the helicopter maintenance manual.
   In the case the detected leaks from the hub hinges exceed the a/m values, it is necessary to perform replacement of hub sealing.

2. Check whether there are no oil leakages from the dask-pot dampers and compensation system.

3. Check whether all nuts, bolts and connections of the hub and swashplate and secured properly.

4. Check the condition of MR hinges stops and make sure if there no squeezes.

5. Checkeyes of adjustable joints in places where MR blades are fixed with bolts.

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Main Rotor Blades (4)

1. Inspect MR blades to check for apparent defects of enamel coating (or chips, bubbles, delaminations ect) as well as for mechanical defects of antiicing skin and rubber parts.

   Particular attention should be paid in winter when inspecting MR blades after the covers removal.
2. Check the condition of self - adhesive tape protecting the leading edge ferrule for apparent bubbles and points of tape deglutination.
3. Check air pressure in the blade spar by the cap position in the signalling device housing. The red cap should be invisible (partially nor completely) from behind white plexiglass strip located on signalling device cap.

   In case of red cap appearance in observation area, suspend the helicopter flights and check the blade spar defects signalling system aac. to Subchapter 6.6.6. "Blade Spar Defect Signalling System Operation".
4. Check visually for mechanikal defects, cracks or scratches on the MR blade spar in roots area (in visible area) and on the signalling device cap.
5. Check visually the first section fairing. For the blades with fairing not coated with sealing compound check for cracks in spar connection area. For the blades coated with sealing compound on the fairings, check the sealing compound on the fairings for cracks or defects.
6. Inspect visually sealling compound condition between individual sections.
7. Check the condition of the blade balance weights for dents and other defects.

WARNING

MAIN ROTOR BLADES WITH DEFECTS EXCEEDING ALLOWABLE LIMITS SHOULD BE PUT OUT OF SERVICE AND REPAIRED.

Landing Gear (5)

1. Check the condition of the landing gear and the fuselage-to- - landing gear joints. Check the stems of shock absorbers om nose and main landing gear for oil leaks. Inspect sight-holes.

2. Check shock absorber charging due to cambering, (see Item 3.2.3 Subsection 1).

3. Inspect the wheels and hubs of nose and main landing gear. Make sure there are no dents and cracks on hubs as well as deep cuts (reaching the type cord) on the tyres.

4. Check the wheels pressure.

5. Check if the wheels fixing are secured properly.

6. Check the condition of compressed air supplying pipes on the nose landing gear wheel brakes.

7. Check whether the landing gear brakes are airtight.

Fuselage and Rear Fuselage (6)

1. Check the condition of outer fuselage facing and inspect for cracks, dents, deformations, and defected riveted joints. Inspect the sight-holes and their locks. Check for oil leaks.

2. Inspect the entrance door for damages. Check the condition of the door lock and functioning of the cockpit door lock interlocking.

3. Check auxiliary tanks, make sure there are no damages and fuel leaks from the tanks as well on pipe connection. Check the fuel level in the tanks.

4. Drain condensate from the tank.

5. Check the tail rotor fixing for cracks, deformations and corrosion.

6. Check the bearing protection of the universal joints of TR shaft.

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7. Inspect tail rotor and stabilizer steering rollers and cables. Check the condition of steering cables near rollers in the neighbourhood of the intermediate tail rotor gearbox - make sure there are no abrasions and breaks of metal cords.

8. Inspect the tail support and its fastening joints. Make sure that there is no damage. Check the condition of the balance weight fastening / in a helicopter with dual control only/.

9. Inspect the stabilizer and fastening joints. Make sure there are no mechanical damages on the stabilizer skin.

Tail Boom /7/

1. Inspect visually the tail boom. Make sure there are no cracks, dents, deformation, damages of the riveted joints or any signs of oil leakages.

2. Make sure there are no oil leakages from the intermediate tail rotor gearbox as tail rotor gearbox.

3. Inspect the needle-bearing protection of the Cardan joints of the tail rotor drive shaft.

4. Inspect the steering cables of the tail rotor.

Tail Rotor /8/

1. Inspect the tail rotor, make sure there are neither mechanical defects or grease leaks on the tail rotor hub hinges.

2. Check whether the blades move smoothly in the hub hinges and make sure that there are no excessive plays.

3. Check whether all joints are properly secured

4. Check the hub surface in the place of blade fixing by moving in the plane of rotation.

5.Inspect the spar root eyes paying close attention to the shot-peened surfaces condition.

6.Inspect the rear lomgeron for defects and cants. Pay close attention to the area within 500 mm from fixing bolts axes.

7.Inspect the facing at the blade root and the coating in the facing area.

8.Inspect the fixing of the blade tip fairing-put the blade out of service in case of the rivets loosening.

9.Check the blade on the leading edge side(in antiicing system area) for scratches and dents on the leading edge, for ferrule edge detachments,ferrule cracks(on ferrule layers),local bulges and deglutinations of the rubber, bulges and detachments of heating strips(in strip-skin connection area),as well as deglutinations and cracks on the face of rubber protecting the blade roots.

In case of deglutinations and cracks on the rubber face pay particular attention to heating strip connection appearance.

Inspect carefully propagation of glue-bonded connections local defect found at previous inspections.

10.Inspect the blade area out of antiicing system for cracks and mechanical defects.

11.Check the condition of lacquer coating paying close attention to defected areas.Defected blades with defects exceeding allowable limits should be put out of service and repaired.Defects should be repaired according to item 6.5.4. "TR Blades Maintenance".

Cargo(passanger) Cabin (9)

1.Check the windows glasses in the cabin.

2.Check for presence airborne fire extinguisher,check its condition and attachment.

3.Check if the cabin is clean.

4.Drain the filter condenstate -air system sedimentation tank,

Cabin Equipment (10)

1.Inspect the cabin equipment.Checki if it is clean and attached properly.

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Pilot´s cockpit /11/

1. Check the emergency jettisonian lever of the left and right door.
2. Inspect the cockpit glazing
3. Make sure about the presence and work position of the left door pass check.
4. Check the operation of the blocking of the passenger cabin door
5. Check pressure in the air installation with the pressure indicator
6. Check the completness of the pilot´s cockpit equipment. Check the fastening of the pilot´s seat. Inspect the seat belt and the mechanism for changing the position of the pilot´s seat.
7. Check the operation of the control systems: longitudinal, lateral, driving, collective pitch.
8. Check the main fuel tank with the fuel quantity indicator.

1.2. Pre-flight Procedure

Preflight procedure is performed to check the helicopter condition,power plant and equipment to state ready-to-flight-condition.

NOTE: The procedures mentioned in para 1.21. and 1.2.2. not to be carried out if the post-flight procedure was already executed this flight day.

1.2.1. Preliminary procedures

1. Remove the covers from the helicopter.
2. Perform visual inspection of the helicopter.
3. Remove the plugs and covers from intake dust and outlet pipes.
4. Openthe main gearbox and engines cowlings.
5. Install flight batteries and connect them to the electric system(if they were removed from the helicopter).
6. Check the helicopter grounding.
7. Check the fuel level and compressed air system pressure.
8. Check if all locks and covers are installed.

1.2.2. Pre-flight inspection

Engines Compartments(1)

1. Inspect the engines cowlings- checking them for close adherence to the fuselage,for cracks and dents.
2. Check condition of fuel and oil pipes connections.of the engines.Check the protections of joints.
3. Check the condition of oil coolers of main gearbox and engines and inspect for oil leaks.

Main Gearbox Compartment (2)

1. Inspect condition of main gearbox cowlings checking them for adherence,cracks and dents.
2. Check hydraulic system tightness and the pipes fixing.
3. Check extinguishing system bottles pressure,which should be not less than allowable value for given temperature(See para 6.9.3).

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Main Rotor (3)

1. Inspect the main rotor hub and swashplate and check their components for defects.
2. Check the protections of all bolts nuts connecting the MR hub and swashplate.
3. Remove air-lock from hydraulic shock-absorbers,

MR Blades (4)

1. Inspect the MR blades for apparent defects of lacquer coa -ting(chips,bubbles,scalings ect.)and for mechanical de- fects of the antiicing system skin and its rubber parts. Particular attention should be paid when inspecting the blades after covers removal.
2. Check the condition of self-adhesive tape protecting the ferrules of the leading edge for apparent bubbles or de- glutination points.
3. Check the blade spar for air pressure by position of the red cap in signalling device housing.The red cap should not be visible(partially or completely) from behind white plexiglass strip on the signalling device cap.In case of red cap appearance in visible area,the helicopter flights should be suspended .Signalling device should be checked acc.to Item 6.6.6."Blade Spar crack indicator Operation".

Landing Gear(5)

1. Inspect the shock absorbers stems of the front and main landing gear as well as attachment points on the fuselage Check for oil leaks on the stems and for proper charging of the wheels and shock-absorbers.

Fuselage and Rear Part of Fuselage (6)

1. Inspect the skin and check for cracks, dents and deformations, riveted joints defects as well as for fuel and oil leaks traces.

2. Check entrance door for defects and proper closing.

3. Check fire extinguishing system bottles pressure, which should not be less than value allowable for specified temperature.
(See Item 6.9.3)

Tail Boom (7)

1. Check the condition of tail boom skin.
2. Check intermediate and tail gearboxes for oil leaks.

Tail Rotor (8)

1. Check TR hub hinges for leaks.
2. Check TR hinges for clearances and jamming.
3. Check the protection of all TR hub connections.
4. Inspect the blades for dents, cracks or bulges.
Check if the antiicing system sections are properly bonded to the skin and inspect the links connections.

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1.2.3. Testing engines, systems and equipment.

NOTES:

1. If the time from the moment of starting the engine till the moment of final stopping was more than two hours, start the engine from cold.
   In case the engines are started by means of airborne batteries, this recommendation is not obligatory for the first engine being started.

2. It is allowed to start the engine by means of a ground electric supplies five times, the interval between successive starts being not less than three minutes.

3. It is allowed to start the engine by means of the 12SAM-28 airborne batteries three times, the interval between successive starts being not less than three minutes.

4. After five succesive starts, cool the starter - generator down to ambient temperature, and allow the ignition unit to cool for 30 minutes.

5. It is prohibited to start the engine in the event of any failure of the engine operation control instruments, as well as in case the batteries are undercharged, i.e. when the battery voltage under 10 to 12A load is less than 24V, 10 to 12 A load is obtained after the PT-70C, PWD-6M, DW-3 and FR-100 or the PT-125, DW-3 and FR-100 have been set in on - position / or it is less than 16V at the completion of dummy starting.

6. In the course of operating the helicopter, always start the engines by means of a ground electric supply / as for as possible / APA- 2 /.
   The number of emergency bafteries is to be determined according to the intensity of the helicopter operation.

7. It is allowed to carry out four 45- starts when starting the engines by means of charged flight batteries type 12 SAM - 28 at initial temperature of electrolyte of 20 +2 °C and two starts at -5°C.

8. Shut the valve controlling compressed air supply to the air intake separator ejector when starting the engine equipped with air intake separators.

Pre - start Procedures

1. The engines of several helicopters should be started successively to avoid influence of the airstream generated by rotating main rotor of the helicopter which was started before.

2. It is allowed to start and test the engines on the ground at the following conditions:

   - front wind velocity not greater than 15 m/s,
   - right side wind not greater than 3 m/s.

3. When operating the helicopter in field conditions, avoid starting the engines on sandy and dusty ground. Spray the ground with water if necessary.

4. Connect APA-2 ground supply source or activate flight batteries.

5. Check for foreign objects in close proximity of the helicopter and check if there is fire fighting equipment.

6. Vent the fuel system after each engine replacement, fuel system dismantling (accessories and pipes replacements) or complete fuel draining.

   To vent fuel system proceed as follows:

   a/ Open the fire - fighting system valves,

b/ screw out the cap of the venting valve on the NR-40T unit and connect the special 63T19-705 device / from airborne engine tool set / to the venting valve.

When venting the fuel system and washing filters of the NR-40T units, do not spill fuel over the ceiling plate. When spilled, the fuel must be removed by means of rags immediately.

c/ Switch on the ECN-75 fuel pump to produce pressure unitil a continuous fuel stream / without air bulbes/ appears at the venting device outlet.

d/ close fire - fighting valves and switch of the ECN-75 pump.

e/ remove the venting device from the NR-40T unit, screw on the cap and secure it with wire.

7. In case the engines are tested with the helicopter in captive flight, check the reliability of fastening the anchoring cables to the helicopter and the trestle eyes

NOTE: the pre-flight testing of engines, systems and equipment / except captive flight / is carried out by a pilot.

8. Take place in the cabin. Fasten the safety belts.

9. Check the position of all knobs and switches installed in the cabin and the operating position of the R.H. control stick / helicopters with dual controls /.

10. Release breakes of the helicopter rotor lowering the brake lever home.

11. Set in on - position all fused out - outs /AZS/ for starting the engines which control the following circuits:

- engine and main transmission oil systems
- hydraulic system
- fire protection system
- fuel pumps
- starting system
- longitudinal and lateral control trimming tabs
- PO-250 converter

/ continued on page 29 /.

12. Set in "WŁACZONO" /"ON"/ position the fire-protection system switch installed on the upper control desk.

13. Make sure that the dynamo switch is set in "WŁACZONO"/"ON"/ position and the ground-and-airborne electric supply switch is set either in "ZASILANIE LOTNISKOWE" /"GROUND ELECTRIC SUPPLY/ position /when the ground electric supply is used/ or in "AKUMULATOR" /"BATTERY"/ position /when the airborne batteries are used/, as well as the "SIEC NA AKUMULATOR" /"MAINS TO BATTERY"/ switch is set in "WYŁACZONO" /"OFF"/ position.

14. Set the engine control levers in the following positions:

   a/ the pitch and power output control lever in extreme bottom position, the correction knob being turned fully to the left.

   b/ the engine separate control levers in mid-position /in middle cut-out of the sector/.

Starting engines by means of ground electric supply

1. Start No. 2 ECN-75 fuel pump in automatic cycle and, after the indicating lamp has lighted, start No.1ECN-75 fuel pump by means of a push-button.

2. Open fire-fighting valves of the port and starboard engines.

3. Give the command "From rotors and engines" and, after receiving the response "Here from rotors and engines", perform the following operations:

   a/ Set the operation mode switch in "ROZRUCH" /"START"/,

   b/ Set the "LEWY-PRAWY /"PORT-STARBOARD/ switch to the engine to be started.

c/ Press the push-button of the engine to be started for 2 to 3 seconds /at the same time the stop-watch/.
Set the cut-off valve control lever of the engine to be started in "OTWARTO" /"OPEN"/ position.

4. Interrupt the engine starting procedure under the following conditions:

a/ when the temperature of gases at the turbine inlet exceeds the admissible value,

b/ when the rotational speed remains steady /no increase of rotational speed /for above 3 seconds,

c/ when there is no oil pressure in the engine or main transmission,

d/ when there are leakages of fuel or oil, or there irregularities in operation of the engine and its units.
To interrupt the starting procedure, press a push-button on the upper control desk and, at the same time, close the cut-off valve of the engine being started.

The engine should reach the minimum speed range within not more than 30 seconds /from the moment of pressing the starting push-button/.

5. After the engine has reached the minimum speed range, start the other engine in the same manner.

6. After the latter engine has reached the minimum speed range, disconnect the ground electric supply.
To do this, set the ground-and-airborne electric supply switch in "AKUMULATOR" /"BATTERY"/ position and then disconnect the ground electric supply connector from the helicopter.

7. Make sure that the engines run smoothly within the minimum speed range and begin warning them up.

Table No. 1

Variable \ Range	Take-off			Rated			Cruising I			Cruising II			Minimum rotational speed		
	Engine series														
	I^x	II	III and IV	I^x	II	III and IV	I^x	II	III and IV	I^x	II	III and IV	I^x	II	III and IV
Helicopter rotor rotational speed, per cent		79 ± 1		82 ± 1			Not more than 84			Not more than 84			50 ± 10		
Turbo-compressor speed, per cent				Determine acc. to Fig. 1.3									57 ± 3		
Temperature of gases at compressor turbine inlet, °C	985	985	970	940	940	920	905	905	890	-			790		
Oil pressure in engine, kG/cm²	$2.5 \div 3.5$												Not less than 1.5		
Oil temperature in engine, °C	80 - 150 Recommended 120 ÷ 140												Not less than + 30		
Oil pressure in main transmission, kG/cm²	$2 \div 8$												Not less than 1.2		
Oil temperature in main transmission, °C	30 ÷ 90 Recommended 80												Not less than + 5		
Specific fuel consumption, g/HP.h	370^{+7}			396^{+8}			420^{+8}			450^{+9}			-		
Hourly fuel consumption kG/h	-			-			-			-			Not more than 55		
Engine continuous running time not more than, min	6			60			No. limitations			No. limitations			20		
Engine total running time during one overhaul life not more than, per cent	5			40			No. limitations			No. limitations			No. limitations		
Main transmission total operation time during one overhaul life not more, than, per cent	5			40			No. limitations			No. limitations			No. limitations		
Variables of power plant operation /H = 0, V = 0/															

x = Series I engine after overhaul

Fig. 1.3.

Diagram of functional dependence of turbo-compressor speed upon air temperature at engine inlet /H = 0, V = 0/

1. Limitation of fuel consumption
2. Take-off power range
3. Limitation of temperature of gases at turbine inlet
4. Rated power range
5. 0.9 rated power
6. 0.735 rated power

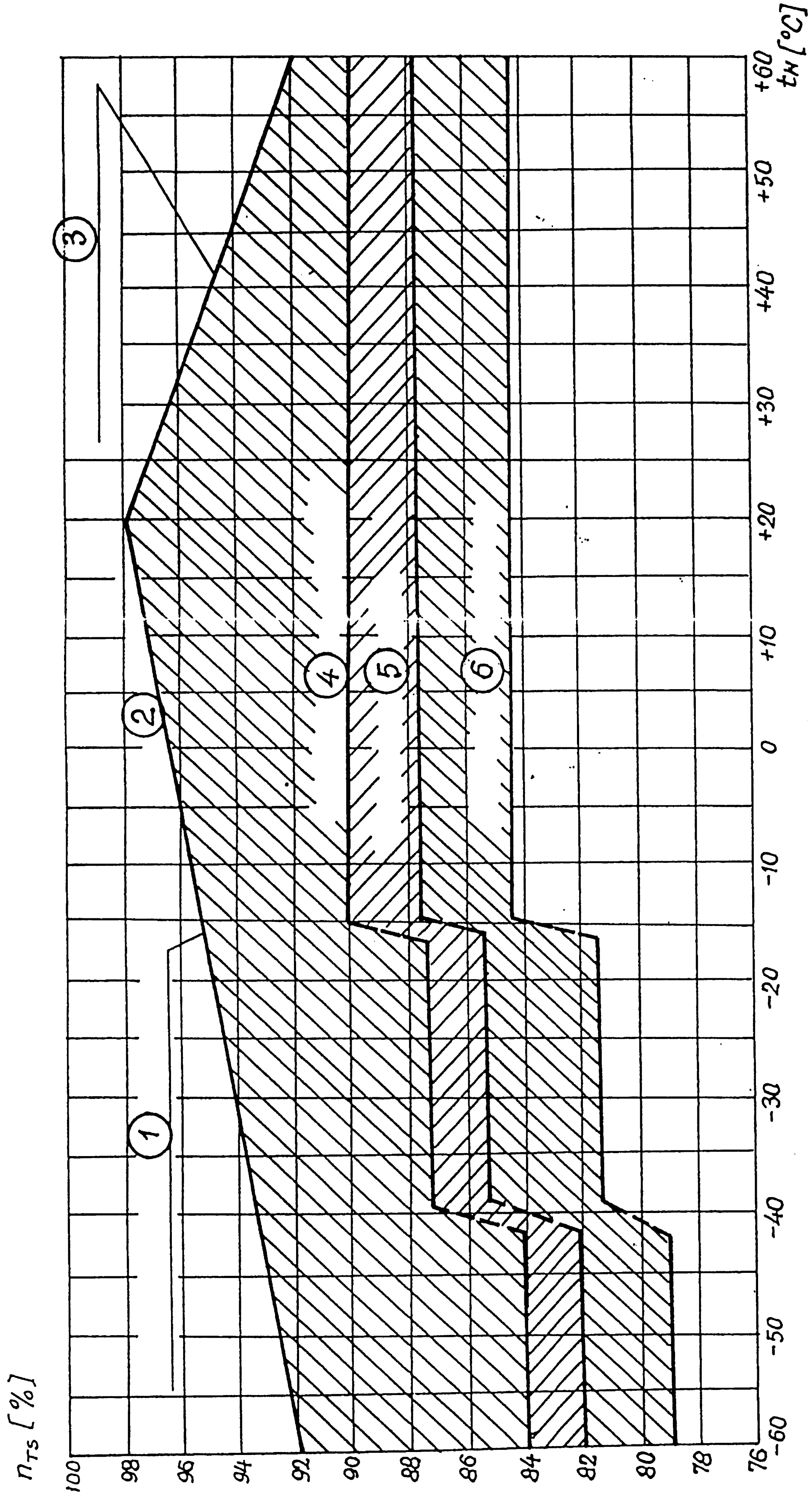
n_{TS} [%]
100
98
96
94
92
90
88
86
84
82
80
78
76
t_H [°C]
-60
-50
-40
-30
-20
-10
0
+10
+20
+30
+40
+50
+60
1
2
3
4
5
6

Fig. 1.3.

Fig. 1.4

Diagram of functional dependence of temperature of gases at turbine inlet upon air temperature at engine inlet

III, IV - engine series.

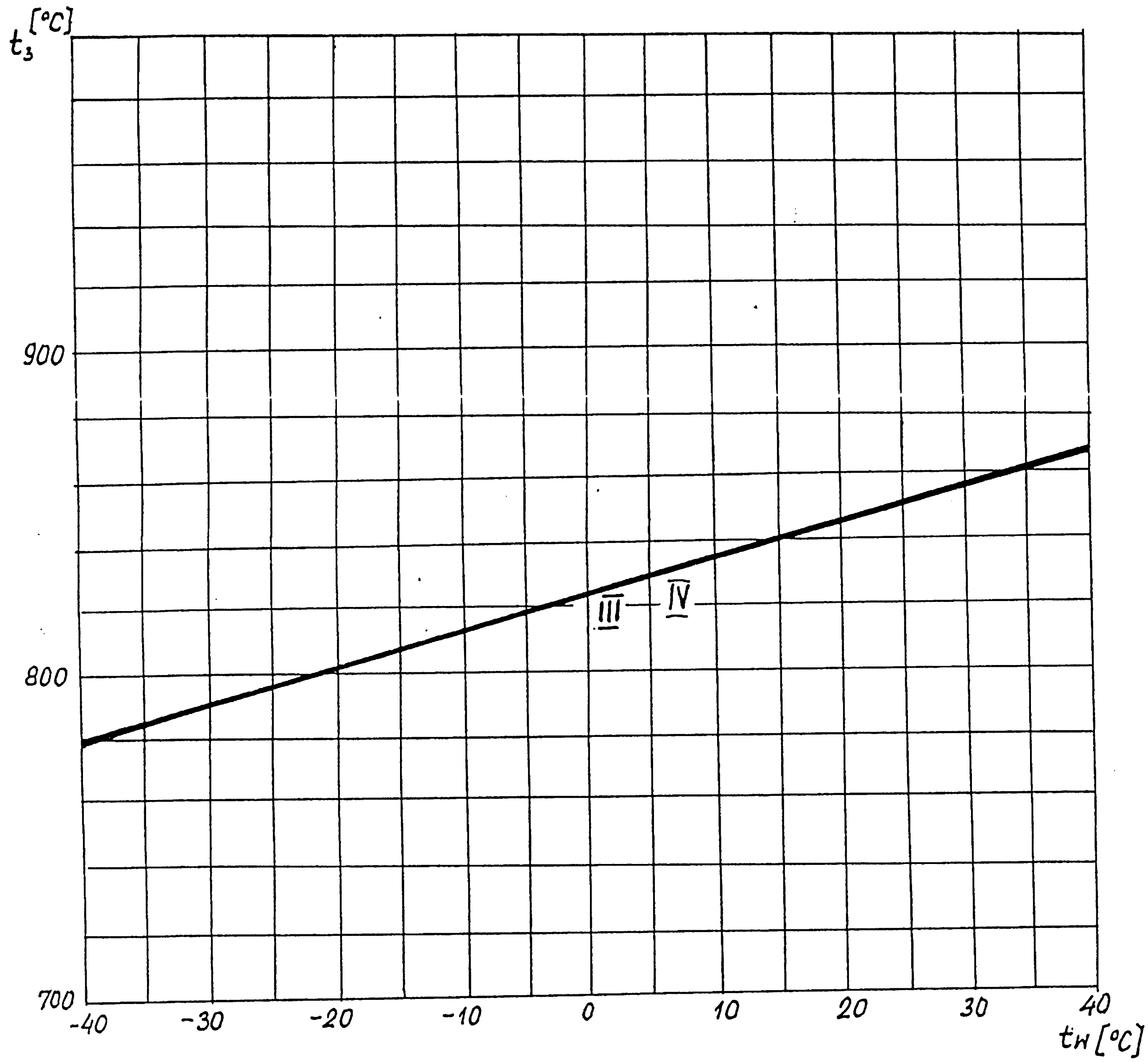

Fig. 1.4.

Fig. 1.5.

Functional dependence of allowable turbo-compressor speed on completion of dummy starting /with closed cut-off valve/ upon ambient temperature

(1) Zone of allowable rotational speed on completion of dummy starting by means of APA-2 ground electric supply.

(2) Minimum allowable rotational speed on completion of dummy starting by means of airborne batteried.

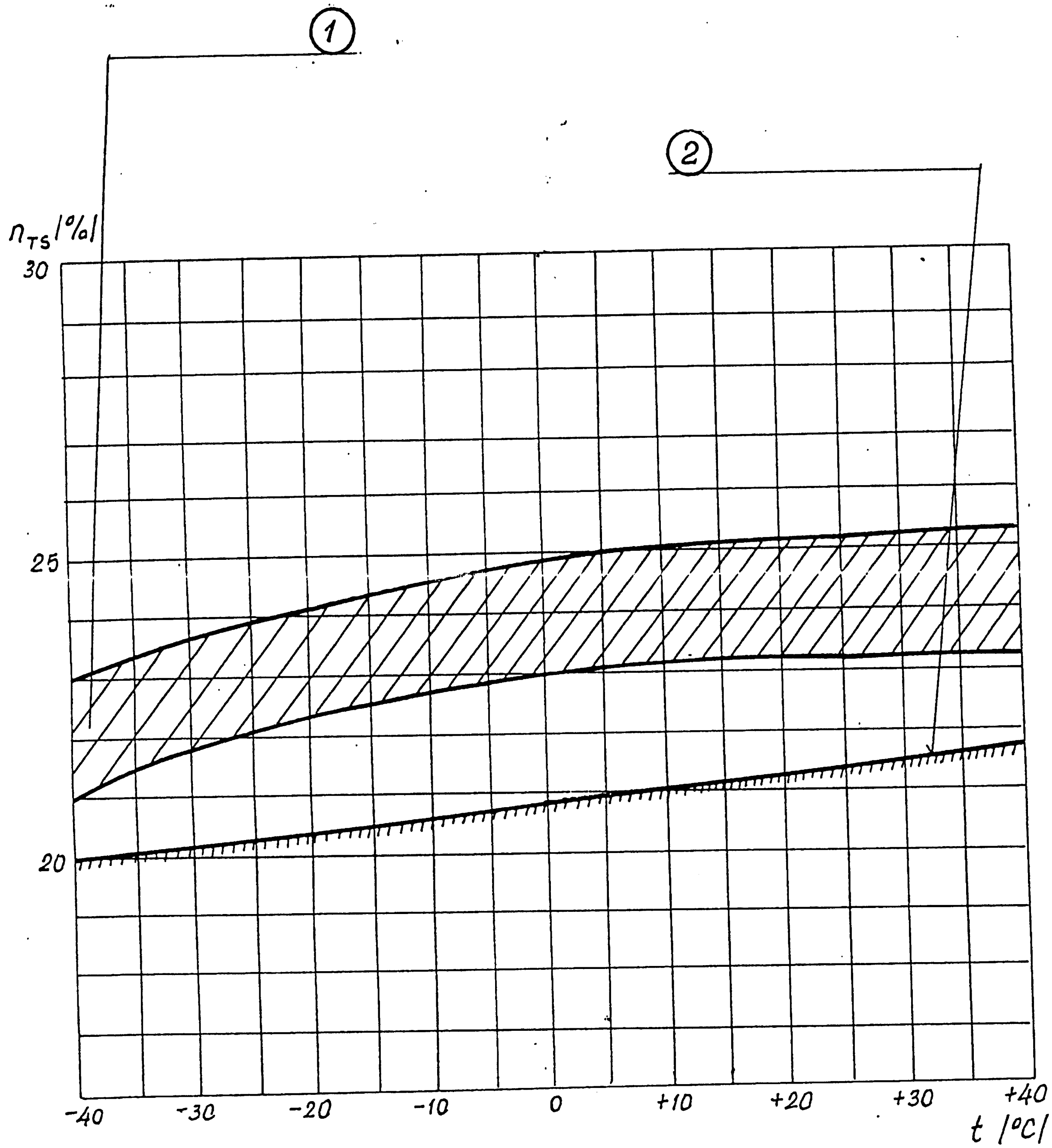

Fig. 1.5

Starting engines by means of airborne batteries

In case a ground electric supply is not available, start the first engine by means of the 12SAM-28 airborne batteries in 24 x 48 arrangement.

1. Start the engine in the following sequence:

   a/ Start the fuel pumps

   b/ Open fire-fighting valves of the engines

   c/ Give warning signal /see above/

   d/ Set the operation mode switch in "ROZRUCH" /"START"/ position.

   e/ Set the "LEWY-PRAWY /"PORT-STARBOARD"/ switch to the engine to be started.

   f/ Press the push-button of the engine to be started for 2 to 3 seconds /at the same time read the stop-watch/.

   g/ Set the cut-off valve control lever of the engine to be started in "OTWARTO" /"OPEN"/ position.

2. Interrupt the starting in case any irregularities are found in the course of starting procedure.
   The engine should reach the minimum speed range within not more than 40 seconds /from the moment of pressing the starting push-button/. The moment the engine has reached the minimum speed range, disconnect the starting system by pressing the interrupter button.

3. After the engine has reached the minimum speed range, start the second engine:

   a/ either using the airborne batteries, as in the case of starting the first engine, the dynamo switch of the operating engine being set in- off-position over the entire period of starting the second engine.

b/ or using the dynamo of the operating engine in 24 V arrangement /i.e. without switching over to 48 V/, the speed of the operating engine being set to 80 to 85 per cent by means of the separate control lever. When the engine to be started reaches a speed of 40 to 45 per cent within less than 15 seconds, switch off the starting system by pressing interrupter button. After the engine has reached the minimum speed range set in mid-position the separate control level of the engine having been started in the first place.

In the case of misstartings of the second engine an interval between successive startings should be not less than 3 minutes.

4. Make sure that the engines run smoothly within the minimum speed range and begin warming them up.

Dummy starting

1. The aim of dummy starting is:
   a/ to check the functioning of starting controls,
   b/ to carry out maintenance procedures.

2. Check the functioning of starting controls with closed cut-off valve /no fuel feed/. Carry out maintenance procedures with open cut-off valve and with L.T. cable disconnected from the SKND-11-1 unit /no H.T. supply to the DP-18U ignition plug/.

3. Prepare the engine for dummy starting in the same manner as in the case of true starting, all starting procedures being also identical.

4. The operating cycle of the PSG-14A start-up programming mechanism is identical in both cases of dummy starting and true starting, i.e. 30 seconds.

5. The turbo-compressor speed during dummy starting is 21 to 24 per cent.

Cold starting

1. The aim of cold starting is:

   a/ to evacuate fuel from the combustion chamber, left after misstarting,

   b/ to cool the engine.

2. During cold starting the cut-off valve should be closed, the operation mode switch set in "PRZEKRECANIE" /"TURNING"/ position and the "LEWY-PRAWY" /"PORT--STARBOARD"/ switch set to the engine to be started.

3. Start the engine by pressing the starting push-button and holding it in position for 2 to 3 seconds.

4. The operating cycle of the PSG-14A programming mechanism is 30 seconds. In this time high tension is supplied to the ignition plug and the solenoid valve feeding fuel to the started jet is energized.

Warming up and testing engines

A. Operating limitations

   a/ During the operation of both engines within transition ranges a temporary /up to 15 seconds/ decrease in the helicopter rotor speed down to 76 per cent is allowable.

   b/ During the operation of both engines within transition ranges a temporary /up to 30 seconds/ increase in the helicopter rotor speed up to 86 per cent is allowable.

   c/ In case the limiting conditions due to the temperature of gases occur within the take-off range, an increase in the helicopter rotor speed above 80 perccent is allowable.

d/ When the transmission is driven by one engine only, the total operation time, with reference to the overhaul life /within the take-off range/, must not exceed 10 per cent /i.e. 5 per cent for each engine/.

B. Warming up and testing

1. Worm up the engines and main transmission within the minimum speed range to obtain a temperature of oil up to + 30°C in the engines and a temperature of oil up to + 5°C in the main transmission, but for not less than 1 minute.
   As the main tranmission is warmed up an decrease in the oil pressure can be observed while as the helicopter rotor speed increases the oil pressure may increase up to the maximum value.

2. While warming up the engines, check the operation of the hydraulic system. With the system working, check the control stick for smoothness of movements.
   The control stick should move smoothly, i.e. without any jamming or jerks. Stop the system. The warning lamp "AWARIA INSTALACJI HYDRAULICZNEJ" /HYDRAULIC SYSTEM FAILURE"/ should light up.

   Reset the system on. The warning lamp should go off.
   While testing the engines, check the pressure of hydraulic fluid which should be 63 to 84 kG/cm^2, and with inoperative control elements, it should be 80 ± 4 kG/cm^2.

3/ Check the performance of both engines, and engine variables, within the following ranges:

a/ cruising range,

b/ rated range,

c/ take-off range.

Stabilize the rotational speed for 10 tp 15 seconds within each of the above-mentioned power ranges to check indications of the instruments used to control pressure and temperature of oil, temperature of gases at the turbine inlet and rotational speed of the compressor turbines and helicopter rotor.
The instrument readings should be conformable to the data given in Table 1.

Test the engine performance within the take-off range in case this power is to be used for take-off, but at intervals not longer than every 25 $\pm$ 5 flying hours,
When testing one engine only, close the cut-off valve of the other engine.
Testing the engine performance within the take-off range is allowed provided the helicopter has been anchored.

4/ At an engine speed of 82 $\pm$ 2 per cent, check the voltage and load of each dynamo successively. To do this, use a three--position switch.
The voltage should be 26.7 to 29.3 V.
On checking the voltage of dynamos, check their parallel running after all loads have been connected. The ammeter readings should be identical /i.e. 50 to 100 A/.

When required, adjust the parallel running of dynamos by means of resistors installed on the middle control desk.

x x x x x x x WARNING x x x x x x x x x x x x x

SHOULD GROUND RESONANCE OCCUR IN THE COURSE OF TESTING THE HELICOPTER, PROCEED AS FOLLOWS:

a/ IMMEDIATELY RE-SET THE PITCH AND POWER OUTPUT CONTROL LEVER IN EXTREME BOTTOM POSITION, DECREASE POWER USING CORRECTION AND STOP THE ENGINES;

b/ BRAKE THE HELICOPTER ROTOR BY STEPS UNTILL THE HELICOPTER VIBRATION IS DAMPED.

x x x x x x x x x x x x x x x x x x x x x x x x x x x

5/ In case icing is expected check the functioning of the helicopter de-icing system.

- Heating system of helicopter rotor blades and tail rotor blades. With minimum collective pitch and at a helicopter rotor speed not less than 78 per cent, switch on the totor blade heating system and mesure the mains alternating-current intensity by means of an ammeter installed on the upper control desk, With the switch in "1" and "2" position, the current intensity /at 208 V/ should be 56 to 64 A, with this switch in "3" position it should be 50 to 60 A and with the said switch in "SMIGŁO OGONOWE" /TAIL ROTOR"/ position it should be 14 to 18 A.

  In case the voltage is other than required /208 V/, regulate it using the WS-33 resistor.

- Heating system of cockpit port window pane. At a helicopter rotor speed not less than 70 per cent, switch on the glass pane heating system and, touching the pane with hand, make sure that it is heated.
  Switch the system off.

  Note: The window pane is heated when the ambient temperature is less than + 30° ± -2°C.

Stopping engines

1. Stabilize the engine minimum speed range by setting the pitch and power output control level in extreme bottom position and turning fully the correction knob to the left.
2. Set the trimming tabs in mid-position.
3. Cool the engines for 1 to 2 minutes.
   In case the ground is dusty, reduce the cooling time to 1 minute .
4. Stop the engines by setting the cut-off valve control lever in"STOP" position.
   While stopping the engines, listen to any abnormal sounds and make sure the turbo-compressors rotate smoothly.
   When required, measure the turbo-compressor impeller overrun time which should be not less than 25 seconds.
   The overrun time is counted from the moment the cut-off valve is closed within the minimum speed range till the moment the compressor impeller has stopped.

   On stopping both engines for a time longer than 10 minutes carry out cold starting of these engines within 2 minutes after they have been stopped.

   In case a ground electric supply is not available, it is recommended that, after both engines have been cooled at minimum speed, one engine be stopped and cold started by means of the dynamo of the operating engine /this engine should be brought up to a speed of 80 to 85 per cent/.

   The above procedure being completed, stop the other engine. Carry out cold starting of this engine by means of airborne batteries.

   After engines stoppi/ng /when equipped with separate oil inje/ctor of 3 rd bearing/ cool starting not allowed

5. The compressor impeller being stopped, close the fire-fighting valve in the fuel system and stop the ECN-75 fuel delivery pump.

x x x x x x x x x x x WARNING x x x x x x x x x x x x x
x IT IS PROHIBITED TO STOP THE ECN-75 PUMP BEFORE x
x BOTH FIRE-FIGHTING VALVES HAVE BEEN CLOSED x
x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x

6. On stoppihg both engines, do not brake the helicopter rotor immediately if this is not required. With rotating helicopter rotor, check the response of warning lamp in hydraulic system, which sould light-up after the pressure in this system has dropped down to 35 ± 8 kG/cm^2.
7. Set the helicopter rotor in such a position that no rotor blade will be over the rear fuselage or stabilizer.
8. On stopping the engines and before leaying the cabin, set in off-position all fused cut-outs /AZS s/ and switches, and disconnect loads. Make sure that the pitch and power output control lever is set in extreme bottom position and the helicopter rotor brake lever is in extreme top position.

1.2.3. Pre-flight inspection / after engine test /

1. Check the engines and pipes of the oil and fuel systems. Make sure that all pipe connections and units are leak-tight. Make sure that there are no leaks of fuel on the fuselage bottom skin.
2. Check the oil-to-oil boosters, pipes and GB-2 hydraulic unit. Make sure that pipe connections are not leaky. Wipe rods of the oil-to-oil bosters with dry flannel.
3. Check whether drain valves in the fuel and oil systems are properly secured.

1.3. Procedure Before the Next Flight

1.3.1. Starting inspection

Starting inspection should be performed to check the helicopter condition prior to takeoff, after the last flight and to check if the helicopter is ready to perform the next flight.

1. After the landing stop the engines, switch off the helicopter electrical system and check for:
   - fuel and oil leaks on the helicopter walls and engines cowlings,
   - apparent defects of the main rotor and tail rotor (when inspected from ground).
2. Check the landing gear condition.
3. Inspect auxiliary fuel tanks - check for fuel leaks.
4. Check oil and fuel level in the tanks. Determine if oil and fuel levels are sufficient for the next flight.
5. Inspect intermediate and tail gearboxes-check for oil leaks.
6. Inspect MR blades for apparent defects.
7. Check MR blade spar for air pressure by visual signalling device.
8. Check the self-adhesive tape protecting the leading edge ferrule for apparent bubbles or deglutination points.
9. Install all plugs and covers and check their closed positions.

1.4. Post-flight procedures

1. Set the helicopter on a stand and connect to ground.
2. Make sure that the batteries and loads hove been switched off.
3. Take the pilot's opinion on the helicopter performance in flight.
4. Remove dirt and dust. Remove soot from the helicopter surfaces using clean rags wetted with 3 to 5 per cent solution of soap or other washing agents, for instance, "IXI" / at a temperature not lower than + 5°C, or cleaning these surfaces with rags wetted with grade B-70 unleaded gasoline.
5. Check the amount of fuel and oil left in tanks after flight, calculate hourly consumption and, basing on the results of calculations, evaluate the in flight engine performance. If required, replenish the fuel and oil systems.
6. Drain condensate from the drain tank after every flying day as well as after every five startings the engines.

1.4.1. Check inspection

1. Check pressure in the fire-suppression cylinders using pressure gauges.
2. Check whether all covers, shields and access panels are closed.

3. Check the number of tools.
4. Fasten the helicopter rotor blades with cables and check whether the helicopter rotor is properly braked.
5. Remove all ground handling and servicing equipment from the stand.
6. Protect the helicopter with canvas covers and affix the lead seals.

1.5. Post - flight preparation of helicopter

In order to secure the airworthingess of helicopter carry out post - flight service at the end of each flying day.
It in the course of operation a long interval in flying is expected convas covers should be put on the helicopter.

1.5.1. Preliminary actions

Before carrying out the post - flight inspection you should do the following:

1. Take the pilot's remarks on any helicopter deteriorations in flight.
2. Put on the cover on the visual icing indicator / It is bult in on the left pilot's cockpit door.
3. Check the helicopter grounding.
4. Check the following in the pilot's cockpit :
   a/ the unloading mechanism is in its neutral position
   b/ the " pitch - power" lever situated in the extreme bottom position.
   c/ main rotor brake lever situated in the extreme top position
   d/ fire - flighting volves are closed / of the fire - fighting system /.
5. Replenish the helicopter with fuel, oil and compressed air
6. Open the engine and main transmission cowlings.

1.5.2. Post flight inspection

Post-flight inspection should be carried out according to the post-flight inspection sequence diagram /Fig.1.2./

Pilot's cockpit /1/

1. Check the completness of pilot's cockpit equipment
2. Check the protection of left and right emergency door droping.
3. Check the operation of the following controlling systems: longitudinal, lateral, pedal, collective pitch, seperated engines controlling as well as unloading mechanisms.

Baggage / passenger / cabin /2/

1. Inspect the cabin. Make sure it is clean

Undercarriage /3/

1. Make sure there are no oil leakages on the damper rods.
2. Check the condition of both nose and main undercarriage wheels. Make sure there are no dents and cracks on hubs as well as no punctures and deep wheel tyre nicks /as deep as the cord /.
3. Inspect the condition of compressed air pipes of the undercarriage wheels.

Front and middle part of fuselage /4/

1. Make sure there are no damages of the fuselage skin.
2. Make sure there are no fuel and oil leakages on the fuselage skin.
3. Make sure the door is fight when closed.

Engines Compartments (5)

1. Inspect the air venting pipes. Make sure that pipes are clean.
2. Inspect the main shafts for defects.

Main Transmission System Compartment (6)

1. Inspect GB-2 hydraulic unit and hydraulic system ducts Check for oil leaks.
2. Wipe the booster rods not protected with covers using a rag wetted with AMG-10 oil, then wipe them using a dry rag.

Main Rotor Hub and Swashplate (7)

1. Check MR hub hinges and hydraulic shock - absorbers for oil leaks.
2. Check theprotections of all nuts, screws, and connections of the hub and swashplate.

Main Rotor Blades (8)

1. Check MR blade spar for air pressure acc. to para 1.2.2. "Before Flight Check"-"Main Rotor Blades" item 3.
2. Inspect visually spar surfaces, blade sections and blade fixing ferrule in spar bolt connection area checking for scratches, dents and other mechanikal defects. Particular attantion should be paid to laquer coating defects.
3. Check for bulges and detachments on the blade sections skin and spar connection areas, on honey comb and spar connection areas, as well as antiicing system sections and spar connection areas. Check antiicing system protective rubber for defects and self - adhesive tape for air bubbles or deglutination points.

Fig. 1.2

Pre-flight inspection sequence diagram

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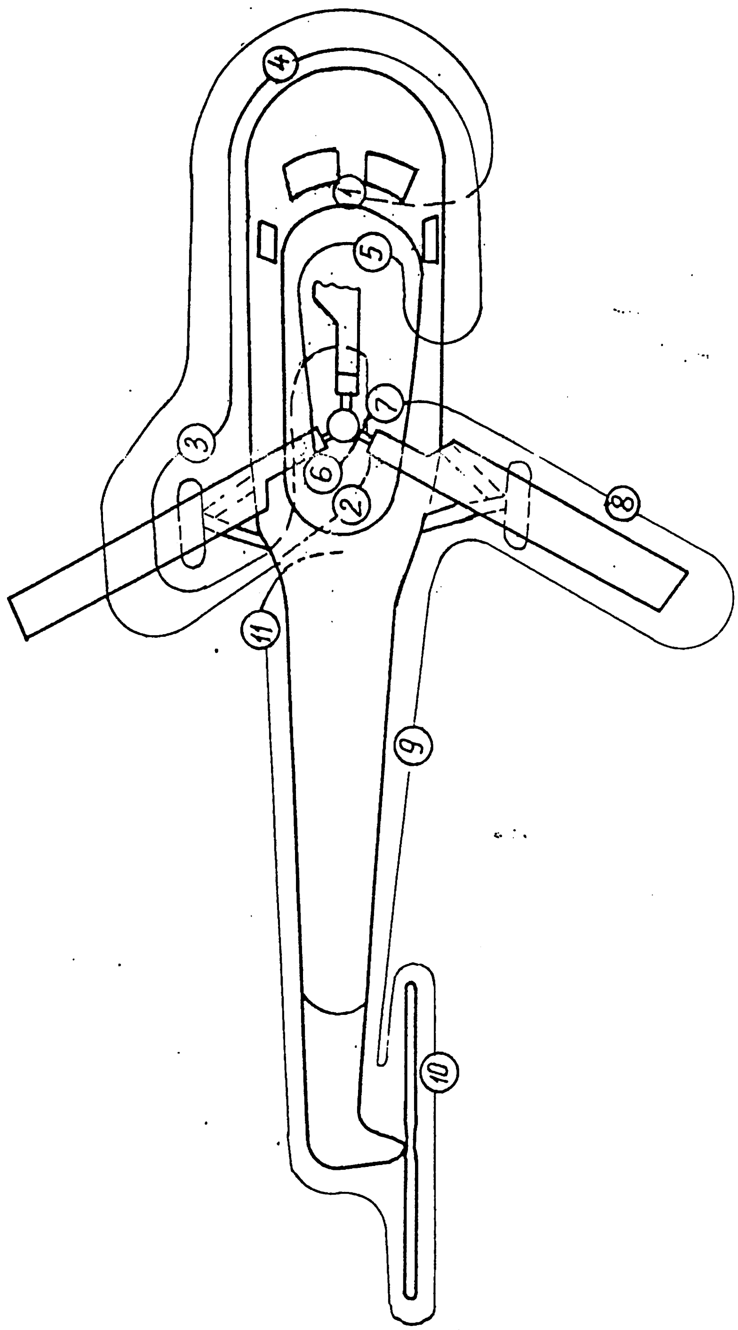

Fig. 1.2.

Rear Part of Fuselage and Tail Boom /9/

1. Inspect the skin of tail boom and rear part of fuselage. Make sure there are no damages.
2. Inspect the rear and end shaft fastening joints. Make sure there are no cracks and deformations.
3. Inspect the stabilizer fastening joints.
4. Check whether there are no oil leakages from the intermediate and rear transmissions.

Tail Rotor /10/

1. Check the fightness and operation of the tail rotor hub articulations
2. Check the security of all connections
3. Inspect the surface of the tail rotor blade spar and skin. Make sure there are no cracks, dents, scratches and laquer coat damages.
4. Make sure there are no bulges and delamination in the places skin is adhesive bonded to the spar and honeycomb filler as well as de-icer to the skin, and ferrule to rubber.

Equipment /11/

1. Check visually the condition of equipment and its fixing. Make sure there are no mechanical damages.

2.. FILLING HELICOPTER SYSTEMS

2.1. General Safety Rules

1. Before beginning to fill the fuel system, carry out the following preliminary procedures:
   - connect to ground both the helicopter and the filling equipment,
   - check whether there is a required fire-fighting equipment within reach of the helicopter.
2. In the course of filling the fuel system it is prohibited:
   - to change over the airborne batteries,
   - to connect and disconnect the ground electric supply units,
   - to work near the radio-communication and/or electric-power equipment.
3. It is prohibited to fill the fuel system with the engine running and in case a distance from other helicopters /or aircrafts/ with engines running is less than 25 m.
4. It is prohibited to fill the fuel system during thunder-storms.
5. General rules for handling grade B-3W oil:
   - When operating the oil filters and magnetic plugs, wear rubber gloves and protective goggles.
   - It is prohibited to mix grade B-3W oil with other mineral oils.
   - Use only vessels bearing the inscription "Olej B-3W" /"B-3W Oil"/ for filling and draining the system. In case other vessels are used, wash them every time with kerosene.

- When filling the system, clean helicopter elements polluted with grade B-3W oil using rags wetted with kerosene.
- When cleaning surfaces polluted with grade B-3W oil, wear rubber gloves and protective goggles.
- Should any part of the body be wetted with grade B-3W oil, wash it with warm suds immediately.

2.2. Table listing the helicopter system capacities and grades of oils and lubricants to be used

Item	System or assembly denomination	Total capacity /filling volume/ / liters/	Working medium Basic	Working medium Equivalent	Remarks on operation
1	2	3	4	5	6
1	Fuel system: - main tank - additional tanks	1076 /1076/ 600 /600/ 2x238 /476/	Grades of fuel, oil and lubricants to be used, engine operation procedures and procedures of working medium grade replacement- according to: "Operating and Servicing Instructions for Engine GTD-350"		
2	Engines oil system: - L.H. engine tank - R.H. engine tank - tubes and coolers	15 /12,5/ 15 /12,5/ 2x2 /4/			
3	Main gearbox oil system - main gearbox - pipes and cooler	- /10/ 2 /2/	Grades of fuel, oil and lubricants to be used, Main Drive operating procedures, and procedures of working medium grade replacement- according to : " Operating and Servicing Instructions for Main Drive WR-2"		
4	Intermediate and TR gearbox: - intermediate gearbox - TR gearbox	1,0 /0,4/ 1,55 /0,65/	1. Hypoid oil acc.to GOST 4003-58		- at positive temperatures and for momentary temperature reduction to minus 5°C
			2. Oil mixture: 2/3 hypoid + 1/3 AMG-10 oil by volume		- below temperatures of plus 5°C; - when starting at temperatures below minus 25°C heat up to reach warm crankcase.
				1. TS- gip	- hypoid oil equivalent; - mixture component acc. to Item 2 to be used instead of hypoid oil.
				2. Aeroshell Fluid 4	- mixture component acc. to Item 2 to be used instead of AMG- 10 oil
				3. Aeroshell Fluid 41	- mixture component acc. to Item 2 to be used instead of AMG- 10 oil
				4. Shell Aviation Oil S8350 5. Hipol 10F	- hypoid oil equivalent; - mixture /Item 2/ equivalent; - when starting below -10°C /for S8350/ and below -15°C /for Hipol 10F/ heat up the gearboxes to reach warm crankcase

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1	2	3	4	5	6
5	Hydraulic system: - internal space of hydraulic block	- /4,5 to 6/	1. AMG-10	1.Aeroshell Fluid 4 2.Aeroshell Fluid 41	
6	Pneumatic system: - air tank contained in landing gear framework		1. Compressed air pressure: 50+4 KG/cm2 /5+0,4 MPa/ acc. to pressure gauge readings /in the cockpit/		
7	Hydraulic shock-absorbers system: - hydraulic shock-absorber - compensating tank incl, pipes	- /2,04/ 3 x0,329/0,987/ - /1,059/	1. AMG - 10	1. Aeroshell Fluid 4 2. Aeroshell Fluid 41	
8	Shock- absorbers: - main landing gear leg - front landing gear - tail skid	- /1,885/ -/2x0,760/ -/0,295/ -/0,70/	1. AMG-10 2. Nitrogen: Pressures: 56±2kG/cm2 /5,5±0,2MPa/ 65± 2 kG/cm^2 /6,4 ±0,2 MPa/ 45± 2 kG/cm2 /4,4± 0,2MPa/	1. Aeroshell Fluid 4 2. Aeroshell Fluid 41	
9	Tyres: - main wheels - front wheels		1. Compressed air pressure: 4+ 0,5 kG/cm2 /0,39 + 0,05 MPa/ 3,5+0,5 kG/cm2 /0,34 +0,05 MPa/		

1	2	3	4	5	6
10	MR hub:				
	- horizontal hinge	- /3x0,15/	1. Hypoid oil acc.to GOST 4003- 53		- at temperatures greater than $0^{o}C$ and at momentary temperature drop to minus $5^{o}C$
	- vertical hinge	-/3x 0,15/	2. Oil mixture: 2/3 hypoid + 1/3 AMG-10 oil by volume		- below plus $5^{o}C$.
				1. TS-gip	- hypoid oil equivalent - mixture component described in Item 2 instead of hypoid oil
				2. Aeroshell Fluid 4	- mixture component described in Item 2 to be used instead of AMG- 10 oil
				3. Aeroshell Fluid 41	- mixture component described in Item 2 to be used instead of AMG- 10
				4. Shell Aviation Oil S8350	- hypoid oil equivalent - mixture component as described in Item 2
				5. Hipol 10F	
11	MR hub:				
	- axial hinge	- /3x0,35/	1. MS- 20		- at temperatures greater than - minus $10^{o}C$
				1. Elf Aviation Engine Oil 100	
				2. Elf Aviation Engine Oil AD100	
				3. AeroShell Oil 100	
				4. AeroShell Oil W100	

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1	2	3	4	5	6
			2. MS-14		- at temperature from minus 25°C to plus 10°C
				1. Elf Aviation Engine Oil 80 2. Elf Aviation Engine Oil AD80 3. AeroShell Oil 80 4. AeroShell Oil W80	- at temperature from minus 25°C to plus 20°C
			3. WNIINP-25		- below minus 25°C
12.	Main shafts and rear shaft		hypoid oil acc.to GOST 4003-53	1. TS-gip 2. Hipol 10F 3. Shell Aviation Oil S8350	
13.	Undercarriage wheels - bearings		1. ST(NK-50)	1. AeroShell Grease 5 2. AeroShell Grease 22A 3. AeroShell Grease 22 4. Mobilgrease 28	
14.	Fan - bearing		1. OKB-122-7	1. CIATIM-221 2. AeroShell Grease 6B 3. AeroShell Grease 15A 4. Aerogrease 33 5. Beacon P-290 6. Aviation General Purpose	
15.	Separable attachment points - joints		2. CIATIM-201	1. AeroShell Grease 6B 2. AeroShell Grease 4 3. Aerogrease 33 4. Beacon P-290 5. Aviation General Purpose 6. Aliten N	

1	2	3	4	5	6
16	AC generator, GO16 PCz3-RS		1. WNIINP-207	1.AeroShell Grease 15A 2.AeroShell Grease 22 3.Mobilgrease 23	

NOTES: 1. When replacing the following oils: hypoid oil acc. to GOST 4003-53; TS-gip; Hipol 10F; and the mixtures: hypoid oil with AMG-10 one into another in the flapping and dragging hinges of the main rotor do not flush the hinges with equivalent oil.
In the feathering hinges flushing is to be carried out when replacing MS-20, M-14, WNIINP oils into the equivalent oils (from column 5 of Table) or vice versa, when replacing the equivalent oils into MS-20, MS-14, WNIINP-25 oils.

2. It is prohibited to mix SS350 oil with hypoid gear oil or TS-gip /or with oil mixtures composed of a/m oil grades/ as well as with Hipol 10F.
3. When performing grease replacement, first remove /wash out/ old grease and replace by equivalent grease or by regreasing the assembly by means of equivalent grease.
The above actions are not to be carried out for greases which are mixed together, i.e.OKB-122-7 grease must not be mixed with CIATIM-221 grease and Aliten N grease with CIATIM-201 grease.
4. Grease replacement in the fan bearing should be conducted after the engines shut down directly, acc. to p.31 of Table No.2a, lubrication of the fuselage joints.
5. Grease replacement in bearings of GO16 PCz3-RS generator are to be conducted acc. to Maintenance Manual. Equipment. Enclosure No.13.
6. Oil grade replacement from one grade into another is given in subchapter 2.12.

2.2a. List of oils and greases standards given in this Instruction

Oil grade	Standard No	Standard No (successive issue)	Standard No, (successive issue)
OILS			
Hypoid oil	GOST 4003-53		
TS-gip	OST 38-01260-82 with supplements 1 and 2		
AMG-10	GOST 6794-53	GOST 6794-75	
HIPOL 10F	TWT RNJe 10/1/75		
Shell Aviation Oil S8350	DTD 900/4981 or MIL-L-2105 (grade 90)		
AeroShell Fluid 4	MIL-H-5606D		
AeroShell Fluid 41	MIL- H-5606D		
MS-20	GOST 1013-49	GOST 21743-76	
MS-14	GOST 1013-49	GOST 21743-76	
WNII NP-25	GOST 11122-65		
Elf Aviation Engine Oil 100	AIR 3560D Grade 100		
Elf Aviation Engine Oil 80	AIR 3560D Grade 80		
Elf Aviation Engine Oil AD100	AIR 3570 Grade 80D or DERD 2450 ISS2 GRD 80		
Elf Aviation Engine Oil AD80	AIR 3570 Grade 65D or MIL-L-22851C		
AeroShell Oil 100	DERD 2472 B/O or MIL-L - -6082D Grade 1100		
AeroShell Oil 80	DERD 2472 A/O		
AeroShell Oil W100	DERD 2450 Grade D80		
AeroShell Oil W80	DERD 2450 Grade D65 or MIL-L-22851B		

Oil grade	Standard No	Standard No (successive issue)	Standard No (successive issue)
GREASES			
CIATIM-201	GOST 6267-59	GOST 6267-74	
CIATIM-221	GOST 9433-80		
ST (NK-50)	GOST 5573-67		
OKB-122-7	GOST 18179-72		
WNIINP-207	GOST 19774-74		
AeroShell Grease 5	MIL-G-3545C or DTD878A		
AeroShell Grease 6B Aerogrease 33 Beacon P-290 AeroShell Grease 4 Aviation General Purpose	DEF STAN 91-12/1 or MIL-G-7711A Or 3GP-682 B		
AeroShell Grease 15A	DTD 5585 or MIL-G-25013D		
AeroShell Grease 22A AeroShell Grease 22 Mobilgrease 28	MIL-G-81322C or DTD 5601	MIL-G-81322D	
Aliten N	TWT/84/78		

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2.3.Fuel System Filling

1.Prior to filling check the fuel grade in the log card, cistern lead seals and mesh condition in the fuelling equipment.

2.Use the fuel grades listed in Table 2.2.

3.Drain condensate from:main fuel tank,fine fuel filters, and filters block signalling device housing(0,5 up to 1,0 l from each point).

Check for water,ice or solid particles content.

CAUTION

FUEL FILTERS AND SIGNALLING DEVICE HOUSING CONDENSATE DRAINING SHOULD BE ACCOMPLISHED WHEN ECN-75 PUMP IS OPERATING.

4.Energize the fuel gauge and check the fuel level in the tank prior to fuel tank filling.

5.Fill the fuel tank,close and secure the filling port.

NOTE: Fuel volume to be filled depends on total helicopter weight(See Flight Manual).
Provide filling check by means of fuel gauge and visual inspection by means of filling port as well as by full tank signalling device.
Operate a)m signalling device as follows:
-prior to filling energize the switch of the full tank signalling device(the switch located on the right side of the fuselage in separate hatch or in the filling port hatch of the main fuel tank).
-when "FULL TANK" signalling lamp goes on,stop filling,deenergize the switch and close the hatch.

6.Fill with fuel using the petrole pumps,mobile fuel cisterns or grond tanks thrugh the filling port located on the right side of the fuselage.

NOTE:Last 100 l should be filled at reduced rpm of the fuelling device to avoid fuel spilling from the filling port.

7.Check the main fuel tank filler closed position prior to filling the auxiliary fuel tanks.

Use the measuring stick when checking the fuel level in auxiliary fuel tanks.
Capacity of each auxiliary fuel tank - 238 l.

NOTE: 1.To maintain c.g.position in allowable limits when filling the main fuel tank and only one of auxiliary fuel tanks,install the right fuel tank only.

2.It is prohibited to open the main fuel tank filler afer filling the auxiliary fuel tanks.

8.Drain 0,5 up to 1,0 l of condensate from the main fuel tank and check for water,ice or solid particles content. Condensate draining is to be performed in 15 minutes after the main fuel tank filling.

NOTE:Drain the condensate repeatedly,if more than 12 hours passed from the last condensate draining.

9.Fuel system draining should be performed through special hose(drwg.no 50.92.223.00.00) and the valve located in the lower part of the fuselage(See drwg.6.14)

2.4.Filling the Engines Oil System

1.Use oil grades as listed in Table 2.2 for engines oil system filling.Oil kinetic viscosity should not be less than 4,8 cSt at 100°C.

2.Fill the engines oil tanks up to upper level mark.

3."Empty" engines oil system should be filled in two steps:
- fill the engine oil tank up to upper level mark,
- start the engine and perform idling during 4 up to 5minutes to fill the oil system,
- shutoff the engine and add oil to reach upper mark.

2.5.Main Gearbox Oil System Filling

1. Use oil grades as listed in Table 2.2 for main gearbox oil system filling.
Prior to filling the sytem with oil mixture,mix it for 3 up to 5 minutes.

2.Fill the main gearbox oil system through the filling port equipped with the filter up to upper mark on the sight glass.

3.When checking oil level pay close attention on actual helicopter inclination on the runway and the time required for oil dripping down to the gearbox walls and foam dropping.

4."Dry"main gearbox oil system should be filled in two steps:
- fill the main gearbox oil tank up to upper level mark,
- start the engines and perform idling for 4 up to 5 minutes
- shutoff the engines and add oil to reach previous level.

2.6. Filling the Intermediate and Tail Rotor Gearbox

1. Use oil grases as listed in Table 2.2. for filling the intermediate and TR rearbox.
2. Fill the intermediate and TR gearbox through the filling port located in the gearbox housing on the right side. Screw out the filler plug prior to filling. Pour oil using a funnel. Check when filling by means of the level marks. Normally oil level should be between the lower and upper mark.
3. Fill the rear transmission through the filler in the top part of the transmission casing. Before filling, screw out the filler plug. Pour oil using a funnel. When filling the transmission, check the oil level by means of the measuring scale. The oil level is between the upper and lower marks.

2.7. Filling Hydraulic System

1. Fill the hydraulic system with grade AMG-10 oil.
2. Screw out the hydraulic unit filler plug and pour oil into the tank using a funnel. The normal oil level is between the lower and upper marks on a measuring sight glass of the hydraulic unit. Remove the filler filter and after washing it with clean gasoline, insert it into the filter.
3. Screw in the filter plug.
4. Fill the "empty" hydraulic system in two stages:

   a/ Fill the hydraulic unit tank with oil until the oil level is between the lower and upper marks on the measuring sight glass. Connect the hydraulic system to a ground hydraulic supply or start the engine to fill the system and test its operation.
   Move the control rod five times in the longitudinal and transverse directions as well as move the collective pilch control lever five times backwards and forwards.
   The oil-to-oil boosters should operate smootlhy, without jerks or vibration.

   b/ On checking the hydraulic system operation, disconnect it from the hydraulic supply. Check the oil level in the hydraulic unit tank and replenish, if required.

2.8. Charging the Air System

1. Charge the air system with compressed air from the bottle.
2. Prior to system charging screw out the cylinder by 10 up to 15 degrees with the valve downwards and unscrew the valve for 1 up to 2 seconds. Should water flow out of the cylinder, do not use it to charge the air system.
3. Connect the charging hose to the cylinder and to the airborne charging connector on the fuselage right side using a special adaptor.
4. Position the cylinder with the valve upwards and open its valve.
5. Charge the air system to reach the air pressure of 50+4 kG/cm^2 /5+0,4 MPa/.

   NOTE: When charging the air system by means of compressor the air pressure may increase up to 50+7 kG/cm^2 /5+0,7 MPa/.
6. Perform the air system pressure check by means of the readings of the pressure gauges located on the left lower panel in the cockpit.
7. After air system charging disconnect the charging hose, plug the airborne filling connector and close.

2.9. Filling the Hydraulic Dampers System

1. Fill the hydraulic dampers system with AMG-10 oil.
2. Filling the hydraulic dampers system should by performed according to the following procedure:

   a/ fill the compensating tank with AMG-10 oil,

   b/ rotate the main rotor to provide perpendicularity of the longitudinal helicopter axis and the axis of the hydraulic damper to be filled,

   c/ screw out 1 plug of the damper chamber air venting /See Fig. 6.4/ and fill the damper moving the MR blade until clean oil wihout air bubbles is visible, screw in the plug.

   d/ remove plug 2 from the airventing hole and repeat the procedure of Item c,

e/ repeat procedures b, c, d, for two other dampers, Sealing washers (thickness of 1,5 up to 2 mm) should be located under the air venting holes plugs to avoid the plug end and charging valve contact.

f/ position the main rotor to provide proper position of the compensating tank draining hole:

- i.e. on the lower side - when helicopter is standing on the inclined sufrace,
- towards the helicopter nose - when helicopter is standing on the level sufrace.

NOTE: The position of the compensating tank draining hole for helicopter 5C.62.01 and subsequent is determined by the red mark visible from the ground.

g/ replenish the fluid in the compensating tank to reach the mark on the transparent cover.

2.10. <u>Filling the Landing Gear Shock-Absorbers</u>

1. Position the helicopter on the lifting jacks.
2. Fill with oil and charge with nitrogen the front leg shock-absorber according to the following procedure:

a/ remove the shock-absorber from the helicopter;

b/ reduce the shock-absorber pressure;

c/ unscrew the charging valve;

d/ discharge the shock-absorber completely;

e/ fill the shock-absorber with oil to reach the thread under the valve and maintain vetical position of the shock-absorber for one hour;

f/ depress the shock-absorber to provide the stem movement (See Fig.6.17) of 10 mm (distance between the stem flange and outer nut face). When the oil level is to low, replenish to reach the thread level under the valve;

g/ install the charging valve and charge with nitrogen up to pressure of $65^{\pm}2$ kG/cm^2;

h/ install the shock-absorber on the helicopter.

3. Fill with oil and charge with nitrogen the main legs shock-absorber according to the following procedure:

a/ remove the cover from the main leg stem;
b/ unscrew the upper fixing bolt of the shock-absorber;
c/ reduce the shock-absorber pressure;

d) unscrew the charging valve;
e) discharge the shock-absorber completely;
f) fill the shock absorber with oil to reach the thread under the valve and maintain the vertical position of the shock-absorber for one hour;

g) depress the shock-absorber to reach the stem movement"a"(See Fig.6.17) of 12 mm(at complete depression of the shock-absorber stem)and maintain this position until oil excess is drained through the valve hole.When the oil level is to low,replenish to reach the thread level under the valve;
h) reinstall the charging valve,replace the shock-absorber and the upper bolt;
i) charge the shock-absorber with nitrogen to reach the pressure of 56 ± 2 kG)cm^2;

j) place the cover on the main leg stem;
k) perform the steps from a to j for another shock-absrber.

4. Fill with oil and charge with nitrogen the tail skid shock-absorber according to the following procedure:
   a) remove the shock-absorber from the helicopter and reinstall to provide charging valve upper position,when the charging valve was on the lower side of the shock -absorber ;
   b) pour oil through the charging valve hole in vertical position,when the stem movement was maximum;
   c) depress the stem compltely and drain(extract) 3cm^3 of oil;

   d) reinstall the charging valve and charge with nitrogen to reach the pressure of 45 ± 2 k^G)cm^2;
   e) reinstall the shock-absorber(when it was removed before).

NOTE: 1.To make the shock-absorbers oil filling easier incline then when filling by an angle up to 30° relative to vertical position.

2.Shock-absorbers filling and the stems depresion after the filling shold be performed slowly to avoid oil foaming and air entrapping to the shock-absorbers.

2.11. Draining the Oil and Fuel Systems of the Helicopter

1. Fuel system draining should be performed by means of the draining valve located in the lower part of the fuselage as well as through the fuel filters in the filters block when the fuel pump is operating.
2. Engines oil system draining should be performed through the draining valves of the engines and oil remains draining-through the tanks draining valves.
3. Main gearbox oil system draining to be performed through the draining valve included in magnetic plug.

   When draining use the special pipe for oil draining.
4. Tail rotor and intermediate oil draining should be performed through the draining holes located in the lower sections of the gearboxes after unscrewing the plugs.
5. Hydraulic system oil draining should be performed through the succion valve located in GB-2 hydraulic block by means of a special pipe.
6. Hydraulic dampers oil system draining should be performed through the draining holes located in the lower part of the dampers housing after removing the plugs. When draining rotate the blades around the vertical hinges within the range of allowable blade movements.
7. Tail skid and landing gear shock-absorbers oil draining should be performed by means of charging valves holes(after removing the charging valves) after prior positioning the helicopter on the lifting jacks and shock-absorbers nitrogen discharging. Remove the shock-absorbers from the helicopter to drain oil.

2.12. Oil grade replacement by an equivalent in helicopter systems

General Instructions.

1. Every oil replacement shall be recorded in Log Cards and in the helicopter Log Book. Record new oil grade as well.
2. Oil when drained from a system or assembly, is useless.

2.12.1. Oil grade replacement by an equivalent for engine oil system

Perform procedures described in para 22, Chapter 6 " Oil grade replacement by an equivalent". in Operating and Servicing Instruction for GTD-350 Engine.

2.12.2. Oil grade replacement by an equivalent in main gearbox oil system.

Perform procedures acc. to para 5 Chapter 4" Oil grade replacement by an equivalent " as described in Operating and Servicing Instruction for WR -2.

2.12.3. Oil grade replacement by an equivalent for intermediate and TR gearbox.

1. Drain preserving or operating oil and fill with equivalent oil grade. In winter it is recommended to drain in hangar or to heat up the crankcase using hot air.
   When filling the gearbox with oil mixture, heat up and thoroughly mix such mixture as described in para 8 Subchapter 4.1.
2. Run engines within 5 minutes.
3. Drain oil from the gearbox.
4. Fill with oil equivalent to reach required level.

2.12.4. Oil grade replacement by an equivalent for hydraulic system.

1. Check if the station Drwg. No. 50.95.600.00.01 is filled with equivalent oil grade. If not, proceed as follows:
   a) drain oil from the station.
   b) fill the station with equivalent oil acc. to requirements included in "Operating, maintenance, and inspection Instructions for station No. 50.95.600.00.01".
2. Then drain oil from helicopter hydraulic system.
3. Fill helicopter hydraulic system with equivalent oil acc. to para 1, 2, 3 Subchapter 2.7 "Filling hydraulic System"
4. Connect and start the the station prepared acc. to para 1. At operating pressure move the helicopter control stick 5 times in longitudinal and lateral direction successively and then perform 5 movements of collective pitch lever.
5. Check the filters of hydraulic block for helicopter and the station. In case of contamination, wash the filters and hydraulic systems after the station operating acc. to Oprating Instructions for the station.
6. Drain equivalent oil from the hydraulic systems of the helicopter and the station.

7. Fill helicopter hydraulic system usingclean equivalent oil and perform operation check acc. to para 4 Subchapter 2.7. "Filling the hydraulic system".

2.12.5. Oil grade replacement by an equivalent in MR hub horizontal, vertical and axial hinges.

1. Drain oil from the hinges. In winter it is recommended to drain in hangar or to heat up MR hub hinges before draining with hot air. Heat up and thoroughly mix oil prior to filling acc. to para 8 Subchapter 4.1.
2. Fill the hinges using equivalent oil acc. to procedures included in Table 2a " Airframe Attachment Points Lubrication" para 1, 2, 3. Heat oil to 50°C prior to filling.

NOTE: For axial hinge different oil grades to be used than for horizontal and vertical hinges (see Table 2.2)

3. Start the engines. Reach main rotor RPM of 79±1% and stop the engines after running for 5 minutes.
4. Drain equivalent oil from the hinges.
5. Fill the hinges with clean equivalent oil.

NOTE: Do not perform procedures decsribed in para 3,4 and 5 for oils included in NOTE 1 under the TABLE 2.2.

2.12.6. Oil grade replacement by an equivalent in hydraulic shock- absorbers.

1. Drain oil from the compensating tank and shock-absorbers on all arms of MR hub.
2. Fill hydraulic shock-absorbers and compensating tank with equivalent oil acc. to para 2.9 "Filling the Shock- Absorber System".
3. Start the engines and accelerate to reach main rotor RPM of 79,1%. Then stop the engines after running for 5 minutes.
4. Drain equivalent oil from hydraulic shock- absorbers and compensating tank.
5. Fill the shock- absorbers and compensating tank with clean equivalent oil as described in para 2.

2.12.7. Oil grade replacement by an equivalent in the shock- absorbers of the main leg, front leg and tail skid.

1. Place the helicopter on the jacks.
2. Remove the shock- absorbers.
3. Reduce the pressure value in the shock-absorbers.
4. Screw out the charging valves.
5. Drain oil from shock-absorbers using the charging valves openings
6. Pull out the shock-absorber completely and fill with equivalent oil to reach valve thread level (valve in vertical position)
7. Perform 5 to 10 full movements of the stem to flush the shock-absorbers with equivalent oil for the shock-absorber horizontal position and draining valve seat in upper position

NOTE: Oil spilling possible when flushing. No refilling.

8. Drain oil equivalent from the shock-absorbers.
9. Fill the shock-absorbers with equivalent oil, charge with nitrogen and install them on the helicopter acc. to Subchapter 2.10 " Landing Gear Shock- Absorbers Filling".

3. ROUTINE PROCEDURES

3.1. General Directions

1. Carry out the routine procedures on the basis of directions contained in the technical documentation /drawings and specifications/ for the aircraft equipment.

   The following documents determine the methods of routine procedures:

   - operating and service instructions,
   - bulletins and regulations.

2. Carry out the routine procedures after each 50 $\pm^{10}_{5}$; 100^{+20}_{-10} and 300 $\pm^{60}_{30}$ flying hours procedures typical of particular lines of the aircraft engineering being carried out at the same time.

   The helicopter flying time covers 100 per cent in - flight operation time and 20 per cent on-ground operation time.

3. In case any units are replaced, carry out the routine procedures pertaining to these units at intervals as schedule on the basis of the helicopter flying hours. In this instance, it is permitted to carry out the successive routine procedures ahead of schedule.

4. To ensure reliable operation of the helicopter, the chief engineer of a given technical base may order to carry out the routine procedures pertaining to all or separate units of the helicopter out of turn and irrespective of the schedule in the following cases :

   - operations under different climatic conditions,
   - intensive operation of separate helicopter units during special actions,

- long out-of-operation,
- replacement of engines.

5. Before carrying out the routine procedures, check the helicopter within the scope of post-flight inspection.

6. As far as the GTD-350 engines and the WR-2 main transmission are concerned routine procedures and the operations in-between routine procedures shauld be carried out according to the Maintenance Manual and its instructions referring to the above said units.

7. When carrying out the routine procedures involved in the main transmission, prpoeed as follows:
   - pay particular attention to the condition of seals in the oil filter, magnetic plug and AK-50M-1G1 compressor drive layshaft.
   - every time, when dismounting and mounting the GO16PCz8 dynamo, replace lock-washers of the bolts fixing the, dynamo clamping rings.

8. When carrying out the routing procedures, pay particular attention to possible damage of components, wiz:
   - cracks, dents and other mechanical damge,
   - leosening of nuts and their securing elements,
   leakages from pipes and units of fuel, oil and hydraulic systems,
   - damage of protective coatings and corrosion of elements,
   - excessive plays in articulated joints,
   - rubbing of moving elements agaisnt other structural components of the helicopter,
   - weakening of riveted joints,
   - clearances between hatch covers, cowlings of fillets and the helicopter skins.

3.2. Procedures after Every 50^{+10}_{-5} Flying Hours.

3.2.1. Engine compartments

1. Inspect the engine cowlings. Make sure they are well fixed and in good condition.
2. Inspect engine and main transmission oil coders as well as oil tanks. Make sure there are no damages and oil leakages.
3. Check the condition and fixing of the fire-fighting system collectors and ducts.

3.2.2. Main gearbox and transmission system

1. Inspect cowlings of the main transmission. Make sure they are well fixed and that there are no damages.
2. Inspect the main gearbox plate - to - fuselage fixing. Make sure there are no vidences of protections and damages.
3. Check the condition and fixing of the fire-fighting system collector and ducts.
4. Inspect main fostening joints. Make sure they are well protected, fixed and without any damages.
   Inspect the protection of main shaft needle bearings.
   Make sure about solid protection.
5. Inspect rear and intermediate transmissions. Make sure there are no damages and oil leakages.
   Check the transmission lequer coat.

   It any laquer coat damages are found they should be repaired / clean, ground and paint /.
6. Inspect the rear transmission shaft abutments. Make sure about the absence of craks, deformations and corrosion.

Inspect the protections of the universal joints needle bearings. Make sure they are not disturbed.

3.2.3. Main Rotor

1. Inspect the main rotor hub and the swashplate. Check for mechanical defects and oil leaks on the hub hinges.

2. Check all protections of the nuts, bolts and connection of the main rotor hub and swashplate.

3. Check the axial hinges on the fixing bolts area on the blade roots. Inspect for mechanical defects and corrosion. Check protection of the MR blades fixing bolts.

3.2.4. Main Rotor Blades

1. Remove the MR blades from the helicopter and place them on the stands prepared previously. The stands should be padded with thick felt or several layers of soft fabric. Prepare the blades to be inspected.

2. Inspect the roots and fixing holes surfaces to be used for the blade fixing on the hub, as well as spar outer surfaces and the spar roots (pay particular attention to the bolts connecting the blade spar with the ferrule in the last two sections-when looking from roots). Inspect another part of the spar visible along whole blade. Pay particular attention to the laquer coating damages. Mechanical defects (cracks, scratches etc.) and corrosion traces on the fixing holes (for hub and ferrule connections) surfaces and their radii are not allowable.

3. Check the blades for:

- laquer caoting defects, dents and sealing strips damages;
- for bulges, deglutination areas on the edges, or local defects as well as erosion places of the rubber securing the antiicing section-particularly the sections reaching the heating strap insulation (making the strap visible);
- separation on idividual layers on the leading edge ferrule;

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4. Inspect the trailing edges of the sections for cants, rear longeron defects and blade weights defects. Check the sections and the tip fairing skin for defects.
5. Check the tip fairing screws tightening. Tighten up if necessary.
6. After each 50^{+10}_{-5} flight hours, but not later than after each 60 ± 5 days perform the spar defect signalling system check according to the following procedure:
   a) check the spar pressure using the pressure gauge 50.93.070.00.00;
   b) reduce the spar pressure through the valve until the red cap is visible (appears from behind the withe strip of the signalling device plexiglass cap);
   c) measure the spar pressure using the pressure gauge for the red cap appearance. Such pressure value, called activation pressure, should be within range of tolerance shown on diagram. Fig. 6.12.
   If the pressure for the red cap appearance exceeds the limits as shown on the diagram, perform another check. When deviation value will out of tolerance range, replace the signalling device. Signalling device procedure according to para 6.6.5. "Defects to be repaired," Item 9.

3.2.5. Tail Rotor

1. Inspect the tail rotor and check for mechanical defects on the hub as well as for grease leaks on the TR hinges.
2. Check the TR hinges for clearances and jammings.
3. Check the protections of all connections.
4. Inspect the TR blades according to preliminary procedure acc. to Section 1.1. "Preliminary procedures of the helicopter" - "Tail Rotor" (8).
5. For the blades having "HB" code check the heating strap and skin bonding and ferrule to rubber bonding condition by tapping. Record your remarks in the blade inefficiency card. Pay particular attention to the root and leading edge area.

3.2.6. Fuselage, Rear Part of the Fuselage and Tail Boom

1. Inspect the skin and check for: cracks, dents,deformations as well as for defects of rivered joints and laquer coating. Make sure there are no oil or fuel leaks as well as corro - sion spots. In case of doubts, remove laquer coating and remove corrosion traces. Then apply new laquer coating again.
2. Check the cockpit door and the door of cargo compartment. Inspect the locks and locking system operation. Check the hatch covers, as well as their adherence to the fuselage, their tightness and locks operation.
3. Check the cabin and condition of the seats and belts. Inspect the windows glasses.
4. Check the condition of earth links.
5. Inspect the stabilizer and its fastenigs for defects.

3.2.7. Helicopter and Engine Control.

1. Inspect the lateral and longitudinal control systems: levers, pull rods, rockers, brackets, unloading mechanisms. Make sure there are no connections defects and seizures. Check if the nuts are sucured properly.
2. Inspect the engine control system components and check their condition. Check if the movements of control levers are smooth.
3. Inspect the pedals, brackets, pull rods,rollers, cables and turnbuckles. Make sure that they are in good condition. Check the components fixing, connections security and control cab - les tension.
4. Inspect "pitch-power" control system: levers, brackets, rocking levers, pull rods, and stabilizer control cables. Make sure that their fixing is reliable and protection is not disturbed. Check the tension of stabilizer control cables.
5. Inspect the rocking levers connecting the lateral and longitu- dinal boosters with the swashplate levers. Make sure that fi- xing is reliable, protections are not disturbed and that are no plays.

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6. Check the control system of the MR brake. Inspect the tension of control cables.

3.2.8. Fuel System

1. Inspect the auxiliary fuel tanks. Make sure there are no visible defects, fuel leaks and that the protections are not disturbed.
2. Inspect the system pipes and their fixing. Check for damages, fuel leaks and for interference with adjacent pipes and helicopter structures.
3. Inspect the fuel system accessories. Make sure that their fixing is reliable and that there are no leaks on connections.
4. Inspect the airventing pipes outlet. Make sure that they are clean.
5. Remove fine filter elements from the filters block.
   Wash in clean unleaded petrol and check their capacities (acc. to Subchapter 6.7.2).
   If the capacity is not in conformity with allowable value replace the fine filter element.

WARNING

PRIOR TO ENGINE STARTING PERFORM THE FUEL SYSTEM AIRVENTING AFTER PARTIAL FUEL DRAINING FROM THE FILTER BLOCK WITHOUT THE FUEL PUMPS OPERATING (EG. IN CASE FILTERS CHECK).

3.2.9. Hydraulic system

1. Inspect the GB-2 hydraulic unit and the hydraulic pipe system. Make sure the unit and pipes are well fixed and that there are no oil leakages.
   Wipe out dust and impurity from the unit. Make sure there are no signs of corrosion.

2. Dismount filters with the buttons signed "FILTR" "FILTER/
   Inspect them, wash them with clean unleaded gasoline. Check them with a special device and install the filters in their right place.
   In case the filters are polluted drain the working liquid from the assembly and pour in new one. Switch on the hydraulic system with the engines working / or by means of the ground equipment / and after 5 minutes work switch off the system. Drain the working liquid and check the filters once more. On completing the above mentioned actions pour in new oil / with the funnel with a net No 18W /.

3. Inspect the oil-to-oil booster and the oil-to-oil booster pipes. Make sure they are well fixed and that the protections are not disturbed and that there are no oil leakages.

3.2.10. Leading Gear

1. Inspect the nose and main shock absorbers of the undercarriage and tail support as well as the undercarriage-to-fuselage and tail support-to-fuselage fastening joints. Make sure there are no oil leakages on the shock absorber rods.

1 KG/CM² = 14.19352 PSI

Check wohether the shock absorbers and pneumatic tyres are properly loaded. At the helicopter normal take-off weight the standing out of the main shock absorber rod should be 50 mm and the standing out of the nose shock absorber should be 35 mm. In case the shock absorber subsidance is unproper check the initial nitrogen pressure in the shock absorbers.
With the unloaded helicopter the required values of the shock absorber pressure should be as follows :

- main shock absorbers 56 ± 2 kG/cm^2
- nose shock absorber 65 ± 2 kG/cm^2
- tail support shock absorber 45 ± 2 kG/cm^2

Pressure in the pneumatic tyres should be as follows :

- main wheels 4,0 + 0,5 kG/cm^2 56 PSI ± 7
- nose wheels 3,5 + 0,5 kG/cm^2 50 PSI ± 7

2. Check the condition of the main and nose wheels. Make sure there are no cracks and deformations of the wheel hubs as well as no punctures and deep cuttings / as deep as the cord / of the wheel tyres.
3. Check the security of wheel fixing nuts.
4. Inspect the lacquer coat on the undercarriage and tail support elements. Clean and cover with enamel those places the lacquer coat has been damaged.

3.2.11. **Air system**

1. Inspect the undercarriage wheel brake pipes for the pressured air.
2. Inspect visually the air system. Make sure the assemblies and pipes are properly fixed, and the protections are undisturbed.

3.2.12. Heating System and Fan System

1. Inspect the cabin heating system and fan system of the helicopter. Make sure if the fastening of the components and units is reliable.

3.2.13. Passanger Cabin Equipment

1. Inspect the passangers cabin. Make sure about the cleanness and good condition of the following items: floor, cabin interior upholstery, seats and safety belts.

3.3. Procedures after Every 100^{+20}_{-10} Flying Hours

3.3.1. Engines Compartments

1. Check for plays between the bracket pins and on the engine mounts shock-absorbers bushings after the first 100 flight hours. If necessary compensate the play by tightening the nuts of the bolts located in the shock-absorber housing.

2. Remove the intake dust separators, clean the caps and suction pipes. Check air intake dust separators and air compressors inlet ducts condition.

3.3.2. Main Gearbox and Transmission System

1. Inspect the fan and check for cracks or other defects.

3.3.3. Main Rotor

1. Inspect the hydraulic dampers, pipes as well as compensating tank. Make sure there are no oil leaks.

2. Check the fixing bolts tightening on the hydraulic dampers. (tightening torque is 0,8 up to 1,0 kGm or 7,8 up to 9,8 Nm).

3. Check the tightening torque value for the MR blade levers fixing bolts (tightening torque is 4,0 up to 4,5 kGm or 39 up to 44 Nm).

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3.3.4. Tail Rotor

1. Check if the TR blades rotation around the horizontal hinges is smooth without jamming and hunting.

2. Check the tightening of the TR blades fixing bolts /tightening torque is 1,0 up to 1,5 kGm or 9,8 up to 14,7 Nm/.

3. Inspect the TR rotor blades and check the condition of the lining and skin /in the glue - bolding area/, glue - bonded connection, the skin and spar glue - bonded connection, as well the skin and honeycomb structure connection. Use JAD-2 device or tapping procedure when checking the condition of a/m connections.

4. Check the condition of the heating section and skin glue - bonded connection, the ferrule and rubber connection as well as the skin and honeycomb glue - bonded connection recording defected areas in the TR blades inefficiency card /indicating that allowable limits are not exceeded/. Use JAD-2 device or tapping when performing mentioned checks. Pay particular attention to the condition of the heating strap connection on the blade roots and the condition of the connection of the ferrule at the blade roots as well as connection on the leading edge in the tip fairing area.

NOTE: For the blades bearing "HB" code letters check only the condition between the skin honeycomb structure, because other inspections are inluded in 50 hours procedure.

3.3.5. Leading Gear

1. Check and in case of necessity regulate the play of the main wheel brakes.

   Distance between brake jaws and the wheel drum should be 0,3 ÷ 0,4 mm / in the peep-hole areas/.

2. In case the helicopter operates on dusty landing fields dismount and dismantle the front and main wheels.
   Carry out the following procedures :

   a/ Check the condition of wheel bearings. Any cracks, signs of erasure and heat tints on the bearing rings and rollers are inadmissible.

   b/ Check the condition of felt rings / seals/. Any new felt rings should be preliminarily soaked in the MK-8 aviation oil.

   c/ Check the condition of outer surfaces of the wheel drums In case seratches, scores, and marks of rubbing the shoes against drums be, the wheel drums must be withdrawy from use.
   Check bolts fixing the brake drum for security of fastening and fighten nuts when required.

   d/ Check the condition of the brake and friction linings. An ultimated number of minor craks of the surface of brake shoe linings is permited. It is also permited to use brake shoe in case a distance between rivet heads and rubbing surface is not less than 0,5 mm.

e/ Check the condition of the wheel distance sleeve / in particular the condition of its face / mounted between the bearing inner races as well as the security of fastening.

f/ Check the condition of return springs and make sure that the cylinder is leaktight.

g/ Check the condition of the axle shafts and undercarriage strut flange.

h/ Check the fastening of the wheel axle to the undercarriage strut flange.
As far as the nose undercarriage wheels are concerned carry out the following procedures :

a/ Check the condition of wheel bearings and axles.
b/ Check the condition of the wheel hub and the tyre retaining rings.

Note : When mounting the wheels on the helicopter tighten home nuts fixing the wheels / while rotating the wheels/.
Next, undo nuts by 1/8 turn and secure.
Eliminate any excessive play between a nut and the hub / if over 1 mm / by inserting a suitable washer under the fixing nut.

3. Check the tightening torque of the screw nut fixing the rocker to the nose undercarriage shock absorber / the tightening torque is 1,0 + 1,5 kGm /.

4. Check the tightening torque of the screw nuts fixing the rocker connector to the rocker and to the nose undercarriage shock absorber / the fightening torque is 1,0 + 1,5 kGm /.

3.3.6. Air System

1. To replace the filtering element in the AK-50-10 compressor carry out the following procedures:
   - remove the lock spring, mesh and filtering element with the filter seal and the secondary mesh,
   - remove the filtering element and the seal,
   - install the secondary mesh, new filtering element with the seal and mesh and them replace the lock spring.

3.4. Procedures after Every 300^{+60}_{-30} Flight Hours of the Helicopter

3.4.1. Engines Compartments

1. Check for clearance between the brackets pins and the shock-absorbers sleeves on the GTD-350 engines mounts (for helicopters with adjusted clamping of the shock--absorbers sleeves).
   In case of clearance tighten the nuts of the shock-absorbers turnbuckles bolts.

3.4.2. Main Gearbox Transmission System

1. Check the main rotor brake adjustment.
2. Check the fan fastening on the main gearbox. Make sure that the protections are undisturbed.
3. Check the tightening torque of the main rotor hub nut (torque value amounts 100 up to 120 kGm or 981 up to 1177Nm).

3.4.3. Main Rotor Blades

1. Remove the MR blades from the helicopter. Place them on a special stand and prepare for inspection.
2. Inspect the attachment point as written in Item 2 of Section 3.2.4.
3. Check the condition of the connections between the blade sections skin and the blade spar and honeycomb structure by tapping or using JAD-device.
4. Check the condition of connection between the heating section and blade spar as well as between the leading edge ferrules and rubber. Pay attention to the condition of the self-adhesive PVC tape. Remove defected sections.
5. After checking the condition of glue-bonded connections record defected area in the blade inefficiency card and determine whether they exceed the allowable limit values as listed in Section 6.6.

3.4.4. Fuselage, Rear Part of the Fuselage and Tail Boom

1. Inspect the tail boom in the zone of coonection with the fuselage. Check for defects, weakenings, lost rivets, as well as for fixing bolts tightening between the tail boom and fuselage.

2. Check the condition of the emergency door dropping mechanisms in the cockpit. Perform the test dropping on the ground for the right and the left door. The force on the emergency door dropping lever should be not more than 12 kG /117 Nm/, for the right door and 15^{+3}_{-1} kG /147^{+30}_{-10} Nm/ for the left door.

3. Check visually the condition of the reinforcing brackets 50.12.700.43.00 and 50.12.700.42.00 between 1F and 2F frames on the deck plate under the right and left engine. Check the brackets in the visible area out of sealing, for craks using the magnifying glass with magnification not less than 2,5. Pay atteention to the lower shelf of the bracket on the total lenght, particularly in reinforcing ribs area as well as at in recovery openings area in the shelf.

   NOTE: For the brackets checking the following items should be removed:
   - deck plate upholstery plate,
   - the lower part of the upper blower guide,
   - air pipe supplying the upper blower including the upper part of the blower pipe.

   Reinstall the parts removed previously, after the brackets checking.

3.4.5. Landing Gear

1. Check the condition of the openings in the brackets:
   - for the main landing gear shock-absorbers attachment points,
   - for the main landing gear framework attachment points.

2. Check the condition of the following:
   - eatthing 50.41.300.00.00 /2 pcs/.
   - electric bonding connector 6245s56-2-100 /6 pcs/.

   If mechanical damages, distertions or traces of corrosion are detected, the affected elements must be replaced by new ones.

3. Check / by means of a pressure gauge/ the pressure value of nitrogen in the shock absorbers of front and main undercarriage and tail skid.

3.4.6. <u>Pneumatic System</u>

1. Having bled the air completely, drain the condensate from the compressed air reservoirs which are situated in the undercarriage struts.
   In order to bleed the air, do as follows:
   disconnect the hose from the pipe that supplies air to the right wheel brake and depress the lever of PU-7 vavle.
   After the air has been bled from the system, connect the hose to the pipe.
   Remove draining plugs from the air reservoirs and drain the condensate.
   After the condensate has been drained, reinstall the plugs with grease, CIATIM-201, applied on their threads previously.
   Charge the pneumatic system and check the draining plugs and connection between the hose and pipe for air tightness.

2. Check the air reservoirs in the struts for air tightness.
   For the check procedure, see Section 6.10. "Pneumatic System " para 4.

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3.4.7. Hydraulic System

1. Check the nuts that mount the hydraulic boosters support to the main gearbox for security (required torque is 3.2 to 3.5 kGm). For number of nuts - see Subsection 3.6.1. para 2d
2. Check the nuts that mount the bearing cases to the support (required torque is 1,5 to 1,65 kGm or 14,7 up to 16,0 Nm).

3.5. Helicopter Maintenance While Parking

In the case when the helicopter has been out of operation for a long time and has not been subjected to preventive maintenance, perform the following procedures:

3.5.1. After Every 10±2 Days

1. Perform the pre-flight inspection of the helicopter.
2. When the engines were not preserved before (in case of fuel and oil systems filled) start the engines and operate them for 3 up, to 5 minutes at II crusing speed every other 10 days (practically every 20±4 days).
3. Start the hydraulic sytem (after operating the engines or using a ground supply) and move the helicopter controls performing 5 up to 10 smooth movements.
(Activate the hydraulic boosters).
4. Check the helicopter components, the engines and equipment for corrosion.
5. Replace the grease on the shock-absorber rods of the landing gearafter the engines test.
6. Remove dust and dirt from the helicopter.
7. After the rain in summer remove the covers from the helicopters and dry them. Open all hatches, cowlings and ventilate the helicopter.

8. Remove the covers from the main rotor and tail rotor blades. Dry the covers and wipe the blades with the clean rag.

3.5.2. After Every 30 ± 5 Days

1. Perform the procedures to be carried out after every 10 ± 2 days.
2. When preparing the helicopter for flight after 30 days parking, perform the post-flight inspection procedure.
3. Remove the MR blades from the helicopter.

   NOTE: When handling the blade, grip the leading edge and transport with the leading edges on the lower side. Do not lift the blade when gripping on the tip fairing.

4. Reduce air pressure in the spars.
5. The blades should be stored in the rooms or under the roofing protecting against the precipitations protected properly with covers.

   NOTE: 1. The blades storing conditions should protect them against possible damages. The blades should be stored with the leading edges in lower position on special stands, shaped properly (including proper allowance) according to the blade profile, padded with thick layer of felt (not less than 4 mm thick). The distance between the ground and the leading edge should amount approximately 500mm.

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2. The blades stored under the roofing should be ventilated every 15±2 days (after removing the blades covers) during all day, at sunny woather after the blades covers removal, and drying.

6. Prior to installing the MR blades on the helicopter fill the blades spars with air to reach the 0,15 atn more than actuating pressure and check when performing 50 hour procedure.

7. Check the tail rotor blades when performing the post-fight inspection.

8. To provide maintaining the blade tracks adjusted properly in allowable limits, the blades should be installing on their previous psitions on the MR hub.

3.5.3. <u>After Every 3 Months ±10 Days</u>

1. Carry out procedures to be performed after every 30±5 days.

2. Inspect the hydraulic block performing 50 hours procedure according to recomendations iccluded in para 1 of Subchapter 3.2.9.

3. Lubricate the points of attachment of the helicopter according to 100 hours procedure.

4. When performing pre-flight procedure after the helicopter parking longer than 3 months, perform flight lasting 30 minutes.

5. MR blades should be ventilated after storing them in the closed store (after removing the blades covers) within 2 up to 3 days

6. Provide MR blades preservation followed by representation when storing under the roofing.

NOTE: 1. MR blades should be preserved as well, when the blades storing time after their removal from the helicopter should last more than 3 months ± 10 days.

2. MR blades should be preserved and then represerved every 6 months in case of storing in the closed rooms.

7. Depreserve the MR blades prior to installing them on the helicopter. Fill MR blades spars with air to reach the pressure value exceeding the activation pressure by 0,15 atn. Then perform the MR blades check included in 300 hours procedure an the TR blades check included in 100 hours procedure.

3.6. Special periodical procedures

3.6.1. Procedures to be performed after the first check flight (within the first 5 flight hours).

The procedures described in this Chapter shall be performed after the first check flight for:

- a new helicopter;
- after overhauling;
- after reinstalling the powerplant assemblies being operated as prescribed for affected assemblies.

1. Perform postflight check
2. Check if the following bolts and nuts are tightened properly:
   a) MR hub nut (tightening torque is 100 up to 120 kGm) MR hub tightening to be checked after removing the MR slip ring.
   b) bolts fastening TR assy on TR gearbox (tightening torque is 2,5 to 3 kGm).
   c) nuts fastening the flanges of intermediate and TR gearboxes (tightening torque is 2,5 up to 3,0 kGm).
   d) the screws fixing the following units to the main gearbox:
      - swashplate (the tightening torque is 1,2 to 1,7 kGm),
      - main rotor brake (the tightening torque is 5,5 to 6,5 kGm),
      - oil-to-oil booster bracket (the tightening torque is 3,2 to 3,5 kGm).

      It is allowed not to check the tightening of the inaccessible nuts (3 nuts at the lower part of the bracket).
   e) the following nuts on the swashplate (Fig. 6.19):
      - the nuts pressing down the pull rod becerings of the longitudinal and lateral controls (the tightening torque is 13 to 15 kGm),

- the nut fixing the radial - thrust bearing /the tightening torque is 17,5 ÷ 22,5 kGm and corresponds to the dynamometer indications 14 ÷ 18 kGm/.

3. Carry out the inspection of the tail rotor blades and check the condition of bonding between facing and skin, skin and spar well as between skin and honeycomb filler. The 30 mm wide zone from the trailing edge is not to be checked /Fig. 6.7./.
   Checking adhesive bonding defects should be carried out with special care.
4. Check the bonding of the heating element of the deicing system and the ferrule-to-rubber bonding in the scope of 100 hours of the periodical inspection as required by the item 5 of the subchapter 3.3.4.
5. Check main gearbox and engine output shaft for alignment.

3.6.1a. Procedures to be performed after the first ground check of a new-installed engine.

1. Perform postflight inspection.
2. Perform engine inspection acc. to "Operating and servicing Instructions for Engine GTD-350".

3.6.1b. Procedures to be performed after the first helicopter flight with a new-installed engine.

1. Perform postflight inspection.
2. Perform engine inspection acc. to "Operating and servicing Instructions for Engine GTD-350".

3.6.1.c. Procedures to be performed after the first flight of the helicopter with new-installed main gearbox.

1. Airvent MR hub dampers.
2. Perform main gearbox inspection acc. to "Operating and Servicing Instructions for Main Drive WR-2".

3.6.1.d. Procedures to be performed after first 5 hours of the main gearbox operation.

1. Perform postflight inspection.
2. Perform main gearbox inspection acc. to "Operating and Servicing Instructions for Main Drive WR-2".

3.6.1.e. Procedures to be performed after the first check flight of the helicopter with a new-installed MR hub.

1. Perform postflight inspection.
2. Airvent MR hub hydraulic dampers.

NOTE: Procedures specified in para 2 shall be also performed after reinstalling the swashplate.

3.6.2. Procedures to be performed every 500^{+100}_{-50} fligh hours.

1. Check if the nut fastening the swashplate radial-thrust bearing is tightened properly (tightening torque is 17,5 to 22,5 kGm) corresponding to dynamometer readings of 14 to 18 kGm.

3.6.3. Procedures to be performed every 750^{+100}_{-50} flight hours.

1. It is recommended to replace SzS-25 bearings included in rockers and tie-rods of the longitudinal and lateral control of the swashplate. The bearings shall be positioned to align the cutouts on the bearings rings with the marks on the rockers and tie-rods.

Tighten the nuts fastening the bearings of lateral and longitudinal control tie-rods using torque of 13 to 15 kGm.
After installing the bearings check if they rotate freely in assemblies.
After 5 hours of operation check the bearings fastening nuts for tightening.

NOTE: 1. Do not replace the bearings if they have been replaced after 500^{+100}_{-50} swashplate operation hours.
2. Do not replace the bearings for the swashplates having service life of 1000 flight hours (to the first overhaul or TBO period).

2. Replace TR blade pushrods for TR assemblies characterized be total service life of 3000 hours.

NOTE: 1. When removing the pushrods, protect the needle bearing against disassembling.
2. Do not replace the both pushrods simultaneously. After completing replacement of the first pushrod one may start to replace another one.
3. Whein installing the pushrod head, the cutout on the bearing inner ring shall be positioned in a plane perpendicular to the pushrod longitudinal axis.
4. Reinstall the shim which has been removed previo-usly ane the fasteners of the pushrod head.
5. When installing the pushrod fork, replace the both plastic thrust washers.
6. Replace the pushrods with the pushrods being marked with the same hub number and the same hub arm numer.

3.6.3a. Procedures to be performed after first 1000_{-100} flight hours (for MR blades).

1. Every 1000_{-100} hours perform periodical procedures as prescribed every 300^{+60}_{-30} flight hours.
2. For every MR blade reaching 1000 flight hours, perform periodical procedures every 100^{+20}_{-10} hours as prescribed for every 300^{+60}_{-30} hours procedure.

3.6.4. Procedure after first 1000_{-100} flying hours of helicopter (for helicopters operating in moderate climate).

1. Perform periodical inspections as scheduled after each 300^{+60}_{-30} flight hours.
2. Check according to log cards and bulletins and replace aggregates and ready - made elements which have worked out their established life.

3.6.4.1. Power Plant

1. Replace engine mounting dampers No. 50.64.110.00.01 (4 pcs).

   NOTE: It is advised to connect the a/m work with the replacement of GTD-350 engines in cases when the engine replacement is to be performed during the procedure after 700 or 1000 hours of flight.
2. Check condition of engine mounting brackets No. 50.64.040.00.00 and 50.64.050.00.00. Further usage of brackets is permissible if:

   a) the diameter of the pivots cylindrical surface is not less than 24,9 mm after removing worn out spots, scratches, dents and corrosion spots.
   The measurement should be done using a special measuring instrument having accuracy up to 0,02 mm.

b) on remaining surfaces, after removing damage to anti-corrosion coating and clearing, with abrasive material, mechanical and corrosion damage, the abrasion depth /measured by means of feeler gauge/ is not bigger than 0,6 mm.
Repair damage to laquer coating according to chapter 3.7.7. Brackets having damage exceeding permissible limits must be replaced.

NOTE: It is advised to perform the a/m work according to item 1 /3.6.4.1./.

3. Check condition of insulation of tubings connecting SO-40 power sharing device.
Replace damaged insulation.

NOTE: It is advised to perform the a/m work according to item 1 /3.6.4.1./.

4. Check condition of stnits connecting engine to main gearbox WR-2. If traces of corrosion are detected, remove corrosion spots with abrassive paper to depth of 0,2 mm and renew laquer coating according to chapter 3.7.7.
Check bearings of connecting rods securing engines to main gearbox.
If play or corrosion is detected, the bearing should be replaced /together with the head piece in which it is installed/.

5. Check condition of fire-fighting,system and whether the spraying holes of manifold /in the engine compartment/ are not obstructed. Obstructed holes must be cleaned with a soft 0,8 dia. wire.

6. Check and replace air cooling system components if defective

- air line	50.63.030.00.00	1 pc
- air line	50.63.040.00.00	1 pc
- hose	4586A-2U-22-250	2 pcs
- skin	50.63.000.05.90	2 pcs

3.6.4.2. Main Gearbox and Transmission

1. Check condition of rubber sealing rings No. 50.15.200.17.00 /2 pcs/ installed on the lateral fire wall, separating the engine compartment from the main gearbox compartment.

If the sealing ring is distorled, cracked or sheared, replace it with new one.

NOTE: It is advised to perform the a/m work according to item 1 /3.6.4.1./.

2. Check externally condition of hydraulic metal piping installed on the mounting deck. Renew loquer coating damage according to chapter 3.7.9., other type of damage on the hydraulic metal piping is not permissable.
3. Check operating smoothness of boosters both with connected ground pressure supply and hydraulic power off.
4. Check condition of fire-fighting system and whether the spraying holes of manifold /in main gearbox compartment/ are not obstructed. Obstructed holes must be cleaned with a soft 0,8 mm wire.
5. Check and replace air cooling system components if defective:
   - air line 50.63.006.00.00. (2 pcs),
   - air line 50.63.004.00.00 (1 pc).

3.6.4.3. Main Rotor

1. On helicopters, on which the SzS-25 bearing in the levers and longitudinal and lateral controll push-pull rods of swashplate have not been replaced after 500 $^{+100}_{-50}$ or 750 $^{+100}_{-50}$ flight hours, perform replacement of bearings according to instructions given in chapter 3.6.3.

3.6.4.4. Fuselage, tail boom, tail pylon

1. In the cockpit and passenger cabin, remove the following:
   - carpets from floor
   - wall lining in the vicinity of brackets of cockpit sliding door and RH door.
2. Check the following for corrosion and mechanical damage /cracks, punctures, distortions/:
   - front and rear floor of helicopter cabin
   - No. 12F frame of fuselage
   - No. 1 and 16 frames of tail boom

- No. 1 and 4 frames of tail pylon,
- magnesium alloy fittings fixing ŁPG-4 hoist,
- magnesium alloy brackets fixing mechanism for jettision of sliding door.

Repair damage on floor according to chapter 3.7.9.
Corrosion pitting on floor is not permissible.
Mechanikal damage and pitting is not permissible on the following frames fuselage - 12F; tail boom - No. 1 and 16; tail pylon - No. 1 and 4 and on magnesium alloy fittings.

NOTE: All magnesium alloy brackets on the helicopter are subject to special inspection.

Damage to laquer coating and traces of sufrace corrosion are to be removed by cleaning with abrasive material after which it is necessary to renew the laquer coating according to chapter 3.7.6. Check condition of sealing between fuselage frame No 12F and tail boom frame No 1. It the sealing is damaged, level the helicopter and check dimensionally for compliance with Levelling Chart.

3. Check condition of the following fittings:
   - for fixing seats,
   - for fixing auxiliary fuel tanks,
   - for fixing undercarriage and tail skid,
   - for helicopter mooring,
   - for particular version equipment.

   Remove detected corrosion spots and renew anti-corrosion coating and laquer coating according to chapter 3.7.6 and 3.7.7. It is permissible to clean by abrasion, any mechanical damage up to 0,3 mm deep, on outer surfaces of the fitting.

4. Check condition of holes in the following fittings:
   - for fixing chemical hoppers
   - for fixing agricultural equipment.

   To do so perform the following:

   - remove bolt from hole after withdrawing cotter-pin
   - wash holes with extraction naphtha, remove traces of corrosion
   - check diameter of holes in fittings using gauge ø $8A_3$ No. 50.06.004.00.00 /except for holes in fittings fixing agricultural equipment under radio compartment, which are checked by means of ø $8A_4$ gauge No. 50.06.005.00.00/.

   NOTE: If holes are corroded or give negative result when checked with not-go gauge, it should be claimed to the Manufacturer to have the repair carried out by the Service Group or by the Operator's qualified mechanics having licence for performing such work according to special technology.

   In case of brackets having holes not exceeding allowable dimensions insert bolts in the holes having before applied a thin coat of CIATIM-201 grease and secure.

5. Inspect shelves fixing blocks in radio compartment behind frame No. 9F. Repair defects affecting efficiency of block fixing.

6. Check tightening of nuts on following mounting bolts:
   - securing main gearbox mounting plate to fuselage mounts /torque 32 ± 2,5 kGm/
   - securing tail boom to fuselage /torque on M8 bolts - 1.8 to 2.0 kGm, which corresponds to torquemeter reading of 1.44 to 1.6 kGm; torque on M10 bolts - 4.0 to 4.4 kGm, which corresponds to torquemeter reading of 3.2 to 52 kGm/
   - securing intermediate gearbox to tail boom and pylon and tail gearbox to pylon /torque 2.5 to 3.0 kGm/.

7. Check glazing of cockpit. Panes distorting image or having mechanical defects such as cracks, scratches unrepairable by polishing, should be replaced.

8. Check condition of the following:

- leather grip 50.10.130.00.00 in cockpit /2 pcs/
- rubber stops 50.10.000.04.00 on frame of sliding door in cockpit.

Replace rubber stops if grip is cracked or sheared or the rubber stop is cracked or distorted.

9. Check magnesium alloy elements on fuselage of helicopter, listed bellow:

- helicopters in agricultural version - replacement is mandatory
- on other helicopters - replace if holes are out of dimension /blacklash on hinges/, and in case of spotting corrosion.

Item	Drawing Number	Name	Q-ty	Remarks
1	50.12.003.00.00	Upper hinge	1	for 50.70.50 helicopter
2	50.12.004.00.00	Lower hinge	1	for 50.70.50 helicopter
3	50.12.803.00.00	Lower hinge	1	for 50.71.50 helicopter

3.6.4.5. Flight and engine control

1. Replace No. 50.50.590.00.00 seating for fixing the RP-35 booster to the support, according to 3.7.4.
2. Check control system support, made of magnezium alloy for corrosion centre.
   Remove corrosion centres and then renew anti-corrosion coatings according to 3.7.6.
3. Check stabilizer and tail rotor control cables and pulleys for condition.
   Replace cables in case of any damage like individual wire break, individual wire extension, sharp folds or corrosion.
4. Replace STU-50.53 chain of tail rotor control system in accordance with the process specification given in 3.7.5.
5. Check 50.13.300.34.00 cable guides /20 pcs/ for general condition.
   Disconnect the guide and check it for damage.
   Check also holes diameters; they cannot exceed 6 mm.
   The distance from the holes in the guide to the edge shall be not less than 1 mm, but to the fixing holes not less than 0.5 mm.
   Replace guide in case of any damages or if hole diameters are over 6 mm. Check each guide individually.
6. Check and replace control system bondings connectors if damaged.
   Remove damaged connector, blend surface round the mounting holes and new bonding connector terminal. Install connector by means of screws and washers previously removed. Apply A17 varnish to the blended areas.
   Mark screws with red enamel.

7. Lubricate single bearings in the following levers:
No. 50.50.520.00.02 or 50.50.52.00.00.01; 50.50.530.00.00, 50.50.540.00.02 or 50.50.540.00.01.
Check lever bearings for freedom of movement.
Lubricate them, if stoppages, in accordance with the process specification given in 3.7.1.

8. Check control system for freedom of movement.
Check forces given in Chapter 1 - "Adjustement Data" p. 9.10 and 11 of "Technical Description - Airframe" on control stick, collective pitch lever and on pedals of the tail rotor central
To measure the forces on the control stick and collective pitch lever disconnect spring force system as well as hydraulic system and remove main rotor blades.
Forces on the control stick measure in the middle of grip while uniformly moving the stick from one to other extreme positions in not less than 20 seconds and at ambient temperature min. + 15°C.
To measure forces on pedals disconnect spring compensator, in the middle of pedals foot-rest.
Displace pedals in the same way as the control stick.

3.6.4.6. Fuel system

1. Check fuel piping insulation for general condition.
In case of any damage replace insulation in the way given in 6.7.3.

2. Replace the following fuel drain hose:
50.61.110.03.90 fuel drain hose from main tank
50.61.200.01.90 /2 pcs/ drain hose from coarse filter
50.61.200.02.90 /1 pc/ drain hose from fine-filter
50.61.400.01.90 /1 pc/ fuel drain hose from engine drain system.

3.6.4.7. ENGINE AND MAIN TRANSMISSION OIL SYSTEM

1. Check oil piping insulation on the isolated pipes of the oil system.
   Replace damaged insulation with a new one (see: 6.7.3., items 1 through 3).
   Paint the pipes with brown EP-140 enamel.

2. Replace the thermo-valves in the oil coolers (see: 3.7.3.).

3.6.4.8. AIR SYSTEM

1. Check a system operation according to the following recommendations:
   - fill the system in from the ground bottle,
   - check the system for leaks during 20-minutes period, look at pressure decrease on the MW-100 pressure gauge.

   A decrease of pressure in the system is forbidden.

3.6.4.a Procedures to be performed every 1500 flight hours.

1. Check (by dabbing) the plate of central floor for deglueing.
   To repair the damages procede, as follows:
   - drill a hole (Ø 2 mm),
   - pour epoxide resin with syringe and needle.

   NOTES: 1. Depth of hole: max. 10 mm. Deeper hole may damage a bottom plate and the fuel tank.
   2. Make 2 to 4 holes for every 100 cm^2.

2. Replace the bearings in levers of control systems attached on the 50.50.500.00.02 bracket - force side.
3. Replace the 50.58.005.00.01, 50.58.010.00.01, 50.58.024.00.01 items on the landing gear installed.
4. Replace the 50.50.510.00.00 bracket together with the slide-bearings attaching the boosters.
5. Replace the cable pulleys and cables in the foot control system and in the stabilizer control.

wprowadzenie kzk 2D-4123 (biul. 6/Mi-2/94).

3.6.5. Periodical special inspections to be done when operation procedures are breached.

3.6.5.1. After hard landing

After euch hard landing shutdown engines and check helicopter. Pay particular attention to tail rotor, landing gear, tail skid, hub and main rotor blades, fixing joints and systems for general condition.

3.6.5.2. After violent use the rotor brakę

(whenever main rotor breaking procedure has been breached).

1. Check brake drum for colours appearing caused by overheating.
2. Check brake drum fixing to the shaft.
3. Check clearарance between break shoe and a drum.
4. Check main rotor blades for folds, skin scores and other defects.

3.6.5.3. After violent rotor or tail rotor stoppage

- check main rotor and tail rotor blades for general condition and in case of any defects send to overhaul facility,
- send helicopter to an overhaul facility to check drive system, transmission and installation and to have them repaired.

3.6.6. Special periodic work shall be done once a year.

3.6.6.1. Check visually main fuel tank for tightness, taking for criteria indicated fuel leakage.

3.6.6.1. Make visual inspection of fastening elements between main tank and fuselage for general condition.

3.7. Work procedures

3.7.1. Bearing lubrication and lever replacement (Fig.3.1.).

No. 50.50.520.00.01 or 50.50.520.00.02
50.50.530.00.00
50.50.540.00.01 or 50.50.540.00.02

1. Disconnect levers 1,2,3 from the hydraulic boosters.
2. Disconnect push rods 4,5, rods 6,7 and lever 2 from the swashplate. Disconnect stabilizer control push rod from the lever 2.
3. Disconnect lever assemblies I, II, III.
   a) lever No. 50.50.540.00.01 or 50.50.540.00.02 /III/
      - disconnect lever from the bracket after 2,5 x 25 GOST 397-66 or 2,5 x 25 GOST 397-79 cotter pin has been removed, undo 3341A-10 nut, remove 3027A-10-112-4 screw and remove lever assembly III,

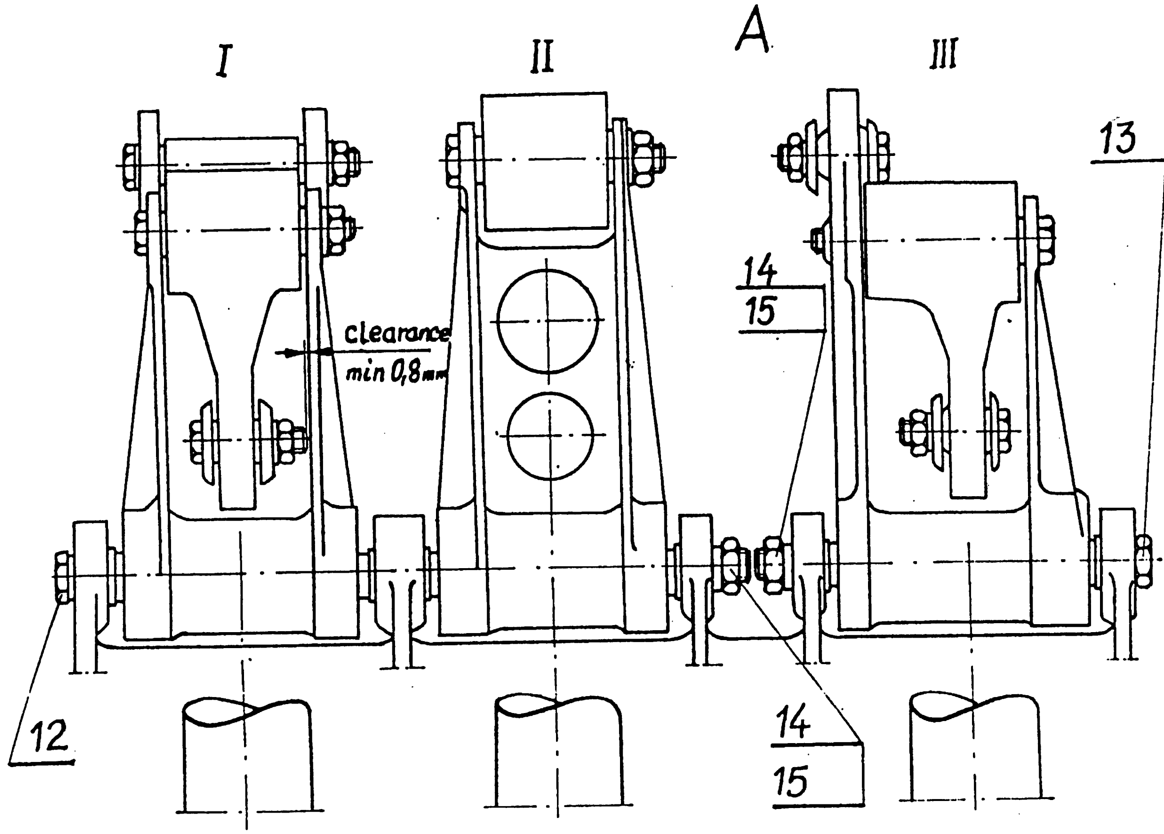
   b) No. 50.50.530.00.00 lever /I/
      50.50.520.00.01 or 50.50.520.00.02 lever /II/
      - disconnect lever from the bracket after 2,5 x 25 GOST 397-66 or 2,5 x 25 GOST 397-79 cotter pin has been removed, undo 3341A-10 nut, remove 3027A-10-197-4 screw to let lever assemblies I and II be removed from the bracket.

Figure 3.1 Cyclic and collective pitch control

I - 50.50.520.00.02 lever assembly
II - 50.50.530.00.00 lever assembly
III - 50.50.540.00.02 lever assembly

1,2,3 - levers
4,5 - push rods
6,7 - linking rods
8,9,10- levers
11 - hydraulic booster
12 - 3027A-10-196-4 screw
13 - 3027A-10-112-4 screw
14 - 3341A-10 nut
15 - 2,5 x 25 GOST 397-66 cotter pin

1 Clearance - min 0.8 mm
2 Flight direction /F.D/


A
I
II
III
Clearance
min 0,8mm
12
13
14
15
14
15

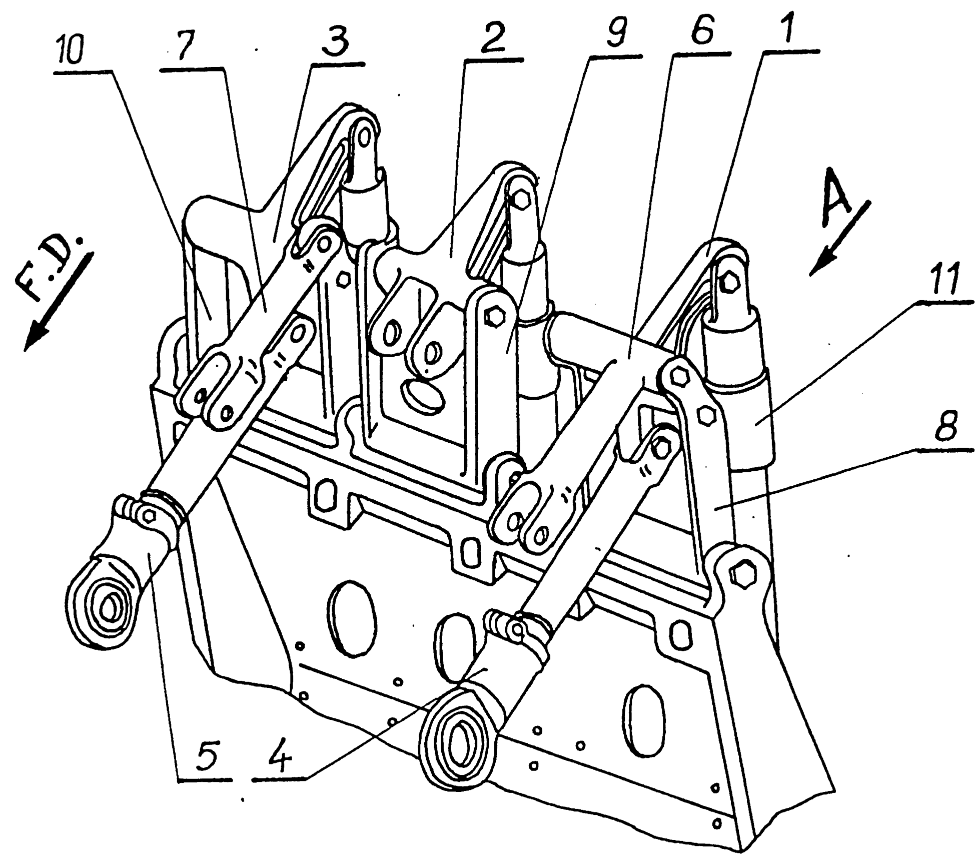

10
7
3
2
9
6
1
A
F.D.
11
8
5
4

Fig. 3.1.

4. Disassemble individual lever assemblies.
   Disconnect push-rods 4,5 from the lever 1,3 and disconnect linking rod 7 from the lever 10.
   Lubricate in individual bearings in the way given in Technical and Servicing Description of ground equipment using No. 50.92. 240.00.00 grease gun tips.
   In case of iterative jamming replace the affected lever.
5. Disconnect levers 1,2,3 from 8,9,10 and linking rod 6 from the lever 8, check double bearings /which do not require lubrication during inspection/ for operation in levers 8,9,10,1,2,3 and a linking rod 6 by moving these elements several times. The movement should be free from jammings. In case of jamming replace the affected lever.
6. Having replenished grease in all bearings and having replaced affected levers, complete lever assemblies. Connect levers 8,10, push rods 4,5 with levers 1,3.
7. Install the lever assemblies on the bracket:
   a/ 50.50.540.00.01 or 50.50,540.00.02 levers.
      Position lever assembly III in bracket holes centre line. Put in 3027A-10-112-4 screw, screw on the 3341A-10 nut and secure with new 2,5 x 25 GOST397-66 or 2,5 x 25GOST 397-79 cotter pin.
   b/ 50.50.530.00.00 lever
      50.50.520,00.01 or 50.50.520.00.02 lever.
      Having positioned lever assemblies I, II, put in the 3027A-10-196-4 bolt and press down /fixing lever assemlby I and lever assembly II to the bracket/. Screw on the 3341-A-10 nut and secure with new 2,5 x 25GOST397-66 or 2,5 x 25 GOST 397-79 cotter pin.
8. Connect assemblied levers with fittings on the swashplate.
9. Connect hydraulic boosters with the levers 1,2,3.

CAUTION! AFTER LEVERS REASSEMBLY CHECK THEM FOR SECURITY

10. Check cyclic and collective and stabilizer adjustment according to the Chapters 5.1, 5.2 and 5.6 of this manual.

LIST
of necessary parts for lever changing /Fig.3.1/

Item	Name	Drawing No. of parts	No. on Fig. 3.1	Q-ty per h-ter	Remarks
1	Lever assembly	50.50.526.00.01 /50.50.526.00.00/	8	1	50.50.520.00.02
2	Lever assembly	50.50.522.00.01	1	1	/50.50.520.00.01/
3	Lever assembly	50.50.520.01.00	6	1	lever assembly I
4	Lever assembly	50.50.531.00.00	2	1	50.50.530.00.00 lever assembly
5	Lever assembly	50.50.532.00.00	9	1	II
6	Lever assembly	50.50.542.00.01 /50.50.542.00.00/	3	1	50.50.540.00.02 /50.50.540.00.01/
7	Lever assembly	50.50.546.00.01 /50.50.546.00.00/	10	1	lever assembly
8	Connecting rod	50.50.540.01.00	7	1	III
9	Cotter pin	1,5x20GOST397-79 /1,5x20GOST397-66/	-	3	
10	Cotter pin	2,5x25GOST397-79 2,5x25GOST397-66	-	3	
11	Cotter pin	2x20GOST397-79 2x20GOST397-66	-	6	

NOTE: 1. Replace items 1-8 only in case of any bearing jamming.

2. In column 3 parts given in brackets are used on No. 50.84.50 helicopter. These parts are thoroughly exchangeable with parts used on helicopter of Nos from 50.85.01.

3.7.2. Replacement of door rubber seal /Fig. 3.2/

A. Replacement of passanger door rubber seal

1. Unscrew /2/ /48 pcs/ the fittings of the door rubber seal /Fig. 3.2/.

2. Remove rubber seal /1/ together with strip /4/ and the rest of glue and sealing compound /by means of a knife or scraper/.

3. Apply K-88 adhesive to the door where the rubber seal. Prior to gluing degrease the rubber seal and door frame with a tampoon soaked in extraction naphtha.

4. Mount strip 4 /removed acc. to point 2/ and make holes in the rubber seal 4, by means of new screws 2. Apply the Ft-068 primer to the screws.

NOTE:
Drive the 3162A-49 screw in the hole.
Cut out protruding parts of screws /the screws can protrude max. 1,5 mm/. Round sharp edges and coat with a primer.

5. Join the rebber seal 1 /see detail - D/ by putting polyurethan foam 5 of approx. 40 mm lenght inside it. Blend sealing compound application areas with abrasive paper. Use cellophane to avoid the rubber seal be bonded to the strip when sealing. After aprox. 4 hours remove outflow of sealing compound and cellophane. Make a drain hole of 5 mm dia. at the bottom from the inside of each rubber seal.

NOTE: 1. It is recommended to replace rubber seals after having removed the door.

2. The rubber seal may be done of three sections /see Fig. 3.2/.

LIST

of necessary parts for replacing load cabin door seal

Item	Name	Drawing No. or designation	Quantity per h-ter	Remarks
1	Rubber seal	50.12.800.10.00	4.200 mm	Max. lenght
2.	Screw	3172A-4-10	47 pcs	of one
3	Screw	3162A-4-9	1 pcs	section is
4	Special nut	50.10.200.46.00	48 pcs	2000 mm
5	Polyurethan foam	25 x 25 mm	150 mm	

Fig. 3.2 Replacement of the rubber seal in passanger cabin and cockip doors

(1) Passanger cabin door
(2) Cockpit sliding door
(3) Points for rubber seal connection
(4) Turned by 180°
(5) 3162A-4-9 screw

1 - rubber seal
2 - screw
3 - special nut
4 - strip
5 - polyurethan foam
6 - cellophane strap
7 - screw
8 - strip
9 - angle bar

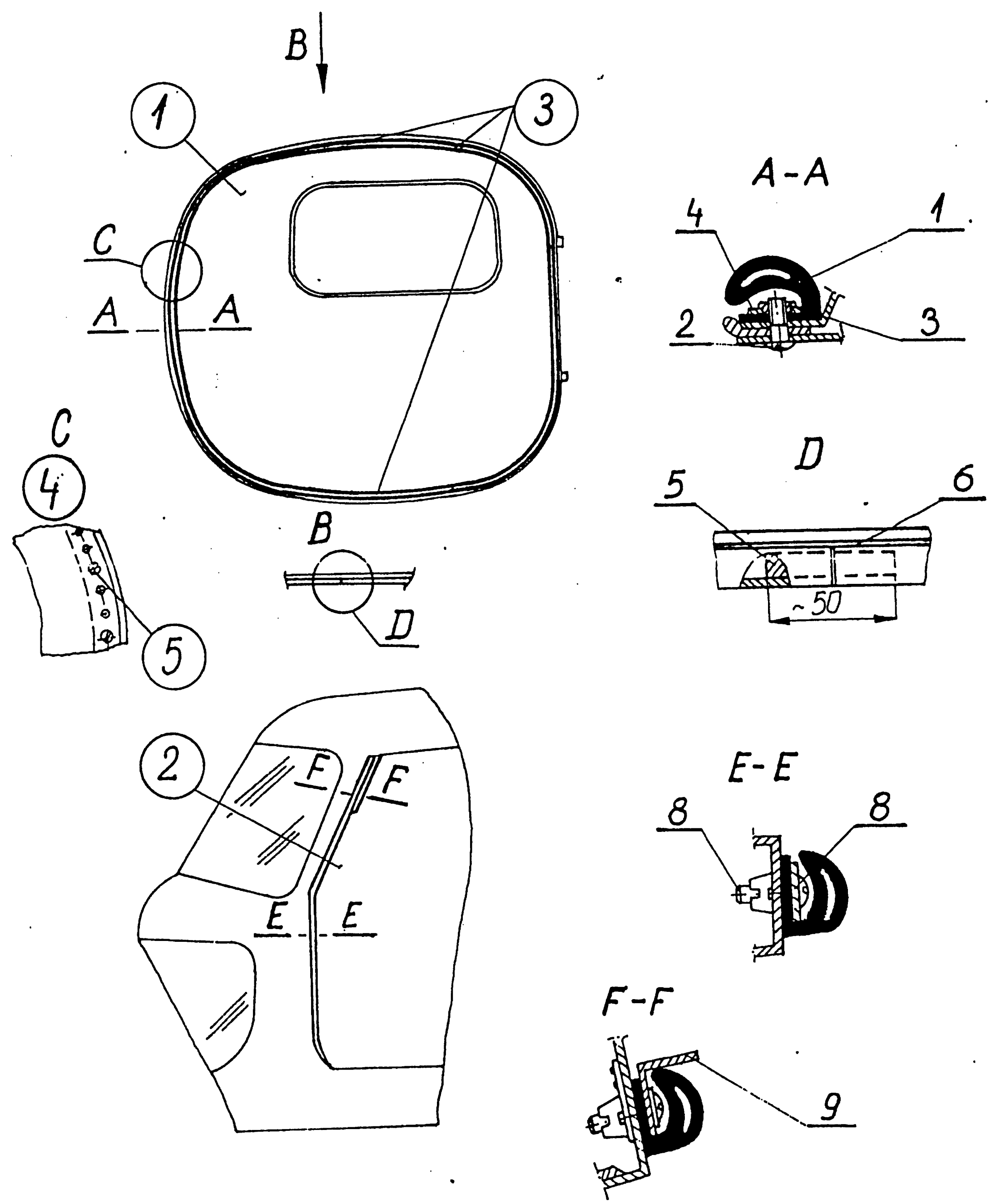
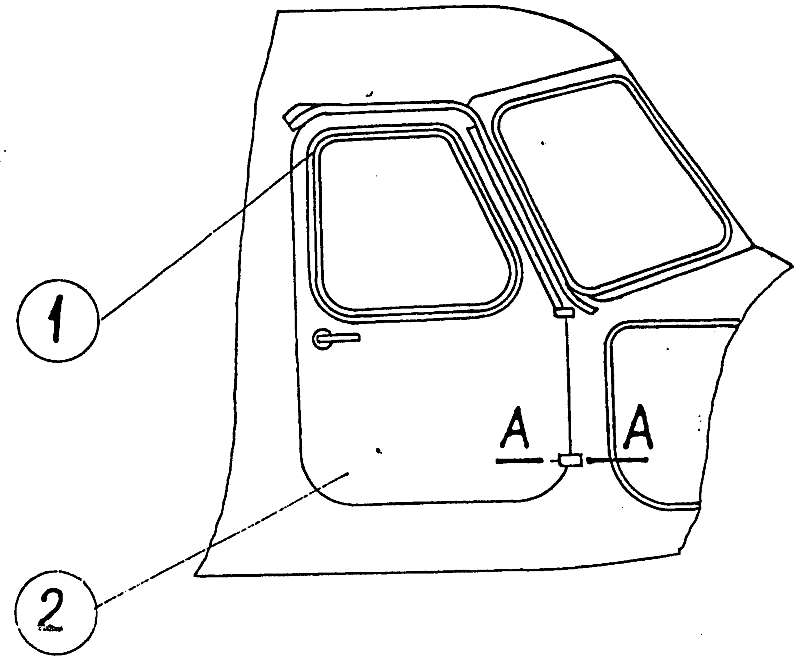


Fig. 3.2.

Fig. 3.3 Replacement of the rubber seal in cockpit right door

① Screw - No. 3162A-4-9
② Cockpit door
③ Hinge

1 - nut
2 - washer
3 - screw
4 - washer



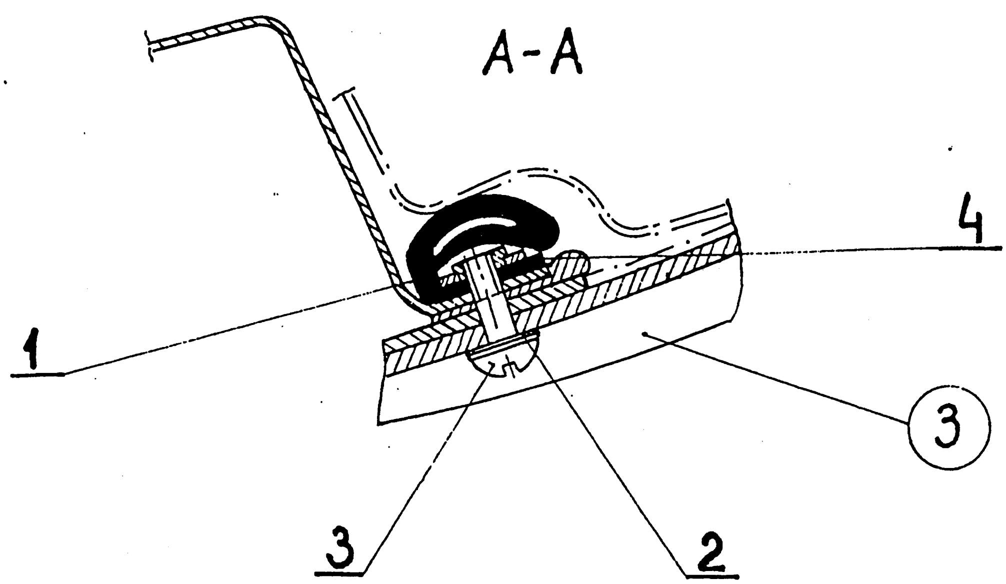


Fig. 3.3.

B. Replacement of the rubber seal in cockpit R.H door.

1. Replacement of the rubber seal should be done in accordance with directions given in p. A /Replacement of passanger cabin door/ and below given revisions.
The 50.10.200.41.00 rubber seal is attached to the strip by means of 38 screws. The rubber seal may consist of 2 sections joined on top and bottom.
Screw out and screw in Nos 3/3050A-5-16 screws and mount hinges together with the rubber seal in accordance with Fig. 3.3.
Screw out nut 1, remove washer 2 and remove screw 3.
Replace the rubber seal.
Select new screws and nuts. Screw in screws 3 using washer 4 and washer 2 from the hinge side and screw on nut 1.
Protruding part of the screw file flat with the nut, blend, punch and coat with a primar.

LIST

of necessary parts for replacement of cockpit R.H door

Item	Name	Drawing Number or Designation	Q-ty per h-ter	Remarks
1	Rubber seal	50.10.200.41.00	3800 mm	
2	Screw	3172A-4-12	37 pcs	Two sec-
3	Screw	3162A-4-9	1 pc	tions of
4	Screw /under hinges/	3050A-5-16	4 pcs	not more
5	Special screws	50.10.200.46.00	38 pcs	than 2000
6	Special screw	50.10.200.37.00	38 pcs	mm lenght
7	Polyurethan foam	25 x 25 mm	50 mm	each

C. Replacement of cockpit L.H rubber seal door.

1. Screw out screws 7/11 pcs. fig. 3.2/ fixing the rubber seal and strip 8 to the door frame.

2. Replace rubber seal according to the directions given in p. A.

NOTE: Fix angle bar 9 in upper door frame by means of the first 4 screws No. 3172A-16.

LIST

of necessary parts for replacement of cockpit sliding door rubber seal

Item	Name	Drawing Number or designation	Q-ty per h-ter	Remarks
1	Rubber seal	50.10.000.39.00	1 pc	
2	Screw	3172A-4-12	11 pcs	
3	Screw	3172A-4-16	4 pcs	

3.7.3. Replacement of thermal valves in GTD-350 engine and WR-2 main gear box oil cooler

A. Replacement of thermal valves in main gear box and right engine oil cooler.

1. Drain oil from oil cooler that thermal valve is to be replaced.

2. Disconnect oil pipes from the cooler.

3. Unscrew 6 nuts fixing the cooler, remove No. 3402A-1-6-12 washer and remove oil cooler /Fig. 3.4./.

Fig. 3.4. Thermal valve replacement in oil cooler

1 - oil cooler

2 - OR-113-53 lead seal

3 - Sb-2795-3-0 thermal valve

4 - 2262A-152 O-ring gasket

5 - GOST-792-41 securing wire

6 - nut

7 - B402A-1-6-12 washer

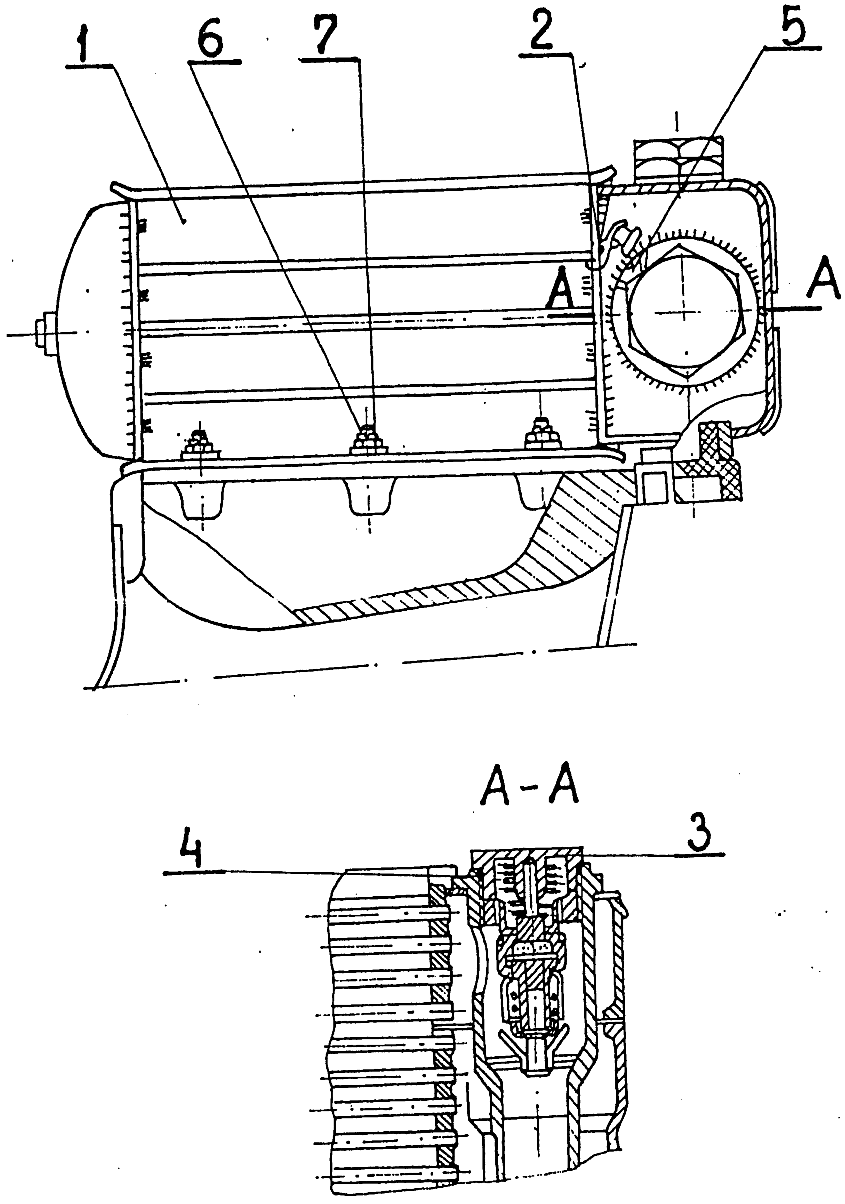


Fig. 3.4.

4. Remove OR-113-53 lead seal.
5. Unscrew Sb 2795-3-0 thermal valve. Cover cooler value seat with a cotton material /if a new thermal valve is not to be mounted just after the old one has been removed/.
6. Put a new 2262A-1520 ring gasket on the new thermal-valve.
7. Screw tight the new thermal-valve in cooler seat.
8. Fix securing wire with OR113-53 lead seal analogically to one before removing.
9. Set up previously removed cooler and washers, screw on nuts and screw them tight.
10. Connect oil pipes to the cooler /disconnected acc. to p. 2/.
11. Having done a/m operations fill oil system with oil in accordance with p. 2.4. "Engine oil system filling". Check oil system with operating engines. Check oil pipes connections th the cooler for sealing with engine shutdown.

B. Thermal valve replacement in L.H engine cooler.

1. Do operations according to p.1; 4÷8, .11 of Chapter A of this process specification.

LIST
of parts for thermal valves replacement

Item	Name	Part No.	Q-ty per h-ter	Remarks
1	Thermal valve	Sb2795-3-0	3	
2	Sealing ring	2262A-152	3	

3.7.4. Replacement of 50.50.590.00.00 seat for fixing hydraulic boosters to the bracket.

1. Disconnect hydraulic boosters 3 from levers 4,5,6 /see fig. 3.5/.
2. Unscrew 3320A-8 and 3301A-8 nuts and remove 3402A-1, 5-8-14 washers.
3. Remove seats 2 /50.50.590.00.00/ from the support 1 and then from hydraulic booster pivots 3.
4. Apply new KF 030 primer to the seat base.
5. Having basis ground in pairs set up new seats on hydraulic boosters pivot /one ground in pair seat for one booster/.
6. Set up seats 2 on screw fixed with the support and 3402A-1,5-8-14 washer; screw on initially 3301A-8 nuts. Boosters clevis should enter into levers arms 4,5,6 without any stress.
7. Tighten 3301A-8 nuts with torque of 1,5-1,65 kGm and secure by means of 3320A-8 nuts.
8. Connect hydraulic boosters with levers 4,5,6 by means of 3027A-7-36-3 screws, 3402A-1,5-6-12 washers, screw on 3341A-6 nuts and secure them with new 1,5 x 20 GOST 397-66 cotter pins.

LIST

of parts for seat replacement

Item	Name	Drawing No.	Q-ty per h-ter	Remarks
1	Seat assembly	50.50.590.00.00	6	Seats ground in pairs
2	Cotter pin	1,5x20GOST397-66	3	

Fig. 3.5. No. 50.50.590.00.00 seats replacement

1 Clearance - max. 0.1

1 - bracket

2 - seat

3 - hydraulic booster

4 - lever

5 - lever

6 - lever

7 - bracket

8 - 3320A-8 nut

3101A-8 nut

3402A-1,5-8-14 washer

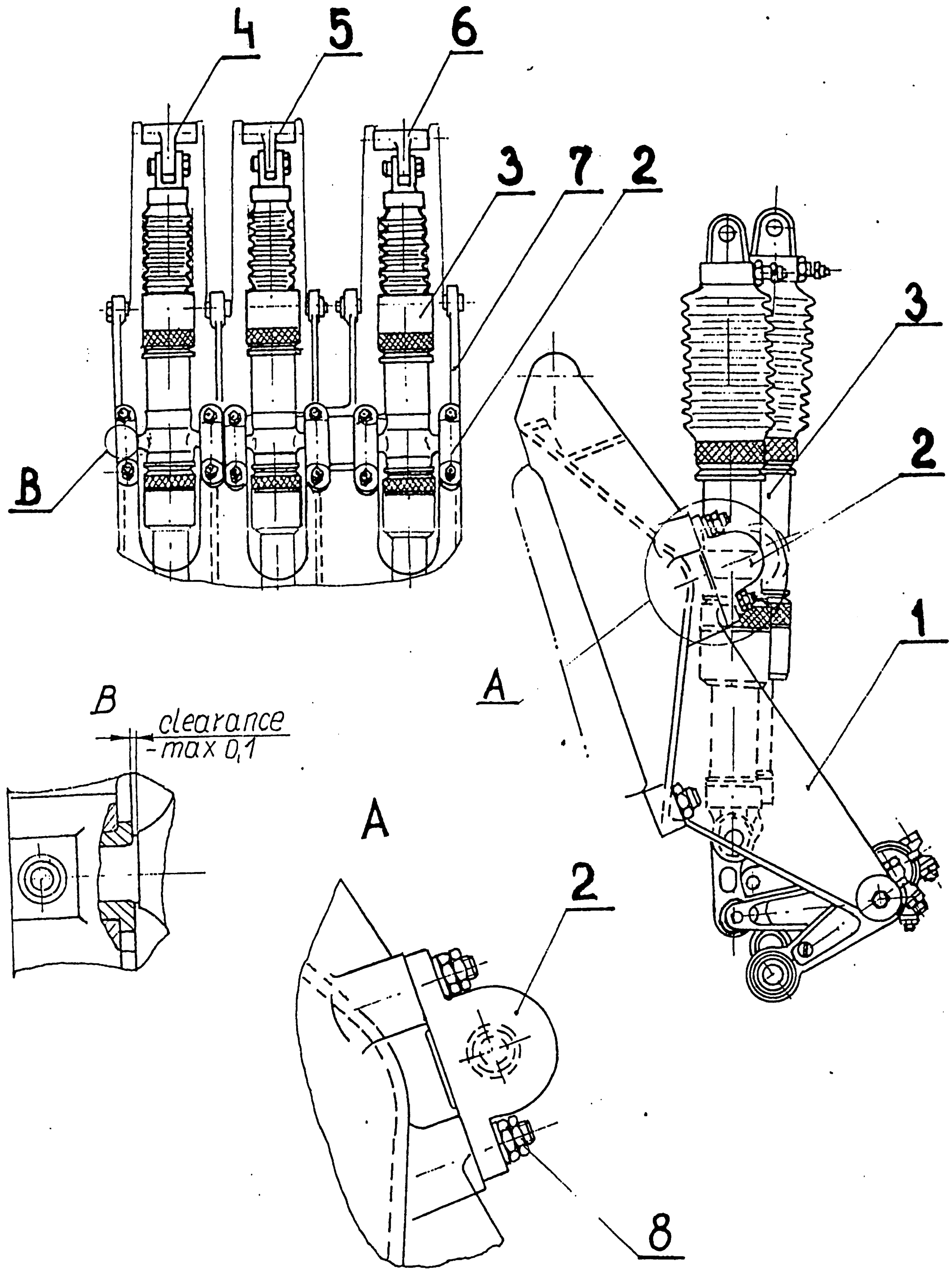


Fig. 3.5.

3.7.5. STU-50,52 chain replacement /Fig. 3.6/

Replacement of STU-50,52 chain in tail rotor control system should be done in accordance with the following process specification.

1. Open cover of transmission shaft between frames 5 to 14.
2. Remove the cover of top inspection opening of tail pylon /Fig. 3.6/.
3. Disconnect control cables from two turnbuckles located between 5 and 7 frame.
4. Remove two up-back cable guides.
5. Move /on pulleys/ backwards cables connected to the chain.
6. Undo OSS-61 anti-collision light and hang it by means of cord on the aft transmission.
7. Connecting points of cables with chain take out through the inspection opening /Detail - A/.
8. Disconnect chain from cables 4.
9. Remove chain from rear transmission gearbox through the inspection opening.
10. Remove tail rotor in accordance with p. 6.5.1 of this instruction.
11. Set up aft transmission shank in neutral position to $152{,}8^{+0{,}25}$ mm by means of No. 50.92.450.00.00 sleeve assembly.
12. Re-install new chain through the inspection opening of the gearbox. The difference between free chain ends length, in neutral shank position shall not exceed 10 mm.

    NOTE: Installed STU-50,52 chain shall be lubricated with CIATIM 201 or ST /NK 50/ grease.

13. Pull out the chain ends through the inspection opening.

Fig. 3.6. STU 50.52 Chain Replacement

(1) 3027A-4-20 bolt

3301A-1 nut

Bump it.

1 - chain

2 - top inspection opening cover

3 - tail rotor gear box

4 - cables

5 - tail boom

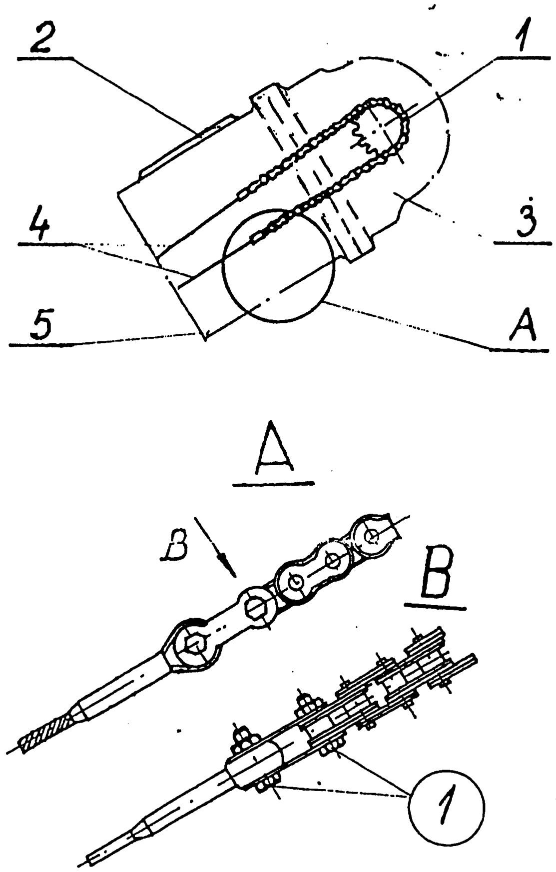


Fig. 3.6.

14. Connect chain to cables, acc. to Fig. 3.6, with new 3027A-4-20 bolts /4 pcs/ and 3301A-4 nuts /4 pcs/, and secure it by bumping bolts that jut out of nuts.

    NOTE: Connect the end of the chain, designated with the part number, to the top cable which is placed near the inspection opening No. 2.

15. Strain cables and connect them, on turnbuckles, to fore cables.
16. Check cable arrangement regularity on pulley.
17. Reinstall upper cable guards and secure them with KO ⌀0,8 wire.
18. Adjust tail rotor control acc. to point 5.7 of this instruction /with bushes for tail rotor control adjustment No. 50.92.450.00.00 - refer to "Technical Description and Ground Equipment Operation Manual of Mi-2 Helicopter", pnt 5.41./.
19. Install tail rotor acc. to pnt 6.5 of this instruction.
20. Install support along with anti-collision light.
21. Fasten transmission shaft cowling.
22. Fasten inspection openings covers on fuselage aft and tail-rotor pylon.

Parts Specification Necessary for
STU 50.52 Chain Replacement

Item	Unit	Part Number	Q-ty per h-ter	Remarks
1	Chain	50.52.000.00.00	1	
2	Bolt	3027A-4-20	4	
3	Nut	3301A-4	4	

3.7.6. Varnish Coatings Renovation.

These are the varnish coatings flaws one mostly finds:

a/ mechanical and chemical coating destruction,
b/ peeling and cracking.

NOTE: The varnish coatings renovation should be accomplished in closed rooms /air-sheds and tents/. You are allowed to do it in the ipen provided it is sunshine and no wind. The ambient temperature should equal +5 ÷ 35°C, and the relatiove humidity should not exceed 75 %.

CAUTION

ONE SHOULD STRICTLY ABIDE BY THE OBLIGATORY FIRE-EXTINGUISHING REGULATIONS BECAUSE OF THE USE OF INFLAMMABLE MATERIALS DURING THE VARNISH COATINGS RENOVATION.

Surface preparation

1. Rinse places of varnish coatings flaws and wipe them dry.
2. Remove damaged coating that comes off, and in case of corrosion, blend area with abrasive paper No. 200-220 and degrease it with petrol B-70.
3. Regrind zone of damaged area transition into not damaged one, and also zone of 5 ÷ 20 cm wide /on periphery/ on not damaged area with abrasive paper No. 200-240.

   NOTE: The operations presented in pnt. 3 should be accomplished only provided that the renovation is performed with the use of a sprayer.

4. Degrease renovated surface with pure non-leaden gasoline.
5. Secure surfaces that don't undergo painting /bearings, rubber parts, plastic parts et./.

NOTE: If the accomplishement of the above mentioned operations does not bring about the disturbance of a priming layer renovate only the external layers of the varnish coating.

Varnish coating renovation on external and internal fuselage surface.

1. Put on thin priming layer-WŁ-02
2. Dry it in ambient temperature within 1-2 hours.

   NOTE: The operations described in the points-1-2 deal with nonanodic parts coatings /in weled joints/ or anodic ones in the erent of a partial anodic film destruction.

3. Put on priming layer-AK-069.

   NOTE: In case of the helicopters that are primed with an epoxy priming, use the yellow epoxy primer 7429-699-130 for the helicopter serial numbers, that follow the 55 helicopter serial number, dry it within 6-8 hours in the ambient temperature.

4. Dry it in ambient temperature within 2-4 hours.
5. Put on second priming layer-AK-069.
6. Dry it in ambient temperature within 2-4 hours.
7. Regrind it with abrasive paper No. 200-240 and degrease it with petrol B-70 /deals with AK-069 priming/.
8. Put on enamel layer-EP-140 of adequate colour.
9. Dry it in ambient temperature within 6 hours.

   NOTE: If decorative coatings are needed, prolong the drying time of the first layer to 24 hours, then grind it with abrasive paper and degrease it with petrol.

10. Put on second enamel layer-EP-140.
11. Dry it in ambient temperature within 24 hours.

NOTE: The operations described in the 7-11 points should not be accomplished in case of the varnish coatings of the internal surfaces on which upholstery linings are mounted.

Varnish Coatings Renovation on Parts made of Magnesium Alloys

The parts made of magnesium alloys are characterized by low resistance to corrosion.
One should striclty abide by the following directions in case of detecting any traces of corrosion:

1. Remove varnish coating with remover.
2. Sand corrosion spots with abrasive paper No. 200-240.
3. Blow through surface with compressed air.
4. Wash surface with petrol and wipe it dry.
5. Oxidize locally bleaded spots with cotton wool swab drenched with solution of following composition:

   - magnesium oxide - 8,9 g
   - chronic anhydride - 45,0 g
   - sulpghurous acid - 0,6-1,0 g /weight density - 1,84/
   - water - 1 l

   Local oxidation time - 30 - 45 sec.
6. Remove excess of solution with cotton wool swab and wipe sufface dry.
7. Put on p EP-076 priming layer.
8. Dry in ambient temperature within 2-4 h.

9. Put on EP-140 green colour enamel layer.
10. Dry in ambient temperature within 6 h.
11. Put on second EP-140 green colour enamel layer.
12. Dry in ambient temperature within 24 h.

3.7.7. Varnish Coating Renovations on Phosphate coated or Cadmium plated Steel Parts

1. Prepare surface acc. to chapter 3.7.6.
2. Put on 7429-659-130 epoxy priming layer.
3. Dry in ambient temperature within 2 + 4 h.
4. Put on first EP-140 enamel layer of adequate colour.
5. Dry in ambient temperature within 6 h.

   NOTE: To obtain decorative coatings, the first enamel layer drying time extends to 24 h.

6. Regrind it with abrasive paper and degrease it with petrol.
7. Put on second EP-140 enamel layer of adequate colour.
8. Dry in ambient temperature within 24 h.

3.7.8. Varnish Coatings Renovations on Helicopter Systems Tubings Made of Steel and PA-1 and PA-2 Aluminium Alloys

NOTE: The particular systems are marked with the following colours:

- compressed air system - black
- hydraulic system - gray-blue
- fuel system - yellow
- fire-extinguishing system - red
- oil system - brown

1. Prepare surface acc. to chapter 6.7.7.
2. Put on 7429-659-130 priming layer.

3. Dry in ambient temperature within 6 - 8 h.
4. Grind with abrasive paper No. 180-200 and degrease it with petrol.
5. Put on first EP-140 enamel layer of adequate colour.
6. Dry in ambient temperature within 6 h.
7. Put on second EP-140 enamel layer of adequate colour.
8. Dry in ambient temperature within 24 h.
9. Renew tubing marking.

3.7.9. Varnish Material Specification

Item	Material Name	Material Designation		Standard		Working Viscosity	Dissolvent
		Russian	Polish	Russian	Polish		
1	2	3	4	5	6	7	8
1	Phosphate priming	WŁ-02	-	GOST-127 07-77	-	-for sprayer 14-19 -for brush 25-50	xylol
2	AK-069, AK-070 primine			OST-6-10 -401-76	-	-for sprayer 14-19 -for brush 20-30	R-5
3	Epoxy priming	MRTU-6-10-755-74	EP-076	OST-6-10 401-76	-	-	R-5
4	Poliamide - epoxy enamel - blue - red - yellow - brown - black - light grey		EP-140	-	BN-78/6115-73	-for sprayer 12-20 -for brush 18-30	R-40 R-5 thinner for epoxy products for enamel of Polish production acc to BN-78/6158-22

1	2	3	4	5	6	7	8
	- grey - white - green - khaki - azure - aluminium - of protective colour						
5	Yellow epoxy primer		7429-659-130		BN-78 / 6113-32	for sprayer 14-20 for brush 20-30	thinner for epoxide products
6	Petrol		B-70	-	PN-58 / C-96023		
7	Dissolvent	R-5		TU-6-10-1251-72			
8	Xylol				PN-54 / C-97025		
9	Technical acetone				PN-59 / C-83001		

3.7.10. Overhoul and Actual Removal of Fuselage, Tail Boom, Floor and 9F Frame Skin Defects.

Fuselage and tail boom admissible defects

1. Check, during overhoul, whether there is no dents, punctures, cracks, extractions, rivet slackening, broken pressure welds.
2. Little dents, 2 % of the greatest dent width, are permitted. This dent area should not exceed 50 cm^2.
3. Scratches max. 300 mm long, not deeper than 0,1 mm are permitted in quantity not greater than 2 per 1 m^2. Blend them and renew varnish coating acc. to 3.7.7.
4. Coating cracks 5 mm long are permitted. Spot drill crack ends with drill Ø 2-3 mm and seal them with the sealing compound U30MES-5 from the inside.
5. Scratches max. 20 % of material thickness deep, 400 mm long, in quantity not more tham 4 per 1 m^2, and little dents max. 2 % of the greatest width deep, with area not exceeding 80 cm^2 are permitted on non-structural skinning /door, covers, cowlings/.

Skin, Dents Removal

NOTE:

Remove engine and main transmission cowling dents, having dismantled them first from a helicopter. Having removed the dents mount cowlings on helicopter.

a/ Remove dirt out of damaged places.

b/ Straighten dished section of surface with textolyte hammer, using steady rest located on skin reverse side. Fit skin profile to helicopter profile with gentle hammer strokes around damaged spot, and then in direction to centre.

c/ Place and rivet additional PR-100-2 strengthening section made of D16T material from the skin inside in case of skin convexity. Drill bores Ø 3,1 and rivet strengthening section with 3560A-3-6 rivets at a pitch of 20 mm, use strengthening section length as required.

d/ Having removed dents, put on varnish layer on coating acc. to 3.7.7.

Non stiuctural skinning cracks and punctures removal

a/ Remove deep scratches and little cracks by drilling out bores at cracks /scratches/ ends /with Ø 2,6 drill/.

b/ In case of greater cracks, fit and rivet a strap, made of D16AM material of thickness equal to skin thickness, from the skin inside, in place of crack. Spot drill bores Ø 3,1 and rivet nut with 3560A-3-6 rivets.

c/ Seal repaired coating spots with U30MES-5 sealing compound and put on varnish coating acc. to 3.7.7.

d/ Remove coating from puncture spot by cutting it out to obtain round or oval cut-out shape.

e/ If there is cut-out on coating and it is not limited with strengthening sections or angle bars /on the outside of cut-out, free area width should be equal to about 25 mm/, fit insert made of D16AM material. Its thickness should be equal to skin thickness.
Then, make a strap overlapping the cut-out by 24 mm.

f/ Put on strap from the skin inside drill out bores Ø 3,1 and rivet strap with 3560A-3-6 rivets.

g/ Fix insert and drill out bores Ø 3,1.
Put in rivets-3560A-3-6 into bores and rivet insert together with strap.

h) Seal the joint surface area with U30MES-5 sealing compound.

i) If any skin cutout being surrounded by profile or angle sections, cannot be provided with straps and insert, only external strap shall be used.

j) Cut out and fit an external strap of D16AM material 1 mm thick with other dimensions exceeding cutout size by 24 mm. A chamfer of 45° shall be provided along the strap circumference.

4. HELICOPTER OPERATION IN WINTER

4.1. Preparing the Helicopter for Winter Flights

The helicopter preparing for winter flights should be performed after ambient air temperature stabilizing at +5°C or below.

1. Perform 50 hours procedure. Pay particular attention to laquer coating. Repair all defects.
2. Inspect the covers and repair the defects.
3. Adjust the cables tension for pedals controlling and stabilizer controlling.
4. Drain condensate from the compressed air reservoirs (after the reservoirs discharging).
5. Check the condition of the individual systems.
6. Remove the plug from the air intake of DW-1kM fan installed in the cockpit.
7. Remove the covers from the main landing gear shock-absorbers stems. Inspect the stems and check for cororosion spots.
   If no corrosion spots or other inefficiences were found, lubricate the stems with CIATIM-201 grease and put the covers onto the stems.
8. For intermediate and TR gearboxes perform oil replacement (for season oils) or not (for multiseason oils) depending on operating temperatures of oils to be used, acc. to Table 2.2. Prior to filling heat up oil mixture to reach +15°C and thoroughly mix for 3 to 5 minutes.
9. For horizontal and vertical hinges of MR hub perform oil replacement (for season oils) or not (for multi-season oils) depending on operating temperatures of oil to be used, acc. to Table 2.2.
10. For axial hinges of MR hub perform oil replacement (for season oils) or not (for multiseason oils) depending on operating temperature of oil to be used, acc. to Table 2.2.

    NOTE: Heat up the hinges using hot air stream to make oil draining more easy.

11. Set the bypass valves of the engines oil system in "OPEN" position (if the bypass valves are installed on the helicopter).
    When during winter operation, the ambient air temperature increases above +5°C, reset the valves to "CLOSED" position.
    Secure the valves after every resetting.

12. Check the fire extinguishing bottles for the valve opening without discharging. (acc. to Item 6.9.4).

13. Install the skids (acc. to Operator request).

4.2. Preparing the Helicopter for Engines Starting

Preparing the helicopter for engines starting in winter should be performed the same way in summer with the following procedures:

1. Remove engines air intake covers and exhaust pipes plugs (if air intake dust separators were not installed) and check the ducts for snow, water or ice presence. Check the blades and vanes of the compressor and turbines for freezing. To perform a)m procedure rotate the compressor by means of Ist stage blades (through the air inlet duct) and free turbine- by rotating the main shaft.

   When any snow or ice is found in ducts - remove it using warm air stream.

2. Heat up using hot air stream at temperature to +80°C:

   a) main gearbox (heating procedure is included in Chapter 3 para 3.1 " Winter Operation" of Operating and Servicing Instructions for -Main Drive WR-2";

   b) intermediate and TR gearboxes to reach warm condition of crankcase determined by hand. (Minimum temperatures to start gearboxes heating are included in Table 2.2.

   "Capacities of the helicopter systems and grades of oils and lubricants to be used").

3. In case the ambient air temperature is below -40°C, warm up the engines, oil coolers and GB-2 hydraulic unit /using warm air at a temperature to 80°C/.

   Check the temperature of oil at the engine inlet by taking readings of temperature indicators on the instrument panel.

   Warm up the engines until the temperature of oil is minimum - 30°C.

4. Should ice or snow be found on the helicopter rotor blades or tail rotor blades, remove it using warm air at a temperature not higher than +60°C, and wipee the surfaces with clean soft rags.

5. While starting the engines, close the valves in hot air supply lines to the heaters.

4.3. Heating-up Engines and Checking Engine Performance

In winter, heat up the engines and check their performance in the same way as in summer and, additionally, carry out the following procedures:

1. Heating up the engines within minimum speed range shall be carried out according to requirements included in "Operating and Servicing Instructions for Engine GTD-350"

2. In case the engines reach the minimum speed range and after a lapse of 1 to 5 minutes the turbo-compressor speed begins to decrease while the temperature of gases begins to increase, stop the engine by re-setting the cut-off valve lever and after a lapse of 3 to 5 minutes restart them. /It is recommended that fuel pump be warmed up with warm air/.
3. At the ambient air temperature below -30°C the engine may not reach the maximum speed within the take-off power range. Do not change the adjustment of fuel pumps, for with an increase in the ambient air temperature the maximum speed will return to the rated value.
4. Having tested the engine and before stopping it, let it run for 2 to 3 minutes within the minimum speed range.

4.4. Maintenance of Helicopter during Longer Out-of-Operation Time

If under operating conditions a longer idle time is planned for the helicopter, carry out the following procedures:

1. Set the helicopter on a ground which is hard enough and not waterlogged.
2. Remove any obstacles which may hinder access to the site.
3. Put canvas covers on the helicopter and blank off the engine inlet and outlet ducts.
4. Put canvas covers on the pitotstatic tube as well as on the radio-altimeter and radiostation antennae.
5. If the ambient air temperature is forecasted to be:
   a/ lower than -35°C, drain oil from the main transmission oil system;

b) lower than -40°C, drain oil from the engine oil systems. In any such case drain oil just after the engines stopping.

Before filling the systems, warm oil to be poured into the oil tanks to reach the temperature of 60 up to 70°C.

6. Provide proper anchoring on the stand protect the helicopter against the wind.

4.5. Preparing the Helicopter for Summer Flights

Prepare the helicopter for summer flights after the the temperature stabilizing at 5°C or more.

1. Perform 50 hours procedure. Pay particular attention to lacquer coating. Repair all defects.
2. Dry and inspect the covers, repair the defects if any
3. Adjust the cables tension for pedals and stabiliser controlling.
4. Drain condensate from the compressed air reservoirs (after previous discharging the air reservoirs).
5. Check the condition of individual systems.
6. Plug the air intake on DW-1KM fan in the cockpit.
7. Remove the covers from the main landing gear shock-absorbers and check for corrosion. When the stems are corrosion free and without other inefficiences, lubricate them with CIATIM-201 and protect with the covers.
8. In intermediate and TR gearboxes and in horozontal and vertical hinges of MR hub perform oil replacement (for season oils) or not (for multiseason oils) depending on operating temperatures of oil to be used acc. to Table 2.2.
9. In axial hinges of MR hub perform oil replacement (for season oils) or not (for multiseason oils) depending on operating temperatures of oil to be used, acc. to Table 2.2.
10. Check if the shorted circulation oil valves in the engines oil system are in CLOSED position. If not, set properly and protect.
11. Remove the skids (if installed).
12. Check fire extinguishing bottles for valve opening reliability without charge discharging (acc. to para 6.9.4).

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5. ADJUSTMENT OF HELICOPTER CONTROLS

If any maintenance procedures carried out in the helicopter may cause misadjustment in control system, readjust the helicopter controls just after the said procedure have been completed. The following controls are subject to readjustment: collective pitch controls, longitudinal and lateral controls including relieving mechanism, helicopter rotor brake controls, stabilizer controls, tail rotor controls and engine controls.

In single controls helicopters, adjust the controls according to recommendations given in paras 5.1 to 5.8.

In dual controls helicopters adjust the controls according to recommendations given in paras 5.1 to 5.8 but only with respect to the first pilot´s controls.

Adjust the second pilot´s controls in such a way that a clearance not less than 1 mm remains on stops of the pitch and power output lever, the correction knob, the control stick and the rudder bar when the first pilot´s controls are set in their extremme positions.

After such an adjustment, check the travel of the first pilot´s rudder bar pedals /it should be within the limits 86.5 ± ± 5 mm in both directions from the mid-position/.

5.1. Adjustment of Collective Pitch Controls /Fig. 5.1./

1. Set the pitch and power output control lever in its extreme bottom position.

2. Adjust the controls /by means of a pull rod 2/ to obtain a clearance 0.2 ÷ 0.5 mm between the control disk slide and the guide collar.

3. Set the pitch and power output control lever in its extreme top position and check clearance between the swash-plate slide and the guide collar. It should be 32 ± 1 mm.

4. A travel of the collective pitch control oil-to-oil booster from the mid-position should be 49.4 mm with the pitch and power output control lever in its extreme bottom position and 50.0 mm with the pitch and power output control lever in its extreme top position.

5. Adjust the collective pitch indicator sensor lever to obtain the following readings:
   - with the pitch and power output control lever in its bottom position — 1 degree
   - with the pitch and power output control lever in its top position — 13 degrees

6. Check main rotor blade tracking acc. to 5.4.

   NOTE: Adjust initially a push-rod to the dimention of 109 mm /between nuts faces/ in case of the collective pitch control adjustment after the swash-plate replacement - before checking the blade tracking.

7. Check main rotor revolution at take off power. They should amount to 79 ± 1 %. Try to obtain revolutions max. approximate to quantity 79%.

8. Check push rods length. Mean length of 3 push-rods should amount to 109 ± 3 mm.

9. When main rotor revolutions or mean length of 3 push-rods do not correspond to required quantities, one should obtain conformity with required parameters /79 ± 1%; 109 ± 3 mm, by means of increasing or decreasing all 3 push-rods by equal quantity.

NOTE: 1. Decreasing mean length of push-rods by the half-turn of a nut results in increasing main rotor revolutions by approximately 1 %.

2. After the replacement the new-fixed push-rods should have the same length as the former ones.

10. Check main rotor blade tracking acc. to 5.4.

5.2. Adjustment of Longitudinal and Lateral Controls /Fig. 5.2/

1. Set the control stick in neutral position locking it in a bracket by means of two dowels.

2. Set the control rocker arms in neutral position and lock them with a pin. To do this, unscrew screws and dismount the cover as well as remove the upholstery above the passenger cabin door and insert a pin into holes in the rocker arms. Adjust the length of pull rods 4 when required.

3. Check the longitudinal and lateral control oil-to-oil boosters and, if required, set their rods by means of pull distances between the top face of the oil-to-oil booster cylinder and the C/L of the bolt fixing the booster rod at its top end:
   - for longitudinal controls 100.7 mm
   - for lateral controls 106.2 mm

4. Check the inclination angle of the swash-plate ring. It should be $40^{\circ} \pm 6'$ forwards in the longitudinal plane and $0^{\circ} \pm 6'$ in the lateral plane.
   Check this angle using scales 8 and vernisers 7 installed on the longitudinal and lateral control rocker arms. When required, adjust the inclination angle of the swash-plate ring using pull rods 5.

5. Adjust the control stick stops to obtain the following values of the inclination angles of the swash-plate ring when the control stick is in its extreme positions:

Displacement of control stick	Inclination angle of swash-plate ring
forwards	$7^{\circ} \pm 12'$
backwards	$6^{\circ} \pm 12'$
to the right	$5^{\circ} \pm 12'$
to the left	$5^{\circ} \pm 12'$

5.3. Adjustment of Longitudinal and Lateral Controls Trimming Mechanism /Fig. 5.3/

1. Set the control stick in mid-position and lock it by means of two dowels.
2. Disconnect the trimming mechanisms from the longitudinal and lateral control rocker arms. Set the rods of the mechanisms in mid-position by means of the trimming tab change--over switch /total rod travel is 30 $\pm$ 1.5 mm/.
3. Connect the trimming mechanism pull rods with the longitudinal and lateral control rocker arms in such a way that springs are not tensioned. When required, adjust the length of pull rods 1.
4. With the trimming mechanism rods in mid-position, set the lever 4 of the UPES-S2w sensors in mid-position using turnbuckles 3.

Fig. 5.1. Collective Pitch control

1 Detail A

2 Detail B

a Collective pitch control lever in extreme down-position

b Collective pitch control lever in extreme up-position

4 Detail C

5 (a- dinamention corresponds to central collective pitch lever position)

6

1 = collective pitch control lever
2 = push - rod
3 = pitch link

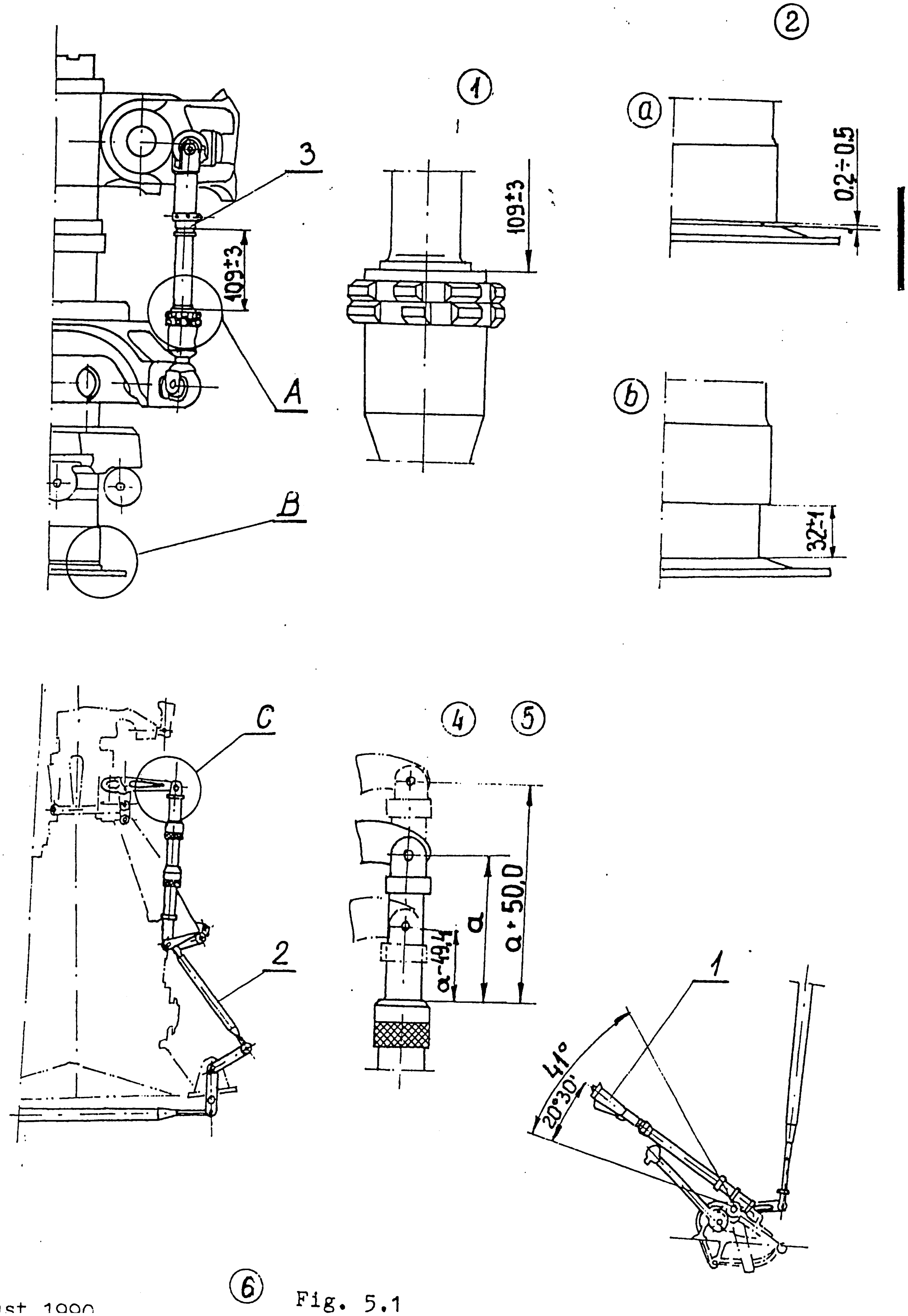

Fig. 5.1

Pointers of the trimming tab indicators should then be in the zero position.

Adjust the indicator readings by changing the lever radius inside oval holes for fastening the lever.

With the relieving mechanism rods fully displaced outwards, the UPES-D sensor levers should deviate from the mid-position by 24° angle.

Fig. 5.2

Longitudinal and lateral controls

1. View A
2. Details of control disk
3. View B
4. View C
5. 1 = Pull rod

   2 = Pins

   3 = Dowels for rocker arms

   4 = Pull rod

   5 = Pull rod

   6 = Control disk

   7 = Vernier

   8 = Scale

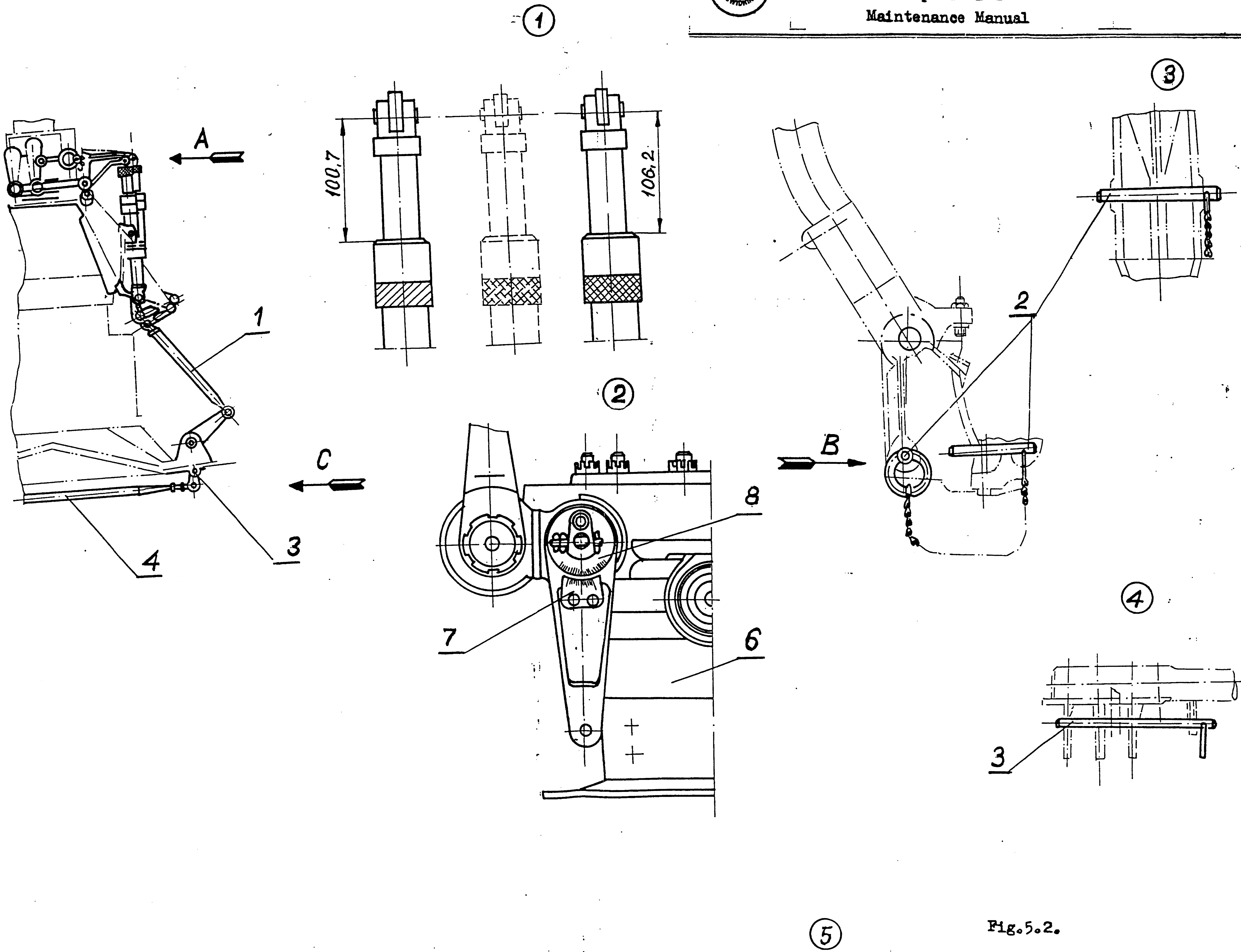

Fig.5.2.

5.8. Adjustment of Engine Controls /Fig. 5.6./

Adjust the engine controls after the adjustment of the helicopter rotor collective pitch controls has been completed.

1. Set the engine separate control lever in the middle cut-out of the sector.
2. Check the angular displacement of the NR-40T lever and adjust it when required.

   According the the helicopter rotor collective pitch the value of this angular displacement should be as follows:

Series of engine	Position of pitch and power output control lever	Collective pitch as per USzW indicator	Angular displacement of NR-40T lever	
			L.H. correction	R.H. correction
II	Bottom position	1°	$0^\circ \pm 1^\circ$	-
	Mid-position	10° $20'$	-	$90^\circ - 6^\circ$
	Top position	13°	$73^\circ \pm 2^\circ$	-
	Bottom position	1°	$0^\circ + 2^\circ$	-
III IV	-"-	1°	-	$30^\circ \pm 2^\circ$
I x/	Mid-position	4°	-	$50^\circ \pm 2^\circ$
	Mid-position	10° $30'$	$56^\circ \pm 3^\circ$	-
	Mid-position	10° $30'$	-	$100 + 5^\circ$

x/ Series I engine after repair

Adjust within a range as determined by oval holes in the NR-40T lever.

2. With the rudder bar and rocker arms in central position measure the dimension G. It should amount 152±0,25 mm.

   When required, adjust G dimension by means of the cables turnbuckles paying attention to correct tension of the cables or by shifting the chain links on the teeth of the rear transmission sprocket wheel. The length difference for the chain ends must not exceed 10 mm for central position of the rod 7 of the rear transmission.

   NOTE: Foot-operated controls adjustment to be performed after the tail rotor hub removal. For adjustment use adjustment sleeves included in set 50.92.450.00.00.

3. Moving the rudder bar (after unlocking the rudder bar rocker arms), check the travel of the rear transmission rod. When the L.H. pedal is moved forwrds, to the extreme position, the dimension should be G= 173,1±0,25 mm, and and for R.H. pedal extreme position 132,5±0,25 mm. Adjust the rod travel if necessary using adjustment screws 3.

4. The full movement of the rear transmission rod, not less than 40,6 mm corresponds to extreme movement of the rudder bar relative to the central position (±86,5±5mm). It corresponds to full cable movement (266 mm) as well.

5. After completing the adjustment, disconnect a spring compensating device 2 from the rudder bar and, as necessary, adjust the length of the device pullrod in such a way, that with R.H. pedal in forward position, the device spring is not tensioned if the device is connected to the rudder bar.

6. Do not adjust and do not check the tail rotor blades angle setting.

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5.6. Adjustment of Stabilizer Controls

1. With the pitch and power output control lever in its extreme positions, the stabilizer angles are as follows:

   a/ with the lever in its bottom position $-9^{\circ} \pm 30'$

   b/ with the lever in its top position $+7^{\circ} \pm 30'$

2. Using turnbuckles, set the tension of cables to 25 ± 5 kG /according to an extensometer/.

3. Using turnbuckles, set the stabilizer to an angle $-9^{\circ} \pm 30'$ when the pitch and power output control lever is in its bottom position and to an angle $+8^{\circ} \pm 30'$ when this lever is in its top position.

   Pay attention to the correct tension of cables.

4. Read the stabilizer angles with respect to a plane perpendicular to the axis of the helicopter rotor and passing through the axis of rotation of the stabilizer. All angles below this plane are to be read as negative while all angles above this plane are to be read as positive.

   Check the stabilizer angles by measuring the deflection of the stabilizer trailing edge. The full deflection upwards is 88 ± 4 mm while the full deflection downwards is 33 ± 4 mm. Measure these distances from a mark on the rear fuselage to a mark on the stabilizer.

5.7. Adjustment of Foot-operated Controls /Fig. 5.5./

1. Set the rudder bar 1 and rocker arms in mid-position and lock them by means of dowels.

   When required, adjust the length of a pull rod over the ceiling plate /compare pull rod a 4 in Fig. 5.2./.

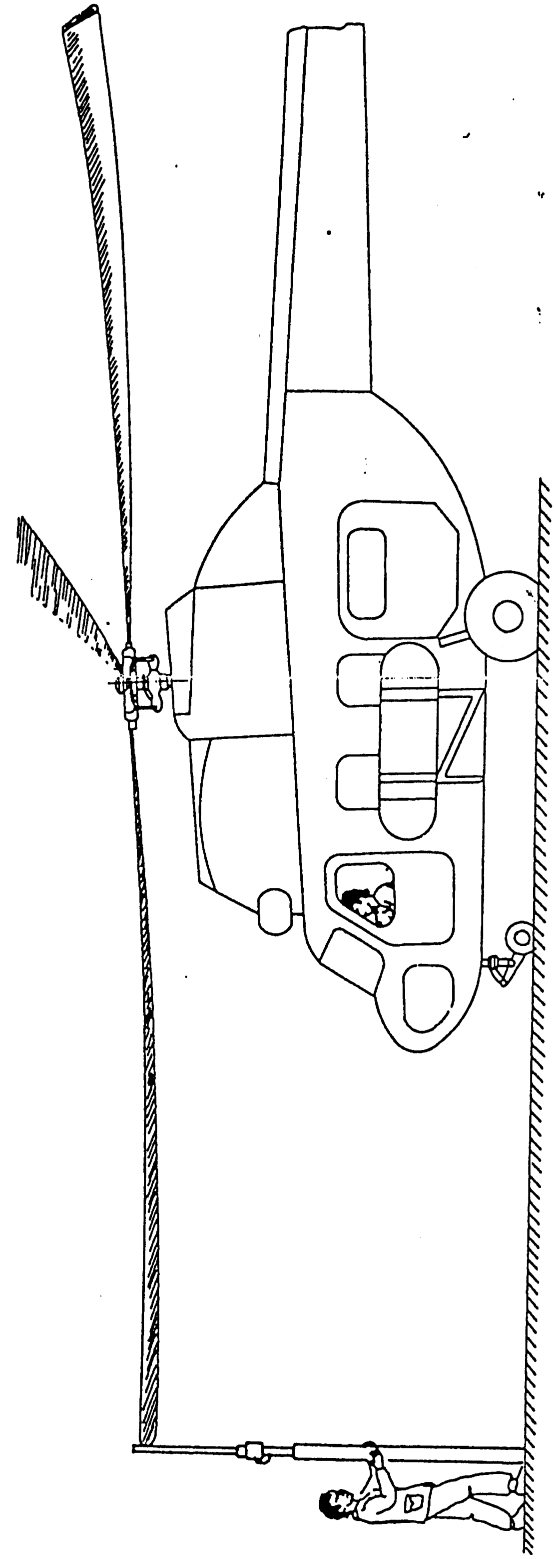

Fig. 5.4.

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Fig. 5.4.

Checking helicopter rotor blades tracking

11. The blades tracking correction is allowed at wind velocity not greater than 6 m/sec.
12. Check the control stick for play (with hydraulic system idle). The play not greater than ±5mm is permissible(when meassured on the control stick handle) within all flight regimes and engines oparating ranges.
13. Mark the pull rods and the push rods fork of the swashplate appying the strip of yellow laquer 1 up to 3 mm wide and about 25 mm long. The strip should be applied along the axis,on the outer side of the helicopter.

5.5.Adjustment of the Helicopter Rotor Brake Controls

1. Using the turnbuckle,adjust the tension of the brake control cable in such a way that cable slightly sags when the brake is in its bottom position.
2. Check the brake adjustment. When the brake lever is in its bottom position ,a clearance between the brake shoes and the brake drum should be 0,2 up to 0,3 mm over the entire circumference. When necessary,adjust the clearance pushing away or pulling back the brake shoes. To do this,turn adjustment nuts.
3. Adjust the brake after cooling.

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9. After correcting the MR blade tracking errors for RPM of 63+1 %, check the blade tracking for RPM of 81%.

NOTE: Start another engine if MR speed of 81% has been not reached.

MR blade tracking errors determined for RPM of 81% should be corrected by bending the compensating plates.

MR blade track is shifted down by 10 to 15 mm by bending the plates down; it is moved up by bending the plates up. Maximum bends amount: -4^{0} upwards and 0^{0} downwards.

10. After correcting the blade tracking errors for RPM of 81%, check and correct the blade tracking for RPM of 63+1% acc. to a/m procedure; then recheck and correct the blade tracking for RPM of 81%.

MR blade tracking correction for RPM of 63+1% and 81% to be repeated until the distance between extreme blades track is less than 20 mm.

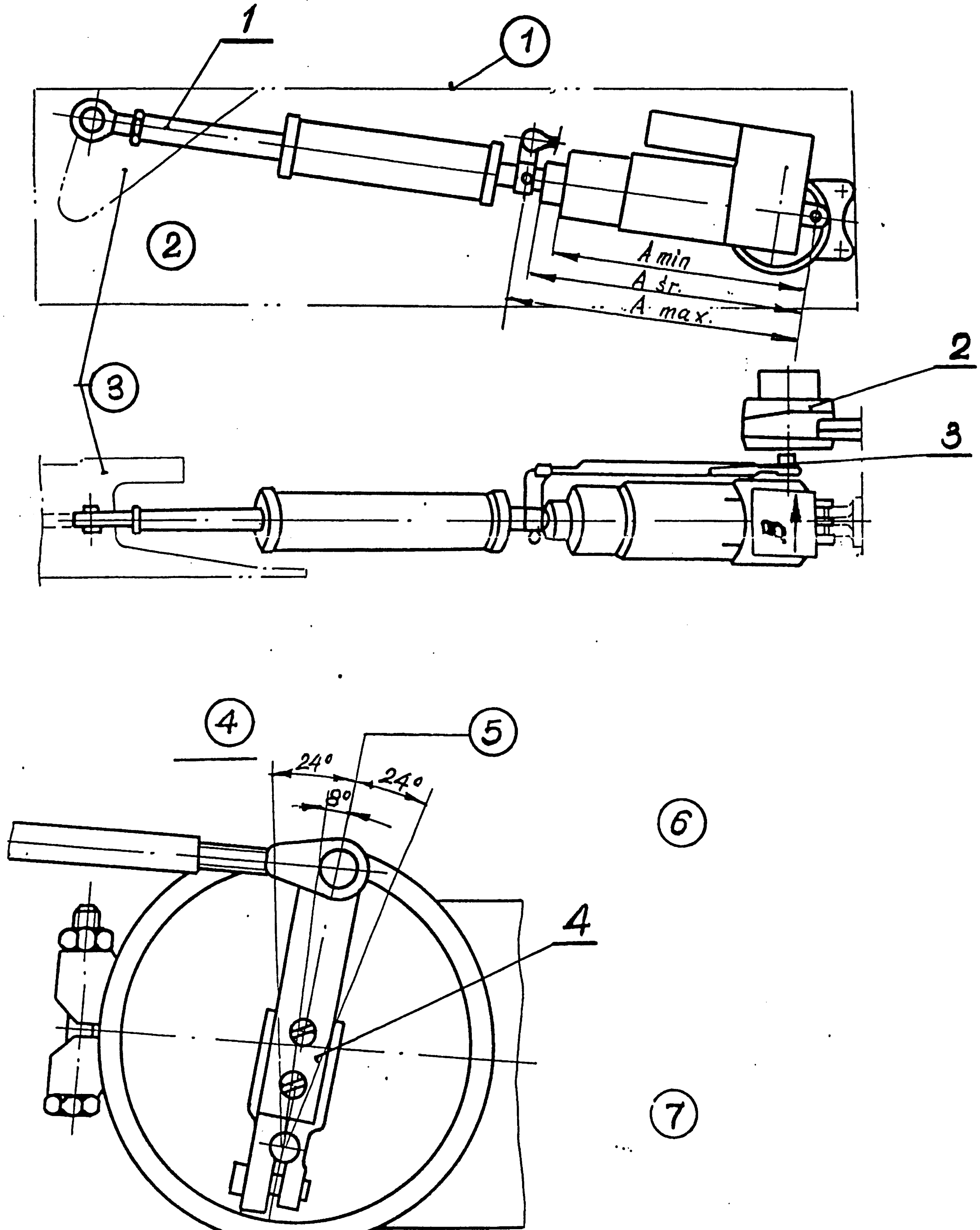

Fig. 5.3.

Fig. 5.3

Adjustment of hand-operated controls trimming mechanism

1. Cockpit floor
2. Fuselage skin
3. Rocker arms on pitch and power output control lever
4. View B
5. Mid-position of UPES-D sensor lever
6. A_{min} and A_{max} — dimensions with mechanism rod in extreme positions

   A_{sr} — dimension with mechanism rod in mid--position

   $$A_{sr} = \frac{A_{max} - A_{min}}{2} = \frac{30 \pm 1.5}{2} \text{ mm}$$

7. 1 = Pull rod

   2 = UPES-D sensor

   3 = Turnbuckle

   4 = Lever

5.4. Correcting the Main Rotor Blades Tracking

Check the MR blades tracking in the following cases:
- adjustment of the MR blades control system,
- replacement of MR blades,
- reinstalling MR blades on the helicopter after previous removing,
- replacement of control systems components i.e: swashplate, the boosters, push rods, ect.,
- other cases influencing the MR control system adjustment.

When checking perform the following procedures:

1. Anchor the helicopter.
2. Prepare the equipment for blade tracking check with the roll of paper inserted in the tube. The part no of the equipment : 50.93.410.00.00.
3. Paint the blades tips with coloured pencils (different colour for every blade).
4. Start one engine.
5. Stabilize MR rpm at 63+1% and MR blade incidence angle at 6°. This angle value should be maintained until adjustment completion.
6. Approach the checking equipment to the MR rotor supporting the lower end of the equipment on the ground, and maintaining the upper end of the equipment (paper roll) on the level of MR blades plane of rotation. (Fig.5.4)
7. Approach the paper roll to the MR blades and after the paper touching by all the blades, move the checking equipment from the main rotor.
8. Check the spacing between the traces drawn on the paper by individual blades. If the distance between the extreme traces drawn by the MR blades is greater than 20 mm,

   proceed as follows:
   - reduce the angle of incidence when the blade track is drawn above the central track,
   - increase the angle of incidence, when the blade track is drawn below the cenral track.

   Angle of incidence setting to be changed by adjusting the lengths of the rods 3 (Fig.5.1)
   Maximum length of protruding part of the rod with thread should not exceed 40 mm.

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3. The adjustment being completed, screw out stop screws 1 to obtain a clearance 0.2 to 0.5 mm between stops and the NR-40T lever when the engine control lever in the cockpit is i either of its extreme positions.

In case it is impossible to synchronize the operation of both engines when the said clearance is 0.2 to 0.5 mm, it is permitted to maintain a clearance 0.2 to 1.0 mm for one of the engines.

Fig. 5.5. Foot-operated Controls Adjustment

1. Rudder bar
2. Spring Mechanism
3. Adjustment Screw
4. Pin Hole for Locking the Rudder Bar in Central Position
5. Flange of the Read Transmission shaft
6. Nut
7. Rear Transmission Rod
8. Sleeve 50.39.00C.01.03

(12) Only the sleeve position as shown in Fig. 5.5 is allowable.

9. Bearing housing
10. Tail Rotor Hub
11. Washer

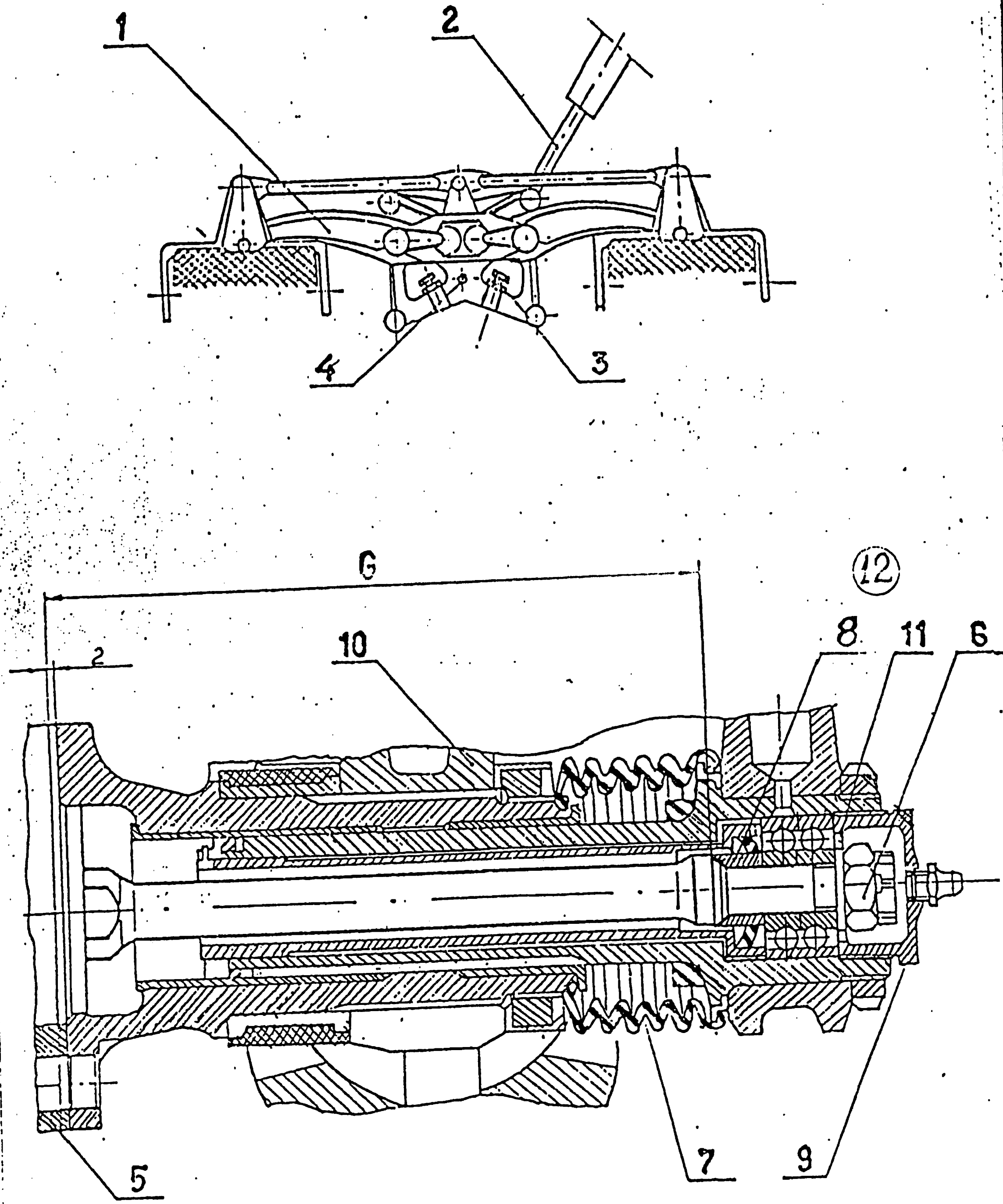

Fig. 5.5.

Fig. 5.6

Adjustment of Engine Controls

1. Stop screws
2. NR-40T lever
3. Stops of NR-40T lever
4. NR-40T pump
5. Bracket
6. Pull rod
7. α = angular displacement of NR-40T lever
8. Ceiling line

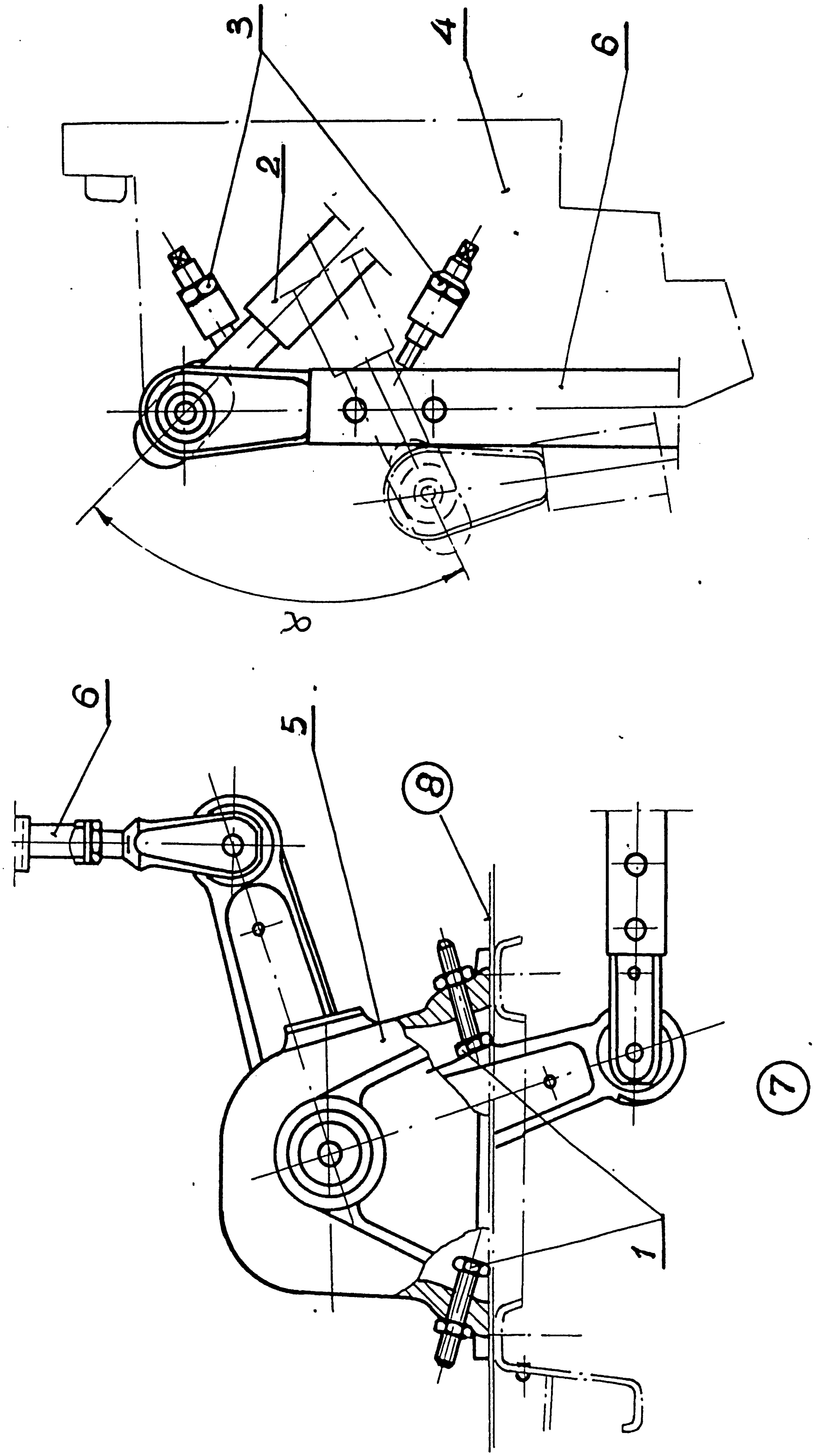

Fig.5.6.

6. MAINTENANCE OF HELICOPTER UNITS AND SYSTEMS

Troubles which occur under service conditions of the helicopter and impair the flying performance may result from either natural or excessive wear /due to improper handling poor workmanship of parts, etc./ of particular parts of the helicopter; they may be also caused by faulty operation of board instruments indicating the operating variables of helicopter units.

To ensure a faulure-free operation of particular units of the helicopter, it is necessary to carry out routine procedures consisting in inspection and maintenance of the helicopter by the right methods and in due time.

6.1. Fuselage

1. To avoid premature wear of the fuselage skin, protect it from any mechanical or chemical damage.
2. To protect the fuselage skin from deterioration within periods of operation, maintenance and storage of the helicopter, wal over the fuselage on special walkways only, either wearing booths with rubber soles or putting soft materials /felt, cardboard, etc./ on these walkways; do not put any metal objects /parts, tools, etc./ on the fuselage skin and provide any equipment to be abutted against the fuselage skin /ladders, etc./ with soft pads.
3. Keep the helicopter clean and regularity any dirt or dust. Wash the skin with warm water containing 3 per cent commercial soap and wipe dry with soft dry rags.
4. Immediately wash and wipe dry these areas which have been contaminated by electrolyte or caustic chemicals.
5. Remove fatty stains with clean rags wetted in unleaded gasoline and wipe the surface with dry rags.

6. Estimate the condition of lacquer coats by visual inspection. It is prohibited to scrape, rub or cut with knife the lacquer coats, when checking, as well as to remove any contamination by means of metal brushes.

7. Inspect the helicopter skin when carrying out routine procedures and when preparing the helicopter for summer or winter flying.

8. Immediately repair all damaged areas on the fuselage skin.

9. When inspecting the skin, pay attention to the condition of spot-welded and riveted joints.
When weakened, the riveted joints are recognizable by the condition of the lacquer coat near a rivet head.

6.2. Replacement of GTD-350 Engine

6.2.1. Dismounting the engine

Before dismounting the engine from the helicopter, apply internal protective coatings on its elements.

1. Remove any contamination from outer surfaces of the elements to be dismounted and from their fasteners.

2. Dismount the fire-fighting system sensors and indicators which might hinder dismounting operations.

3. Disconnect electric cables from the engine.

4. Disconnect the power output control and engine stopping control rods from the engine and rocker arms /mounted on the ceiling plate/.

5. Dismount the main shaft joint ventilation line.

6. Disconnect the fuel system line from fittings on the engine and top plate.

7. Dismount the fuel system breathing line.

8. Dismount the heating system pipe /attached to the engine compressor and top plate/.

9. Dismount the elements of the fire-fighting system:

   - rear sprayer,
   - front sprayer,
   - lower line.

10. Drain oil from the oil system.

11. Dismount the oil system breathing line.

12. Dismount the oil system line.

13. Dismount a separable clamping ring of the engine air intake and band clips for fastening the oil tank.

14. Dismount the oil tank.

15. Dismount the main shaft joint rear shield and deflect the front one, and then dismount the main shaft.
    To do this, disconnect the main shaft from the main transmission flange and pull out the shaft extension of splines on the engine shaft.

16. Dismount the rod connecting the engine with the main transmission. Hold the engine in position that it will not about against the ceiling plate.

17. Undo clamp nuts holding down a pivot of the bracket which fastens the shock absorbers to the engine as well as bushes of the brackets which fasten the shock absorbers to the ceiling plate.

18. Mount two brackets /designed for handling the engine/ on the engine side seatings. Using an approx. 500 kG crane, lift the engine. Remove the L.H. and R.H. shock absorbers with spacers from the bracket shafts. Place the engine on a truck.
    When dismounting the engine. take care not to damage the engine elements by inadventently handling the hoisting rope.

19. Dismount the JD-8 and D-1 sensors,from the engine.

20. Blank off the engine fittings from which pipes, sensors, etc. have been disconnected.

21. Apply protective coat on the engine outer surface.

22. Wash metal components removed from the engine with unleaded gasoline while rubber ones with spirit, and wipe them with dry rags.

6.2.2. Mounting the engine

1. Remove internal protective coatings from the engine. Wash rubber components and fasteners with spirit and wipe with dry clean rags.

2. Mount a bracket on the engine skew surface and fasten it with bolts to the engine casing. The distance between pivots of the bracket for the engine to be mounted on the port side of the helicopter should be greater than the distance between pivots of the bracket for the engine to be mounted on the starboard side.

3. Mount the JD-8 and D-1 sensors.

4. Lift the engine using an approx. 500 kG crane. Place spacers on the outer pivot of the bracket and then place the shock absorbers on both pivots.

5. Place the engine on the helicopter and screw nuts of the shock absorbers on the ceiling plate joints. Until the rod fastening thr engine to the main transmission is mounted, support the engine in such a way that it will not touch the helicopter structural elements.

6. Screw a nut on the outer pivot of the bracket, place a lock washer and screw on a thumb nut.

With helicopters having adjustable casings of shock absorbers, re-tighten nuts of the turnbuckles until any displacement of the shock absorber along the axis of the pivot, resulting from shifting the engine in the transverse direction by hand, is eliminated. The nut being tightened, a slit clearance in the shock absorber casing should be not less than 1 mm.

7. Connect the non-adjustable end of the rod fastening the engine to the main transmission with a bracket on the main transmission while the adjustable end of this rod - with the engine top mounting.

8. Mount the main shaft splined fork on splines of the engine shaft /maintain a distance between the fixed part of the engine casing and the shaft fork face not less than 5 mm/. Fasten with bolts the other end of the main shaft to the main transmission flange. Tighten nuts applying a torque of 7 to 9 kGm.

   Check the clearance between the shaft fork face and the engine gear casing. This clearance should be not less than 0.5 mm.

9. Check the alignment of the main shaft with respect to the main transmission and engine shafts. The maximum skewing of the shaft should be 30', which corresponds to the cumulative indications of a measuring device sensor not greater than 0.7 at an arbitrary checkpoint.

   Reduce any excessive skewing of the shaft by screwing in and out the front fork of the rod fastening the engine to the main transmission, or by placing spacers on pivots of the engine bracket. Should a clearance less than 1.5 mm between the engine bulkhead and the strut be found, counterbore a hole in the bulkhead.

10. Mount the shields of joints, a clearance between the shields and the joints to be less than 1.2 mm.

11. Mount the helicpter cabin heating system line.

12. Mount a separable clamping ring on the engine air intake flange /together with the flange/.

13. Clean the oil tank from the outside with unleaded gasoline. Pour 1 to 1.5 litre of gasoline into the tank and flush it. Mount the tank on the helicopter. Tighten nuts of the band clip bolts applying a torque of 0.5 kGm. Make sure that a clearance $3^{+1}_{-0.5}$ mm between the tank flange and the duct is maintained over their entire circumference.

14. Mount the engine oil system lines. Blow through with dry compressed air all pipes and units which have been dismounted and wipe them from the outside with clean flannel. Coat threads of nuts and fittings with a thin layer of grade CIATIM-201 /or LMP/ grease.

15. Mount the engine oil system breathing lines, Maintain a clearance not less than 5 mm between the pipelines and any structural elements /except at points of fastening these pipelines/.

16. Mount the elements of the fire-fighting system:

   - front sprayer
   - rear sprayer,
   - lower line.

17. Mount the fuel system line.

18. Mount the fuel system breathing lines.

19. Mount the cooling system line.

20. Check the engine separate control lever forces.
    Should the forces be too small /below 4.0 ± 0.5 kG at the lever arm r = 320 mm/, increase them by screwing in adjusting nuts.

21. Re-set the pitch and power output control lever in its bottom position while the engine separate control lever set and lock in the middle cut-out of the sector.

22. Connect the engine stopping control and engine power output control reds to the control lever on the engine.

23. Check whether the controls function correctly and check the adjustment of controls. Readjust them if required.

24. Mount electric cables.

25. Mount the fire-fighting system sensors and indicators.

26. Clean the outer surface of the engine and cowlings with clean rags and close the cowlings.

6.3. Main Transmission

6.3.1. Replacement of the main transmission

Dismounting the main transmission :

Before dismounting the main transmission from the helicopter, apply internal protective coatings on its elements.

1. Dismount the transmission cowlings and the top fan cover.
2. Drain oil from the engine oil system.
3. Dismount engine oil pipelines.
4. Dismount the oil coolers and the fan.
5. Disconnect the layshafts and the rear transmission shaft from the transmission drive shaft extensions.
6. Disconnect the helicopter control elements from the transmission.
7. Screw out bolts fixing the transmission mount to the helicpter framework.
   Screw a grip handle on the helicopter rotor shaft extension /over the entire length of thread/.
8. Dismount the transmission from the helicopter using a minimum 700 kG crane.
9. Screw out bolts fixing the transmission to the frame.
10. Dismount all units from the transmission and blank off holes.

Mounting the main transmission

Before mounting the main transmission, remove internal protective coatings from its elements and check whether there is no mechanical damage.

1. Screw a grip handle on the helicopter rotor shaft extension /over the entire length of thread/.
2. Lift the transmission using a lifting jack /300 kG lifting capacity/ and place it on the mount which has been previously dismounted from the helicopter.
3. Fasten the transmission to the mount by means of 20 bolts /the tightening torque is 8 to 9 kGm/. Tighten the bolts uniformly to obtain a uniform load distribution at all fastening points.
4. Mount the following units on the transmission:
   - control disk
   - helicopter rotor hub
   - hydraulic dash-pot damper reservoir /to be mounted on the helicopter rotor hub casing/
   - GB-2 hydraulic unit
   - bracket with oil-to-oil boosters
   - GO16PCz-8 alternator
   - DTE-1 speed sensor
   - helicopter rotor brake
   - JD-8 oil pressure sensor
   SKND-11-1A ignition coil
   - AK-50P-10 compressor
   - P-1 temperature sensor

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When mounting the units / some of them may have been already mounted, take care not to damage thread or splines on the protruding helicopter rotor shaft extension by incorrectly screwing on the nut or by accidentally knocking the shaft. When mounting a layshaft of the AK-50M-1Б1 compressor on the transmission, take particular care not to contaminate the oil passage in the transmission.

5. Lift the transmission with installed units using a minimum 700 kG crane and place it on the helicopter. Before mounting the transmission, remove cowlings of the engines and the main transmission as well as a top cover of the fan.

6. Fasten with 4 bolts the transmission mount to the helicopter fuselage structural joints / the tightening torque is 29.5 to 34.5 kGm/.

7. Mount the following units on the transmission :
   - fan
   - oil coolers
   - pipelines of the engine oil systems
   - helicopter control elements.

8. Connect the engine shafts with the transmission drive shaft extensions by means of universal joints.

9. Check the alignment of the engine shafts with respect to engines and main gearbox according to chapter 6.3.2.

10. Connect the rear transmission shaft to the main transmission.

11. Having mounted the transmission on the helicopter, remove the corrosion - inhibiting oil from the inside accoding to The Explatation and Service Manual of Main Gearbox WR-2.

12. Check the adjustment of controls.

13. Install covers and cowlings.

6.3.2. Checking and Adjustment of the Main Gearbox and Engine Shafts Alignment (Fig.6.1).

1. Insert the dial gauge tip 1 into the clip 2 and tighten the wing-nut.
2. Fasten the clip with the dial gauge on the main shaft a at the gearbox to provide the dial gauge tip preloading of 5mm approximately.
3. Set the dial gauge in zero position.

   Zero position to be assumed when the dial gauge is in uppermost point of the main shaft rotation.
   After reaching such position, set the gauge scale on "zero".
4. Rotate the main shaft (with the dial gauge) and record maximum deflection of the gauge pointer, which should not exceed 0,7 in any position of the main shaft. Take readings for 8 positions of the main shaft (every 45°).
5. Perform the same measurement for the driving shaft of the engine.
6. Excessive misalignment of the main shaft relative to the engine or main gearbox should be reduced by screwing the front fork connecting the engine with the gearbox or by means of the shims located on the engine mount axis. If the clearance between the engine wall and the rod will be below 1,5 mm, mill the hole in wall properly. Then the rod fork tip should not reach beyond the check hole in the rod.
7. Allowable readings difference of the gauge should not exceed 0,4 mm at misalignment measurements for the main gearbox and engine for given value of main shaft angular position.

   Excessive difference of absolute readings values should be reduced by adjusting the lenght of the rod connecting the engine with the main gearbox or by means of the shims located on the engine mount axis.

   EXAMPLE: the gauge readings for the angle of 180° are as follows: for the engines side: - 0,60 mm, for the main gearbox side: + 0,20 mm.
   The difference of absolute values amounts (0,60)-(0,20) = 0,40, which corresponds to 0,4mm.

   If the adjustment is not possible, the gauge readings difference up to 0,7 mm is allowed.

/continued on page 129/.

6.4. Helicopter Rotor Hub

6.4.1. Replacement of the helicopter rotor hub

Dismounting the hub

Before dismounting the hub, remove the helicopter rotor current collector from the helicopter.

1. Drain oil from the hydraulic dash-pot damper oil system. Undo nuts of rubber hoses from connections of the make-up tank 6 /Fig. 6.2/, and then remove the oil tank from the hub spinner.
2. Disconnect pull rods of the ~~control disk~~ swash-plate from levers fastened to the casing of the helicopter rotor hub axial hinge.
3. Paint /in a red oil colour/ marks on taped surfaces of the half-rings 4 and the helicopter rotor hub spinners, and then undo a nut 5 holding the hub on the main transmission shaft 2 /after the transmission has been locked by means of the brake/.
4. Using a crane /minimum 150 kG hoisting capacity/, carefully lift the hub by approx. 20 mm. Paint /in a red oil colour/ marks on non-working surfaces of the cone ring 3 and on the rotor hub casing, and then dismount the hub.
5. Remove the cone ring from the swash-plate driver clamping ring.

Fig. No. 6.1

Checking the transmission and engine shafts for alignment

1. Dial gauge
2. Clip
3. Transmission shaft extension
4. Layshaft.

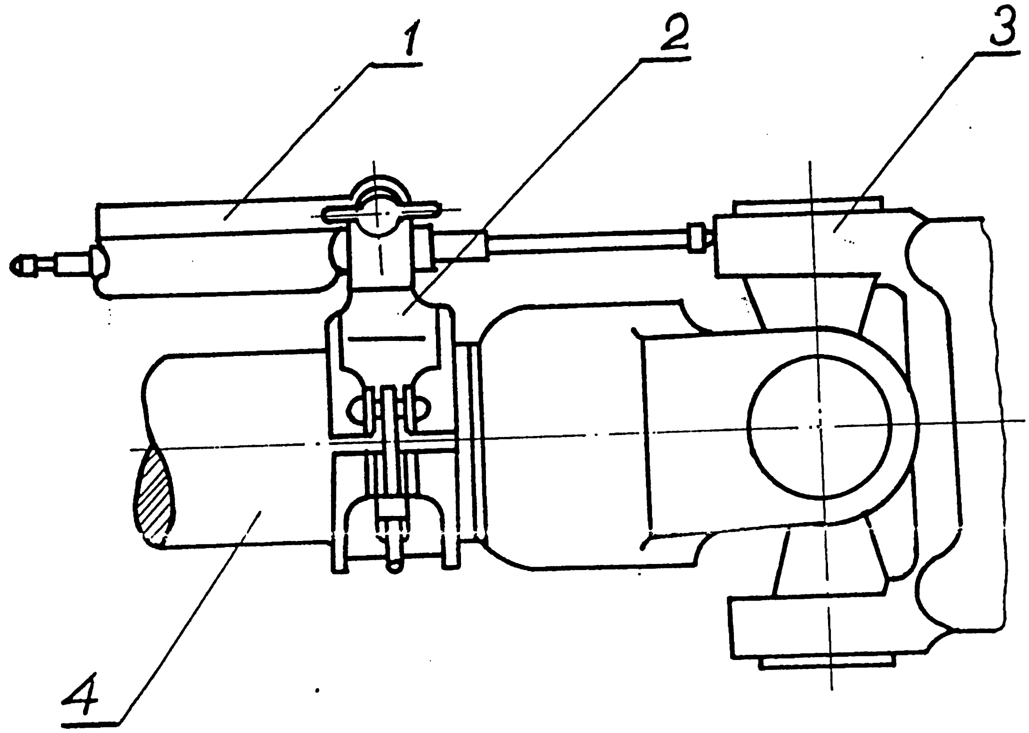

Fig.6.1.

Mounting the hub

1. Coat with grade NK-50 grease the surfaces of splines of the main trabsmission shaft 2 and the helicopter rotor hub 1 including its lower split cone ring 3 and two upper half--rings /Fig. 6.2/.
2. Place the split cone ring on the main transmission shaft and position it with respect to the surface of swash-plate driver /marks painted in a red oil colour on the ring should correspond to marks on the helicopter rotor hub casing/.
3. Using a crane /minimum 150 kG hoisting capacity/ carefully place the helicopter rotor hub on splines of the main transmission shaft.
4. Lock the main transmission by means of brake. Screw the nut 5 on the transmission shaft. Insert under the nut flange the half-rings marked with identical serial numbers and an item number /e.g. "17-1"/, and then tighten the nut so that the surfaces of rings will come into contact with the conical surface of the helicopter rotor hub casing seat. Position the half-rings so that marks on their surfaces will correspond to identical marks on the surfaces of the helicopter rotor hub.
5. Tighten the nut applying a torque of 100 to 120 kGm.
6. Connect pull rods of the swash-plate to the levers fastened to the casing of the rotor hub axial hinge.
7. Mount the make-up tank of hydraulic dash-pot damper system 6 on the rotor hub casing. Screw on nuts of hoses connecting the hydraulic dash-pot dampers to the oil tank connections. Fill the tank with grade AMG-10 oil.
8. Check the controls for adjustment.

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6.4.2. Replacement of the helicopter rotor current collector /concerning the helicopters with rotor current collector mounted/

Fig. 6.2 Detail of the helicopter rotor hub

1. Helicopter rotor hub
2. Main transmission shaft
3. Cone ring
4. Half-rings
5. Nut
6. Make-up tank of hydraulic dash-pot damper system.

Dismounting the collector

1. Remove protective rubber covers and disconnect the collector plug-in connectors 1 /Fig. 6.3/.
2. Remove the current collector casing 2.
3. Disconnect electric cables 4 /running inside the transmission shaft /from the collector.
4. Undo nuts fastening the collector to the make-up tank 5 of hydraulic dash-pot system and remove the collector.

Mounting the collector

1. Remove the casing 2 of the current collector /Fig. 6.3/.
2. Place the collector on the make-up tank 5 of hydraulic dash-pot damper system and fasten it with bolts.
3. Connect electric cables 4 /running inside the transmission shaft / to the corresponding terminals 3 on the collector, paying attention to the conformity of marks on the cables with those on the terminals. Seizing with hand the group of cables running inside the transmission shaft, pull them down until a resistance is felt.
4. Mount the casing 2 of the current collector.
5. Connect the plug-in connectors 1 of cables going from collector to the blades.
6. Check the functioning of the de-icing system /with both engines in operation/.

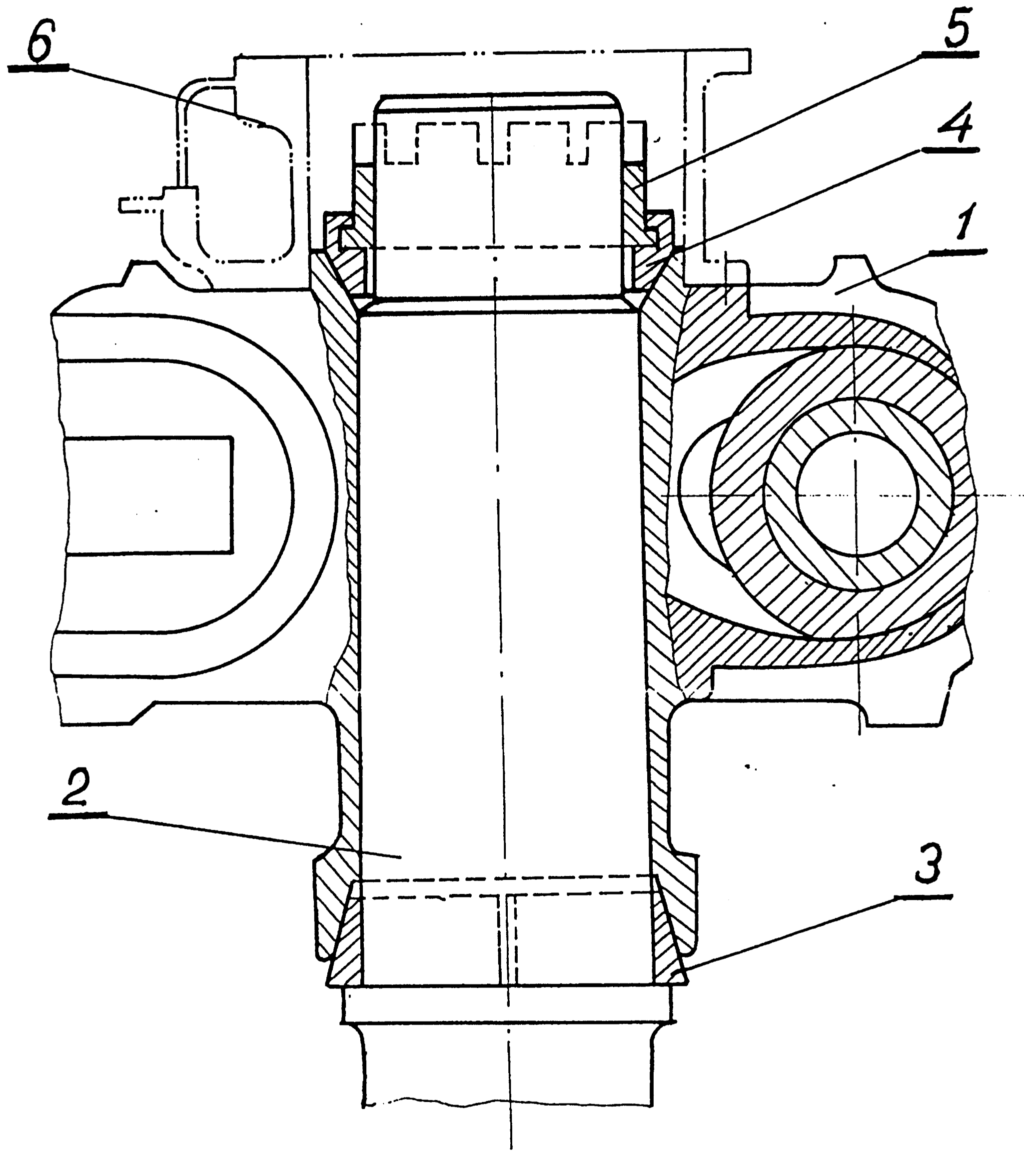


Fig. 6.2.

Fig. 6.3

Helicopter rotor current collector

1. Plug-in connector
2. Casing
3. Terminal
4. Electric cable
5. Make-up tank

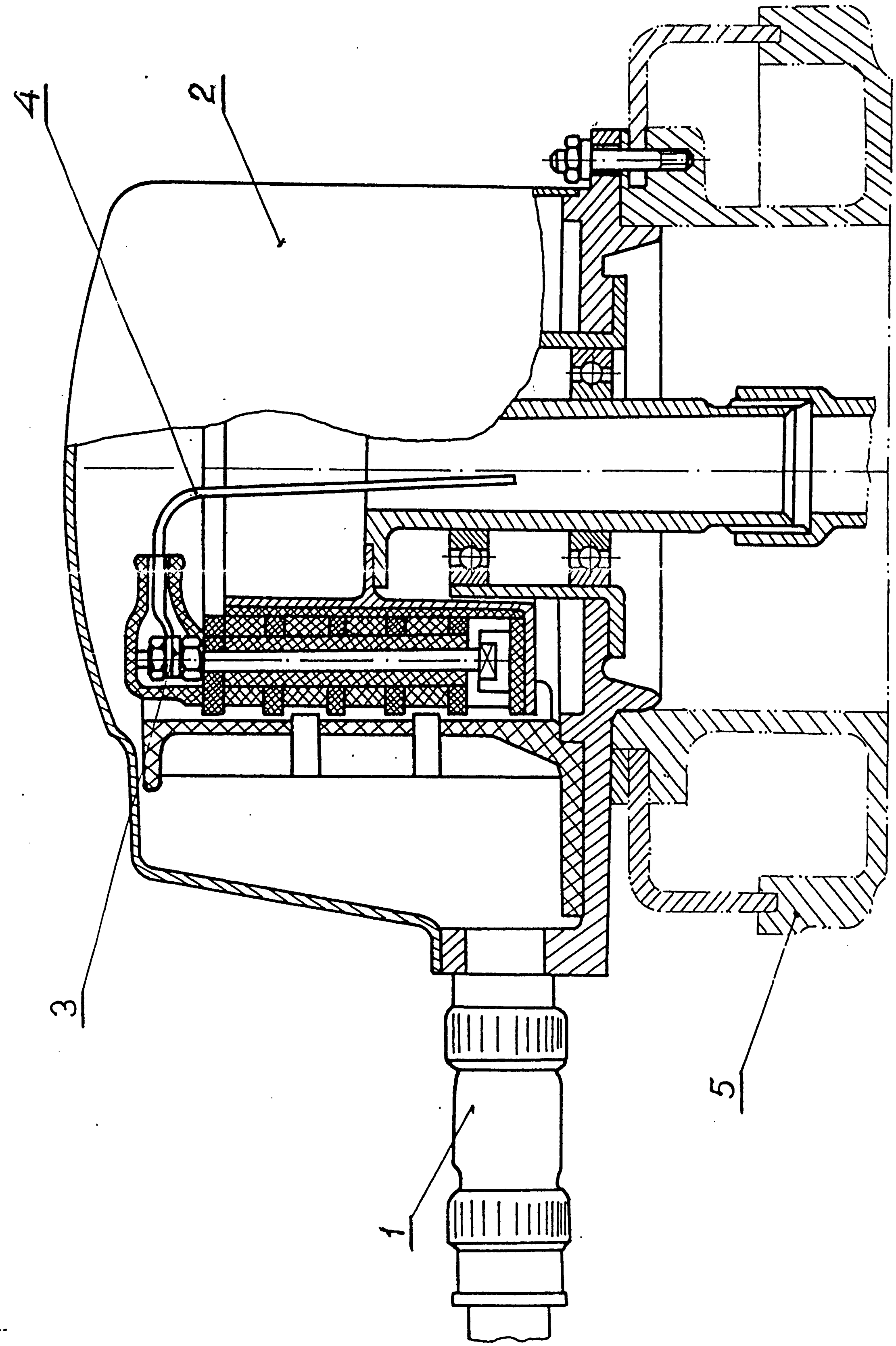


Fig. 6.3.

Fig. 6.4.

Hydraulic dash-pot damper

1. Breather hole plugs
2. Breather hole plugs
3. Connection

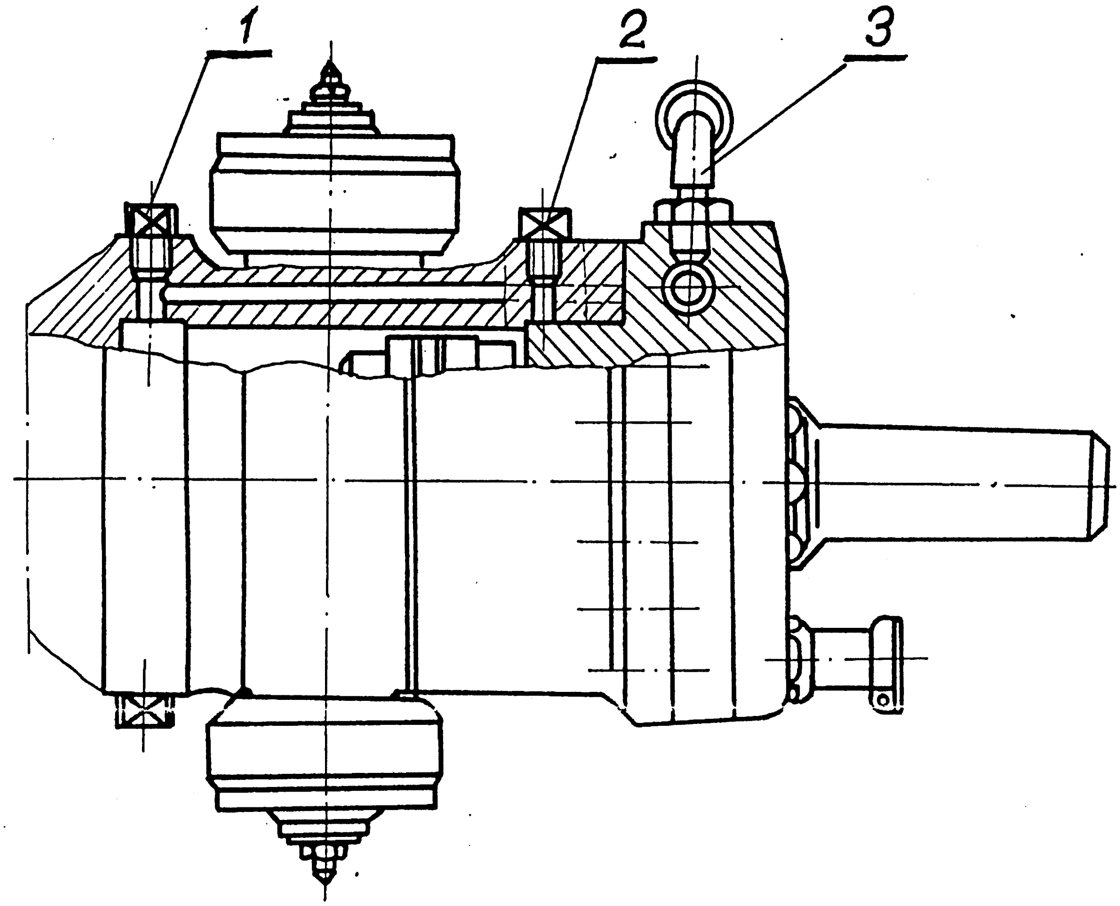


Fig. 6.4.

6.5. Tail Rotor

General Instructions

In MR blades marked with "HB" prefix before the set number, the inner surfaces of the eyes and eye holes provided additionally with metal sleeve, are hardened by shot peening.
When servicing MR blades, observe general instructions for main rotor blades servicing.
The blades without heating sections are marked with "S" letter added to blade drawing number.
When operating thore blades observe the general procedures concerning TR blades.
The blades marked with "EP" prefix before the set number are coated with epoxy enamel.
When installing the blades in MR hub after previous removal, pay attention to marks conformity on main rotor hub and the blades.
When the sand blasting spots are found on the blade ferrules in case of helicopter operation in sandy areas - it is recommended to put self - adhesive tape /GOST 52107-73/on the leading edge of the blades to protect the ferrules against corrosive wear.

6.5.1. Tail Rotor Replacement

Tail Rotor Removal

1. Disconnect the electric wires from the cellector.
2. Unscrew the housing of the bearing 9 /Fig. 5.5./.
3. Unscrew the nut 6 on the TR stem 7 and remove the sleeve 8.
4. Unscrew the bolts fixing the TR hub and fixing the collector on the TR gearbox flange and remove the hub 10.

Tail Rotor Installing

1. Check the displacement of TR stem 7 /Fig. 5.5/.
2. Set the rudder bar to central position.
3. Lubricate the nut 6 /Fid.5.5/. With MK-22 engine oil, screw it by hand onto the TR gearbox stem and unscrew.

Apply grease CIATIM-201 on the gearbox and tail rotor friction surfaces and lubricate all threads with MK-22 oil.

4. Install TR hub 10 on the TR gearbox stem,then align the holes in the hub flanges and in TR gearbox shaft 5 and fix by means of screws.
   Tighten the screws using the tightening torque from 2,5 up to 3 kGm.
5. Install the sleeve 8(50.39.000.01.03) on TR gearbox stem,mount the nut 6 on the stem and tighten using the torque from 2,0 up to 3,0 kGm.

C A U T I O N

INSTALL THE SLEEVE 50.39.000.01.03 WITH THE INNER CHAMFER TOWARDS THE GEARBOX STEM (Fig. 5.5).

6. Install the housing of the bearing 9 using the tightening torque from 2,5 up to 3 kGm.
7. Protect all screw joints,
8. Connect all electric wires of the blades to the collector
9. Fill the space under the bearing 9 housing with grease CIATIM-201 through the grease nipple hole after the nipple has been screwed out of the housing.

6.5.2. Replacement of TR Current Collector
/concerning the Helicopters with Rotor Current Collector mounted/

Dismounting the Collector

TR current collector may be dismounted after TR removal from the helicopter.

1. Remove the collector inner part from the TR gearbox (See Item 9 in Fig.6.5).
2. Unscrew the nuts fixing the brush-holder casing 3 on the TR gearbox flange. Remove the brush-holder casing from the helicopter and store with the other collector components,that were removed previously.

Fig. 6.5

Tail rotor current collector

1. Rear transmission
2. Tail rotor hub
3. Brush-holder casing
4. Shims
5. Brush-holder cover
6. Brush-holder
7. Brush
8. Insulating rings
9. Collector inner part

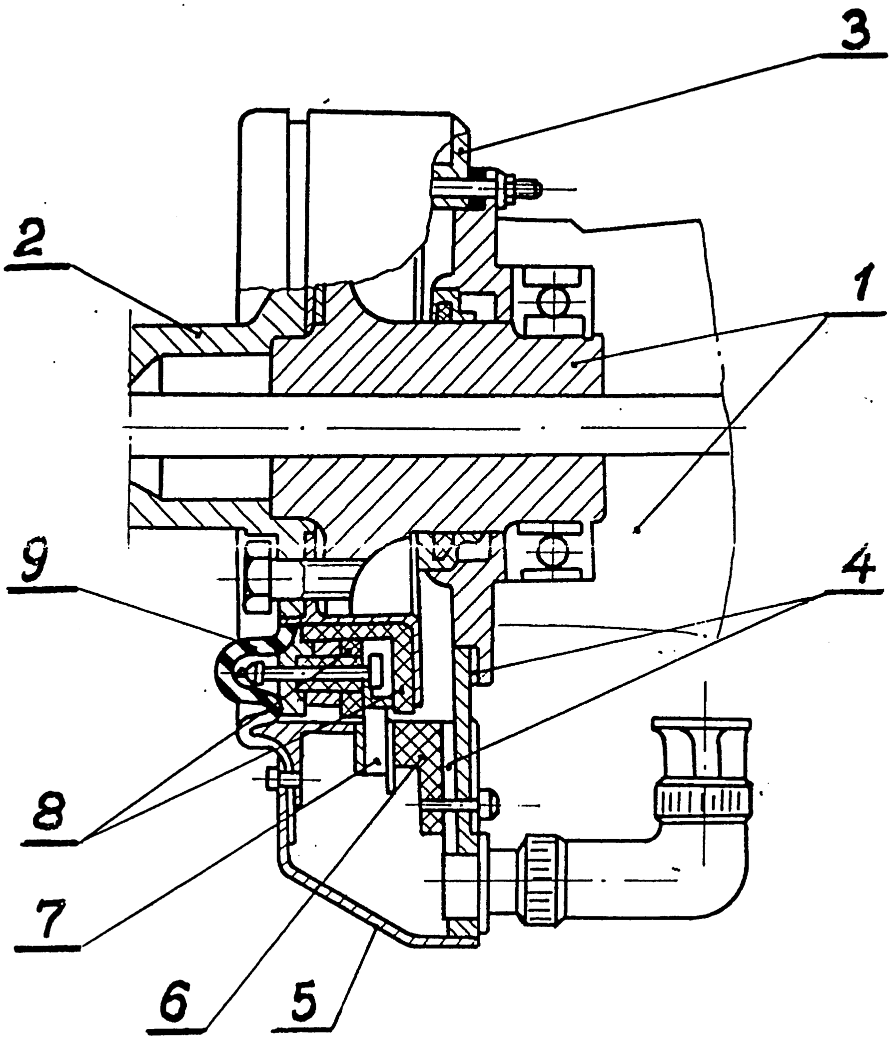


Fig. 6.5.

Mounting the collector

It is recommended that the tail rotor current collector be mounted on the helicopter just before the tail rotor is mounted.

1. Screw out screws fastening the brush-holder cover 5 /Fig. 6.5/ to the collector.
2. Place the brush-holder casing 3 on the rear transmission flange.
3. Screw out the screws fastening the brush-holder 6 to the casing.
4. Place the current collector inner part 9 on the rear transmission rod. Check the position of brushed 7 between edges of the insulating rings 8.
   A clearance should be not less than 0.5 mm.
   To obtain a proper clearance between the side surfaces of rings and the brushes, place shims 4 between the brush-holder casing flange and the rear transmission flange, or between the brush-holder casing and the brush-holder.
5. Mount the brush-holder and the brush-holder cover.
6. Check the functioning of the collector /after the tail rotor has been mounted/ with both engines in operation.

6.5.3. Checking the Clearance between the Housing and the Flange of the Driver.

1. Lower the driver completely depressing the right pedal to its extreme position, Check the clearance between the housing and the flange of the driver. The clearance value should be not less than 1 mm. Check if the MR blades rotation around the horizon tal hinge is smooth. TR oscillating movements rela tive to the horizontal hinge should be smooth without jamming and jerking in the hinge.

/continued on page 148/

6.5.4. Tail Rotor Blades Maintenance

Directions concerning the TR blades with adhesive bonded polyvinyl chloride tape.

1. Place new polyvinyl chloride tape to be adhesive bonded on the blade ferrule if worn during operation to provide anticorrosion protection.
2. Polyvinyl chloride tape 50 mm wide to be bonded on the leading edge of the blade starting from the tip fairing (see Fig. 6.7a) acc. to the following procedure:
   a) cut a strip of polyvinyl chloride tape (self-adhesive) 200 mm long plus allowance 25mm on each side(to grip during the tape bonding).
   b) degrease the blade surfaces on the length of 200 mm after removing dust and contaminations and bond the tape strip acc.to 6.7a and directions incl. in Item 6.6.3a(concerning the tape bonding on MR blades).

Minor Defects(not to be repaired)

1. Abrasions,small cracks and scratches on the laquer coating not reaching the metal structure.
2. Smooth dents without damaging the tip section and tip fairing as well as small scratches,dents on the ferrules and rubber if they do not impair normal functioning of the antiicing system.
3. Defected adhesive bonds between the skin and honey-comb(excluding the section 30mm wide,acc.to Fig. 6.7,not requiring the bond checking):
   -single defects on surface up to 10 cm^2;
   -single defects reaching total area up to 100 cm^2 on each blade.

NOTE: mark any defective adhesive bonded joints whose area is 80 per cent the area of the above-mentioned defects, and check them after every flight.

4. Single defective adhesive bonded joints between the cover plate and the skin as well as between the skin and the spar /within the zone where the cover plate is bonded/ of an area up to 3 cm^2, provided that they do not reach the edge and appear in a number not greater than three on either side, as well as a sibgle damaged adhesive bonded joint of an area from 3 to 5 cm^2 on either side.

NOTE: Mark any defective adhesive bonded joints, irrespective of their area, and check them after every flight.

Should a defective adhesive bonded joint reach the edge of the blade skin or cover plate, withdraw the blade from use by the time the defective adhesive bonded joint is repaired /use K-153 adhesive/. It is permitted to check the development of defective adhesive bonded joints disclosed during inspection, by tapping them with a mallet.

5. Abrasive wear of the lacquer coat on the front part of the tip fairing.

Major defects /which require a repair/

1. Any damage exceeding the allowable limits.
2. Repairs of defective adhesive bonded joints between the cover plate and the skin:

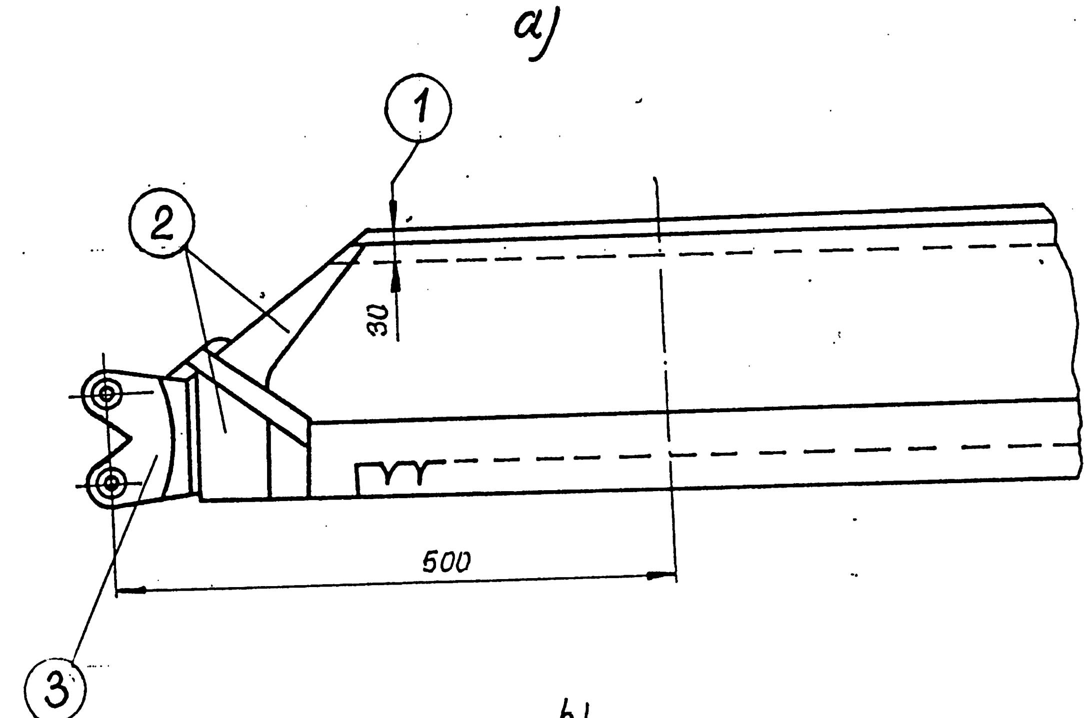
   a/ Remove residues of an old adhesive from the surfaces to be glued.

   b/ Degrease the surfaces to be adhesive bonded with a cp gasoline /once only/ and submit to seasoning for 15 minutes. and then degrease these surfaces with acetone /twice/ and subbit to seasoning for 5 minutes after every degreasing.

Fig. 6.7

Detail of the tail rotor blade

1. Within this zone the adhesive bonded joints of the skin to the honeycomb filler and spar are not subjected to checks.
2. Cover plate
3. Shot-peened surface T
4. Depth of a defect /on the surface T/.



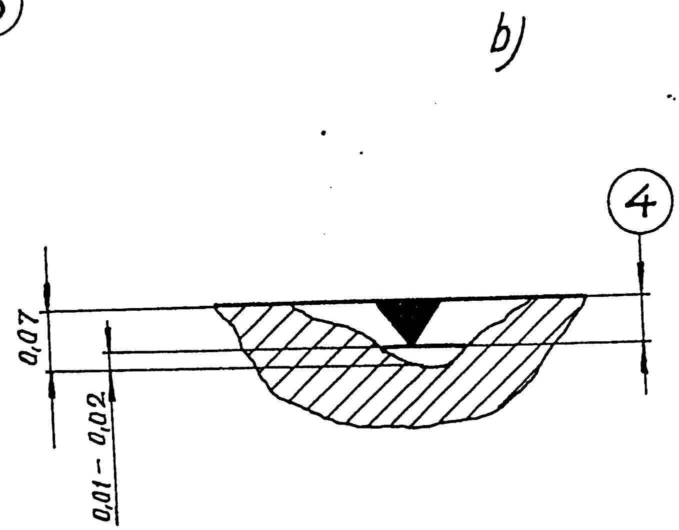


Fig. 6.7.

c/ Apply a K-153 adhesive, press down the cover plate and remove leaks with clean rags.

d/ Place a layer of foam rubber on the surfaces to be bonded and press it with a weight to produce a pressure of 1 to 2 kG/cm^2.

e/ Hold down the adhesive bonded joint under pressure for 24 hours at a temperature not lower than $20^{o}C$. To reduce the holding down time, it is recommended that the elements be bonded at a temperature of $60 \pm 10^{o}C$, the holding down time being reduced to 4 hours.

f/ Repair defective adhesive bonded joints between the skin and the spar in the same manner as above do not exert a pressure when repairing defective adhesive bonded joints of a area up to 1.5 cm^2/.

3. Remove mechanical defects /scratches, cracks, dents, etc./ from the shot-peened surfaces of the blade root clevis by re-grinding, polishing and coating them with WŁ-02 primer, and then with AG-3A primer and two layers of ChW P.C.V. enamel according to the colour scheme.

After re-grinding the depth of a defect must not exceed 0.07 mm.

All re-grinding operations of the shot-peened surface should be recorded in the data card.

6.6. Main Rotor Blades

General Recommendations

The blades marked by the symbols "W", "WK" or "WT" followed by a number are interchangeable and can be used on the helicopter with any other blades marked with these symbols. "K" index means that the heating pack adhesive bonded to the blade spar using WK-3 adhesive while the absence of this index means that the heating pack is bonded with K-153 adhesive.
"T" code is marked on the blades with poyvinyl chloride self-adhesive tape bonded on the leading edge ferrule.
The tape improves the ferrules bonds life and protects them against the sand particularly when operating in sandy areas. The blades marked with "EP" code under the blade number to be coated with epoxy enamel.
The blades without heating sections are marked with "S" letter added to blade drawing number.
When operating thore blades observe the general procedures concerning MR blades..

1. In case of snow or ice deposits on the blades, store them for 24 hours at ambient temperature above 0°C or blow with warm air stream /not warmer than 60°C/ supplied by ground heating equipment and wipe the blades surfaces using the clean soft rags.

2. Remove dust from the blade surfaces using soft cloth, avoiding the scratches of the laquer coating.

3. In case of contaminations remove them with soft cloth soaked in 3% soap solution /neutral/ and squeezed. Then wipe with clean dry rags paying attention to adhesive bonds area to remove moisture. The rags to be used for wiping should be clean without any hard inclusions /sand, metal cips ect./. Dry the surfaces after washing, providing moisture removal in adhesive bonds area. Washing the blades with strong water stream is not allowable to avoid water pouring over the sections interior through the draining gaps between the sections /on the lower side of the blade/. Washing the blade is not allowed after SzR joints plugs removal. Check the gaps between the sections of the trailing edge and remove dirt if necessary in case of no sealing between the blade sections.

4. Wipe fatty spots using the clean rag soaked in extraction naphta and than wipe with clean dry rags.

5. Inspect visually the laquer coating condition. It is prohibited when checking:
   - to scrap, scratch or remove the coating with knive,
   - place any objects /tools, spare parts, rags soaked with oil or gazoline etc/ to avoid damaging the laquer coating as well as the spar, thin skin of the section and antiicing system rubber,

- remove contaminations, ice, grease spots and point using wire brushes,
- wash blades using solvents or point removers.

6. In case of prolonged helicopter parking in field, longer than 3 days and in case of probable rains or icing, the blades should be protected with covers.

   When installing and removing the covers be careful to avoid damaging the laquer coating and balancing weights.
   After rain remove the covers, dry them and wipe the blades using clean rags.
   The covers shoud be removed and dried every 10 up 15 days of the helicopter parking with the blades installed.

7. Perform blade tracks check when assembling the blades previously removed from the helicopter.

6.6.1. The blades removal.

1. Remove cotter pins protecting the bolts fixing the blade on MR hub.
2. Unscrew the nuts and remove the bolts from the hub and blade holes.
3. Remove the blade from the MR hub and place it on the stand.
4. Repeat the procedure for the other blades.
5. After every installing and connecting the electrical wire bundles wrap the rubber caps on the bond joints connecting the blades heating sections with collector.

   When wrapping use threads as shown in Fig. 6.7b (to protect against moisture entrapping to the joints).

6.6.2. Installing the Blades

1. Remove the blades from the main rotor hub.
2. Lift the blade and install it in the MR hub, then connect the holes using the brass pin.
3. Insert the bolts into the holes and tighten the nuts using the torque of 1,5 up to 2 kGm.
4. Perform the same procedure when installing other blades. When removing and installing the blades pay particular attention to avoid damages of the holes fixing the blades on the MR hub.

6.6.3. Directions for the MR Blades Check

1. When inspecting the spar pay particular attention to the condition of its surfaces from section No.10 to the blade tip, as well as to its condition at contact points of the tip sections and at contact edges between the blade section and the spar as shown in Fig. 6.8a. Use the magnifying glass if necessary.
2. In case of scratches, cracks and defects of the laquer coating, check the spar surfaces for damages. To do it remove the laquer coating using paint remover SD(or standard) or R-5 diluent. Apply the paint remover gradually by spraying. Paint remover when applied becomes solidified very fast. It should remain in such form for 10 up to 15 minutes, then remove the softened laquer coat using wooden spatula or bristle brush. Repeat the procedure if necessary. When applying the paint remover protect the adhesive bond. To provide the protection cut an inspection hole, coat with glue(paste or paper adhesive) and bond with the blade surface. It is permitted to use plasticine for this purpose, rolling it to reach the diameter of 6 up to 7 mm, put around the area to be washed out and depress slightly. Wipe the cleaned area to remove paste and wax residuals using clean rags soaked with unleaded petrol B-70 It is prohibited to remove swollen and wrinkled laquer film using metal brushes or scrapers.
3. When inspecting the blade spare inspect defected laquer coating areas as first, paying particular attention to the contact edges between the section and the blade spar. (Fig.6.8a).

   In case of scratches and cracks on the metal surface of the spar, determine the depth of the defect using the gauge (Fig.6.8b). Prior to installing the gauge

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Fig. 6.7a

Installing caps on electric supply joints of helicopter rotor blade heaters

(1) Win with thread in places shown with arrows "A".

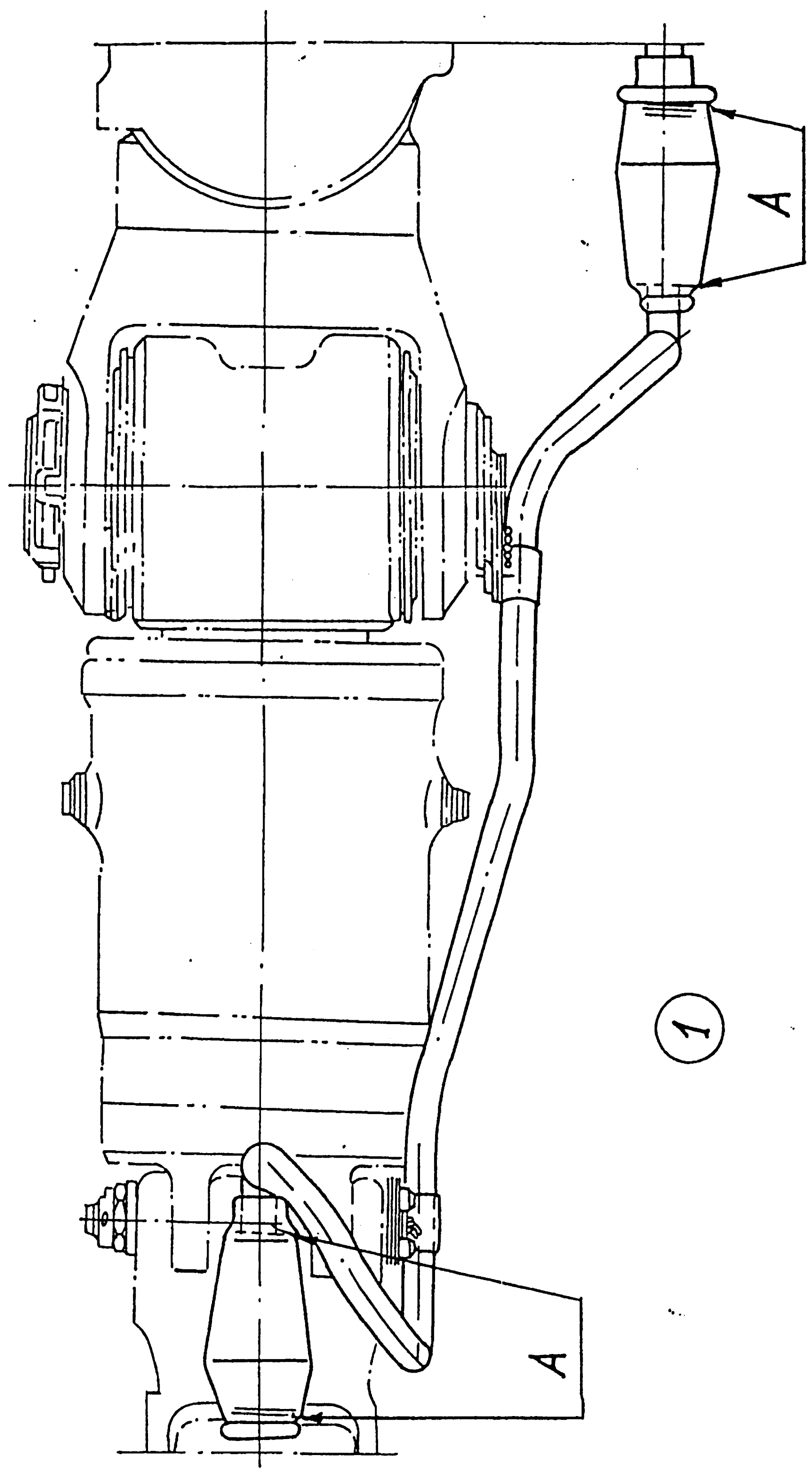

Fig. 6.7a

Fig. 6.8a MR blade section

1 - section edge and spar contact area

Fig. 6.8 b. Defect depth dermining on the spar surface

1 - metal surface
2 - clamp
3 - tip
4 - dial indicator

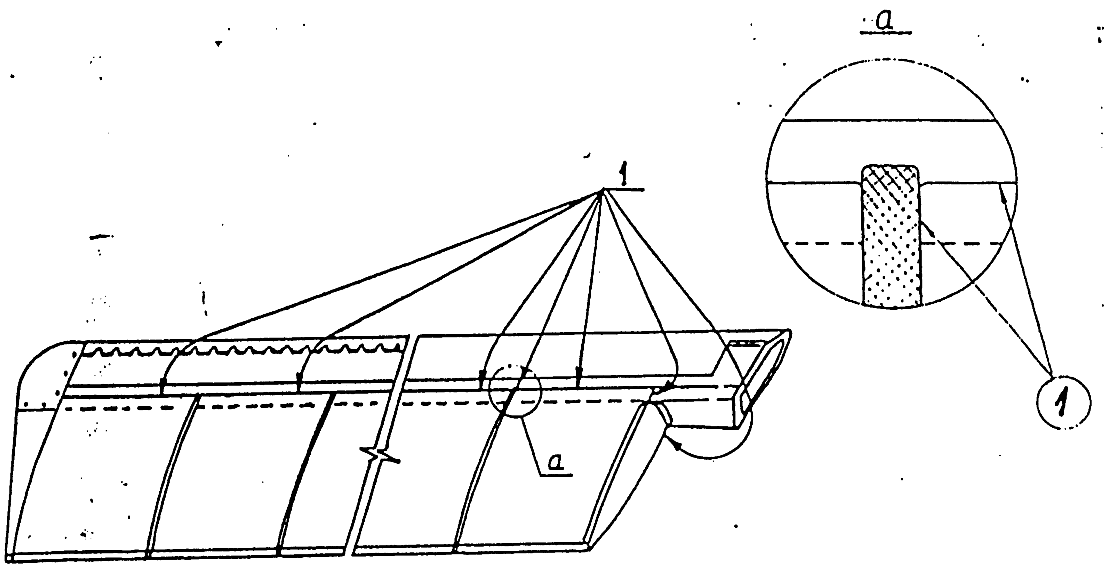

Fig. 6.8a

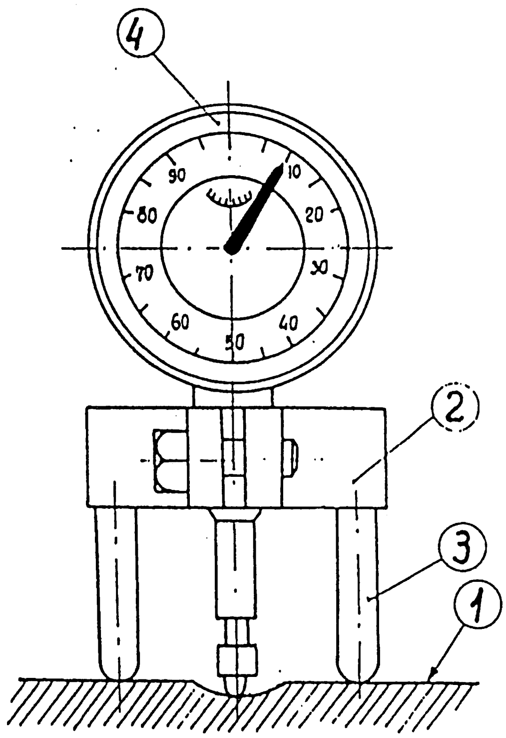

Fig. 6.8b

remove the scratches and cracks found on the metal surface using the scraper,smooth file or emergy cloth, and the polish these surfaces using G01 paste. Cleaned area should provide the setting of the gauge ball. The difference of the gauge readings for the ball located in the dent(after the crack removal) and for the ball located on the metal surface(prior to defect removal) determines the defect depth to be found (Fig. 6,9). When performing the measurements set the the tips in the same points on the blade spar. Mark the setting points using soft pencil.

4. The type of metal surface defects should be determined by means of magnifying glass (at least 4x). Detected defects of the metal structure should be repaired immediately on total depth of the defect. After repair apply the primer and paint according to the requirements included in para 1 Section 6.6.5.
5. Checking the adhesive bond between the section and spar as well as honeycomb to be performed for total surface of the adhesive bonds,excluding the strips of the sec--tions 27 up to 30 wide(from the trailing edge) on the upper and lower side. Checking the adhesive bond between the sections and spar tp be performed on the total length on the width of 26 mm- the width of adhesive bond between the skin and spar,excluding the spar radius -as shown in Fig. 6.10 a,crossection A-A. A/m width is indicated on the blade with the narrow strips-on the lower and upper side-standing out against the blade background of different laquer colour. It is prohibited to insert metal feeler gauges under the skin to determine the size of adhesive bond defect.

6. Check the adhesive bond using JAD-1(JAD-2,JAD-3) device. When such devices are not available ,it is possible to check adhesive bonds by tapping with a hammer (Textolite,weight 10 up to 15 g)having a spherical tip or using a small ball-ended steel rod(weight 25 up to 30 g).
When tapping determine the adhesive bond condition between the blade section and spar as well between the heating section and spar and between the leading edge ferrule and rubber.
In the face of fact,that detecting the adhesive bonds defects is impeded at ambient temperatures below 0°C, it is recommended to perform such procedures in a warm (and dry if possible) room on the blades removed previously from the helicopter to provide results accuracy. To avoid damaging the surfaces to be checked, perform above mentioned inspection by hammer dropping from the height not greater than 10 up to 15 mm or by gentle tapping (from the height not greater than 10 mm) avoiding the skin defects.

A high-pitched sound when tapping means non-defected bond while dead sound (and buzzing) means defective adhesive bond.

Tapping procedure should not be used for adhesive bond checking between the ferrule and rubber under the adhesive tape for the blades with "WT" code.

7. Checking the adhesive bond condition between the antiicing section and the blade spar and between the leading edge and rubber to be performed by tapping with a small hammer -as written in para 6; checking the adhesive bond for rubber ,if any doubts,by additional pressure on the rubber surfaces using small non-metal tools and moving them along the rubber surface simultaneously.
Any wrinkles,folds or displacements are caused by defected bond of the rubber in this area.

8. Adhesive tape bond(for the blades with "WT"index) to be inspected visually.

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9. When checking the adhesive bonds of the blades pay particular attention to possible propagation of incomplete adhesive bonds areas as specified in the blade log card in Deglutination Card.

10. The sealing compound condition between the blade sections and on the tip fairing of the first section to be performed visually. Pay particular attention to proper adhesion and sealing compound condition in the spar area of root fairing of the first section of the other sections spar areas grom upper and lower side,/see Fig.6.10.b/ indicated as D areas.
In case of sealing compound regeneration, check carefully the spar surface acc. to para 1 to 4 of the subsection.

11. Check the tip fairing condition and tightening of the screws fixing the front part of the fairing.

6.6.3a <u>Instructions concerning self -adhesive tape bonding on the leading edge ferrule /recommended when operating the helicopter in sandy areas/</u>

1. Remove defected section of the tape.

2. Remove dust and contaminations with a soft rag from the whole surface to be bonded with a tape.

NOTE: 1. In saline areas, where salt deposits on the blades are possible, it is imperative to wash them from the leading edge ferrule using warm water, to dry with warm air or wipe thoroughly with clean dry rags.

2. The coated with K-88 adhesive for the tape bonding, should be rasped lightly with fine abbrasive paper without damaging rubber and ferrules.

3. Check adhesive bond condition between rubber and ferrule by tapping.

3. Degrease the surface to be adhesive bonded using extraction naphta.

NOTE: Do not touch the blade surface after degreasing and preperaring prior to tape bonding to avoid contamination.

4. Cut the self-adhesive tape /acc. to GOST 52107-73/piece, 50mm wide and not longer than 1100 mm with allowances of 25 mm on each end.

NOTE: Grip the allowances with hands when bonding. The other areas of the tape should not be touched with hands, particularly on adhesive layer.
The latter if contaminated can lead to incorrect bonding and fast deglutination on the ferrule.

5. Apply a tape piece symmetrically to the chord avoiding the air bubbles. Apply the tape uniformly, without excessive tensioning, that can cause bulges and folds difficult to repair.
Cut the allowances with scissors -round the end withs radius R/see Fig.6.11b/-and smooth it up and down beginning from the front part and moving to another end.
When smoothing avoid wrinkles and similar defects. Cut another allowance without overlapping on the next tape section providing clearance, about 1 mm.

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6. K-88 adhesive is recommended to make the self-adhesive tape bond stronger, particulary if ambient air temperatures reach + 45°C and more.
In such case apply a thin layer of K-88 adhesive /TU-38-105540-73/ on degreased surface of leading edge ferrule using a brush. Similar procedure to be repeated for adhesive coated side. Stabilize for 3 up to 5 minutes and bond the tape on the leading edge acc. to procedure described in para .5.

7. Bond the second and third stripe of self-adhesive tape with the clearance between them max. 1 mm.

6.6.4. Defects not to be repaired.

1. Abrades, small cracks and scratches on lacquer coating not reaching the metal structure /spar, ferrule on the blade root, sections facing/.

2. Scratches on the section facing material on the depth not greater than 0,2 mm, continuous dents without failure of the facing material on the sections and on the front and tip fairings, as well as insignificant canting of the rear longeron /deformation 3 up 5 mm for total section length/ without disturbing normal blade operation, and small cuts, dents and cracks, on the ferrules and rubber without disturbing normal operation of anticing system or being the catastrophic failures when further blade operation is allowable.
The sections facing material scratches should be protected using laquer kit when performing periodical procedures.

3. Defects of adhesive bond between spar and section without reaching the edge total area up to 6 cm^2 on each side of the section at maximum area of single deglutination up to 3 cm^2.

4. Deglutination areas between the facing and honeycomb not allowed within 35 mm from the rear wall of the spar /Fig 6.10b. zone A/ on the upper and lower side.
Total area of deglutinatios not greater than 20 cm^2 is allowed for remaining surface, at maximum area of single deglutination not greater than 12 cm^2.

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5. Single deglutinations between rubber and leading edge ferrule without reaching the edges on maximum area 6 cm^2 and on total area up to 18 cm^2 for one ferrule, excluding possible deglutinations of the ferrules on the leading edge on total area 150 cm^2 /for one ferrule/ located between the ferrules cut -outs zone B, Fig 6.11.b/.

6. An "ageing" grid visible on the heating section rubber of the blade is allowed if there are no apparent defects and rubber cracks reaching the insulating layer of the heating section. If such defects, cracks or bulbs and bulges /as deglutinations/ are found, repair them using a mixture composed of K-153 adhesive and U 30-MES -5 sealing compound.
The surface area of single defect /bulges and bulbs / should not exceed 15 cm^2 and 3 cm^2 for losses/ when the heating section insulation is visible/. Total area of a/m surfaces should not exceed 10 % of tofal rubber surface area.

7. Small dents, cracks and cuts on the leading edge and rubber are not catastrophic defects if they do not cause abnormal operation of antiicing system and further blade operation is permissible.
The leading edge ferrules transverse cracks propagating from the ferrules cut -outs without deglutination on ferrule.
The number and length of the cracks are not limited.

8. Small cracks of sealing compound between the sections, on the root fairing of the first section.
   The losses /excluding the areas not coated with sealing compound/, gaps or significant corrosion damages are not allowed and should be repaired.
   It is particularly important for the root fairing spar area of the first section and spar areas of the other sections/ on the upper and lower side of the blade - see. Fig 6.10b indicated as areas D /.
9. Defects /losses, worn places, cracks/ of enamel coating on the sealing compound stripes between sections.
10. Self -adhesive tape losses /on the blades with "WT" index/ or its corrosion damages on the leading edge ferrule if tape replacement is not possible/ e.g. in winter conditions outside the hangar at ambient temperature below + 5°C./
    In case of detecting the tape deglutination or big air bubbles impairing normal operation /e.g. flapping of deglutinated edge of the tape/ and if replacement or repairing is not possible -tear off defected section of the tape.
11. Adhesive bond between heating section and single defects of the spar, not extending to the heating section edge, on the area not greater than 15 cm^2 and total area not greater than 80 cm^2/ separately for upper and lower surface of the blade/.
    NOTE: Incomplete adhesive bonds reaching 10 mm and less from the rubber edge. are regarded as incoplete bonds not extending to the heating section edge.

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6.6.5. Defects to be repaired

The following defects can be repaired in the aerodrome conditions:

1. Worn places, cracks and other defects of enamel coating to be removed applying the primer and enamel coatings.

   a/ lacquer coating make - up

   in case of metal surface fitting and anodize film removal:

   - apply 1 layer of WL-02 primer overlapping the fitted places for about 5 mm; then dry
   - apply 1 layer of AK-069 primer with addition of PAK - 4 aluminium powder /1.5%/

   in case of an intact anodize film:

   - apply two layers of AK-069 primer adding 1.5% PAK - 4 aluminium powder for the first layer and drying after each layer.

   Drying WL-02 primer and each layer of the other primers as well as laquer coating to be performed within 2 hours at ambient temperatures/ + 12°C up to 25°C/.

   Apply two layers of ChW -16 polyvinyl chloride enamel on the primed surface / after previous drying / adding 2% PAK-4 for the first layer. For the blades painted with epoxy enamel- two layers of EP-140 enamel drying the first layer within 7 hours and the second layer within 24 hours at ambient temperatures.

   Abrasions and defects of ChW-6 enamel coating to be repaired by applying ChW-16 enamel proper colour, and in case of the blades painted with epoxy enamel - by applying EP-140 enamel.

   Apply the primer and enamel on the blade surface as possible - using the brush or paint sprayer.

b/ Preparing WŁ-02 primer

Prepare WŁ-02 primer in the pot made of acid - resistant metal sheet, of glass or plastic.

The components for WŁ-02 preparing:

1/ Basic component /resin with pigment/

2/ Acid thinner /acid solution of phosphoric acid/

- basic component to be thoroughly mixed with acid thinner in weight ratio 4:1 for steel and 8:1 for dural.

  Add thinner to the basic component observing proper principle;

- after 30 min. dilute the mixture to reach working viscosity adding 3160 thinner.

  Pot life of the primer, if ready for use amounts 8 hours at temperatures $10^{o}C$ up to + $25^{o}C$ or 4 hours at temperatures 25^{o} up to $35^{o}C$.

c/ preparing EP -140 primer.

The components to be used when preparing EP -140 enamel:

1/ basic component /resin with pigment/

2/ polyamide hardener for epoxy products

- mix each component separately, mix together half hour before painting and thoroughly mix the basic component with hardener in weight ratio 3:1 for bluegrey enamel and 7:3 for black enamel;
- after 30 minutes dilute the mixture to reach the working viscosity adding epoxy products thinner. Pot life for ready -for -use enamel amounts 24 hours - the pot containing prepared enamel should be covered.

2. Dents, scratches, cracks and cuts on the spar.
Repair such defects by fitting them with scraper, smooth file or emergy cloth No 220, and polishing with GOI paste. Fit the flat surfaces acc. to Fig. 6.9, detail D, maintaining the following dimensions: 40 up to 50 mm along the logitudinal axis of the blade; 20 up to 25 mm perpendicularly to the longitudinal axis of the blade.
Fit the fixing holes in F area along the radius, within this area on the whole thickness of the eye.
To provide defect depth measuring accuracy, set the dial indicator in this point with the tips on the unfitted metal -after local fitting to the depth h-acc. to detail D in Fig. 6.9. The difference between the indicator readings for the dial indicator positioned in the cavity resulted by preliminary fitted defect and the readings for dial indicator positioned on the metal surface not fitted previously gives a defect depth to be found. After measurements remove the defect /dimensions in mm/ thoroughly acc. to Fig. 6.9. detail D.
When measuring set the indicator tips in the same points on the spar, therefore mark the indicator tips locations using soft pencil.
Polishing should be performed paralelly to the spar axis. Inspect adjacent section of the spar before defect repair.
Any repair marks for defects caused by previous operation are not allowable within 300 mm on each side of defected place for the same surface on the both sides for defect on the opposite surface of the spar.

After fitting, measure the cavity depth that should be within the limits acc. to Fig.6.9/ dimensions in mm/.
If the fitting depth exceeds allowable limits, the blade should be put out of service.
Record all fitted places on the blade spar indicating their depths and coordinates in Defects and Domages Record attached to Blade Log Card.
Apply primer and paint fitted places.

WARNING

IN CASE OF CORROSION FOUND ON THE SPAR, PUT THE BLADE OUT OF SERVICE IMMEDIATELY, IRRESPECTIVE OF ITS POSITION AND CONDITION.

3. Punctures on the section facing /Fig.6.11a/.
It is allowed to repair the punctures in the section facing even in case of local damage of honeycomb.
Facing defect repair is permitted if defected place distance is not less than 20 mm for rear wall of the spar and not, less than 15 mm for sealing compound stripes and rear longeron.
The area of repaired puncture should be not greater than 20 x 20 mm.
Repaired places quantity for each section should be not greater than 2 for sections nos. 1 up to 10 and not greater than 1 for the other sections.
The punctures repairs are permitted by adhesive bonding a fabric or dural patch.
If the punctures quantity is greater than 1 for a section, their repair is allowable, if the distance between the edges of individual punctures on the same side of the section amounts at least 150 mm, or if the punctures on both sides of the section are not overlapping.

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Prior to bonding the patch, prepare the section to be repaired :

- remove the primer coat 1 using SD remover /ordinary/ or R-5 thinner /for the blades with epoxy enamel coating remove the paint coating with abrasive paper 220 and prime coating by means of SD/
- cut and round the puncture edges, round sharp edges and spot drill the cracks edges with diameter Ø 1.5 up to 2 mm.

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WHEN SPOTTING THE HOLES IN THE FACING AVOID DAMAGING THE SPAR RIBS AND REAR LONGERON.

- in case of humidity entrapping to the blade interior, dry the section using warm air /t=50 up to 60^{o}C/.

a/ Version including dural patch: cut a round patch from dural sheet 0,3 up to 0,4 mm thick with overall dimensions extending up to 15 mm beyond the limits of defected area. The surfaces to be bonded should be degreased with extraction naphta and stabilized within 15 minutes, then degreased with acetone and stabilized twice, 5 minutes at a time.
Apply K-153 adhesive on the patch and facing edges with a brush, bond the patch i remove excess of adhesive on the edges using a rag.
Cover the patch witch a piece of foil or cellophane and then with a layer of stingy rubber and with a weight to exert a pressure of 0,5 up, to 1,0 kg/cm
Do not pressure in the area of old facing cut - out.

August 1990

Stabilize under pressure within 24 hours at temperature 18°C or within 12 hours at 40 up to 50°C .
Apply AK-069 and WŁ-02 primer and paint with ChW-16 enamel /for the blades with epoxy enamel coating apply WŁ-02 and AK-069 primer and paint using EP-140 enamel/.

b/ Version with fabric patch:
cut a round serrate patch from AST-100 cloth with overall dimensions extending 25 up to 30 mm beyond defective area.
The surfaces to be bonded should be degreased with extraction naphta and stabilized within 15 minutes then degreased twice with acetone and stabilized twice, 5 minutes at a time.
Apply AK-20 adhesive on the metal and cloth using a brush, bond the patch and depress with a tampon. Dry at 12°C up to 35°C within 3 up to 4 hours.

Apply two layers of AK-069 primer on the repaired area using the brush /drying after each layer/. Coat with two layers of ChW-16 polyvinyl chloride enamel proper colour and two layers of EP-140 enamel for epoxy enamel painted blades.
When operating pay attention to the condition of repaired place checking it during post - flight inspection.
Patch replacements are allowed if necessary without any limitations.
Provisional fabric patches to be replaced by metal patches when performing periodical procedures.

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4. Incomplete adhesive bonds between the ferrule and rubber reaching the ferrule edge, incomplete adhesive bonds between the heating section and spar, reaching the section edge, local rubber deglutinations reaching the rubber edge, local rubber bulges /as incomplete adhesive bonds/, as well as inner incomplete adhesive bonds between the ferrule and rubber and between heating section and spar are not allowable when exceeding specified limits.
In operating conditions it allowed to repair:
local incomplete adhesive bonds between the ferrule and rubber, reaching the ferrule edge but not exceeding allowable limits: local incomplete adhesive bonds between the heating section and spar reaching the heating section edge, but not exceeding allowable limits, as well as local rubber bulges reaching the rubber edges.
In individual cases, when any deglutinations will arrise on operated blades, causing abnormal working conditions /vibrations, flapping of deglutinated rubber edge ect/, put the blades out of service and repair defected adhesive bonds using K-153 adhesive

a/ removing local rubber - bulges /incomplete adhesive bonds/

- cut rubber in bulged area paralelly to longitudinal blade axis. Pay particular attention when cutting to avoid heating section insulation damaging.
- the surfaces to be adhesive bonded should be degreased two times with acetone /including stabilizing after each degreasing within 10 min./.
- apply K-153 adhesive /prepared without cement/ on the bond area and depress the rubber to level the area of cutting. Remove excessive adhesive with clean rag.

- cover the bonds area with a piece of foil or cellophane, then put a thick piece of rubber and a weight and depress the bond surfaces using a pressure from 1 up to 1 kG/cm^2.
Stabilize under this pressure within 24 hours at temperature not lower than 18°C or within 12 hours at 40 up to 50°.
Insignificant irregularietes of bond area are permissible.

b/Repairing local rubber defects
- even up ragged and irregular edges cutting them and avoiding the heating section insulation damaging.
- degrease the heating section surface in extraction naphta two times and stabilize after each degreasing within 15 minutes.
- apply K-153 adhesive and U 30 MES-5 sealing compound mixture on defective rubber area using a spatula and bond a self - adhesive tape.
- stabilize at temperature not lower than 18°C within 24 hours.
- after drying applied mixture gently remove the self adhesive tape and level with surrounding profile by cutting or local fitting with fine abrasive paper.

c/repairing /a/ incomplete adhesive bond between the leading edge ferrule and rubber; with a bond defect reaching the edge.
- in case of deglutination on whole ferrule surface, remove old adhesive residues from the ferrule and rubber surface,

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- degrease twice the ferrule and rubber surfaces to be bonded using a tampon soaked in acetone and stabilize after each degreasing, 10 minutes at a time.
- apply K-153 adhesive using a wooden or plastic spatula,
- depress the ferrule to the rubber cover with a piece of cellophane or foil and install the clamping fixture /50.93.450.00.00/,
- stabilizer under load within 24 hours at temperature not lower than + 18^{o} C or within 12 hours at temperature 40 up to 50^{o}C.
- remove the claping fixture and remove K-153 adhesive leaks,
- check adhesive bond quality by tapping,

d/Repairing incomplete adhesive bonds between the heating section and spar at defects reaching the edge:
- check deglutinated area for defects of anodized protective coating and spar metal surface exposing. Apply WŁ-02 primer on defected area acc. to para 9 of this section;
- clean the surfaces to be adhesive bonded,
- degrease two times the places to be adhesive bonded using a tampon soaked in extraction naphta and stabilize after each degreasing within 15 minutes at a time. Then degrease two times using acetone and stabilize after each degreasing within 10 minutes,
- apply K-153 adhesive under the heating section using a plastic spatula,

- cover with a piece of cellophane or foil and install a clamping fixture /50.93.450.00.00/ or load with a weight /through a thick piece of rubber/ to exert a pressure from 1 up to 2 kG/cm^2 on the surface to be adhesive bonded,
- stabilize when loading within 24 hours at temperature not lower than 18^{o}C or 12 hours at temperature from 40 up to 50^{o}C,
- remove the clamping fixture and foil and clean adhesive leaks,
- check adhesive bond quality by tapping.

Insignificant surface irregularities are allowable in areas of repaired deglutinations.

5. Sealing compound make - up between the sections:

- cut and remove defected section of sealing compound.

  NOTE: proceed gently to avoid the section and spar facing damages.

- degrease the surfaces to be coated with sealing compound washing twice with extraction naphta and stabilizing within 15 minutes after each degreasing.
  Dry in dry air stream or store the blade during 13 up to 15 hours in a dry and warm room,
- protect the places to be coated with fresh sealing compound using self - adhesive tape to provide boundary limits;
- apply U 30 MES - 5 sealing compound layer 0,5 up to 1 mm thick using a brush or a spatula;

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- remove gently the limiting pieces of self adhesive tape after 10 up to 15 minutes;
- stabilize within 72 hours at 15 up to 35°C and relative humidity up to 75 % until sealing compound is completely cured.
  Sealing compound application is permitted only exceptionally at temperatures not lower than 12°C followed by stabilizing within 84 hours with coated surface upwards;
- renew lacquer coating in the area to be coated with sealing compound.

Repaired blade should be in horizontal position and the surface to be coated with sealing compound should be faced upwards within minimum 4 hours. Make -up laquer coating defects applying the primer and enamel layers.

a/ preparing U-30 MES -5 sealing compound :
- components required for U-30 MES - 5 sealing compound preparing;

1/ U -30 E -50 paste /100 parts by weight/;
2/ paste No 9/7 up to 11 parts by weight;
3/ diphenylguanidine /0,5 up to 1,0 part by weigh/;

- mix thoroughly U-30 paste with paste No 9, then add diphenylguanidine and remix thoroughly. Pot life of sealing compound depends on added amount of diphenylguanidine and amounts 4 hours maximum.

6. Cut off and level deglutinated or ragged edges of protective layer on the leading edge ferrule.

7. Dents, cracks and scratches on the blade ferrule. These defects to be immediately fitted with emergy cloth No 220 and then polished with GOI paste /as in para 2 for the spar/.

After fitting and polishing measure the fitting depth, that should not exceed values specified on Fig. 6.10c. Fitting depths to be measured on the outer surfaces by means of dial indicator and with the special caliper gauge in the holes.
Fitting depths should not exceed 0,25 mm on the ferrule i the spar root area.
The fixing eyes and holes allowable only in the area shown in Fig.6.10c to the depths:
- in the holes up to 0,005 mm
- on the surface up to 0,020 mm
For fixing holes in area E1 fit along the radius on whole eye thickness within this area.

NOTE: the holes fitting up to 0,005 and the plane fitting up to 0,02 to be performed in overhauling plant.

The blades should be withdrawn from operation in case of the ferrules defected in the area not allowed to fit or in case of fitting depth /required for complete repair of the defect /greater than above mentioned values.

8. Apply primer on metal to repair anodic coating losses. Proceed as follows:
- clean the surface,
- degrease the metal surface using B-70 gasoline and

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Fig. 6.9. MR blade spar defects to be repaired.

3 - fitted surface cross - section

4 - parallel to the blade axis ;

1 - crack /defect/;

2 - fitting limit;

h_1 - defect depth;

h - total depth after repairing.

Allowable depth of spar fitting:

Area A : 0,07 mm
Area B : 0,12 mm
Area C : 0,17 mm

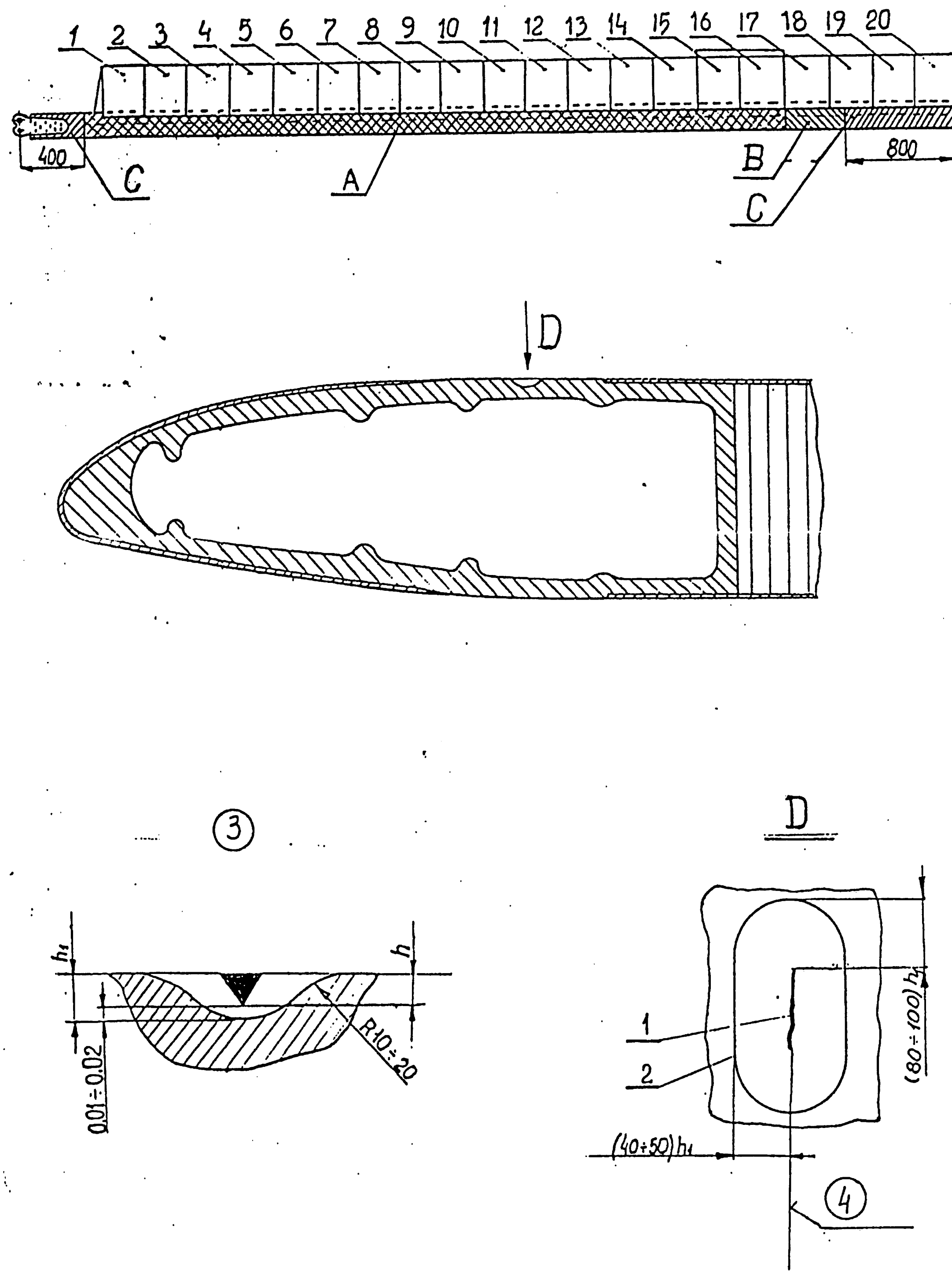

Fig. 6.9.

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6.9

Fig. 6.10a Adhesive bonding the section facin, honeycomb and spar.

1 - spar;

2 - section facing ;

3 - facing rib;

4 - honeycomb;

5 - section longeron;

6 - sealing compound strip;

7 - anticing system pack;

8 - adhesive bond checking area line /yellow strip/;

9 - section facing edge;

10 - thes area is not subject to checking.

NOTE: within 4 mm

Adhesive bond between section facing and spar not subject to checking within 4 mm area.

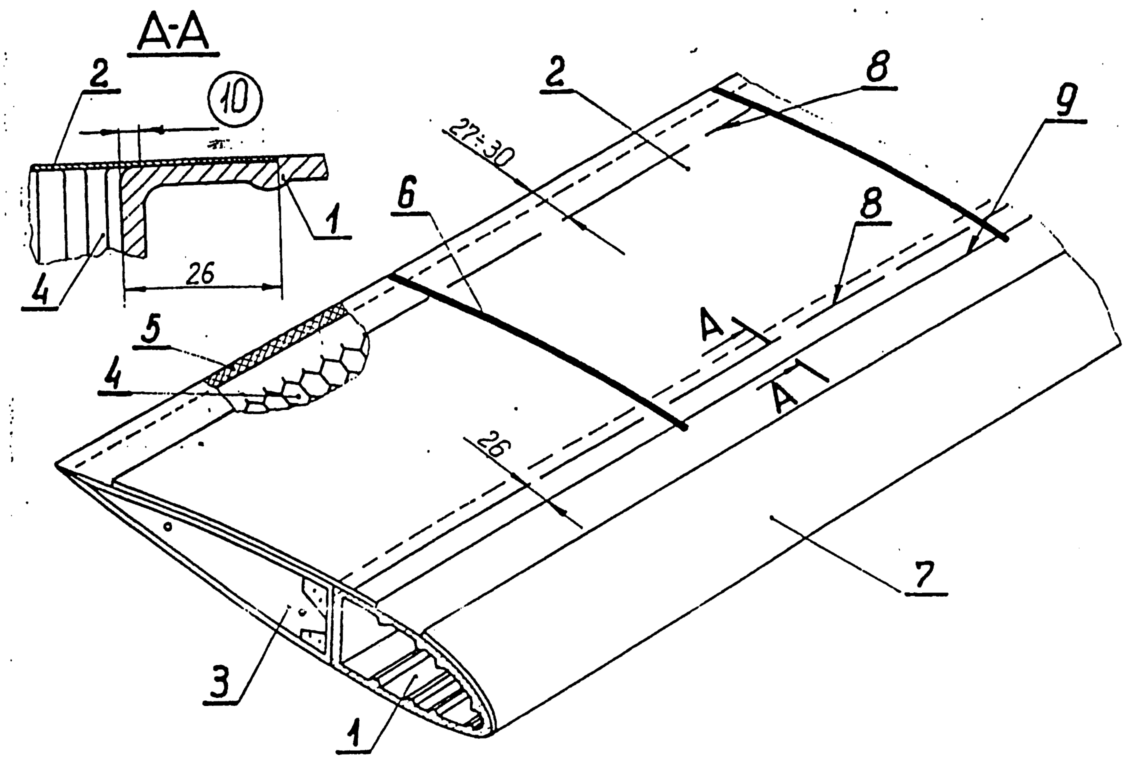

Fig. 6.10a.

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Fig. 6.10 b. Allowable defects of adhesive bond between the section facing and honeycomb and between the leading edge ferrule and rubber.

1 - chord

2 - yellow strip

3 -Area D on the lower and upper surface of the blade

4 - Area A   5 - Area B

6 - Area C on the upper and lower surface of the blade

NOTE : Any deglutinations not allowable between the sections facing and honeycomb on the upper nad lower side of the blade within area A-35 mm from the rear wall of the blade spar.
Deglutinations between leading edge ferrule and rubber are allowable up to 150 cm^2 on each ferrule, within area B-20 mm /area limited by cut - outs in the leading edge ferrules/.
In area C-20 mm /on chord/.
Only single deglutinations are allowed between heating section and spar on its total length, not exceeding 35 cm^2 on total surface 160 cm^2.
In area D-40 mm wide /on the upper and lower surface of the blade/, sealing compound defects are not allowed.

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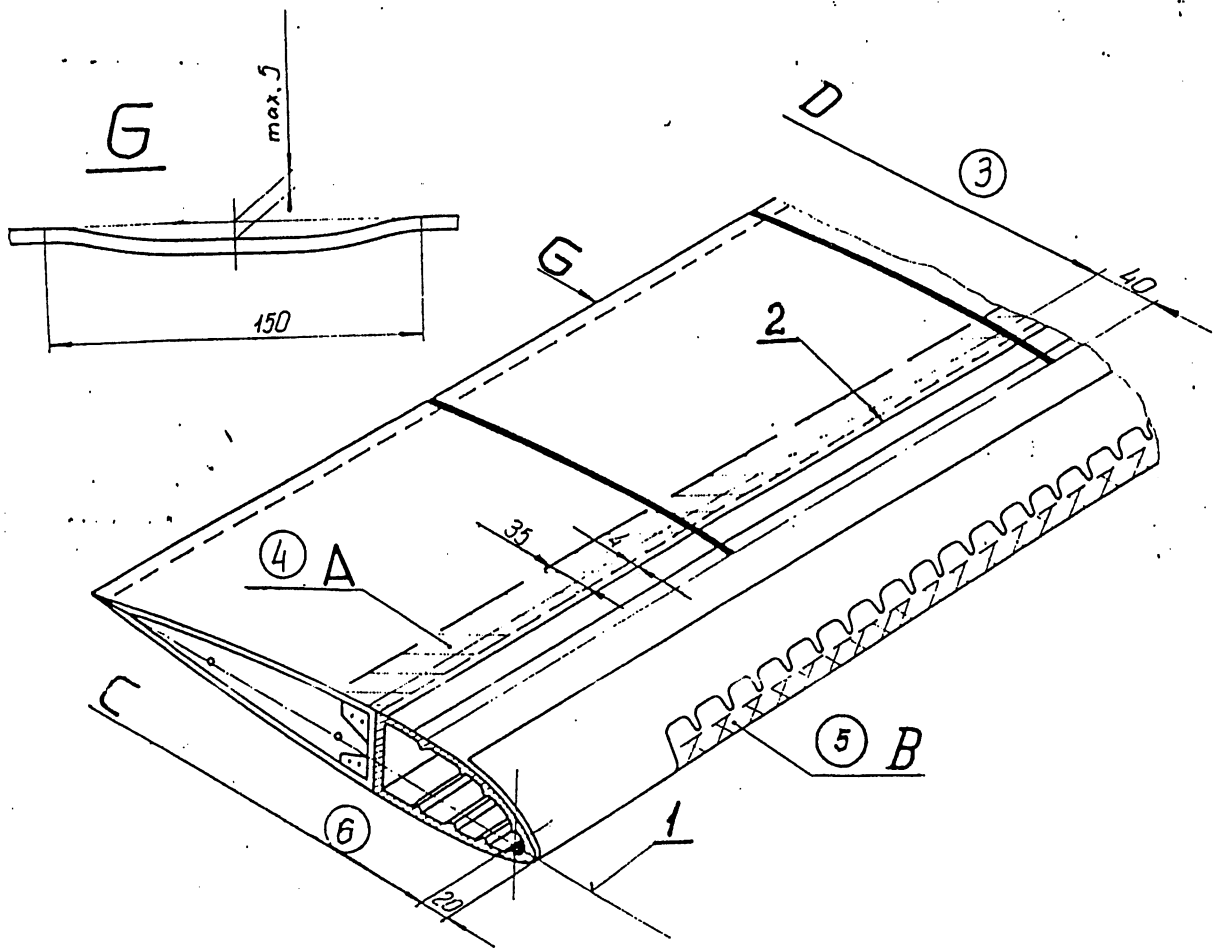

Fig. 6.10b

Fig. 6.10c. Allowable fitting depth for the spar ferrule.

Area C	- max. fitting depth :	0,25 mm
Area E	- max. fitting depth :	0,005 mm
Area F	- max. fitting depth :	0,02 mm
Area D	- not allowed	

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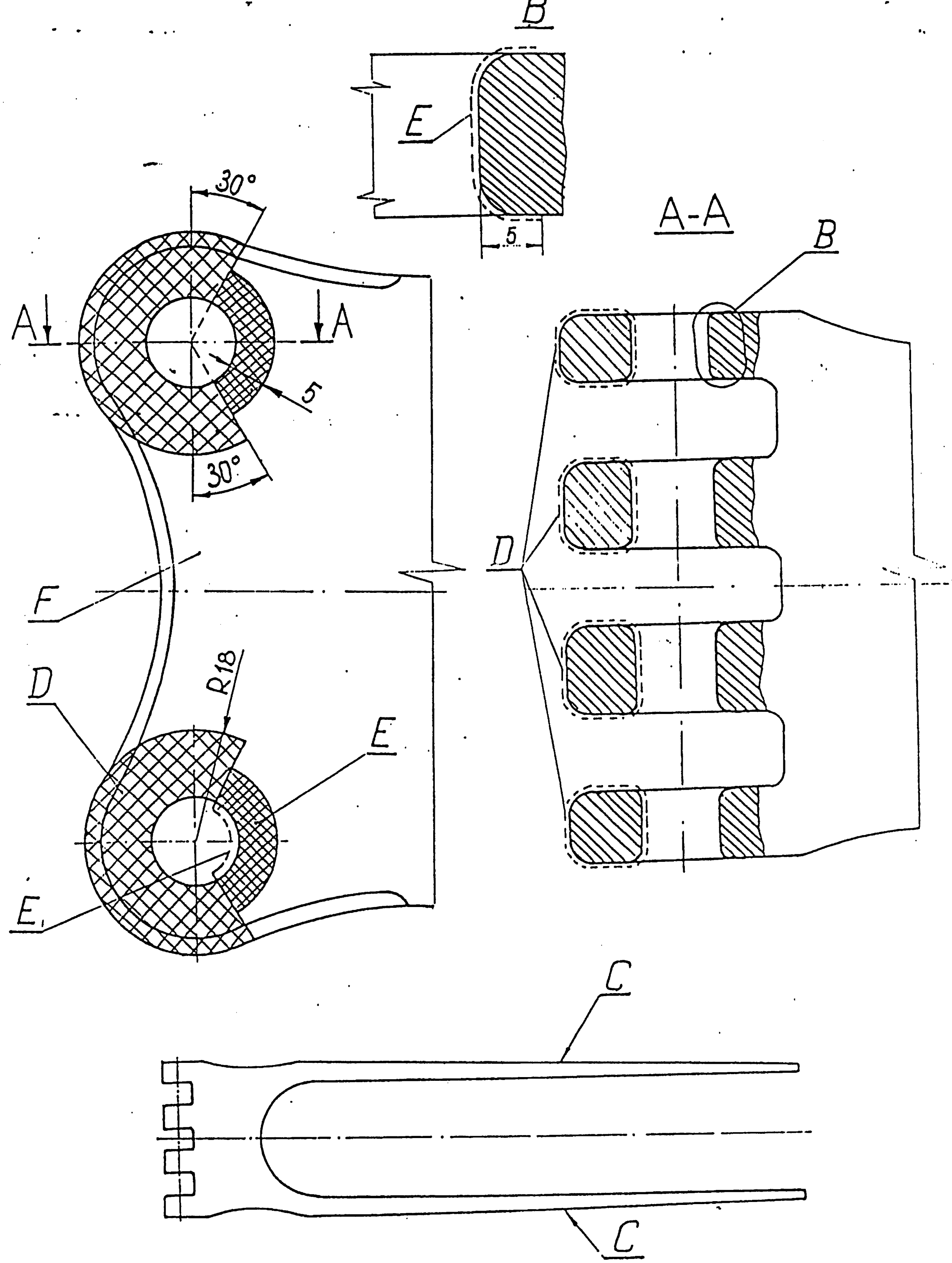

Fig. 6.10c

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Fig. 6.11a. Repairing the punctures of MR blade sections facing.

1 - dural patch
2 - fabric patch
3 - section facing
4 - puncture
5 - levelling line of the puncture edge.

Fig. 6.11b. MR blade with self - adhesive tape on the ferrule.

1 - rubber
2 - ferrule
3 - self-adhesive tape

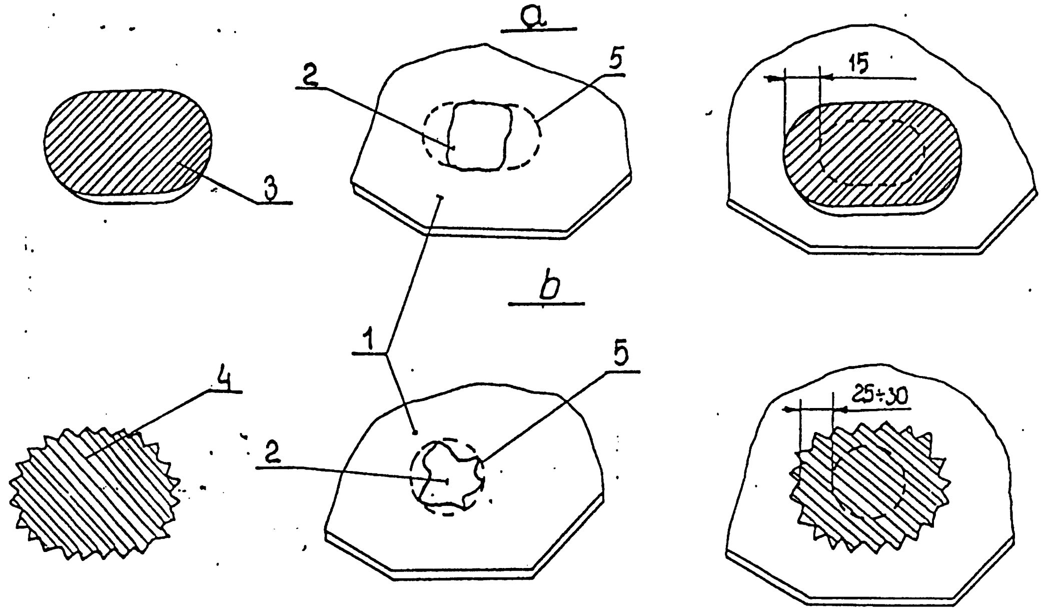

Fig. 6.11a

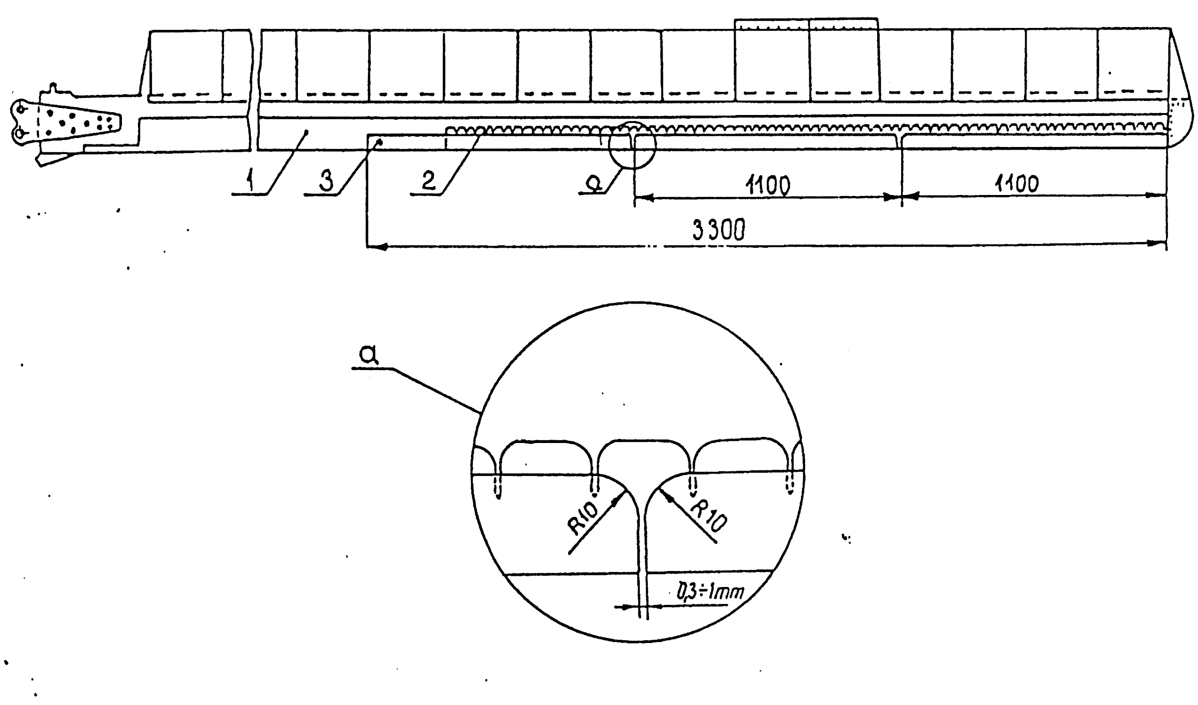

Fig. 6.11b

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stabilizer for 25 up to 30 minutes, then twice degrease with acetone and stabilize within 10 minutes after each degreasing,

- apply WŁ-02 primer on repaired place and dry at least for 2 hours.

9. MR blade spar crack indicator defect.
Appearing of the red cap is a symptom of the defect of spar crack indicator. Check the spar valve for leaks and spar overpressure acc. to procedure included in Subchapter 6.6.6. if the red cap is visible.
"Spar crack signalling system operation" para 8a,b.
When it is stated that spar crack indicator failure is the reason of red cap appearance, replace the indicator acc. to the following procedure:

NOTE: The indicator replacement procedure /Fig.6.12a/ to be performed at temperature 15 up to 30°C and max. relative air humidity 75 %.

a/ place the blade on the stands with the leading edge dowdownwards,
b/ cut the wires protecting the valve capkey and indicator,
c/ unscrew the valve insert /2-3 turns/ and deflate the spar,
d/ unscrew EŁ-RP -27 -1270 crack indicator from the spar by turning left,
e/ remove residual sealing compound from the tapped hole in the spar using a tampon soaked in acetone,
f/ screw a new crack indicator including a rubber sealing in the hole, mark the hole position for lockwire on the hexagonal housing of the indicator,

g/ unscrew the indicator from the spar and drill a hole Ø 1,2 mm for lockwire KO Ø 0,8 mm in marked position of hexagonal housing,

h/ wipe the hole in the spar, tapped part of the indicator housing and rubber washer using a tampon soaked in extraction naphta,

i/ wipe the hole in the spar and tapped part of the indicator housing using a tampon soaked in acetone and dry for 5 minutes ,

j/ apply a layer of U 30 MES -5 sealing compound in putty conistence on the tapped part of the crack indicator and on the both sides of the rubber washer and screw the indicator in the spar hole after the rubber sealing. Wipe excesive sealing compound around the rubber washer using a tampon soaked in acetone,

k/ stabilize for minimum 24 hours at 15 up to 30 ^{o}C , then tighten the valve insert and charge the spar with air to reach a pressure value exceeding the crack indicator operating pressure by 0,15 atn. Check the valve and described indicator for leaks using soap foam,

l/ check the spar pressure after 48 hours.
If the spar pressure does not drop after 48 hours /considering ambient temperature and atmospheric pressure/, new indicator has been installed properly, but the blade is allowed to operate after 72 hours,

m/ install a cap-key on the charging valve; lockwire the valve and indicator. Record the indicator replacement in the blade log card.

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6.6.6 Operation of the spar crack indicating system.

Spar crack indicator operation in case of MR spar wall crack or spar leaks or charging valve inefficiencies - air pressure in the spar and in the indicator housing becomes equilized to atmospheric pressure.

As a result of inner pressure elasticity forces, a bellow is tensioned and red cap of crack indicator extends from the housing behind the white stripe and is visible under transparent hood evidencing a blade inefficiency.

WARNING

WITHDRAW THE BLADE FROM OPERATION - UNTIL THE REASON OF THE CRACK INDICATOR OPERATING IS RECOGNIZED.

1. Use the diagram /Fig.6.12/ showing the spar air pressure vs ambient air temperature when checking the spar crack indicator at periodical procedures.

2. To provide proper operation of the system, charge the blade spar with air to reach a pressure exceeding the operating pressure of the crack indicator by 0,15 atn.
   After air charging or discharging install the cap on the valve housing and lockwire.

3. At all periodical procedures record the following data in the blades set log card: air temperature, working pressure before and after procedure and operating pressure of the spar crack indicator.

4. Blade spar working pressure should be not less than 0,25 atn at ambient air temperatures below - 40°C. Then check air pressure in the spars after every flight. Spar air pressure increase is possible up to 0,9 atn. at ambient air temperature greater than + 40°C .

5. Check the indicator housing for cracks and scratches. The cracks may cause the system leaks.
The scratches to be fitted and polished. Wash the housing using a clean rag and water. Do not use detergents or solvents to avoid sealing compound dissolving and system leaks.
Remove snow and ice using warm air stream or washing with warm water. Do not remove ice by scraping to avoid the housing damages.

6. It is forbiden to remove the crack indicator and other system components /excluding the cap and charging valve insert/.

7. It is forbiden to exceed 0,8 at when charging. Therefore it is not allowed to use compressors, compressed air bottles ect. for blade spar filing.
Charge the blade spar with air to reach working pressure using only a car inflater performing 10 up 15 full strokes per every 0,1 atn and checking periodically by means of the pressure gauge 50.93.080.00.00.

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Fig. 6.12

Functional dependence of the response pressure of the helicopter--rotor blade-spar damage monitoring system upon the ambient air temperature

1. Allowable deviation limits
2. Design pressure
3. NOTE: P abs = P atm + 735 P man /relationship equivalent to the nomograph to Fig. 6.12/.

   P atm = barometric pressure

   P man = type 50.93.070.00.00 pressure gauge readings /in fractions of one atmosphere/, i.e. monitoring system response pressures.

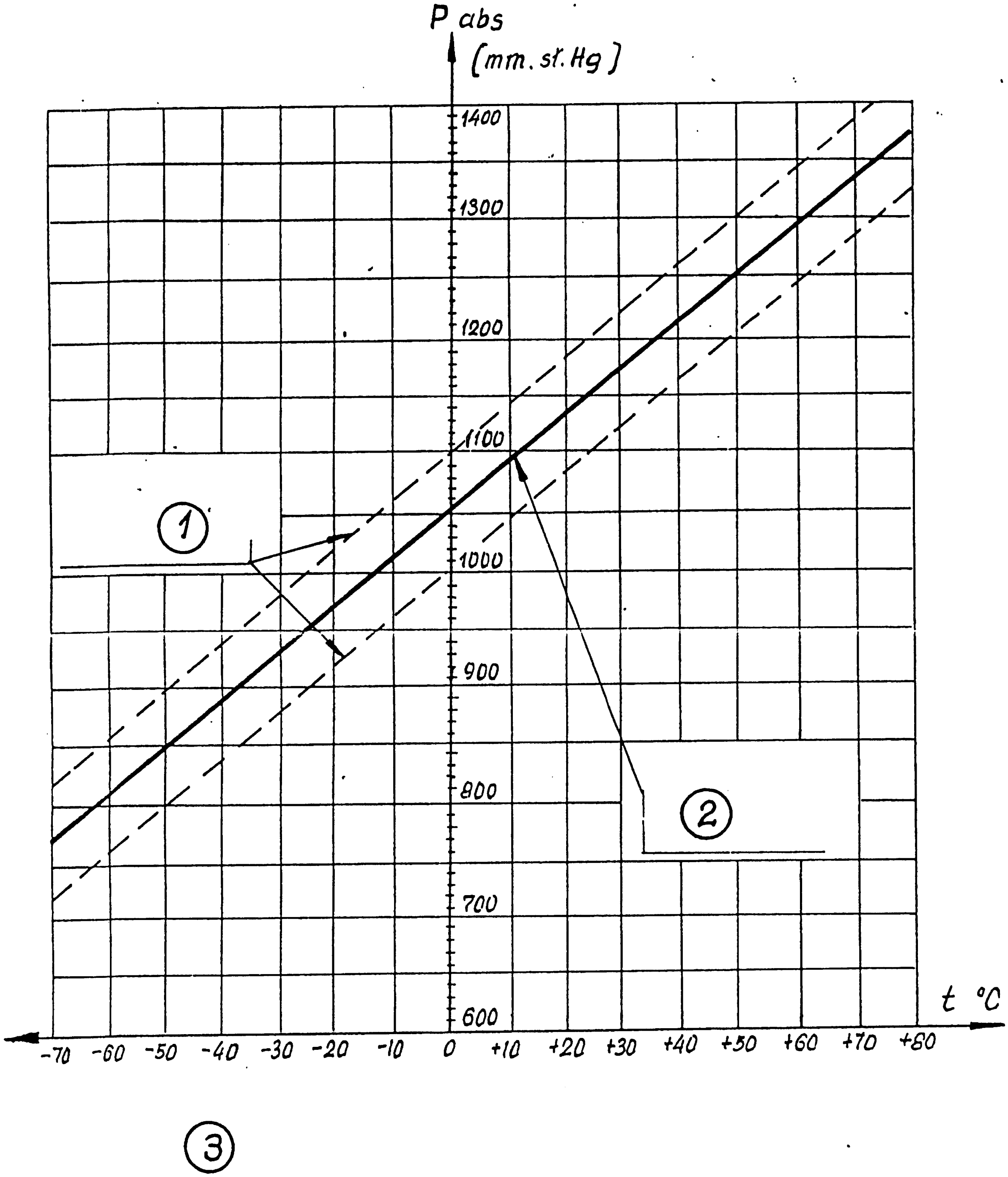
P abs
(mm. st. Hg)
1400
1300
1200
1100
1000
900
800
700
600
t °C
-70
-60
-50
-40
-30
-20
-10
0
+10
+20
+30
+40
+50
+60
+70
+80
1
2
3

Fig. 6.12.

Fig. 6.12 /Cont./

Nomograph for assigning the monitoring system response pressures

(1) Example: P man = 0.35 at

P atm = 720 mm Hg.

P abs = apprx.

980 mm Hg.

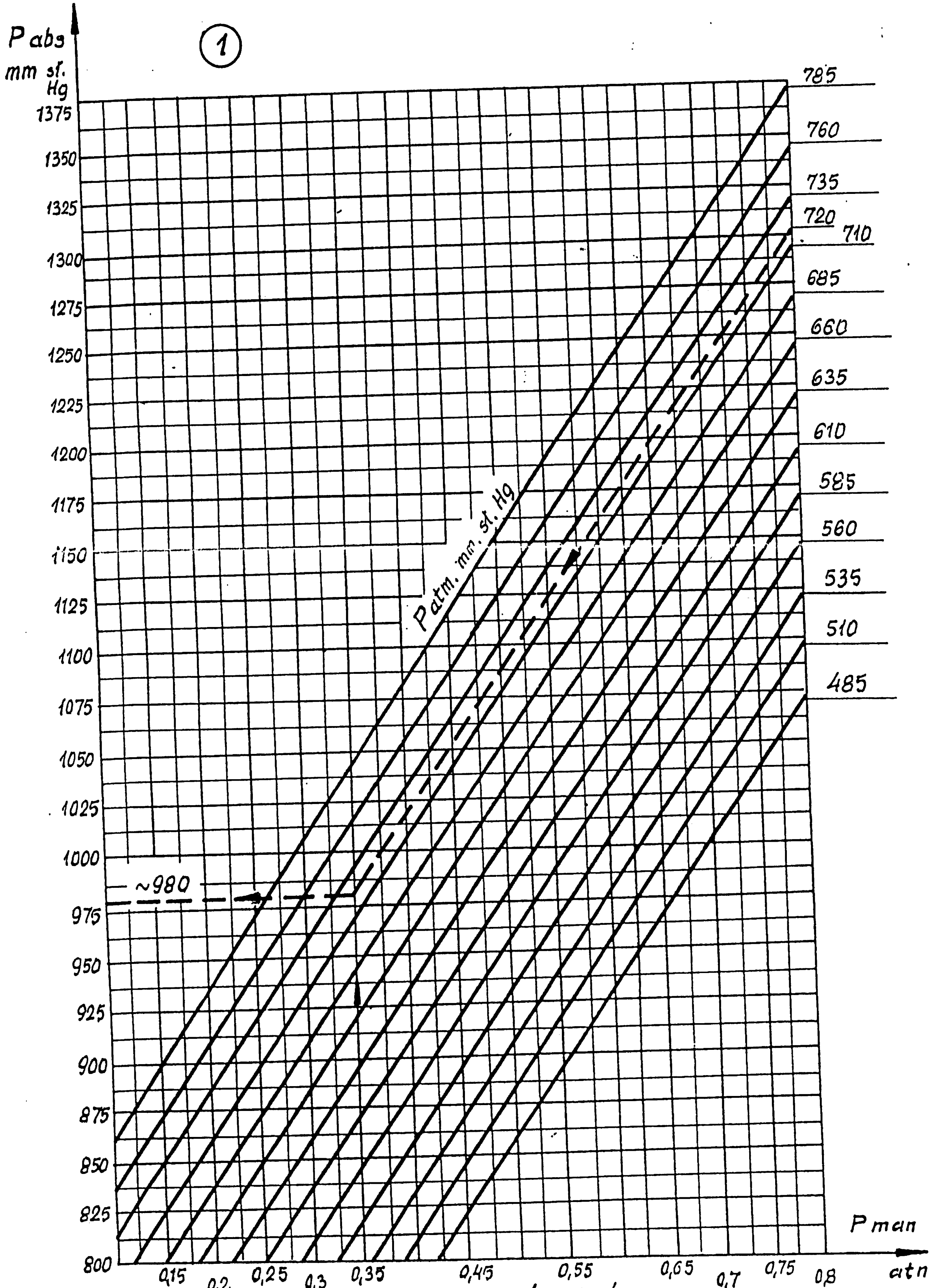
1
P abs mm sł. Hg
1375
1350
1325
1300
1275
1250
1225
1200
1175
1150
1125
1100
1075
1050
1025
1000
975
950
925
900
875
850
825
800
~980
P atm. mm sł. Hg
785
760
735
720
710
685
660
635
610
585
560
535
510
485
P man
atn
0,15
0,2
0,25
0,3
0,35
0,45
0,55
0,65
0,7
0,75
0,8

Fig. 6.12 /Cont./

Fig. 6.12a. EĽ - RP27-1270 blade spar crack indicator.

1 - spar;
2 - EĽ- RP27-1270 crack indicator;
3 - rubber washer;
4 - sealing compound;
5 - spar ferrule;
6 - cap key;
7 - lockwire KO Ø 0,8

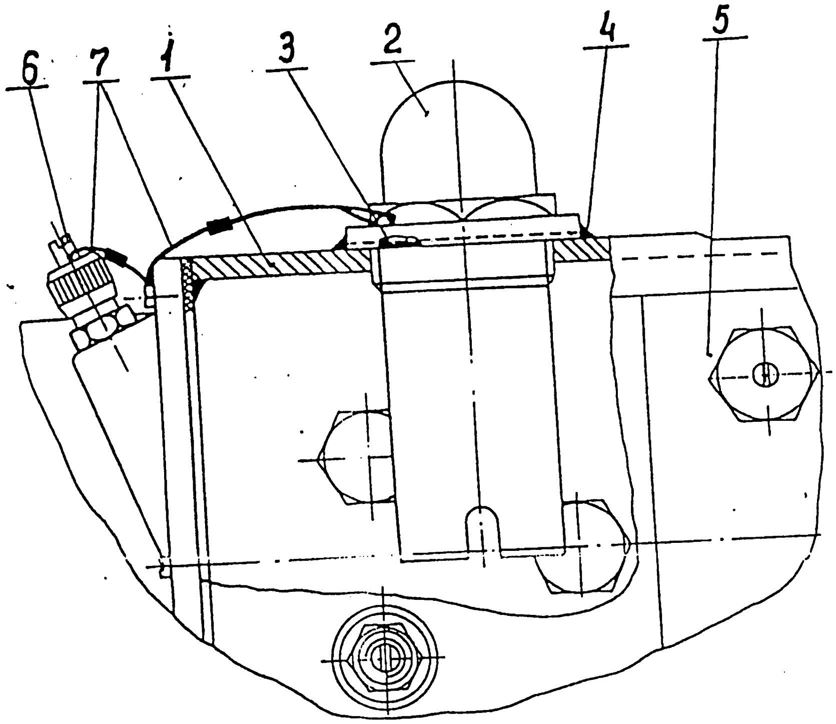

Fig. 6.12a

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8. When the red cap is visible even on one side, remove the cap - key from the charging valve and check the spar air presure using the pressure gauge.

a/ If the spar pressure is equal or lower than the spar indicator operating pressure /see diagram/, charge air to reach the working pressure /by 0,15 atn greater than crack detector operating pressure/ checking its calibration previously. Start the engines, set collective pitch at 5 up 6^{o} and main rotor rpm at 80 %.
Move control stick forward to 1/2 up to 2/3 extreme movement. Shutoff the engines after 20 minutes and repeat air pressure check through the charging valve. If the pressure drop is greater than 0,1 atn check the charging valve for leaks acc. to the following procedure.
- remove the cap - key from the charging valve and check rubber seal condition.
  The seal should not extend from its seat.
  Replace the cap - key or its seal if necessary,
- check the valve for leaks using soap foam.
  Tighten the set screw of the insert in case of leaks symptoms or replace the insert if required.
  After repairing the valve inefficiency recharge the blade with air to reach working pressure and perform a test at operative engines. Withdraw the blade from operation, when air pressure drop is greater than 0,1 atn.

b/ When the spar pressure is greater by 0.15 atn than crack indicator operating pressure for give temperature, replace the indicator due to inefficiency.
In case of partial visibility of red cap /on one side/ discharge air from the spar and make it sure if the cap moved completely /without jamming/ beyond the observation line.
In the cap is still in initial position /without moving upwards/, replace the crack indicator.
Only a ferry flight of the hepicopter is allowed, until the indicator replacement.
Then recharge the spar, to reach pressure 0,7 up to 0,8 atn /considering ambient air temperature/ and check the spar pressure - after 2 hours minimum or after operating the engines for 20 minutes - as in para A. The helicopter ferry flight is allowed for spar indicator replacement, if pressure drop is not greater than 0,1 atn.

9. Check charging valve for leaks when checking the spar crack indicator for defects, before installing the cap key, on the charging valve.
In case of the valve leaks - tighten the insert and replace if required.

6.6.7. Maintenance of blades dismounted from the helicopter

1. If within a flying period the out-of-operation time longer than 1 month is planned, dismount the blades from the helicopter.

2. Having dismounted the blades from the helicopter for storage, coat with commercial petrolatum the surfaces of clevis, holes and jaws of the spar fitting.
Remove dirt and dust from the surface of the blade.

3. When handling the blade, carry it with leading edge downwards. It is prohibited to lift the blade gripping it by the tip fairing.

4. When conveying and storing the blades dismounted from the helicopter, protect them by putting dry canvas covers.
Store the blades in a closed space or in the open air under a roof protecting them from rainfall and snowfall.

5. Place the blades on special stands provided with cut-outs corresponding to the shape of the blade leading edge and covered with a felt pad at least 4 mm thick with leading edge downwards. A distance from the ground to the blade leading edge should be not less than 500 mm.

6. In case the blades are stored in a store-room or on stands for a period longer than 15 days, deflate the blade spars.
When re-installing the blades on the helicopter, inflate the blade spar and check the spar damage monitoring system within the scope as provided for overall inspection.

7. When storing the blades on stands under a roof, remove canvas covers every 15 days and air the blades all day long /at sunny weather/ and allow the canvas covers to dry.
In case the blades are stored in a closed space, remove canvas covers at least every 3 months and air them for 2 to 3 days.

8. The conditions of storage should ensure adequate protection of the blade spars, de-icing system and section skin from any damage.

9. Renew protective coat on the blades after a six months storage in a closed space or after a three months storage in the open air.

10. In case the blades have been stored in a closed space for a period longer than 6 months or in the open air for a period longer than 3 months, check the condition adhesive bonded joints of the section skin to the spar and honeycomb filler using the JAD-1 /JAD-2/ device or by tapping the surfaces with a mallet, before the blades are re-installed on the helicopter. Mount the blades on the helicopter, start the engines and allow them to operate for 10 minutes in hovering.

6.6.8. Preparation of K-153 adhesive

1. Work Safety Rules

- Weigh the ingredients on a balance placed in a fume cupboard with a fan in operation.
- Open vessels containing hexamethylenediamine inside the fume cupboard just before weighing.
- When opening vessels containing hexamethylenediamine and K-153 ingredient, wear rubber gloves. Mix products inside the fume cupboard with a fan in operation.
- In case hands are contaminated with the adhesive and its ingredients, remove them from hands using a wool tampon wetted with acetone and then wash them in warm water with soap.

- Store the adhesive ingredients at a temperature not lower than 18°C.
- Wash vessels and brushes contaminated with the adhesive using acetone, just after the preparation has been completed.

2. Ingredients to be used for preparation of K-153 adhesive:
   - K-153 product acc. to standard specifications TU-6-05-1584. This product is packed in a glass vessel with ground stopper.
   - Hexamethulenediamine
     This product is packed in a glass vessel with ground stopper.
   - Grade "450" Portlant cement.
     This product is packed in a glass vessel hermetically closed.

3. Method of preparation of K-153 adhesive.
   a/ Prepare a balance, set of weights and vessels for weighing ingredients.
   b/ Weigh each ingredient in proportions according to Table 1, basing on the required amount of the adhesive.
   c/ Mix the ingredients at a temperature of 18 to 20°C. At a temperature above 20°C, cool the mixture by immersing a vessel with adhesive into cold water.
   d/ Mix the K-153 ingredient with the Portland cement in a dry clean vessel for 2 to 5 minutes using a glass or wooden rod.
   Add the hardening agent and mix again the content for 10 minutes.

Table 1

Amount of K-153 adhesive,												
Name of ingredient	20 G	30 G	40 G	50 G	60 G	70 G	80 G	90 G	100 G	120 G	150 G	200 G
K-153 ingredient	9.6	14.6	19.2	24.2	29.2	33.8	38.4	43.4	48.4	58	72.6	96.8
Grade "450" Port. cement	9.2	13.7	18.4	22.9	27.4	32.1	36.8	41.3	45.8	55	68.7	91.6
Hexamethylenediamine	1.2	1.7	2.4	2.9	3.4	4.1	4.8	5.3	5.8	7	8.7	11.6

Weigh the ingredients with exact to 0.1 G.
Hexamethylenediamine is added as a hardening agent to each set of blades.

NOTE: 1/ Before using the Portland cement, dry it at a temperature of 100 to 110°C for 4 hours, stirring every 20 minutes.

2/ Before using the hardening agent, melt it in a water bath at a temperature up to 70°C.

e/ Check the temperature of the adhesive prepared.
In case this temperature is above 20°C, cool the adhesive by placing the vessel in cold water. Take care for water not to penetrate into the adhesive.

f/ Use the adhesive only within the period of its tackines. The tackiness of K-153 adhesive is 30 to 40 min. at a temperature up to +25°C.

6.7. Fuel System

6.7.1. Mounting the auxiliary fuel tanks /Fig. 6.13/

1. Fix the struts 1 and 2 on the attachment points 3.
2. Install the fuel tanks on both sides of the fuselage . After installing the auxiliary fuel tanks ,set a stop at the sliding door to prevent the door hitting the fuel tank. Fasten the fuel tank by means of struts at the frames No.4F and no.6F and another fuel tank on the frames No. 3F and 5F. Connect outer fittings of the fuel tanks attachment points by means of the struts 2 with fittings on the frames No.5F and No.F6 respectively.
3. Connect the fuel lines /from the auxiliary tanks/ to the L.H. and R.H. connectors on the side walls of main fuel tanks ,after unscrewing the stoppers 6. Screw the stoppers on the plugs.
4. Check the condition of the fuel tanks , lines and connections during operation period.
5. Having completed all installing procedures , install the ground links. Clean contact areas on the terminals and clips until metallic lustre is obtained and coat them with 17A varnish.
6. Coat all unprotected surfaces and fasteners with grease when removing them from the helicopter.Before reinstalling them on the helicopter remove grease using B - 70 gasoline.

6.7.2. Fine filter disassembing and washing

1. Remove the fine filters from the filter block.
   When removing proceed as follows:
   - Shut the antifire valves and drain fuel from the inner filter chamber trough the draining valve.
     The draining valve to be closed after fuel draining.
   - Unlock and unscrew the wing nuts.
     Remove both fine filters.

2. Wash the filters in clean unleaded petrol.

3. Check the filter using device No. 50.93.840.00.00 for filtering elements checking.
   The filtering element is considered to be clean and operable, if the time of filling with AMG-10 oil is equal or less than 10 sec.

6.7.3. Insulation replacement on the insulated wires of fuel system

Replace defected insulation as described below.

1. Remove defective ŁAS tape 35 mm wide from the wire.
2. Wrap ŁAS tape around asbestos cord layer, applying K-88 adhesive on the both ends of the tape.
3. Protect the tape ends additionaly by wrapping five coils of wire KO ϕ 0,5 mm.
4. Paint the wire (after wrapping ŁAS tape) using EP-140 yellow enamel.

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Fig. 6.13/1

Installing the auxiliary fuel tanks

1. Struts
2. Struts
3. Attachment points
4. Fuel line
5. Auxiliary fuel tank connector
6. Stopper
7. Fuselage skin

a Frame No. 3F
b Frame No. 4F
c Frame No. 5F
d Frame No. 6F
e Fuel supply from the auxiliary fuel tank

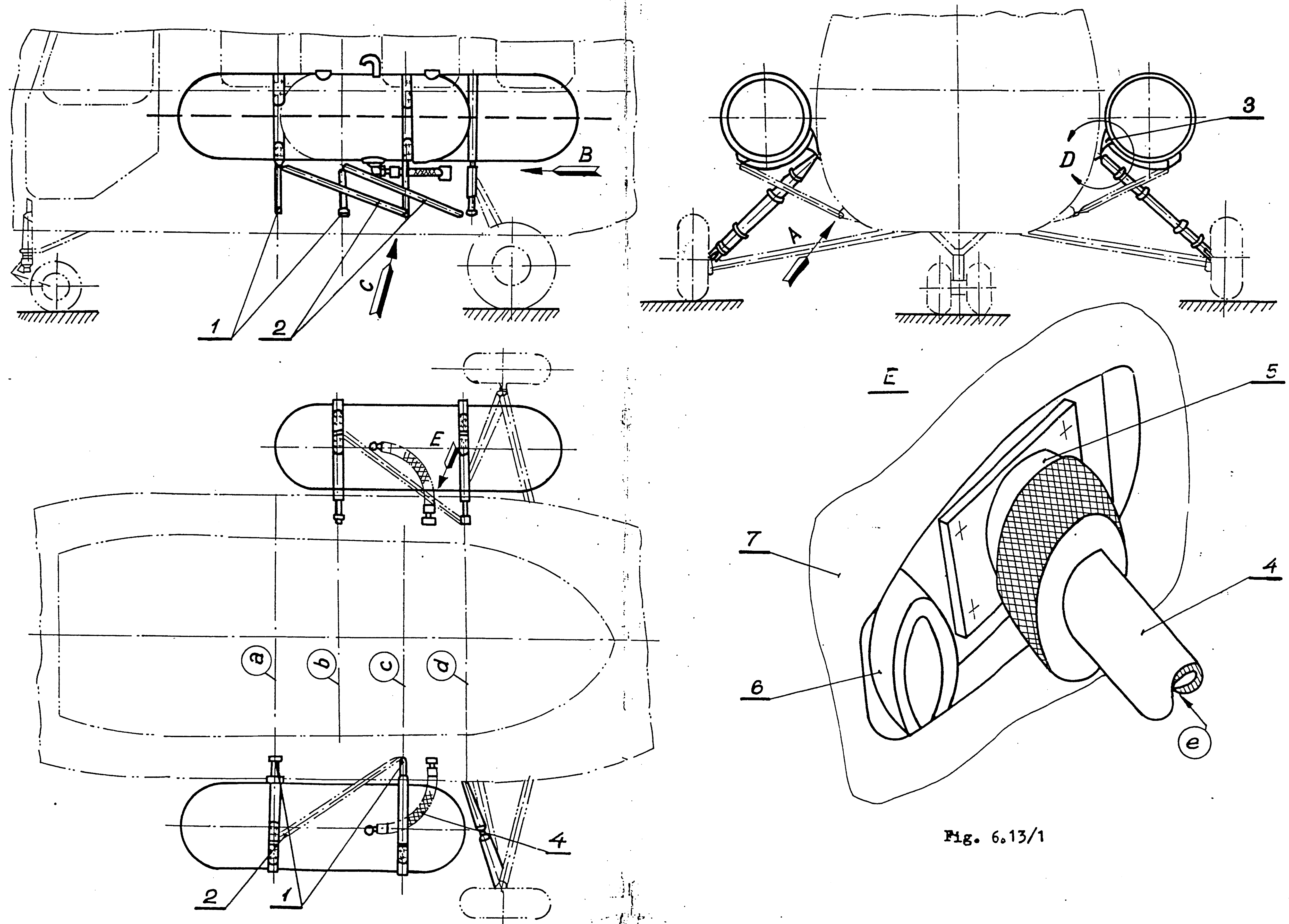

Fig. 6.13/1

6.7.4. Remote opening the main fuel tank draining valve.

A mechanical device shown in Fig. 6.14. is designed for main fuel tank draining valve opening. Draining valve /6/ is opened by depressing a handle /1/ to transmit is movement via bowden /2/, seat /3/ and slide /4/.
Closing the drain valve is efected - by releasing the bowden cable and by operating the valve spring at handle release.
Place device 50.22.250.00.00 for tank condensate prior to valve opening.

Fig. 6/13/2

Mounting the belly tanks

1. View A
2. View B
3. View C
4. Detail D
5. Fuselage bracket

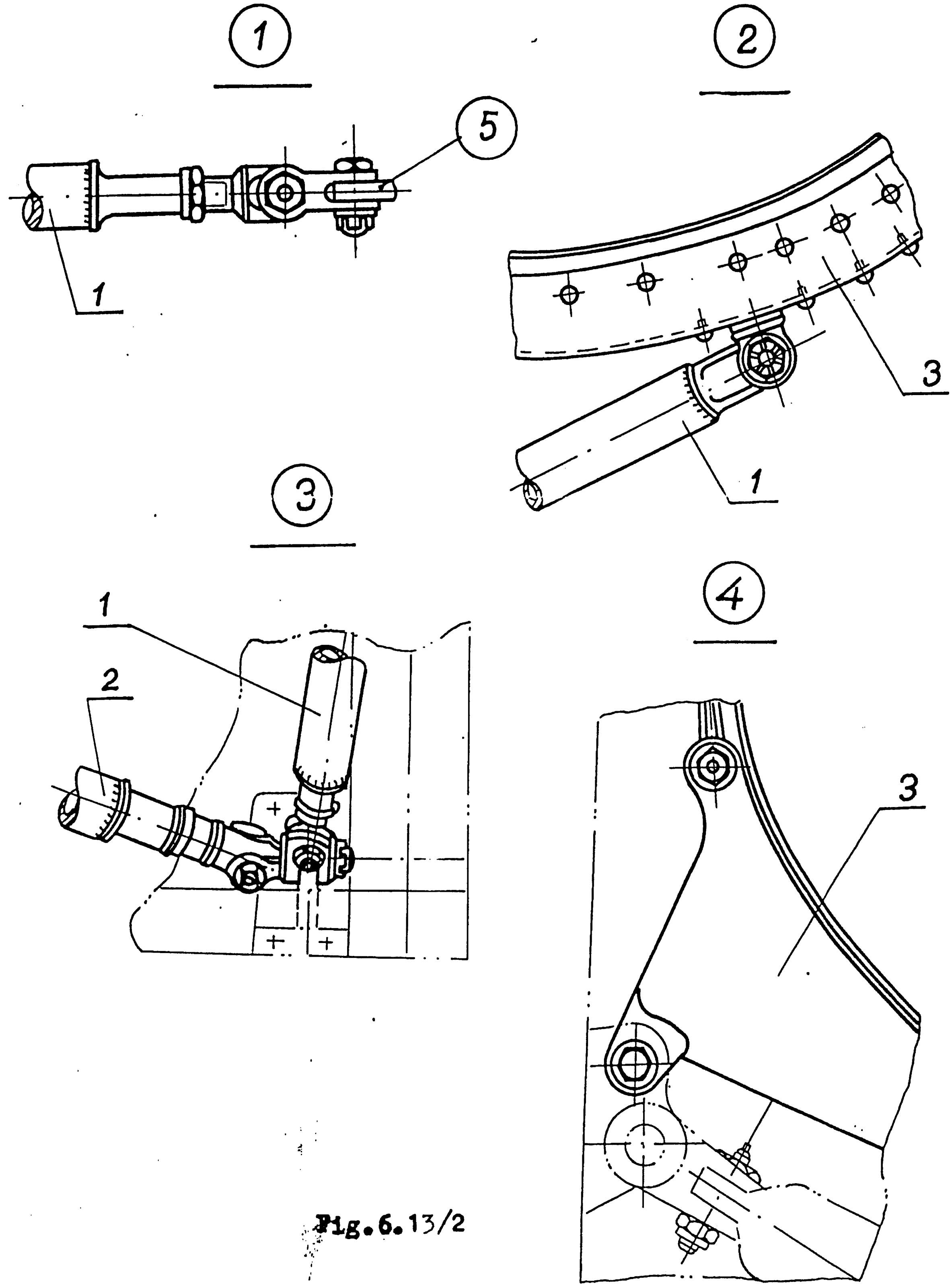

Fig.6.13/2

Fig. 6.14. Remote system of draining valve opening.

1 -handle;

2 - bowden ;

3 - cable seat;

4 - slide;

5 - spring;

6 - drain valve 600400M ;

7 - floor line .

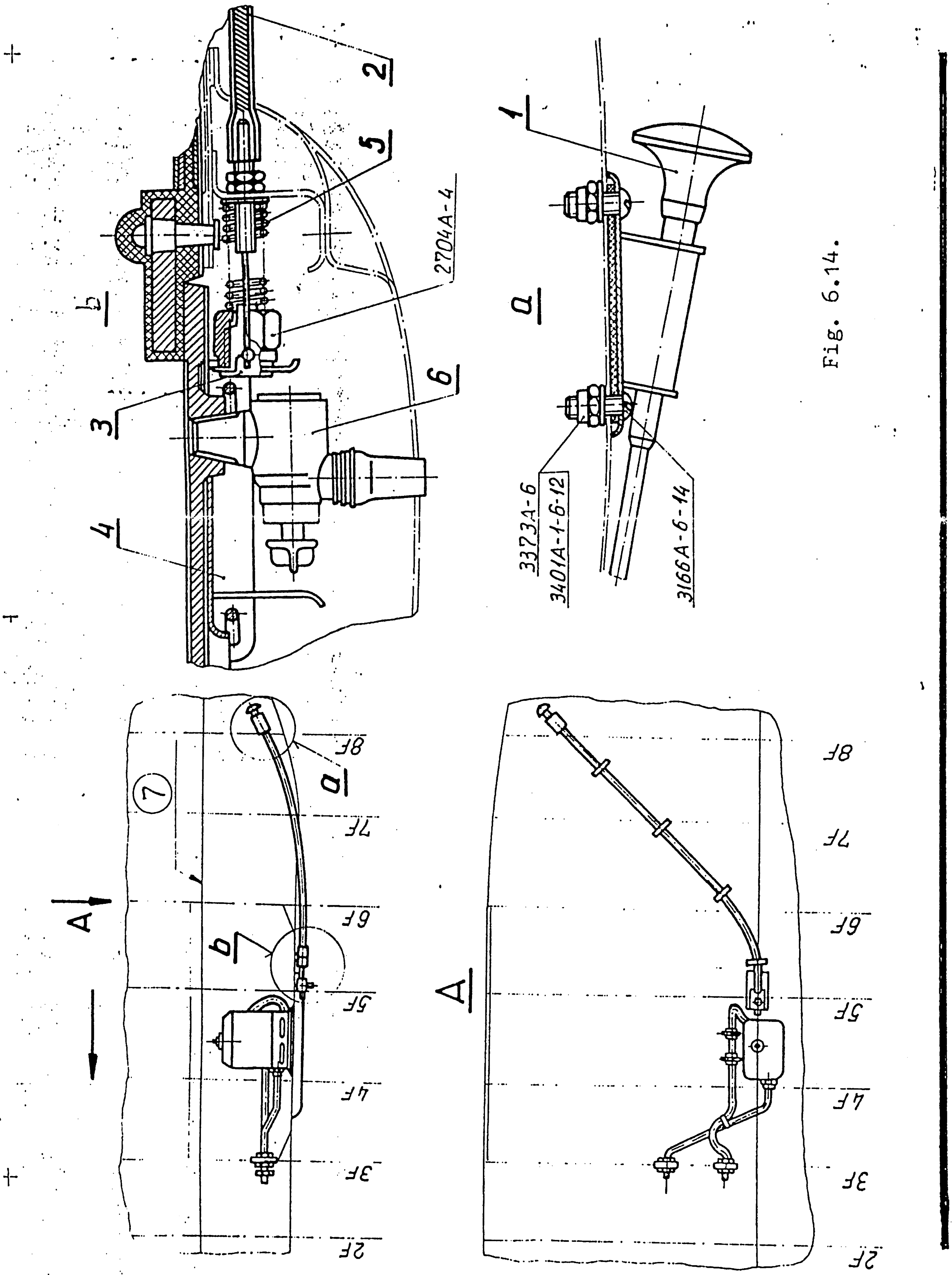

Fig. 6.14.

ORYGINAŁ (tylko prawa)

6.8. Hydraulic System

General Directions

To ensure a failure-free operation of hydraulic system, carry out all standard procedures. Check whether the surfaces of the hydraulic unit and the other units of hydraulic system are not contaminated, or whether there are no leakages of oil in connections.
Check whether the surfaces are not mechanically damaged and whether the pipelines do not rub against one another or against other parts of the system.

6.8.1. Replacement of the hydraulic unit

Dismounting the hydraulic unit

1. Drain the working fluid from the hydraulic unit and from the system by moving the control sticks several times.
2. Disconnect, from the hydraulic unit, lines connecting this unit with boosters.
3. Dismount the hydraulic unit from the helicopter.
4. Blank off holes from which pipelines have been disconnected and fill the unit with grade AMG-10 oil.

Mounting the hydraulic unit

Before installing the hydraulic unit on the helicopter, perform the following operations:

- Remove grease from the unit using a wooden scraper, wipe the surfaces with a flannel wetted with grade B-70 gasoline and then wipe them with dry clean flannel.
- Drain oil from the reservoir.
- Wipe contact areas with a clean flannel wetted with grade B-70 gasoline and blow them off with compressed air.

- Using a brush, coat the splined connection of the hydraulic unit with grade St/NK-50/ grease.

1. Mount the hydraulic unit on the main transmission flange /flange the covers of the main transmission chamber have been opened/.
2. Connect the hydraulic unit to the helicopter electric mains.
3. Connect the hydraulic unit outlet to its inlet.
4. Fill the hydraulic unit with grade AMG-10 oil.
5. Start the system and thoroughly flush the hydraulic unit for 10 to 15 minutes. Then stop the system, drain oil and refill the unit with fresh oil. Flush the unit again.
6. Drain fouled oil.
7. Remove filters whose plugs bear the unscription "Filtr" /"Filter"/.
   Check whether they are not damaged or contaminated, wash them in clean gasoline ans install in position.
8. Disconnect the hydraulic unit outlet from its inlet. Connect to the unit lines according to inscriptions on the identification plates.
9. Fill the hydraulic unit with fresh oil and check the operation of the system. Having tested the system, replenish oil if required.

6.8.2. <u>Replacement of the oil-to-oil boosters</u>

<u>Dismounting the oil-to-oil boosters</u>

1. When moving the control sticks, drain grade AMG-10 oil from the oil-to-oil boosters to the hydraulic unit reservoir.
2. Drain oil from the entire system.
3. Disconnect the oil loading and return lines from the boosters, and blank off holes.

4. Disconnect the helicopter control levers from the forked joint.

5. Dismount the oil-to-oil boosters from the helicopter and drain reminin oil.

Mounting the oil-to-oil boosters

Before installing the oil-to-oil boosters on the helicopter, perform the following operations:

- Remove stoppers and drain corrosion-inhibiting oil from the boosters.
- Place stoppers in position.

1. Mount the oil-to-oil boosters on the helicopter, connect the control system levers to the forked joint and check the controls for smoothness of movements.
2. Remove stoppers from the booster connectors and connect the hydraulic system lines.
3. Start the system and check the operation of the boosters by moving control levers several times to displace the controls.
4. Check the controls for adjusment.

6.8.3. Maintenance of hydraulic system operating periods

1. After dismounting the defective hydraulic unit from the helicopter, apply protective coats on its surfaces not later than after 24 hours, and place stoppers on the connectors.

2. Keep the inner space of the hydraulic unit filled with grade AMG-10 oil over the entire operating period.
While handling, mounting or dismounting the hydraulic unit, keep it upright.

3. Should any leaks of the working fluid in pipe connections be found, tighten and secure clamp nuts.

4. To prevent nuts fastening the booster bracket to the main transmission and nuts fixing the bearing housing to the bracket from working loose, tighten these nuts securely. It is permitted not to tighten three nuts at the bottom of the booster bracket /difficult access/.

   When carrying out procedures involved in maintenance of the oil-to-oil boosters, take care not to damage the rod working surface. Any injury of the chromium plated sliding surface of the rod may cause the rod to be seized or the seal edges to be cut.

5. Should excessive leaks of grade AMG-10 oil /excessively wetted top areas on the surfaces of the housing and rod/ be found, put the oil-to-oil booster on test to determine its serviceability. After a succesive planned flight, check whether leaks of oil do not exceed the allowable limits.

   This check should be accomplished as follows:

   a/ check the upper seal:

   - unfasten the piston rod cover from the hydraulic booster body /if the boosters are provided with covers/,
   - wipe the booster piston rod and the booster body nut with a clean dry rag,
   - apply hydraulic pressure to the booster,
   - keep the booster under the pressure for 10 minutes, make the booster piston rod travelling smoothly to its extreme position /by use of the respective controls from the cockpit/,
   - check the annular groove located between the rod and the internal rim /flange/ in the top nut face.

   If after 10 minutes of the booster operation the groove is not filled with hydraulic liquid, this proves that leaks through the seal do not exceed allowable values /acc. to the booster log card/.
   If after 10 minutes of the booster operation the groove is filled up /or overfilled/, the booster should be removed

from the helicopter.

b/ check the lower seal:

- the lower seal is checked by keeping the booster under pressure for 15 minutes at 45 two-way travels of the booster piston rod to the extreme positions.

If during this time no liquid drop drips down the check result is considered as satisfactory.
If the result is negative, the booster should be removed from service.

6.9. Fire-extinguishing System

6.9.1. Precautions to be adopted when operating the OS-2 extinguisher

The personnel authorized to charge or handle the fire extinguisher should know and observe the safety code as applied to all operations involved in compressed gases and toxic liquides: this personnel should be acquainted with the consequences following every damage of fire extinguishers. The competences of this personnel should be checked by special board of experts. In addition, the said personnel should follow the instructions as given in this Section.

1. When dealing with Freon and the composition "7", it is forbidden to work near open flame and to smoke because products of thermal decomposition of Freon and the composition "7" have toxic properties and may cause deep intoxication.
2. Do not place the fire extinguishers hear heating systems and avoid exposing them to direct solar radiation.
3. The rooms where the fire extinguishers are charged /i.e. fire-extinguisher charging stations/ should be provided with forced ventilation.
4. Discharge the fire extinguishers into the atmosphere. In case the fire extinguishers are discharged inside a room, it should be provided with forced ventilation and its cubic capacity should be not less than 60 m^3.
5. Keep vessels with Freon /compound "7"/ hermetically closed to avoid vaporization and absorption of moisture from the air.

6. Perform all operations with Freon/compound "7" and its ingredients wearing a gas-mask and protective clothing, i.e. overalls, helmet, rubber boots, ruberized apron and rubber gloves.

If accidently contaminated with Freon/compound "7", take a hot shower and change the contaminated clothing for a clean. Should any signs of poisoning, i.e. giddiness, difficult breathing, headache, etc., be observed, see a doctor.

7. The OS-2 fire extinguishers are charged with Freon/compound"7"/ under high pressure and have large outlet sizes. Thus, in case a charge is thrown out into the atmosphere without the piping being connected, this shot takes place within a very short period /up to 4 seconds/ and the fire extinguisher is acted upon by a great recoil force.

Any unexpected self-opening of the valve when the fire extinguisher is held in hands as well as any untimely opening of the valve by the actuating lever /for throwing out the charge into the atmosphere/ when the fire extenguisher is not fastened securely results in imminent accidents, including fatal accidents, for the human force is insufficient for the fire extinguisher being discharge to be firmly held in hands.

8. When discharging or checking the fire extingusher for efficiency /with throwing out the charge into the atmosphere/, fasten the fire extinguisher firmly in a clamping device.

The clamping device must be firmly fastened to a foundation or must have a sufficient weight to withstand a blow resulting from throwing the charge out of the fire extinguisher. Before throwing out the charge make sure that there is nobody at a within 10 metres from the charge jet. Throw out the charge by gradually screwing out the set screw by means of 2G3. 108-1 wrench.

It is prohibited to discharge even small residues of the charge without the stopper being placed on the working end fittings

9. When screwing home the screw locking the poppet, use special 2G3.108-1 wrench.

10. Always screw the stopper on the working end fitting over the entire length of thread, except the following cases:

a/ When installing the fire extinguisher on the helicopter. It is permitted to remove the stopper just before the piping is connected to the head working end fitting provided that the fire extinguisher is firmly fastened to the brackets.

When removing the fire extinguisher /either charged or discharged/ from the helicopter, screw the stopper on the end fitting just after the piping has been disconnected, and only then dismount the fire extinguisher from the brackets.

b/ In case testing the fire extingusher for efficiency /with throwingg out the charge into the atmosphere/, i.e. opening the valve by firing the explosive charge, is required.
Before removing the stopper, fasten the fire extinguisher in the tester.

c/ When charging the fire extinguisher.
Remove the stopper from the working end fitting only just before the fire extinguisher is connected to the charging device. Screw the stopper on the working end fitting every time the charged fire extinguisher has been disconnected from the charging device /i.e. after every charging operation/.

11. It is prohibited to wet the extinguisher head with gasoline oil or water.
12. It is prohibited for one man to handle more than one extinguisher. While handling the extinguisher, hold the cylinder firmly.

6.9.2. Replacement of the OS-2 fire-extinguisher

Replace the fire extinguisher in the following cases:

a) If pressure in the extinguisher cylinder is, for Freon, more than 5 kG/cm², or for the compound "7" more than 10% lower than the allowable pressure at actual ambient air temperature (refer to Table 6.9.3, para b), or should the weight of the cylinder contents be less than it is admissible.

b) If self-discharge of the fire extinguisher took place (determine the degree of the self-discharge according to the pressure gauge readings).

c) After the contents have been used up.

d) If it is necessary to check the valve efficiency by bleeding the contents.

Two extinguishers are installed under the rear bay cover (behind the main transmission) while the third one is installed in the radio bay.

To replace the fire extinguisher, do as follows:

1. Disconnect the pipe from the working end fitting 1 of the extinguisher valve (Fig. 6.15).
2. Disconnect the detonator from the valve and remove the explosive cartridge.
3. Install stoppers onto the working end fitting 1 and detonator 3.
4. Release the fire extinguisher fastening push.
5. Remove the fire extinguisher from the helicopter.

6. Take the charged fire extinguisher, and check its weight and pressure. Check the pressure using the pressure gauge 4. Before installing the fire extinguisher onto the helicopter, when it has been stored for more than 3 months, check the valve for reliability.
It is allowable to install the fire extinguisher charged with Freon or compound "7" regardless which the type of fire extinguishing agent the other fire extinguishers installed on the helicopter are charged with.

7. Install the fire extinguisher in its seat and check the clearance between the valve locking lever and the other components of the helicopter structure (the clearance should be at least 25 mm) and then remove the stopper from the working end fitting and connect the pipe there.

8. Remove the stopper from the detonator end fitting, make sure that the detonator circuit is deenergized, then install a new explosive cartridge, and screw the detonator on the end fitting.

9. Using a tester, check the detonator electric circuit for reliability. The tester terminals should be series connected into the open detonator circuit.
While depressing the tester pushbutton, the indicator light should be flashing.

10. Should the fire extinguisher be replaced due to self-discharge, install a new diaphragm into the valve safety device.

6.9.3. Re-charging the OS-2 fire extinguisher

Re-charge the fire-extinguisher (at the ambient temperature within 15 to 20°C) when the pressure in the fire extinguisher decreased below allowable limit corresponding to the actual ambient temperature (refer to the Table below).

- not more than 5 kG/cm² - for Freon, and
- not more than 10% - for the compound "7".

a) for the compound "7"

Ambient Air Temp., °C	-55	-45	-35	-25	-15	-5	0	+5	+15	+25	+35	+45	+80
Pressure in Cylinder, kG/cm²	30	35	40	45	50	55	60	65	70	85	90	100	140

b) for Freon 114 W 2

Ambient Air Temp., °C Above	-60	-50	-40	-35	-30	-25	-20	-15	-10	-5
Ambient Air Temp., °C To	-50	-45	-35	-30	-25	-20	-15	-10	-5	0
Pressure in Cylinder, kG/cm²	69	72	75	77	78	80	82	83	85	87

Ambient Air Temp., °C Above	0	5	10	15	20	25	30	35	40	50	60	70
Ambient Air Temp., °C To	5	10	15	20	25	30	35	40	50	60	70	80
Pressure in Cylinder, kG/cm²	88	90	92	93	95	96	98	100	101	104	108	111

1. Connect the working end fitting of fire extinguisher valve 2 (Fig. 6.16) to the charging device 1.
2. Produce required pressure in the charging device;
   a) of air - for the Freon fire extinguishers, or
   b) of carbonic acid anhydride - for the compound "7" fire extinguishers.

Fig. 6.15

OS-2 Fire extinguisher

1. Working end fitting
2. Pressure cap
3. Detonator end-fitting
4. Pressure gauge
5. Locking lever
6. Set screw
7. Bottle
8. Valve

Fig. 6.16

Method of re-charging OS-2 fire extinguisher

1. Charging device
2. OS-2 Fire extinguisher
3. Piping
4. Fire extinguisher clamping device

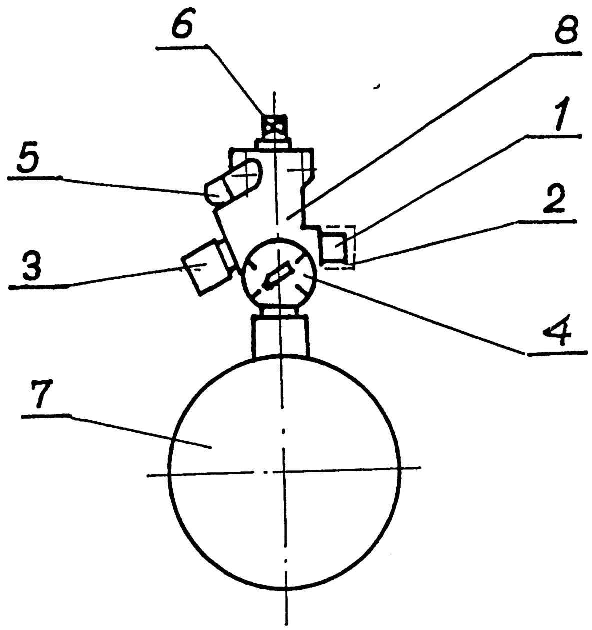

Fig. 6.15.

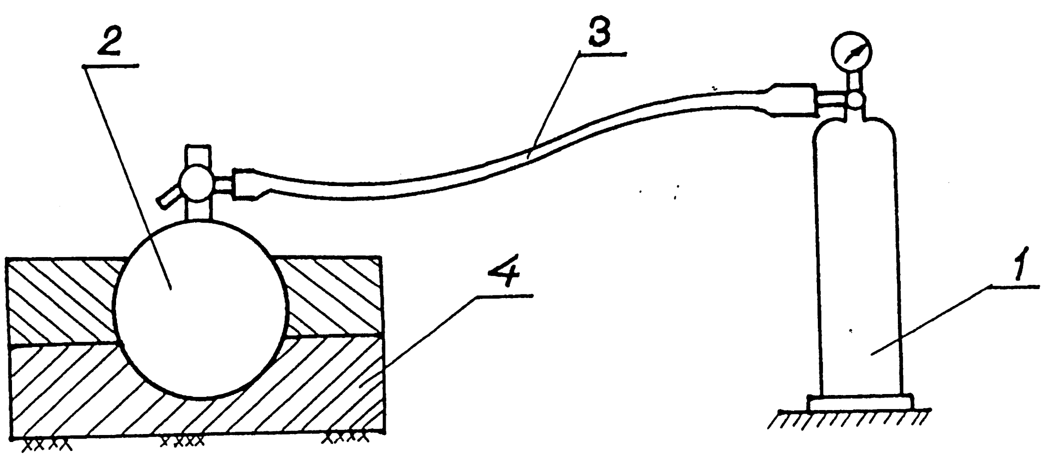

Fig. 6.16.

3. Open valves of the charging device and screw out the set screw of the fire extinguisher valve by turning it through 5 to 6 tuns.
4. After a pressure of 93^{+5} kG/cm^2 /for Freon/ or 75 ± 5 kG/cm^2 for compound "7" / has been reached in the fire extinguisher, screw home the set screw of the fire extinguisher valve unitil perfect seal has been obtained.
5. Close the valve of charging device.
6. Disconnect the fire extinguisher valve from the charging device and screw a pressure cap on the working end fitting.
7. Holding the cylinder, shake the fire extinguisher to mix liguid with free air / for Freon/ or with carbonic and onhydride / for compound "7"/ in the cylinder continue mixing unitil constant pressure is obtained.
8. Weigh the fire extingusher and record its weight in the extinguisher data card.

6.9.4. <u>Checking the OS-2 fire extinguisher for reliable opening.</u>

1. Fix the fire extinguisher in a tester of sufficient weight or firmly fastened to foundation.
2. Screw a pressure cap 2 /Fig.6.15/ on the working and fiting.
3. Insert explosive charge and connect the cable to the D.C. 18 to 30 Volt supply.
4. Detonate the explosive charge. The valve should then open. To close the valve, proceed as follows:

   a/ Break the seals on the set screw 6, screw out this screw, set the nose of the locking lever 5 under the release shaft and screw home the set screw. To screw home the set screw, use special wrench / 203 10 B-1/.

   It is prohibited to use any other wrenches to increase the valve closing force.

b/ Remove the detonator and slowly screw out the pressure cap on the working end fitting by turning it through 1 to 2 turns. Hold the pressure cap in position until residual charge is evacuated from the valve, and then screw out the pressure cap and screw on the protective two-hole pressure cap /included in the equipment set/.

c/ Check the fire extinguisher valve for dependable closing by applying suds in holes of the protective pressure cap screwed on the working end fitting.

5. Tighten the lock-nut of the set screw, weigh the extinguisher and affix seals. Record the result of checking the valve for reliable opening as well as the latest weight of charge in the extinguisher data card.

6. Should the fire extinguisher valve not open when being checked, replace the explosive charge and open the valve. On doing this, close the valve and open it once more. When in order, the valve should open after the second check for reliable opening.
In case the valve does not open after the second check, replace the fire extinguisher.

6.9.5. Storage of OS-2 fire extinguishers

1. Store fire extinguishers, both charged and discharged, set in vertical position in wooden seats /in work-places when fire extinguishers are charged, checked or stored over short periods/.

2. Store-rooms where fire extinguishers are kept as well as storage and handling conditions should meet the requirements pertaining to construction and content of compressed, liqufied and dissolved gas cylinders and for issuing the extinguisher-data cards.

3. In case the fire extinguisher is stored within a period of over 6 months, carry out the following maintenance procedures:

   a/ Discharge the fire extinguisher

   b/ Wash with spirit the interior of the cylinder

   c/ Wash with spirit the valve recesses

   d/ Coat with petrolatum all steel and unpainted parts and threads.

   e/ Screw pressure caps on the working end fitting and detonator-end fitting.

   f/ Record information on maintenance procedures in the extinguisher-data card.

4. A store-room where charged fire extinguishers are kept should be isolated from the charging station and ventilated, its temperature being not higher than +30°C and relative humidity not greater than 70 per cent.

5. This store-room should be provided with special shelves where fire extinguishers can be securely placed.

6. Shelves should be provided with suitable seats padded with a soft material to protect fire extinguishers from falling down and inpacts.

7. Fire extinguishers must not be exposed to heat /solar radiation, heating stoves, sources of heat, etc./.

8. A store-room must be fire-resistant and located at a distance not less than 25 m from other buildings.

9. It is prohibited to store any other gas cylinders together with fire extinguishers.

10. Discharged fire extinguishers should be stored in a separated room.

11. When repairing, charging or delivering fire extinguishers to the helicopter, convey them on special trolleys.

6.9.6. Basic procedures pertaining to use of the fire-extinguishing system

1. In case a fire breaks out in any bay /engine bay or main transmission bay/, the circuit supplying the fire-extinguishing fluid from the cylinder started in the first instance is switched on automatically.
   Cylinders started in second and third instance are operated by the pilot. There is a possibility of manually operating the cylinder started in the first order.

2. After the OS-2 fire extinguishing cylinder has been discharged, wash with spirit the non-return valves of all cylinders /twice/ and blow through with compressed air until they are air-dry.
   Dry the other parts of the system by blowing with compressed air. To anable dismounting the non-return valves, it is advised to remove the cover of the rear bay.

3. To extinguish fire in the cabin use the fire extinguisher OU-2 /mounted on the rear wall/.

6.9.7. Service of the system with the OS-2 fire extinguishers filled with Freon.

It is allowed for the fire extinguishers filled with Freon to be mounted on helicopter. The service of fire extinguishing system should be carried out according to the recommendations in this chapter.
Information about the kind of the lead is given on the information card placed on the fire extinguisher.

a/ technical data of the fire extinguisher load
- Freon 114 W2 acc to MRTU6-02-470-68 / or acc. to WT-75 /ZA-69/ - 2,725 $^{+0,1}$ kG/cm^2,
- free air - for the pressure in the cylinder depending on ambient temperature - refer to Table 6.9.3, para b (with tolerance ± 5 kG/cm^2).

- total weight of extinguishing agent - 2.82 to 2.92 kG.

b) maintenance of the OS-2 fire extinguisher charged with Freon should be carried out in accordance with the requirements and instructions as those for the OS-2 fire extinguisher charged with the compound "7", regarding the following remarks:
   - The fire extinguisher should be re-charged with compressed air only.
   - Check pressure inside the cylinder using the pressure gauge (the pressure should be within the allowable limits for actual ambient air temperature, i.e. it should correspond to the data included in the Table 6.9.3, para b).

c) maintenance of the fire extinguishing system with the fire extinguisher(s) charged with Freon should be carried out in accordance with the requirements and instructions as those for the fire extinguishing system provided with the fire extinguishers charged with the compound "7".

6.9.8. Installing OS-2 fire extinguishers onto helicopter

It is allowed to install the OS-2 fire extinguisher charged with Freon onto the helicopter even when the other fire extinguishers on the very helicopter are charged with the compound "7".

6.10. Pneumatic System

1. Decrease of air pressure in the pneumatic system may be caused by a failure of the system component (or the pressure indicating instrument). When the pressure has decreased, find out and replace a faulty component:

   a) pressure gauge,
   b) pipes,
   c) AK-50P-10 compressor,
   d) AD-50 pressure controller,
   e) main undercarriage leg struts.

2. Should any symptoms of malfunctioning of the AK-50P-10 compressor be found, check the compressor output rate by measuring time necessary to charge the air reservoir (5.6 l capacity) until 50 kG/cm² pressure is obtained. The time necessary to charge the reservoir (at the compressor shaft speed 1450 rpm) should not exceed 22 minutes.

3. While holding the brake lever on the cyclic pitch control stick depressed, the pressure in the pneumatic system should not change. A pressure drop means that connections between pipes and other components of the system (from the PU-7 valve to the wheel brakes) are not air-tight.

4. Leaks in the system can be located by applying suds on the pipe connections. Stop the leaks by tightening appropriate securing nuts.

   Air-tightness of the main undercarriage struts is to be checked as follows:

   - charge the system with 50^{+4} kG/cm² pressure;
   - Using a brush, apply suds within the areas A and B shown in Fig. 6.16a, both from the top and from the bottom side;
   - inspect the areas for air bells that indicate air leaks;
   - mark the leaky areas using a colour pencil.

Fig. 6.16a.

Main Undercarriage Leg Strut

A, B - Areas where air-tightness is to be checked

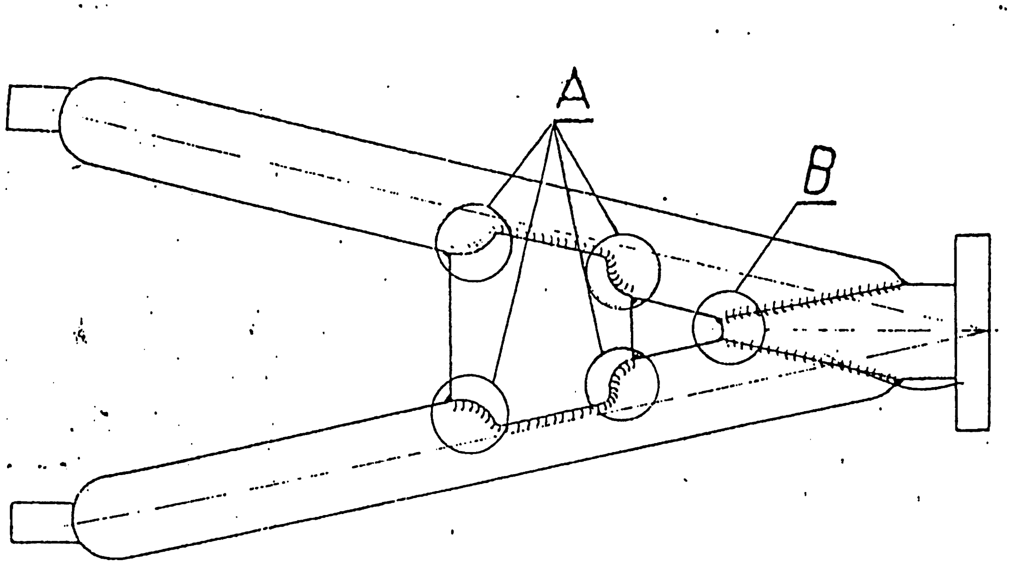

Fig. 6.16a

Fig. 6.17

Undercarriage

1. Shock absorber loading valves
2. Shock absorber loading valves

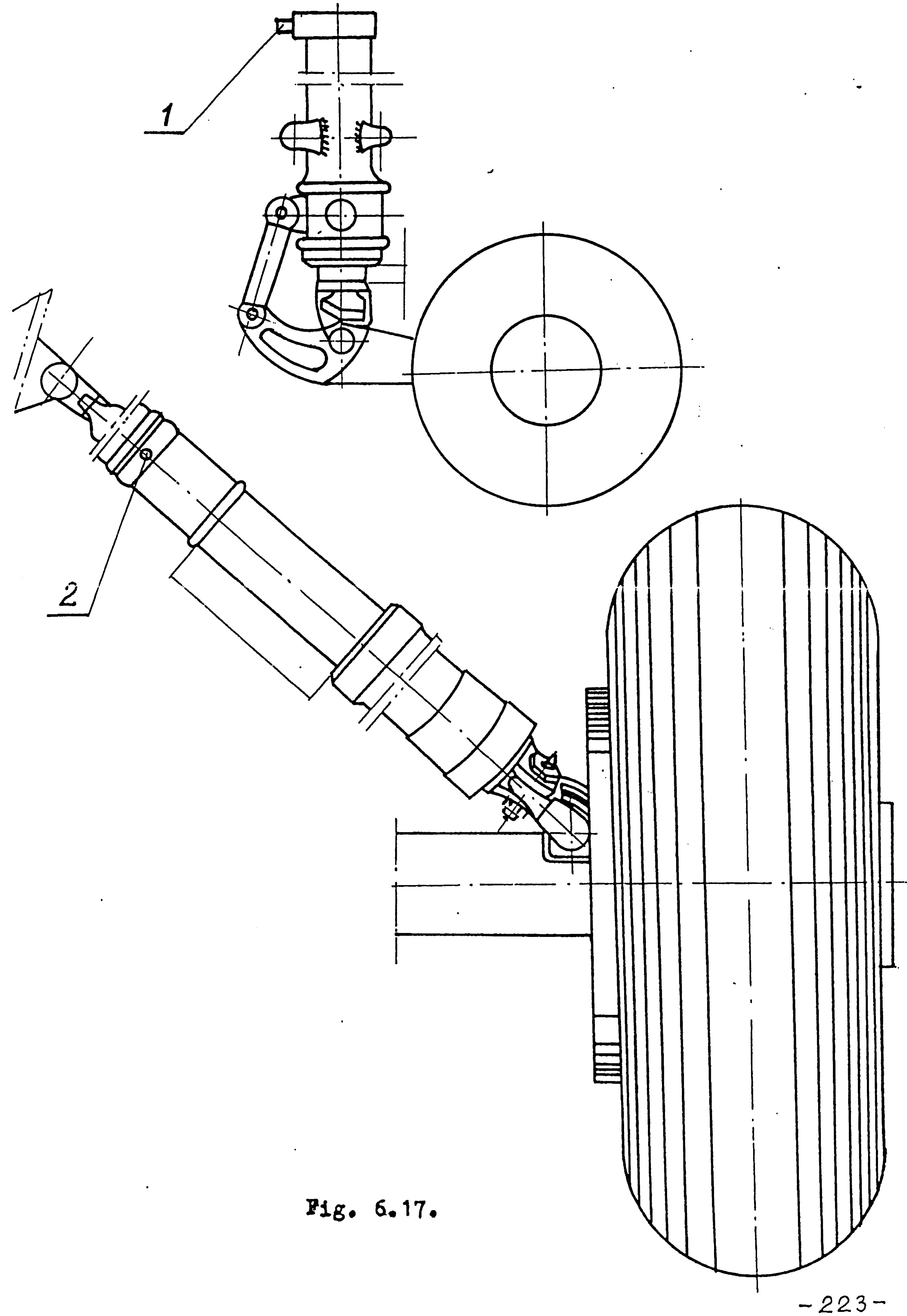

Fig. 6.17.

Fig. 6.18

Diagrams of control cable tension against ambient air temperature

1. Summer flights

2. Winter flights

3. a/ Foot operated controls

b/ Stabilizer controls

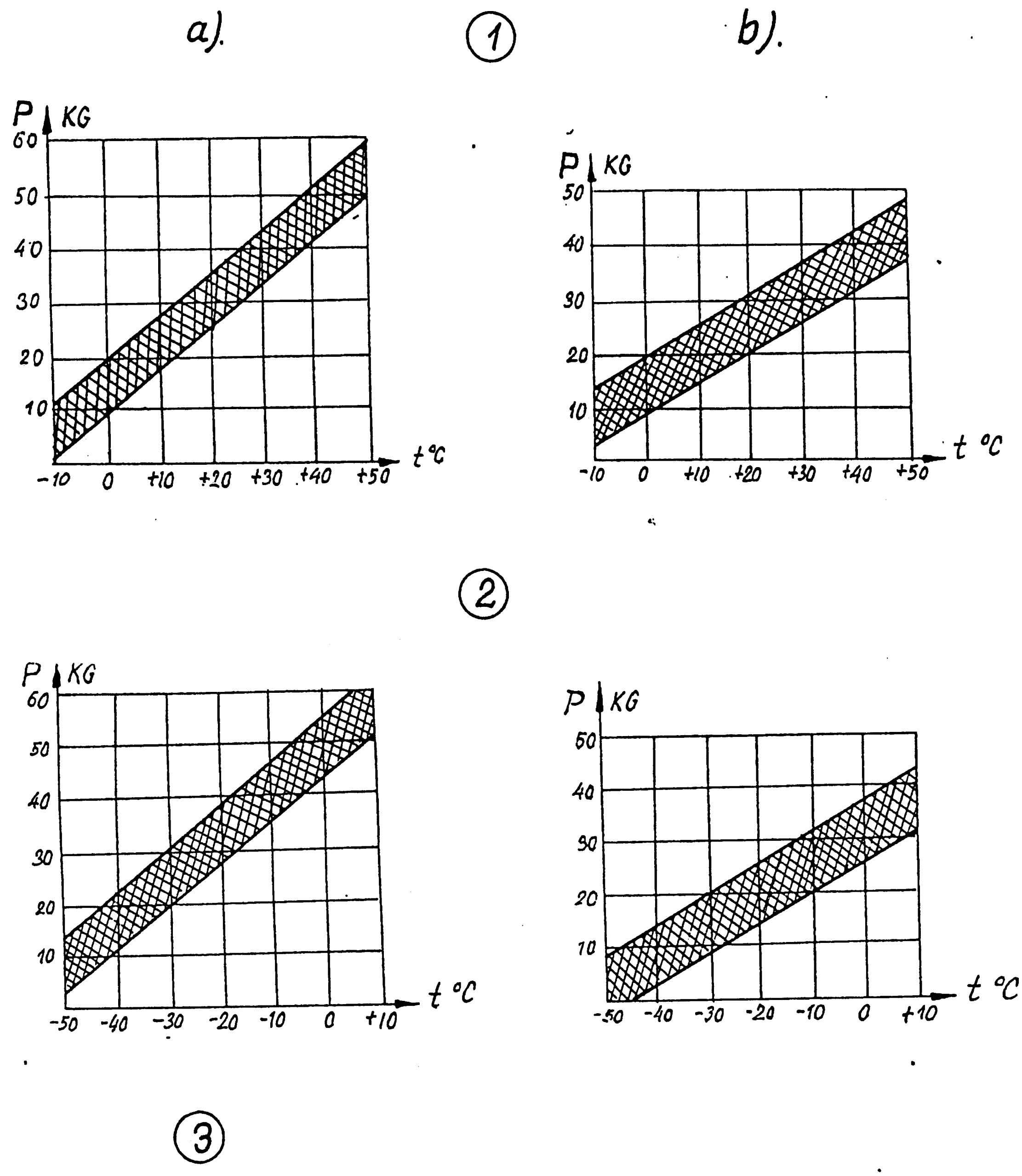

Fig. 6.18.

6.11. Undercarriage

General

When servicing the undercarriage, pay attention to the degree of charging and perfect seal of shock absorbers and of strut air cylinders.
Keep the undercarriage clean and regularly carry out standard procedures.
To check the shock absorbers for the degree of charging with nitrogen, use a pressure gauge and note travels of the shock absorber rod. Should losses of oil be found, set the helicopter on lifting jacks and replenish oil, the nitrogen pressure having been reduced to zero.

6.11.1. Replacement of undercarriage wheels

1. Main and nose wheels
   a/ Unscrew the lock screw of the wheel fixing nut, undo this nut and dismount the wheel from its axle.
   b/ Mount a new wheel / or that previously dismounted for inspection / on its axle, screw on the wheel fixing nut and secure it with a lock screw.
   c/ When mounting the wheels on the helicopter, tighten the nose wheel fixing nut until resistance is felt when rotating the wheel, and then screw it out by turning through one eighth of a turn and secure.
   Tighten the main wheel fixing nut home.
   An excessible clearance / over 1 mm / between the nut and the nose wheel hub should be removed by putting washers under the fixing nut.

6.11.2. Maintenance of undercarriage wheels

1. Any cracks, abrasion marks, heat tints, etc. on bearing rings and rollers are inadmissible. It is prohibited to repair damaged beartings within the undercarriage operating period.

2. If cracks or scratches are discovered on inner surfaces of main wheels, where the brakes are mounted, or when brake rubs against wheel, replace the wheel.

3. Unlimited number of small cracks is permissible on the surface of brake shoe linings.
   The distance between the rivet heads, which secure the brake shoes, and frictional surface should be at least 0,5 mm.

4. Prior to checking the filling of shock absorbers with grade AMG-10 oil release nitrogen from shock absorbers to atmosphere.

6.12. Helicopter Controls

General

1. Within the helicopter operating period, regularly check the condition of component parts of control system to ascertain that there is no damage.

2. When inspecting cables, pay particular attention to those cable lenghths which mate with rollers or are situated at a shoet distance from fixed elements of the helicopter.

3. The signs of a cable defect are as follows :
   - single wires broken,
   - sharp bends,
   - excessive elongation / decrease of cable diameter/,
   - carrosion.

   Should even one of the above-mentioned derects is noticed replacement the cable.

4. In the course of maintenance, proceed as follows:

- Check cables for cleaness. Wipe dirty cables with rags wetted with gasoline and then with rags saturated with grade CIATIM-201 grease..
  - Check cables for tension /Fig. 6.18/
  - Check skewing of roller faces with respect to the cable /The allowable skewness is $1^{\circ}30'$/.
  - Check the condition of cable clips.
  - Check all cable guide elements for reliable fastening.
  - Check all screws and shield for correct setting and reliable fastening.

5. When inspecting rollers, pay attention to the reliability of fastening and smooth rotation of these elements; check whether there are no cracks npr scratches on their surfaces mating with cable. Inspect the rollers and cables at the same time.

6. Maintain a clearance not less than 3 mm between moving elements of controls and fixed elements of the helicopter structure, as well as a clearance not less than 5 mm between moving elements of controls and other moving elements.

7. No distorions of the pull rods are admissible.

6.12.1. Replacement of swash-plate

Dismounting the swash-plate

1. Dismount the helicopter rotor blades.
2. Dismount the helicopter rotor hub together with the current collector.
3. Disconnect levers 1 /Fig. 6.19/ of the swash-plate from upper forked joints of the oil-to-pil boosters.

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Fig. 6.19

Swash-plate

1. Lever
2. Guide bar
3. Swash-plate guide
4. Main transmission shaft
5. Main transmission
6. Nut
7. Sz-S-25 bearing

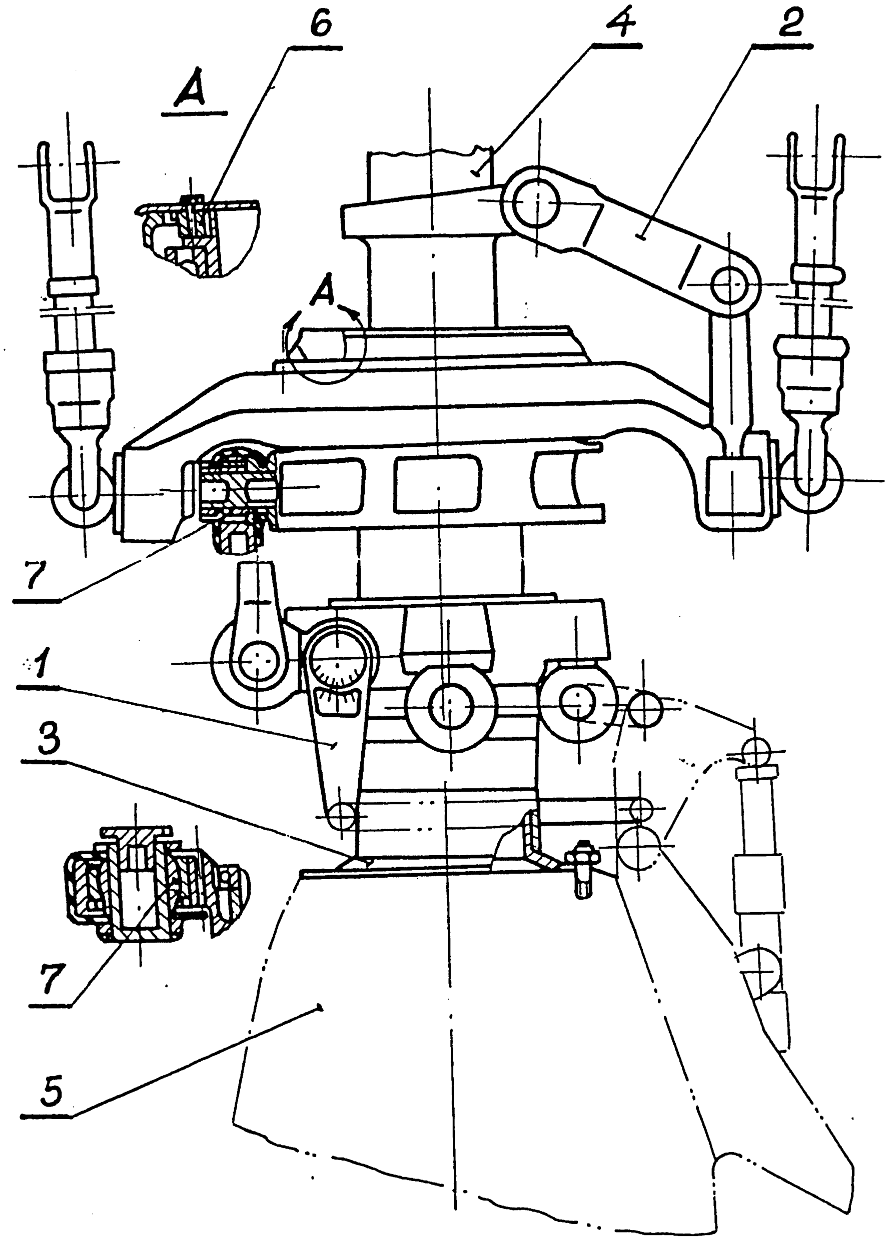

Fig. 6.19.

4. Disconnect the swash-plate guide 3 and a connection clip of the swash-plate ring guide-bar 2 from the main transmission, and dismount the swash-plate together with the collective pitch indicator sesnsor.
   When dismounting the swash-plate from the helicopter, take care so as not to damage splines of the main shaft.

Mounting the swash-plate

Before mounting the swash-plate apply grade NK-50 grease on the main transmission shaft and on the inner surface of the swash--plate guide 3 /Fig. 6.19/.

1. Mount the swash-plate on the main transmission shaft and fasten it so that the arrow on the swash-plate guide is set in the direction of flight.

   Mount the casing of the collective pitch indicator sensor the a flange of the swash-plate guide. Screw home bolts fixing the swash-plate guide to the main transmission flange applying a torque of 1.2 to 1.7 kGm.
2. Connect the pull rod of the collective pitch indicator sensor with the casing of the swash-plate slide.
3. Clamp the connection clip of the swash-plate ring guide-bar on the main transmission shaftm
4. Connect levers 1 of the swash-plate to upper forked joints of the oil-to-oil boosters.
5. Mount the helicopter rotor hub tigether with the current collector.
6. Mount the helicopter rotor blades.
7. Adjust the controls.

6.12.2. Replacement of controls

With a helicopter provided with controls of the determined type /dual or single controls/, there is a possibility of replacing a given type of controls by another, i.e. the dual controls by the single controls or vice versa.

Replace the controls when it is necessary to adapt the helicopter for new operational tasks to be performed over a longer period and when the determined type of controls is required to facilitate these tasks.

Replacement of dual controls by single controls

1. Dismount the R.H. pilot´s seat.
2. Remove the rear casing of the pitch and power output control lever /on the L.H. side of the control column/ and dismount the L.H. pilot´s seat.
3. Dismount seats of the oxygen cylinders /if mounted/.
4. Remove casings of the following units:
   - pressure gauge casing /under the port sliding doors/
   - fire-fighting valve lever casing /after the joint of a group of cables on the second pilot´s control desk has been disconnected/,
   - control column casing 3 /Fig. 6.22/.
5. Open all access panels in the cockpit floor and in the fuselage /under the cockpit floor/ including the fan casing.
6. Dismount the R.H. rudder bar /Fig. 6.20/. To do this, perform the following operations:

   a/ Push in L.H. rudder bar pedals.

   b/ Disconnect the pull rod 2 from the levers 3 and 4.

   c/ Disconnect the pull rod 5 from the lever 4.

   d/ Remove the lever 4 from the bracket 7 and then dismount this bracket.

   e/ Dismount the rudder bar 6 /including the lever 11 and thw pull rod 5/.
   When dismounting the rudder bar, remove the pin 8.
7. Dismount the second pilot´s swash-plate.
8. Dismount the L.H. rudder bar /Fig. 6.21/.
   To do this, perform the following operations:

a/ Disconnect the group of cables /in the R.H. control stick electrical circuit/ from the helicopter electrical system.

b/ Remove the casings 3 and 4.

c/ Disconnect the pull rod 6 from the shaft 11.

d/ Disconnect the bowden from the control stick, and then detach the control stick from the floor.

Should it be impossible to detach the control stick from the floor /for a period of disassembly work/, screw out the lateral controls adjustment screws.

e/ Disconnect the pull rod 7 from the lever mounted on the bracket 12. Allow the forked joint to remain on the lever.

f/ Disconnect the pull rod 15 from the levers 14 and 16. If required, unlace or remove the L.H. control stick casing /for a period of disassembly work/, and remove the heating control casing.

g/ Dismount the R.H. control stick.

h/ Remove the pull rod 15 from under the floor.

i/ Detach the bracket 12 from the floor and disconnect it from the shaft 11.

9. Disconnect the bowden at the second pilot's seat from the PU-7 valve lever, and detach the bowden brackets from bulkheads arranged under the floor.
Remove bowdens together with brackets from under the floor. Should it be impossible to remove all brackets, undo nuts locking bowdens on the brackets to facilitate disassembling the brackets.

10. Dismount the pitch and power output control lever /Fig.6.22/. To do this, perform the following operations:

a/ Disconnect the groups of cables /in the pitch and power output control lever electrical circuit/ from the helicopter electrical system.

b/ Disconnect from the lever all pull rods running under the floor and in the control column 3, i.e. the engine separate control rods, collective pitch control rods as well as foot-operated and hand-operated control rods.

c/ Disconnect the trimming mechanisms 8 and 9 /Fig. 6.21/ from the MP-100M engines.

d/ Detach the pitch and power output control lever from the floor.

e/ Dismount the pitch and power output control lever together with the trimming mechanisms and shaft 11 /Fig. 6.21/. When dismounting, take care not to damage the bearing in the joint of the shaft with the pitch and power output control lever /this shaft should not be deflected by more than 15°/.

f/ Disconnect the shaft 11 from the pitch and power output control lever.

g/ Disconnect the trimming mechanisms from the lever 10, the shaft 11 and the pitch and power output control lever.

11. Mount the pitch and power output control lever for single controls /Fig. 6.22/.
to do this, perform the following operations:

a/ Connect the trimming mechanisms 8 and 9 /Fig. 6.21/ with corresponding lever rocker arms.

b/ Check if the thicker plates of single engine control levers friction-brakes are clutched by their notches with the collective pitch lever bracket.

c/ Place the pitch and power output lever on the floor.

d/ Connect the group of cables /in the pitch and power output control lever electrical circuit/ with the helicopter electrical system.

e/ Attach the lever brackets to the floor.

f/ Connect the trimming mechanisms with the MP-100M engines.

g/ Connect the hand-operated and foot-operated control rods, collective pitch control rods as well as engine separate control rods with the lever rocker arms.
Having connected each of the pull rods, check whether the mid-position of the corresponding control sticks and the rudder bar in the cockpit squares with the mid-position of the lever over the passenger cabin doors.
Failing that, adjust lengthe of the pull rods.

12. Check the respective controls for adjustment and readjust them if required.

13. Close all access panels in the cockpit floor and in the fuselage /under the cockpit floor/ and mount the fan casing.

14. Mount the control column casing and the fire-fighting valve lever casing /designed for the helicopter with single controls/. Plug-in the joint of a group of cables of the second pilot´s swash-plate /which has been previously dismounted/ to the valve lever casing.

15. Mount the pressure gauge casing under the port sliding doors.

16. Mount the pilot´s seat and rear casing of the pitch and power output control lever /on the L.H. side of the control column/.

17. Attach supports under the front passenger´s seat.

18. Remove a balance weight from the tail support.

Replacement of single controls by dual controls

1. Dismount the front passenger´s seat supports.

2. Remove the rear casing of the pitch and power output control lever /on the L.H. side of the control column/, and then dismount the pilot´s seat.

3. Remove casings of the following units:

- pressure gauge casing /under the port sliding doors/.
- Fire-fighting valve lever casing /after the joint of a group of cables on the second pilot's swash-plate has been disconnected/,
- cpntrol column casing.

4. Open all access panels in the cockpit floor and in the fuselage /under the cockpit floor/, and dismount the fan casing.

5. Dismount the pitch and power output control lever for single controls /Fig. 6.22/.
   To do this, perform the following operations:
   a/ Disconnect the group of cables /in the pitch and power output control lever electrical circuit/ from the helicopter electrical system.
   b/ Disconnect all pull rods from the pitch and power output control lever.
   c/ Disconnect the trimming mechanisms 8 and 9 /Fig.6.21/ from the MP-100M engines.
   d/ Detach the lever from the floor and dismount it together with the trimming mechanisms.

6. Mount the pitch and power output control lever for dual controls /Fig. 6.22/.
   To do this, perform the following operations:
   a/ Connect the trimming mechanism 8 with the corresponding rocker arm on the pitch and power output control lever while the trimming mechanism 9 with the lever 10 mounted on the shaft 11 /Fig. 6.21/.
   b/ Connect the shaft 11 /Fig.6.21/ with the bracket 5 /see Fig. 6.22/.

When mounting, take care not to dmage the bearing in the joint of the shaft with the pitch and power output control lever /this shaft should not be deflected by more than 15°/.

c/Check if the thicker plates of the single engine control lever brakes are clutched by their recess with the bracket of the collective pitch lever torque tube.

d/Place the pitch and power output control lever on the floor and connect the group of cables /in the lever electrical circuit/ to the helicopter electrical system.
Attach the lever to the floor /screw in the screw 2 at first/.

e/Connect the trimming mechanisms with the MP-100M engines.

f/Connect the hand-operated and foot operated control rods, collective pitch control rods as well as engine separate control rods with corresponding rocker arms of the pitch and power output control lever.

Having connected each of the pull rods, check whether the mid-position of the corresponding control sticks and the rudder bar in the cockpit squares with the mid-position of the lever over the passenger cabin doors. Failing that, adjust lengths of the pull rods.

Check the mid-position of the lateral control system after the bracket 12 /Fig.6.21/ has been mounted.

7. Mount the R.H. control stick 1 /Fig. 6.21/.
To do this, perform the following operations:

a/ Place the bracket 12 on the floor, connect the shaft 11 with the bracket and attach the latter to the floor.

b/ Place the pull rod 15 under the floor /its forked joint facing to the left/ and connect with the lever 16.
If required, unlace or remove the L.H. control stick casing /for a period of assembly work/, and remove the heating control casing.

c/ Place the R.H. control stick on the floor and connect the pull rod 7 with a lever mounted on the bracket 12.

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d/ Attach the control stick bracket to the floor. Should this be impossible, screw out the lateral controls adjustment screws /for a period of assembly work/.

e/ Connect the pull rod 15 with the lever 14. Adjust the length of this pull rod /if required/ so that the mid--position of both the control sticks in the lateral direction is ensured at the same time after the pull rod has been connected with the lever 14.

f/ Connect the pull rod 6 with the shaft 11. Check whether both the control sticks are set in the mid-position in the lateral direction simultaneously. If not, adjust the length of the pull rod 7.

g/ Connect the group of cables /in the control stick electrical circuit/ with the helicopter electrical system.

h/ Mount the casings 3 /after the bowden has been mounted on the control stick/, and the casign 4.

8. Install the bowden at the second pilot's seat. Attach the bowden brackets to bulkheads arranged under the cockpit floor.
Within the zone of PU-7 valve, attach the bowden to a bracket, to which the bowden at the first pilot's seat is attached, so that the length of a free end of the bowden armour /from the face of the nut locking the bowden on the bracket/ is 5 to 16 mm.
Connect the cable end to the PU-7 valve lever while the free cable end /in the cockpit/ to the lever mounted on the R,H. control stick, and attach the bowden to the control stick.

9. Mount the R.H. rudder bar /Fig. 6.20/.
To do this, perform the following operations:

a/ Place the R.H. rudder bar together with the lever 11 and the pull rod 5 on the floor, and attach it to the floor. Remove the pin 8 /for a period of assembly work/.

b/ Mount the bracket 7 and install the lever 4 on its shaft.

c/ Connect the pull rod 5 with the lever 4.

d/ Connect the pull rod 2 with the lever 4 and adjust its length /if required/ so that it will be possible to connect the pull rod with the lever 3 when both the rudder bars are set in their true mid-position.

10. Check the particular controls for adjustment, and readjust them if required.

11. Place a balance weight on the tail support.

12. Install the second pilot's swash-plate on the control column.

13. Close all access panels in the cockpit floor and in the fuselage /under the cockpit floor/. Mount the fan casing.

14. Mount casings of the following units:

- control column casing,
- fire-fighting valve lever casing /designed for helicopters with dual controls/,
- pressure gauge casing /under the port sliding doors/.

Attach the joints of group of cables of the second pilot's swash-plate to the valve lever casing.

15. Mount the pilot's seats. On mounting the L.H. pilot's seat, install the rear pitch and power output control lever /on the O.H. side of the control column/.

6.12.3. "Folding" the R.H. control stick

The helicopter is provided with a facility for "folding" the control stick forwards to enable the second pilot to enter /or to leave/ the cockpit easily. To "fold" the control stick, proceed as follows:

1. Pull out the locking lever.

2. Push the control stick forwards;

NOTE: to prevent the control stick from hitting the instrument panel, deflect the stick to the left through an angle of about 10° before "folding" it.

3. To set the control stick in its working position, perform the above operations in inverted order.

Fig. 6.20

Foot-operated controls /Local view/

1. Compensator
2. Pull rod
3. Lever
4. Lever
5. Pull rod
6. R.H. rudder bar
7. Bracket
8. Pin
9. Bracket
10. L.H. rudder bar
11. Lever

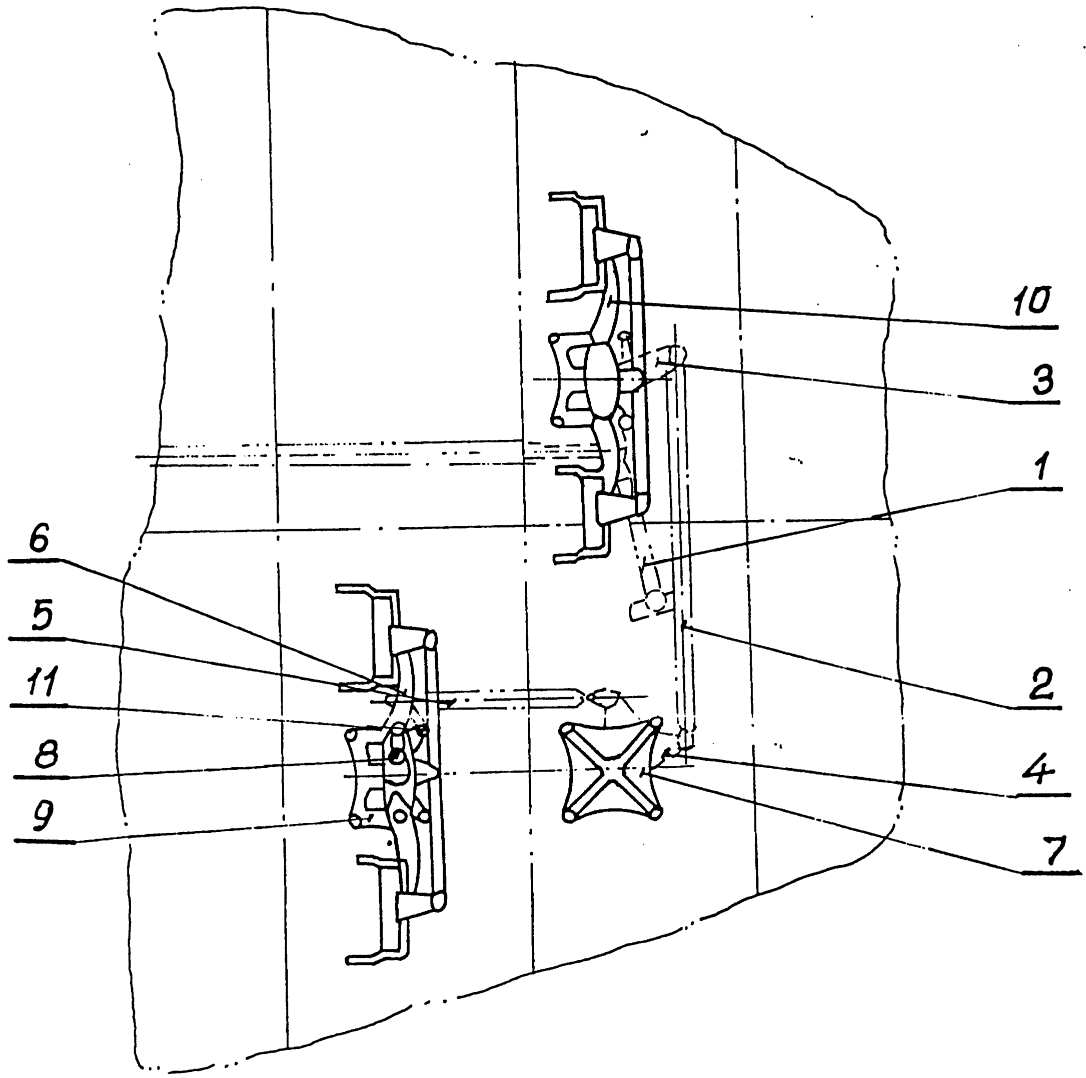


Fig. 6.20.

Fig. 6.21

Hand-operated control /Local view/

1. R.H. control stick
2. L.H. control stick
3. Casing
4. Casing
5. Pull rod
6. Pull rod
7. Pull rod
8. Trimming mechanism
9. Trimming mechanism
10. Lever
11. Shaft
12. Bracket
13. Bracket
14. Lever
15. Pull rod
16. Lever

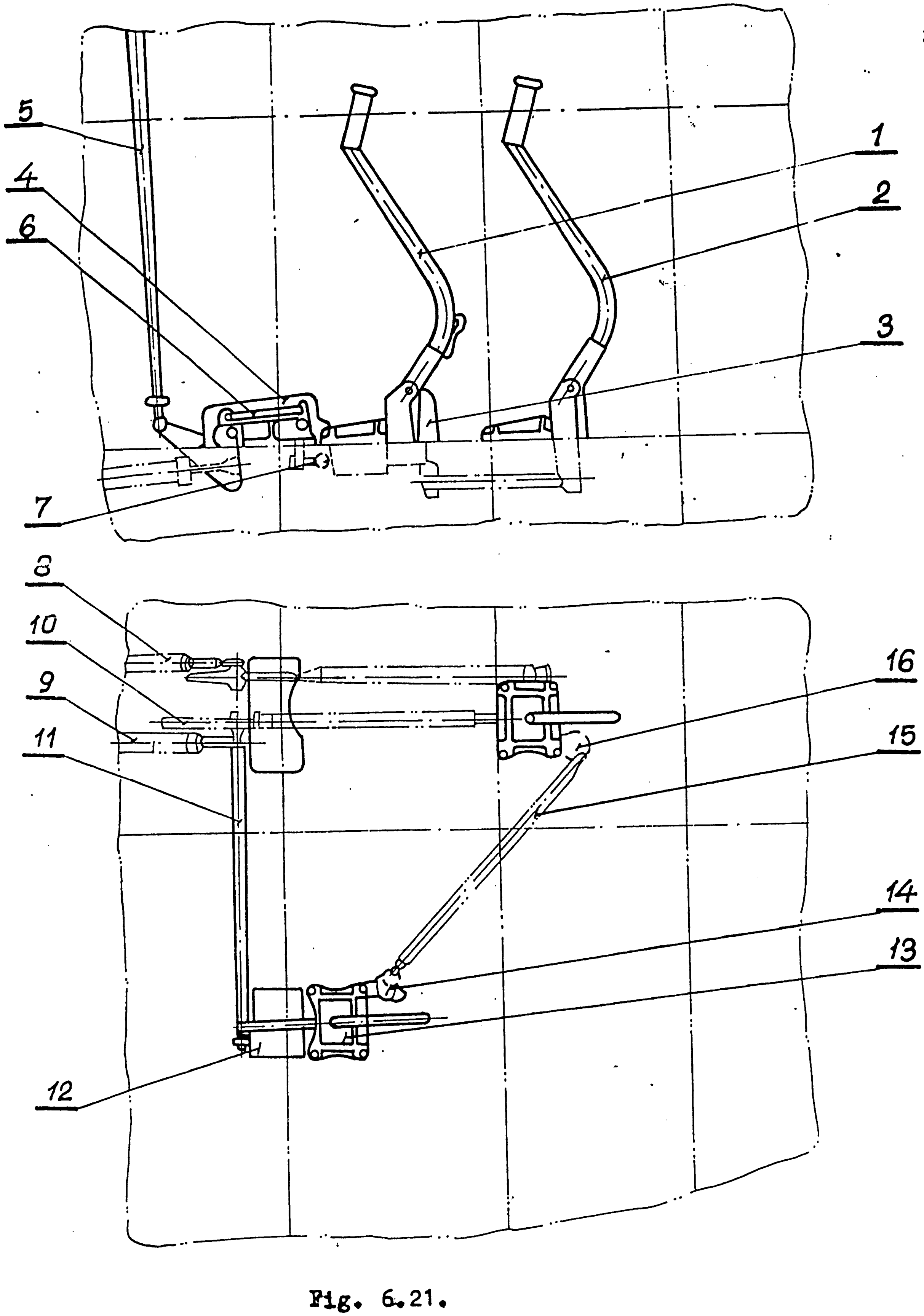


Fig. 6.21.

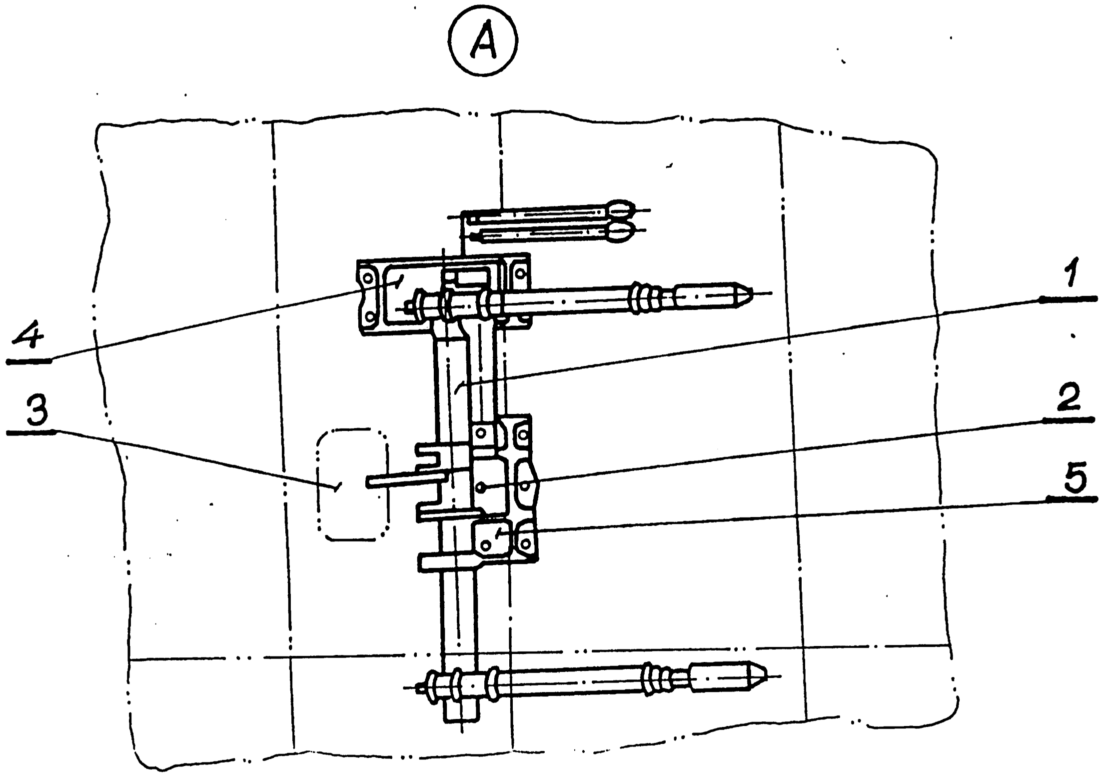
Fig. 6.22

Pitch and power output controls /Local view/

(A) Dual controls

(B) Single controls

1. Pitch and power output control lever
2. Screw
3. Control column
4. Bracket
5. Bracket.



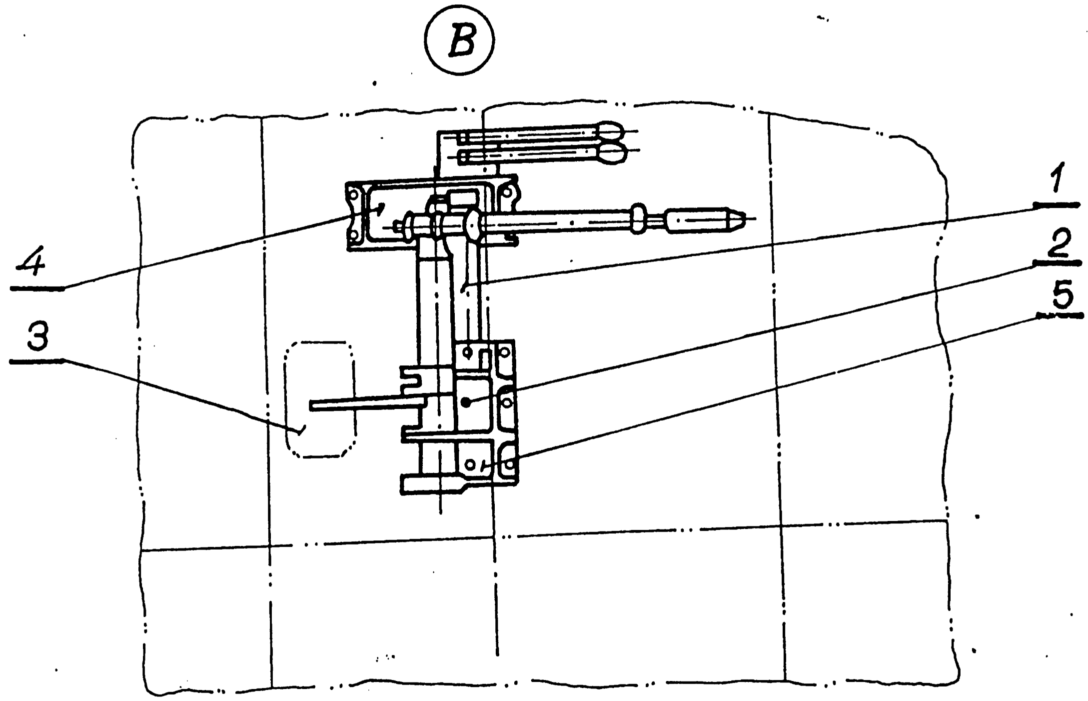


Fig. 6.22.

7. MAINTENANCE OF HELICOPTER WITH SPECIAL EQUIPMENT FOR VARIOUS TYPES

7.1. Ambilance Types

Item	Description of sanitary equipment	Q-ty	Unit of measure
1.	Stand and stretcher-handle bracket	4	pc.
2.	Sanitary table bracket	4	pc
3.	Stretcher stand	1	pc.
4.	Patient´s seat with safety belts	2	pc.
5.	Sanitary table	1	pc
6.	Sanitary seat	1	pc
7.	Oxygen cylinder container	1	pc.
8.	Sanitary bag	1	pc.
9.	Vacuum flask /1 litre/	2	pc.
10.	Stretcher belt	2	pc.
11.	Fixing belts	1	set
12.	Patient´s net	2	set
13.	Window sunshade	6	set
14.	Curtain	1	set

Fig. 7.1/1

Mouting the sanitary equipment

1. Doctor´s table
2. Doctor´s seat
3. Patient´s seat with seat belts
4. Oxygen cylinder container
5. Vacuum flask
6. Suitcase holder
7. Sanitary bag
8. Stretcher belts
9. Stretcher belts
10. Fixing belts
11. Patient´s net
12.–15. Stretcher and stand brackets
16. Doctor´s table bracket
17. Stand
18. Rail
19. Curtain
20. Type "Kramer" medical splint
21.–22. Screws
23.–24. Brackets
25. L.H. pan
26. R.H. pan
27. Cradle
28. Supports
29. Supports
30. Bush
31. Screw
32. Bolt
33. Washer
34. Plate
35. Tape

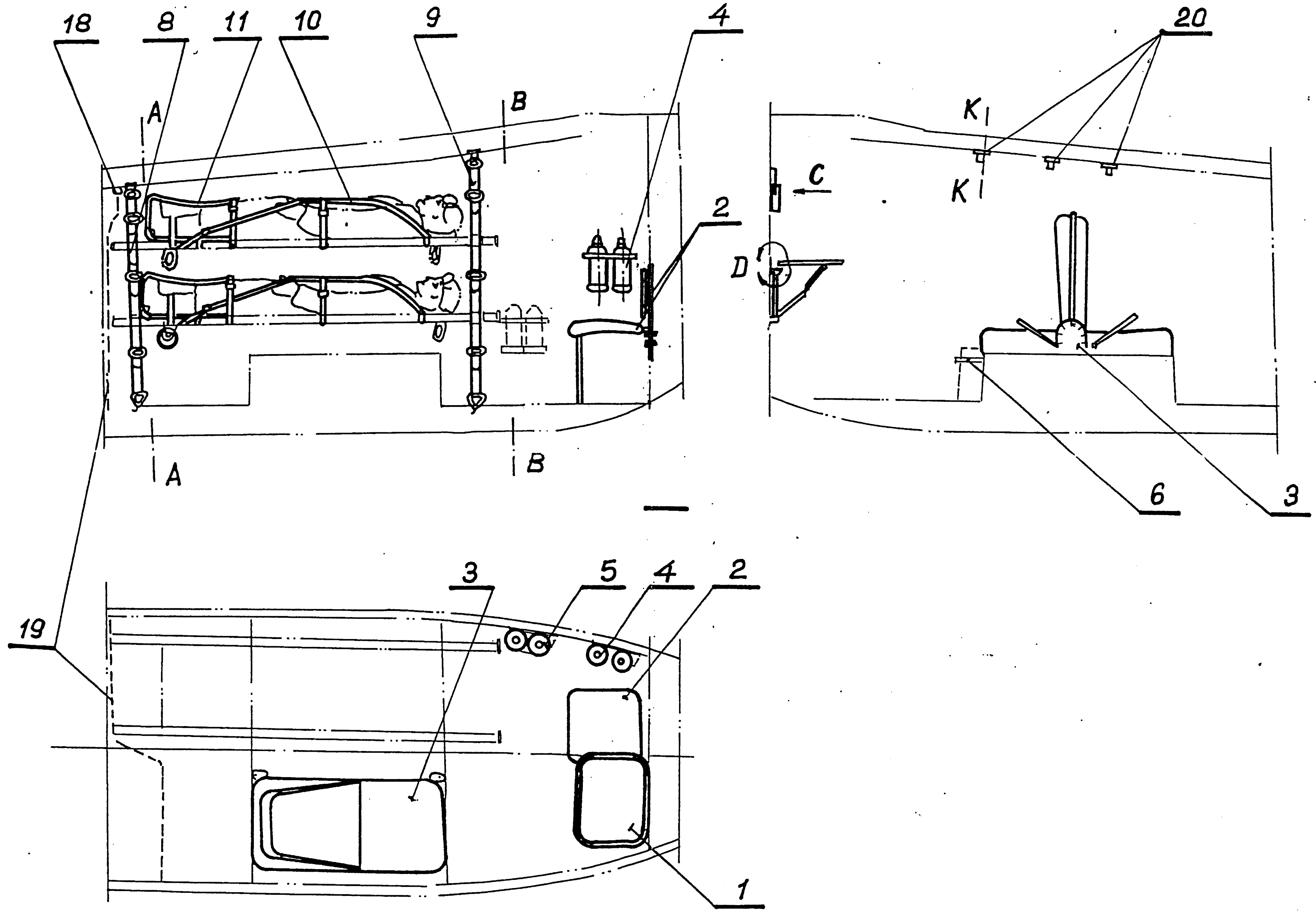


Fig. 7. 1/1

7.1.1. Mounting the sanitary equipment /Fig. 7.1/

1. Install on the ceiling and starboard wall of the passenger cabin special fittings and brackets designed for fixing the sanitary equipment.
   To do this, proceed as follows:

   a/ Find access panels installed on the cabin upholstery, which cover the fittings designed for fixing the sanitary equipment.

   b/ Remove screws screwed in holes of the sanitary equipment fittings.

   c/ Mount the stretcher and stand brackets 12, 13, 14 and 15 on the cabin upholstery, a textile pad /two layers/ having been insterted between the fuselage skin and the mating face of the bracket to be mounted.

   Mount the bracket 14 only when stretchers are to be used. If not, remove this bracket.

   d/ Mount the rail 18 of the curtain 19 on the ceiling, on removing an access panel covering the belt 8 fitting.

2. Mount the stand 17 /including stretcher-handle brackets/ in brackets installed on the starboard side between No. 6F and No. 7F frames.
   Having mounted the stand, insert a locking pin into pin-hole in the lower fitting to prevent the stand from falling out of its seating in the fuselage fitting.

3. Turn to service position the stretcher-handle brackets which are arranged along the cabin starboard side and in the stand 17.

4. Open locks of the brackets by pressing push buttons installed in the bottom part of these brackets.

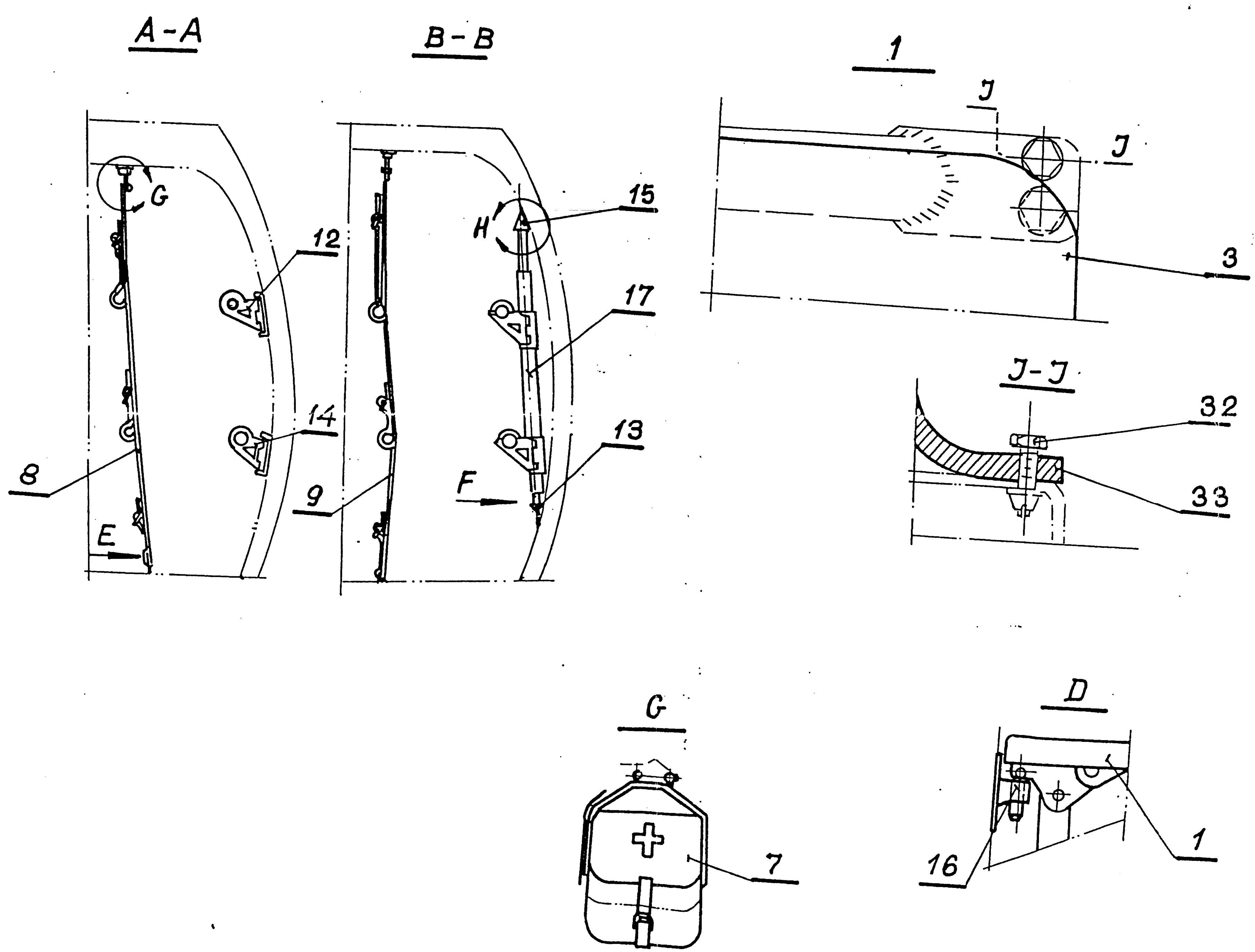


Fig.7.1/2

5. Attach two stretcher belts 8 and 9 to special fittings in the ceiling and the floor, and tighten these belts. Having attached the belts, hang the curtain 19 from the rail 18.

6. Mount the oxygen cylinder brackets on the starboard wall bear No. 8F grame and insert two oxygen cylinders /Fig. 7.1/4/.

   To do this, proceed as follows:

   a/ Screw out the screws 21 /8 screws/ and 22 /4 screws/ from the cabin upholstery.

   b/ Mount on the cabin upholstery the brackets 23 and 24 as well as the L.H. and R.H. pans 25 and 26 using the screws as mentioned under point a/.

   c/ Insert the oxygen cylinders into the pans and attach to the brackets using belts with locks.

7. Mount the cradle and vacuum flask supports on the starboard wall near No. 7F frame, and insert the vacuum flasks /see Fig. 7.1/4/.
   To do this, proceed as follows:

   a/ Screw out the screws 31 /12 screws/ from the cabin upholstery, without removing the bushes 30.

   b/ Mount on the cabin upholstery the cradle 27 and supports 28 and 29 using the screws as mentioned under point a/.

   c/ Install the vacuum flasks 5 on the supports. Fasten the vacuum flasks to the cradle 27 by means of rubber cords absorbing shocks.

8. Attach the sanitary folding-down table 1 to the brackets 16 installed on No. 9F frame on the port side of the cabin rear wall as well as mount the seat 2 with head-rest.

9. Hang the sanitary bag 7 from hooks over the sanitary seat.

Fig. 7.1/3.

Mounting the sanitary equipment

1. Stretcher belt
2. Stand bracket
3. Stand
4. Stand bracket
5. Type "Kramer" medical splint

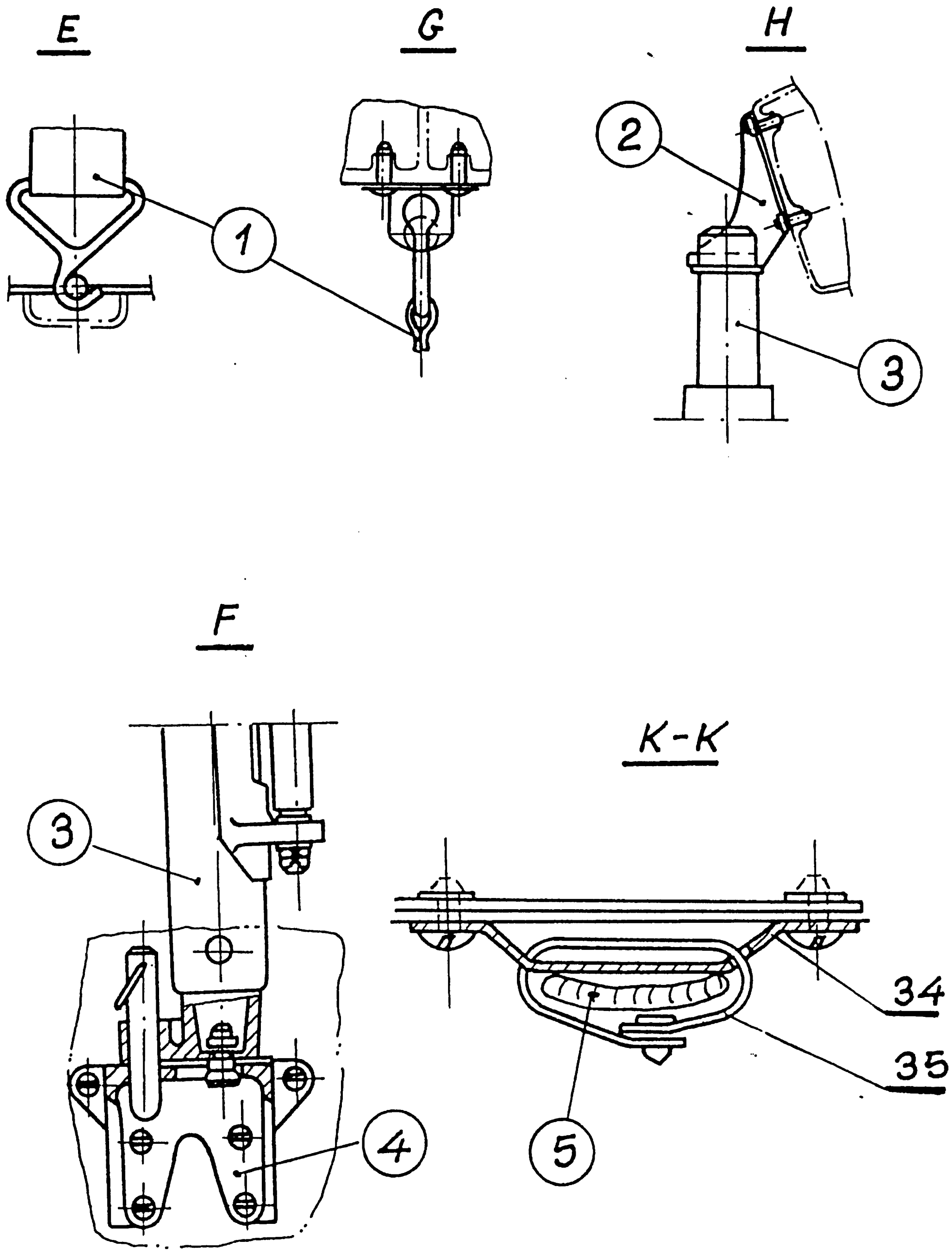


Fig. 7. 1/3.

10. Mount the patient's seat 3 on the fuel tank container plate. To convey one patient, use the seat with back cushion set in horizontal position while to convey two patients, use the seat with back cushion set in vertical position.
To do this, proceed as follows:

   a/ Set the seat 3 on the left side of the fuel tank container.

   b/ Attach the seat from one side to the bracket at the port side of the cabin using fasteners while from the other side to the container plate using the screws 32 /Fig. 7.1/2, item 1/. Place washers 33 under the bolts 32.

11. Attach the type "Kramer" medical splint /when required/ by means of tapes 35 to three plates 34 fixed to the cabin ceiling over the patient's seat 3 which is on the port side of the cabin.

12. Having dismounted the sanitary equipment from the helicopter /including the brackets/, mount the access panels and screw in the screws.

7.1.2. Emplaning patients /Fig. 7.1/

1. Emplane patients lying on stretchers through the doors on the port side of the helicopter. Position the stretchers in the cabin in the direction of flight.

2. To attach the stretchers, clamp one pair of handles in locks of the brackets while the other pair of handles in loops of the tapes.

Fig. 7.1/4

Mounting the sanitary equipment

(a) Mounting oxygen cylinder brackets
View on the cabin starboard side.

(b) Mounting cradle and vacuum flask supports
View on the cabin starboard side.

(1) from No. 8F frame

(2) No. 9F frame

(3) No. 7F frame

(4) No. 8F frame

(5) Assembly horizontal datum.

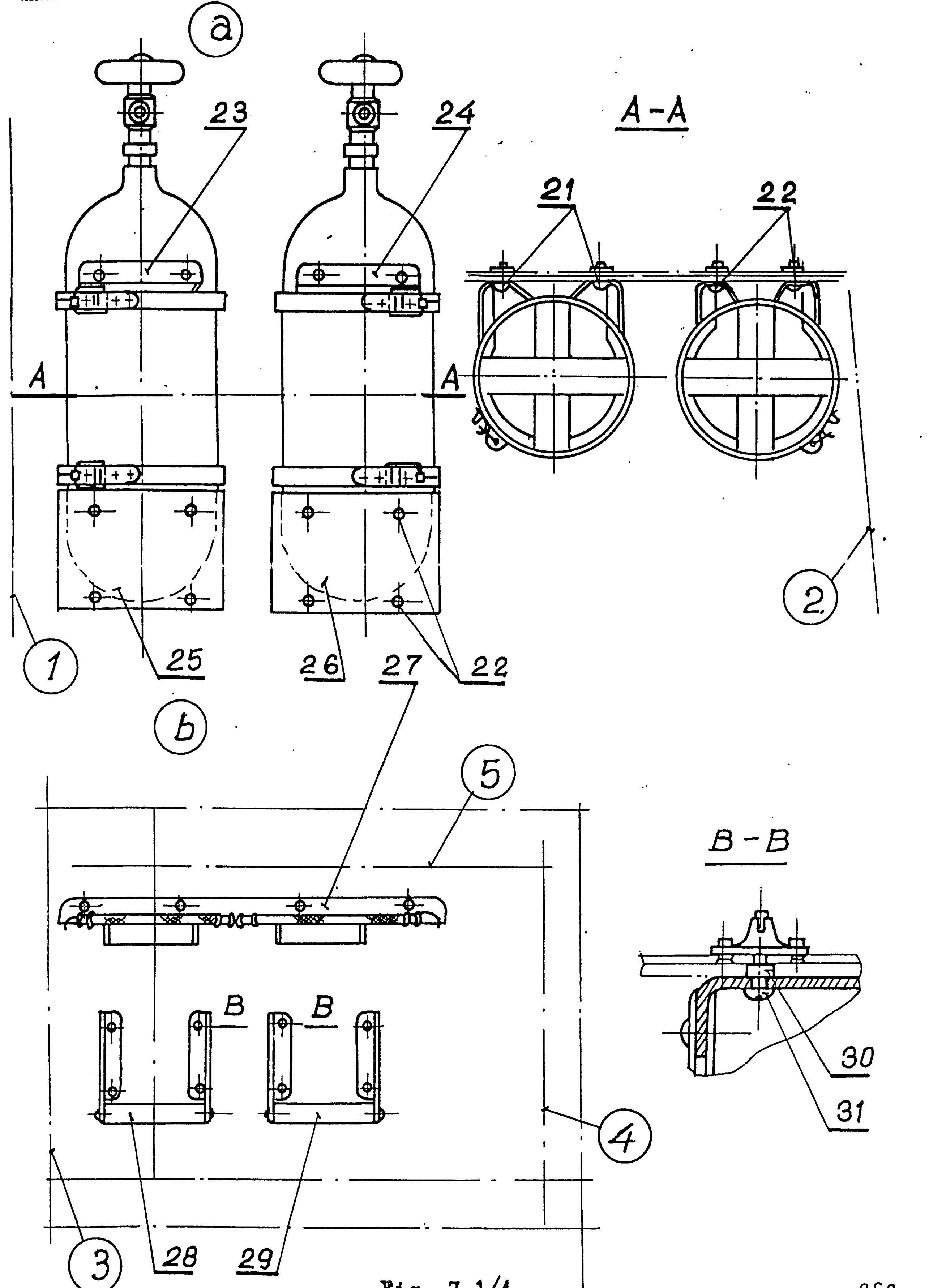


Fig. 7.1/4

3. In case the helicopter is provided with single controls, it is possible to place two stretchers on the starboard side of the cabin.

   In case the helicopter is provided with dual controls, it is possible to place one stretcher on the port side of the cabin, at the top.

   However, with one-man crew, it is possible to place two stretchers on the starboard side of the cabin after the R.H. pilot's seat has been dismounted.

7.2. Additional Tanks

Item	Name of part of additional tank assy	Quantity
1.	Strut	6
2.	Bearer	4
3.	Fuel line	2

7.2.1. Mounting additional tanks

1. Attach struts to the fuel tank bearers.
2. Mount the fuel tanks on both sides of the fuselage. Attach the starboard tank bearers by means of struts to fittings on No. 4 and No. 6 frames while the port tank bearers by means of struts to fittings on No. 3 and No.5 frames.

   Connect outer fittings of the port and starboard tank front bearers with fittings on No. 5 and No. 6 frames respectively.
3. Connect fuel lines from the belly tanks to the L.H. and R.H. end-fittings on side walls of the main tank after pressure caps on these end-fittings have been screwed out.

7.3. Cargo Type

To load and unload the cargo cabin, use an outrigger with ŁPG-4 electric winch /120 kG lifting capacity/ to be mounted above the cabin doors.
To transport bulky cargoes of total weight up to 800 kG, mount the external crane suspension.

Item	Name of a part of transport facilities	Q-ty	Unit of measure	Weight
	a/ Carriage of freights in cargo cabin			
1.	Cargo net, 1.5 x 2 mm	1	pc	Set of facili-ties 20.4 kG
2.	Cargo belt, 3 m long	4	pc.	
3.	Cargo belt, 4 m long	4	pc	
4.	ŁPG-4 electric winch	1	set	
5.	Operator's belt	1	pc.	
	b/ Carriage of freights on external suspension			
1.	Air cylinder	1	pc	Set of facili-ties 21.4 kG
2.	Lock suspension rope	3	pc.	
3.	Intermediate rope	1	pc.	
4.	Lifting rope	4	pc.	
5.	Lock	1	set	

7.3.1. Carraige of freights in cargo cabin

1. Mount the bracket with the outrigger 1 on No. 9F frame at the top rear corner of doorway. To fasten the bracket, use bolts, It is prohibited to screw out the bush 11 of the bracket 1. Secure bolts with a wire.
2. Mount the roller 3 and secure the roller pin with a pin 2.
3. Mount the electric winch 5 on No. 9F frame wall after decorative screws have been screwed out. Screw the winch screws in anchor nuts arranged on the fuselage fittings.
4. Pass the rope 4 on rollers 3 and 10. Attach the ground cable 14 and hook 8 to the hook weight.
5. Mount the KUŁ-4 winch control box 7 on No. 9F frame wall, and screw the set screws in anchor nuts arranged on the fuselage fittings.
6. Attach the winch control desk bag 6 to No. 9F frame wall after decorative screws have been screwed out.
7. Connect electric cables to the units according to the winch wiring diagram.
8. Having mounted the crane, check it for operation under a load from 30 to 120 kG /a weight suspended from the hook/. When lowered the weight must not touch the ground.
9. Having dismounted the crane from the helicopter, coat all unprotected points and the ropes with grade LMP grease. Before mounting the crane on the helicopter, remove grease using grade B-70 gasoline.

Use of the outrigger /Fig. 7.2/

1. When lifting or lowering cargo, set the retainer 15 and sector 16 in the position as shown in Fig. 7.2.

Fig. 7.2/1

Mounting the crane

(A) View on rear wall

(B) View on helicopter port side

1. Bracket with outrigger
2. Locking pin
3. Roller
4. Rope
5. ŁPG-4 electric winch
6. Winch control desk bag
7. Winch swash-plate
8. Hook
9. Spring
10. Rollers
11. Bush
12. Stop
13. Hook weight
14. Ground cable
15. Retainer
16. Sector
17. Operator´s belt

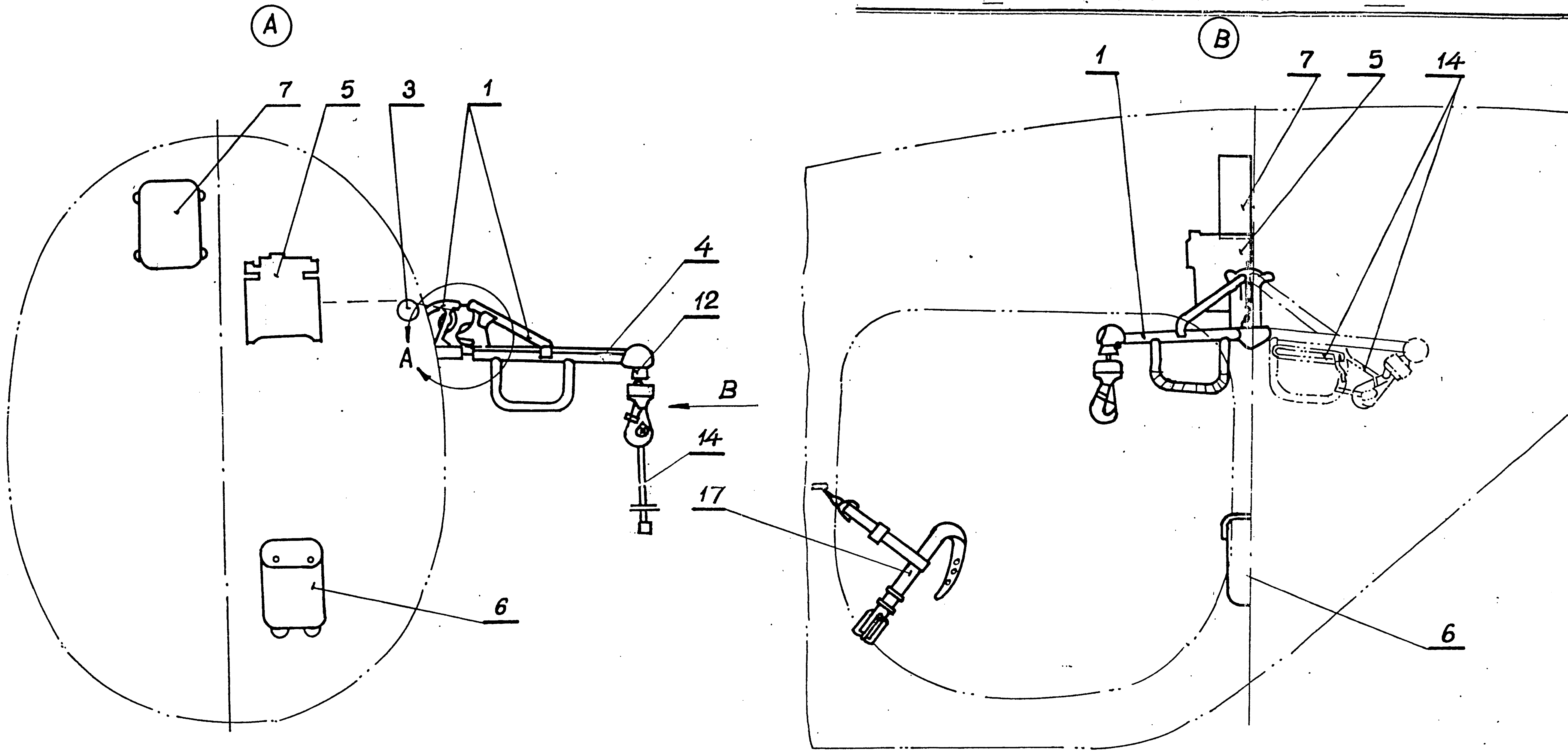


Fig. 7.2/1

When loading or unloading the cabin, set the crane outrigger so that the retainer will engage the recess I in the sector. When set in off-position the retainer should engage the recess II in the sector.

2. In case there are grooves two thirds the diameter of the rope /2 mm/ in depth on the outer surface of the bush installed in the stope12, replace the bush.

3. The operator of the crane being in use during hovering must be protected with a belt 17 attached to a grip on the port side of the helicopter.

4. Having set the crane outrigger in the cruising position, i.e. along the fuselage, fasten the hook 8 to the outrigger handle and tighten the rope 4. Reel the ground lead 14 on thimbles arranged on the outrigger handle and fasten the lead bob in a grip.

Carriage of freights

Freights of a total weight up to 700 kG can be transported on the helicopter. To ensure the proper location of the centre of gravity and adequate load distribution over the cabin floor, stow the cargo to be carried according to the cargo plan on the cabin starboard wall /Fig. 7.3/.

It is prohibited to stow the cargo to be carried directly behind the pilot´s seats /on the front part of the fuel tank container cover/ on a helicopter with dual controls, with full fuel tank and with two crew members on board.

Fasten the cargo by means of belts attached to the fittings /18 fittings/ arranged on the cabin floor and on the top plate of the fuel tank container.

Stow package cargo of a total weight up to 600 kG on the top plate of the fuel tank container. To fasten this cargo, use a cargo net and cargo belts attached to the fittings.

Fig. 7.2/2

Mounting the crane

1. Diagram showing possible outrigger settings
2. Outrigger in position when cargo is drawn into the cabin
3. Direction of flight
4. Outrigger in service position
5. Outrigger in cruising position

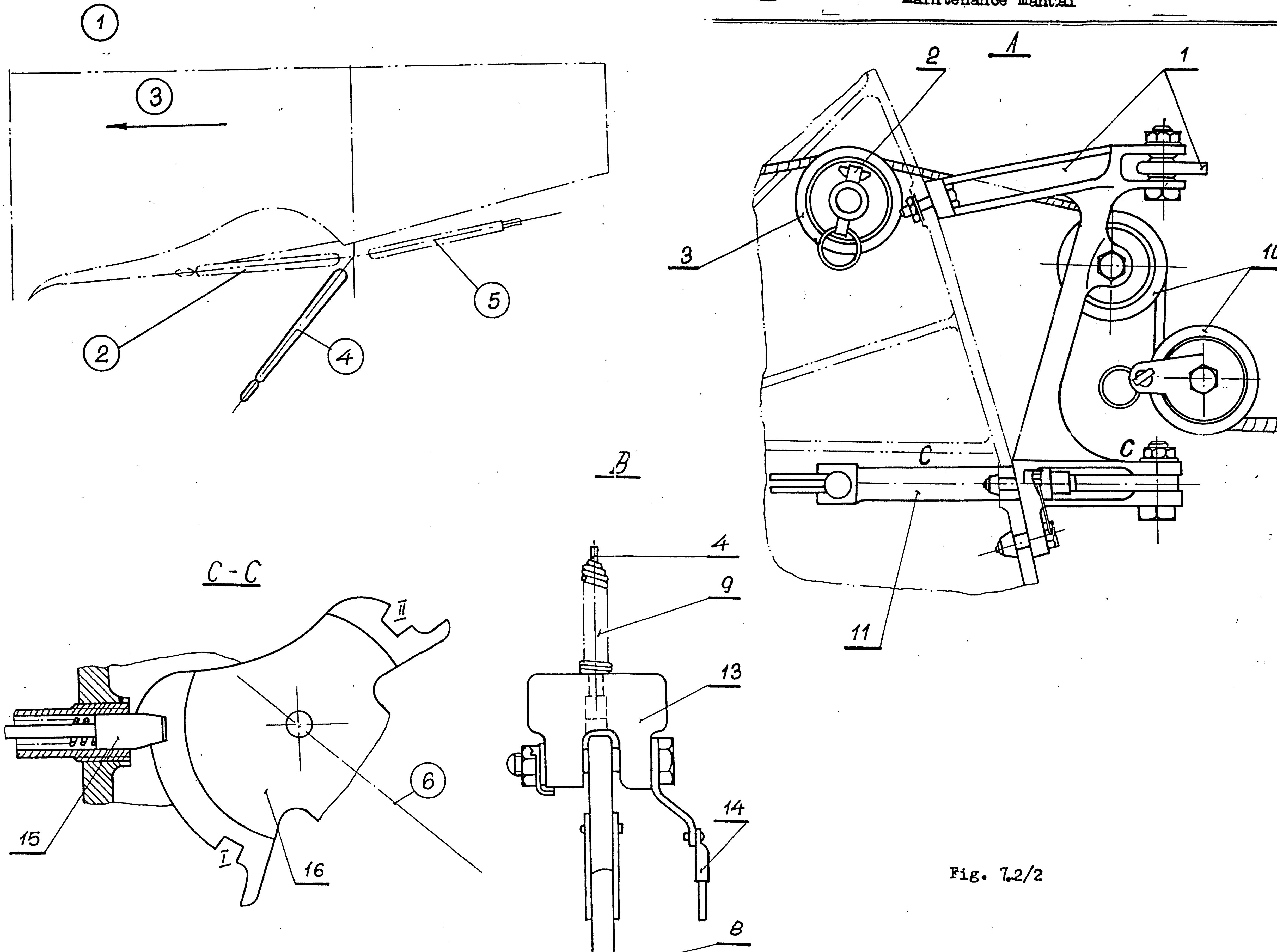


Fig. 7.2/2

According to need, attach the cargo net either with its longer side or with its shorter side in the direction of flight /do not fasten middle belts on these sides to the fittings/.
To ensure free access to all fittings, dismount the front wall 1 and the rear wall 2 /Fig. 7.4/.

7.3.2. Carriage of freights on external suspension

Mounting the external suspension /Fig. 7.5/

Before mounting the suspension on the helicopter, check the condition of ropes, air cylinder, connecting links, bolts and lock.
Ropes with broken wires must be withdrawn from use.

1. Mount the ropes and air cylinder on the helicopter fuselage, the following sequence of operations being observed:
   a/ Bolt the front rope 3 to the cylinder end 12, and then bolt the cylinder 10 with connecting links 6 and 13 and and with the clevis 14 to the bracket mounted on the fuselage close to the undercarriage front leg /Detail A/.
   b/ Bolt the rear ropes 7 /2 ropes/ to connecting links 8 and then to fittings on the fuselage /fittings for fastening the undercarriage rear lower struts - Detail B/.

      When screwing home the bolts "K", ensure that the interconnected parts are free to turn with respect to one another in these joints, no clearance between the parts being left.

      Mount the connecting link 8 designated by the numeral "2" on a fittingson the port side while that designated by the numeral "3" on a fitting on the starboard side.
2. Having mounted the external suspension, secure all bolted joints with split pins.

Fig. 7.3/1

View on starboard wall inside the passenger cabin

1. Table
2. No. 9F frame
3. Arrow on table 0-1000 blue colour
   Arrow on tables 100 to 1000 red colour

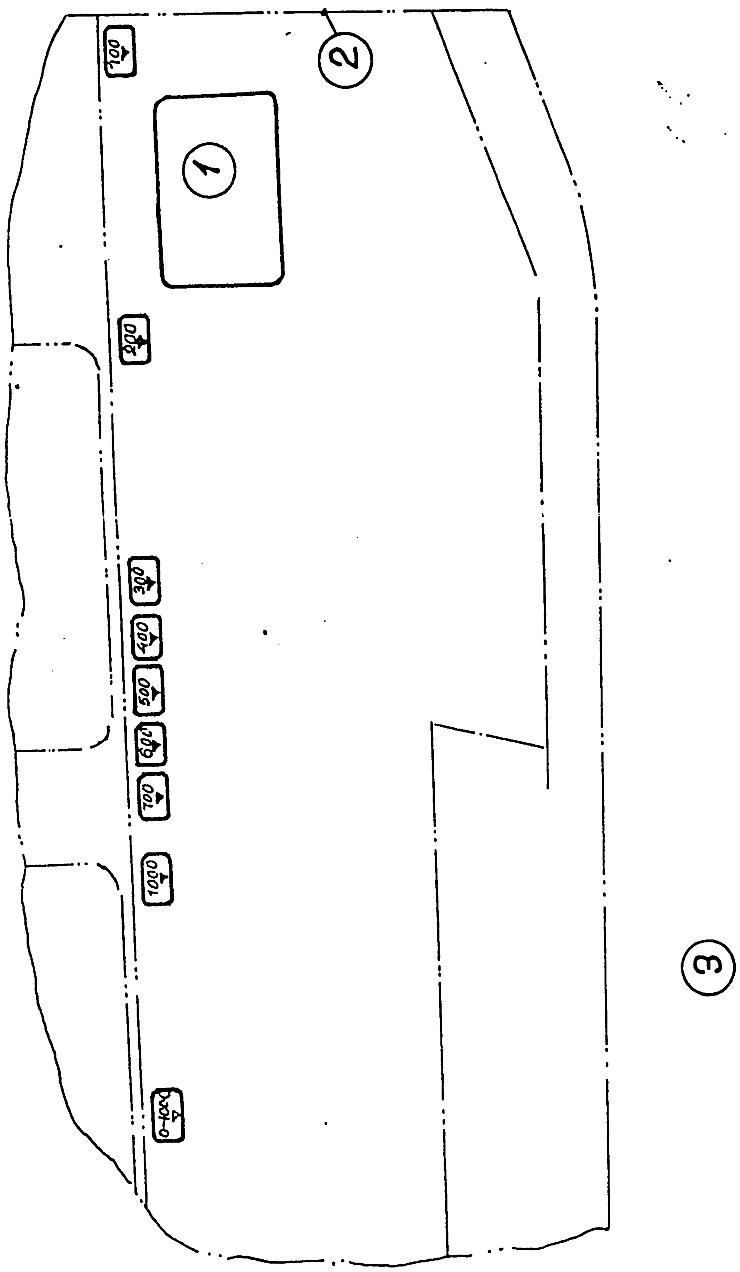


Fig. 7.3/1.

Fig. 7.3/2

View on starboard wall inside the passenger cabin

1. Table

1

N O T E

Resultant centre of gravity of all loads must be situated between red arrow and blue arrow which correspond to loads caused by a given cargo /in kG/.

E.g., stow the cargo including 100 kG, 200 kG and 300 kG parcels /total 600 kG/ so that their resultant centre of gravity is between the blue arrow and the "600 kG" red arrow.

1

ВНИМАНИЕ!

Общий центр тяжести всех грузов располагать между синей и красной стрелкой, соответствующей весу данных грузов (в кг).
Пример: грузы весом 100, 200 и 300 кг (в сумме 600 кг) располагать так, чтобы их общий центр тяжести был между синей и красной стрелкой с надписью "600".

Fig.7.3/2

Fig. 7.4

(1) Direction of flight

1. Front wall
2. Rear wall
3. Front strip
4. Rear strip
5. Fittings on top plate of the fuel tank container
6. Fittings on the cabin floor
7. Cargo belt
8. Cargo net

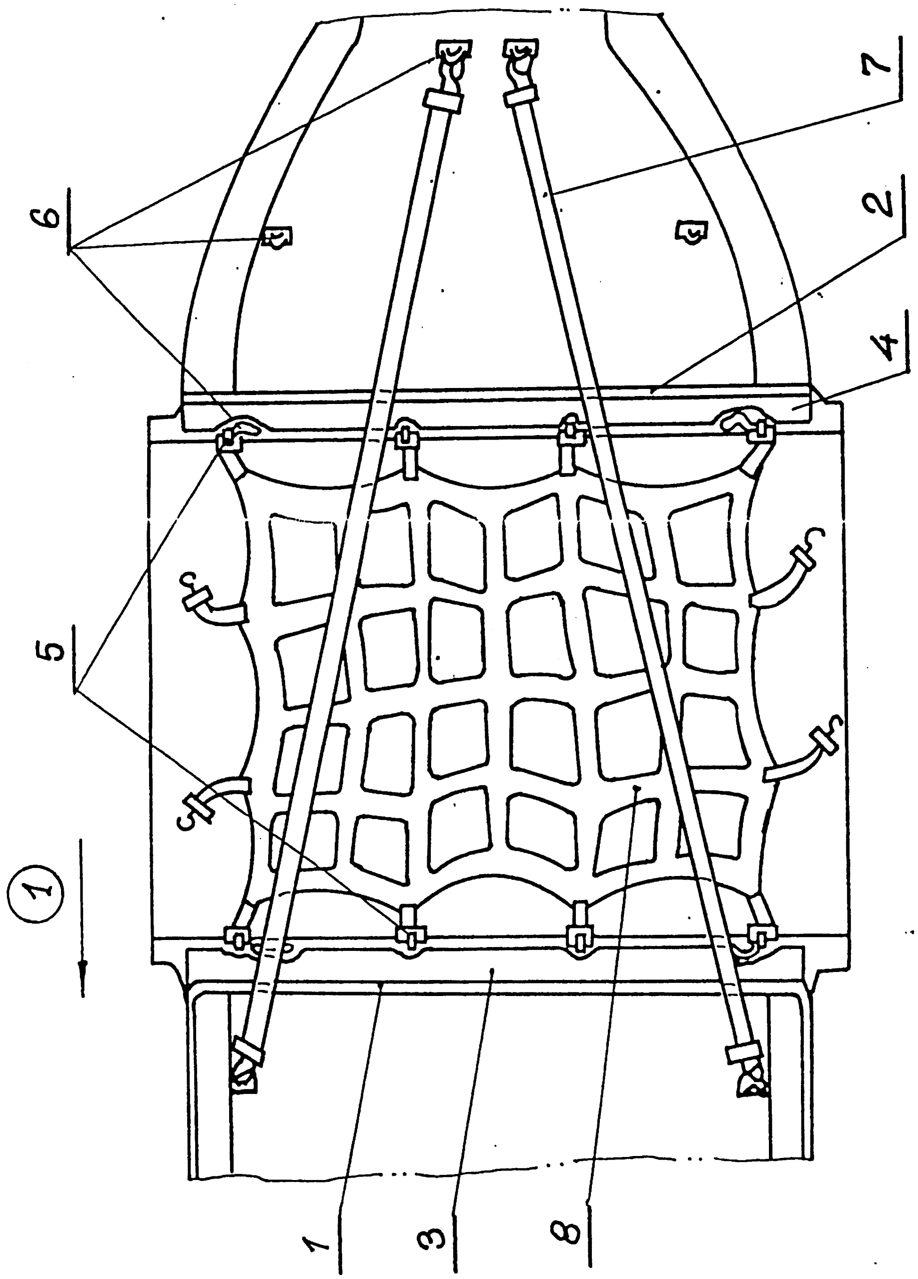


Fig.7.4

3. Connect the air cylinder 10 by means of pipe 19 to end fittings of the helicopter air system / installed on the port side at the bottom of the fuselage/.
4. Connect electric cables of lock 20 to socket outlets on board.
5. Having mounted the suspension, check the lock controls for dependable operation.
   To do this, proceed as follows:
   - check the tactical release system,
   - check the emergency release system,
   - check the lock closing mechanism.
6. Having dismounted the external suspension from the helicopter, coat all unprotected places with grade LMP / or CIATIM-201 / grease.
   Before mounting the external suspension on the helicopter, remove grease using grade B-70 gasoline.
   Fill the air cylinder with the AMG-10 oil, then put the endson. The stem wohen performing the above actions should be skid inside the cylinder as far as possible.
   The oil from the cylinder should be removed just before mounting the cylinder on helicopter.

Use of the external suspension / Fig. 7.5 /

1. The cargo tactical release mechanism is actuated from the cockpit. To release the cargo, press the tactical release push button installed on the pitch and power output control lever. The lock grip should then open.
2. The cargo emergency release mechanism is actuated from the caokpit. To release the cargo, press the emergency release pusg button installed on the control stick.
3. To suspendedthe cargo from the external suspension, use the intermediate rope 5 attached with its catch to the lock grip. To suspend a bulky cargo, additionally use the lifting ropes 9.

4. To suspend the cargo, press down lower part of the lock stop with the rope 5 catch so that the catch enters the lock grip.

5. To close the lock grip, turn it home /holding the lock grip by its lower part/.
When holding the lock grip in position with hand, place special wrench on the lever 21 end and turn this wrench home in the direction of flight.

6. In case the lock grip is to be opened by ground personnel, une special wrench and press down with a pin welded-on to this wrench on the push button 22 of the grip 23 opening mechanism.

7. On installing the air cylinder 10 on the helicopter, adjust the length of the cylinder rod /if necessary/ by means of a threaded fastener 12 and nut 11 to ensure the lock to abut on the helicopter structure.
When adjusting, ensure an additional /up to 3 mm/ travel of the cylinder rod.
Adjust the external suspension "WYPUSZCZ" /LOWERED/ position monitoring system by means of a bolt 15.
When adjusting, ensure an additional /3 to 1 mm/ movement of the micro-switch lever. Retracting lowering the external suspension follows the respective setting of the air system valve lever /on the left side of the pilot´s seat/ in the "POCIAG" /"RETRACTED"/ or "WYPUSZCZ" /"LOWERED"/ position. The external suspension control system is connected to the helicopter air system through the valve 18 installed behind the pilot´s seat on the left side of the cobtrol column.

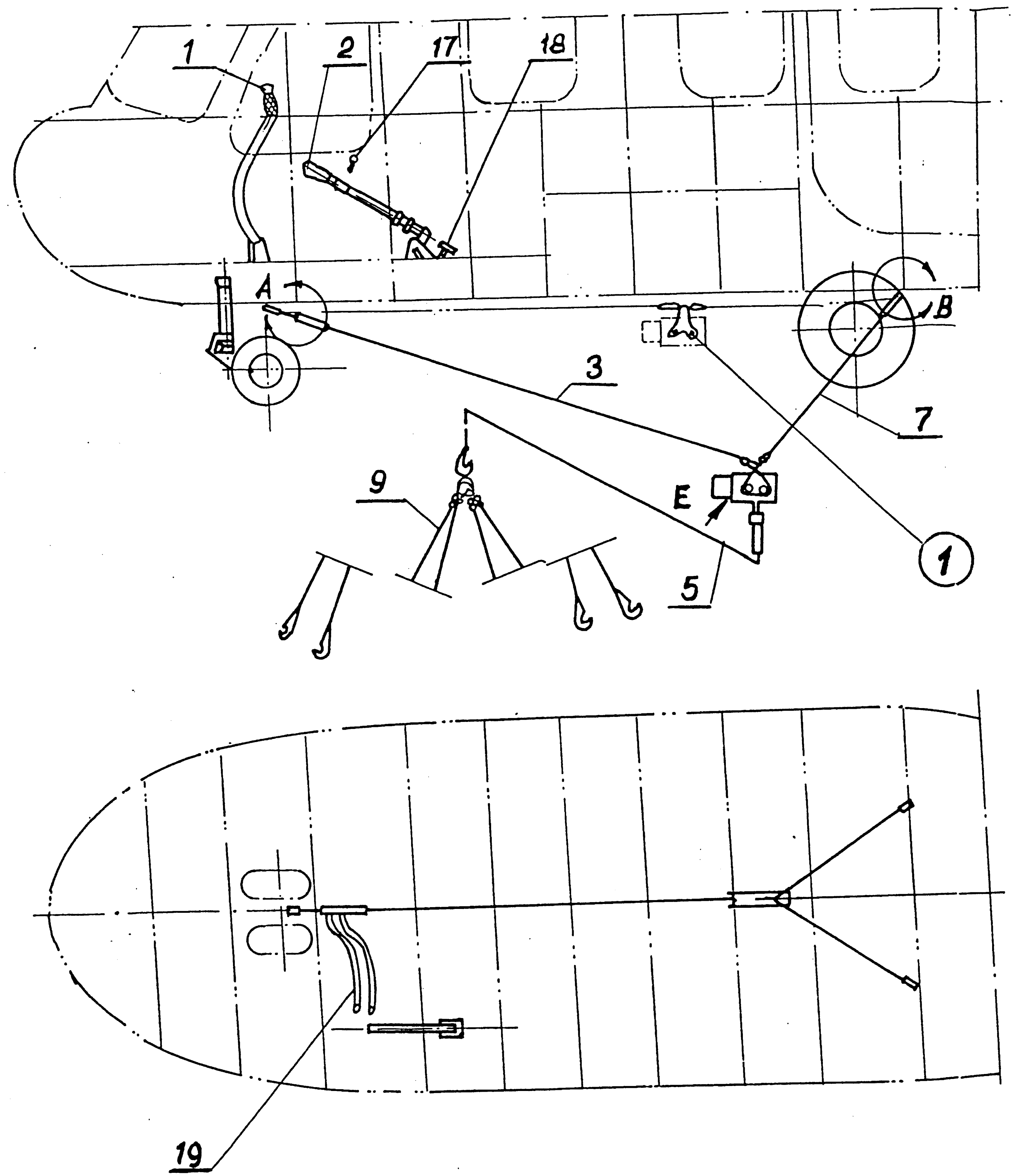
In case the external suspension is setin retracted position during the helicopter out-of-operation time, additionally attach the lock 20 to the belt 4 /this belt to be attached to a special pin on the lock/.
Having detached the lock, attach the belt 4 to a clip under the fuselage.

Fig. 7.5/1

Mounting the external suspension

1. Cargo emergency release push button
2. Cargo tactical release push button
3. Front rope
4. Belt
5. Intermediate rope
6. Connecting link
7. Rear ropes
8. Connecting link
9. Lifting ropes
10. Air cylinder
11. Nut
12. Threaded fastener
13. Connecting link
14. Clevis
15. Bolt
16. Nut
17. Air valve lever
18. Air valve
19. Pipe
20. Lock
21. Lever
22. Push button
23. Grip

1 Lock in retracted position



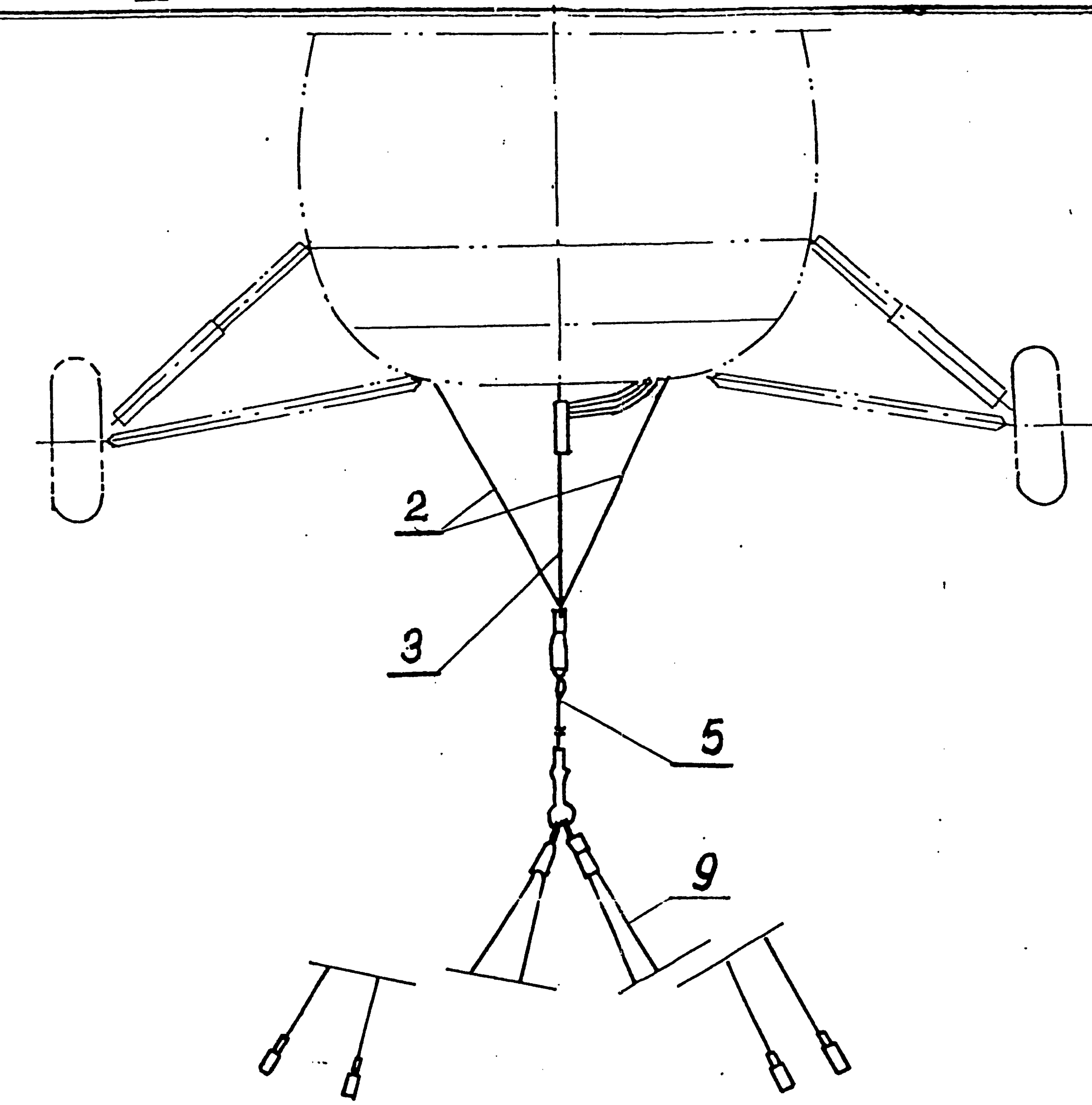


Fig. 7.5/1

Fig. 7.5/2

Mounting the external suspension

1 Micro-switch

2 Setting lock in retracted position by means of belt

3 Position of belt when detached from lock

4 Detail A

5 Detail B

8. When operating the external suspension or handling cargo in the course of landing or during hovering, connect the helicopter to ground /to remove electric charges/ using the ground cable from the external suspension set.

To do this, drive the cable ground end in the ground and touch any accessible part of the helicopter or external suspension with handle end.

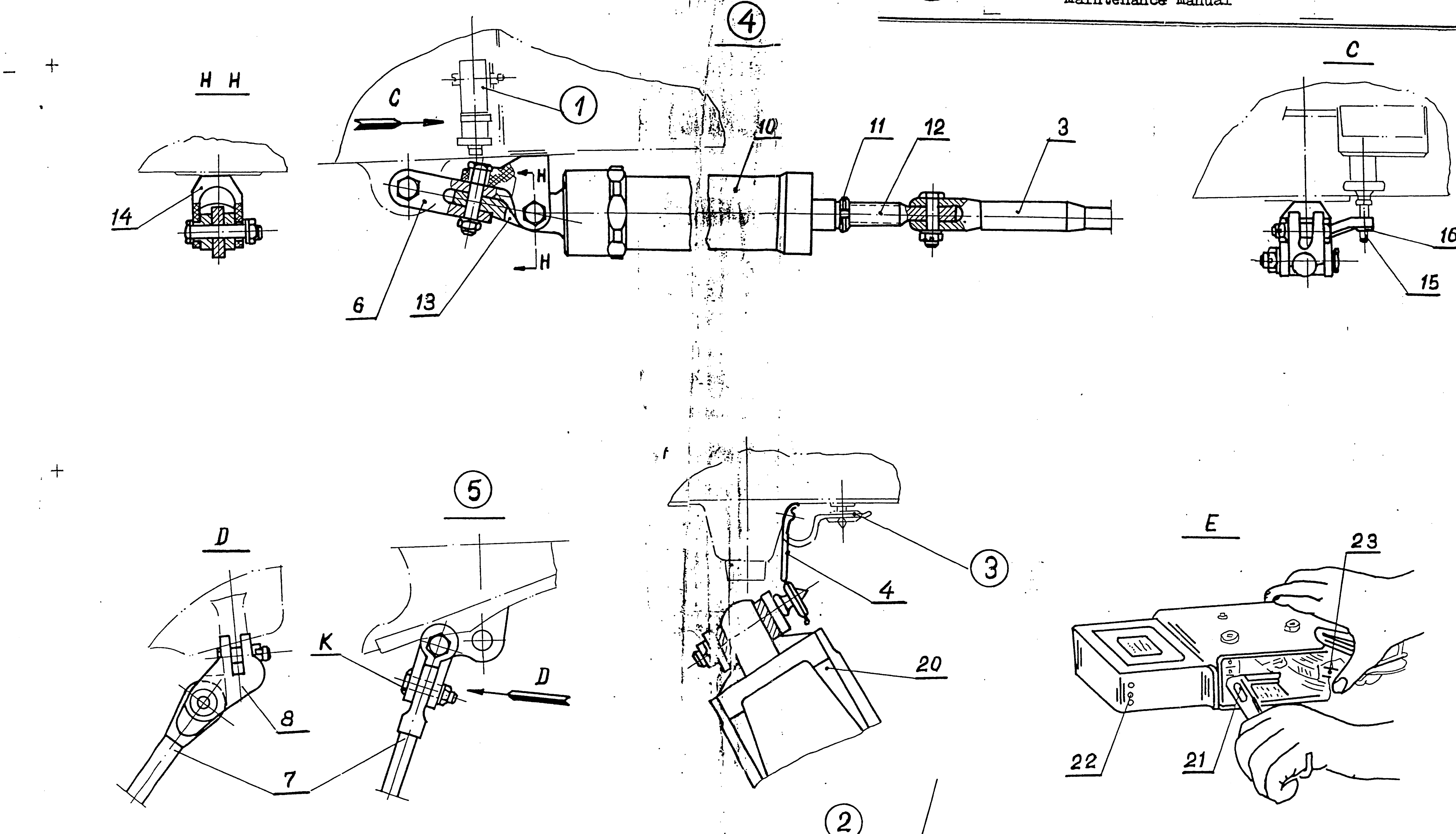


Fig.7.5/2

7.4. Passenger Type

Item	Name of a part of passenger equipment	Q-ty	Unit of measure	Weight
1.	Six-seat chair	1	pc.	Set of equip-ment 30 kG
2.	Front seat	1	pc.	
3.	Rear seat	1	pc.	
4.	Table	1	pc	
5.	Carpet	1	set	

7.4.1. Mounting the passenger equipment /Fig. 7.6/

1. Install the six-seat passenger chair 1.
   To do this- proceed as follows:

   a/ attach seat belts to the brackets on the fuel tank container plate,

   b/ attach the passenger chair by means of retainers to the brackets.
   When installing the passenger chair pay attention to the numerals stamped on the fuel tank container plate and the passenger chair.

2. Install the rear seat 3 with back cushion pinning its feet tbe the rear wall and on the floor.
   On installing the seat, attach seat belts.

3. Mount the table 4 on the starboard wall. Fasten it with screws in anchor nuts.

4. Install the front seat 2 /on a helicopter with single controls only/.
   To do this, proceed as follows:

   a/ pin its feet to the front brackets,

   b/ pin its frame to seats in the rear brackets,

   c/ attach seat belts.

5. Hang sunshades in the cabin windows /Fig. 7.7, item 1/.
   To do this, proceed as follows:

   a/ loosen screws 6 which fix the window framings 5,

   b/ insert upper parts of the sunshades and straps 2 under the window framings /with sunshades drawn down, the strap clips 7 should correspond to respective sunshade clips/.

   c/ screw home screws which fix the window framings.

6. Having mounted the passenger equipment, pad the cabin floor with carpets 5.

7.4.2. Use of the passenger equipment

1. To ensure correct location of the helicopter centre of gravity, assign places to the passengers to be taken up according to the numeration shown on the passenger's seats /Fig. 7.6/1/.

   On helicopters with single controls the passengers are allowed to take all seats /8 passengers/, the seat on the left side of the pilot to be taken lastly.

   In case one passenger /crew member/ is to be taken, it is necessary to place an at least 50 kG trimming load on the floor behind the fuel tank.

On helicopters with dual controls the passengers are allowed to take seats designated with the numbers from 4 to 7 /i.e. 4 passengers/, in the order of increasing numbers.

2. During any longer out-of-operation time of the helicopter, put covers on the seats.
3. Should it be necessary to draw sunshades up, roll them up and fasten with straps.

NOTE: on helicopters of passenger type it is possible to install two types of six-seat chairs, i.e. hard or soft ones.

Fig. 7.6/1

Mounting the passenger equipment

1. Six-seat chair
2. Front seat
3. Rear seat
4. Table
5. Carpeting
6. Retainer

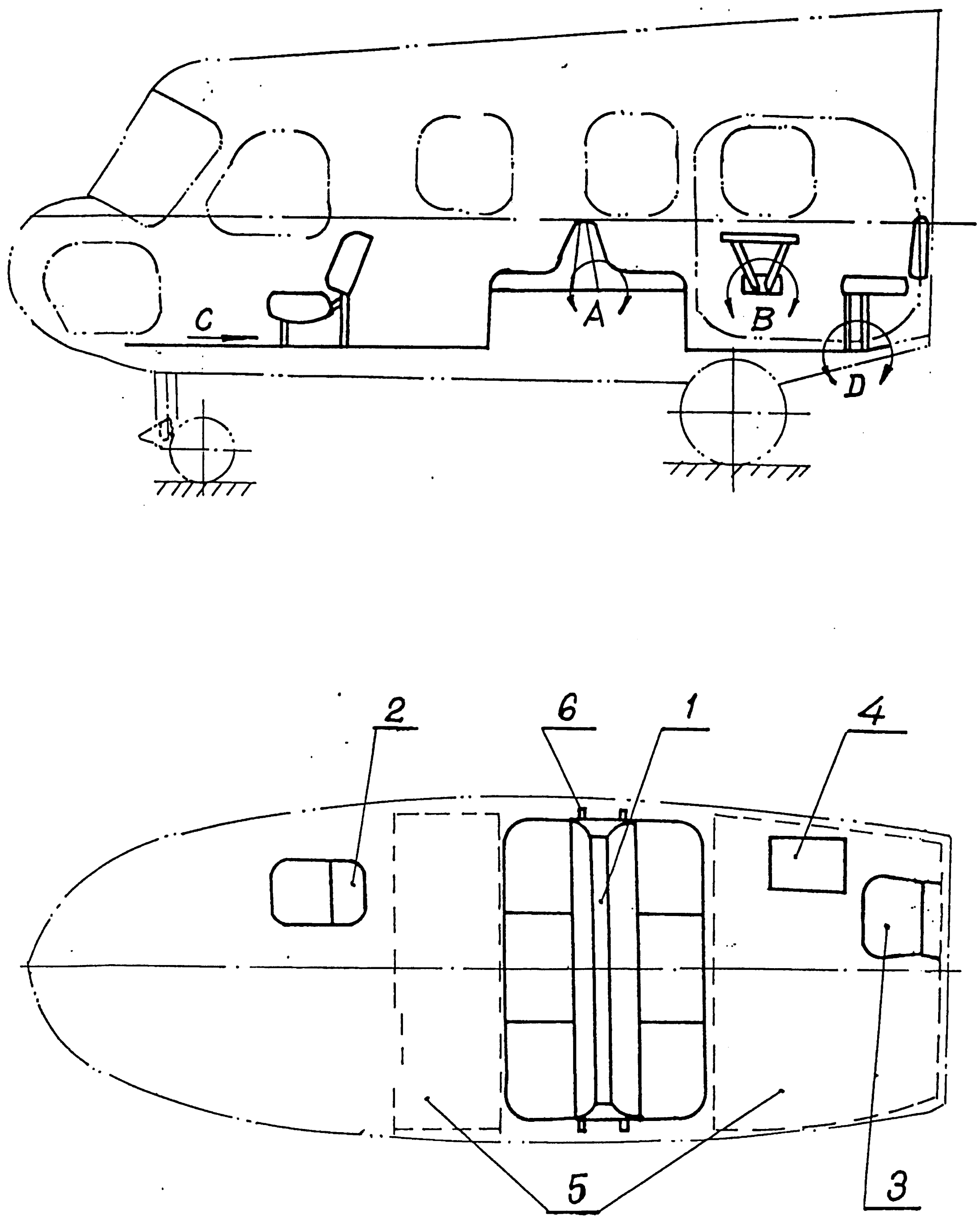


Fig.7.6/1

Fig. 7.6/2

Mounting the passenger equipment

1 Fastening

2 Fastening seat belts to the fuel tank plate

3 Typical fastening of the carpet

4 Strip

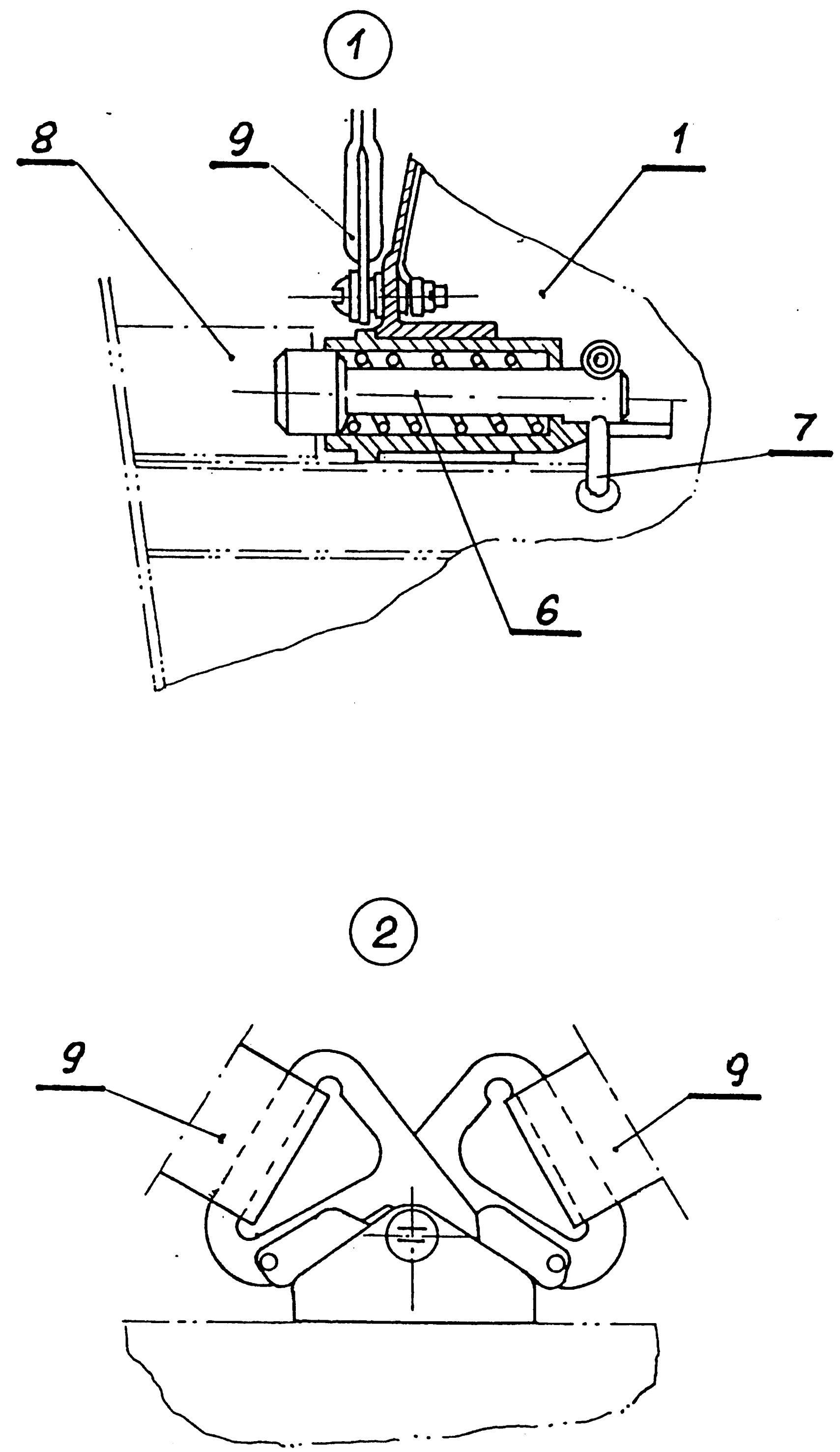
5 Screw

6 Floor

7. Lever

8. Bracket

9. Seat belt



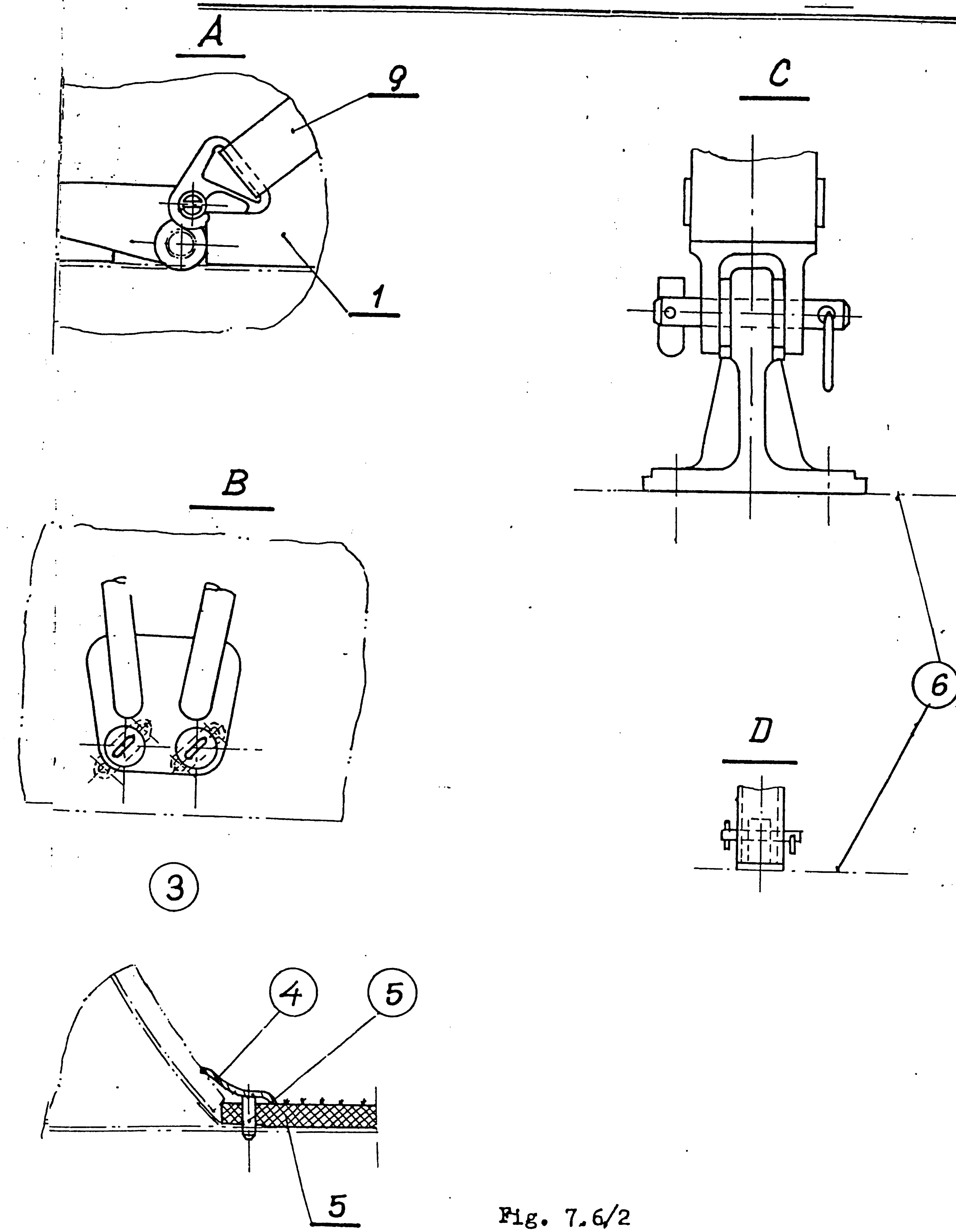


Fig. 7.6/2

7.5. Training version /dual controls/

Item	Components included in training equipment kit	Qty	Unit
1.	Oxygen bottles attachment points	2	pcs
2.	Hand -operated window curtains	1	set
3.	Balancing weight	1	pcs

7.5.1. Installing the training equipment

1. Install the attachment points for oxygen bottles on the floor behind the first pilot seat.
2. Install the fixed window curtains on the helicopter structure using the clamps and check condition and operation of movable windows curtains sliding system /para 7.5.3./.

7.5.2. Training equipment operation.

1. Hand -operated window curtains are installed to adapt a helicopter equipped with dual controls for "blind flying".
2. The helicopter may be equipped with oxygen system flights requiring oxygen supplying for the pilots /instructor and student/.
   The oxygen bottles are installed at attachment points specially provided for this purpose. Suspend the oxygen masks on the parachutes catches when there is no need of oxygen supply when flying. The oxygen system pipes should be suspended on the catches located on the side edges of the pilot seats.

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Fig. 7.7

Hanging sunshades in the passenger cabin windows

1. Sunshade
2. Strap
3. Strap
4. Cabin upholstery
5. Window framing
6. Framing set screw
7. Clip

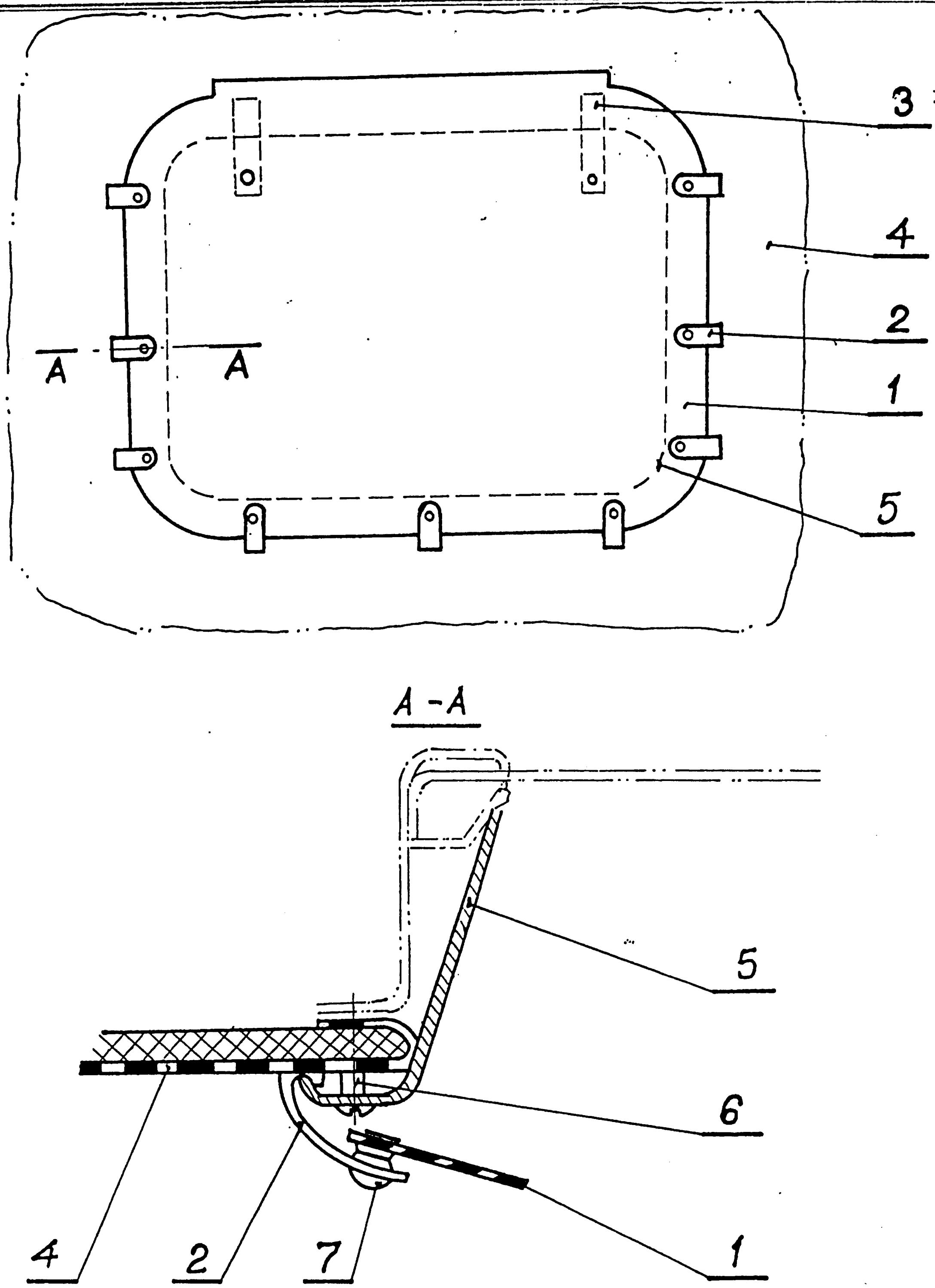

Fig. 7.7.

7.5.3. Hand -operated curtains for blind flying

The hand operated curtains for blind flying /IFR/ are installed on the helicopter with dual as well as single control.
The curtains design and arrangement do not disturb the pilot to control the helicopter as to embark and disembark the cockpit. /Fig.7.8/.
Before training flights when the curtains on the left side of the cockpit are to be used, proceed as follows:

1. Install the fixed curtains to the helicopter structure using the clamps :
   - LH lower vision window - to window frame,
   - RH lower vision window -to RH side of instrument panel and front frame of RH door,
   - middle curtain /above the instrument panel/ - to instrument panel and column between the windshields and the ceiling,
   - windshield curtain - to windshield frame and, using the rubber suction elements to windshield panel.
2. Check the movable curtains mechanism,sliding door, curtain, windshield curtain and middle curtain between the pilots.
   The curtains are shut by moving the lever /9/ forwards with the slide /10/ installed in the slide way fixed on ceiling plate.
   A turnbuckle connected to the slide-way cable /8/ is provided for cable length adjustment.
   After VFR flight remove the fixed curtains and slide off the movable curtains by unlocking and moving the lever /9/ with the slide /10/ backwards, straps attached to the windshield and middle curtains are provided for fastening the curtains after sliding aside.
   The hand -operated curtains may be partially dissassemblied by removing the movable curtains.

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Fig. 7.8. Hand - operated curtains.

1 - L-H lower window fixed curtain;
2 - R-H lower window fixed curtain;
3 - fixed middle curtain;
4 - fixed windshield curtain;
5 - movable curtain of the sliding door;
6 - movable curtain of the windshield;
7 - middle movable curtain;
8 - cable;
9 - lever;
10 - slide.

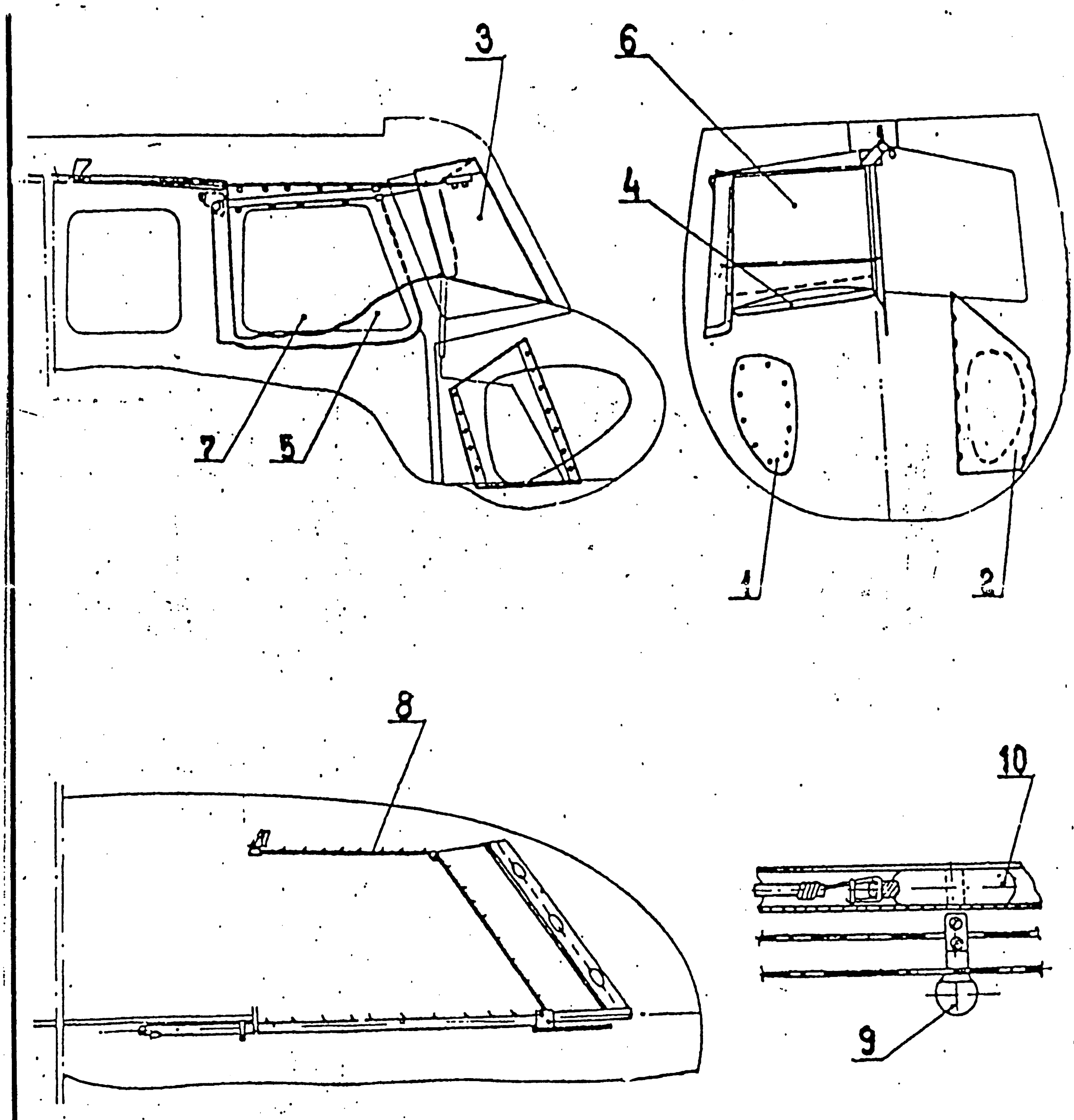

Fig. 7.8

To perform such disassembling, unfasten the clamps from the cable metal slotted rings /and fasteners/ fixed clamps protected against sliding along the cable by means of screws/.

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7.6. Additional Equipment

7.6.1. Ladder

A rope ladder 15 m long /to be attached to the brackets in the cabin/ is designed to permit the flying personnel to leave the helicopter and to go aboard during any rescue operation /over the sea or the ground/.

Use of the ladder

1. Lowering the ladder:
   a/ attach the ladder to the ceiling fittings in the cabin,

   b/ drop the ladder outside the helicopter,

   c/ check whether the ladder is firmly attached to the fittings and whether it correctly hangs down.
   It is permitted to drop the ladder only after the passenger cabin door has been dismounted, and the net and curtain /i.e. safety devices provided in the door-way/ have been rolled up.

2. Rolling up the ladder:

   a/ retract the ladder on the helicopter,

   b/ uniformly roll up the ladder /beginning from its bottom end/,

   c/ detach the ladder from the ceiling fittings and roll it up completely,

   d/ place the ladder on the cabin floor /ensuring easy access and safety for the helicopter crew.

3. Protect the ladder from excessive insolation, as well as from the detrimental action of grease, oil, fuel, etc.
   In addition, protect nylon ropes of the ladder from the action of formic acid.

7.6.2. Rescue seat

For full details concerning the construction and use of the rescue seat see Appendix to "Technical Description - Airframe".

7.6.3. Detachable windows and access panels

Detachable windows with access pabels or without access panels, as well as access panels installed in fixed windows can be installed in place of fixed windows.

All dismounting and mounting operations are simple and easy. The windows are fastened by means of two single-arm levers.

7.6.4. Container for tools and pressure caps

This container is located in the passenger cabin on the starboard side, under the passenger's seat.

7.6.5. Emergency battery guide rails

These guide rails are installed in the passenger cabin on the floor, behind the fuel tank container.

7.6.6. Metal skis No.50.44.000.00.00. Their description and instructions for service have been presented in a seperate dokumentation called: "Technical description, service manual, running repair, ubilization of the skis No.50.44.000.00.00 flight which are mounted on Mi-2 helicopter" / publ.1978/.

7.6.7. Engines air intakes dust separators. General information.

1. Engines intake air dust, separators are designed to prevent dust and other fine particles contained in air supplied to helicopter engines.

2. The set consists of :

   - two oil tanks/left and right/ designed specially for caps installing,
   - two intake caps further called "intake air dust separators",
   - compressed air supplying lines from the engine compressor to the dust separators ejectors /pumps/,

3. Air intake dust separators /intake caps/, interchangeable /left by left, right by right/ may be transferred from one helicopter to another if necessary.

4. Air intake separator supply is actuated /for left and right separator separately/ by unscrewing the valves located near the ceiling on side walls of the, cockpit, behind left and right door.

   NOTE: When starting the engines close the valves controlling compressed air supply from the engines compressors to air intake dust separators ejectors due to III /turbine inlet gases temperature increase.

Installing the air intake dust separators.

1. Install the air intake dust separators on oil tanks with the dust offtake pipes directed outside and rotated downwards by 30° /Fig.7.9/.
   When installing proceed as follows:
   - locate air intake dust separator in the central opening of oil tank,
   - holding the dust separator up, insert three connecting links /1/ on the protracting ends of connecting links /1/ insert the inserts /2/ between dust separator and oil tank, then install the connecting links /1/ with a screwdriver and protect with a lockwire /3/.

2. Install the line /4/ supplying compressed air from the engine compressor to the air intake dust separator ejector. Nuts /6/ connecting the line /4/ with the connector pipe /5/ and elbow /7/ to be protected with lockwire /3/.

3. Repeat procedures 2 and 3 for another dust separator.

Air intake dust separators dismantling

1. Remove lockvire /3/.
2. Remove ejector supplying line /4/.
3. Plug the elbow /7/ opening using the plug 12-31 GOST 13971 and nut 2704A-10.
4. Unscrew the connecting links /1/ remove inserts /2/and remove air intake dust separator.
5. Repeat procedures 1-4 for another separator .

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Fig. 7.9. Engine air intake dust separators installation.

1. - connecting link;
2 - insert;
3 - lockwire;
4 - line ;
5 - connector pipe;
6 - nut;
7 - elbow ;
8 - intake cap /dust separator/ .

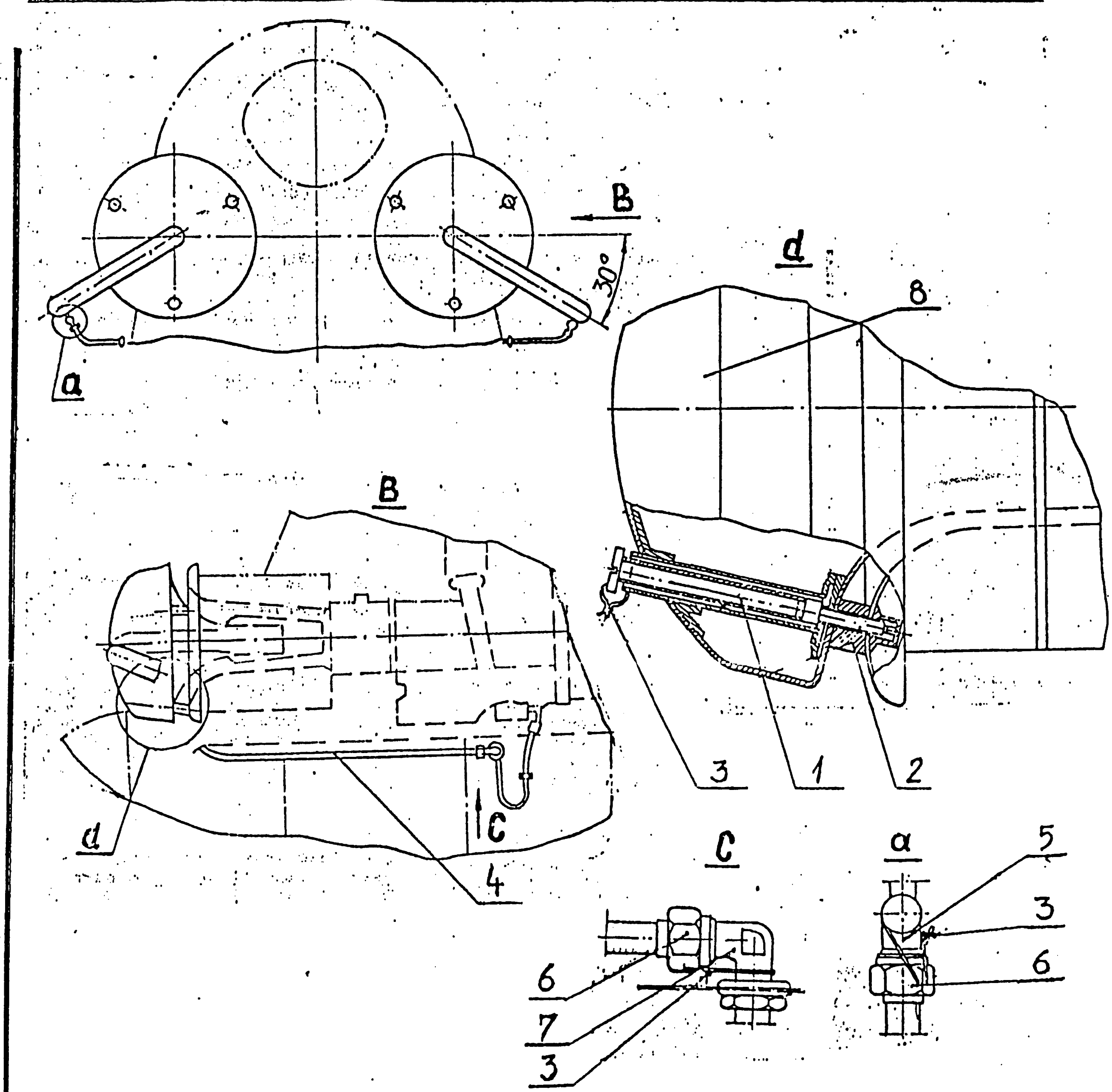

Fig. 7.9

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Air intake dust separators operation

Check the following after periodical removing the air intake dust separators:

- for dents, cracks or other mechanical defects on the dust separator surfaces,
- for wear of laquer coating, particularly on air intake duct surfaces,
- air intake duct and 1st stage turbine blades condition,
- wash the dust separators and inner surfaces of oil tanks using water with addition of soap /or other washing agents/ or with petrol. Remove deposits and contaminations.

Thoroughly wipe after rinsing with clean water.

Defects repairing

1. Fit, prim and paint the laquer coating defects on metal surfaces.
2. Remove laquer coating from dust separators laminate structures /if without laminate fabric damaging/ then lute and paint.
3. In case of laminate fabric damaging bond a patch made of glass fibre fabric soaked in epoxy resin and lute and paint after hardening.

WARNING

LAMINATE FABRIC DEFECTS ARE NOT ALLOWED ON THE AIR INTAKE DUCT

4. Lute and paint laquer coating losses /enamel abrades/ after removing residual enamel.

8. TOWING THE HELICOPTER

1. For towing the helicopter, use either the hitching device / Fig.8.1/ or the two-rope / Fig.8.2/, or the complete towing device / Fig.8.3/.

2. To use the hitching device for towing the helicopter, proceed as follows :
   - attach hooks of the hitching device to pivots of the nose undercarriage leg,
   - attach the clevis of the hitching device to the hook of the towing wehicle hitch.

3. To use the tow-rope for towing the helicopter under difficult ground conditions/, proceed as follows :
   - attach shackles to the main undercarriage frame and close these shackles with pins.
   - attach a ring of the other rope end to a hook of the towing vehicle hitch.

   In this instance, use the hitching device for steering the undercarriage wheels only.

4. To use the complete towing device, proceed as follows :
   - attach nooks of the hitching device to pivots of the nose undercarriage leg.
   - attach shackles to the main undercarriage frame and close these shackles with pins.
   - attach a ring of the other rope end to a hook of the towing vehide hitch.
   - adjust the rope lengths with turnbuckles / after adjusting has been completed, secure the turnbuckles with a metal wire /.

5. Before towing the helicopter, check the operation of the wheel brakes and the pressure in the braking system.

6. While the helicopter is towed, either pilot or flying engi engineer should remain in the cabin.

7. When towing the helicopter under airfield conditions, brake the helicopter rotor in such position that none of the blades will remain over the rear fuselage or the stabilizer.

8. When towing the helicopter over longer distances outside the airfield/, dismount the helicopter rotor blades and tail rotor blades. In this instance, convey the blades on special trucks.

9. The towing speed must not exceed the following values :

a/ Soft and uneven surface	3 km/h
b/ Even and smooth surface	6 km/h
c/ Concrete or asphalt pavement	8 km/h

10. When towing the helicopter, the towing vehicle is allowed to make turns provided that the following angular displacement of the helicopter with respect to the towing vehicle is not exceeded :

- in case the hitching device is used	60°
- in case the tow-rope is used	15°
- in case the complete towing device is used	20°

Fig. 8.1

Towing the helicopter by means of hitching device

1. Hitching device

2. Towing vehicle

3. Nose undercarriage leg

1 Direction of towing

2 Detail A

3 Detail B

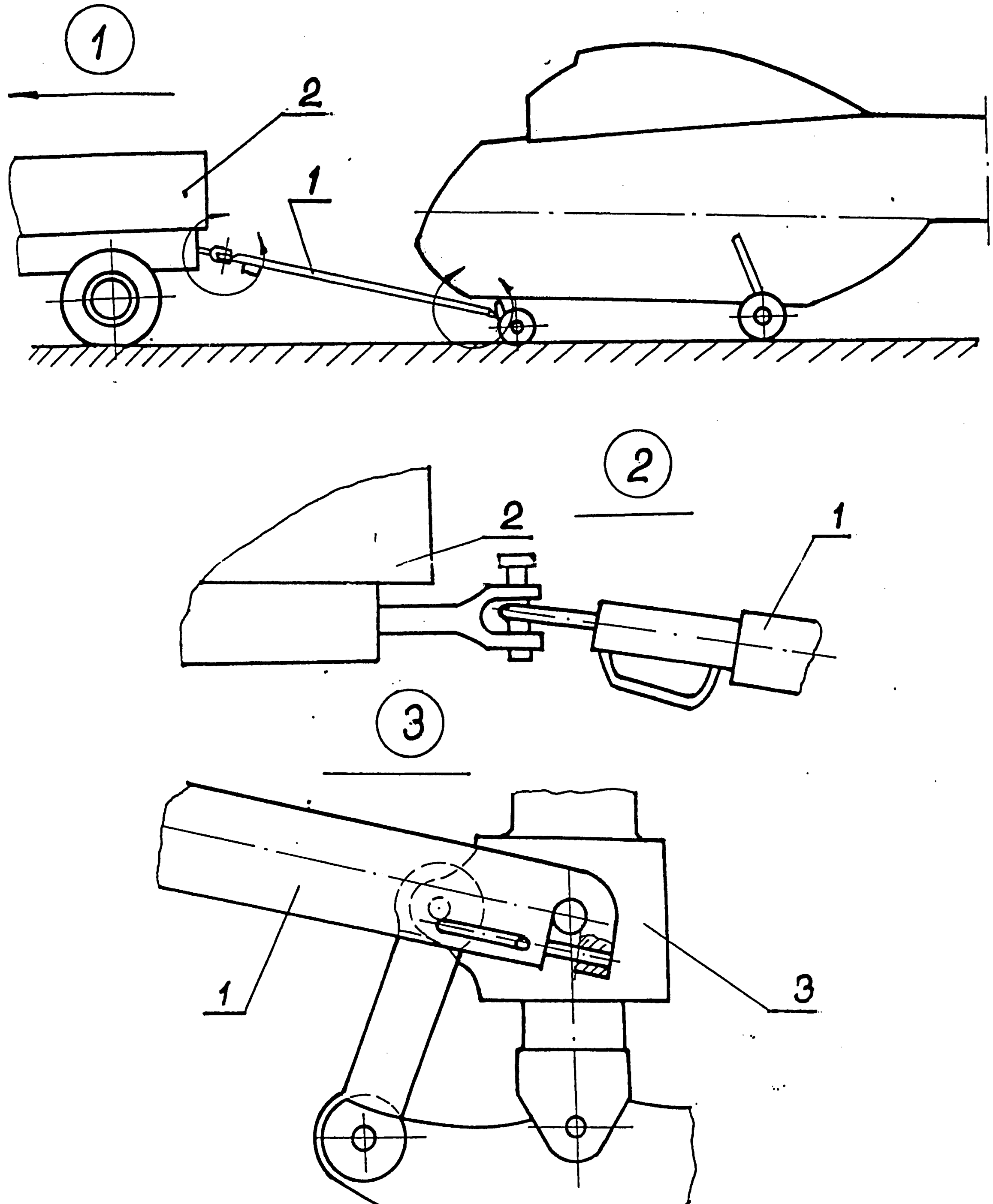

Fig. 8.1.

Fig. 8.2

Towing the helicopter by means of tow-rope

1. Tow-rope
2. Towing vehicle
3. Main undercarriage frame

1 Direction of towing

2 Detail A

3 View B

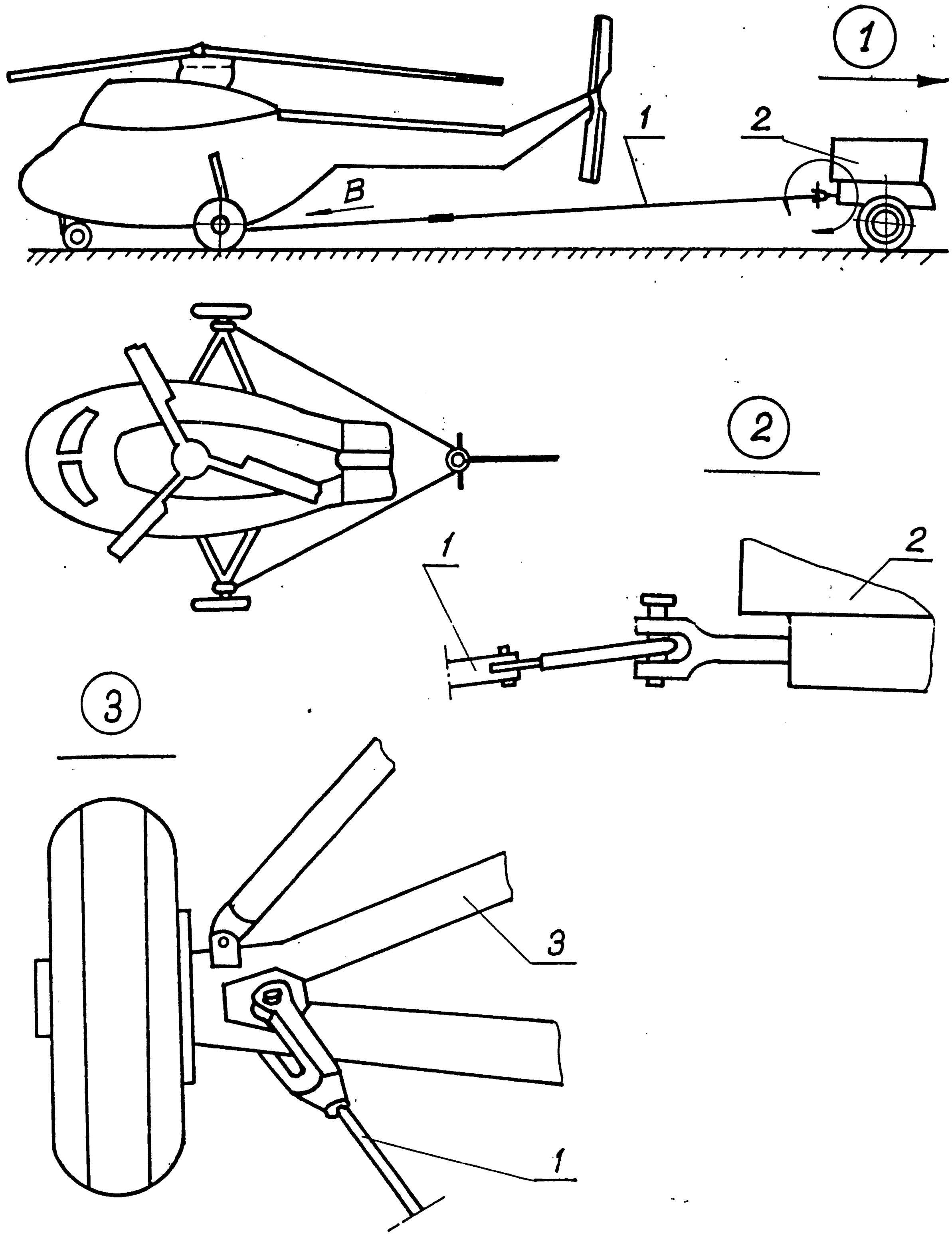

Fig. 8.2.

Fig. 8.3.

Towing the helicopter by means of complete towing device.

1. - Hitching device
2. - Rope
3. - Towing wehicle
4. - Nose undercarriage leg
5. - Main undercarriage frame

1 - Direction of towing
A - Detail A
B - Detail B
C - Detail C

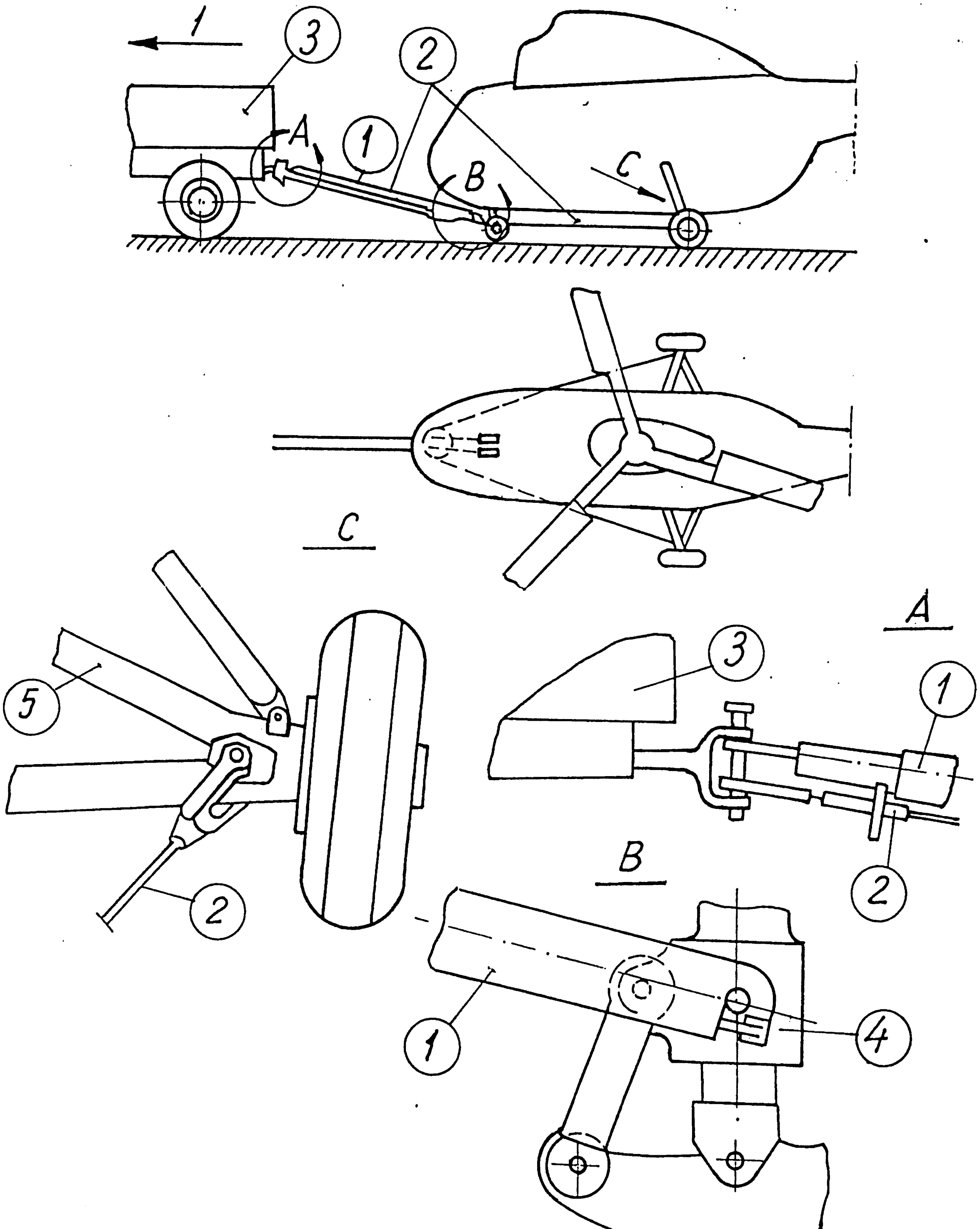

Fig. 8.3.

A P P E N D I C E S

Airframe Attachment Points Lubrication

Table No. 2a

Item	Lubrication point	Points Qty	Type of basic lubricant	Lubricating procedure	Lubrication intervals
1	2	3	4	5	6
1	MR hub vertical hinge	3	MR hub (Fig. Z.1) 1) hypoid oil; 2) oil mixture: 2/3 hypoid + 1/3 AMG-10 oil by volume	Fill through the valve inupper part of vertical hinge using funnel incl. No. 18W gauze to reach level of 30 to 35 mm below filling hole. Drain used oil at oil replacement using the lubricator for washing	Filling: after installing on helicopter. Level check and refil after every 25±5 hours replcmnt: after 1st test flight with new MR hub installed. - every 500(-50) hours - depending on temp. range of oil; - every year, despite of operating hours
2	MR hub axial hinge	3	1) MS-20 oil 2) MS-14 oil 3) WNIINP 25	Fill through the hole in axial hinge housing by means of funnel with No. 18W gauze to reach level 10 to 15 mm below outer edge of filler hole.	Filling: after installing on the helicopter Oil check and replenishment: - every 25± 5 hours Oil replacement - after the first check flight in case of installing a new MR hub;

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1	2	3	4	5	6
2 /cont/					-after every 100^{+20}_{-10} oper. hours; - depending on oil operating temperature range; - every year, irrespective to operation hours;
3.	Flapping hinge of helicopter rotor hub	3	1) Hypoid oil 2) Oil mixture: 2/3 hypoid + 1/3 AMG-10 oil by volume	Pour oil through the hole in flapping hinge housing funnel with No. 18W gauze up to a level 10 to 15 mm below outer edge of filler hole.	Filling -when mounted on the helicopter Oil level check and replenishment -after every 25 ± 5 hrs operation; Oil change: after the first check flight in case of installing a new MR hub; - after every 500_{-50} hrs operation; - depending on oil operation temperature range; - every year irrespective to operation hours.
4.	Blade rotation lever bearing	3	Grade CIATIM-201 grease	Fill with grease using grease gun.	On installing on helicopter and every 25 ± 5 working hours.
5.	Needle bearing of hydraulic dash-pot damper clevis.	3	Grade CIATIM-201 grease	Fill with grease using grease gun through clevis grease nipple.	When installing on helicopter and every 25 ± 5 working hours.

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Table 2a /Cont./

1	2	3	4	5	6
6.	Bearing of hydraulic dash-pot damper clevis slide.	3	Grade CIATIM-201 grease	Fill with grease using grease gun through clevis grease nipple.	On installing on helicopter and every 25±5 working hours.
7.	Bearing of hydraulic dashpot damper bracket.	2x3=6	Grade CIATIM-201 grease	Fill with grease through two grease nipples in bracket nuts using the end fitting for hypoid oil. Fill until grease appears in inspection hole.	On installing on helicopter and every 25 ± 5 working hours
	Tail rotor hub /Fig.Z.2/				
8.	Flapping hinge of tail rotor hub.	2	Grade CIATIM-201 grease.	Fill with grease through two grease nipples using grease appears in inspection holes /with the stem pushed out. Lubricating should be carried out in smooth and seizureless movements of the grease gun levers. Stop lubricating the moment the grease oppears in the inspection holeand remove the surplus of the grease. Before lubricating clean carefully the inspection holes /e.g.with a soft steel wire/.	On installing on helicopter. In the first 12.5 flying hours fill with grease before each flying day, and then every 25 ± 5 working hours.

1	2	3	4	5	6
9.	Feathering hinge of tail rotor hub	2	Grade CIATIM--201 grease.	Fill with grease gun till the grease appeares from uder the gasket in the basal part of the axial hinge body.	When mounted on the helicopter. During the first $25^{\pm}5$ flight hours before every fluing day and then after every 12,5 $\pm$2,5 flight hours.
10.	Double-row bearing of tail rotor hub driver.	1	Grade CIATIM--201 grease.	Fill teh grease appeares from under the slide sleeve/ with the protective cover removed at the hub zone and with the stem pushed out.	On installing on helicopter and every 25 $\pm$ 5 working hours.
11.	Self-aligning bearing of tail rotor hub rod bottom-end.	2	Grade CIATIM--201 grease.	Fill with grease through grease nipple using grease gun.	On installing on helicopter and every 25 $\pm$ 5 working hours
12.	Bearing of tail rotor hub rod top-end.	2	Grade CIATIM--201 grease.	Fill with grease through grease nipple using grease gun.	On installing on helicopter and every 25 $\pm$ 5 working ......

Table 2a /Cont./

1	2	3	4	5	6
13.	Swash-plate /Fig. Z.3/ Splines and brass bush of swash-plate slide	2	Grade CIATIM-201 grease	Fill with grease using grease gun.	On installing on helicopter and every 25±5 working hours.
14.	Bearing of swash-plate slide.	1	-"-	Fill with grease using grease gun.	On installing on helicopter and every 25± 5 working hours.
15.	Bearing of swash-plate outer ring.	2	-"-	Fill with grease using grease gun.	On installing on helicopter and every 25± 5 working hours.
16.	Bearing of swash-plate inner ring.	2	-"-	Fill by means of grease gun until grease appears under test valve. Rotate the disk while lubricating.	On installing on helicopter and every 25 ± 5 working hours.

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1	2	3	4	5	6
17.	Articulation joint shaft of swash-plate ring and driver ball coupling.	3	Grade CIATIM-201 grease.	Fill until grease is visible under protective ring of the pull rod of MR blade rotating lever	When installing on helicopter and every 25 ± 5 working hours.
18.	Bearings of swash-plate pull-rod.	2	-"-	Fill by means of grease gun, using the end fitting for hypoid oil, until grease appears under test valve.	When installing on helicopter and every 25± 5 working hours.
19.	Longitudinal control rocker a/bearing SzS b/ball bearing	 1 1	-"-	Fill by means of grease gun until grease appears from the under rubber cap.	When installing on helicopter and every 25± 5 working hours.
20.	Lateral control rocker arm: a/bearing SzS b/ball bearing	 1 1	 -"- -"-	Fill by means of grease gun until grease appears from under the rubber cap.	When installing on helicopter and every 25± 5 working hours.

Tabela 2a

1	2	3	4	5	6
21.	Bearing of collective pitch lever clevis bolt	1	Grade CIATIM-201 grease	Fill by means of grease gun.	When installing on the helicopter and every 25 ± 5 warking hours.
22.	Bearing of blade rotation rod.	3	Grade CIATIM-201 grease	Fill by means of grease gun.	When installing on the helicopter and every 100 $^{+20}_{-10}$ working hours.
23.	Driver bearing.	4	Grade CIATIM-201 grease	Remove the cover an fill chamber with grease. After installing the cover tighten the nut by hand then by 90°-120° and lockwire.	When installing on the helicopter and every 100 $^{+20}_{-10}$ working hours
24.	Bearing of compensating rod clevis bolts.	4	Grade CIATIM-201 grease	Fill by means of grease gun.	When installing on the helicopter and every 25 ± 5 working hours.
25.	Transmission element /Fig. Z.4 Main shaft universal joints	4	Hypoid oil	Fill by means of grease gun	When installing on the helicopter and every 12,5 ± 5 working hours

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1	2	3	4	5	6
25.	/cont./			gun until grease appears from under the safety valve poppet. Prior to filling rotate the valve poppet.	in prolonged out-of operation periods at least every month.
26.	Rear shaft universal joints	8	Hypoid oil	Fill by means of grease gun through grease nipple.	On installing on helicopter and every $50 \pm^{10}_{5}$ flying hours: in prolonged out-of-operation periods at least every two months
27.	Engine GDT-350	2	Grade B-3W oil	Pour through filler and distributor filters Filtrating accuracy 6-7μ. Check the level by means of graduated rod.	Periodicy of lubricating should be according to the Exploitation and Service Manual of GTD-350 Engine.
28.	Main transmission	1	Oil mixture:	Pour through filler and distribution filters	Periodicy of lubricating should be according to the Exploitation and Service Manual of the WR-2: Main Transmission.

1	2	3	4	5	6
28	(Continued)		2/3 Hypoid 1/3 AMG-10 oil, by volume.	Filtrating accuracy 6÷7 μ. Check the level on level gauge. Recommended level: half-way between the graduation mark.	
29.	Intermediate Transmission	1	1. Hyoid oil 2. Oil mixture: 2/3 Hypoid, 1/3 AMG-10 oil, by volume.	Pour oil through filler hole using a funnel with No. 18W gauze. Check level on level gauge G and D.	<u>Filling</u> - after installing on the helicopter. <u>Level check and refilling:</u> - before and after flight, - after every 50 (+10/-5) operating hours. <u>Replacement:</u> - after every 300 (+60/-30) operating hours, - depending on temp. range of oil, - after 2 (two) years from the last oil replacement, independently of XMSN operating time.
30.	Rear Transmission	1	1. Hypoid oil 2. Oil mixture: 2/3 Hypoid 1/3 AMG-10 oil by volume.	Pour oil through filler hole using a funnel with No. 18W gauze. Check level with graduated rod.	<u>Filling</u> - after installing on the helicopter. <u>Level check and refilling:</u> - before and after flight, - after every 50 (+10/-5) operating hours. <u>Replacement:</u> - after every 300 (+60/-30) operating hours, - depending on temp. range of oil, - after 2 (two) years from the last oil replacement, independently of XMSN operating time.

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1	2	3	4	5	6
31.	Fan bearing	1	Grade OKB-122-7 grease	Grease performing smooth movements of lubricator lever. When greasing insignificant leaks are allowed under felt seals.	When installing on helicopter, every 200^{+40}_{-20} working hours and at least once a year irrespective of the number of flying hours.
	Undercarriage /Fig. Z.5/				
32.	Undercarriage articulated joints.	15	Grade CIATIM-201 grease	Fill by means of grease gun.	When installing on helicopter and every 50^{+10}_{-5} working hours.
33.	Undercarriage wheel bearing	4	Grade St/NK-50 grease.	Apply manually	When installing on helicopter and every 100^{+20}_{-10} working hours.

Table.2a.

1	2	3	4	5	6
			Hydraulic assemblies		
34	Undercarriage shock absorber /Fig.Z.5/	4	Grade AMG-10 oil	Pour through funnel with No.18 W gauze.	Filling:- when installing on the helicopter. Level check and refilling: -when passing from winter to summer operation.
35	Hydraulic unit GB-2	1	Grade AMG-10 oil	Pour through funnel with No.18 W gauze.	Filling: - when installing on the helicopter. Replacement: -after every 300^{+60}_{-30} operation hours; -at least yearly, irrespective to operation hours.
36	Rotor hub oil -to-pil boosters.	3	Grade AMG-10 oil	Pour through funnel with No.18 W gauze.	Filling:- when installing on the helicopter. Level check and refilling: -after every 100^{+20}_{-10} operation hours. Replacement:- at least yearly, irrespective to operation hours.

Table 2a

1	2	3	4	5	6
	Helicopter control system				
37.	Collective pitch and power slides and individual control lever	3	Grade CIATIM-201 grease	Apply grease manually	When installing on the helicopter and every 50±5 flying hours.
38.	Brake lever slide	1	Grade CIATIM-201 grease	Apply grease manually	When installing on the helicopter and every 50 ±5 flying hours.
39.	Bearing of lateral control rod.	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
40.	Bearing of first pilot s control stick rod.	2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease	When installing on the heli - copter
41.	Bearings of lateral control rods /first and second pilot/	2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter

Table 2a.

1	2	3	4	5	6
42.	Bearing of first pilot's longitudinal control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
43.	Bearings of foot controls rods	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
44.	Bearing of second pilot 's foot controls rods.	2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
45.	Bearing of second pilot 's foot controls rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
46.	Bearing of second pilot's lateral control rods.	2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter

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Table 2a

1	2	3	4	5	6
47.	Bearing of second pilot´s control stick rod /in lateral control system/	1	Grade CIATIM-201 grease	Remove grease from covered bearing surfasec with a clean rag and apply new grease.	When installing on the helicopter
48.	Bearing of second pilot´s longitudinal control rod.	1	Grade CIATIM-201 grease	Remove grease from covered bearing surfaces with a clean rag and apply new grease.	When installing on the helicopter
49.	Second pilot´s control stick folding mechanism.	1	Grade CIATIM-201 grease	Lubricate the lever shaft and, if necessary, top up with grease the bush of control stick folding mechanism.	When installing on the helicopter; At least every year irrespective to operation hours
50.	Bearing of second pilot´s control stick rod /in longitudinal control system/	1	Grade CIATIM-201 grease	Remove grease from covered bearing surfaces with a clean rag and apply new grease.	When installing on the helicopter

Table 2a.

1	2	3	4	5	6
51.	Bearing of second pilot, s longitudinal control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
52.	Bearing of second pilot, s longitudinal control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
53.	Fire-fighting valve operating cables.	4	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter and every 25±5 flying hours.
54.	Rollers of fire fighting valve operating cable	12	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter. At least every year irrespective to operation hours
55.	Bearing of engine and helicopter control rods	6	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease...	When installing on the helicopter

ORYGINAŁ

Table 2a

1	2	3	4	5	6
56.	Roller of rotor brake control system	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours
57.	Bearing of separate engine control rod	4	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grese.	When installing on the helicopter
58.	Bearings of engine and helicopter control rods.	12	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter
59.	Articulated bearings of engine stopping control rods.	2+2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours.

Table 2a.

1	2	3	4	5	6
60.	Articulated bearing of engine control rods.	1+1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter. At least every year irrespective to operation hours.
61.	Bearing of engine control rods.	1+1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter. At least every year irrespective to operation hours.
62.	Foot controls roller	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter. At least every year irrespective to operation hours.
63.	Rotor brake	1	Grade CIATIM-201 grease	Apply grease manually	When installing on the helicopter and every 25 ± 5 flying hours.
64.	Roller of rotor brake control system	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter. At least every year irrespective to operation hours.

Table 2 a

1	2	3	4	5	6
65.	Bearings of longitudinal control rods	4	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	- when installing on the helicopter - at least every year irrespective to operation hours.
66.	Bearing of colective pitch lever.	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	- when installing on the helicopter - at least every year irrespective to operation hours
67.	Bearings of lateral control rods.	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	- when installing on the helicopter - at least every year irrespective to operation hours
68.	Bearings of stabilizer control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	- when installing on helicopter - at least every year irrespective to operation hours
69.	Bearings of oil-to-oil booster upper fork.	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	- when installing on the helicopter - at least every year irrespective to operation hours

Table 2a.

1	2	3	4	5	6
70.	Bearing of oil-to-oil booster	3x2	Grade CIATIM-201 grease	By means of grease gun top-up bearings until fresh grease appears in the gap between the bearing housing and uoi-to -oil booster housing:	When installing on the helicopter and every $50^{+}_{-}5$ flying hours.
71.	Bearings of oil-to-oil booster lower fork	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter At least every year irrespective to operation hours
72.	Bearings of helicopter control rods	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter At least every year irrespective to operation hours
73.	Bearings of rotor control rod	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter At least every year irrespective to operation hours
74.	Bearings of rotor control rod	3	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installining on the helicopter At least every year irrespective to operation hours

ORYGINAŁ (tylko prawo)

Table 2a

1	2	3	4	5	6
75	Bearing of stabilizer control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours
76.	Roller of stabilizer control system	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours.
77.	Stabilizer control cable	6	Grade CIATIM-201	Apply grease manually	When installing on the helicopter and after every 50±5 hours.
78.	Tail rotor control cable	8	Grade CIATIM-201 grease	Apply grease manually	When installing on the helicopter and every 50±5 flying hours.
79.	Bearings of tail rotor control rod	5	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours.
80.	Bearing of foot control rod	1	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours.
81.	Foot controls rollers	2	Grade CIATIM-201 grease	Remove grease from covered surfaces of bearing with clean rag and apply new film of grease.	When installing on the helicopter; At least every year irrespective to operation hours.

ORYGINAŁ

Table 2a

1	2	3	4	5	6
82.	Roller chain and rear transmission rack.	1	Grade ST/NK-50	Apply grease manually or using grease gun	When installing on the helicopter and after every 100^{+20}_{-10} hours, but at least twice a year.
83.	Pilot's and co-pilot's seat support	2	CIATIM-201 grease	Manually apply thin layer of the grease on the support surfaces	When installing into the helicopter
84.	Top pull rod bearings for fixing the GTD-350 engine to the WR-2 main gear box /Bearings of engine top mounting pad and relevant main gearbox ones/.	2+2	CIATIM-201 grease	Manually lubricate the bearing inner race after it has been defected Bearings to be lubricated prior to installing GTD-350 engine fixing tie-rod	When installing into the helicopter
85.	Sz-12 bearing of the collective pitch lever	1	CIATIM-201 grease	Manually lubricate the inner race of the bearing. When lubricating, move the lever up and down and rotate the lever grip.	When installing into the helicopter and after every 100^{+20}_{-10} operation hours

NOTE: Oils and lubricants equivalents included in Table 2.2."Helicopter systems capacities and oil and lubricants equivalents"

Fig. Z.1. Main rotor hub
/Lubrication points -see Tabele 2a/

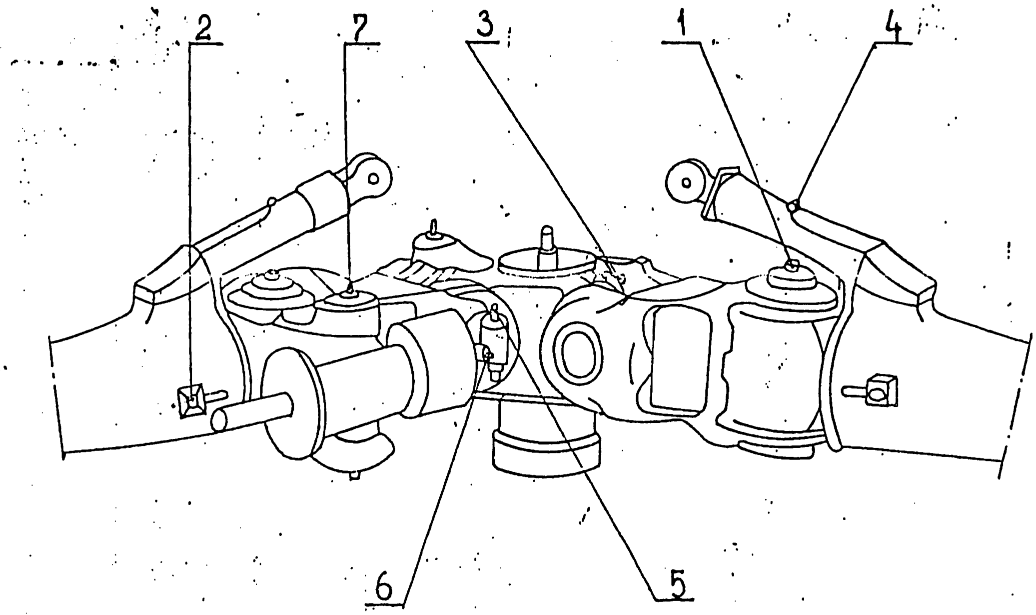

Fig. Z.1.

Fig. Z. 2. Tail rotor hub
/Lubrication points -see Table 2a/

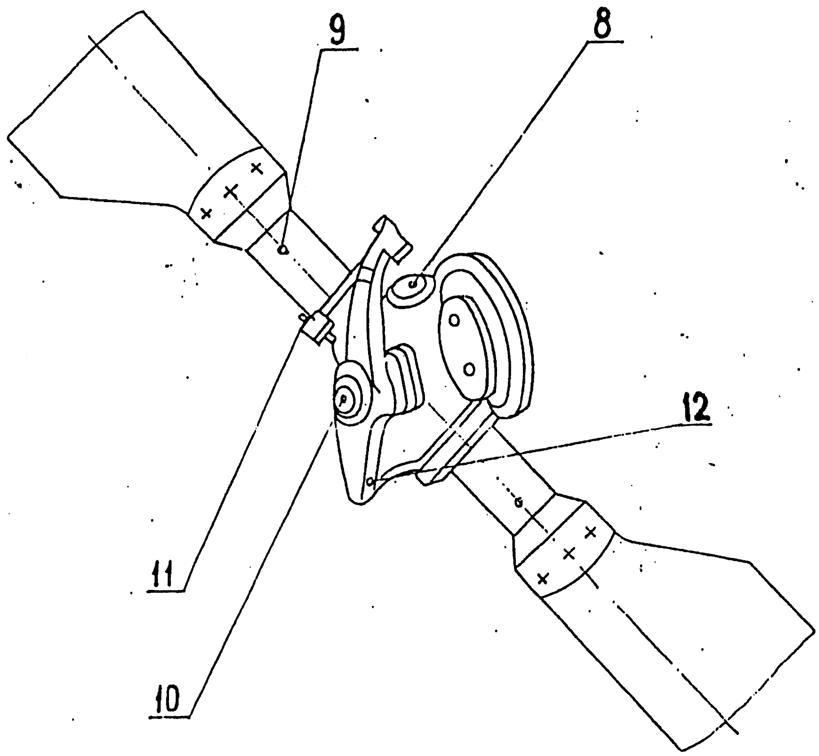

Fig. Z.2.

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Fig. Z.3 Swash -plate
/Lubrication points -see Table 2a/

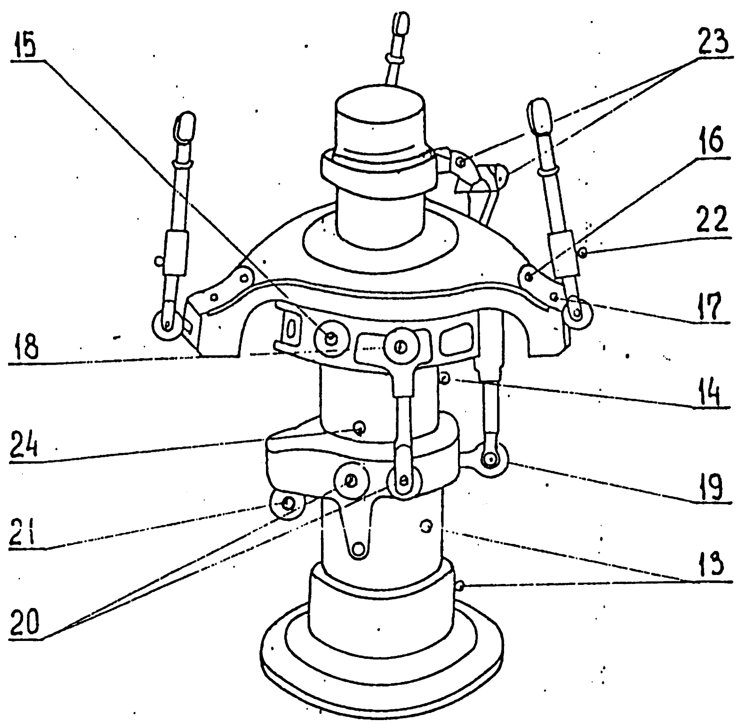

Fig. Z.3.

Fig. Z.4 Transmission system
/Lubrication points -see Table 2a /

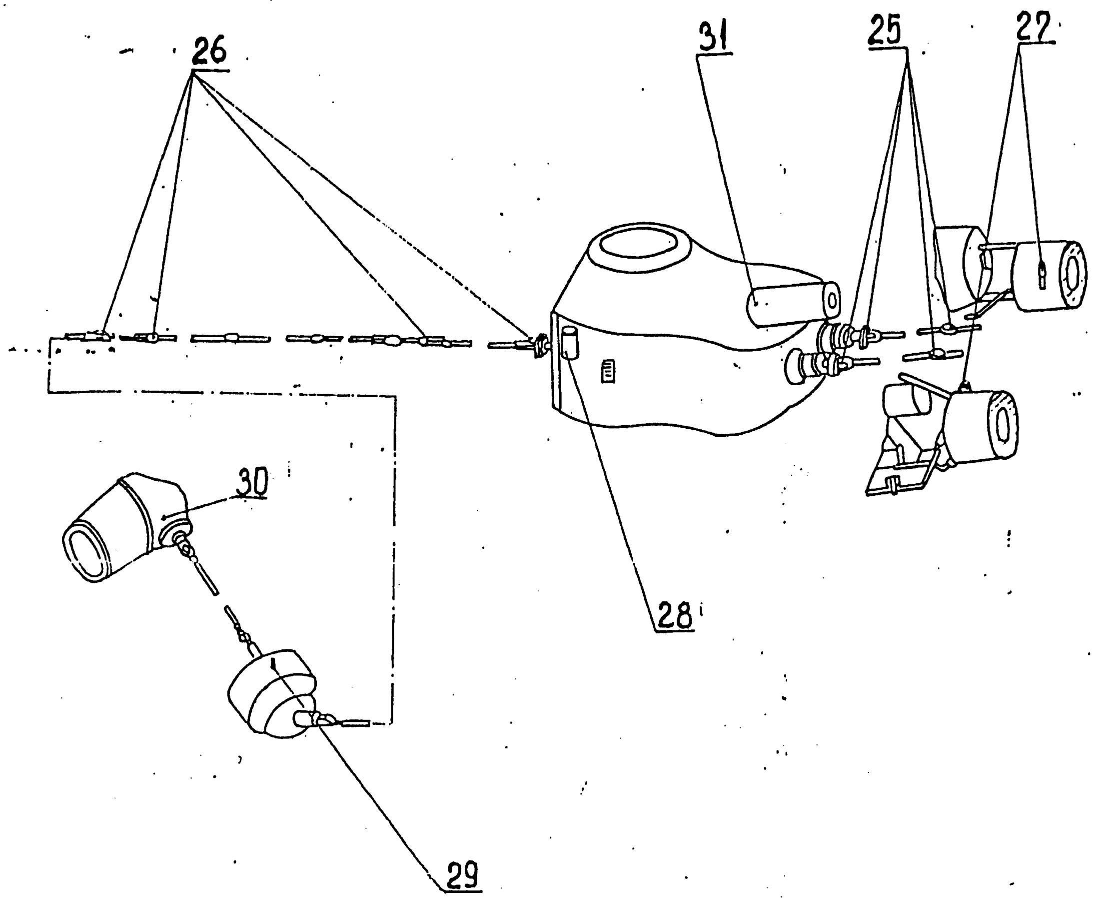

Fig. Z.4.

Fig. Z. 5/1 Landing gear
/Lubrication points -see Table 2a/

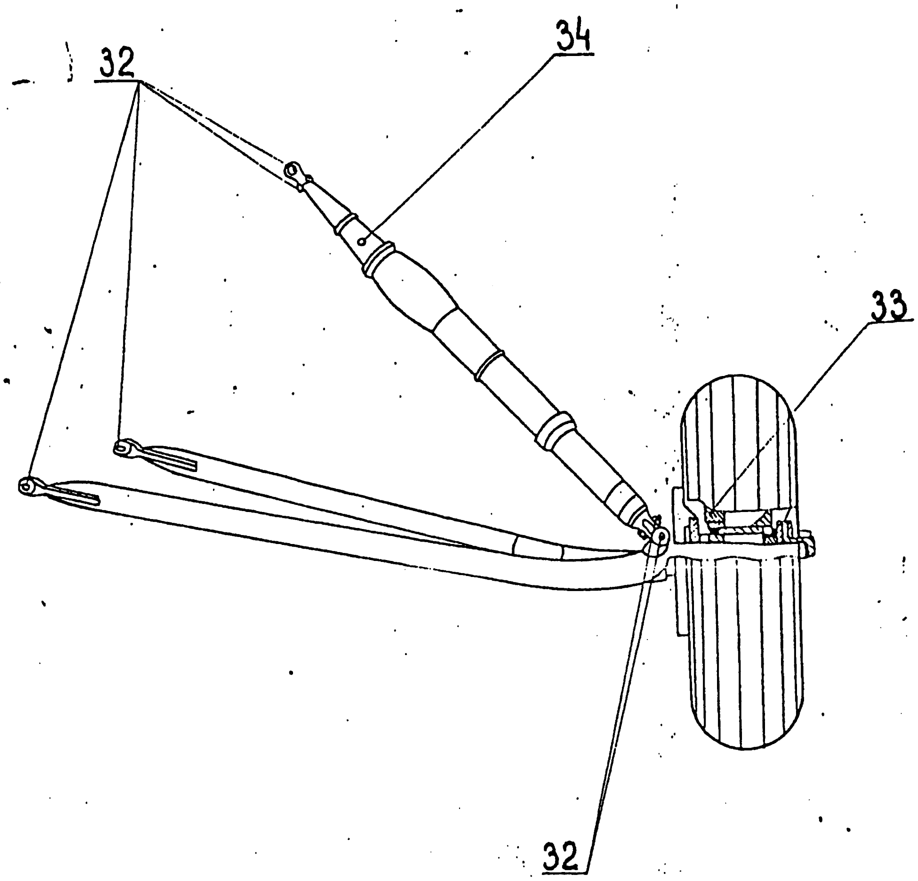

Fig. Z.5/1.

Fig. Z.5/2 Landing gear
/Lubrication points -see Table 2a/

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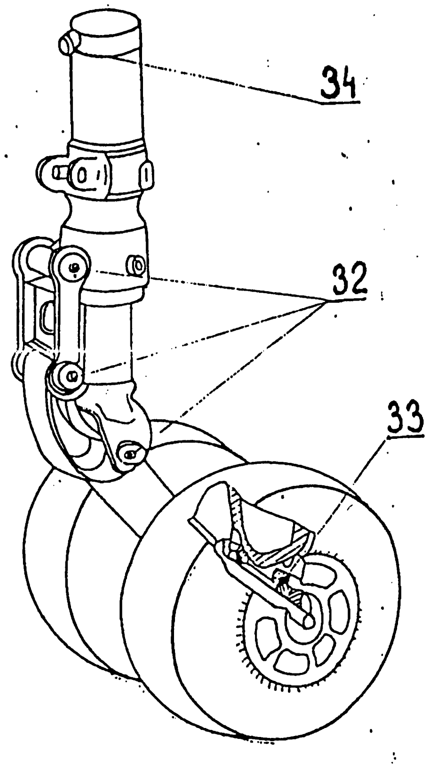

Fig. Z.5/2.

Fig. Z.5/3 Landing gear
/Lubrication points -see Table 2a/.

1 - Possible location of lubricating points.

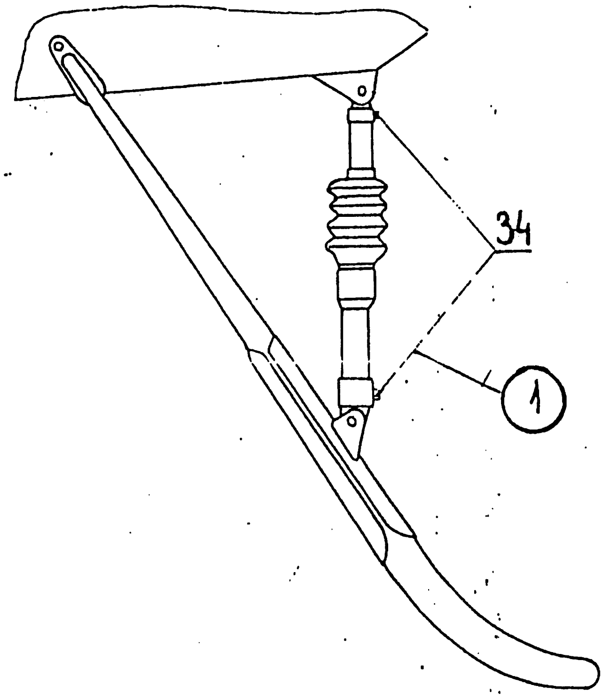

Fig. Z.5/3.

Fig. Z.8

Helicopter Controls /Lubrication Diagram/

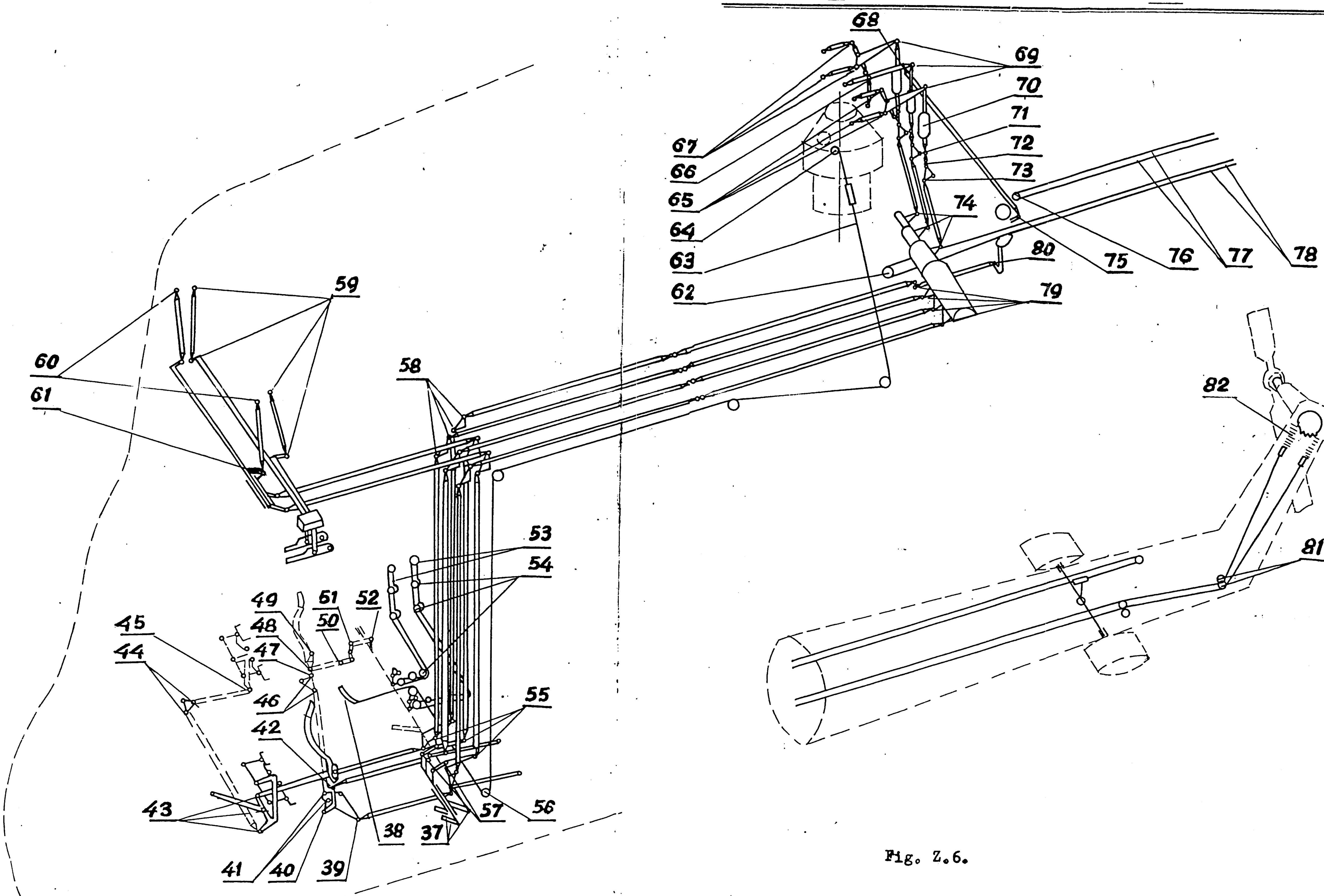
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Fig. Z.6.

Fig Z.7 Collective pitch power lever
Lubrication points -for Table 2a

1 - Floor line

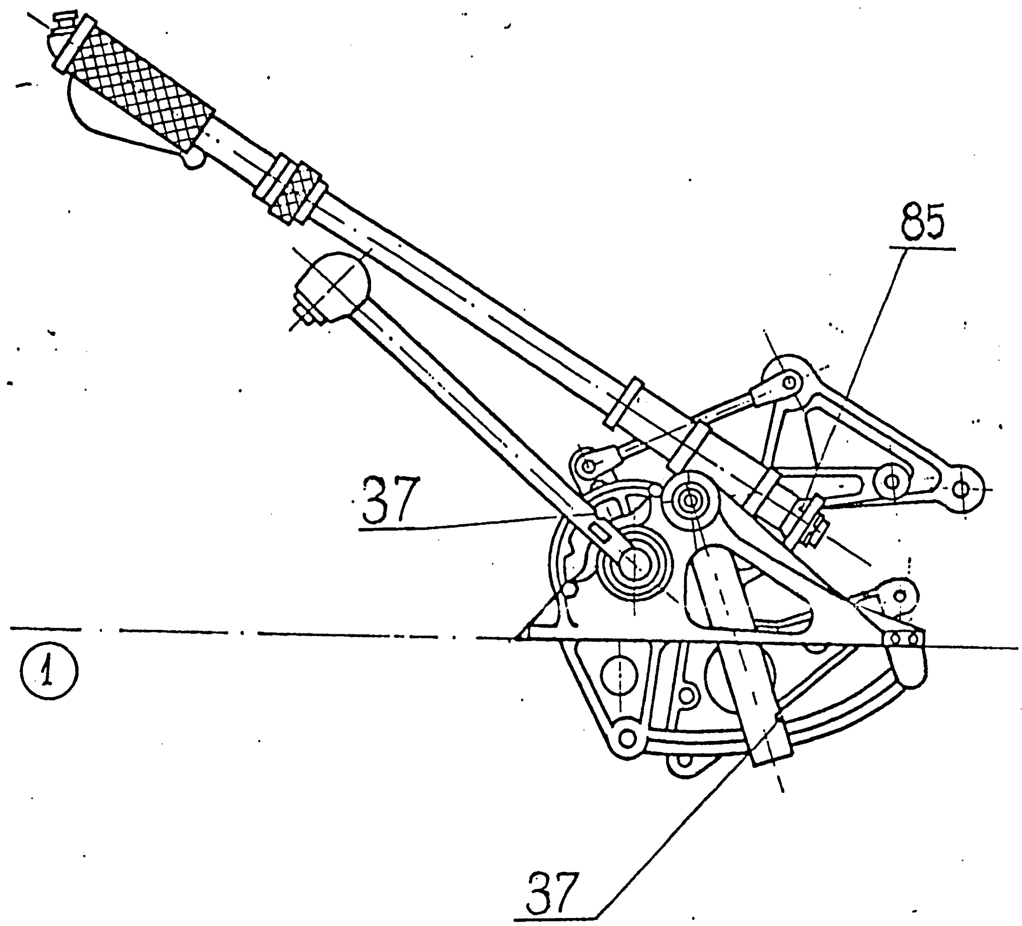

Fig. Z.7

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Lubrication point No. / Time interval	1	2	3	4	5	6	7	8	9	10	11	12	13	14÷21	22	23	24	25	26	27	28
After installing on the helicopter	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Acc. to "Operating and Servicing Instructions for Engine GTD-350"	Acc. to "Operating and Servicing Instructions for Main Drive WR-2"
Current procedures																					
After first flight after MR hub replacement	⊙	⊙	⊙																		
Within first 12,5 operation hours before every flight day								•													
Within first 25 operation hours before every flight day									•												
After every 12,5 ± 2,5 operation hours									•									•			
After every 25±5 operation hours	•	•	•	•	•	•	•	•		•	•	•	•	•			•				
After every 50 $^{+10}_{-5}$ operation hours																			•		
After every 100 $^{+20}_{-10}$ operation hours		⊙													•	•					
After every 200 $^{+40}_{-20}$ operation hours																					
After every 300 $^{+60}_{-30}$ operation hours																					
After every 500 $_{-50}$ operation hours	⊙		⊙																		
At least monthly																		•			
At least every two months																			•		
At least yearly	⊙	⊙	⊙																		
Depending on oil operating temperatures	⊙	⊙	⊙																		

Lubrication point No. / Time interval	29	30	31	32	33	34	35	36	37	38	39÷48	49	50÷52	53	54	55	56	57÷58	59÷62	63	64÷69	70	71÷75	76	77	78	79÷81	82	83÷84	85
After installing on the helicopter	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Current procedures	•	•																												
After first flight after MR hub replacement																														
Within first 12,5 operation hours before every flight day																														
Within first 25 operation hours before every flight day																														
After every 12,5 ± 2,5 operation hours																														
After every 25±5 operation hours														•						•										
After every 50 $^{+10}_{-5}$ operation hours	•	•		•					•	•												•			•	•				
After every 100 $^{+20}_{-10}$ operation hours					•			•																				•		•
After every 200 $^{+40}_{-20}$ operation hours			•																											
After every 300 $^{+60}_{-30}$ operation hours	⊙	⊙					⊙																							
After every 500 $_{-50}$ operation hours																														
At least monthly																														
At least every two months																														
At least yearly	3/ ⊙	3/ ⊙	•		1/ •	2/ • ⊙	⊙	⊙			•	•	•		•		•		•		•		•	•			•		1/ •	
Depending on oil operating temperatures	⊙	⊙																												

• oil level check and refilling

⊙ oil replacement

▼ filling

1/ - 2 times per year

2/ - after half interval between oil replacements

3/ - after 2 (two) years

TABLE No. 2b. HELICOPTER ATTACHMENT POINTS LUBRICATION.

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Tab. No. 3. ALLOWABLE TIGHTENING TORQUES FOR THE BOLTS AND NUTS

Description	Qty	Tool	Tool No.	Tightening torque kGm /Nm/	Torque spanner readings kGm /Nm/
1	2	3	4	5	6
Nut 50.21.000.03.00 fixing the rotor hub	1	Torque spanner socket Torque spanner up to 135 kGm	50.91.595.00.00. 50.91.602.00.00	100-120 /981 -1177/	100-120 /981-1177/
Nut 50.21.320.09.00. for bolt fixing the hydraulic dash-pot damper bracket to rotor hub axial hinge	24	Torque spanner socket Torque spanner up to 7 kGm	50.91.592.00.00 50.91.610.00.00	0,8-1,0 /7,8 -9,8/	0,8-1,0 /7,8 -9,8/
Bolts 50.21.000.45.00 and 50.21.00.46.00 fixing the rotor blade rotation lever.	6+6	Torque spanner socket Torque spanner up to 7 kGm.	50.91.593.00.00 50.91.610.00.00.	4,0-4,5 /39 - 44/	4,0-4,5 /39 - 44/
Nut 50.21.000.47.00 for bolt fixing the rotor blade.	6	Torque spanner socket Torque spanner up to 7 kGm.	50.91.588.00.00 50.91.601.00.00	1,5-2,0 /14,7-19,6/	1,5-2,0 /14,7-19,6/

1	2	3	4	5	6
Nut 3327A-12 of rear transmission shank.	1	Torque spanner socket Torque spanner up to 7 kGm	50.91.586.00.00 50.91.601.00.00	2,0-3,0 /19,5-29,5/	2,0-3,0 /19,5-29,5/
TR hub cap 50.39.140.03.01	1	Torque spanner socket Torque spanner up to 20kGm	50.91.588.00.00 50.91.601.00.00		
50.39.100.32.03	1	Torque spanner socket Torque spanner up to 7 kGm	50.91.653.00.00 50.91.610.00.00	2,5-3,0 /24,5-29,5/	2,5-3,0 /24,5-29,5/
Bolt 3017A-10-20-182 AT-1 fixing the rear rotor hub to rear transmission flange	6	Torque spanner socket Torque spanner up to 7 kGm	50.91.580.03.00 50.91.610.00.00	2,5-3,0 /24,5-29,5/	2,0-2,4 /19,5-23,5/
Nuts 3346A-12 and 3341A-14 for bolts fixing the rear rotor blades	4+2	Torque spanner socket Torque spanner up to 7 kGm Flat spanner for holding bolt	50.91.586.04.00 50.91.601.00.00 CHIFA 17 x 19	1,0-1,5 /9,8-14,7/	1,0-1,5 /9,8-14,7/

ORYGINAŁ

1	2	3	4	5	6
Nut 50.10.000.46.00 for bolt fixing the main transmission cradle to fuselage fittings.	4	Torque spanner socket Torque spanner up to 135 kGm Bolt holding soclet Extension rod	50.91.595.00.00 50.91.602.00.00 50.91.520.01.00 50.91.510.01.00	29,5-34,5 289 -338	29,5-34,5 289 -338
Nut 3327A-14 for bolt fixing main transmi - ssion to cradle	20	Torque spanner socket Torque spanner up to 20 kGm. Flat spanner for holding bolts	50.91.580.01.00 50.91.601.00.00 CHIFA 19 x 22	8,0-9,0 /78,5-88/	6,4-7,2 /62,7-70,6/
Nut 3327A-8 for fixing the swash-plate guide flange to main transmission	18	Torque spanner socket Torque spanner up to 7 kGm	50.91.580.05.00 50.91.580.05.00	1,2-1,7 /11,7 -16,7/	1,0-1,4 /9,8-13,7/

1	2	3	4	5	6
Bolt 3017A-12-16 for fixing the brake drum to main transmission drive flange.		Torque spanner socket Torque spanner up to 20 kGm.	50.91.586.05.00 50.91.601.00.00	5,5- 6,6 /55,9-63,7/	5,5-6,5 /53,9-63,7/
Nut 3327A-10 for fixing intermediate and rear transmissions	20+6	Torque spanner socke socket Torque spanner up to 7 kGm	50.91.580.03.00 50.91.610.00.00	2,5-3,0 /24,5-29,5/	2,0-2,4 /19,6-23,5/
Nut 50.25.00.03.00 for bolt fixing the rear and end shaft flanges	16	Torque spanner socket Torque spanner up to 7 kGm.	50.91.580.02.01 50.91.610.00.00	1,5-2,0 /14,7-19,6/	1,2-1,6 /11,7-15,7/
Nut 50.27.000.06.00 fixing main shaft flanges to main trans - mission drives	8	Torque spanner socket Torque spanner up to 20 kGm	50.91.580.04.00 50.91.601.00.00	7,0-8,0 /68,5-78,5/	5,6-6,4 /54,9-62,8/

ORYGINAŁ

1	2	3	4	5	6
Nut 3320A-8 and 3301A-8 fixing bearing housings to oil-to-oil bosterss	12+12	Torque spanner socket Torque spanner up to 7 kGm	50.91.592.00.00 50.91.610.00.00	1,5-1,65 /14,7- 16,0/	1,5-1,65 /14,7-16,0/
Nut 3335A-10 fixing oil-to-oil booster brackets to main transmission	7	Torque spanner socket Torque spanner up to 7 kGm	50.91.593.00.00 50.91.610.01.00	3,2-3,5 /31,4 -34,3/	3,2-3,5 /31,4-34,3/
Nuts 50.22.000.42.00 and 50.22.000.46.00 fixing the bearings of swash-plate longitudinal and lateral control rods	1+1	Torque spanner socket Torque spanner up to 20 kGm Pin holding mandel	50.91.566.01.00 50.91.601.00.00 50.91.565.00.00	13-15 /127,5- 147/	11,5-13,3 /112,8-130/
Nut 50.22.000.01.00 fixing the thrust radial bearing of swash-plate ring	1	Torque spanner socket Torque up to 20 kGm	50.91.560.00.00 50.91.601.00.00	17,5-22,5 /171,6- 220,7/	14-18 /137,2-176,5/

1	2	3	4	5	6
Nuts for bolts fixing the tail boom to the fuselage 3303A-8	5	Torque wrench adapter	50.91.580.05.00	1,8-2,0 /17,6- 19,6/	1,44-1,6 /1,41-15,7/
		Torque wrench up to 7 kGm	50.91,610.00.00		
		Flat wrench for fixing the bolts	CHIFA 10 x 12		
3303A-10	9	Torque wrench adapter	50.91.580.03.00	4-4,4 /39,2-43,1/	3,2-3,52 /31,7-34,5/
		Torque wrench adapter	50.91.610.00.00		
		Flat wrench for fixing the bolts	CHIFA 14 x 17		

WARNING: Use only the sets consisting of socket-wrench acc. to column 3.
Arbitrary selection of the sets "socket-wrench" does not provide tightening torques listed in column 5,
In such case a screw joint damaging is possible.

ADDITIONAL DATA AND ASCERTAINMENTS

CONCERNING HELICOPTER AND ITS ASSEMBLIES

1. Service life

For Mi-2 helicopters the service life is established separately for:
- helicopter airframe,
- main assemblies (equipped with their log-cards),
- items forming a part of helicopter (without log-cards)
and is as follows:

1.1. Airframe service life

a) The first TBO interval is as follows:
   - 1000 flight hours for helicopters operating in dry tropical climate,
   - 1500 flight hours for helicopters operating in moderate climate,
   - 2000 flight hours for agricultural helicopters, (*)
   - 3000 flight hours for brand new helicopters or helicopters repaired by Manufacturer. (*)

b) Remaining TBOs:
   - 1000 flight hours regardless to climate,
   - 2000 flight hours for agricultural helicopters, (*)
   - 3000 flight hours for helicopters repaired by Manufacturer,(*)

c) Total service life:
   - 8000 flight hours regardless to climate (and for agricultural helicopters too (*)),
   - 9000 flight hours of helicopter (*).

1.2. The service life for helicopter main assemblies is given in their log-cards.

1.3. The service life for items forming a part of helicopter is not limited. These items should be operated on their technical conditions. It means, that such an item may be operated on the helicopter as long as it:

a) Complies with the requirements included in:
   - "Mi-2 Helicopter Maintenance Manual (Airframe)", and
   - "Mi-2 Helicopter Maintenance Manual (Equipment)",

b) Operates properly.

NOTE: 1. The service lives above described are effective under the following conditions:
- the helicopter is operated and maintained according to the helicopter documentation (see: point 4 of this chapter),

(*) refers to the helicopters complying with the requirements of Bulletin No. 3/Mi-2/93.

- the routine repaires are performed according to repairement instructions,
- the helicopter Manufacturer and the Supervision Department acknowledges the Repair Plant and performed repairs.
- the "Helicopter Log-Book" and the log-cards are fulfilled properly.

2. Under the notion of "Airframe" it is understood as follows:

a) The whole fuselage of helicopter,

b) Assemblies not registered in the "Helicopter Log-Book" such as:

- control,
- undercarriages,
- power and drive transmission system,
- airframe installations,
- electric and avionics equipment (electric, radio, navigation equipment),
- particular version equipment,
- items given in the list No. 50.16.500.68.00 (see: sub-chapter 6),

3. Under the notion "main assemblies" it is understood assemblies registered in the Log-Book and having log-cards.

4. Under the notion "items forming a part of helicopter it is understood items registered in the Log-Book but not equipped with their own log-cards.

2. Calendar Operating Period

2.1. Calendar operating period of airframe.

The calendar operating period for the airframe is not limited under the condition that:

a) The items installed on the helicopter and listed in the list No. 50.16.500.68.00 are replaced by the new ones,

b/ The airworthiness is maintained according to requirements of
"Mi-2 Helicopter Maintenance Manual Airframe",
"Mi-2 Helicopter Maintenance Manual Equipment".

2.2. Calendar operating period for main assemblies and items forming part of helicopter.

The calendar operating period for main assemblies and items forming part of helicopter is not limited if:

a/ not established in the log card;
b/ comply to requirements given in maintenance instructions under subchapter 2.1. b/.

The above does not concern items listed below for which the following operating period is effective:

Item	Description	Dwg.No. or type	Calendar period of operating
1.	OS-2 Extinguisher	50.66.871.00.00	acc. to test validity of Pressurized Equipment Supervision Inspectorate
2.	Filter	340044A	5 years
3.	Additional Air bottle	50.58.501.00.00	5 years
4.	Tyre	300 x 125	6 years from date on tyre
5.	Tyre	600 x 180	6 years from date on tyre

It is forbidden to use items which have expired calendar period of operation.

3. Log cards issue

The helicopter Manufacturer or overhaul -shop dispatches the helicopter with the valid log cards for the assemblies , what is noted down in the helicopter log book.

The Operator should store the log cards observing the following rules:

a/ keeping them until the equipment is scrapped;

b/ recording proper notes in adequate Chapters of log cards;

c/ remit them to the Repair Shop together with the helicopter or defected assembly.

4. Documentation

Basic documentation of the helicopter:

a/ Helicopter log book,

b/ log books of the engines installed on the helicopter,

c/ Airworthiness Certificate of the helicopter and engines or Commercial Airworthiness Certificate,

d/ Helicopter Flight Manual,

e/ log cards of all main assemblies,

f/ helicopter registration certificate,

g/ helicopter construction-overhaul certificate,

i/ radio licence for helicopter radio equipment.

Descriptive operation documents

Descriptive operation documents list is included in the binder containing such documentation containing the following documents:

a/ Helicopter Maintenance Manual -

b/ Helicopter Maintenance Manual-Agricultural version } for agricultural version only.

c/ Flight Manual -Agricultural version } for agricultural version only.

d/ GTD-350 Engine Maintenance Manual

e/ Maintenance Manual -Equipment

f/ Technical descriptions and maintenance manuals for remaining assemblies, equipments and accessories as well as technical

descriptions and maintenance manuals of the equipments and accessories for individual helicopter versions.
Furthemore, the revisions on operated helicopters are introduced by means of bulletins to be issued by the Manufacturer.

5. **Type Certificate**

Type Certificate is obligatory for the helicopters in Republic of Poland.
The Mi-2 helicopters , manufactured by Polskie Zaklady Lotnicze are designed in accordance with "Przepisy Zdatnosci Cywilnego Sprzetu Lotniczego ,czesc BC-smigłowce" and have gained Type Certificate after passing civil tests for the following versions:
a/ passenger,
b/transportation,
c/ambulance,
d/agricultural,
equipped with single or dual control system for each version.

GTD-350 engines manufactured by Polskie Zakłady Lotnicze /PZL/ are designed in accordance to "British Civil Airworthiness Requirements"/BCAR/ and have gained Type Certificate from IInd series after passing proper tests.

Construction and operation of a/m helicopters and engines operated in Civil Aviation in Poland are under the supervision of Civil Aviation Authority.
-Inspektorat Kontroli Cywilnych Statkow Powietrznych.
02- 021 Warszawa. ul. Grojecka 17 , Polska

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6. List No. 50.16.500.68.00

of airframe items, which are subject to obligatory replacement after:

- 7 years operation in modertate climat,
- 5 years operation in the dry tropics.

The a/m service period for flexible conduits is counted from:

- production date of helicopter /for new helicopters/
- production date of hose /date marked on hose/ for helicopters on which the a/m items have been replaced during operation or overhaul.

Item 1	Description 2	Dwg.No. or type 3	Remarks 4
1	Hose	4568-U4-440	
2	Hose	4584A-U4-270	
3	Hose	4572-U12-510	
4	Hose	4584-U4-520	
5	Hose	50.58.050.00.00	
6	Hose	50.61.090.00.00	
7	Hose	50.61.095.00.00	
8	Hose	4609A-G4-150-480 or 50.59.036.00.00	Concerns h-pters to No.68.50 Concerns h-pters from No.69.01
9	Hose	4609A-G4-150-505 or 50.59.035.00.00	Concerns h-pters to No.68.50 Concerns h-pters from No.69.01
10	Hose	50.62.100.00.02 or 50.62.100.00.03	w/out heat insulation with heat insulation
11	Hose	50.62.110.00.00 or 50.62.110.00.01	w/out heat insulation with heat insulation

1	2	3	4
12	Hose	50.62.010.00.00 or 50.62.010.00.01	W/out heat insulation With heat insulation
13	Hose	50.62.020.00.00 or 50.62.020.00.01	W/out heat insulation With heat insulation
14	Hose	50.62.030.00.00	
15	Hose	50.62.040.00.00	
16	Hose	50.62.120.00.00 or 50.62.120.00.01	W/out heat insulation With heat insulation
17	Hose	50.62.125.00.00 or 50.62.125.00.01	W/out heat insulation With heat insulation
18	Damper	50.64.110.00.01	
19	Hose	50.64.210.00.00	
20	Hose	50.64.220.00.00	
21	Hose	50.64.230.00.00	
22	Hose	4580A-U4-8000	
23	Hose	4584A-U4-1020	
24	Duct	50.62.803.00.00	