

50X1-HUM

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50X1-HUM

SCHEDULED MAINTENANCE PROCEDURE
AIRCRAFT AND ENGINE

(SUPPLEMENT TO SCHEDULED MAINTENANCE
INSTRUCTIONS No. 11)

50X1-HUM

GENERAL

1. The aircraft and engine scheduled maintenance operations must be performed in terms specified in Scheduled Maintenance Instructions No. 11.
2. The tools and fixtures used for aircraft maintenance must be in serviceable condition and must have special markings.
Before the beginning and after the completion of work in the aircraft check the tools against the tool kit list to prevent losing or leaving some tools inside the aircraft.
3. Upon completion of maintenance operations make sure that no tools or other foreign objects are left in the intake ducts, jet nozzles, etc.; then lock the aircraft control stick, pressurize the cockpit (if the aircraft has not been covered with canvas) and check to see that all access panels that were opened during work are closed.
4. Do not grease or wash ball bearings of the closed type. Their maintenance should be confined to wipe-cleaning and external coating with EWATEM-201 lubricant.
5. During inspection and maintenance clean outer surfaces of aircraft assemblies and the engine of dirt, dust and old grease.
6. All friction surfaces of the aircraft except the wheel bearings and the turbine and cooler units should be treated with EWATEM-201.

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Lubricant; wheel bearings should be treated with MX-50 lubricant, and the turbine and cooler units with OIL-102-W oil.

SAFETY PRECAUTIONS

Prior to carrying out an inspection or any kind of work on the aircraft take precautionary measures to avoid accidental firing, retraction of the landing gear and spontaneous operation of electrical units, which may result in accidents and damage of equipment.

For this purpose open the cockpit and, without climbing in, make sure that:

- (a) safety lockings (the main and ground ones) of the ejection gun are in their places, the seat elbow rests and the face screen grip are locked;
- (b) drop fuel tank emergency button is protected with a cap;
- (c) landing gear selector valve is latched in the neutral position;
- (d) storage battery and all switches of electric equipment are OFF (the circuit breakers located under the right-hand organic glass panel, except circuit breaker 100V-0100 (100V-0100)) may be on).

When installing the drop tanks on the aircraft, do not cut in the storage battery till the operation is completed;

- (e) explosion circuit is out off (safety pin is in place).

Loading and unloading of the seat ejection gun, as well as adjustment and testing of the mechanical linkage of the gun striker release should be entrusted to a qualified armorer only.

All ground operations pertaining to inspections and preparation, repair and adjustment of the seat ejection gun should be carried out with the gun unloaded (explosive discharge cartridge removed).

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When carrying out operations in the engine compartment (with the engine mounted) do as follows:

- (a) secure all tools to be used with a string to prevent them from falling;
- (b) take care to prevent the dismantled units and fastenings from falling into the engine compartment, for which purpose place clean pieces of cloth around the unit attended to;
- (c) see that during assembly and disassembly operations the air by-pass ports of the compressor are covered by bands.

When carrying out operations in the wells of the landing gear, flaps and air brakes, bring the pressure in the hydraulic system down to zero, switch off the storage battery and set the slide of the air brakes in the **RETRACTED (YEPANO)** position.

After opening from the outside the cockpit canopy sliding section set the canopy external opening handle in the initial (sunk) position; with the cockpit canopy open do not open the cockpit pressurization cock unless necessary.

To protect the rubber parts and glasses of the cockpit canopy from exposure to sun rays, the cockpit of a parked aircraft must be covered with canvas.

It is not allowed to remove from the aircraft the cockpit canopy together with the interlocking cable.

When working in the cockpit with the canopy open or removed, install protective caps on the canopy remover pneumatic gun rods; before a flight the caps should be removed.

When loading or reloading the guns, install a red danger tag in front of the aircraft at a distance of 3 - 5 metres from the nose section. The tag serves

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as warning prohibiting the personnel to stand or walk in front of the aircraft.

With the engine running, it is not allowed to remain in front of the intake ducts within 15 m. zone.

All openings in aircraft assemblies and pipe lines uncovered during disassembly should be immediately closed with plugs or with polyvinyl chloride film.

To avoid using up all fuel from the inner chambers of the engine pumps open the filler neck of No.1 fuel tank before draining fuel from this tank and build up pressure in the fuel system by switching on the pump of fuel tank No.1, upon which close the shut-off fuel cocks and drain the fuel.

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LANDING GEAR

Operations	Possible defects	Remedy
<u>Inspection of Landing Gear</u>		
1. Wash the landing gear struts and shock absorbers in gasoline with the help of a hair brush.		
2. Examine the landing gear struts and shock absorbers with the help of a magnifying glass and check them for cracks. When examining the struts and shock absorbers, pay special attention to the condition of welded seams.	Cracks.	Remove the paint coating from the places suspected of cracks using solvent-moistened waste, then again examine the crack through the magnifying glass.
3. Examine visually the locking arrangement (Fig.1) of the main strut shock absorber sealing nuts.	Damaged locking arrangement.	Replace the cracked parts or the entire strut or shock absorber. Replace the damaged locking arrangement.

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Operations	Possible defects	Remedy
<p><u>Inspection of Landing Gear Locks Emergency Opening Linkage</u></p> <p>1. Remove the cockpit and the pilot's seat from the aircraft and check the condition of the lock emergency opening linkage.</p> <p>When examining the cable linkage, pull several times the locks emergency opening handle and then let it go, checking the condition of the cable and the attachment fittings.</p> <p>2. Reinstall the pilot's seat and the cockpit canopy on the aircraft.</p>	<p>Damaged cable.</p> <p>Corroded cable.</p> <p>Loose fit of the guide sleeves and cable pulleys.</p> <p>Damaged locking arrangements of the cable turnbuckles and pulleys.</p>	<p>Replace the damaged cable.</p> <p>Wipe the corroded portions of the cable with a kerosene-moistened cloth and then with a dry cloth, after which coat them with MILITARY-201 lubricant.</p> <p>Tighten up the guide sleeves and the pulleys.</p> <p>Replace the defective locking arrangements.</p>

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Operation	Possible defects	Remedy
<p><u>Checking Emergency Opening of Landing Gear Locks</u></p> <p>1. Jack up the aircraft till the wheels clear the ground.</p> <p>2. Connect the hoses of the ground hydraulic pump to the aircraft hydraulic system pipe unions and switch on the hydraulic pump to build up pressure in the hydraulic system.</p> <p>3. Retract the landing gear for which purpose set the landing gear cock in the RETRACTED (NEPAHO) position; after the landing gear warning lamps flash up and the automatic relief valve operates, set the L.G. cock in the neutral position.</p> <p>4. Switch off the ground hydraulic pump and reduce the pressure in the hydraulic system to zero by extending and retracting the air brakes or the wing flaps.</p>		

Operations	Possible defects	Remedy
<p>5. Open the landing gear up-locks from the emergency system, for which purpose pull the landing gear locks emergency opening handle in the cockpit as far as it will go. With the landing gear locks closed, free travel of the handle must not exceed 13 mm, and with the locks open the travel should be not less than 5 mm.</p> <p>6. After the struts move out of the landing gear wells, set the struts in the extended position by applying manual effort to the wheel or to the strut; the extreme position of the strut is indicated by lighting up of the landing gear green warning lamps.</p>	<p>Free travel of the handle is other than specified.</p>	<p>Examine the linkage of the landing gear locks emergency opening handle by pulling several times the handle as far as it will go; the handle must travel freely. After that, adjust free travel of the handle by means of the turnbuckles located in the wells of the main struts; use a piece of wire to make sure that the check holes of the turnbuckles are closed.</p>

Operations	Possible defects	Remedy
<p><u>Checking Landing Gear Emergency Extension System for Operation and Tightness</u></p> <p>1. Jack up the aircraft till the wheels clear the ground and retract the landing gear by means of the ground hydraulic pump.</p> <p>2. With the hydraulic system pressure at zero and the air pressure in the landing gear emergency bottles at 50 kg/sq.cm., open the landing gear Up-locks from the emergency system, for which purpose pull the L.G. locks emergency opening handle as far as it will go. After the red lamps go out and the wheel position indicator arms slightly move out, set the landing gear cock in the EXTENDED (EMDCK) position and open the landing gear emergency cock.</p>	<p>During retraction of the landing gear no pressure is created in the hydraulic system of the aircraft.</p>	<p>Localize by the soap suds method the leaky joints, tighten them up and repeat the test; if this fails to eliminate the fault, disconnect the joint, apply paste EV and again connecting the joint re-check the system for tightness. As a last resort replace the defective pipe or the unit.</p>

Operations	Possible defects	Remedy
<p>3. After the green lamps light up, note the time and mark the air pressure in the system (without closing the emergency cock of the landing gear); in 30 min. check the drop of pressure in the system (permissible drop is 8 kg/sq.cm.).</p>	<p>Excessive pressure drop in the system.</p>	<p>(a) Check the level of AIT-10 fluid in the hydraulic tank of the aircraft hydraulic system and top it up if necessary.</p> <p>The oil level in the hydraulic tank with zero pressure in the hydraulic system, with extended landing gear and retracted wing flaps and air brakes must be within the marks on the oil dipstick.</p> <p>(b) Disconnect the delivery hose of the ground hydraulic pump from the aircraft hydraulic system and place it in the filler neck of the hydraulic tank.</p>

Operations	Possible defects	Remedy
<p>4. Release air from the landing gear emergency system. To this end, loosen the union nuts on the pipes of the main strut actuating cylinder vent valves (on the extension side). After bleeding the air tighten up the loosened union nuts and safety them in position.</p> <p>5. Connect the ground hydraulic pump to the aircraft hydraulic system.</p> <p>6. Open the plug of the hydraulic tank, upon which retract and extend the landing</p>		<p>(c) Start the ground hydraulic pump; after air bubbles no longer appear in the AIT-10 fluid delivered by the hose, stop the pump and connect the delivery hose of the hydraulic pump to the aircraft hydraulic system.</p>

Operations	Possible defects	Remedy
<p>rear two or three times from the hydraulic system and check the level of AT-10 fluid in the hydraulic tank.</p> <p>7. Charge with air the landing gear emergency system and check it for tightness on the section between the emergency bottles and cocks.</p> <p><u>Checking Landing Gear Struts for Play</u></p> <p>1. Jack up the aircraft, retract and extend the landing gear as instructed above.</p> <p>2. Place a support with a rule near one of the wheels as shown in Fig. 1.</p> <p>3. Apply an effort of 15 kg to the strut in the longitudinal direction with the help of cables and a dynamometer; bring the rule close to the wheel tire and note</p>	<p>Excessive play of landing gear struts.</p>	<p>If the play of the landing gear struts exceeds the permissible value, localize the joint with the maximum play or that which causes the maximum total play in the strut, and tighten</p>

Operations	Possible defects	Remedy
<p>the rule division showing from the support. After that apply an equal effort to the strut in the opposite direction and again note the division on the rule. The total play of the main strut in the longitudinal direction will be equal to the difference between the above values.</p> <p>4. Measure the total play of the main strut in the lateral direction as instructed under Items 3 and 4.</p> <p>5. Measure the total values of play of the other main strut and of the nose strut as instructed under Items 3 and 4. The play must not exceed the following values:</p> <p>(a) main strut: longitudinal play 6 mm, lateral play 10 mm;</p> <p>(b) nose strut: longitudinal and lateral play 5 mm.</p> <p>6. Retract and extend the landing gear to check its operation.</p>		<p>up the joint or replace one of its parts.</p> <p>Permissible axial clearance in the L.G. attachment fitting (Fig. 3) is as follows:</p> <p>main strut 0.04-0.1 mm nose strut 0.25 mm</p> <p><u>Notes:</u> 1. Maximum permissible local clearance is 0.2 mm on an arc of the fitting which must not exceed 1/6 of the circumference length and 0.15 mm on an arc not more than half the circumference length. If necessary, it is allowed to install washers not less than 1 mm thick with a total</p>

Operations	Possible defects	Remedy
		<p>thickness up to 4.1 mm; there must be not more than two washers on one side or one washer on each side.</p> <p>2. If necessary, it is allowed to install one washer, 0.5 mm thick.</p> <p>Permissible misalignment of the strut axis relative to the aircraft centre line is 2 mm.</p> <p>Maximum permissible radial clearances in the hinges of the landing gear are shown in Fig. 4.</p>

Operations	Possible defects	Remedy																																																						
		<p>Sizes of joints</p> <table border="1"> <thead> <tr> <th rowspan="2">Joint</th> <th colspan="2">Nose strut</th> <th colspan="2">Main strut</th> </tr> <tr> <th>d, mm</th> <th>b, mm</th> <th>d, mm</th> <th>b, mm</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>13.965</td> <td>0.07</td> <td>27.960</td> <td>0.085</td> </tr> <tr> <td>E</td> <td>13.965</td> <td>0.07</td> <td>17.967</td> <td>0.068</td> </tr> <tr> <td>B</td> <td>13.965</td> <td>0.07</td> <td>17.967</td> <td>0.068</td> </tr> <tr> <td>Γ</td> <td>22.955</td> <td>0.09</td> <td>23.960</td> <td>0.085</td> </tr> <tr> <td>Δ</td> <td>27.960</td> <td>0.085</td> <td>19.955</td> <td>0.09</td> </tr> <tr> <td>E</td> <td>15.965</td> <td>0.07</td> <td>19.955</td> <td>0.09</td> </tr> <tr> <td>X</td> <td>-</td> <td>-</td> <td>23.960</td> <td>0.085</td> </tr> <tr> <td>3</td> <td>-</td> <td>-</td> <td>51.940</td> <td>0.12</td> </tr> <tr> <td>И</td> <td>31.950</td> <td>0.1</td> <td>49.950</td> <td>0.10</td> </tr> </tbody> </table> <p>d - minimum permissible diameter of the joint pin (bolt); b - maximum permissible clearance in the joint equal to the difference between the diameters of the hole and the pin (bolt) of the joint.</p>	Joint	Nose strut		Main strut		d, mm	b, mm	d, mm	b, mm	A	13.965	0.07	27.960	0.085	E	13.965	0.07	17.967	0.068	B	13.965	0.07	17.967	0.068	Γ	22.955	0.09	23.960	0.085	Δ	27.960	0.085	19.955	0.09	E	15.965	0.07	19.955	0.09	X	-	-	23.960	0.085	3	-	-	51.940	0.12	И	31.950	0.1	49.950	0.10
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Operations	Possible defects	Remedy
<p><u>Measuring Clearance between Stop on Frame No.4 and Upper Link on Nose Strut</u></p> <ol style="list-style-type: none"> 1. Jack up the aircraft, retract and extend the landing gear. 2. Apply an effort of 15 to 20 kg to the nose strut wheel axle in the direction of flight and measure the clearance between the stop and the upper link of the strut by a clearance gauge (Fig.5); the clearance must be within 0.05 - 0.15 mm. 3. Make sure that the strut cannot be retracted by the effort of one man. <p><u>Changing Lubricant QUATEL-201 in Grease Fittings of Landing Gear Strut Hinges (Fig.6)</u></p> <ol style="list-style-type: none"> 1. Clean the surface of the grease fittings of dust and dirt. 2. Connect the grease gun to the grease fitting and feed fresh 	<p>Clearance is other than specified.</p> <p>The strut retracts under the effort of one man.</p>	<p>Adjust the clearance by the bolt of the strut actuator or, as a last resort, by changing the thickness of the shim on fuselage frame No.4.</p> <p>Replace the strut actuator.</p>

Operations	Possible defects	Remedy
<p>Lubricant QUATEL-201 till the old lubricant starts coming out of the hinge. If the lubricant is not pressed out, turn the parts of the hinge joint relative to one another or disassemble and wash the hinge after which lubricate it again.</p> <p><u>Removal and Inspection of Wheel Parts</u></p> <p>Operations on the main wheel should be performed as follows:</p> <ol style="list-style-type: none"> 1. Jack up the aircraft till the wheels clear the ground. 2. Disjoint the brake pipe from the wheel (on the side of the wheel axle nut). 3. Unscrew the nut of the wheel axle by means of a special wrench (Fig.7) and remove the brake drum, the wheel and the rear roller bearing. 4. Unbend the lug of the obturator closing the roller bearing, then take off the obturator 		

Operations	Possible defects	Remedy
and remove the second roller bearing. 5. Wipe the wheel drum with dry waste, clean it with compressed air and examine the brake shoes and the plate springs of the brake.	Resinous deposits and oil on the brake shoes.	Resinous deposits and oil on the brake shoes should be eliminated with emery cloth, grit No.180. After that the surfaces should be wiped with gasoline-moistened waste and blown off with compressed air; see that gasoline does not get into the brake chamber.
	Wear or deterioration of brake shoes.	Brake shoes less than 8 mm thick and deteriorated brake shoes are subject to replacement.
6. Wipe the inner surface of the brake jacket with gasoline-moistened waste and examine the surface.	Broken springs. Cracks on the brake jacket (Fig.8).	Replace broken springs. If cracks in the brake jacket run through the whole depth of the iron layer and extend to the outer face, the wheel should be replaced.

Operations	Possible defects	Remedy
7. Check the brake jacket fastening bolts for tightening. 8. Wash the roller bearings of the wheels with gasoline by means of a brush, blow them off with compressed air and examine carefully. 9. Check the roller bearing outer rings for proper fit. The outer rings must not yield to manual effort. 10. Lubricate the roller bearings with HK-50 lubricant and reinstall them in place. 11. Install the wheel and the brake drum on the strut and core on the wheel axle nut. Before connecting the brake system pipes to the wheels blow them through with compressed air. Then installing the nut on the axle of the main wheel, screw it on till the wheel has to overcome resistance in its rotation, upon which back out the nut through	Loose bolts Cracks, traces of rubbing and temper colours on the bearing rings and rollers. Loose fit of outer rings of roller bearings.	Tighten up the nuts and replace the locking arrangement. Replace the bearings having cracks, traces of rubbing or temper colours. Replace the wheel.

Operations	Possible defects	Remedy
<p>1/8 or 1/16 of a turn and lock in this position.</p> <p>13. Check air pressure in the wheel tyre by means of a pressure gauge (Fig.9); the pressure must be 9^{+0.5} kg/sq. cm. in the main wheel and 6^{+0.2} kg/sq.cm. in the nose wheel.</p>	<p>Air pressure in the wheel tyre is less than permissible.</p>	<p>Connect one end of the air hose (Fig.10) to the compressed air bottle, and the other end to the landing gear wheel inflation device (Fig.11); remove the cap from the wheel nipple, press the other end of the device to the nipple and carefully open the air bottle valve; when the air pressure in the wheels reaches the required value (9^{+0.5} kg/sq.cm. in the main wheel and 6^{+0.2} kg/sq.cm. in the nose wheel by the device pressure gauge) close the bottle valve</p>

Operations	Possible defects	Remedy
<p>When removing, inspecting and reinstalling the nose wheel, proceed in the same way as in the case of the main wheel, bearing in mind the following:</p> <p>(a) the wheel axle should be inserted from the right side of the fork (looking forward);</p> <p>(b) the nose wheel fastening nut should be screwed home till axial play is eliminated and the wheel rotates without difficulty.</p> <p><u>Blowing Brake System through with Compressed Air</u></p> <p>1. Check the air system bottle for air pressure.</p> <p>2. Disconnect the brake system pipes from the wheels.</p>		<p>and check again the pressure in the wheel tyre.</p>

Operations	Possible defects	Remedy
<p>3. Depress the brake lever for 1 or 2 seconds (the lever is located in the cockpit on the control stick); the air must freely come out of the pipes.</p> <p>4. Connect the pipes to the wheel pipe unions, after which check the brake system for leakage.</p>		
<p><u>Charging Fluid in Landing Gear Shock Absorbers</u></p>		
<p>1. Jack up the aircraft till the wheels clear the ground.</p>		
<p>2. Connect the shock absorber charging device (Fig.12) to the shock absorber to bring the air pressure in the shock absorber down to zero.</p>		
<p>3. Remove the main strut shock absorber, turn out the charging valve and drain the fluid from the shock absorber into a clean vessel. This done, reinstall the shock absorber on the strut.</p>		

Operations	Possible defects	Remedy
<p>When changing AIT-10 fluid in the nose strut, remove the strut, drain the fluid and reinstall the strut in the aircraft.</p>		
<p>4. Pour 550 cu. cm. of AIT-10 fluid into the shock absorber of the main strut (750 cu.cm. in the nose strut); when doing so, move the rod out of the shock absorber.</p>		
<p>5. After 1.5 to 2 hours check the level of AIT-10 oil in the shock absorber and charge the shock absorber with air as instructed above.</p>		
<p>6. Lower the aircraft and remove the jacks.</p>		
<p><u>Checking Fluid Level in Landing Gear Shock Absorbers</u></p>		
<p>1. Lift the aircraft with the help of one jacks so that the wheel of the shock absorber under check clears the ground while the other wheels remain on the ground.</p>		

Operations	Possible Defects	Remedy
<p>2. Connect the shock absorber charging device (Fig.12) to the shock absorber, reduce the pressure in the shock absorber to zero and keep the strut motionless for 1.5 to 2 hours.</p> <p>3. When checking the fluid level in the shock absorber of the main strut, turn out the charging valve of the shock absorber.</p> <p>When checking the fluid level in the nose strut, turn in the charging valve and unscrew the check plug.</p> <p>4. Using a squirt, feed appr. 100 cu.cm. of AMT-10 oil into the shock absorber.</p> <p>5. Lower smoothly the aircraft till the shock absorber being tested is completely compressed and keep it in this state for not less than 10 minutes.</p> <p>6. Turn the charging valve in the shock absorber of the main strut or the drain plug in the shock absorber of the nose strut.</p>	<p>When compressing the shock absorber AMT-10 fluid does not overflow.</p>	<p>Add AMT-10 fluid into shock absorber and drain the excess of fluid as instructed under Items 1 to 5.</p>

Operation	Possible Defects	Remedy
<p>7. Lift the aircraft with the help of one jack till the wheel of the shock absorber being tested clears the ground, then charge the shock absorber with compressed air till the pressure reaches the following limits:</p> <p>main strut 70±1 kg/sq.cm. nose strut 30±1 kg/sq.cm.</p> <p>8. Lower the aircraft on the ground and remove the jack from under the aircraft.</p> <p><u>Checking Air Pressure in Landing Gear Shock Absorbers by Pressure Gauge</u></p> <p>1. Jack up the aircraft till the wheels clear the ground.</p> <p>2. Connect the shock absorber charging device (See Fig.12) to the charging valve of the shock absorber.</p>		

Operations	Possible defects	Emergency
<p>3. Turn the screw of the device several turns in and check the air pressure by the pressure gauge of the device (70± kg/sq.cm. for the main strut and 30± kg/sq.cm. for the nose strut).</p>	<p>Air pressure in the shock absorber exceeds the permissible value.</p> <p>Air pressure in the shock absorber is below the permissible value.</p>	<p>Reduce the excessive pressure in the shock absorber to zero (with the screw of the device turned in, loosen union nut A of the device).</p> <p>Charge the shock absorber with air, for which purpose:</p> <p>(a) back out the screw of the device by 2 or 3 turns;</p> <p>(b) remove nut A of the device and connect one end of the air hose (Fig.10) to the device and the other end to the compressed air cylinder;</p> <p>(c) turn in the screw of the device;</p>

Operations	Possible defects	Emergency
<p>4. Remove the landing gear shock absorber charging device from the shock absorber, turn the screw cap on the charging valve and lock it in place.</p> <p>5. After checking the air pressure in the landing gear shock absorbers, lower the aircraft and remove the jacks.</p> <p><u>Changing Fluid in Nose Wheel Shimmy Damper</u></p> <p>1. Remove the shimmy damper from the aircraft, unscrew the plug and, shifting</p>		<p>(d) slowly open the cylinder valve; when the pressure gauge of the device registers the necessary pressure, close the cylinder valve and back out the screw of the device by 2 or 3 turns;</p> <p>(e) disconnect the hose from the device, turn the hose nut on the device and check the pressure in the shock absorber again.</p>

Operations	Possible defects	Remedy
<p>2. Check operation of the landing gear position indicator and electrical warning system.</p> <p>After the warning lamps light up and the automatic relief valve operates, set the cock at neutral position. The following warning lamps light up:</p> <p>(a) three Green lamps with the landing gear extended;</p> <p>(b) three red lamps with the landing gear retracted;</p> <p>(c) warning lamp EXTERN LANDING GEAR with the landing gear retracted and the wing flaps down.</p> <p>When the landing gear is retracted, the position indicator arms must be flush with the aircraft skin (without any interference between the indicator rim and the skin).</p> <p>3. See that the landing gear does not touch the aircraft structure, or units and pipe lines located in the landing gear wells. During extension</p>	<p>Electrical warning system is out of order.</p> <p>Protection of the landing gear position indicator arms or interference between the indicator arms and the skin when the landing gear is retracted.</p>	<p>Correct the warning system (the necessary maintenance operations should be performed by a skilful electrician).</p> <p>Unlock the landing gear position indicator arms and adjust their position by turning them in or out. Extend the landing gear and lock the position indicator arms.</p>
<p>of the landing gear the wheel tyre is allowed to touch the inner lining of the wheel door.</p> <p>4. Check for leakage of AIT-10 fluid from aircraft units and pipe lines and for condition of the units and pipe lines in the wells of the landing gear struts (cracks, corrosion, etc.).</p> <p>5. Check to see that the hydraulic pressure during retraction of the landing gear is not over 100 kg/sq.cm.</p> <p>WARNING. If the landing gear has not been fully extended (the green lamps do not light), do not perform additional retraction of the landing gear until after locking manually the wheel door cylinders.</p>	<p>Possible defects</p> <p>Leakage of AIT-10 fluid, cracks, corrosion and dents.</p>	<p>Eliminate the fault by tightening up the joints, cleaning off traces of corrosion or replacement of the defective unit, pipe or hose.</p>
<p>The wheel tyre touches the aircraft parts.</p>		<p>Eliminate the fault by flanging the pipe lines and filling off the wheel doors.</p>

Operations	Possible defects	Remedy
<p>2. Check operation of the landing gear position indicator and electrical warning system.</p> <p>After the warning lamps light up and the automatic relief valve operates, set the cock at neutral position. The following warning lamps light up:</p> <p>(a) three green lamps with the landing gear extended;</p> <p>(b) three red lamps with the landing gear retracted;</p> <p>(c) warning lamp EXTERNAL LANDING GEAR with the landing gear retracted and the wing flaps down.</p> <p>When the landing gear is retracted, the position indicator arms must be flush with the aircraft skin (without any interference between the indicator rims and the skin).</p> <p>3. See that the landing gear does not touch the aircraft structure, or units and pipe lines located in the landing gear wells. During extension</p>	<p>Electrical warning system is out of order.</p> <p>Projection of the landing gear or arms or interference between the indicator arms and the skin when the landing gear is retracted.</p>	<p>Correct the warning system (the necessary maintenance operations should be performed by a skilful electrician).</p> <p>Unlock the landing gear position indicator arms and adjust their position by turning them in or out. Extend the landing gear and lock the position indicator arms.</p> <p>Eliminate the fault by flanging the pipe lines and filling off the wheel doors.</p>
<p>of the landing gear the wheel tyre is allowed to touch the inner lining of the wheel door.</p> <p>4. Check for leakage of AMT-10 fluid from aircraft units and pipe lines and for condition of the units and pipe lines in the wells of the landing gear struts (cracks, corrosion, etc.).</p> <p>5. Check to see that the hydraulic pressure during retraction of the landing gear is not over 100 kg/sq.cm.</p> <p>WARNING. If the landing gear has not been fully extended (the green lamps do not light), do not perform additional retraction of the landing gear until after locking manually the wheel door cylinders.</p>	<p>Possible defects</p> <p>Leakage of AMT-10 fluid, cracks, corrosion and dents.</p>	<p>Remedy</p> <p>Eliminate the fault by tightening up the joints, cleaning off traces of corrosion or replacement of the defective unit, pipe or hose.</p>

Operations	Possible defects	Remedy
<p>8. Check operation of the strut and wheel door locks; with the landing gear valve in the neutral position, the struts and the wheel doors must not fall out or open.</p> <p>9. Make sure that the landing gear doors in the retracted position are flush with the wing and fuselage surfaces.</p>	<p>The landing gear doors in the retracted position are not flush with the wing and fuselage surfaces.</p>	<p>Adjust the landing gear doors to fit the contours of the wing and fuselage.</p>
<p>10. Check to see that when the pressure in the hydraulic system is not less than 80 kg/sq.cm. and the landing gear valve is in the RETRACTED position, the pressure in the brake system of the wheels is equal to 5 - 10 kg/sq.cm.; after the valve is set in the neutral position, the pressure in the brake system must fall to zero for not more than 60 sec. After lowering the landing gear, turn the wheels by hand to make sure that they are not braked.</p>	<p>The brake system pressure is other than 5 - 10 kg/sq.cm. IV-7 valve builds up a pressure of 5 - 10*0.5 kg/sq.cm. (if necessary adjust the pressure by the screw on valve IV-7).</p>	<p>1. Check to see that pressing the brake lever of IV-7 valve builds up a pressure of 5 - 10*0.5 kg/sq.cm. (if necessary adjust the pressure by the screw on valve IV-7).</p> <p>2. Set the necessary pressure by the</p>

Operations	Possible defects	Remedy
<p>6. Check operation of the sequence valves (Fig. 13). The wheel doors must close after the struts have been retracted.</p> <p>Press on the adjusting screw of the sequence valve and make sure that the screw returns to the initial position.</p>	<p>Wheel doors are closed before the struts are retracted.</p> <p>After pressing on the adjusting screw of the sequence valve the screw fails to return to the initial position.</p>	<p>Extend the landing gear screw of the sequence valve, then again check the valves for operation, for which purpose retract the landing gear.</p> <p>Examine the adjusting screw (make sure that the rod and the screw are not bent) and the sequence valve spring; replace defective parts, if any.</p>
<p>7. Make sure that the wheel door cannot be retracted under manual-applied effort of one man after the landing gear selector valve has been set for retraction and till the moment the strut presses on the sequence valve.</p>	<p>The wheel doors yield to hand-applied effort of one man (due to clogging of the sequence valve).</p>	<p>Remove, disassemble, wash and examine the sequence valve, after which reinstall it in position and check its operation.</p>

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Operations	Possible defects	Remedy
<p>(c) not less than 2 mm between the fuselage and the doors in the extended position.</p> <p>Perrmissible clearances for the main strut doors (in the retracted position) are as follows:</p> <p>(a) 2.5_±1 mm between the wheel doors and the strut door;</p> <p>(b) the clearance between the strut door and the wing door varies in width: 10_±2 mm along the front edge; 15_±1 mm in the middle, and 20_±2 mm along the rear edge;</p> <p>(c) 2.0_±0.5 mm between all doors (along the front and rear edges) and the wing (except the strut door, where the clearance along the rear edge must be equal to 4_±0.5 mm);</p> <p>(d) 6[±]1 mm between the wheel door and the wing (on the side of the fuselage), except the section located along the front edge of the forward attachment fitting of the door, where the clearance must be 2.5_±0.5 mm.</p>		

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Operations	Possible defects	Remedy
<p>11. After replacement, adjustment or fitting of struts, actuating cylinders or landing gear doors, check the clearances between the contours of the landing gear doors and also between the doors and the wing.</p> <p>The following clearances are permissible for the nose strut:</p> <p>(a) not less than 6 mm between the lowered doors and the nose strut during retraction; not less than 15 mm between the wheel and the doors in the retracted position;</p> <p>(b) between the fuselage and the doors in the retracted position: 1.5_±0.5 mm along the front and rear edges and not less than 1.5 mm along the side edges;</p>	<p>The brake pressure relief time is over 60 sec.</p> <p>Clearances are less than permissible.</p>	<p>screw of the automatic braking valve (Fig. 14). Adjust the time period by the screw of the automatic braking valve.</p> <p>Wipe off the doors to set the normal clearance.</p>

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Operations	Possible defects	Remedy
<p>With the aileron in the neutral position, sinking of the interceptor (Fig.15) relative to the wing contour must be within 1.5 - 2.5 mm and must not decrease on account of the backlash.</p> <p><u>Notes:</u> Projection of interceptors beyond the wing contour, with the ailerons in the neutral position, is not permissible.</p> <p>Check the interceptor clearances:</p> <p>(a) the clearance between the interceptor in the retracted position and the rear edge of the wing must be within 1.5±1.5 mm;</p> <p>(b) the clearance between the interceptor and the wing flap must be 1±0.5 mm.</p> <p>7. Install a prettractor on the aileron (Fig.16) and check the interceptor mechanism for adjustment. Check on the following points:</p>	<p>Clearance is less than permissible.</p> <p>Clearance is less than permissible.</p> <p>Interceptor deflection is other than permissible.</p>	<p>Straighten the interceptor.</p> <p>Straighten the interceptor.</p> <p>Adjust the interceptor mechanism for which purpose:</p>
<p><u>Inspection of interceptors</u></p> <ol style="list-style-type: none"> Extend the wing flaps. Remove the interceptor access panels (on the flap panel and on the upper wing skin between ribs No.14 and No. 15). Fully extend the interceptor by shifting the control stick. Wipe all hinge joints and friction surfaces in the interceptor control linkage through the access holes on the wing and in the flap panel; for wiping use a clean cloth lightly soaked in clean non-styylated gasoline. Examine the interceptor control mechanism (Fig.15); check all joints for proper fastening and locking, apply lubricant LUKIL-201 to all hinge joints of the mechanism. Retract the interceptor by placing the aircraft control stick to the neutral position, then check to see that the interceptor is flush with the wing contour. 	<p>Joints are not locked.</p>	<p>Lock the joints.</p>

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T I R 3

Operations	Possible defects	Remedy
<p><u>Inspection of interceptors</u></p> <ol style="list-style-type: none"> Extend the wing flaps. Remove the interceptor access panels (on the flap panel and on the upper wing skin between ribs No.14 and No. 15). Fully extend the interceptor by shifting the control stick. Wipe all hinge joints and friction surfaces in the interceptor control linkage through the access holes on the wing and in the flap panel; for wiping use a clean cloth lightly soaked in clean non-styylated gasoline. Examine the interceptor control mechanism (Fig.15); check all joints for proper fastening and locking, apply lubricant LUKIL-201 to all hinge joints of the mechanism. Retract the interceptor by placing the aircraft control stick to the neutral position, then check to see that the interceptor is flush with the wing contour. 	<p>Joints are not locked.</p>	<p>Lock the joints.</p>

Operations	Possible defects	Remedy
<p>8. Check the interceptor for play, for which purpose deflect the ailerons 10 to 20° downward; an effort of 1.5 kg applied to the interceptor</p>	<p>If it proves to be necessary, screw the rail end piece in or out again; with the end piece being screwed in, the aileron deflection angle at which the interceptor starts coming out increases, and vice versa when the end piece is screwed out the angle decreases; (e) after adjustment of the interceptor mechanism is completed, tighten the locknut on the end piece, lock the bolt which connects the rod with the end piece and reinstall the access panel.</p>	<p>Find the joint with the largest play and tighten up, or replace one of the parts.</p>

Operations	Possible defects	Remedy
<p>(a) with the aileron deflected 3°±3' downward, the interceptor must gradually come out of the wing; (b) with the aileron deflected 8°±2' downward, the interceptor must fully come out of the wing by 57±2 mm; (c) further motion of the aileron downward from 8°±2' to 20° must not cause any displacement of the interceptor; (d) the difference between the distance of full downward travel of the right and left interceptors must be not over 3 mm.</p>	<p>(a) through the access hole in the upper skin of the wing remove the bolt connecting rod 13 (Fig. 15) with the end piece of rail 7 of the interceptor mechanism; (b) loosen the locknut and screw the end piece in or out of the rail of the interceptor mechanism; (c) bolt rod 13 with the end piece and check the interceptor mechanisms for proper adjustment as instructed under Item 7; (d) the interceptor must start coming out of the wing when the aileron is deflected downward through 3°±30'; at this position ensure a clearance of not less than 3 mm between the roller of the interceptor mechanism and the plate on the rail face.</p>	

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Operations	Possible defects	Remedy
		<p>(b) shift the rail of the mechanism towards the wing end, then displace the plate and slightly move out the interceptor mechanism;</p> <p>(c) disjoin rod 13 from rail 7 and dismantle the interceptor mechanism from the aircraft through the access hole in the wing flap panel;</p> <p>(d) examine the ball bearings and replace the defective ones, if any;</p> <p>(e) ensure free motion of the rail in the rollers by turning the rollers eccentric bolts;</p> <p>(f) assemble the interceptor mechanism and install it back in place reversing the order of dismantling.</p>

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Operations	Possible defects	Remedy
<p>in the upward direction; at the point where it is attached to lever 16 (Fig.15) must cause the interceptor to move up by not more than 3 mm.</p> <p>9. Check the interceptor mechanism for smooth motion; the motor must be free, without jamming.</p>	<p>Jamming or seizing in the interceptor control system.</p>	<p>Jamming or seizing may be caused by the interceptor panel catching on the wing skin and the flap skin due to deformation of the panel. In this case the fault should be remedied by straightening the interceptor.</p> <p>If the repeated test reveals seizing or jamming of the aileron controls, remove and examine the interceptor mechanism in the following sequence:</p> <p>(a) with the wing flaps lowered, disconnect bell crank 17 from the shackle and remove the bolts fastening the interceptor mechanism cover plate to the rear stringer;</p>

Operations	Possible Defects	Remedy	Possible Defects	Remedy
<p><u>Inspection of Wing Flaps</u></p> <ol style="list-style-type: none"> 1. Connect the hoses of the ground hydraulic installation to the aircraft changing connections of the hydraulic system and start the ground installation. 2. After building up a pressure of 100 - 120 kg/sq.cm. in the hydraulic system, press button LAMPING (УКАЗАТЕЛЬ) of the left-hand control desk. 3. Make sure that the wing flaps are in the lowered position (the warning lamps on the panel and on the left side of the instrument board must light up). Then lowering the flaps, see that the flap elements do not touch the inner lining of the wings; the clearance must be not less than 1.5 mm. 	<p>Hydraulic locks fail to hold the wing flaps in the lowered position.</p>	<p>Replace the defective hydraulic lock.</p>	<p>When the wing flaps are lowered, make sure that they are reliably held by the hydraulic locks in the extended position (the flaps must not yield to the effort of two men applied to the rear edge of the wing flap).</p> <ol style="list-style-type: none"> 4. Wash, with clean non-ethylated gasoline, the guide rails, carriages, slides and flap pins (Fig. 17) till all dirt and old lubricant are completely removed; when washing, use a brush. 5. Examine all the above mentioned parts; if necessary, use an inspection lamp. 6. Apply lubricant MAME-201 to the parts with the help of a hair brush. Retract and extend the wing flaps several times to ensure a better penetration of lubricant into the hinge joints of units; when doing so, check the flaps for synchronous extension. The difference in the deflection of the left and right wing flaps must 	<p>Replace the cracked parts.</p> <p>Replace the reverse flow divider JA-57 of the wing flap extension and retraction system.</p>

Operations	Possible defects	Remedy
<p>(c) the clearance between rails 2 (See Fig.17) on the wing and the cuts for the rails on the flap must be within 1 - 3 mm;</p> <p>(d) the clearance along the faces of the wing flap must be within 1 - 4 mm.</p> <p>8. Check to see that the wing flap is flush with the wing contour;</p> <p>(e) projection and sinking of the flaps in the wing must not exceed 0.5 mm;</p>	<p>The clearance is less than permissible.</p> <p>The clearance is less than permissible.</p> <p>Projection or sinking of the flaps is in excess of 0.5 mm.</p>	<p>File off the out on the wing flap.</p> <p>File off the wing flap.</p> <p>Straighten the edge of the wing skin. If the flap is not flush with the wing contour as required by the Specifications replace eccentric bushings 7 (See Fig.17) or chamfer the upper edge of the flap skin to 0.5x2.5 mm.</p>
<p>(b) displacement of the flaps relative to the tail-piece of rib No.19 of the wing ("scissors") must not be out of the range of ±2 mm.</p>		<p>Adjust the position of the flap in the wing during retraction with the help of eyebolt 1 (Fig.18) of the actuating cylinder rod.</p> <p>Adjust the position of the flap in the wing during retraction with the help of eyebolt 1 of the actuating cylinder rod.</p>

Operations	Possible defects	Remedy
<p>be not more than 20 mm in the landing position and not more than 16 mm in the take-off position.</p> <p>7. With the flaps in the retracted position, check on the following clearances:</p> <p>(a) the clearance between the rear upper edge of the wing and the projecting skin (with the stringer) of the wing flap must be within 0.2 - 1 mm; a clearance up to 1.5 mm along 30 per cent of the edge length may be tolerated;</p> <p>(b) the clearance between the rear (lower) edge of the wing and the tip of the wing flap must be within 0.5 - 2.5 mm;</p>	<p>The projection of the flap skin bears against the edge of the wing skin in the retracted position.</p> <p>The clearance is less than permissible.</p>	<p>Adjust the position of the flap in the wing during retraction with the help of eyebolt 1 (Fig.18) of the actuating cylinder rod.</p> <p>Adjust the position of the flap in the wing during retraction with the help of eyebolt 1 of the actuating cylinder rod.</p>

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Operations	Possible defects	Remedy	Possible defects	Remedy
<p>9. Lubricate the units again; remove carefully the excess lubricant with clean cotton waste taking care to keep the lubricant off the skin of the wing and the wing flap.</p> <p>Examine visually the cylinder and the rod of the flap actuating cylinder.</p>	<p>Cracks on the cylinder, deterioration of the chrome plating and corrosion on the rod.</p> <p>Leakage of fluid around the actuating cylinder rods due to wear of the sealing rings and damage of the rod.</p> <p>Damaged locking arrangement.</p>	<p>In case of cracks on the cylinder and deterioration of the chrome plating or corrosion on the rod, the actuating cylinder is subject to replacement.</p> <p>Replace the sealing rings of the actuating cylinders.</p> <p>Replace the damaged locking arrangement.</p>	<p>Scratches and corrosion. Corrosion on electrod parts can be identified by bulged paint coating or friable wet deposit of light gray colour indicating deterioration of metal surface.</p>	<p>Clean the corroded or scratched spots with glass paper till all signs of corrosion are eliminated, then wipe with clean cotton waste soaked in gasoline. After that coat the surface with a 10 per cent solution of selonous acid, dry and coat with AHT-1 primer. Let the surface get dry and coat</p>
<p>10. Examine the hinge joints of the actuating cylinder rods and check the fastening nuts for proper locking.</p> <p>11. Apply EMANT-201 lubricant to the actuating cylinder rod fastening hinges by means of a hair brush.</p> <p>12. Check the attachment of the actuating cylinders and the locking of the fastening nuts (from the side of the landing gear well).</p>	<p>13. Retract the wing flaps by pressing button RETRACTED (VERAN); make sure that the flap retracted position warning lamp on the panel lights up.</p> <p><u>Inspection of Wing Parts</u> <u>Made of Electron</u></p> <p>Examine the parts made of electron. All such parts are painted green or blue (except the wing flaps).</p> <p>Subject to inspection are the following wing elements:</p> <p>(a) wing flaps (2 pieces);</p> <p>(b) sequence valve fastening brackets (in the landing gear wells, 2 pieces);</p> <p>(c) attachment brackets of the lever of landing gear lock emergency release mechanism in the landing gear wells (near the sequence valve attachment bracket, 2 pieces);</p> <p>(d) attachment brackets of the roller of the landing gear lock emergency release mechanism (in</p>	<p>Check the nuts for tightening and replace the damaged locking arrangement.</p>	<p>Scratches and corrosion. Corrosion on electrod parts can be identified by bulged paint coating or friable wet deposit of light gray colour indicating deterioration of metal surface.</p>	<p>Clean the corroded or scratched spots with glass paper till all signs of corrosion are eliminated, then wipe with clean cotton waste soaked in gasoline. After that coat the surface with a 10 per cent solution of selonous acid, dry and coat with AHT-1 primer. Let the surface get dry and coat</p>

Operations	Possible defects	Remedy
<p>(k) aileron extreme attachment fittings (on the aileron and the wing, 8 pieces); (l) rear attachment fittings of the wheel door (2 pieces); (m) aileron end tips (8 pieces).</p> <p><u>Checking Flap Emergency Extension System for Operation and Tightness</u></p> <p>1. At zero pressure in the hydraulic system and the air pressure in the flap emergency bottles being 110 to 130 kg/sq.cm., press the LAMPING (MOCAJMA) button on the left control desk panel, then open the emergency cock of the wing flaps.</p> <p>2. After the warning lamps of the flaps flash up, note the time and check the air pressure in the system; in 30 minutes check</p>		<p>it with enamel A9 or A9? (wheel surfaces should be coated with enamel A24T). Parts with heavy and deep corrosion spreading over the entire part surface, as well as parts with individual concentrations of deep corrosion should be replaced by new ones.</p>
		<p>the landing gear wells, 2 pieces); (e) aileron bell crank attachment bracket in the left well of the landing gear (near the longitudinal bear); (f) wing stringers (in the landing gear wells); (g) flap fastening brackets on the flaps and the wing (3 pieces); (h) attachment bracket of EV-12M hydraulic booster in the right wing (access through the inspection hole); (i) attachment bracket of rib No.15 (access through the inspection hole AILERON BELL CRANK (KAVAYKA BLEFOEL) in the upper wing skin); (j) aileron control central units (on the aileron and the wing, 10 pieces);</p>

Operations	Possible defects	Remedy
		<p>Localize by the soap suds method the leaky joints, tighten them up and again</p>

Operations	Possible defects	Remedy
<p>4. Remove the plug of the hydraulic tank, then retract and extend the flaps from the hydraulic system 2 or 3 times and check the level of MIL-10 fluid in the hydraulic tank.</p> <p>5. Charge the flap emergency system with air and check the system for tightness from the emergency bottles to the cocks (when closed); air pressure drop in the course of 30 minutes indicated by the pressure gauge of the flap emergency system is not permissible.</p>		

Operations	Possible defects	Remedy
<p>3. Discharge air from the flap emergency lowering system. For this purpose, loosen the union nuts of the flap hydraulic locks on the side of the actuating cylinders (the hydraulic locks are located above the actuating cylinders of the main landing gear struts). After discharging air, do up the loosened union nuts and lock them.</p>		<p>check the system for tightness as indicated in Items 1 and 2.</p> <p>If the leakage still persists, disconnect the joint, coat it with N paste, connect the joint and check the system for tightness again, as a last resort, replace the defective pipe.</p>

Operations	Possible defects	Remedy
<p>3. Close the engine doors and the access panels which were opened for inspection.</p> <p><u>Changing Lubricant in Air Brake Attachment Fittings and Hinge Joints</u></p> <ol style="list-style-type: none"> 1. Lower the air brakes, reduce pressure in the hydraulic system (operating the aircraft control stick with the hydraulic boosters switched on), turn off the accumulator and set the air brake slide lever on the right engine control lever in the extreme rear position RETRACTED (JEPARD). 2. Clean the grease fitting surfaces of dust and dirt and wash them with kerosene. 3. Apply IMATHM-201 lubricant to the hinge joints with the help of a grease gun; feed lubricant till the old grease shows from the hinge joints. 		

P U S E I A 9 3

Operations	Possible defects	Remedy
<p><u>Inspection of Engine and Attachment Fittings</u></p> <ol style="list-style-type: none"> 1. Open the engine doors and all the access panels between frames No. 20 to 22 of the fuselage and the access panels marked SUSPENSION OF TAIL PIPE, ELEVATOR CONTROL PULL CRANKS located at fuselage frame No.35. <p>Note: If the fuselage is dis-jointed, do not open the access panels.</p> <ol style="list-style-type: none"> 2. Examine: <ol style="list-style-type: none"> (a) the six engine attachment fittings located on fuselage frame No. 20; (b) the four attachment fittings of the tail pipe located on fuselage frame No.35. 	<p>Cracks on attachment fittings.</p> <p>Disturbed locking arrangement.</p> <p>Attachment fitting bolts work loose.</p> <p>Outer bolt of tail pipe suspension ruptured.</p>	<p>Replace the cracked fittings.</p> <p>Replace the locking arrangement.</p> <p>Tighten up the bolt and lock it.</p> <p>Replace the bolt.</p>

Operations	Possible defects	Remedy
<p>(a) pull at the cable running from the parachute to the lock with an effort of 30 - 40 kg (to be measured with a dynamometer rated for not more than 100 kg.);</p> <p>(b) Press button PARACHUTE RELEASE (СЕРОС НАРАМЕТТА) located on the left desk; the lock must open.</p> <p>4. Wash all the hinges with clean non-ethylated gasoline by means of a brush, then lubricate them with ИМАТНН-201 lubricant.</p> <p>Examine the parachute compartment; check the parachute container for easy installation and removal.</p> <p>Make sure that the parachute container is reliably held in place by the latches.</p> <p>5. Close the parachute cable lock, for which purpose press by hand the lower hook of</p>		
		<p>Open the doors and clean the surface of the pins with emery cloth, grit No.180-220, then check free travel of pins 1 and 2; when doing so, turn pin 2. The effort applied to the pin during the check must not exceed 5 kg. Binding is not permissible.</p> <p>Travel of pins 1 and 2 must be 20 mm.</p>

Operations	Possible defects	Remedy
<p><u>Inspection of Brake Parachute Doors and Checking their Operation from Electro-Pneumatic System</u></p> <p>1. Switch on the accumulator in the cockpit.</p> <p>2. Open the doors of the brake parachute, for which purpose press button PARACHUTE RELEASE (СЕРОС НАРАМЕТТА) on the panel installed above the instrument board; the spring loaded doors must open sharply.</p> <p>3. Check opening of the parachute control cable lock, for which purpose:</p>	<p>The doors do not open or open with difficulty and binding due to scores and nicks on pins 1 and 2 (Fig. 12).</p>	<p>Open the doors and clean the surface of the pins with emery cloth, grit No.180-220, then check free travel of pins 1 and 2; when doing so, turn pin 2. The effort applied to the pin during the check must not exceed 5 kg. Binding is not permissible.</p> <p>Travel of pins 1 and 2 must be 20 mm.</p>

Operations	Possible defects	Remedy
<p>6. Check the clearances along the door edges with the doors in the closed position; the clearance must be within 5-7 mm.</p> <p>9. Secure the locking mechanism with the doors in the closed position by means of wire ZOK-0.5.</p> <p><u>Visual Inspection of Air Ducts and Engine Compartment from Inside.</u></p>		
<p>1. Examine the intake ducts and the engine compartment from the outside and make sure that there are no loose rivets or foreign objects; the ducts must be clean.</p>	<p>Deterioration of engine screens.</p>	<p>Replace the defective section of the engine screen.</p>
<p>2. Check the intake ducts for deformation of the skin, particularly in the vicinity of the fuel tanks.</p> <p>3. Check the compressor 1st stage for damaged blades. During inspection use a portable lamp or a search light.</p>	<p>Deformation of the skin.</p>	<p>Straighten or replace the deformed skin sections.</p>

Operations	Possible defects	Remedy
<p>the lock till its extension lines up with the rod so that the release cylinder moves over the hook shank.</p> <p>6. Close the doors of the brake parachute and shift front stop pin I (Fig.19) back with the help of the hook; when doing so, make sure that the system of the locking rods can move freely with the doors in fully closed position. Check the lock of the ball lock for being fixed in the front and rear positions.</p>	<p>The hook is not fixed in the extreme positions due to absence of the ball or spring or because of a broken or weakened spring.</p>	<p>Disassemble the lock, for which purpose: (a) unlock and remove screw 3 (Fig.19), remove the spring and the ball; (b) check the lock for completeness and install the missing parts if necessary; replace the broken or weakened spring. Assemble the lock proceeding as follows: (a) install the ball in its seat; (b) install the spring; (c) turn in the screw and lock it with wire ZOK-0.5.</p>
<p>7. Make sure that the parachute doors are completely closed; the pin hook, with the doors fully closed, must check with red line 4 (Fig.19) on the fuselage.</p>		

Operations	Possible defects	Remedy
<p>Visual Inspection of Accessories, Pipe Lines and Drain Pipes of All Systems Located in Engine Compartment and in Fuselage Section</p> <p>1. Examine all the accessories, pipe lines, drain pipes with their attachment fittings located on the engine, in the tail section of the fuselage; examine visually and check by hand feel the connections of the accessories, presence of locking arrangements and tightness of the accessories.</p>	<p>Chafing of pipe lines, leakage of fluid or air.</p>	<p>Carefully flange the pipe line and eliminate the cause of chafing. Pipes with deep may be used for further service, provided the cause of chafing is eliminated and the damaged section of the pipe is painted anew. If leakage of fluid or air is evidenced at the joints of pipe lines or pipe connections, tighten up the joints; build up</p>
<p>2. Check condition of the heat-insulating tape made of glass fibre.</p> <p>3. Check arrangement of the fire fighting equipment located in the fuselage on the left side.</p> <p>4. Examine the air heat exchanger and the turbine and cooler unit together with their pipe lines through the port located on the right side near frame No.15.</p> <p>5. Clean the drain pipe outlets of dirt, snow and foreign particles.</p>	<p>Clogged pipes.</p>	<p>working pressure in the system and check the connection for leakage of fluid or air again. If the fault still persists, replace the pipe or the accessory.</p> <p>Clean the pipes with a piece of wire. To eliminate the ice,</p>



Operations	Possible defects	Remedy
<p>2. Examine the frames, longerons and stringers of the fuselage and check the condition of their interconnections. Examine the inner skin of the fuselage tail section. Make sure that there are no loose rivets, cracks, or residual deformation.</p> <p>3. Examine the condition of the sealing rubber on frame No. 20 and its attachment to the frame.</p>	<p>Deformation and cracks.</p> <p>Chafing and traces of overheating on parts.</p> <p>Separation and deterioration of rubber.</p>	<p>Straighten or replace the deformed parts. Repair or replace the cracked parts.</p> <p>Determine the cause of trouble and eliminate the defect.</p> <p>Glue up the separated rubber with glue No. 88; replace the defective rubber.</p> <p>Note: Rubber with minor cracks is fit for further service.</p>
<p><u>Inspection of Wing-end Stabilizer-to-Fuselage Attachment Fittings and Bolts: Checking Bolts for Tightening</u></p> <p>1. Turn out the wing (stabilizer) fillet fastening screws and remove the fillet.</p>		

Operations	Possible defects	Remedy
<p>6. Check the fuel pumps of No. 3 and No. 4 fuel tanks for secure attachment in the fuselage fin, also check condition of the pipe lines in the fuselage ventral fin. Special care should be exercised towards the rubberized (durite) connections; the extra length of rubberized sleeves for the fastening olamps at pipe line connections must be within 6 - 10 mm.</p> <p><u>Inspection of Fuselage Tail Section from Inside</u></p> <p><u>Inspection of Packing Rubber on Frame No. 20</u></p> <p>1. Place a mat, a plywood sheet or a thin duralumin sheet on the inner skin of the fuselage.</p>	<p>Leakage of fuel around hole covers.</p>	<p>beat the pipes with hot air.</p> <p>Take off the cover and localize the place of leakage by external inspection (against a light).</p> <p>Eliminate leakage by tightening up the joints or by replacing the accessory.</p>

Operations	Possible Defects	Remedy
<p>5. Check the notches on the stabilizer corrugations for alignment.</p> <p>6. Using a hair brush, apply MAFM-201 lubricant to all attachment fittings and bolts.</p> <p>7. Reinstall the wing (stabilizer) fillets and fasten them with screws.</p> <p><u>Inspection of Fuselage Parts</u> <u>Made of Electron</u></p> <p>All electron parts are painted green or blue. When inspecting such parts, pay special attention to the condition of the paint coating.</p> <p>Examine:</p> <p>(a) brackets of the elevator attachment fittings (4 pieces);</p> <p>(b) brackets fastening rod on the elevator trim tab (2 pieces);</p> <p>(c) fairlead box on fuselage frame No.9;</p>		

Possible defects and remedies are identical with those of wing parts (See above).

Operations	Possible Defects	Remedy
<p>2. Using a hair brush, carefully wash with gasoline the attachment fittings and bolts that fasten the wing (stabilizer) to the fuselage, then wipe the fittings and bolts with a piece of cloth.</p> <p>3. Examine carefully (with the help of a magnifying glass) the attachment fittings and bolts and check them for cracks.</p> <p>4. Unlock the nuts of the jointing bolts; the nuts must not turn when checked for tightening by means of wrenches.</p>	<p>Cracks on attachment fittings.</p> <p>Nuts turn.</p>	<p>Replace the cracked attachment fittings.</p> <p>Tighten up the loose nuts with a wrench as far as they will go and lock the nuts; when tightening, do not use handle levers. If after tightening the locking holes in the nut and bolt do not check, select a new washer of appropriate thickness.</p>

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Operations	Possible defects	Remedy
<p>(1) attachment bracket of nose strut down switch; (m) attachment bracket of control bell crank and afterburner suspension fitting; (n) attachment brackets of hydraulic accumulators on fuselage frame No. 15; (o) fin attachment brackets (2 pieces).</p>		

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Operations	Possible defects	Remedy
<p>(d) control bell cranks near fair-lead box on fuselage frame No.9 (2 pieces); (e) control bell cranks of left engine at fuselage frame No.8 (2 pieces); (f) attachment brackets on frame No.8 (2 pieces); (5) central control assembly in cockpit; (h) attachment bracket of alleron bell crank No.1 in cockpit; (6) profiles of frame No.18; (1) attachment bracket of nose strut retracting mechanism lever on fuselage frame No.4 (in the nose strut well); (4) attachment bracket of wing flaps emergency system air bottle (on fuselage frame No.5); (k) attachment brackets and bell cranks of N-11 hydraulic boosters (2 pieces);</p>		

FUEL SYSTEM

Operations	Possible defects	Remedy
<p>5. Remove plates 4 on the fuselage bottom (on the drain hatch cover of fuel tank No.1) giving access to the fastening pins of fuel tank No.1; unscrew the fastening pin locknuts.</p> <p>6. Back out two screws used to secure the fuel tank bonding.</p> <p>7. Turn out the fuel tank hatch cover-to-fuselage attachment bolts and remove the cover.</p> <p>8. Disconnect the electric wire running to pump 495 and its fastenings.</p> <p>9. Unlock and partially ease off bolts 23 (FIG-20) securing base plate 12 of the inverted flight valve; through the slot formed, pour out the remaining fuel from the fuel tank into the fuel drain containers prepared beforehand.</p> <p>10. Fully unscrew bolts 23; uphold and bend the base plate</p>		

FUEL SYSTEM

Operations	Possible defects	Remedy
<p><u>Residual Fuel and Inertness</u> <u>Fuel Tank No.1</u></p> <p>1. Ground the aircraft and the fuel drain containers.</p> <p>2. Remove the plate giving access to the filler neck of fuel tank No.1 and open the filler neck. Engage pump 495 of fuel tank No.1 to create pressure in the fuel system.</p> <p>3. Close the fuel shut-off valves.</p> <p>4. Remove the plate giving access to pump 495 of fuel tank No.1; put the fuel servicing truck hose onto the drain valve, or on the valve and drain the fuel through the drain valve.</p>		

Operations	Possible Defects	Remedy
<p>To unlock and ease off the yoke's securing clamping plate to break pipe of the inverted flight valve.</p> <p>11. Remove the tank plate along with the inverted flight valve.</p> <p>12. Remove dirt from the fuel tank walls and bottom using a clean piece of cloth or a hair brush.</p> <p>Note: Before inspecting and cleaning the fuel tank, alter the inverted flight valve has been removed, keep it in the open air from 15 to 20 minutes to let fuel fumes evaporate from the fuel tank interior. In order to reduce the time necessary for evaporation of fuel fumes from the tank, it is allowed to blow the fuel tank interior with air compressed to 1-2 kg/cm² at a temperature of 10 to 15°C.</p> <p>13. Clean the fuel tank interior walls to make sure that there is no separation, swelling or any other damage to the fuel tank.</p>	<p>union flange from the walls; a number of small cracks on the interior walls. Deep cracks on the fuel tank wall along the contour, where the inverted flight valve base plate is secured.</p>	<p>Separation and swelling; Remove and replace the fuel tank interior. Replace the fuel tank material; separate tank.</p>
<p>Note: To avoid any accidents, while examining the fuel tank interior walls, use a portable 24 V explosion-proof lamp.</p> <p>14. Unscrew the nuts and remove the inverted flight valve cap; wash the valve components in kerosene and blow them with compressed air; make sure that the cylinder with the balance weight moves smoothly; for this purpose turn the valve over 3 or 4 times and see to it that the cylinder valve does not bind in the extreme positions; at the same time, check the disc valves, located in the inverted flight chamber, for proper operation - the</p>		

Operations	Possible defects	Remedy
	fuel tank No.1 (with all fuel tank pumps in operation); fuel throut out may be caused also by float binding on the rotation axle due to valve leakage.	- ease off and turn out the nuts of the float valve pipe union located on frame No.15 of the fuselage; - remove the float valve through the hole made in fuselage frame No.15; - install the float valve in its proper place in the order reverse to removing. In case it is impossible to replace the drop tank valve floats (Fig.21), solder the float and check it for leakage in the following order:

Operations	Possible defects	Remedy
valves must be free to move in their seats. 15. Examine the valve components and the balance weight linkage. 16. Check up visually the outer side of the fuel tank walls and bottom for cuts and chafing.	Cracks on the valve components. Corrosion deposit on the floats.	Discard the cracked valve. Polish off the corrosion traces with emery paper, grainularity 220.
17. With the help of a portable electrical lamp, examine the condition of the float valve components through the inverted flight valve hatch; shake the floats slightly to see if there is any fuel in them; fuel in the floats will produce foreign noise.	Float leakage resulting in premature opening of the valves which let the fuel from the rear and drop tanks into fuel tank No.1. Outwardly it is manifested by some fuel getting out of the drain pipe of	Replace the defective float. To do this: - remove the ICP-CT-6000 starter-generators; - disconnect the rear or drop tanks fuel lines from the defective float valve pipe union;

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Operations	Possible defects	Remedy
	<p>Valve is leaky.</p>	<p>and let it dry. To test this spot for leakage, put the float for 10 minutes into water, heated to 95-98°C, then shake the float to make sure that there is no foreign noise in it.</p> <p>If the valve is leaky, remove it, examine the valve and pipe union working surfaces; check them for notches, pits and nicks; in case of defects, coat the valve and the pipe union with a thin layer of NM paste and check the valve for leakage.</p> <p>To do this place the valve in a vertical position (with the pipe union up), close the valve manually and fill</p>

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Operations	Possible defects	Remedy
		<ol style="list-style-type: none"> 1. Disconnect float from link 2, turn out screw 7 and take off washer 6. 2. Supply the float with air compressed to 0.3 kg/sq.cm. and put it into a bath with potassium bicromate dissolved in water; the float must not leak. 3. Cover the float with chalk, dissolved in water, dry it, fill it with kerosene and leave it for 24 hours. No dark kerosene spots, testifying to float leakage, must appear on the chalk. 4. Turn screw 7 and washer 6 on shellac into the float bottom, pour some shellac on the screw

Operations	Possible defects	Remedy
<p>19. Make sure that the butt face of flexible pipe 4 (See FIG.20) is brought closely to the rear wall and its two fastening yokes are tightened normally.</p> <p>20. Install the valve and fuel tank hatch cover in place in the sequence reverse to removal, then prime the fuel system. Visually check leakage of the joints that have been disconnected during removal of the inverted flight chamber.</p> <p><u>Inspecting Fuel Tanks Nos 3 and 4</u></p>	<p>The screw is bent.</p>	<p>Replace the yoke tie screw fastening the flexible pipe to the branch pipe of the inverted flight valve.</p>
<p>1. Turn out the attachment screws and remove the panels of fuel tanks Nos 3 and 4, located in the rear part of the fuselage, between frames Nos 22 and 25 and between frames Nos 25 and 30 respectively.</p>	<p>19. Move the valve floats up and down to make sure that the valves do not bind; pay special attention to their secure fastening and to condition of shaft locking.</p> <p>Valves bind.</p>	<p>the pipe union with kerosene (FIG.22); in this position, valve leakage must not exceed 10 drops per minute. To check the rear tank float valve (FIG.23), let some kerosene compressed to 1.5 kg/sq.cm. through the valve pipe union; the valve (closed by hand) must not allow more than 21 litres of kerosene to leak for 5 minutes. The valves bind because of deformation of valve pivot shaft 5 when foreign matter gets under the valve. Replace the deformed valve shaft.</p>

Operations	Possible defects	Remedy
<p>18. Move the valve floats up and down to make sure that the valves do not bind; pay special attention to their secure fastening and to condition of shaft locking.</p>	<p>Valves bind.</p>	<p>the pipe union with kerosene (FIG.22); in this position, valve leakage must not exceed 10 drops per minute. To check the rear tank float valve (FIG.23), let some kerosene compressed to 1.5 kg/sq.cm. through the valve pipe union; the valve (closed by hand) must not allow more than 21 litres of kerosene to leak for 5 minutes. The valves bind because of deformation of valve pivot shaft 5 when foreign matter gets under the valve. Replace the deformed valve shaft.</p>

Operations	Possible defects	Remedy
<p>2. Remove the hatch cover in the belly for giving access to the drain plug in the fuel pipe line connecting fuel tanks Nos 3 and 4.</p> <p>3. Remove the hatch cover in the belly for giving access to HPP-1 pump of fuel tank No.4.</p> <p>4. With the help of a portable lamp, examine visually fuel tanks Nos 3 and 4 for reliability of their attachment; make sure that no moisture appears and no fuel leaks through the welded seams and rivets.</p>	<p>Cracks. Fuel leakage.</p> <p>Dents, bulges or chafing.</p>	<p>Remove the fuel tank, repair or replace it. Send the defective fuel tank to the repair shop.</p> <p>If fuel tank wall chafing is not over 0.3 mm, it may not be considered defective provided the causes of chafing are eliminated by attaching a gasket of heat-insulating fabric (felt, greatcoat cloth),</p>
<p>5. Swing fuel tanks Nos 3 and 4 manually to make sure that they are firmly secured in their places.</p> <p>6. Examine the condition and locking of tank drain valves, band turnbuckles and nuts connecting the fuel supply hose to the fuel tank.</p>	<p>Cracks in the attachment bands of the fuel tanks.</p> <p>Swinging of fuel tanks.</p> <p>Damaged locking arrangement.</p>	<p>using glue P.88. Gently sloping dents and bulges up to 2 mm deep (high) are permissible; repaint the damaged spots. Remove the fuel tanks if chafing is more than 0.3 mm deep and send them to the repair shop.</p> <p>Replace the bands.</p> <p>If the fuel tanks shift, tighten the band turnbuckles to eliminate this shifting. Take care not to deform the fuel tank.</p> <p>Replace the damaged locking arrangement.</p>

Operations	Possible defects	Remedy
<p>2. Remove the hatch cover in the belly for giving access to the drain plug in the fuel pipe line connecting fuel tanks Nos 3 and 4.</p> <p>3. Remove the hatch cover in the belly for giving access to HPP-1 pump of fuel tank No.4.</p> <p>4. With the help of a portable lamp, examine visually fuel tanks Nos 3 and 4 for reliability of their attachment; make sure that no moisture appears and no fuel leaks through the welded seams and rivets.</p>	<p>Cracks. Fuel leakage.</p> <p>Dents, bulges or chafing.</p>	<p>Remove the fuel tank, repair or replace it. Send the defective fuel tank to the repair shop.</p> <p>If fuel tank wall chafing is not over 0.3 mm, it may not be considered defective provided the causes of chafing are eliminated by attaching a gasket of heat-insulating fabric (felt, greatcoat cloth),</p>
<p>5. Swing fuel tanks Nos 3 and 4 manually to make sure that they are firmly secured in their places.</p> <p>6. Examine the condition and locking of tank drain valves, band turnbuckles and nuts connecting the fuel supply hose to the fuel tank.</p>	<p>Cracks in the attachment bands of the fuel tanks.</p> <p>Swinging of fuel tanks.</p> <p>Damaged locking arrangement.</p>	<p>using glue P.88. Gently sloping dents and bulges up to 2 mm deep (high) are permissible; repaint the damaged spots. Remove the fuel tanks if chafing is more than 0.3 mm deep and send them to the repair shop.</p> <p>Replace the bands.</p> <p>If the fuel tanks shift, tighten the band turnbuckles to eliminate this shifting. Take care not to deform the fuel tank.</p> <p>Replace the damaged locking arrangement.</p>

Operations	Possible Defects	Remedy
<p>fuselage frame No. 17 attachment brackets and cable.</p> <p><u>Washing Out Fuel Filters, Installed in Drop Tank Supply Line</u></p> <ol style="list-style-type: none"> 1. Take off the hatch plates having the inscription: START PIVOT (OOB CTOEMH) (on the wing top skin near the aerodynamic fences) to gain access to the filters. 2. Open and remove cover 2 from body 1 of the filter (Fig. 24), together with filtering element 3. <p>CAUTION! Protect the filter body against foreign matter.</p> <ol style="list-style-type: none"> 3. Wash out the filtering element (together with the body cover) with kerosene, and then 		<p>them with cotton waste and grease with IMATHN-201 lubricant. Replace cables with broken wires.</p> <p>The gauze of the filtering element is damaged. or replace the entire filter.</p>

Operations	Possible Defects	Remedy
<p><u>Checking Fuel Tanks Nos 1 and 2 for Reliability of Attachment</u></p> <ol style="list-style-type: none"> 1. Turn out the screws and open the hatches on the skin of the fuselage nose part to gain access to the attachment pins which secure bag fuel tanks Nos 1 and 2 to the fuselage. 2. Open the hatch plate in the hatch load-carrying door of fuel tank No. 2. 3. Check the nuts securing the fuel tank pins to the fuselage for proper tightening; examine visually the nuts to make sure they are intact and properly locked. 4. Put the access hatch plates where they belong. 5. Examine through the engine inspection ports, tank No. 2-10- 	<p>loose nuts.</p> <p>Broken wires, corroded cables.</p>	<p>Tighten the nuts and lock them again.</p> <p>In case of corrosion thoroughly rub the cables with a piece of cloth, soaked in Gasoline, etc</p>

Operations	Possible Defects	Remedy
<p>SHUT-OFF VALVES, RIGHT ENGINE OIL PRESSURE (ИЗЪЕМЛЕНИЕ КРАП, ПАРМЕИ МАКЛА ИПАВОВО ДЕМОНТАЖ) the circuit breaker STORAGE BATTERY (АККУМУЛЯТОР) being switched on.</p> <p>2. Take off the button caps and press in buttons SHUT-OFF VALVE, LEFT and RIGHT (ИЗЪЕМЛЕНИЕ КРАП, ЛЕВ and ПРАВ.) (on the left side control panel); Turn on the engine valves one by one - they must close.</p> <p>3. Examine the valves.</p>	<p>The valve rod locking arrangement is deformed.</p> <p>Leakage of fuel.</p>	<p>Replace the deformed locking arrangement.</p> <p>Tighten the loose joint and lock it again.</p> <p>If tightening the joint does not eliminate fuel leakage, replace the valve and send</p>

Operations	Possible Defects	Remedy
<p>1. Turn on the circuit breaker, check the pressure in the fuel filter.</p> <p>2. Examine the fuel filter condition and cleanliness.</p> <p>3. Assemble the filter and install it on the aircraft in the order reverse to removal and disassembling.</p> <p>4. While examining the fuel system for leakage, see that there is no leakage of kerosene through the joint between cover 2 and body 1 of the filter.</p> <p>Checking Fuel Shut-off Valves for Proper Closing</p> <p>1. Turn on, in the cockpit, the circuit breaker SHUT-OFF VALVES, LEFT ENGINE OIL PRESSURE (ИЗЪЕМЛЕНИЕ КРАП, ПАРМЕИ МАКЛА И ПАВОВО ДЕМОНТАЖ) and</p>		

Operations	Possible defects	Remedy
<p>the lower edge of the fuel tank filler neck; add some more fuel into the tanks, if necessary.</p> <p>4. Screw a pressure gauge with a scale of 0 to 1 kg/sq.cm. into the filler neck of fuel tank No.1</p> <p>5. Close the fuel system pressure intake pipe union with a special plug (Fig.25).</p> <p>To do this:</p> <ul style="list-style-type: none"> - insert a special plug into the intake pipe union; - hold the plug with one hand and turn in the plug screw with the other as far as it will go. <p><u>Note:</u> The intake pipe union of the vent system pressurization is located in front of the filler neck of fuel tank No.1.</p>		

Operations	Possible defects	Remedy
<p>4. Lock the valve links, cover and lock the button caps.</p> <p><u>Checking Drop Tanks and Tank No.1 for Proper Pressurization; Checking Pressurization System Pipe Lines for Leakage</u></p> <p>1. Remove the hatch plate giving access to the filler neck of fuel tank No.1 and open the filler neck.</p> <p>2. Unlock and unscrew the filler neck caps of the drop tanks with a special wrench.</p> <p>3. Check whether fuel tank No.1 and the drop fuel tanks are filled with fuel to the necessary level; the fuel level in the tanks must be from 10 to 20 mm (in winter time) and from 20 to 30 mm. (in summer) below</p>		<p>the deformed one to the repair shop.</p>

Operations	Possible defects	Remedy
<p>6. Screw the cap (Fig. 26) with two pipe unions into the filler neck of any of the drop tanks, one pipe union being intended for a pressure gauge with a scale of up to 1 kg/sq.cm. and the other for an air hose (See Fig. 10); screw a similar cap but without pipe unions into the filler neck of the other tank.</p> <p>Screw a pressure gauge with a scale of up to 1 kg/sq.cm. onto one of the cap pipe unions and close the other one (by screwing a blind plug onto it).</p>		
<p>7. Start the engines and check the pressure gauges for air pressure in fuel tank No. 1 and in the drop tanks at 7000 r.p.m.; the air pressure must be: from 0.11 to 0.15 kg/sq.cm. in fuel tank No. 1 and from 0.38 to 0.52 kg/sq.cm. in the drop tanks; while testing the engines, make sure there is no leakage</p>	<p>The pressure in the drop tanks is other than permissible.</p>	<p>Check the safety valve box (Fig. 27) for leakage in the following sequence:</p> <ol style="list-style-type: none"> 1. Disconnect (through the left engine inspection port) the pipe line (connecting the box with the drain pipe of fuel

Operations	Possible defects	Remedy
<p>of fuel or air through the pipe union joints near the wing.</p>		<p>tank No. 1) from pipe union 4 of the safety valve box, fixed on the left drain pipe line, and plug the pipe line free end.</p> <ol style="list-style-type: none"> 2. Connect pipe union 4 of the box with an external compressed air bottle hose fitted with a reducing valve and pressure gauge. 3. Create a pressure of 0.3 kg/sq.cm. in the box and shut off the external compressed air bottle valve. The pressure in the box may drop from 0.3 to 0.1 kg/sq.cm. in no less than 180 seconds.

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Operations	Possible defects	Remedy
		<p>2. Check the drop tanks for pressurization and adjust the valves, if necessary: to do so, with the engines running: screw (to increase pressure) or unscrew (to reduce pressure) covers 3 (Fig.28) of the safety valve. Adjust the valves by pressing the valve shanks one by one (when adjusting the first valve, close the second one).</p> <p>3. Check the box for leakage. Remove the cover of fuel tank No.2, and adjust the safety valves, installed in the drain pipe of fuel tank No.1.</p>
	<p>The pressure in fuel tank No.1 is other than permissible.</p>	

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Operations	Possible Defects	Remedy
		<p>Should pressure drop exceed the permissible limits: -</p> <ul style="list-style-type: none"> - disconnect the pipe lines from the box pipe unions and unscrew the nuts of the box attachment clamp bolts; then remove the box and wipe the box and the place of its attachment on the valves, install it in its proper place (having replaced the damaged gaskets); - check the box for leakage again. <p>If the box is not quite pressure-tight:</p> <ol style="list-style-type: none"> 1. Remove and overhaul the box and the valves and install them where they belong.

Operations	Possible defects	Remedy
		<p>Adjust the valves with the engines running by screwing or unscrewing the valve covers.</p> <p>Check the pressurization system for leakage, if safety valve adjustment and box examination do not result in obtaining normal pressurization, do this:</p> <p>- screw, into the filler neck of one of the drop tanks, the same appliance which was used for checking the drop tanks for pressurization but with an additional pipe union for supply of compressed air from an external compressed air bottle, and with a reducing valve;</p>

Operations	Possible defects	Remedy
<p>8. Turn the pressure gauge out of the filler neck of fuel tank No.1, close the filler neck of fuel tank No.1.</p>		<p>- create a pressure of 3 kg/sq.cm. in the system and close the external compressed air bottle valve;</p> <p>no pressure drop in the system is permissible for 15 minutes.</p> <p>If the pressure is dropping, it is necessary to locate, by listening to the noise or with the help of soap suds, the probable places of air leakage, and eliminate them; the probable places of air leakage are: the filler necks, the drop tank front and rear rests, the return (air) valve (Fig.29), the pipe line joints and the tank walls.</p> <p>In case the return valve is out of order, remove, disassemble and examine the return valve of the drop tank pressurization system.</p>

Operations	Possible defects	Remedy
<p>Take the plug out of the fuel system pressure intake pipe union.</p> <p>9. Turn the special plugs out of the drop tank filler necks and close the filler necks with the plugs belonging to these tanks.</p>		<p>To do this:</p> <ol style="list-style-type: none"> 1. Remove the valve from the aircraft (the valve is located near frame No. 15 of the fuselage). 2. Disassemble the valve. 3. Wash the valve metal components in non-ethylated gasoline. 4. Examine the valve components. 5. Assemble the valve. <p>Wash pipe union 6 and valve 4 in clean gasoline and dry them with a clean piece of cloth before assembling the valve.</p> <p>Insert the pipe union into the body on paste IV.</p> <p>6. Check valve 4 for leakage, for which purpose:</p>

Operations	Possible defects	Remedy
		<ul style="list-style-type: none"> - put the return valve in vertical position (the arrow on the valve body must point upwards); - fill the valve body with kerosene; - connect the valve body to the external compressed air bottle by means of a hose; the compressed air bottle must have a pressure gauge and a reducing valve; - compress the air in the valve up to 0.2 kg/sq.cm. and wait for 5 minutes. <p>Kerosene leakage of 5 drops per minute maximum is permissible; dry kerosene off the valve interior surface and blow the valve through with air compressed from 3 to 4 kg/sq.cm.</p> <p>7. Check the valve for proper opening, for which purpose:</p>

Operations	Possible defects	Remedy
		<p>- put the valve in a vertical position (the arrow must point downwards);</p> <p>- through the opening of pipe union 6 put a 150 gr metal rod of 8 to 9 mm in diameter on disc valve 4;</p> <p>- the valve must open as far as possible.</p> <p>5. Connect body 1 of the valve to the external compressed air bottle and check the threaded coupling for leakage.</p> <p>Put the valve into a bath with a solution of potassium bichromate in water (from 2.5 to 3 gr of potassium bichromate per 1 lit. of water), create a pressure of 5 kg/sq.cm. and keep the valve in this</p>

Operations	Possible defects	Remedy
		<p>condition for 5 minutes. Air must not escape through the threaded coupling.</p> <p>9. Install the valve on the aircraft (the arrow on the valve body must point downwards).</p>

HYDRAULIC SYSTEM

Operation	Possible defects	Remedy
<p><u>Filter QP-11</u></p> <p><u>Washing Out and Inspecting</u></p> <ol style="list-style-type: none"> 1. Unlock and unscrew the hydraulic pipe attachment union nuts from the QP-11 filter, with pressure in the hydraulic system equal to zero. Drain the mixture into clean containers. Close the pipe line ends with metal plugs. 2. Unscrew the nut from the filter fastening clamp, expand the clamp and remove the filter. 3. Unlock and unscrew the filter cover (sleeve). 4. Remove the coarse filtering element, wash it in clean, non-ethylated gasoline and examine it. Blow the filtering element with compressed air. 5. Remove the fine filtering element (215.30) and wash 		
		Replace the gauze or the assembly.
	The gauze is torn off.	

Operations	Possible defects	Remedy
<p>it in clean, non-ethylated gasoline (if its service life has not yet expired). Install a new fine filtering element if the element service life has expired.</p> <ol style="list-style-type: none"> 6. Wash all the metal filter components in gasoline and blow them with compressed air. 7. Examine all the metal components and the rubber gasket. 8. Lubricate slightly the filter cover threading with NY Grease. 9. Assemble the QP-11 filter in the order reverse to disassembling, install it in its proper place and examine it, while checking the hydraulic system for interior leakage, as follows: <ol style="list-style-type: none"> (a) check whether the warning button is pressed down. Check the filter for leakage again if the warning button is not depressed. To this end: 		
		Replace the cracked component or the entire filter.
	Cracked filter body and covers.	
		The warning button is not depressed.
		If the warning button will not get depressed for the second time replace the filter and have the oil case repaired.

Operations	Possible defects	Remedy
<p>hydraulic system accumulator is located to the right of the same frame.</p> <p>2. Screw the appliance (See Fig.12) onto the filler valve.</p> <p>3. Turn in the appliance screw and check, by the pressure gauge, the hydraulic accumulator for air pressure, which must be equal to 40±3 kg/sq.cm.</p>	<p>Hydraulic accumulator air pressure is above normal.</p>	<p>Reduce the pressure in the hydraulic accumulator to the normal level (keep screw 1 of the appliance screwed in and ease off union nut 4 (See Fig.12) for the time, necessary to reduce the air pressure). Boost-charge the hydraulic accumulator air compartment. To do this: - give screw 1 of the appliance 2 or 3 turns back;</p>

Operations	Possible defects	Remedy
<p>17) - pull the warning button manual stick to the right and to the left repeatedly to flush the hydraulic system. The warning button must remain in the pulled position;</p> <p>(b) check the filter sealing for leakage.</p>	<p>Operating fluid leaks through the warning button sealing.</p>	<p>Disassemble the GT-11 filter, replace the sealing, assemble the filter and check if for leakage again.</p>
<p><u>Checking Hydraulic Accumulators for Air Pressure</u></p> <p>1. Remove, through the engine inspection port, the plug from filler valve 3 of the hydraulic accumulator (Fig.31); the main hydraulic system hydraulic accumulator is located to the left of frame No.15 of the fuselage; whereas the booster</p>		

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Operations	Possible defects	Remedy
<p>4. Turn out the appliance screw, remove the appliance from the hydraulic accumulator and turn the plug onto the hydraulic accumulator filler valve.</p> <p><u>Flushing the Hydraulic System</u></p> <ol style="list-style-type: none"> 1. Jack up the aircraft until the wheels clear the ground. 2. Connect the aircraft with the ground power source and the ground hydraulic pump. 3. Drain AM-40 fluid from the aircraft hydraulic system. To this end: <ul style="list-style-type: none"> - retract the landing gear and wing flaps; lower the speed brakes, shut off the ground hydraulic pump and release pressure from the aircraft hydraulic system (by moving the aircraft control stick); - lower the landing gear and the wing flaps from the emergency 		

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Operations	Possible defects	Remedy
		<ul style="list-style-type: none"> - remove nut 4 of the appliance; - connect one end of the air hose (See Fig. 10) to the appliance and the other - to the compressed air bottle; - turn in the appliance screw; - turn the compressed air bottle valve towards opening and when the appliance pressure gauge shows the necessary pressure, close the bottle valve and give the appliance screw 2 or 3 turns back; - disconnect the air hose from the appliance, turn the nut onto the appliance and check the hydraulic accumulator for air pressure again.

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Operations	Possible defects	Remedy
<p>5. Fill the aircraft hydraulic system with AIT-10 fluid, which will be used to flush the aircraft hydraulic system.</p> <p>This is done as follows:</p> <ul style="list-style-type: none"> - fill the aircraft hydraulic service tank with AIT-10 fluid from the hydraulic service truck or use a funnel with gauge No.40; - set the landing gear selector valves to EXTENSION (ВЫТЯЖ) and the wing flaps to LANDING (ПОСАДКА); - then switch on the hydraulic boosters; - add some more AIT-10 fluid into the system and flush it, simultaneously retract and extend three to four times the landing gear, wing flaps, and speed brakes; besides, exercise the aircraft control stick in all directions for 4 to 5 minutes from extreme position to extreme 		

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Operations	Possible defects	Remedy
<p>system and release pressure from their actuating cylinders;</p> <ul style="list-style-type: none"> - open the hydraulic service tank filler neck; - disconnect and put the high pressure hose of the ground hydraulic pump into the container for used AIT-10 fluid, switch on the ground hydraulic pump and pour out the AIT-10 fluid; - set the speed brakes valve for retracting and simultaneously retract the brakes by hand. <p>4. Remove the hydraulic service tank filler neck filter, wash it in gasoline, examine and install it in its proper place.</p>	<p>The filter gauze is damaged.</p>	<p>Solder the damaged place, if the damaged surface of the gauze does not exceed 1 sq.cm. or if the gauze is unsoldered at the place of soldering. Replace the filter, if the damaged surface of the Gauze exceeds 1 sq.cm.</p>

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Operations	Possible defects	Remedy
<p>the tank and the filter and install the filter in its proper place.</p> <p>Press the tank valves to make sure that they open when pressure upon and close when pressure effort is removed.</p> <p>10. Install the hydraulic tank in the aircraft.</p> <p>11. Fill the aircraft hydraulic system with fresh ALT-10 fluid as described in Para.5, simultaneously make 20 complete movements with the aircraft control stick to flush the hydraulic system instead of pumping it through for 4 to 5 minutes.</p> <p>12. Switch off the hydraulic accumulator and the circuit breaker in the pilot's cockpit, which were switched on to flush the aircraft hydraulic system, disconnect the ground hydraulic pump.</p>	<p>The valves do not close after opening.</p>	<p>sealing does not eliminate leakage.</p> <p>Replace the hydraulic tank.</p>

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Operations	Possible defects	Remedy
<p>position, switching the hydraulic boosters on and off 5 to 6 times.</p> <p>6. Four screws that ALT-10 from the aircraft hydraulic system as pointed out in Para.3.</p> <p>7. Remove, wash and tighten the throttle valve (Fig.32); two valves are located in the main landing gear strut wells and one valve is between Para.5 frames Nos 4 and 5 accessible and install them in their proper places.</p> <p>8. Remove and wash in gasoline the coarse filtering element of GI-11 filter and replace the fine filtering element. Assemble the filter, and install it on the aircraft.</p> <p>9. Remove the hydraulic service tank, the tank return line filter, wash and examine</p>	<p>Leakage through the hydraulic tank sealing.</p>	<p>Tighten the sealing; replace the hydraulic tank if tightening the</p>

Operations	Possible defects	Remedy
<p>pump and create working pressure in the hydraulic system.</p> <p>3. Connect the aircraft to the external source of power and switch on, in the pilot's cockpit, the hydraulic accumulator and the circuit breakers of the wing flaps, speed brakes and hydraulic boosters.</p> <p>4. Extend and retract the wing flaps and the speed brakes three to four times.</p> <p>5. Deflect the aircraft control stick to the extreme right, left, forward and backward positions five to ten times, simultaneously turning on and off the hydraulic boosters 5 to 6 times with the help of the circuit breaker</p> <p>ELEVATOR, ALLERON HYDRAULIC BOOSTER (BY PVB BACON, SHEPCHA) then, with the hydraulic boosters engaged and the air pressure being 60 to 70 kg/sq.cm., release the</p>		

Operations	Possible defects	Remedy
<p>13. Disconnect the ground source of power from the aircraft.</p> <p>14. Lower the aircraft and remove the jacks.</p> <p><u>Note:</u> It is allowed to use the same fluid for retesting the hydraulic systems of three aircraft.</p> <p><u>Checking Hydraulic System for External and Internal Leakage</u></p> <p>1. Check the hydraulic system for oil filling. The AR-10 fluid level in the tank must be within the marks on the dipstick if there is no pressure in the hydraulic system, and if the wing flaps and speed brakes are retracted.</p> <p>2. Connect the ground hydraulic pump to the aircraft hydraulic</p>		

Operations	Possible defects	Remedy
<p>condition (at a pressure of 80 ± 5 kg/sq.cm.); the measured time must be not less than 45 seconds.</p>	<p>and aircraft control stick in the neutral position).</p>	<p>Increase considerably when the hydraulic boosters are being disengaged, disconnect the low pressure hose from the hydraulic booster, which mostly affects the automatic relief valve functioning time; then create working pressure in the system and set the hydraulic booster piston in the neutral position; check the disconnected hydraulic booster pipe union for the amount of AT-10 fluid leaking from it to determine interior leakage of the hydraulic booster (mainly leakage</p>

Operations	Possible defects	Remedy
<p>aircraft control stick; the latter must return to the neutral position. 6. Use the main hydraulic system pressure gauge (in the pilot's cockpit) to check the automatic relief valve for switching over, which must take place at a pressure of 140 ± 5 kg/sq.cm. (switching over to idle run) and at a pressure of 60 ± 5 kg/sq.cm. (switching over to operating condition).</p>	<p>Automatic relief valve switches over when the pressure is less than 140 ± 5 kg/sq.cm.</p>	<p>Check the automatic relief valve changeover pressure with the engines running; replace the automatic relief valve if, with the engines running, the valve operates at a pressure less than 140 ± 5 kg/sq.cm. Check once more the time necessary for the automatic relief valve to operate and if it is again less than permissible, do as follows: 1. Switch off the hydraulic boosters in the cockpit one by one and check the hydraulic system for interior leakage. Should the time necessary for the automatic relief valve to charge-over</p>
<p>7. Check the hydraulic system for interior leakage, for which purpose: - create a pressure in the system of 140 ± 5 kg/sq.cm. and start the engines stopped; - stop the switch at the moment the hydraulic run change-over from idle to operating</p>	<p>The automatic relief valve operates in less than 45 seconds (with flap valves in the neutral position, special brake valve switched off, hydraulic boosters engaged</p>	<p>1. Switch off the hydraulic boosters in the cockpit one by one and check the hydraulic system for interior leakage. Should the time necessary for the automatic relief valve to charge-over</p>

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Operations	Possible defects	Remedy:
		<p>To this end:</p> <ul style="list-style-type: none"> - disconnect the ground hydraulic pump, extend and retract the speed brakes several times (to check the main hydraulic system accumulator), or with the hydraulic boosters disengaged operate the aircraft control stick (to check the hydraulic booster system accumulator); the hydraulic system pressure (by the cockpit pressure gauge) must drop gradually to 40*5 kg/sq.cm. and then drop abruptly to zero; in case of any doubt, check the hydraulic accumulator for pressure with the help of a pressure gauge. Recharge the hydraulic accumulators if the pressure level is below 40*5 kg/sq.cm. and check the hydraulic

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Operations	Possible defects	Remedy
		<p>must not exceed 2000 cu.cm. per minute); replace the hydraulic booster, if maximum leakage exceeds 2000 cu.cm. per minute, and check the hydraulic system for pressure-tightness again.</p> <p>2. Check the hydraulic system for external leakage of AM-10 fluid through the pipe lines, units and their joints.</p> <p>Tighten the joints, replace the units or the pipe line to eliminate this leakage and check the hydraulic system for leakage again.</p> <p>3. If the hydraulic system is pressure-tight, check the hydraulic accumulators for air pressure, which must be 40*5 kg/sq.cm.</p>

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Operations	Possible defects	Remedy
<p>system for interior leakage.</p> <p>4. Switch the valves off one by one (by disconnecting and closing the pressure supply lines), to check the hydraulic booster unit for interior leakage.</p> <p>If the change-over time increases to normal then one of the valves is cut off, this valve is leaky and it must be replaced.</p> <p>5. If the hydraulic booster system interior pressure tightness is normal, check the main hydraulic system for interior leakage by checking the return valve (installed at the automatic relief</p>		<p>valve) for leakage. To do this:</p> <ul style="list-style-type: none"> - remove the return valve, fill it with AM-10 fluid from the side of the spring, and connect it to the compressed air bottle (with air compressed from 80 to 100 kg/sq.cm.); exceed 10 drops per minute; replace the valve if leakage exceeds the above mentioned value. 6. If the valve is pressure-tight, check the landing gear, ring flap, speed brake and jet nozzle valves for leakage (by disconnecting them from the system one by one); replace the automatic relief valve, if the valves are pressure-tight.
<p>8. Check the booster hydraulic system return valve for proper operation; the hydraulic booster</p>		

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Operations	Possible Defects	Remedy
		<p>system for interior leakage.</p> <p>4. Switch the valves off one by one (by disconnecting and closing the pressure supply lines), to check the hydraulic booster unit for interior leakage.</p> <p>If the change-over time increases to normal then one of the valves is cut off, this valve is leaky and it must be replaced.</p> <p>5. If the hydraulic booster system interior pressure tightness is normal, check the main hydraulic system for interior leakage by checking the return valve (installed at the automatic relief</p>

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Operations	Possible defects	Remedy
<p>2. Hold body 3 of the filter (Fig. 32) to unscrew the union nuts, ease off the filter fastening clamp and remove the filter; plug the disconnected pipes.</p> <p>3. Turn out locking screw 2.</p> <p>4. Unscrew cover 1.</p> <p>5. Remove gasket 4, the supporting washers and the filtering element.</p> <p>6. Wash the filtering element of the filter (washers) in clean gasoline and blow with compressed air.</p> <p>7. Wash all the filter metal components and dry them.</p> <p>8. Examine the filter components.</p>		
	<p>Damaged threading. Traces of corrosion.</p>	<p>Replace the filter components with damaged threading or replace the whole filter. Clean the corrosion traces with emery paper No. 18 to No. 220.</p>

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Operations	Possible defects	Remedy
<p>system pressure must not drop when the main hydraulic system pressure is lowered (by actuating the speed brakes).</p> <p>9. Disconnect the aircraft from the ground hydraulic pump and the external power source.</p> <p>10. Switch off the accumulator and the hydraulic booster circuit breakers in the cockpit.</p>		
<p>C O M P R E S S E D A I R S Y S T E M</p>		
<p><u>Inspection of compressed air union washers and Cockpit Pressurizing Valve</u></p> <p>1. Remove the filter pipe union nut locking arrangement (the compressed air system filter is located on the spar in the left main landing gear strut wall, near the filler pipe union; the safety pressurizing system filter is located on the empty slipstream section).</p>		

Operations	Possible defects	Remedy
<p>the left wing, near the fuselage).</p> <ol style="list-style-type: none"> 2. Remove the wing flap emergency bottle (which is located on the nose landing gear strut well, near frame No.4 of the fuselage, on the right-hand side if looking forward). 3. Pour the condensate out of the bottles. 4. Tap on the bottles with a mallet and shake them to make sure there is no foreign matter in them. 5. Check the cylinders for proper outside condition. 		<p>Replace the damaged rubber gasket.</p>
	<p>Foreign matter in the bottle.</p> <p>Traces of corrosion. Damaged varnish and paint coating.</p>	<p>Replace the bottle.</p> <p>Clean the corroded places with emery paper, coat them with Alu-1 primer and paint with black enamel. Paint away the damaged places on the entire bottle.</p>

Operations	Possible defects	Remedy
<ol style="list-style-type: none"> 9. Assemble the filter and install it on the aircraft in the order reverse to its removal. The arrow on the filter must point in the direction of the flow. 10. Check the filter and its joints for leakage under pressure. No leakage is permissible (carry out this operation while checking the entire system for leakage). <p>Removal and Inspection of Main Compressed Air System Bottles and Wing Flap Emergency Bottle</p>	<p>Damaged rubber gasket.</p>	<p>Replace the damaged rubber gasket.</p>
<ol style="list-style-type: none"> 1. Remove the main compressed air system bottles (one bottle is located in the left wing leading edge, between ribs No.2 and No.5 and the other is in 		

Operations	Possible defects	Remedy
<p>head (FIG. 3c) and into the levers located on the arm rests;</p> <ul style="list-style-type: none"> - take the ground safety cotter pin out of the ejection gun head and remove the head protecting plate; then insert the ground safety cotter pin in place again; - bring trigger 2 (FIG. 3d) on the head rest out of connection with fork 3 of the ejection gun head; - bring emergency canopy ejection lever 4 located on the seat out of connection with forked rod link 5; - place the bracing clamp on the fins; remove bolt 6 connecting the upper seat clamp with the seat ejection gun; - remove the seat of the aircraft seeing that the ejection gun safety cotter 	<p>During removal, the seat touches the aircraft structural elements.</p>	<p>Shift the parts electric wires and their attachment components, etc.)</p>

Operations	Possible defects	Remedy
<p>6. Examine the bottle attachment components.</p> <p>7. Put the bottles in place.</p> <p>8. Charge the system with air and check it for leakage.</p> <p><u>Removing Seat from Aircraft</u></p> <ol style="list-style-type: none"> 1. Remove the cockpit canopy from the aircraft. 2. Unload the ejection seat gun (the ejection seat gun may be unloaded by experts on armament only). 3. Remove the seat, for which purpose: <ul style="list-style-type: none"> - disconnect the cable spring hook of the AL-3 automatic mechanism from the clamp located on fuselage frame No. 7; - make sure that the ground safety cotter pins are inserted in the gun 	<p>Cracks on the components.</p> <p>EJECTION SEAT</p>	<p>Weld the cracks or replace the components.</p>

Operations	Possible defects	Remedy
<p>AM-3 mechanism (FIG.36); the footrest grips and the safety belt locks should unlock; examine the pin.</p> <p>Examine the automatic mechanism AM-3 for attachment to the seat; the AM-3 mechanism should be reliably bolted to the seat.</p> <p>3. Disassemble the mechanism of the lowering footrests, for which purpose:</p> <ul style="list-style-type: none"> - remove bolts 17 (FIG.35) securing the left-and-right-hand damper guards to the seat arm rests; - lower the footrests and take the dampers out of the casings; - take the damper rods out and make sure they have no dents, scores or any bending. <p>4. Use a brush and non-ethylated gasoline to wash</p>	<p>Loose nuts of AM-3 mechanism attachment bolts.</p>	<p>Tighten up the nuts.</p>

Operations	Possible defects	Remedy
<p>pin does not touch the aircraft structural elements.</p> <p><u>CAREFUL:</u> In removal and installation of the ejection seat, it should move freely in the guides without binding or distortion.</p> <p><u>Inspecting and Checking Mechanisms of Lowering Footrest Grips and Safety Belts for Proper Functioning</u></p> <ol style="list-style-type: none"> 1. Remove the ejection seat from the aircraft. 2. Unload (on the removed seat) spring-loaded mechanism 1 (FIG.35) of the system serving to unlock the safety belts and retract grips. To this end, pull out flexible pin 3 of the 	<p>Bending, extension of turns and corrosion on the pin.</p>	<p>to ensure a clearance of at least 5 mm between the aircraft structural elements and the seat when the latter is being removed from the aircraft.</p> <p>Replace the pin.</p>

Operations	Possible defects	Remedy
<p>- use a special hook to stretch the actuating cable in flexible hose 14 (Fig. 35) as far as it will go;</p> <p>- set the A-3 automatic mechanism at the required time period with the aid of the flexible pin and lock the latter;</p> <p>(b) arm the spring-loaded mechanism, for which purpose:</p> <p>- arm the middle plunger and fix it in the cylinder by means of a cotter pin;</p> <p>- arm the side plungers and insert cotter pins;</p> <p>- insert the middle cylinder, connected with the A-3 automatic mechanism through a cable in the flexible hose, as far as it will go;</p> <p>- take out the cotter pins fixing the mechanism plungers.</p>		

Operations	Possible defects	Remedy
<p>the hinges, seat sliding parts and cables until dirt and old grease are completely removed.</p> <p>5. Examine the hinges and sliding joints; check the cable linkage, attachment of the cable to the flexible sleeve and condition of the flexible sleeve.</p> <p>6. Coat all hinges, sliding joints and cables with lubricant LANTH-20; the cables in the flexible sleeve are coated by wiping them with a cloth liberally soaked in lubricant LANTH-20; when coating the cables that run in flexible sleeves or in tubes, shift the cables inside the sleeve or tube.</p> <p>7. Check the safety ball and contact with locks for proper contact. In this case:</p> <p>(a) arm the A-3 automatic mechanism, for which purpose:</p> <p>- insert flexible pin 2 (Fig. 35) into the mechanism;</p>	<p>Rotten cable braiding.</p> <p>Deformation of cable flexible sleeve due to improper attachment.</p>	<p>Replace the braiding.</p> <p>Straighten the sleeve.</p>

Operations	Possible Defects	Remedy
<p>at the moment the mechanism operates); the safety belt lock and footrest grips should unlock without delay and binding; repeat the check two times;</p> <p>(f) as soon as the check is over, set the system into operating condition as prescribed above (See steps "a" to "e"); in this position the footrest grips should be unlocked.</p> <p><u>Note:</u> If the grips get accidentally locked, unlock them by turning bell crank 3 of the footrest grips (See Fig.35); the bell cranks protrude from the ports made in the inside walls of the footrests;</p> <p>(g) lock the flexible pin of the M-8 automatic mechanism with the help of thread 10.00.</p> <p>8. With the seat removed, check operation of the lowering footrest mechanism, for which purpose:</p>		

Operations	Possible Defects	Remedy
<p><u>NOTE:</u> The side bumpers and middle cylinder should be installed flush with the spring-loaded mechanism wall;</p> <p>(e) lock the footrest grips by stepping down on the heel rests;</p> <p>(d) lock the safety belts after they have been smoothed down and stretched manually so that the lock occupies its normal position;</p> <p>(e) pull out the flexible cotter pin of the M-3 automatic mechanism (start the stopmatch at the moment the cotter pin is pulled out); the mechanism will start operating and will open the lock when the set time period is up (stop the stopmatch</p>	<p>Mechanism operating time period is other than specified on the scale.</p> <p>Safety belt lock does not open.</p>	<p>Replace the mechanism.</p> <p>The belts are poorly tightened; stretch the belts and repeat the check.</p>

Operations	Possible defects	Remedy
		<p>- apply a load of 0.5 kg for lowering the footrests and a load of 20 kg for folding, and check the time required for footrest lowering. In case one of the dampers is charged insufficiently, recharge it as follows:</p> <ul style="list-style-type: none"> - remove the damper from the seat; - compress the damper completely; - screw the plug out of the filler pipe union and fill the damper with A.T.-10 fluid up to the face of the filler pipe union; - then drain 1.5 cu.cm. of A.T.-10 fluid; - screw the plug onto the filler pipe union and lock it;

Operations	Possible defects	Remedy
<p>(a) set the damper rods in place;</p> <p>(b) secure the dampers on the arm rests;</p> <p>(c) apply a load to the footrests.</p> <p>The footrests should move evenly, without distortion or binding; the footrests should lower for a time period of 1 to 3 seconds under a load of 1 kg.</p> <p>The footrests should fold for a time period of 5 to 10 seconds when a load of 20 kg is applied to them.</p>	<p>Time for lowering and folding of the footrests for a time period less than permissible indicates lack of operating fluid in the dampers. In order to find out which damper is insufficiently charged, do as follows:</p> <ul style="list-style-type: none"> - disconnect one of the dampers from the seat arm rest; 	<p>Lowering and folding of the footrests for a time period less than permissible indicates lack of operating fluid in the dampers. In order to find out which damper is insufficiently charged, do as follows:</p> <ul style="list-style-type: none"> - disconnect one of the dampers from the seat arm rest;

Operations	Possible Defects	Remedy
<p>position. After the seat has been installed, the levers of the footrest grip mechanism should rest against the restraining flats on the cockpit floor.</p> <p><u>Checking Shoulder Harness Locking Mechanism for Proper Operation</u></p> <ol style="list-style-type: none"> 1. Put the parachute in the seat bowl, place yourself in the seat and fasten the harness. 2. Release the shoulder harness and make sure that its adjusting mechanism operates correctly. 3. Lock the harness belts, in turn, in every point and check to see that the adjusting mechanism is disengaged and that no forward deflection is possible; pay special attention to the locking of the 		

Operations	Possible Defects	Remedy
<p><u>Installing Ejection Seat on Aircraft</u></p> <ol style="list-style-type: none"> 1. Check the seat stabilizing fins for easy rotation and for reliable locking in the open position. 2. Mount the ejection seat on the aircraft. Ejection seat installation is the reverse to removal. <p><u>Note:</u> Prior to installing the ejection seat on the aircraft, raise its footrests to the upper</p>	<p>Fluid leakage around the damper sealing.</p>	<p>- mount the damper on the seat and check it for proper operation once more.</p> <p>Eliminate fluid leakage by tightening the sealing or replace the latter.</p>

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Operations	Possible defects	Remedy
<p><u>CAUTION</u> 1. Never remove the interlocking cable along with the canopy; when necessary, remove the interlocking cable from the aircraft after the canopy has been removed.</p> <p>2. To avoid accidents when working inside the cockpit, with the canopy opened or removed, put protecting caps on the cylinders of the canopy remover pneumatic guns.</p> <p><u>Inspecting and Lubricating Canopy Lock Parts and Detention Mechanism</u></p> <p>1. Wipe the parts of the locks on the canopy sliding section and on the fuselage as well as the emergency rack and spring-loaded mechanism with a clean piece of cloth</p>	<p>Cracked part's of lock.</p>	<p>Replace the lock.</p>

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Operations	Possible defects	Remedy
<p>shoulder harness in the position corresponding to seat ejection.</p> <p><u>Removing Cockpit Canopy from Aircraft</u></p> <p>1. Remove the safety cotter pin connecting the ejection gun interlocking cable with the canopy.</p> <p>2. Take the locking pins out of the rear restrainers of the left-hand right-hand guide rails; the springs should force the restrainers to turn to rear position.</p> <p>3. Slide the canopy backwards by means of the front lock levers until the rollers disengage the rails, and remove carefully the canopy sliding section from the aircraft.</p>	<p><u>CAUTION</u></p>	

Operations	Possible defects	Remedy
<p>4. Coat all the indicated parts and cables with <u>HEATSHIELD-201</u> lubricant; when coating the cables, that run in tubes, displace the cables to ensure even coating of the cable in hard-to-get-places; the cables in the tubes should be heavily coated with <u>HEATSHIELD-201</u> lubricant. Check the cables for easy movement.</p>		
<p>5. Check to see that canopy front lock hooks 3 (Fig. 37) disconnect simultaneously from the shackle when the internal canopy opening control handle is actuated; the difference in deflection of the right- and left-hand lifting levers 5 at full travel of the control handle must not exceed 1.5 mm; after the handle is released, it should be energetically pushed forward by the springs.</p>	<p>Difference in deflection is more than permissible.</p>	<p>Adjust the system by means of the turnbuckles of the cable that interconnects the front locks. After adjustment, lock the cable turnbuckles with wire <u>KOK-0.5</u> mm.</p>

Operations	Possible defects	Remedy
<p>soaked in clean non-ethylated gasoline; examine the above-mentioned parts.</p> <p>2. Wash and visually examine the rods on the fuselage and the canopy jettison mechanism cable linkage on the fuselage and on the canopy.</p>	<p>Loose locking nuts of turnbuckles, unbent tabs of locking washers.</p> <p>Broken cable wires.</p>	<p>Replace cracked locking washers. In case of loose locking washer tabs, bend them over the flats of the turnbuckles; tighten loose locking nuts towards the turnbuckles and lock them with wire <u>KOK-0.5</u> mm. Replace the cable.</p>
<p>3. Check the attachment of the cable linkage tubes of the canopy jettison mechanism (on the canopy sliding section); see that the tubes are reliably secured to the canopy framework; no swinging of tubes is permissible. Pay special attention to the conditions of the cables where they are secured to the terminals and where they enter the tubes.</p>		

Operations	Possible defects	Remedy
<p>between the rests of hook 3 (Fig. 37, Section AERT) and the rails must be 0.2 to 1 mm, the difference in the clearances being not more than 0.4 mm; with the cockpit pressurized, there should be no clearance between the hook rests and the rails.</p> <p>3. Close the canopy and check, from the outside, the canopy sliding section for proper contact with the windshield; sinking of the canopy front part relative to the windshield is permissible if it does not exceed 1.5 mm.</p> <p>4. Open the canopy; the efforts required to open hook 3 and to shift the canopy sliding section from closed position must not exceed 35 kg (the efforts are to be measured by a dynamometer, the load being applied to canopy opening handle 10 at an arm of 120 mm from the axis of rotation).</p>		
	<p>The effort on the handle exceeds the permissible values.</p>	<p>Wash and coat the cable interconnecting the right- and left-hand locks and check the clearances between union shackles shafts 2 and the hooks.</p>

Operations	Possible defects	Remedy
<p><u>Checking Canopy Jettison Switch for Proper Operation and Canopy Locks for Unlocking</u></p> <p>1. Make sure that canopy jettison lever 4 (See Fig. 34), located on the ejection seat, is connected with forked link 5 and that the ground safety button pin is inserted into the head of the ejection gun. Release the air from the aircraft main air system and from the canopy pneumatic gun bottle until a pressure of 50 kg/sq.cm. is obtained, for which purpose press the pneumatic valve button and turn the pneumatic valve lever.</p> <p>2. Mount the canopy on the aircraft. Mounting is the reverse of dismounting. Shift the canopy sliding section along the rails to check for binding; the clearance</p>	<p>Clearances are other than specified.</p>	<p>In case of reduced clearances, file the hook necks to obtain the requisite clearance, replace the lock.</p>

Operations	Possible defects	Remedy
<p>- there should be no clearance between rests 11 and rail 6.</p> <p>7. Pay special attention to the connection between canopy jettison movable rail 9 (Fig. 38) and carrier 8 of the rear lock mechanism; as the canopy sliding section is moved backwards, the carrier should be engaged with rail 9 all over the canopy movement range and there should be a clearance of 2 mm maximum between the internal surface of the rail and the carrier in the vertical plane.</p> <p>8. Jettison the cockpit canopy from the ejection seat face screen, for which purpose:</p> <p>(a) close the canopy and pressurize the cockpit by opening pressurizing valve 8 (See Fig. 37);</p> <p>(b) cover the canopy sliding section with a blanket from</p>	<p>The clearance is other than specified.</p>	<p>Obtain the required clearance by adjusting the plug of spring-loaded mechanism rod 7 and carrier 8.</p>

Operations	Possible defects	Remedy
<p>5. Check closing of the canopy. The locks should close without any knock as the sliding section of the canopy is slowly closing. When this is done:</p> <p>- clearance between the vertical edge of hook 3 and union shackle shaft 2 must be 0.4 to 0.8 mm (without any pressure in the cockpit); the shackle shaft must be parallel to the canopy ejection plane;</p> <p>- clearance between the horizontal edge of hook 3 and union shackle shaft 2 from 0.5 to 1.0 mm is permissible (without any pressure in the cockpit).</p> <p>6. With the canopy closed and the cockpit not pressurized:</p> <p>- the hook rollers should rest against the lower surface of rail 12; no clearances are allowed;</p>	<p>Obtain the required clearances between the hook and the shackle shaft by shifting the shackle column on the fuselage panel.</p>	

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Operations	Possible defects	Remedy
<p>the canopy pressurizing valve to avoid damage to the pressurizing rubber tubes;</p> <p>(d) after pulling out the face screen as far as it will go, the canopy jettison system must operate and the canopy must break loose from the fuselage.</p> <p><u>CAUTION:</u> Protect drooping parts of canopy locks against damage.</p>	<p>Canopy cannot be jettisoned. (Locks do not open).</p>	<p>If the locks do not open, adjust the system by means of forked link 5 (See Fig. 34) located at the ejection seat head rest. The forked rod is adjusted by means of an adapter so that with the face screen travelling by 140⁺³⁰ mm, the jettison movable rail shifts by at least 35 mm and the clearance between the link and the fuselage panel is 2.5±1 mm.</p> <p>Repeat operations under Item 8.</p> <p>Wash the parts and hinges of the locks with clean</p>

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Operations	Possible defects	Remedy
<p>top and hold the blanket on both sides of the aircraft at the moment the canopy sliding section is being jettisoned; in doing so see that the canopy sliding section can go up by 80 to 100 mm;</p> <p>(e) pull energetically with both hands at the handle of the seat face screen as far as it will go; the effort required to jettison the canopy from the ejection seat face screen must not exceed 20 kg by a dynamometer. Travel of face screen at canopy jettisoning is 140⁺³⁰ mm.</p> <p><u>CAUTION:</u> 1. For safety, it is necessary to first incline the head. 2. After the canopy has been jettisoned, close immediately</p>	<p>for pulling at the seat face screen due to insufficient clearance between link 5 (Fig. 34) and the fuselage panel.</p>	<p>clearance of 2.5±1 mm between the link and the fuselage panel.</p>

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Operations	Possible defects	Remedy
<p>9. Arm the canopy rear lock. To do this: (a) insert lock lever 12 with roller (See Fig.38) into body 1, set blocking lever 2 at working position and hold the latter by your hand until the spring-loaded mechanism is armed; (b) arm the spring-loaded mechanism, for which purpose insert the stem of the device shown in Fig.40 through the canopy starboard opening and screw it into the spring-loaded mechanism rod.</p> <p>10. Close the front locks (Fig.41), for which purpose do the following on each of the locks: put hook 2, blocking lever 3 and control lever axle 4 into working position. During this operation, support manually the cables of the locks at bell crank 4 (See Fig.35) of the rear lock mechanism to avoid sharp bends of the cable.</p>		

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Operations	Possible defects	Remedy
<p>(e) press the canopy from below to raise it and to make sure that the locks are opened and that the canopy has detached from the aircraft; REMOVE the canopy without lowering the sliding section onto the locks.</p>	<p>binding in the lock hinges. Canopy cannot be jettisoned due to excessive clearance between pneumatic valve lever 2 (Fig.39) and rear lock mechanism bell crank 4.</p>	<p>non-ethylated gasoline and coat them with MATHIL-201 lubricant. If necessary check adjustment of the locks. Adjust the system to obtain the required clearance of 3.4 mm between the valve lever and the bell crank by shifting the pneumatic valve over the fuselage panel.</p>

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Operations	Possible defects	Remedy
<p>even and the effort applied to both rods should be equal.</p> <p>12. Mount the canopy sliding section on the aircraft and jettison it in the same order at a pressure in the cockpit equal to 0.1 kg/sq.cm., using a blanket to hold the canopy from falling down (do not stretch the blanket). Air pressure in the cockpit is created as follows:</p> <ul style="list-style-type: none"> - Remove hatch plate bearing the inscription CHARGING WITH OXYGEN (ЗАПЛІТА КИШОРОМ) located at frame No.4, port side, and connect the airfield compressed air bottle hose to the rear pipe union; - put the screw plug on the branch pipe of the PA-2MA regulator (Fig.42); - remove the screw plug from the pipe union in the cockpit; 		

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Operations	Possible defects	Remedy
<p>11. Check the rods of the canopy pneumatic gun cylinders for proper extension which should be 65 mm; return pneumatic valve lever 2 (See Fig.39) into vertical position and release the air from the canopy pneumatic gun cylinder by pushing button 3 on the pneumatic valve; set manually the canopy pneumatic gun cylinder rods to initial position and check the rods for proper travel: rod travel should be</p>	<p>Pneumatic valve lever binds.</p> <p>Pneumatic valve spring and sealing are damaged.</p>	<p>Wash the hinges in clean non-ethylated gasoline and use a brush to coat them with IPATHEP-201 lubricant. Replace damaged spring and sealing.</p>

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Operations	Possible Defects	Remedy
<p>cockpit). Disconnect the hose of the ground compressed air bottle and remove the screw plug from the branch pipe of the <i>EM-2MA</i> regulator. Mount the screw plug on the pipe union located in the cockpit.</p> <p>15. Check the canopy locks for synchronous opening, for which purpose:</p> <ul style="list-style-type: none"> - remove the canopy from the aircraft and place it horizontally; - disconnect rear lock mechanism lever 14 (See Fig. 38) from the spring-loaded mechanism rod and set the entire system on the cockpit canopy at initial (closed) position as indicated in Items 9 and 10; - mount the device shown in Fig. 43 on the canopy beam; - suspend 5-kg loads from each roller and apply an effort of 8 - 10 kg to the control levers of the front locks; - slowly turn the rear lock mechanism bell crank using a 		

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Operations	Possible Defects	Remedy
<p>- close the canopy sliding section and pressurize the cockpit;</p> <p>- open the valve of the airfield bottle, fill the cockpit with air up to a pressure of 0.1 kg/cm² (as checked by the readings of pressure warning unit <i>YBZ-15</i> and close the valve.</p> <p>13. After the canopy has been jettisoned:</p> <ul style="list-style-type: none"> - set the canopy jettisoning system at initial (closed) position as indicated in Item 11; - mount the canopy sliding section on the aircraft and close the canopy; 14. Jettison the canopy: the tubes by means of the automatic jettisoning handle (14) the cockpit is pressurized to the excessive pressure that is the nature of <i>YBZ-15</i> in the 		

Operations	Possible defects	Remedy
<p>locks opening simultaneously, the rear lock may lag behind by 0.5 mm of the bell crank travel.</p> <p>Permissible lagging behind of the rear-hand lock opening moment relative to the left-hand one and vice versa must not exceed one division of the protractor; with the front locks opening simultaneously, the opening moment of the rear lock may lag behind by not more than one division of the protractor.</p> <p>CAUTION: Protect the lock falling out parts against damage.</p> <p>16. Connect link 14 (See Fig. 38) with the spring-loaded mechanism rod and set the canopy detensioning system at initial</p>	<p>Opening moment of the locks lags behind by more than one division of the protractor.</p>	<p>Adjust opening of the front and rear locks by changing the cable length with the aid of turn-buckles 3 and forked rod 10 (See Fig. 38) that connects the bell crank with control lever 11 of the rear lock mechanism. After adjustment, lock the turnbuckles with wire TOK-O.5 mm.</p>
	<p>Loose cables.</p>	<p>Tighten the cables by means of the turn-buckles.</p>

Operations	Possible defects	Remedy
<p>special wrench with a pointer; the locks must open simultaneously.</p> <p><u>Note:</u> If no special device (See Fig. 43) is available, turn the rear lock mechanism bell crank manually, (do it slowly); under the action of 5-kg loads suspended from each lock roller and under 8 - 10-kg efforts applied to the lock control levers the right- and left-hand locks should open simultaneously; permissible lagging behind of one lock relative to the other is 0.5 mm maximum of the travel of bell crank 4 (See Fig. 38) of the rear lock mechanism (as counted by the cable-to-bell crank attachment points).</p> <p>The rear lock should open simultaneously with the last front lock; with the front</p>		

Operations	Possible Defects	Remedy
<p>20. Mount the canopy on the aircraft, connect the interlocking cable to the canopy and recharge the aircraft compressed air system and the canopy remover pneumatic gun bottle with air.</p> <p><u>Inspecting Cockpit Pressurizing Rubber Tubes</u></p> <ol style="list-style-type: none"> 1. Remove the canopy from the aircraft. 2. Examine the pressurizing rubber tube on the canopy sliding section (no broken portions, chafing or scores are permissible). 	<p>Protective coating of pressurizing rubber tubes is damaged.</p>	<p>Wipe damaged places of rubber tube coating with a clean piece of cloth soaked in gasoline, allow the surface to dry and brush it over with three coats of Glue 23-CA; wait at least 2 - 3 minutes for each coat to dry. The rubber tube should be coated and dried at a temperature not below +10°C.</p>

Operations	Possible Defects	Remedy
<p>(closed) position as prescribed in Items 9 and 10; do not fail to see that the cables are not loose.</p> <p>17. Set the latches of the rear hinged rests on the rails to closed position, and in this position, turn the jettisoning autonomous handle forward.</p> <p>18. Use wire KOK-0.5 to safety control levers 4 (See Fig.37) on the front locks, the seat face screen handle, canopy jettisoning autonomous handle and movable rail 9 (See Fig.38), turnbuckles 3 of the cable linkage running to the front locks and to the rear lock mechanism ball crank, as well as the locking nut on carrier 8.</p> <p>19. Load the seat ejection gun (this operation must be performed by an expert on aircraft armament).</p>		

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Operations	Possible defects	Remedy
<p>rubber gasket in the canopy ventilation system branch pipe.</p>	<p>Burrs and scores on branch pipes and dirt in branch pipes.</p>	<p>with the cockpit non-pressurized and without any pressure in the pressurizing rubber tube. Remove burrs and scores with emery cloth, Gramularity No.130; remove dirt with a clean piece of cloth; coat the cleaned places with primer.</p>

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Operations	Possible defects	Remedy
<p>3. Check the arrangement of the pressurizing rubber tube in the groove of the canopy sliding section: the tube must extend out of the groove from 0 to 1.5 mm; pay attention to see that the tube is glued to the groove bottom only and that it is not glued to the groove walls; there should be no dirt between the rubber tube and the groove walls.</p> <p><u>Inspecting Joint between Cockpit Supply System Branch Pipe and Canopy Ventilation Manifold etc</u> <u>Checking Condition of the latter</u></p>	<p>Damaged rubber gasket.</p>	<p>In case of damaged rubber gasket or rubber separation, replace the gasket or remedy it with glue No.88; when doing so, the gasket should be compressed to 4-1 mm</p>

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Operations	Possible defects	Remedy
<p>4. Remove the access hatch plate bearing the inscription CHAPLINS WITH OXYGEN (ЗАПЛИВА КИСЛОРОДОМ) and located in the vicinity of fuselage frame No. 8, and connect the hoses of the ground appliance along with the ground (airfield) bottle to the two rear pipe unions; remove the screw plugs from the pipe unions in the cockpit (at the port side pedal).</p> <p>5. Close the canopy and pressurize the cockpit from the outside by turning the pressurizing valve spindle counter-clockwise with the aid of a screw driver.</p> <p>6. Open the valve of the appliance to pressurize the cockpit from the ground bottle until the pressure reaches 0.3 kg/sq.cm. and watch the readings of the YBU-15 pressure warning unit mounted on the appliance.</p>		

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C O C K P I T

Operations	Possible defects	Remedy
<p><u>Checking Cockpit for Pressure-Tightness</u></p> <p>1. Inspect the sealing boots of the aileron control rods on fuselage starboard near the pressurizing box on fuselage frame No. 9, as well as the fairlead boots of the landing gear lock emergency opening cables.</p> <p>2. Check all joints of the cockpit supply system units for reliability of attachment and also the tube heat-insulation and tube-to-engine flange attachment for being in good condition.</p> <p>3. Place the screw plug (Pic. 42) on the branch pipe of the Y-1000 regulator (outside the aircraft on the fuselage port side).</p>	<p>Damaged rubber boots.</p>	<p>Replace faulty boots.</p>

Operations	Possible defects	Remedy
		<p>at zero pressure in the cockpit and 3.5 mm when the cockpit is under pressure;</p> <p>- use a clearance gauge to check the clearance between the windshield (Fig.45) and the canopy sliding section which must not exceed 2 mm at zero pressure in the cockpit.</p> <p>(2) In case of air leakage through the joint between the canopy framework and the organic glass, apply new tape on the organic glass to eliminate leakage.</p> <p>(3) The cockpit may be also rendered non-airtight by the following: low pressure in the pressurizing rubber tube (the pressure in the rubber tube is to be checked by means of a pressure gauge connected to it), leaky or inoperative return valve, safety valve or pressurizing valve.</p>

Operations	Possible defects	Remedy
<p>7. Close the appliance valve and count (by the stopwatch) the time during which air pressure drops from 0.3 to 0.1 kg/sq.cm; air-tightness of the cockpit is considered adequate if the pressure drops for a time period not less than 90 sec.</p>	<p>Time during which pressure drops is less than 90 sec.</p>	<p>To determine places through which air leaks from the cockpit, examine all the cockpit fairleads for control rods, cables, pipe lines and electric wires; check also the canopy glasses and rivet joints for air-tightness by means of soap suds.</p> <p>(1) In case of air leakage through the joints of the canopy sliding section to the fuselage undercanopy panel and to the canopy windshield, check the canopy for proper contact (Figs 44 and 45) in the following sequence:</p> <p>- use a clearance gauge to check the clearance between undercanopy panel 1 (Fig.44) and canopy framework 3 in the vicinity of pressurizing rubber tube 2. The clearance must not exceed 1.5 mm</p>

Operations	Possible defects	Remedy
<p>8. Depressurize the cockpit, place screw plugs into the pipe unions located in the cockpit and remove the screw plug from the Pt-21A regulator branch pipe.</p>		<p>fixing the valve in its extreme positions; in case the valve is leaky, remedy it by replacement of the faulty part, then check the valve for leakage at a pressure of 3 kg/sq.cm. In case the pressure reducing valve PB-1.5 was removed or replaced, check the pressure in the rubber tube once more with a pressure gauge; binding of the relief valve piston is eliminated by lapping.</p> <p>If the safety valve located in the cockpit fails in operation, remove the valve, disassemble it, wash, dry, assemble it again and mount on the aircraft.</p>

Operations	Possible defects	Remedy
		<p>Remove faulty unit, disassemble and wash it. Replace deteriorated or damaged rubber sealing, assemble the unit and put it where it belongs.</p> <p>In case the safety valve or the PB-1.5 pressure reducing valve is disadjusted, remove and adjust the unit; pressure in the pressurizing rubber tube must be 1.8 ± 0.75 kg/sq.cm. The safety valve should be adjusted for a pressure of 2.5 ± 0.3 kg/sq.cm. and it should be completely open at a pressure of 3 kg/sq.cm.; after adjustment is over, test the valve for leakage in a bath with an aqueous solution of potassium bichromate, feeding air compressed to 4 kg/sq.cm. After the test, blow through the valve with compressed air for 1 hour at a temperature of 30 to 35°C.</p> <p>In checking the pressurizing valve, pay special attention to</p>

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Operations	Possible defects	Remedy
<p>unit located on the instrument panel. For safety, match the warning unit through the canopy glass at a distance of 0.5 to 1 m. from it.</p> <p>Close the bottle valve and check by a stopwatch to see that the time required for the pressure to drop from 0.3 to 0.1 kg/sq.cm. is not less than 90 sec.</p> <p>4. Unpressurize the cockpit, install the screw plug into the cockpit pipe union and remove the screw plug from the branch pipe of the PT-2MA regulator.</p> <p>5. Disconnect the airfield bottle hose from the pipe union and close the access hatch.</p> <p><u>Washing Slide Valve and Body of Cockpit Air Supply Valve</u></p> <ol style="list-style-type: none"> 1. Back out the screw and remove handle 3 (Fig.46). 2. Screw off four valve cover attachment screws and take out the slide valve. 		

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Operations	Possible defects	Remedy
<p>9. Disconnect the appliance hoses from the aircraft pipe unions and close the access hatch.</p> <p><u>Checking Cockpit for Pressure-Tightness when No Appliance Is Available</u></p> <ol style="list-style-type: none"> 1. Place the screw plug shown in Fig.42 into the branch pipe of the PT-2MA regulator and remove the plug from the cockpit rear pipe union. 2. Remove the access hatch plate bearing the inscription <u>CHARGING WITH OXYGEN</u> and connect the airfield bottle hose to the rear pipe union. Close the cockpit canopy and pressurize the cockpit from the outside. 3. Open the valve of the airfield bottle to create an excessive pressure of 0.3 kg/sq.cm. in the cockpit as read by the JEM-15 pressure warning 		<p>The defects and remedies are the same as described above when checking the cockpit for pressure-tightness with the help of a special appliance.</p>

BRAKE SYSTEM

Operations	Possible defects	Remedy
<p><u>Inspecting Pressure Reducing Valve IV-7 and Differential Control Unit IV-8 and Their Controls</u></p> <ol style="list-style-type: none"> 1. Remove the aircraft canopy and ejection seat. 2. Check condition of the pressure reducing valve IV-7 and differential control unit IV-8 (Fig. 47). <p>Check the IV-7 valve control cables and sleeving paying special attention to places where the cable is secured to the terminals and where it comes out of the flexible sleeving. Inspect also the places where the cable is bent.</p>	<p>Broken cable wires, displacement of flexible hose turns.</p> <p>Traces of corrosion; broken cable wires.</p>	<p>In case of the above-mentioned defects, replace the faulty cable or flexible sleeving.</p> <p>Wipe corroded places on the cable with cotton waste soaked in kerosene, then coat these places with lubricant MIL-201 and wipe them dry with pieces of cloth; it is not recommended</p>

Operations	Possible Defects	Remedy
<ol style="list-style-type: none"> 3. Wipe the working surface of the valve body with a piece of dry cloth. 4. Wash the slide valve in clean non-ethylated gasoline. 5. Examine the working surface of the body and slide valve and also the rubber gasket. 	<p>Traces of deposit.</p>	<p>Remove deposit with a wooden stick, wash the parts in gasoline again by means of a brush, allow the surfaces to dry and coat them with grease OHS-122, oil MSH or lubricant MIL-201.</p> <p>Replace damaged gasket.</p>
<ol style="list-style-type: none"> 6. Coat the working surface of the valve body with a thin layer of MIL-201 lubricant. 7. Put the slide valve in place following the order reverse to removal. 8. Check the cockpit supply valve for proper operation shifting the valve 4 or 5 times; the valve handle should move freely, without any binding. 	<p>Gasket is cut or damaged.</p>	

AIRCRAFT CONTROLS

Operations	Possible Defects	Remedy
<p><u>Checking Aircraft Controls for Play</u> (before the fuselage is disjoined)</p> <p>The check is to be carried out as follows:</p> <ul style="list-style-type: none"> - shift manually the elevator (aileron) trailing edges, with the hydraulic booster disengaged, to make sure that there are no knocks in the links from the elevator (aileron) to the hydraulic booster (Figs 48 and 49); - deflect the control stick forward and rearward (to the right and to the left) to make sure that there is no noise in the links from the control stick to the hydraulic booster; - clamp the rudder and deflect the pedals to check the links for knocks. 	<p>Knocks in aircraft control hinge joints.</p>	<p>Replace parts of a knocking hinge joint.</p> <p>Play on the aircraft control stick with the hydraulic boosters disengaged should be 12 to 15 mm.</p> <p>Elevator (aileron) play, with the stick clamped and a load of 5 kg applied at a distance of 80 to 100 mm from the elevator (aileron) trailing edge, should be: 2.5 mm for the elevator; 5 mm maximum for the right-hand aileron and 5.5 mm maximum for the left-hand aileron; play of aileron halves relative to each</p>

Operations	Possible Defects	Remedy
<p>3. Mount the ejection seat and the canopy on the aircraft.</p>	<p>to remove corrosion with the aid of emery cloth; if broken wires have been detected, replace the cables.</p> <p>Cables Adjust the cable length by means are excess- of their turnbuckles.</p> <p>ively extended.</p>	

Operations	Possible defects	Remedy
<p><u>Inspecting Hinge Joints</u> <u>inside Fairlead Box on Fuselage</u> <u>Frame No.9</u></p> <ol style="list-style-type: none"> 1. Remove the canopy sliding section and pilot's seat. 2. Remove the fairlead box cover. 3. Through the hole in the box make sure that there is no foreign matter inside the box. 4. Use a hair brush and gasoline to wash the hinge joints inside the box. 	<p>Foreign matter in the box.</p>	<p>other must not exceed 1 mm. Play on the rudder with the pedal fixed must not exceed 10 mm. Free travel of aircraft control stick (with the hydraulic boosters engaged) should not exceed 3.5 mm before the elevator or aileron begins to deflect.</p>

Operations	Possible defects	Remedy
<p><u>CAUTION:</u> When washing the hinge joints inside the box, prevent gasoline from getting onto the rubber sealing of the control shafts. Blow the hinge joints inside the box with compressed air.</p> <ol style="list-style-type: none"> 5. Manually move the bell cranks inside the box and check to see that they have no angular play. 6. Examine the condition of the parts inside the box. Make sure that when the aircraft and engine control rods are moved there is no peculiar noise in the bearings of the hinge joints located inside the box. 	<p>Play between bell cranks and their axles. Damaged parts. Noise is produced during movement.</p>	<p>Tighten the bell crank taper attachment bolts. Repair or replace the damaged parts. Wash the bearing with gasoline, blow it with compressed air, coat with Lubricant LITHOL-201 and check the controls again; if this fails to eliminate the peculiar noise, replace the bearing or the rod along with the bearing.</p>

Operations	Possible defects	Remedy
<p>7. Inspect the rubber sealing of the box shafts (without their removal) and the box cover gasket.</p> <p>8. Coat the hinge joints with EMATH-201 lubricant using a brush for this purpose; do not forget to move the bell cranks in order to let the lubricant get inside the joints.</p> <p>9. Put the cover in place.</p> <p>10. Move the aircraft control stick and engine control levers to make sure that the parts inside the box do not touch each other.</p>	<p> Damaged shaft rubber sealing and gasket, or rubber being.</p>	<p> Replace the faulty parts.</p>
<p><u>Checking Condition of Compensating Weights and Aero-dynamic Compensating Fabric of Ailerons</u></p>		
<p>1. Back out the screws and open the hatches on the wing bottom skin giving access to the aero-dynamic compensating fabric and aileron control units.</p>		

Operations	Possible defects	Remedy
<p>2. Inspect the aerodynamic compensating fabric and also the compensating weights.</p>	<p> Torn fabric.</p> <p> Loose screws attaching the fabric to the wing.</p> <p> Damaged attachment of aileron compensating weights.</p>	<p> Repair the fabric by gluing up patches with glue No.88 or replace the fabric.</p> <p> Tighten up loose screws and replace their locking arrangement; the ends of the locking wire should be located so that they do not touch the fabric when the ailerons are being moved.</p> <p> Repair or replace the aileron.</p>
<p>3. Visually examine the aileron attachment fittings.</p>	<p> Damaged parts of attachment fittings (e.g. bearings).</p>	<p> Replace the damaged part.</p>
<p>4. Lubricate the aileron attachment fittings and control elements without removing the ailerons.</p>		

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Operations	Possible defects	Remedy
<p>5. Put the plates of the hatches giving access to the aileron zero-dynamic compensating fabric in place.</p> <p>6. Move the ailerons to make sure that they do not touch the wing structural elements.</p> <p><u>Removing, Washing, Inspecting, and Lubricating Aileron Middle Attachment Fittings</u></p> <p>1. Remove the aileron middle attachment fittings (Fig. 51), for which purpose:</p> <ul style="list-style-type: none"> - remove the plates of the hatches giving access to the middle attachment fitting on the under-aileron panel and on the wing top skin between ribs Nos 23 and 24; - remove bolt 1 connecting the bell crank of the middle attachment fitting with the aileron control rod; 		

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Operations	Possible defects	Remedy
<ul style="list-style-type: none"> - take out two bolts 2 attaching the ailerons to universal joints 3; - remove the aileron; - take out four bolts 4 securing bracket 5 of the middle attachment fitting to the bracket on the wing; - remove the aileron middle attachment fitting. <p>2. Wash all hinged joints and friction surfaces of the middle attachment fitting with clean non-ethylated gasoline.</p> <p>3. Inspect the middle attachment fitting, check it for attachment and proper locking of all its joints.</p> <p>4. Coat the parts of the attachment fitting with <u>EMALTA-201</u> lubricant with the aid of a hair brush.</p> <p>Move the bell crank and universal joints in the</p>		

Operations	Possible defects	Remedy
<p>attachment fitting several times to let the lubricant get into the hinged joints.</p> <p>5. Install the middle attachment fitting and access hatch plates where they belong following the order reverse to removal.</p> <p><u>Checking Elevator and Rudder Balance Weights for Proper Attachment</u></p> <ol style="list-style-type: none"> 1. Remove the access hatch plate in the rudder nose part. 2. Visually examine and swing the balance weight by hand to check the attachment of the balance weight position in the hatch. 3. Put the access hatch plate in place. 4. Visually inspect the attachment of the balance weight located in the rudder horn. 	<p>The balance weight swings under hand-applied force.</p> <p>Loose rivets.</p>	<p>Tighten the balance weight attachment bolts and lock them again.</p> <p>Replace loose rivets by new ones of the next larger size. Given below are the main indications to rivet looseness:</p>

Operations	Possible defects	Remedy
		<p>(a) swinging or slipping of rivets in the seats of the riveted pack; this is revealed by light taps with a mallet against the skin in the vicinity of the riveted seam;</p> <p>(b) separation of the skin from the rivet head placed on the non-rigid part of the wing framework (stringers, ribs) when the skin is pressed down in the vicinity of the rivet (the rivet "breathes");</p> <p>(c) deformation of rivet heads; most dangerous is one-side deformation of rivets in the same direction when adjacent rivets are located on the load-carrying portions of the framework, especially in joints of riveted seams; such deformation testifies to the fact that the skin begins to displace.</p>

Operations	Possible Defects	Remedy
<p>(a) in the cockpit (especially under the pilot's seat);</p> <p>(b) in engine compartment (when carrying out the 25 and 50-hour routine maintenance operations);</p> <p>(c) in fuselage tail section (the spring-feel mechanisms and the "trimming effect" mechanism included);</p> <p>(d) in wing; during inspection do not fail to exercise the aircraft control rods.</p>	<p>Binding and wear of aircraft control elements.</p> <p>Loose and poorly locked locking nuts.</p> <p>Damaged parts, attachments and locking arrangements.</p> <p>At the aircraft control rods are seized, a peculiar noise is heard in the bearings, testifying to clogging, seizure or damage of bearings.</p>	<p>Remove binding; paint up worn places.</p> <p>Tighten and lock the locking nuts.</p> <p>Repair parts with such defects or replace them.</p> <p>Replace damaged locking arrangements.</p> <p>Check the bearing with gasoline, blow it with compressed air, lubricate and check it once more; if the peculiar noise cannot be eliminated or the bearing is clogged, seizure or damage the bearing; replace the bearing rod in tail track.</p>

Symptoms	Possible Defects	Remedy
<p>5. Before the flight (on the elevators) diving warning to the YC-61 electrical system.</p> <p>5. Visually inspect and adjust the balance and the attachment of the control rods in the tail.</p> <p>7. Put the covers back plates where they belong.</p>	<p>Balance swings under thrust.</p>	<p>Tighten the balance weight attachment bolts and lock them anew.</p>

Operations	Possible defects	Remedy
<p>2. Move the aircraft control stick to the right, to the left, backward and forward as far as it will go and press the rudder pedals home to make sure that the rudder, elevator and ailerons are free to move and can be fully shifted in the required position without binding or jerks. With the rudder, elevator and ailerons moved to their extreme positions, the aircraft control stick and pedals should stop against the adjustable rests (screw located on the aircraft control central unit that mounts the aircraft control stick and pedals).</p> <p>3. Check the aircraft controls for play.</p> <p>4. Make sure that the aircraft control stick is loaded by the spring-feel mechanism.</p>	<p>When fully deflected in some direction, the aircraft control stick or pedals do not reach their adjustable rests.</p>	<p>Measure the deflection angles of the rudder, elevator or ailerons in accordance with the aircraft levelling diagram.</p> <p>Find out the cause preventing the rudder, elevator or ailerons from moving to full angles; adjust the aileron, rudder or elevator deflection angles by means of the adjustable rests, then and if necessary.</p>
<p>3. Check the aircraft controls for play.</p> <p>4. Make sure that the aircraft control stick is loaded by the spring-feel mechanism.</p>	<p>The aircraft control stick, left in its extreme positions does not return to its neutral position.</p>	<p>1. Employ a dynamometer to measure the efforts on the control stick required for its deflection to the extreme positions. These efforts should be 7 to 9 kg for rearward deflection;</p>

Operations	Possible defects	Remedy
<p>4. Using a hair brush apply QUARTZ-201 lubricant to the aircraft control hinge joints; move the aircraft control stick and rudder pedals several times from one extreme position to the other. Lubricate the hinge joints once more and remove the excess lubricant on the joint's outside by means of a clean wipe cloth.</p> <p>5. Mount the seat and canopy on the aircraft, retract the landing flaps and close the access hatches.</p> <p><u>Washing, inspecting and lubricating Elevator, Rudder and Aileron Attachment Fittings without Removal from Aircraft</u></p> <p><u>Checking Aircraft Controls with Hydraulic Boosters Disconnected and Engaged</u></p> <p>1. Inspect the aircraft controls.</p>		<p>The operations, probable defects and remedies do not differ from those given above in subsection "Inspecting Aircraft Controls".</p>

Operations	Possible defects	Remedy
<p>5. Connect the aircraft to an external power supply source and to a ground hydraulic pump. Switch on the hydraulic pump to obtain working pressure in the hydraulic system.</p> <p>6. Switch on the storage battery and circuit breakers of the hydraulic boosters in the cockpit.</p>		
<p>7. Check the aircraft controls with the hydraulic boosters engaged for which purpose move the aircraft control stick to its extreme positions.</p>	<p>Jerky movement of aircraft control stick.</p>	<p>Disconnect the hydraulic booster and check for play in the control system rods and levers; remove detected play. If play cannot be eliminated, remove the hydraulic booster from the aircraft and have it checked on a test stand.</p>
<p>Movement of the control stick should be smooth, without overshoot or jerks; the control stick left in one of its extreme positions</p>	<p>The stick returns from the extreme to the neutral position at different speeds.</p>	

Operations	Possible defects	Remedy
<p>The aircraft control stick left in the extreme positions should return to its approximate neutral position.</p>		<p>11.5 to 13.5 kg for forward deflection; 3 to 10 kg for deflecting the stick to the right or to the left.</p> <p>2. Locate the place causing excessive friction in the aircraft controls. Excessive friction may be caused by the following: absence of required clearances between the aircraft control elements and other members of the aircraft, corrosion in the spring-feel mechanisms (especially if the aircraft has not been flown for a long time) or excessive friction in the hydraulic booster. The effort required to shift the actuating rod of the hydraulic booster disconnected from the aircraft controls must not exceed 15 kg.</p>

Operations	Possible defects	Remedy
<p>(load) from the constantly engaged spring-feel mechanism).</p> <p>9. Check the hydraulic booster cross-feed system of the elevator as prescribed in Item 8 moving the stick forward and rearward.</p> <p>10. Check the operation of the flight spring-feel mechanism (Fig. 50); the selector switch of the variable-ratio boost control unit must be in position AUTOMATIC (AERO. AT); for this purpose:</p>	<p>The variable-ratio boost control unit fails to switch on or does not switch off.</p>	<p>Have the PA-74/3 valve serving to engage the flight spring-feel mechanism checked by an expert on aircraft electric equipment for power supply to the valve; if power supply is all right, replace the PA-74/3 valve.</p>
<p>(a) engage the hydraulic boosters; press against the limit switch of the variable-ratio boost control unit located on the nose landing gear strut; the hand-applied effort to shift the elevator control</p>		

Operations	Possible defects	Remedy
<p>should return to the neutral position with equal speed.</p> <p>Free travel of the aircraft control stick must not exceed 3.5 cm before the elevator or aileron begins to move.</p>	<p>The control stick moves with difficulty over separate portions of its tray due to considerable friction in hinges of aircraft control rods and levers in the linkage between the control stick and the hydraulic booster slide valve.</p>	<p>Check all the conjugations by examining every link. Check the joints between the control bell cranks and the hydraulic booster head to see that the bolts are not overtightened and that there are no distorted or damaged parts.</p> <p>Remove defects, if any.</p>
<p>8. Check the cross-feed system of the aileron hydraulic booster. To this end, move the aircraft control stick to the right and to the left, disconnect the hydraulic booster and move the control stick to the right and to the left again. After the hydraulic booster was disconnected, the control stick should move smoothly.</p>	<p>The control stick moves with difficulty due to improper functioning of the hydraulic booster cross-feed system.</p>	<p>Move the aircraft control stick several times; if this fails to eliminate the faults in the cross-feed system, remove the hydraulic booster for repairs.</p>

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Operations	Possible defects	Remedy
<p>switched on, pressing the button TRIMMING EFFORT located on the aircraft control stick upward should move the control stick forward and pressing the button downward should move the stick rearward.</p> <p>12. Check the spring-feel mechanism and the "trimming effect" mechanism for cutting out as the pressure in the aircraft hydraulic system drops.</p> <p>To do this, set the selector switch of the variable-ratio boost control unit at GREATER EFFORT position, cut out the external hydraulic pump, press the button "trimming effect" up or down and deflect the aircraft control stick forward or rearward. As the pressure in the aircraft hydraulic system drops below 40 kg/sq.cm. by the hydraulic booster pressure gauge located in:</p>	<p>The flight spring-feel mechanism and the "trimming effect" mechanism cut out at a pressure of more than 40 kg/sq.cm. in the aircraft hydraulic system.</p>	<p>Proper movement of its rod. If the rod of the YT-CJ motor moves, remove and replace the spring-feel mechanism or replace the actuating hydraulic cylinder of the spring-feel mechanism or repair it.</p>

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Operations	Possible defects	Remedy
<p>handle should increase up to 15.5 kg when moving it rearward and up to 17.5 kg when moving it forward.</p> <p>Release the limit switch of the variable-ratio boost control unit - the effort applied to the control handle should decrease;</p> <p>(b) when the selective valve of the variable-ratio boost control unit is changed over from position AUTOMATIC to position GREATER EFFORT (TRIMMED), the effort required to move the aircraft control stick should increase to the maximum values indicated in operation (a); as the selector switch is returned to position AUTOMATIC or to position GREATER EFFORT (TRIMMED), the effort on the control stick should decrease.</p> <p>11. Check the operation of the "trimming effect" mechanism with the circuit breaker.</p>	<p>The "trimming effect" mechanism is out of order.</p>	<p>Have the YT-CJ electric motor checked by an expert on aircraft electric equipment for</p>

Operations	Possible defects	Remedy
<p>over, set the trim tab at a position corresponding to the moment when the warning lamp lights up;</p> <ul style="list-style-type: none"> - as the selector switch of the aileron aerodynamic trim tab is set in position TO THE RIGHT (BETABO) and TO THE LEFT (BIBEO) the aileron trim tab should go up or down respectively. <p>After the check is over, set visually the aileron trim tab at neutral position according to the aileron trim tab.</p> <p>14. Switch off the storage battery and circuit breakers (in the aircraft cockpit) that have been cut in to check the aircraft controls, disconnect the external source of power and external hydraulic pump from the aircraft.</p>		

Operations	Possible defects	Remedy
<p>the cockpit, the following mechanisms should cut out:</p> <ul style="list-style-type: none"> - spring-feel mechanism; - "trimming effect" mechanism; as the button of the "trimming effect" mechanism is pressed up or down, the control stick should not deflect from the neutral position. <p>13. Check the deflection of the aerodynamic trim tabs of the elevator and aileron:</p> <ul style="list-style-type: none"> - as the selector switch of the elevator aerodynamic trim tab is set at PITCHING (KAPITOPORANIE) and DIVING (DIPPOBANE), the elevator trim tab should correspondingly go up or down and when the trim tab steps over the position corresponding to the inscription on the trim tab, the green warning lamp in the cockpit should go on. After the check is 		

Operations	Possible defects	Remedy
<p>3. Actuate the external hydraulic pump to obtain working pressure in the booster hydraulic system and inspect the sealing places of the hydraulic booster (cylinder, slide valves, pipe unions and nipples); leakage up to 4 cu. cm. per hour or 2 drops per minute is permissible along the working surfaces of the hydraulic booster.</p> <p>4. Examine the attachment of the hydraulic booster and the control linkage!</p>		<p>working pressure for 10 to 15 minutes.</p> <p>If exercising the hydraulic booster fails to eliminate leakage, remove the hydraulic booster from the aircraft and send it for repair. During repair the booster must be disassembled and the worn seals replaced.</p>
	<p>Locking of nuts and arrangements damaged.</p>	<p>Before disassembling the hydraulic booster, the nuts and arrangements must be examined.</p>

HYDRAULIC BOOSTERS EV-13M and EV-14M

Operations	Possible defects	Remedy
<p><u>Inspection, hydraulic booster</u></p> <p>1. Remove the panel from the hatch giving access to the hydraulic boosters. The access hatch for the EV-13M booster is located on the bottom skin of the right-hand wing and that for the EV-14M booster is positioned in front of the seat.</p> <p>2. Inspect the hydraulic booster and check its for leakage of operating fluid (about 10-15 cu. cm. of fluid per cylinder) and that the hydraulic booster working surfaces is satisfactory, if there is no pressure in the hydraulic system.</p>	<p>Operating fluid is squeezed out between the hydraulic booster working surfaces in amount exceeding the permissible limits.</p>	<p>Leakage may be caused by deterioration of elastic properties of the rubber sealing after a considerable interval in operation. In this case, the elastic properties of the rubber sealing may be reconditioned by exercising the hydraulic booster under</p>

Operations	Possible defects	Remedy
<p>2. Remove the access hatch plate of the hydraulic booster.</p> <p>3. Wedge the main distributing slide valve of the hydraulic booster in neutral position by means of a special device attached to each hydraulic booster EV-13X. To do this:</p> <ul style="list-style-type: none"> - mount restrainer 1 (FIG.52) on the neck of the main distributing slide valve. <p><u>Note:</u> The size (thickness) of the restrainer should correspond to the distance from the face of the duplicating slide valve to the face of the main slide valve lug for the neutral position of the slide valve;</p> <ul style="list-style-type: none"> - shift aside cover 5 (FIG.52) to open the hole in the plug; - fit the special grooves of screw clamp 1 on the head 		

Operations	Possible defects	Remedy
<p>check to see that the hydraulic booster bar is free of foreign matter.</p> <p>5. Tip the hydraulic booster with a cloth with slacks and put the access hatch plate of the hydraulic booster in place.</p> <p><u>Checking Operation of Hydraulic Booster Distribution Slide Valve</u></p> <p>1. Turn on the hydraulic booster cock and reduce the pressure in the hydraulic system to zero by moving the aircraft control stick from one extreme position to the other.</p>	<p>Loose nuts of the bolts.</p> <p>Hydraulic booster transmissions to the bracket are loose.</p>	<p>Tighten up and lock the nuts of the bolts.</p>

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Operations	Possible Effects	Remedy
<p>deflect the control stick to one side may be greater than that required for its deflection to the other side.</p> <p>f. Reduce the pressure in the hydraulic system of the hydraulic booster to zero and remove the device from the hydraulic booster in the order reverse to its installation.</p> <p>7. Wedge the main distributing slide valve in the extreme left position and repeat steps 3, 4 and 5.</p> <p>Note: The thickness of the restrainer should correspond to the distance from the face of the duplicating slide valve to the face of the main slide valve lug for the extreme left position of the slide valve.</p> <p>8. Wipe the working surfaces with a dry clean wipe cloth and put the access hatch panel of the</p>		<p>If the indicated effort exceeds the permissible limits, replace the hydraulic booster.</p>

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Operations	Possible Effects	Remedy
<p>and nut of the bolt of the main distributing slide valve and drive screw 2 of the device into the plug hole; then tighten slightly screw 2 and clamp previously installed; restrainer 4 between the faces of the main and duplicating slide valves.</p> <p>4. Produce pressure in the hydraulic system of the hydraulic booster by exercising the external hydraulic pump.</p> <p>5. Deflect the aircraft control stick to the extreme positions for 2 to 3 minutes; the control stick should move smoothly, without jerks or crepage; the additional effort on the EV-13M and EV-14M hydraulic boosters required to compress the spring of the duplicating slide valve should not exceed 4 and 5 kg respectively. The effort required to</p>	<p>The aircraft control stick moves from the aircraft with difficulty.</p>	<p>Remove the hydraulic booster from the aircraft and measure the effort required for shifting the duplicating slide valve (with the main slide valve wedged) first to the neutral and then to the extreme left positions; the effort should be from 24 to 27 kg. Make measurements 2 to 3 times.</p>

Operations	Possible Effects	Remedy
<p>hydraulic booster in place.</p> <p><u>Inspecting Screen Filter</u> <u>located in Nipples of Line</u> <u>Unions feeding pressure fluid</u> <u>to Hydraulic Boosters</u></p>		
<p>1. Move the aircraft control stick from one extreme position to another to reduce pressure in the hydraulic system of the hydraulic booster to zero.</p>		
<p>2. Remove the hydraulic booster access hatch panel, and unlock the pipe union of the hydraulic booster swivelling nipples; place a clean container under the hydraulic booster, drain the fluid and direct the hoses from the hydraulic booster; plug the holes at the disconnected hoses and at the fluid drain pipe unions.</p>		

Operations	Possible Effects	Remedy
<p>3. Unlock and turn out the pipe union at the hydraulic booster inlet, take out the swivelling nipple after closing the port in the hydraulic booster with a clean piece of cloth to protect it from clogging. The pipe union is turned out of the EV-12M hydraulic booster with the aid of a special wrench (Fig.53).</p>		
<p>4. Using round pliers, take the screen filter out of the swivelling nipple pipe union exercising utmost care not to damage the screen. Examine the filter and nipple. Wash the filter and nipple in clean non-ethylated gasoline.</p>		<p>The filter is clogged.</p>
<p>5. Install the filter in the nipple and the nipple in the hydraulic booster in the order reverse to their removal.</p>		<p>Remove the hydraulic booster from the aircraft and examine the main and duplicating cittle valves.</p>

Operations	Possible Defects	Remedy
<p>Booster, insert the bolts in place (into the bell crank).</p> <p>3. Back out the nuts securing the bodies of the hydraulic booster bearings and remove carefully the hydraulic booster along with the bearings from the aircraft.</p> <p>4. Remove the bearings from the hydraulic booster trunnions. Wipe thoroughly the hydraulic booster with a piece of cloth slightly soaked in clean non-ethylated gasoline.</p> <p><u>Examining Hydraulic Booster Main and Application Slide Valves</u></p> <p>1. Remove the hydraulic booster from the aircraft.</p> <p>2. Take the hydraulic booster distributing device apart, for which purpose:</p>		

Operations	Possible Defects	Remedy
<p><u>Note:</u> When installing the hydraulic booster filter it is necessary to insert the nipple so that the pipe unions and hoses do not touch the airplane components when the airplane control stick is actuated from the cockpit.</p> <p><u>Removing Hydraulic Booster from Aircraft</u></p> <p>1. Reduce the pressure in the hydraulic system of the hydraulic booster to zero and disconnect the hoses from the hydraulic booster.</p> <p>2. Disconnect the hydraulic booster (Figs 48 and 49) from the aircraft control cell cranks after disconnecting the hydraulic</p>		

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Operations	Possible Faults	Remedy
<p>3. Wash the slide valves in clean non-ethylated gasoline. This operation should be done with utmost care to protect the friction surfaces from dust and dirt, since even the slightest amount of dust or dirt may cause excessive friction of the slide valves and result in "creepage" and jerks on the control stick, and also in premature wear of its components. Dry and wipe the valves with chamois leather; in doing so do not touch the working surfaces with the hands to avoid development of corrosion; examine carefully the slide valve hands by means of a magnifying glass. The slide valve shoulders should have no notches or scratches.</p> <p>4. Force clean, non-ethylated gasoline into the fitting places of the duplicating slide valve in the hydraulic booster and of the</p>		<p>Inner recesses of hydraulic booster head unit are cleaned, so as follows:</p>

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Operations	Possible Faults	Remedy
<ul style="list-style-type: none"> - remove the cotter pins, back out the nut, take out bolts 1 and 2 and disconnect the shackles from the main slide valve (S1, S2); - take the main slide valve out of the hydraulic booster carefully so as not to damage the slide valve working edges; - mount the hydraulic booster in the device, unlock and turn plus 5 out of the head unit; - unlock and remove the duplicating slide valve and then take out the washer, spring and bushing; - take the duplicating slide valve carefully out of the device so as not to damage the working edges of the slide valve; - take the rubber rings off the slide valve and examine them. 	<p>The rings are damaged or worn.</p>	<p>Replace the rubber rings by new ones from the single set.</p>

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Operations	Possible defects	Remedy
<p>2. Disassembly and assembly of the hydraulic booster is to be performed in a room or a clean table covered with organic glass, vinyl-plastics or teritolite.</p> <p>It is necessary to take steps to prevent gasoline, slushing compound or dust from getting into the internal cavities of the hydraulic booster.</p> <p><u>Testing Hydraulic Booster after Examination of Its Slide Valves</u></p>		
<p>1. Place the hydraulic booster on a test stand and create pressure in the hydraulic system of the stand.</p> <p>2. Turn the bell cranks by hand to check the main slide valve for smooth travel; the slide valve should move easily.</p>	<p>Binding in the hinge joint.</p>	<p>Replace the hydraulic booster.</p>

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Operations	Possible defects	Remedy
<p>5. Lubricate the slide valve units with clean operating fluid; install carefully the duplicating and main slide valves in the head unit so as not to damage the sharp edges of the slide valve working bands. Bearings of the slide valves in the reverse of dismounting. Then test the hydraulic booster for proper operation.</p> <p><u>Notes:</u> 1. Install the slide valves only when the hydraulic booster is in vertical position.</p>	<p>- send the hydraulic booster for repair involving complete disassembly of the head unit and actuating cylinder;</p> <p>- drain the operating fluid from the hydraulic system, wash the hydraulic booster and fill its hydraulic system with fresh oil ANT-10.</p>	

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Operations	Possible defects	Remedy
<p>3. Check the hydraulic booster actuating rod on the stand for equal speed of movement in different directions. For this purpose, shift the actuating rod in different directions by moving reciprocally the main slide valve at a pressure of 15⁵ kg/cm² with no load on the rod. The actuating rod should move to either side at equal speed. Difference in speed of rod movement up to 10% is permissible. When checking the speed of rod movement to either side ensure equal pressure in the hydraulic system.</p>	<p>The difference in speed of rod movement to different sides is more than permissible.</p>	<p>In case the speed difference exceeds the permissible values, do as follows: - remove the hydraulic booster; - screw out the nuts and take out the middle and lower belts; - carefully take off the right-hand and left-hand shackles of the head unit; - check the condition of the felt packing rings; replace the hydraulic booster if the rings are damaged or ruffled; - check to see that there are no foreign particles in the gaps between the bushings</p>
<p>A. Check the hydraulic booster for leakage through its outer sealing, for which purpose:</p>	<p>Operating fluid is leaking from under the main slide valve and along the actuating rod.</p>	<p>and the holes in the head unit bracket; - put the parts in place in the order reverse to disassembly. If this fails to eliminate the defect, adjust the position of the main slide valve relative to the grooves of the duplicating slide valve, using for this purpose the eccentric bolt, that connects the bell crank with the shackle. Travel of the main slide valve, with the hydraulic system engaged or disengaged, is determined by the clearance between the slide valve lug face and the sleeve face which should be $-2^{+0.05}$ mm. Replace the packing rings and gaskets.</p>

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Operations	Possible defects	Remedy
<p>3. Check the hydraulic booster actuating rod on the stand for equal speed of movement in different directions. For this purpose, shift the actuating rod in different directions by moving reciprocally the main slide valve at a pressure of 15⁵ kg/cm² with no load on the rod. The actuating rod should move to either side at equal speed. Difference in speed of rod movement up to 10% is permissible. When checking the speed of rod movement to either side ensure equal pressure in the hydraulic system.</p>	<p>The difference in speed of rod movement to different sides is more than permissible.</p>	<p>In case the speed difference exceeds the permissible values, do as follows: - remove the hydraulic booster; - screw out the nuts and take out the middle and lower belts; - carefully take off the right-hand and left-hand shackles of the head unit; - check the condition of the felt packing rings; replace the hydraulic booster if the rings are damaged or ruffled; - check to see that there are no foreign particles in the gaps between the bushings</p>
<p>A. Check the hydraulic booster for leakage through its outer sealing, for which purpose:</p>	<p>Operating fluid is leaking from under the main slide valve and along the actuating rod.</p>	<p>and the holes in the head unit bracket; - put the parts in place in the order reverse to disassembly. If this fails to eliminate the defect, adjust the position of the main slide valve relative to the grooves of the duplicating slide valve, using for this purpose the eccentric bolt, that connects the bell crank with the shackle. Travel of the main slide valve, with the hydraulic system engaged or disengaged, is determined by the clearance between the slide valve lug face and the sleeve face which should be $-2^{+0.05}$ mm. Replace the packing rings and gaskets.</p>

Operations	Possible Defects	Remedy
<p>(cylinder faces, both ends of the actuating rod and the head unit);</p> <ul style="list-style-type: none"> - move the piston rod reciprocally over its full range of travel at maximum speed. The hydraulic booster is considered fit for service if not a single drop of operating fluid comes off the cylindrical surface of the actuating rod or main slide valve for 15 minutes. During this time period the surface of the rod may only get moistened, whereas the surface of the main slide valve may be wetted by the operating fluid. <p><u>Note:</u> Leakage of operating fluid under full working pressure through the outer sealing is permissible if it does not exceed 4 cu.cm. per hour or 2 drops per min.</p>	<p>Operating fluid is leaking or pressure has increased out through the outer sealing in amounts exceeding the permissible limits.</p>	<p>If tightness of the hydraulic booster does not meet the above requirement, check it on the stand during one hour. If in this case leakage exceeds the specified values, replace the hydraulic booster.</p>

Operations	Possible Defects	Remedy
<p>(a) put manually the main distributing slide valve in one of its extreme positions and the piston will also shift over to the extreme position; with the pressure in the hydraulic system of the stand being 210±5 kg/sq.cm., keep the slide valve and hydraulic booster under pressure for 3 minutes; no fluid leakage is permissible. The other chamber of the hydraulic booster is to be checked in the same way;</p> <p>(b) connect the hydraulic booster actuating rod to the power spring of the stand under the following varying loads: from zero to 1100 kg for the EV-13M booster and from zero to 4600 kg for the EV-14M hydraulic booster, the pressure in the system being 130 kg/sq.cm.;</p> <p>- wipe thoroughly the plunger where fluid leakage is most probable</p>	<p>Fluid is leaking from under the unit head plug and around the plug of the duplicating slide valve.</p>	<p>To eliminate leakage do as follows:</p> <ul style="list-style-type: none"> - turn the plug out of the head unit; - remove the spring ring from the face of the duplicating valve; - take out the plug; - replace the packing rings; - put the parts in place.

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Operations	Possible Effects	Remedy	Possible Effects	Remedy
<p>fluid pressed out through the outer sealing of the hydraulic booster must not drop off the surface of the actuating rod and main slide valve for 15 minutes.</p> <p>Note: Put a sheet of white paper under the hydraulic booster to watch the falling drops of fluid.</p> <p>5. Check the hydraulic booster for internal leakage with the actuating rod in its check position. Internal leakage should be checked at 35.5°C of the operating fluid and a pressure of 130 kg/sq.cm. without application of any load to the rod. The check is performed as follows:</p> <p>(a) put the actuating rod at neutral position and check the amount of internal leakage; it should not exceed 200 cu.cm. per minute.</p>				
<p>Note: With the rod placed in its extreme right or extreme left position, leakage must not exceed 200 cu.cm. per minute.</p> <p>(b) set the main distributing slide valve and the actuating rod of the hydraulic booster at extreme left and then at extreme right position; in the extreme positions internal leakage must not exceed 400 cu.cm. per minute; if the hydraulic booster meets the specified requirements it may be installed on the aircraft.</p> <p><u>Installing Hydraulic Booster on Aircraft after Testing It on Stand</u></p> <p>1. Remove the hydraulic booster from the stand, and install it on the aircraft in the order reverse to that of removal. Prior to installing the hydraulic booster on the aircraft do the following:</p>				

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Operation	Possible defects	Remedy	Operations	Remarks
<p>- thoroughly check cleanliness of the hydraulic booster and operating fluid;</p> <p>- fill the cylinder repeatedly with operating fluid to evacuate the air from them;</p> <p>- check the actuating rod manually for smooth travel; there should be no jerks and the rod should move easily.</p>	<p>Hydraulic system and operating fluid are polluted.</p> <p>The actuating rod moves with difficulty and jerks.</p>	<p>Drain the operating fluid from the system, wash the hydraulic system and fill it with clean oil</p> <p>Remove the hydraulic booster from the aircraft, screw off the head unit and cylinder and cylinder with non-ethylated gasoline, let them dry, coat with operating fluid and put in place again.</p> <p>If this fails to eliminate travel difficulty and jerks replace the packing rings and gaskets; assemble and install the hydraulic booster on the aircraft.</p>	<p>In installing the hydraulic booster on the aircraft observe the following:</p> <p>(a) exclude any possibility of binding, distortion, excessive friction or play in the joints between the hydraulic booster and the aircraft control rods;</p> <p>(b) check the actuating rod for its neutral position in the cylinder. This position is determined by the distance from the trunion axis to the centre of the bolt connecting the bell crank with the control rod; this distance must be equal to:</p> <p>- 183 mm for the EV-13M hydraulic booster;</p> <p>- 206 mm for the EV-14M hydraulic booster.</p> <p>If these sizes are other than specified, replace the hydraulic booster, since adjustment of the distance</p>	

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Operations	Possible defects	Remedy	Operations	Possible defects	Remedy
<p>between the axes of the bell-crank bolts by screwing the shank in or out is strictly prohibited.</p> <p>In connecting the control rod to the bell crank of the hydraulic boosters, do not overtighten their connecting bolt nut.</p> <p>2. Create a pressure in the hydraulic booster system and move the aircraft control stick 10 to 15 times from extreme position to extreme position; the stick should move smoothly, without creepage or jerks.</p> <p>3. Check operation of the cross-feed system, for which purpose actuate the valve in the cockpit to disconnect the booster hydraulic system, then repeat the motions of the control stick as prescribed in Para. 2; the stick should move smoothly</p>	<p>The aircraft control rod is not stable in the neutral position.</p> <p>Creepage, jerks, vibration and difficult travel of control stick.</p>	<p>Replace the hydraulic booster and send the removed booster to a repairing organization.</p> <p>Check all attachment joints of the hydraulic booster for binding, distortion, excessive friction or play in the connections between the hydraulic booster and the aircraft control rods. The end clearance between the bell crank and the bushing of the shackle unit should</p>	<p>without application of considerable efforts.</p> <p>4. Wipe the working surfaces of the hydraulic booster with a dry clean wipe-cloth, put the booster in place and secure the access hatch plate.</p>	<p>The aircraft control stick requires excessive efforts to be moved from one extreme position to another.</p>	<p>be 0.3 mm minimum. When being inserted, the bolts should enter easily under hand-applied effort or when being lightly tapped with a mallet.</p> <p>Move the control stick several aircraft times in different directions. If the stick continues to move with difficulty, remedy the defect as described above.</p>
<p><u>Checking De-icing System for Leakage</u></p>			<p>D E - I C I N G S Y S T E M</p>		
<p>1. Disconnect the non-return valve, located in the upper front bay of the</p>					

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Operations	Possible defects	Remedy	Operations	Possible defects	Remedy
<p>fuseage, from the de-icing system pipe line connecting the slinger ring with the non-return valve and plug the latter.</p> <p>2. Create an air pressure in the system equal to 3 kg/sq.cm. pressing with the hand against the lever of valve 3K-48 (after having opened the hatch at frame No.4, port side) or by pressing the de-icing system button, located in the cockpit, for a period of 20 to 30 seconds.</p> <p>No leakage of air through the joints is permissible.</p>	<p>Air leakage through the joints of the pipe lines, pipe unions, around the tank plug, and through the non-return valve.</p>	<p>Should air leakage be detected, reduce pressure in the system to zero, disconnect the pipe lines and check the condition of the nipple joint to see that it is free of corrosion and damage to the thread of its nuts and pipe unions.</p> <p>Replace pipes, pipe unions and nuts having corrosion pits.</p> <p>In case of minor corrosion, wash the parts thoroughly with clear gasoline.</p>	<p>3. Connect the pipe to the non-return valve.</p> <p><u>Washing Out De-Icing System Tank</u></p> <ol style="list-style-type: none"> 1. Open and remove the access panels at fuselage frame No.1 (on the wall of the suction duct and on the fuselage inner wall). 2. Remove the cotter pins and back out the nut coupling the pipe lines with the tank. 3. Remove the cotter pins and open the lock of the tank attachment collar. 		<p>Coat the threaded joints with grease N, connect the pipe lines and check the system for leakage once more. Should leakage be detected around the filler neck plug of the tank, replace the filler neck rubber basket. Repair the non-return valve, if necessary.</p>

P I R 2 - F I G H T I N G S Y S T E M

Operations	Possible Defects	Remedy
<p>4. Remove the tank from the aircraft, take the filler neck plug out of the tank and drain the alcohol into a clean vessel.</p> <p>5. Wash the tank with hot water and pour it on the aircraft in the order reverse to its removal.</p> <p><u>Note:</u> At outdoor temperatures below zero, dry the tank after it has been washed.</p>		

Operations	Possible Defects	Remedy
<p><u>Renovating and Weighing Fire-Fighting System Bottle</u></p> <p>1. Unload and remove the explosive discharge cartridge III-9 of the fire-fighting bottle. The explosive discharge cartridge should be unloaded by an expert on aircraft armament only.</p> <p>2. Remove the cotter pins and turn off the upper nut, then disconnect the carbon dioxide outlet pipe of the bottle from the T-piece.</p> <p>3. Remove the cotter pins, disconnect the clamp attachment collar and remove the bottle from the aircraft.</p> <p>4. Weigh the bottle on a balance along with the discharge bonnet and check for loss of carbon dioxide from the bottle after having previously removed the bottle cover. Weight of</p>	<p>Weight of the bottle is reduced by more than 100 gr as checked against the weight indicated</p>	<p>Have the bottle recharged.</p>

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ENGINEERS

Operations	Possible defects	Remedy
<p><u>Checking Engine Control System</u></p> <ol style="list-style-type: none"> 1. Remove the cockpit canopy and the pilot's seat and open the engine access doors. 2. Examine the engine control system parts: <ol style="list-style-type: none"> (a) in the pilot's cockpit (without removing the side control desks) and particularly under the pilot's seat; (b) in the engine compartment, visually; 3. Shifting the engine control levers, make sure that: <ol style="list-style-type: none"> (a) the rods and bell cranks operate without "crunch" in the bearings (check aurally); 	<p>Dents, cracks, corrosion on parts and deterioration of locking devices.</p> <p>Movement of the engine control levers is accompanied by "crunching", which is attributable to contamination, seizing or deterioration of bearings.</p>	<p>Repair or replace the defective parts; replace the unserviceable locking.</p> <p>Wash the bearing with gasoline, clean it with compressed air and check again if "crunching" still persists or if the bearing shows signs of deterioration, replace the bearing, the rod or the bell crank.</p>

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Operations	Possible defects	Remedy
<p>the bottle may be reduced by not more than 10% gr as checked against the weight indicated on the bottle proper and in its Service Log.</p> <ol style="list-style-type: none"> 5. Mount the bottle and explosive discharge cartridge on the aircraft. 6. Check the fire warning system for operation with the storage battery and ENGINE INSTRUMENTS circuit breaker switched on, for which purpose: <ul style="list-style-type: none"> - disconnect the 23-contact plug connector No.57 working through the left-hand engine inspection hatch; the fire warning lamp should light up. This operation must be carried out by an expert on electrical equipment; - press the button to check the warning system for proper operation; the warning lamp should light up. 	<p>in the bottle Service Log.</p>	

Operations	Possible Defects	Remedy	Possible Defects	Remedy
<p>4. Apply <u>EMALIN-201</u> lubricant to the hinge joints of the engine control system by means of a hair brush; shift the engine control levers several times from one extreme position to the other. Again lubricate the hinge joints and wipe off the excess grease with a clean cloth from the outside.</p> <p><u>Inspecting Oil Unit Filter</u></p> <ol style="list-style-type: none"> 1. Place a clean cloth near the filter cover (to prevent the filter attachment parts from dropping). 2. Unscrew the air oil filter fastening nuts and remove the filter from the engine. 3. After removing the filter from the engine: <ul style="list-style-type: none"> (a) install cover 7 (Fig.55) instead of the filter in the engine oil unit (the plug should be taken from the aircraft engine tool kit); 			<p>Parts of the control system catch on other parts and are chafed.</p>	<p>Eliminate the possibility of contact between parts; paint over the chafed places.</p>
<p>(b) the engine controls do not catch on other parts (check aurally and visually).</p> <p>4. Install the seat and the canopy on the aircraft and close the engine doors.</p> <p><u>Chamfer Lubricant in Engine Control Hinge Joints</u></p> <ol style="list-style-type: none"> 1. Remove the canopy, the pilot's seat and the side panel of the left desk. 2. Place some cotton waste on the cockpit floor to protect it against gasoline. 3. Using a hair brush, wash with gasoline the hinge joints of the rods, levers and units of the engine control system, then check them for condition and proper locking. When checking the engine control system, shift the engine control levers. 				

Operations	Possible defects	Remedy	Possible defects	Remedy
<p>(b) install rubber plug 5 in the filter taking it from the aircraft engine tool kit; (c) examine the filter.</p> <p><u>CAUTION:</u> Never remove sticking particles from the oil unit filter and fuel-oil unit filter screens by means of some hard objects (screw driver, nutch, etc.)</p>	<p>Damaged filter screen. Metal shavings on the filter.</p>	<p>Replace the filter.</p> <p>Presence of metal shavings on the filter may indicate a need for replacement of the engine; the decision on the possibility of further engine service must be taken by the appropriate authorities.</p> <p>Clean thoroughly the entire surface of the filters or wash them on the outside; in the first case stop the inner hole of the filter elements with special plug 6.</p> <p>Minor sediment on the screens of the oil unit filter and the fuel and oil unit filter (Fig. 5C)</p>		
				<p>that remains after washing in gasoline may be tolerated. To clean thoroughly the entire surface of the filters, proceed as follows: (a) stop filter opening 2 (See Fig. 5C) with rubber plug 5 and rinse the filter in clean gasoline; (b) unscrew the filter nut and take the filter elements off the frame; (c) stop the inner opening of one filter element with plug 6; (d) clean the surface of the filter element screen on both sides with a brush.</p>

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Operations	Possible defects	Remedy
<p>4. Reinstall the filter in the engine. 5. Prime the lubrication system (See Appendix 5) with the help of a hose (Fig.57). <u>Inspecting Attachment Fittings</u> <u>Securing Engines and Afterburners to Aircraft</u> 1. If the fuselage is not and will not be disjointed, open the</p>		<p>When washing the filters on the outside only, proceed as follows: (a) Rinse the filter in clean gasoline without removing the cover; stop the cover hole with a rubber plug to prevent ingress of gasoline into the inner cavity of the cover; (b) dry up the filter without blowing it with compressed air.</p>

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Operations	Possible defects	Remedy
		<p>or hair brush (available in the aircraft engine tool kit) moistened in clean gasoline; (e) wash all other filtering elements as described above; (f) wash all other filter parts in clean gasoline; (g) dry the filter parts without blowing them with compressed air; (h) assemble the filter and reinstall it in the engine. <u>CAUTION: When washing the filter, keep dust, dirt and foreign objects off the cleaned surfaces and especially from the inner cavities of the filter elements.</u></p>

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Operations	Possible defects	Remedy
<p>connections and make sure that there are no leaks of oil, fuel or AIT-10 fluid.</p> <p>2. Using spanner wrenches, check tightening of all joints of the fuel, lubrication and hydraulic systems in the accessible places.</p> <p><u>CAUTION:</u> In case of oil leakage from under the filter cover of the engine oil units provided with a quick-detachable cover, do not attempt to eliminate the leak by tightening up the cover fastening nut. To correct the fault, it is necessary to</p>	<p>Leakage of liquid from a pipe or accessory due to cracks or corrosion pitting.</p> <p>Leaky joints due to insufficient tightening.</p>	<p>replaces the gasket, the pipe line or the accessory.</p> <p>Replace the defective pipe or accessory.</p> <p>Tighten up the leaky joints.</p>
<p>engine doors, the lower panels located between fuselage frames Nos 20 - 21 and the panels SUSPENSION OF TAILPIPE AND ELEVATOR CONTROL ROLL CRANKS located on fuselage frame No.35.</p> <p><u>Note:</u> If the fuselage is dis-jointed, do not open the panels.</p> <p>2. Check the condition of the attachment fittings of the engines and afterburners to the aircraft by outward inspection.</p> <p>3. Reinstall the access panels in position.</p> <p><u>Checking Engine Fuel, Lubrication and Hydraulic Systems for Tightness and Secure Attachment of Joints</u></p> <p>1. Inspect visually the accessible sections of the pipe lines, accessories and their</p>	<p>Deterioration of attachment fitting parts.</p> <p>Damage of locking devices of attachment fittings.</p>	<p>Replace the unserviceable parts of the fittings.</p> <p>Restore the locking devices.</p> <p>Tighten up the joints to eliminate leakage; if the leakage still persists,</p>

Joining and Disjoining of Fuselage

Operations	Possible defects	Remedy
<p>replace the sealing ring under the cover. <u>Inspecting Pipe Lines for Cracks, Dents, Chafing, Contact with Other Parts and Loose Attachment</u> Check condition of pipe lines by visual inspection.</p>	<p>Sores and cold hardening on pipe line surfaces. Pipe lines touch one another and other engine parts. Loose attachment of pipe lines.</p>	<p>Replace the defective pipes by new ones; replacement of sealing rings and locking devices is imperative. Eliminate the contact by slightly displacing or turning the flangeing olamps (i.e. by finding a more suitable position of pipe lines). See that the clearance between adjacent parts is not less than 2 mm. Tighten up the clamp bolts and replace the locking devices.</p>

1. To avoid damaging the aircraft fuselage or engine, all operations on joining or disjoining of the fuselage must be carried out on a flat horizontal ground; the aircraft must be jacked up till its wheels are clear of the ground; the air blow-off bands must be closed, and the air brakes must be extended.
2. Disconnect the hydraulic system pipes and the pipe union of the air pipe (near frames Nos 20 - 22).
3. Disconnect the upper plug connectors and the lower plug connector UP-4 (through the left lower panel ACCESS TO ACCESSORIES in front of the air brake).
4. Disconnect two joints of the elevator and rudder control rods (fastening the rods with a piece of string) and the joint of the rear fuel tanks drain pipe (through two panels FUEL FILTERS located on top of frame No.21).
5. Turn out four thermo-couple sending units from each engine, gaining access through panels THERMO-COUPLES located near frame No. 25).
6. Disconnect the fuel pipe line valve from the rear tanks (through the lower panel HUP-1 PUMP located near frame No.21).
7. Disconnect the pipe of the fire fighting system near frame No. 20.
8. Disconnect six drain pipes from the pipe unions and back the pipe unions out of the engines (through four panels ENGINE DRAINAGE located under the air brakes).

CAUTION! When disconnecting the drain pipes, check on the presence of bandages on the pipes (the bandages prevent the union nuts from sliding down the pipes into the tank compartment). A bandage may be made by winding a length of insulating tape on the pipe.

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9. Disconnect four afterburner suspensions (through two panels SUSPENSION OF TAILPIPE AND ELEVATOR CONTROL BELL CRANKS located on fuselage frame No. 35).

10. Disconnect six disconnect valves (or pipe unions) of the nozzle control hydraulic line (through two panels DISCONNECT VALVES, NOZZLE CONTROL located on the stabilizer); secure the pipes with a piece of string.

11. Unscrew four drain pipes from the engine pipe unions which are located at the fuselage rear cone.

12. Bring a special dolly under fuselage frames Nos 24 and 35 and secure upon it the fuselage tail section (by means of the dolly band and a special bolt fastening the fuselage tail bumper).

13. Unlock and unscrew eighteen nuts fastening the fuselage nose section to the fuselage tail section.

14. Check once again, through the fuselage panels near frames Nos 19 - 21, to see that all the aircraft control rods, pipe lines and electric wiring running from the fuselage nose section to the fuselage tail section are disconnected.

15. Disconnect the fuselage nose section from the tail section by slightly swinging the dolly with the fuselage and simultaneously moving it back.

16. Carefully roll off the fuselage tail section on the dolly seeing that the fuselage is clear of the engine and the disjointed parts; pay special attention to the vent pipe connections of the engine relief cavities.

17. Plug the ends of the disjointed pipe lines; reinstall the removed panels and fastenings.

18. Examine from the inside the fuselage tail section, the accessories and the pipe lines between frames Nos 15 and 20 as well as the engines (if they are not subject to removal or replacement).

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19. When jointing the fuselage, proceed in the reverse sequence; make sure that the fuselage is clear of the engines and that the hoses, pipes etc. are not jammed. If necessary, adjust the fuselage position with the screws of the special dolly.

20. When fastening the exhaust cones to the rear attachment fittings, make use of a special fixture which is furnished with the aircraft set. In view of the fact that the fastening bolts of the engine tailpipe suspension shackles become gummed in the course of time, these bolts should be coated with graphite compound prior to installation.

21. When bringing frame No. 20A to frame No. 20, adjust the dolly in such a way that the guide pins on frame No. 20A check with the corresponding holes in frame No. 20; this being so, connect the lower split valve of the fuel system.

22. The jointing bolts of the fuselage should be tightened up uniformly in diametrically opposite directions and in a criss-cross manner. The clearance between the fuselage lining and the jet nozzle (ejector) must be uniform along the horizontal axis, and must be not less than 13 mm on top and not less than 20 mm at the bottom along the vertical axis. Should it prove necessary, adjust the clearance with the help of the adjusting bolts of the tailpipe suspension fittings.

23. After jointing the fuselage, switch on the fuel tank booster pumps and check the fuel system connections for tightness by external inspection.

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APPENDIX 2

Removal of Engine

1. Just after disjoining the aircraft and engine fuel, oil, hydraulic and air system pipe lines, it is necessary to stop the open ends of the pipes with plugs.

2. If the engine is subject to replacement or is to be dismantled from the aircraft for a period exceeding 24 hours, it is necessary to slush the engine inside not later than 3 hours after the engine has been removed from the plane.

3. Move the engine control levers to make sure that the engine control system is free from backlash and the elements of the control system do not catch on one another.

4. Close the air blow-off bands of the engines and disjoin the tail section of the fuselage.

5. Disconnect the engine control rod (of the aircraft) from the lever on the engine.

6. Disconnect the electric wiring from the starter-generator and disjoin the electric plug connector of the K-8 engine panel (on top, near fuselage frame No. 20). Remove the cooling air supply pipe union from the starter-generator.

Note: It is more convenient to remove the pipe union rear fastening bolt after the engine has already been slightly moved out of the fuselage.

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7. Drain the AIT-10 fluid from the hydraulic tank through the ground hydraulic pump connecting valves.

8. Disconnect the outlet pipe hose from the vent pipe union of the engine lubrication system (beyond the hydraulic accumulator) and the drain pipe from the outlet pipe; disconnect the drain pipe of the starter-generator and the drain pipe of the automatic fuel starting unit 213 of HT-100 pump.

9. Disconnect the hoses and one pipe from the pipe unions of hydraulic pump 623; place the disconnected hoses on the side of the other engine.

Note: When removing the second engine, dismantle also the hydraulic tank.

10. At the bottom, near frame No.20, disconnect the following pipes from the engine:

- (a) the air intake pipe for pressurizing the fuel system;
- (b) two fuel drain pipes.

11. Close the fuel shut-off cock.

12. Disconnect the fuel feed pipe line from the engine pump HT-0.

13. Disconnect the starting fuel supply hose from the engine behind panel HT-3.

14. Disconnect the hydraulic tank ailing pipe; when dismantling the starboard engine, it is necessary to remove from it the cockpit feed system pipe complete with the OVM-106 valve located beyond fuselage frame No. 20 above the engine; in the case of the port engine, the cockpit feed system pipe should be disconnected from the OVM-106 valve.

15. Roll up a special dolly under the engine to be removed and secure the engine on the dolly.

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16. Disconnect the engine attachment side struts from the fittings on fuselage frame No. 20.

Note: Do not disturb adjustment of the length of the side struts and make markings on the struts in order to provide for reinstallation of the engine without levelling.

17. Back out the retainer from the engine attachment lower fitting, loosen the fitting cover fastening nuts and take out the engine fastening pin.

18. Move out carefully the engine from the fuselage, preventing the engine and its accessories from touching the fuselage and aircraft equipment.

19. Place covers on the compressor air intake (on the engine) and the air intake duct of the fuselage.

20. Examine the engines from the outside; if an engine is subject to replacement, apply corrosion-preventive compound to its outer surfaces.

21. Wash and examine the engine compartment, as well as the accessories, pipe lines and the aircraft and engine control elements located in the compartment; change the lubricant in the hinges of the aircraft and engine control systems.

Note: When replacing engine accessories, bear in mind the following:

(1) if the threaded joints are stiff, flood them with kerosene and keep them so for 10 - 15 minutes;

(2) before assembly apply liberally chalk paste to the thread joints of units designed to operate under conditions of high temperatures (for example, flame igniter attachment units);

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the paste is made of powder chalk mixed with oil used in engine operation;

(3) replacement of sealing and split washers, as well as of locking devices of the units subject to replacement is imperative;

(4) prior to replacement of the nozzle control cylinder it is necessary to measure, with the engine idle, the distance between the axis of the cylinder-to-afterburner fastening pin and the axis of the pin in the rod extension at all the three positions of the nozzle;

(5) in the newly installed engine adjust the distance between the axes of the pins so that it is equal to the distance measured on the old cylinder in the same position. In the same manner adjust the distance between the pin axes for the normal and maximum ratings;

(6) after installing the new or the old unit of the engine fuel or oil systems or the nozzle control cylinder, prime the system and check the unit for proper operation and tightness of joints with the engine running; the check should be done after running the engine at normal rating for 1 or 2 minutes.

Operation of the nozzle cylinders should be previously checked on an idle engine;

(7) to check tightness of the starting system, switch on the AIRBORNE IGNITION switch for 15 - 20 minutes with the switch on the IV-8 panel in CONSERVATION position and the circuit breakers STARTING UNITS on.

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APPENDIX 3

Installation of Engine on Aircraft

1. If a new engine is to be installed, the following operations should be performed before mounting the engine:
 - (a) after unpacking the engine wash its external surfaces with clean gasoline to remove the slushing compound;
 - (b) secure the engine lifting cross piece and unfasten the engine from the box support. Employ a crane to lift the engine taking special care not to damage the engine and preventing the cables from touching the engine; carefully place the engine on a special dolly and roll the engine into the engine compartment of the aircraft, then secure the engine in place;
 - (c) connect the engine with its suspension struts in accordance with their markings, install the engine nose piece, hydraulic pump 623, relief chambers air outlet pipe unions, HI-9 pump spacer and the tachometer generator from the removed engine.
- Note: Prior to mounting the relief chambers air outlet pipe unions, check by the records in the engine Service Log, whether the diaphragms under the pipe unions are installed properly.
2. Examine the engine visually.
 3. Before installing the engine, inspect the engine compartment in the fuselage and clean it of foreign objects, traces of fuel, oil, fluid (oil) AT-10, dirt and dust.
 4. Bring the engine into the fuselage compartment, seeing that the engine does not catch on the fuselage and aircraft equipment and that the pins do not slip out of the guide rolls.

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- Note: When the engine is 100 - 200 mm short of its home position, install the starter-generator airing pipe union and the pipe union rear fastening bolt; after the engine has been fully brought into the fuselage compartment, secure the pipe union in place.
5. Install the engine fastening pin into the lower fitting in accordance with the marking on the pin and the fitting, tighten up the fitting attachment nuts and screw the pin retainer right home.
 6. Connect the engine attachment side struts on fuselage frame No. 20. The lower eye bolts of the inner struts should be installed with their bosses towards the engine.
 7. Connect the afterburner to the engine and secure it with a clamp.
- Note: Thickness of the clamp and width of the broad groove in the clamp at one joint differ from similar data at the other joint by 2 or 3 mm.
- When installing the clamp, see that its wider part is placed towards the fuselage axis and that the drain pipe union of the clamp is in the bottom position. The pipe union located on the side of the aircraft axis must be plugged.
8. Install the cockpit feed pipes complete with the GEM-10' valve.
 9. Connect the fuel drain pipe running along the engine top to the nozzle; place a copper washer in the joint.
 10. Complete erection of the engine in the sequence reverse to engine dismantling.
 11. When installing a new or an overhauled engine in the aircraft, erect a special girder truss for testing the engines without jointing the fuselage tail section.

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12. Remove anticorrosive coating from the engine inside and prime the fuel and oil systems.

13. When the same engine is installed that has been removed from the plane, joint up the fuselage sections.

14. Check the engine and nozzle control on an idle engine (See Appendices 6 and 7).

15. Start the engine and check the fuel, oil and hydraulic systems of the engine for tightness; eliminate leaks, if any. If the fuselage has been jointed, test the engine at all ratings.

16. Remove the girder truss (if it has been installed), correct all defects that have been discovered, joint the fuselage and check the engine and nozzle control when the engine is idle. This done, start the engine and test it at all ratings. After the first starting and testing a new or an overhauled engine, perform the following:

(a) remove and examine the filter of the oil unit and that of the reducing valve, then prime the oil system;

(b) turn over the engine without switching on the ignition system and check the oil system for tightness.

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Removal of Slushing Compound from Engine
Internal Surfaces

APPENDIX 4

1. To ensure drainage of fuel from the engine, jack up the fuselage nose till the nose wheel is clear of the ground.

2. Turn over the engine.

Install the IV-3 panel switch in the CONSERVATION position, switch on the storage battery and the circuit breaker No.1 TAKE PUMP, STARTING UNITS and EMERGENCY AFTERBURNER CUT OFF, then depress the STARTING button for 1 or 2 seconds and in 5 or 6 seconds switch off the circuit breakers.

The rotor must rotate freely, without knocks and seizure. After the rotor has come to a standstill, turn on the STARTING UNITS circuit breaker and keep it so for a period of up to 30 seconds to let the starter automatic system complete the cycle of operation.

3. Drain oil from the oil unit and the engine front body and fill 8 litres of fresh oil into the oil tank.

4. Depressure the starting fuel system, for which purpose switch on the STARTING UNITS circuit breaker and press the AIRBORNE IGNITION switch two or three times, keeping it depressed 1 or 2 seconds each time and observing an interval of not less than 40 sec. between each ignition switch pressing. See that gasoline flows from the drain pipe.

Note: The steps under items 2 to 4 are carried out with the IV-3 panel switch in the CONSERVATION position.

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5. Flush the fuel system, then deprocess the afterburner fuel system; for this purpose, with the engine control levers in the position AUGMENTED RATING turn over the engine 3 or 4 times with the ignition system out off and No.1 fuel tank booster pump switched on.

Note: If the engine has been treated against corrosion in the aircraft and has not been removed ever since, do not flush the fuel system.

6. Set the IV-3 panel switch in OPERATION position, then turn over the engine once with the ignition out off.

7. Examine the engine oil and fuel systems and eliminate faults, if any.

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APPENDIX 5

Flushing Engine Fuel, Oil and Hydraulic Systems

1. The engine oil and fuel systems should be flushed each time after disconnecting the system or replacing one of the units of the corresponding system. The hydraulic system is subjected to flushing after replacement of the nozzle control cylinder.

2. The main fuel system is flushed with kerosene, while the oil system is treated with oil with the help of hoses (See Fig.57) connected to the bleed valves of pumps HP-10A, HP-11A and to the oil unit. The bleed valves are located in the upper parts of the pump and oil unit. Flushing may be finished, when the emerging stream of fuel (oil) is free of air bubbles. Upon completion of system flushing install new rubber rings on the pipe unions.

3. When flushing the HP-10A and HP-11A pumps, open the fuel cocks and switch on the booster pumps; the oil unit should be flushed when the engine is turned over with the ignition system switched off.

To flush the starting fuel system, set the IV-3 panel switch in the CONSERVATION position and, with the storage battery and the STARTING UNITS circuit breaker on, press the AIRBORNE IGNITION switch for one or two seconds.

4. To flush the nozzle control hydraulic system, proceed as follows:

- (a) connect the ground hydraulic pump and build up a pressure in the aircraft hydraulic system;
- (b) loosen pipe line nuts at the two upper nozzle control cylinders;
- (c) set the IV-3 panel switch in the CONSERVATION position, switch on the circuit breakers AUGMENTED RATING EMERGENCY CUT OFF, SHUT OFF COCK.

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OIL PRESSURE and STARTING UNITS, after which move 2 or 3 times the engine control lever from low speed throttle to augmented condition;

(d) when ANT-10 fluid flowing from under the loosened union nuts is free of air bubbles, tighten up the nuts and lock them in position.

5. To flush the centrifugal valve (after it has been replaced), turn over the engine one or two times with the ignition system switched off and the valve oil inlet nut loosened. When oil begins to drip from under the nut, tighten up the nut and lock it in position.

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APPENDIX 6

Checking Engine Control System

1. Set the engine control lever in the STOP position and make sure that the lever on the engine rests against its stop and the lever on the IV-3 panel is at zero division; the engine control lever in the aircraft cockpit must be 1 or 2 mm short of the rear stop on the throttle control.

Note: The required relative positions of the engine control levers which must rest against the corresponding stops in the cockpit and the IV-3 panel lever (which must be located at the zero division of the dial) must be adjusted only by changing the length of the aircraft rod (near the HP-10A pump or the engine control lever) or by shifting the appropriate engine control levers in the cockpit.

2. When the engine control lever is resting against the idling rating stop, the lever of the HP-10A pump must be located between the notches of the idling rating flat (to be checked with the help of a mirror).

3. Movement of the engine control lever from the idling rating position to the normal position must be accompanied by a click in the IV-3 panel. When the engine control lever is resting on the NORMAL RATING stop, the IV-3 panel lever must be located on dial division 70_{-1}^0 and the HP-10A pump lever must rest against the maximum speed stop.

4. Movement of the IV-3 panel lever towards 75_{-1}^0 division of the dial must be accompanied by a click in the IV-3 panel.

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5. Movement of the IV-3 panel lever towards 85°₁ division of the dial must be accompanied by a click in the IV-3 panel.

Note: The click of the appropriate terminal switch of the IV-3 valve must be heard when the engine control lever is approximately 3 or 4° short of the MAXIMUM or AUGMENTED positions by the dial of the IV-3 panel.

6. When the lever of the IV-3 panel is shifted from the AUGMENTED to the NORMAL position, the lever of the HP-10A pump must remain on the maximum speed stop.

7. Check the engine control lever for free motion and make sure that there is no excessive backlash and that the lever is reliably fixed on the stops: STOP (when the lever is pushed off), IDLING RATING (when the lever is pulled towards the pilot), NORMAL and MAXIMUM (when the lever is pushed off) and AUGMENTED (when the lever is pushed off and pulled towards the pilot).

- Notes:
1. The effort required to shift the engine control lever from the STOP position to the NORMAL position must not exceed 7 kg and to the AUGMENTED position, 13 kg. The effort necessary for removing the lever without pressing the triggers must be not less than 20 kg.
 2. The total play of each engine control lever, with a 5-kg effort applied to the handle pin and the lever on the HP-10 pump pressed to the maximum speed stop, must be not more than 2 mm (at the upper end of the engine control lever).

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APPENDIX 7

Checking Nozzle Shutter Control System with Engines Idle

1. Make sure that all switches in the aircraft cockpit are off and the engine air blow-off bands are closed.
2. Connect the ground hydraulic pump and the airfield electric power source.
3. On the engine under test cut out the electric plug connector from the contactor of the HP-10A pump hydraulic decelerator and install a contactor on the disjuncted section (with jumpers between terminals A and F); cut out the electric connector from the ACU-2 sending unit and prepare its contactor for installation between terminals 1 and 2.

Note: The contactors are available in the engine tool kit.

4. Open the air blow-off band of the engine under test.
5. In the aircraft cockpit switch on the storage battery and the circuit breakers: STARTING UNITS, EMERGENCY AUGMENTED RATING CUT OFF and SHUT-OFF COCK, OIL PRESSURE.
6. Make sure that the taper ring of the jet nozzle shutters, with the engine control lever in STOP and IDLING RATING positions, occupies the extreme rear position, with the lever in the NORMAL position - the middle position, with the lever in the MAXIMUM position - the extreme forward position (prior to this check, switch off the circuit breaker SHUT OFF COCK, OIL PRESSURE or close the air blow-off band).

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Notes: Permissible angular misalignment of the taper ring is 25 ms, as estimated by sight.

7. Set the engine control lever in the AUGMENTED position and make sure that the AUGMENTED warning lamp flashes up; connect the electric connector to the disjoined ACQ-2 connector for not more than 6 seconds, and check to see that the ring of the shutters occupies the rear AUGMENTED position which corresponds to the STOC position. Looking through the nozzle, check the spark plug for spark formation.

Switch off the circuit breaker EMERGENCY AUGMENTED RATING CUT OFF (with ACQ-2 connector out in); the shutter ring must depart from the AUGMENTED position; switch off the connector from the ACQ-2 sending unit connector and switch on automatic circuit breaker EMERGENCY AUGMENTED RATING CUT OFF.

8. Moving evenly the engine control lever in the reverse direction, check position of the nozzle shutters in MAXIMUM, NORMAL and IDLING RATING positions. After the control lever has passed the MAXIMUM position, switch off the circuit breaker SHUT OFF COCK, OIL PRESSURE or open the air blow-off band depending on what has been done before setting the lever in the MAXIMUM position.

9. Set the engine control lever in the NORMAL position, switch off the circuit breaker SHUT OFF COCK, OIL PRESSURE or close the air blow-off band, shift the control lever to the IDLING RATING position and make sure that the shutter ring remains in the NORMAL position. After that switch on the circuit breaker SHUT OFF COCK, OIL PRESSURE or open the air blow-off band.

10. If the fuselage tail section has been disjoined, do the following:
(a) check the nozzle shutter control of the other engine;

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(b) in the STOC position connect the control levers of both engines and make sure that the shutter rings operate simultaneously throughout the whole range of the throttle control.

11. Switch in the disjoined electric connectors of HP-10A pump and the ACQ-2 sending unit.

12. Check the connections for tightness by visual inspection and eliminate faults, if any.

Notes: 1. When checking operation of the jet nozzle control system, perform the work together with an expert on engine electric equipment.
2. If the jet nozzle shutters cannot be set to the necessary positions by shifting the engine control levers, or if the AUGMENTED warning lamp does not light up, the faults resulting from unsatisfactory functioning of aircraft electric equipment must be corrected by an electrician.

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APPENDIX S

Checking Actual Engine Speed Relative to Rated Stable Corrected Speed
with Closed Compressor Air Blow-Off Band

This check should be carried out on each engine separately, the other engine being idle. Perform the check as follows:

1. Change over the air blow-off band of the starboard engine to manual control. To this end:

(a) complete the band manual control electric circuit (See Fig. 58);
(b) switch off the connector of the air blow-off band control system solenoid-operated valve, connect instead the connector of the completed electric circuit and connect the plug to the airfield source of electric power.

2. Start the starboard engine, warm it up, then set it to normal rating and run the engine for 0.5-1 min. After that reduce the engine speed to 10,000 r.p.m.

3. Turn on electric power supply to the solenoid-operated valve of the air blow-off band control system by pressing the switching-on button (close the electric circuit of the band manual control system), then slowly reduce the engine speed by shifting the engine control lever to the value corresponding to that at the actual ambient temperature in accordance with the Table given below and to the required corrected engine speed.

Given below are rated stable revolutions per minute of various production engines corrected for a temperature "t" of $+15^{\circ}\text{C}$ with the compressor air blow-off band closed.

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(a) engines up to No. T726256 (inclusive) must operate stably with the compressor air blow-off band closed at corrected speed $n=9250$ r.p.m. If the aircraft is provided with new 1st category engines up to No. T726256 (inclusive) the rated stable speed must be equal to 9150 r.p.m.;

(b) engines beginning with No. T726257 must operate stably with the compressor air blow-off band closed at corrected speed $n=7050$ r.p.m. If the aircraft is provided with new 1st category engines beginning with No. T726257, the rated stable speed must be equal to 8950 r.p.m.

Run the engine at the indicated speed for 3 minutes. The engine must run steadily, without back-shots.

The engine speed must be measured accurate within ± 25 r.p.m. If the necessary instrument is not available, measure the engine speed by means of a TS-15 tachometer with a scale whose one division stands for 100 r.p.m.

In case of engine surge at a speed which exceeds or equals the value in the table corresponding to the given ambient temperature, immediately de-energize the solenoid-operated valve (open the air blow-off band) and move the engine control lever to the IDLING RATING position.

If, after the engine control lever has been set in the IDLING RATING position (after a back-shot), the temperature of gases past the turbine is above 650°C , or if back-shots continue, it is necessary to stop the engine by shifting the control lever to the STOP position.

After completing the test and stopping the engine, disconnect the band manual control electric circuit and connect the solenoid-operated valve plug.

4. Carry out operations under Items 1, 2 and 3 on the port engine.

Notes: When attending to aircraft with controlled stabilizer, before starting the port engine change the afterburner shutter control system to hydraulic fluid supply from the ground hydraulic pump.

Table

Actual engine speed relative to rated corrected speed depending on ambient temperature

For Above-Zero Temperatures

C°	Corrected engine speed (r.p.m.)				C°	Corrected engine speed (r.p.m.)			
	8950	9050	9150	9250		8950	9050	9150	9250
	Measured engine speed (r.p.m.)					Measured engine speed (r.p.m.)			
0	8715	8812	8910	9007	+9	8853	8952	9050	9149
+1	8732	8829	8927	9024	+10	8870	8969	9068	9167
+2	8749	8846	8944	9042	+11	8888	8987	9085	9184
+3	8766	8864	8962	9060	+12	8905	9005	9104	9204
+4	8783	8881	8979	9077	+13	8923	9023	9123	9222
+5	8792	8890	8988	9086	+14	8932	9032	9132	9232
+6	8809	8907	9006	9104	+15	8950	9050	9150	9250
+7	8826	8925	9024	9122	+16	8965	9065	9165	9265
+8	8844	8943	9041	9140	+17	8986	9085	9187	9287

C°	Corrected engine speed (r.p.m.)				C°	Corrected engine speed (r.p.m.)			
	8950	9050	9150	9250		8950	9050	9150	9250
	Measured engine speed (r.p.m.)					Measured engine speed (r.p.m.)			
+18	8995	9095	9196	9296	+32	9127	9320	9423	9526
+19	9013	9114	9214	9315	+33	9236	9339	9443	9546
+20	9031	9132	9233	9334	+34	9246	9349	9452	9556
+21	9049	9151	9252	9353	+35	9265	9368	9462	9565
+22	9059	9160	9261	9362	+36	9275	9378	9477	9575
+23	9077	9178	9280	9381	+37	9284	9388	9482	9585
+24	9095	9197	9299	9400	+38	9294	9398	9505	9605
+25	9114	9216	9318	9419	+39	9113	9417	9521	9626
+26	9123	9225	9327	9429	+40	9323	9427	9531	9635
+27	9142	9244	9346	9448					
+28	9151	9253	9356	9458					
+29	9170	9272	9375	9477					
+30	9179	9282	9385	9487					
+31	9193	9301	9404	9501					

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For Subzero Temperatures

C°	Corrected engine speed (r.p.m.)				F°	Corrected engine speed (r.p.m.)			
	8950	9050	9150	9250		8950	9050	9150	9250
	Measured engine speed (r.p.m.)					Measured engine speed (r.p.m.)			
0	8715	8812	8910	9007	-20	8388	8490	8575	8669
-1	8598	8795	8892	8989	-21	8372	8465	8559	8653
-2	8681	8778	8875	8972	-22	8357	8450	8543	8637
-3	8664	8761	8858	8954	-23	8341	8434	8527	8621
-4	8647	8744	8841	8937	-24	8325	8419	8512	8605
-5	8630	8727	8823	8920	-25	8309	8395	8488	8581
-6	8622	8719	8815	8911	-26	8297	8380	8472	8565
-7	8597	8593	8790	8886	-27	8272	8364	8456	8549
-8	8589	8685	8781	8877	-28	8256	8349	8441	8533
-9	8573	8668	8764	8860	-29	8241	8333	8425	8517
-10	8556	8652	8748	8843	-30	8218	8310	8402	8494
-11	8540	8635	8731	8826	-31	8203	8295	8387	8478
-12	8516	8611	8706	8801	-32	8188	8280	8371	8463
-13	8500	8594	8689	8784	-33	8165	8255	8350	8440
-14	8483	8578	8673	8768	-34	8150	8240	8331	8423
-15	8467	8562	8657	8751	-35	8136	8227	8318	8409
-16	8459	8550	8648	8743	-36	8121	8212	8303	8394
-17	8435	8530	8624	8718	-37	8107	8197	8288	8379
-18	8420	8514	8608	8702	-38	8080	8170	8260	8350
-19	8404	8498	8591	8685	-39	8070	8161	8251	8341
					-40	8048	8138	8228	8318

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