

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR

REPORT

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**AIRCRAFT TU-16**  
**Maintenance Instructions**

**Book III**  
**BOMBING EQUIPMENT**

(English Language)

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**AIRCRAFT Ty-16**  
**Maintenance Instructions**

**Book III**  
**BOMBING EQUIPMENT**

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 БТ-500

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БГ  
 В-45

2В-45

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БК2-142В

БГ-1, БГ-2, БГ-3,

БГ-4, БГ-5

ДВ-15-ОПБ-11p

ДС-1200-ОПБ-11p

Деп-3-48

Деп-4-49

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УУ-50

К-50Д

КВ6-2А

КВСБ-49А

КД3-488

КД4-388

КОС-45

КД3-547H

КНУ-3

## SYMBOLS AND ABBREVIATIONS

- circuit breaker;
- autopilot;
- bombing equipment;
- electric bomb hoist, modernized;
- bomb trolley, 500 kg maximum carrying capacity;
- bomb trolley, 3000 kg maximum carrying capacity;
- bombsight;
- switch;
- gang switch;
- push-type switch;
- limit switch;
- measuring instruments available in the БГ stand set;
- bombsight altitude transmitter;
- bombsight speed transmitter;
- bomb shackle of group three bomb rack;
- bomb shackle of group four bomb rack;
- bomb shackle of group six bomb rack;
- spark extinguisher device;
- contactor;
- limit switch;
- bomb release variation box;
- bomb rack;
- bomb rack;
- red light filter dome lamp;
- hoisting guide of group three bomb racks;
- combined tester set;

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КСБ-49 - bomb release button;  
 КУ-50 - universal key to cock ПДБ-48 release unit;  
 МЛ-500 - hoist motor;  
 МВН-48 - arming mechanism;  
 МПС - ground speed motor of ОПБ-11p bombsight;  
 ОПБ-11p - optical bombsight (ganged with radar bomb-  
 sight РБН-4);  
 ПБД-48 - bomb release unit;  
 П-4 - packet-type switch;  
 ПН-45 - push-type switch;  
 ПК-3-53 - hoisting hook to lift bombs to bomb racks;  
 ПО-4500 - 4500 W inverter;  
 ПП-5 - adjustment device of ОПБ-11p bombsight;  
 ПУР - signal flare control panel;  
 РБН-4 - radar bombsight;  
 РК - distribution box;  
 Р-8, Р-9 - units of РБН-4 bombsight (navigator's  
 indicator, navigator's control panel);  
 РП - computer of ОПБ-11p bombsight;  
 u - wind velocity;  
 c - aircraft-to-wind angle;  
 α - drift angle;  
 φ<sub>np</sub> - dropping angle;  
 - angle of lateral displacement;  
 φ<sub>в</sub> - sighting angle;  
 Т-СУЛ-473 - electric trolley of БЛ-473M hoist control  
 system, modernized;  
 УЭ-1с - dynamotor of ОПБ-11p bombsight;  
 ФАБ-250М46 - 250-kg high-explosive bomb;  
 ФСТАБ-100-80 - 100-kg photoflash bomb;  
 ШР - plug connector;  
 ЗКСЛ-39 - electrically-operated, 39-mm signal flare  
 launcher;  
 ЗСБР-49А - intervalometer (electric bomb release);  
 H - flight altitude;  
 T - time of bomb falling;

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Y - trail angle;  
 V - true airspeed;  
 θ - ballistic coefficient of bomb;  
 ПН-2 - change-over relay;  
 ПН-6 - change-over relay;  
 РТ-40 - change-over relay;  
 СЛЛ-51 - indicator light;  
 САБ-100-90 - flare bomb;  
 ТТ-1 - tester;  
 ΔV - indicated airspeed aerodynamic correction;  
 h - target elevation over sea level;  
 D - slant range;  
 D<sub>min</sub> - minimum slant range;  
 D<sub>max</sub> - maximum slant range;  
 φ - pitch stabilization angle;  
 V<sub>np</sub> - indicated speed;  
 W - ground speed;  
 H<sub>np</sub> - indicated altitude;  
 t<sub>3</sub> - temperature on the ground;  
 t<sub>H</sub> - temperature at given altitude;  
 L - train length;  
 П - formation correction;  
 K - heading angle;  
 τ - bomb release warning time;  
 ΔH - altitude correction,

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Chapter I  
PRE-FLIGHT AND POST-FLIGHT INSPECTION

PREPARATION OF EQUIPMENT, BOMB HOISTING  
AND PRE-FLIGHT INSPECTION

While making pre-flight inspection, preparing the equipment and hoisting bombs, it is recommended to carefully and strictly follow the present Instructions.

Inspection priority is shown in Fig.1.

Special Instructions

1. Prior to turning on the interlocking switches (Fig.2) make sure that all the bomb-bay door and release control switches are in the OFF (ВЫКЛЮЧЕНО) or NEUTRAL (НЕЙТРАЛЬНО) positions and personnel or things are kept away from the bomb-bay doors.
2. For all operations on the bombing equipment make use of 27  $\pm$ 2.7 V D.C. power source having a voltage regulator.
3. Checking the bomb control release electric circuits and preparing the bombing equipment for bomb hoisting is performed prior to bomb loading and should not depend on the operations on bomb unpacking and transportation to the aircraft.
4. Leaving the bombing equipment units energized (without necessity) or cocking bomb shackle release units (БЕД-48) and turning on the rear row bomb rack engagement switch with the КВСБ-48 bomb release variation box OFF is prohibited.
5. Hoisting bombs or performing any other operations in the bomb bay is not allowed unless the interlocking switches are off.

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6. Remember that the bomb-bay doors will not close unless the interlocking switches are in the ON (BKJNHEHO) position.

7. On having hoisted the bombs the bomb-bay doors are closed by the Aircraft Senior Technician or the Armament Technician after he makes sure that no bomb hoisting guides, end blocks or other things are left in the bomb bay. Make sure that the interlocking switches are in the ON position and report to the pilot on the completion of bomb hoisting and on results of bombing equipment pre-flight inspection.

**CAUTION:** 1. The interlocking switches are engaged and the bomb-bay doors are closed after completing the pre-flight inspection and the work in the cabins.

2. The bomb-bay doors having been closed the crew members ONLY are allowed to remain in the cabins.

#### Bomb Rack Installation

In accordance with the assigned task the bomb racks are installed to provide the required bomb load variant.

Electromechanical bomb hoists, types BJ-473M or BJ-56, are employed for hoisting and lowering the bomb racks. For the arrangement of hoist cables for hoisting and lowering the bomb racks see Fig.3. The same type of hoists is used during hoisting, lowering or replacing the bomb racks.

#### Removal of Bomb Racks

1. Energize the aircraft mains and open the bomb-bay doors.
2. Install hoists BJ-473M on the bomb-bay doors and connect them to power supply source (for details see Chapter 5).
3. Install single-sheave end pulley 3 on the attachment fitting (Fig.3).
4. Install block 1 for removing the rack.
5. Remove the hoisting beam from the holder, for this:

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- (a) withdraw the hinge bolts handles from the slots;
- (b) remove the hinge bolts;
- (c) disengage the beam from the attachment fittings by pulling it up and remove it.

6. Disengage the feed cable from the bomb rack plug connector and connect it to the adapter on the side of the aircraft.

7. Screw the cap on the bomb rack socket.

8. Arrange the hoist cable as is shown in the diagram (Fig.3) and connect the cable terminal on rear side of the bomb rack (Fig.4).

9. Lift the rack slightly up to remove the easy-to-remove belts securing the bomb rack to the bottom attachment fittings.

10. Remove the easy-to-remove bolts.

11. Withdraw the bomb rack from attachment fittings and, supporting the rack, carefully lower it on the ground; make sure that the bomb rack is clear of the aircraft.

12. Put the easy-to-remove bolts back into the attachment fittings of the aircraft.

**Note:** While removing the racks, see that latch control handles are in the top position.

13. De-energize the aircraft mains and remove all the accessories.

#### Installation of Bomb Racks

The sequence of bomb rack installation operations is reverse to the removal operations; care should be exercised not to confuse the left-hand and the right-hand racks.

#### Checking Bomb Release Control Circuits and Preparing Bombing Equipment for Bomb Loading

1. Energize the aircraft mains.
2. Turn on the interlocking switches,
3. Open the bomb-bay doors.



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4. Check operation of the bombing system units, with the bomb release control circuit de-energized.

(a) on bomb racks of КДЗ-488 and КД4-388 types perform the following to check the combat bomb release control system:

- cock the ПБД-48 bomb shackle release units with the special key;
- put the latch group control handles in the UNLOADING (РАЗГРУЗКА) position (bottom position) (Fig.5). Make sure that the red indicator pins are extended from the bomb rack beams;
- remove the shackles from the bomb racks;
- put the latch group control handle in the LOADING (ЗАГРУЗКА) position (top position) (Fig.6). Make sure that the red indicator pins sink flush with the bomb rack beam;
- mount bomb shackles in conformity with the assigned loading variant;
- insert the ring of the special clamp into the arming retainer and the clamp into the carrying hook, and lock the shackle (Fig.7);
- remove all the auxiliary pieces of equipment from the bomb bay;
- make sure that the following switches on the navigator's left-hand circuit breaker panel are OFF: BOMB-BAY DOOR CONTROL (УПРАВЛЕНИЕ СТВОРКАМИ БОМБОТСЕКА), COMBAT BOMBING (БОЕВОЕ БОМБОМЕТАНИЕ), ARMED (ВЗРЫВ), КСБ-48 power supply (ПИТАНИЕ КСБ-48), COMBAT BOMBING INTERLOCKING RELAYS (БЛОКИРОВОЧНЫЕ РЕЛЕ БОЕВОГО БОМБОМЕТАНИЯ), BOMBING EQUIPMENT WARNING SYSTEM (СИГНАЛИЗАЦИЯ БОЕВОГО ВООРУЖЕНИЯ) and make sure that the station status indicator lights for the required variant on the left-hand release panel and the bomb-bay door position indicator lights on the bomb-bay door control panel are burning;
- on the ЗСЕР-49A intervalometer (Fig.8) set the release interval, and the number of bombs to be released; put the TRAINSEL switch to SELECTIVE (ОДИНОЧНО) position;

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- on the bottom bomb release control panel turn on the rack selector relay and put the salvo switch in the "1 BOMB PER SALVO (ПО 1) position (Fig.8);

- close the bomb-bay doors by pressing the switch on the bomb-bay door control panel for setting the hydraulic actuator to the locked position (the switch must be kept ON until hydraulic pressure reaches 110 - 120 kg/cm<sup>2</sup>). Make sure that after closing the bomb bay doors, the BOMB-BAY DOOR CLOSED indicator light (ЛЮК ЗАКРЫТ) comes on, while the BOMB-BAY DOOR OPEN indicator light (ЛЮК ОТКРЫТ) on the bomb door control panel goes out, and that the station status indicator lights on the left-hand bomb release control panel are also dead.

Note: The bomb-bay doors are opened or closed only when the command BOMB-BAY DOORS CLEAR is carried out;

- turn on MASTER BOMBING SWITCH (ГЛАВНЫЙ ВЫКЛЮЧАТЕЛЬ БОМБОМЕТАНИЯ) and make sure that the following lights are ON: READY (ГОТОВ) on the navigator's left-hand panel, READY TO DROP (ГОТОВ К СБРАСЫВАНИЮ) on the operator-navigator's panel, ARMED (ВЗРЫВ) on the bomb-bay door control panel and ARMED (ВЗРЫВ) on the pilot's instrument panel;

- push the CHECK STATION STATUS, WITH BOMB-BAY DOORS CLOSED (ПРОВЕРКА ПОДВЕСКИ БОМБ ПРИ ЗАКРЫТЫХ БОМБОЛЮКАХ) button on the left-hand bomb release control panel and make sure that the indicator lights are burning;

- by operating the switch of the normal bomb-bay door opening system open the bomb doors and make sure that the door OPEN (ОТКРЫТО) position indicator light comes on and the indicator light CLOSED (ЗАКРЫТО) goes out;

- perform the release by successively pushing the navigator's bomb release button of the КСБ-49 release variation box. Make sure that the station status indicator lights go out and that the ПБД-48 release units (and the shackles) have operated in accordance with the required sequence of release;

- pull the arming cables with hand to make sure that the arming wire rings are safely held by the arming retainers;

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- turn off all the switches;
  - cock the ПБД-48 bomb shackle release units and close the bomb shackles again;
  - put the TRAINSEL switch (on the intervalometer) to the TRAIN (СЕРИЯ) position;
  - prepare the bomb release control system for train bombing;
  - perform a release by operating the operator-navigator's КСБ-49 bomb release button;
  - put all the switches and change-over switches on the navigator's panel to the OFF (ВЫКЛЮЧЕНО) or NEUTRAL (НЕЙТ-РАЛЬНО) positions;
- (b) perform the following to check the emergency release control system:
- cock the ПБД-48 release units, insert special clamps and rings and close the shackles;
  - operating the switch on the pilots' hydraulic system control panel (Fig.9) close the bomb doors (bomb door stand-by closing system):
  - make sure that emergency release circuit breaker А3С-10, emergency release control relay circuit breaker А3С-2, and emergency release circuit breaker А3С-5 located on the navigator's right-hand circuit breaker panel are ON;
  - turn on the emergency ARMED release switch (Fig.10) on the pilot's board and make sure the indicator light ARMED (ВЗРПВ) lights up;
  - turn on the emergency release control switch (Fig.11) on the pilot's panel and make sure that the bomb doors are open and the shackles have operated for an ARMED release;
  - turn the ARMED (ВЗРПВ) and the emergency release control switches to the initial position;
  - cock ПБД-48 bomb shackle release units, insert the special clamps and close the shackles;
  - turn on the emergency release switch on the navigator's left-hand panel (Fig.12) and make sure that special clamps

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have dropped out of the carrying hooks, i.e. the shackles have operated for a SAFE (HEB3PVB) release;

- turn OFF the emergency release control switch;
- (c) perform the following to check the top emergency release control system:
- de-energize the aircraft mains;
  - cock ПБД-48 bomb shackle release units, insert the special clamps and close the shackles;
  - turn on the ARMED (ВЗРПВ) switch on the pilot's control panel (Fig.13) and make sure that the light indicating ARMED (ВЗРПВ) is burning;
  - unlock bomb release handle 3 designed to be used when the aircraft mains is de-energized, pull it as far as it will go and make sure that the shackles have operated for an ARMED (ВЗРПВ) release (the rings remain in the retainers);
  - return the handle to the initial position and turn OFF the ARMED switch;
  - cock ПБД-48 bomb shackle release units, insert the special clamps and close the shackles;
  - pull the bomb release handle as far as it will go and make sure that the shackles have operated for a SAFE (HEB3PVB) release (the rings have dropped out of the retainers);
- Return the handle to the initial position and lock it.
5. Check operation of ЗКСИ-39 signal flare launchers:
- make loose the tightening-up screws of the ЗКСИ-39 launcher set of tubes (Fig.14);
  - pull out the sets of tubes and magazines (Fig.15);
  - examine the sets of tubes, jackets and shoes of the launchers;
  - open the magazines (Fig.16);
  - insert check lamps from the set of spare parts of the ЗКСИ-39 launcher into the squib seats;
  - lock the check lamps with a spring-lock handle (Fig.17);
  - close the magazines;
  - fasten the sets of tubes of the jackets;

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- switch ON circuit breaker A3C-5 on the signal flare control panel located on the copilot's circuit breaker panel (Fig.18);
  - turn on switch 1 of the 3KCH-39 control panel (Fig.19);
  - by successively pressing signal flare release buttons 2 check if the lamps flash up to indicate faultless operation of the 3KCH-39 signal flare launcher;
  - remove the sets of tubes and pull out the check lamps.
6. Prepare the bomb racks for bomb hoisting:
- cock ПБД-48 bomb shackle release units;
  - place the latch group control handles in the UNLOADING (ПАЗПВЗКА) position (bottom position);
  - remove all the shackles;
  - place the latch group control handles in the LOADING (ЗАПВЗКА) position (top position);
  - prepare the arming wire and the locking forks.

Transportation of Bombs to Place  
of Hoisting

250 or 500-kg Bombs

The bombs of 250 or 500-kg calibre are brought to the aircraft in the BT-500 trolley in the following way:

1. The BT-500 bomb trolley is brought over the unpacked bomb, the 4AB-250 bombs are brought to the aircraft by two at a time.
2. Fix the lifting device available on the bomb trolley to the bomb suspension lugs.
3. By means of the hoist lift the bomb onto the bomb trolley and fix it with sway braces (Figs 20, 21).
4. Bring the bomb trolley to the rear part of the bomb bay, with the bomb nose directed forward.
5. Align the bomb so that the bomb axis matches the respective mark on the bomb-bay door. The trolley should be moved along the aircraft axis until the forward suspension lug matches the respective mark on the bomb-bay door.

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6. After the bomb axis and the forward suspension lug are aligned with the respective marks, the trolley is stopped and wooden supports are put under the cylinder portion of the bomb.

7. Lower the bomb on the supports.
8. Disconnect the trolley lifting device from the bomb and move the trolley away.
9. On having hoisted the bomb, the same procedure is performed for hoisting the subsequent bombs.

3000-kg Bombs

The bombs of 3000-kg calibre are brought to the aircraft by the BT-49 trolley in the following way:

1. The BT-49 trolley is brought over the unpacked bomb (on the site for packing and unpacking bombs).
2. Fix the lifting device available on the trolley to the bomb suspension lugs.
3. By means of the hoist lift the bomb onto the bomb trolley and fix it with sway braces.
4. Bring the bomb trolley to the rear part of the bomb bay, with the bomb nose directed forward.
5. Align the bomb so that the bomb axis matches the respective mark on the bomb-bay door. The trolley should be moved along the aircraft axis until the forward suspension lug of the bomb matches the respective mark on the bomb-bay door.
6. After the bomb axis and the forward suspension lug are aligned with the respective marks, the trolley is stopped and wooden supports are put under the cylinder portion of the bomb.
7. Lower the bomb on the supports.
8. Disconnect the trolley lifting device and move the trolley away.
9. On having hoisted the bomb the same procedure is performed for hoisting the subsequent bombs.

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Bomb Hoisting to Bomb RacksGeneral

1. Prior to starting the operation make sure that all the interlocking switches are OFF.
  2. Standing under the bomb being hoisted or lowered is prohibited.
  3. Bomb guides (roller paths) should be furnished with red flags fixed to cord lengths which make the flags visible even when the bomb-bay doors are open.
  4. For safety purposes, put a wooden frame (support) under the bomb to be hoisted. The grating serves to absorb the shock, if the bomb falls on the ground. It is made of four wooden bars of square or rectangular section, not less than 120x120 mm in size, which are arranged crosswise; the upper pair of bars must be arranged perpendicular to the bomb axis under its cylindrical portion, the distance between the squared bars must be equal to 3/4 of the length of the bomb cylindrical portion.
  5. Prior to hoisting the bombs should be carefully inspected, particular attention should be paid to the condition of welds of suspension lugs, suspension band joints, the thread of the fuze adapter and fins.
  6. When hoisting bombs only the personnel engaged in the operation is permitted to stay at the loading site.
  7. When hoisting bombs to the KJ3-488 bomb rack it is permitted to lift bombs to both sides simultaneously, the number of personnel engaged being doubled.
  8. Particular attention must be paid to proper position of the shackle relative to the flight direction.
  9. Forward bomb racks must be loaded first.
  10. The bombs are equipped with fuzes and time fuzes in strict conformity with the standing orders, manuals and instructions on combat employment of appropriate types of fuzes and time fuzes.
- For the types of arming wire to be used see the Appendix.

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Loading KJ3-488 Bomb Rack250-kg Bombs

Equipment employed: two electric hoists, types БЛ-473М or БЛ-56, two two-sheave end pulleys, two hoisting hooks and four guides (roller paths), type KJ3-547H.

Hoisting procedure:

1. Mount the БЛ-473М or БЛ-56 bomb hoist on the forward butt end of the bomb-bay door of the respective side.
2. Install a two-sheave end pulley on the brackets (Fig.22).
3. Install the KJ3-547H guides to direct the bombs onto the bomb rack.
4. Unroll the hoisting cable to the required length.
5. Put the hoisting cable round two-sheave end pulley 11 (Fig.23), through the bottom pulley of the bomb rack and into the guiding tube designed for hoisting 250-kg bombs and lower the cable end to the ground.

Note: Forward bomb racks must be loaded first.

6. Attach the shackle to the bomb, for which do the following:
  - (a) bring the carrying hooks into the bomb suspension lugs, shift the intermediate lever to turn the carrying hooks and lock them;
  - (b) press the locking actuator of the shackle (Fig.24);
  - (c) looking through the inspection hole make sure that the shackle has got closed;
  - (d) attach the arming wire to the bomb and pull the arming wire retainer hook aside, insert the arming ring in the recess and release the hook;
  - (e) turning the nut of the forward sway brace located next to the recess lock the shackle firmly on the bomb.
7. Attach the cable terminal to the hoisting hook and lock it.

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8. Engage the hoisting hook with the shackle neck (Fig.25).

9. Hoist the bomb (Fig.26) in conformity with the instructions for operation of EJL-473M bomb hoists (Chapter V).

#### 500-kg Bombs \*\*\*\*\*

Equipment employed: four EJL-473M bomb hoists, two two-sheave end pulleys, two single-sheave end pulleys, two hoisting hooks and two bomb hoisting beams.

#### Hoisting procedure:

1. Mount two EJL-473M bomb hoists on the forward and rear butt ends of the bomb-bay doors of the side where the bomb is to be hoisted (Fig.23).
2. Install two-sheave end pulley 11 on the brackets in the forward part of the bomb bay.
3. Install single-sheave end pulley 4 in the bomb bay rear part.
4. Install hoisting beams on the bomb racks (Fig.27) with their tabs nosewise.
5. Fix a sheave block into the beam seat for hoisting 500-kg bombs (Fig.28).
6. Arrange a 500-kg bomb hoisting system, for which:
  - (a) unroll the required length of the forward hoist cable; pull the cable through the two-sheave end pulley, put it over the pulleys of bomb rack, lower the cable terminal to the ground and secure it to the hoisting hook;
  - (b) unroll the required length of the rear hoist cable, pull the cable through the rear end pulley sheave, put it over the pulleys of the bomb rack and the hoisting beam and bring the cable terminal through the pulley of the beam marked for the calibre of the bomb to hoist;
  - (c) lower the cable terminal to the ground.
7. Attach the shackle to the bomb (See the procedure outlined in Item 6, Subsection "250-kg Bombs").

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8. Prepare the bomb for hoisting it to the bomb rack, for which:

(a) engage the hoisting hook and the cable with the shackle neck;

(b) put the rear hoist cable under the bomb body, secure the cable terminal to the lower part of the hoisting hook (Fig.29) and by using the hoists strain the cables.

9. Hoist the bomb in conformity with the instructions for operation of EJL-473M hoists (two-hoist lifting, see Chapter V)

(a) as the shackle journals approach the bottom part of the rack beams, slow down the hoist and carefully bring the journals into the beam channels;

(b) proceed with hoisting the bomb, seeing that its body is approximately parallel to the ground, the bomb does not touch the bomb rack beams and there is a clearance between the bomb body and the bomb rack beams;

(c) hoist the bomb up to the level of the top latches; slow down the hoisting as the bomb approaches the latches; align the bomb to keep it parallel to cross bars of the rack;

(d) hoist the bomb until a click is heard indicating that the shackle journal has passed the lower latch of the top station. Then slightly swinging the bomb by its fin assembly, lift it so that the second journal reaches the upper face of the second latch to produce a similar click. After the second click slacken out the cables.

10. Make sure the latches are engaged. Once the latches are engaged correctly, the latch position indicator pins are flush with the bomb rack beam. The extending pin indicates that the shackle journal is not engaged with the latch. Proper engagement is provided by swinging the bomb until the pin sinks. After slackening out the cables the bomb has to be tried by shaking the fin assembly.

11. Slacken out the hoist cables and disengage the hoisting hook from the shackle (Fig.30).

12. Hoist next bombs in a similar way.

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Note: While the bomb is being hoisted along the bomb rack beams to the holder, rock it lightly up and down by the fin, to prevent warping and jamming of the shackle in the beam. The procedure of loading the K43-488 bomb rack with flare bombs is the same as that of appropriate calibres of high explosive bombs.

Cables with rings are provided in the bomb bay to receive flare bomb parachute rip cords. The cables are secured to free attachment fittings (top and bottom) of the rack with bolts. To fix the cable pull its upper end through the hole in the top attachment fitting for the bomb rack and engage it with the lock; fix the lower end of the cable (having an eye) to the lower attachment fitting by means of an easy-to-remove bolt (Fig.31).

The bombs having been hoisted, equip them with fuzes and remove all the auxiliary accessories and hoisting equipment from the bomb bay.

Note: If the K43-488 bomb rack is to be loaded partially, the bombs are hoisted to the stations from which they will be released first. In this instance ПБМ-48 bomb shackle release units of the non-loaded stations shall not be cocked (except those affecting hoisting) and the shackles shall not be removed.

Loading K43-488 Bomb Rack  
3000-kg Bombs

WARNING: Prior to loading 3000-kg bombs to the right-hand bomb rack, set the beam strainer in the combat position (above the second station).

Equipment employed: two bomb hoists, БМ-473М or БМ-56, two two-sheave end pulleys, two movable blocks, two hoisting

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sling cables (long and short), two bomb hoisting beams, a hoisting sling, a twin guy and a hoisting frame.

Hoisting procedure:

1. Install two bomb hoists, БМ-473М or БМ-56, on the rear butt ends of the bomb-bay doors.
2. Attach the hoisting sling to the bomb.
3. Fix the shackle to the bomb so that the arrow on the shackle frame shows nosewise, and close the shackle. Look through the inspection hole of the shackle to check the proper engagement of the shackle.
4. Turn the bomb to such a position that the shackle is at 45° to the bomb rack. The red line on the hoisting sling must be located against the suspension lugs.
5. Install the arming wire on the bomb and bring the arming ring into the arming wire retainer.
6. Mount hoisting beams 5 on the bomb racks (Fig.35).
7. Mount two-sheave end pulleys 8 on the bracket of frame No.49.
8. Arrange the changeable brackets of the hoisting beams in conformity with the designations on the beams.
9. Unroll the bomb hoist cables.
10. Assemble starboard and port side pulley blocks (Fig.35).
11. Bring both ends of each hoisting sling cable running over the larger sheave of the movable pulley block first to the bottom and then to the top pulleys of the same bomb rack. Arrange the hoisting sling cable marked K (short) on the port side of the aircraft and the cable marked Л (long) on the starboard side of the aircraft.
12. Bring the terminals of the hoisting sling cable marked Л (long) from the top bomb rack pulleys to the hoisting beam pulleys and lower them.
13. Pull the ends of both hoisting sling cables through the spacer holes on the hoisting sling (Fig.34), pass them under the bomb casing and secure them in the seats of the hoisting sling, on the other side of the bomb.

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14. Hoist the bomb in conformity with the instructions for operation of bomb hoists of БЛ-473М or БЛ-56 types (See Chapter V), for which:

(a) as the shackle journals approach the bottom ends of the bomb rack beams slow down the hoists and carefully bring the journals into the beam channels;

(b) continue hoisting the bomb seeing that its body is approximately parallel to the ground. Check for uniform operation of the two hoists. Hoist the bomb so that the bomb body is clear of the bomb rack beams; maintain a constant clearance between the bomb body and the bomb rack beams;

(c) hoist the bomb as high as the level of the top latches; as the bomb approaches the latches slow down the hoists and align the bomb body to be parallel to the bomb rack cross members. While hoisting the bomb slightly shake it up and down by the fin;

(d) bring the bomb onto the bomb rack latches, the procedure being the same as outlined above for the ФАБ-500 bomb (КЛЗ-488 bomb rack).

15. When sure of proper suspension, disconnect the sling cables from the hoisting sling and lower the latter on the ground (Fig.36).

16. When hoisting the bottom ФАБ-3000 bomb on the starboard side, install hoisting frame 13 on the port side bomb rack (See Fig.35) and fix twin guy 6 to the hoisting beam. In this case bring the terminals of the port side hoisting sling cable from the top pulleys of the bomb rack to the hoisting frame pulleys and then to the pulleys of the twin guy (Fig.37), pass them through the spacer holes and under the bomb body to secure to the hoisting sling.

The bomb hoisting over, the bombs are equipped with fuzes; all the auxiliary accessories and hoisting equipment shall be removed from the bomb bay.

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#### ЗКЦП-39 signal flare Launcher Loading

1. With cloth remove the lubricant from the launcher.
2. Release the catch and put the magazine at 90° relative to the set of tubes (See Fig.16).
3. Insert four signal flare cartridges into the tubes (Fig.38).
4. Return the magazine to the initial position, closing the catch thereby.
5. Check up four squib-initiated igniters, insert them into the magazine seats (Fig.39), and holding them by fingers in pairs fix them in the position by turning the handles of the spring-loaded lock through 90° (See Fig.17).
6. Insert the loaded set of tubes with the magazine into the casing so that marks on the set end and on the casing align.
7. Tighten the screw as far as it will go. Load the other two launchers.

#### Pre-Flight Inspection

Prior to flying a bombing mission the aircraft fully equipped for the purpose should be inspected by the navigator and armament technicians with a view to testing for proper preparation of the aircraft. Pre-flight inspection is performed after all the preparatory operations on the aircraft are over.

Pre-flight inspection involves the following:

1. Inspection of the navigator's, pilots', and operator's cabins to make sure that all the switches on the bomb release control panels as well as control and instrument panels are in the OFF (ВЫКЛЮЧЕНО) or NEUTRAL (НЕЙТРАЛЬНО) positions while the switches of the bomb release control circuit breakers on the circuit breaker panels are ON.
2. Checking whether the amount and calibre of bombs correspond to the mission.
3. Checking for proper bomb suspension from the bomb racks and making sure that all the shackle journals are reliably

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engaged by the latches (indicator pins are flush with the bomb rack beams) and the shackles are properly attached (the arrows show nosewise).

4. Checking for correct insertion of fuses into the bombs, proper equipment of fuzes, setting of delay data, fuze locking and testing for correct attachment of the parachute rip cords of incendiary and flare bombs.

5. Inspection of the bomb bay to make sure that pieces of auxiliary equipment, tools, bomb hoisting units except those listed in the present Instructions are removed from the compartment.

6. Reporting the results of the pre-flight inspection to the aircraft commander, switching on the bomb-bay interlocking switches and closing the bomb-bay doors.

7. Closing the hatch of the interlocking switches.

#### Routine Maintenance and Inspections

The scope and time limits for routine maintenance and inspections of the bombing equipment are specified by standing Instructions on routine maintenance and inspections of Bombing Equipment.

Routine maintenance operations are usually performed during the post-flight servicing and within the time specially allotted for the purpose. The results of routine maintenance are recorded in the Service Log for the bombing equipment.

The aircraft whose bombing equipment has not undergone the required routine maintenance operations cannot be admitted for flying.

The aircraft bombing equipment is considered serviceable only after the elimination of all the faults discovered during the flight and in the course of post-flight inspection and after the completion of the scheduled routine maintenance operations.

For routine maintenance and inspections use only those types of control and test appliances, tools and lubricants

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which are recommended by the technical descriptions of respective units.

The personnel in charge of routine maintenance and inspections must be properly qualified to exercise high professional skill in maintenance and experience in adjusting and testing bombing equipment units and mechanisms.

#### Preparation for Night Flight

Preparation for night bombing includes the following operations:

1. Adjusting the caps of all the indicator lamps for the required illumination.
2. Checking good repair of the ultraviolet illumination equipment and panel illumination lamps.
3. Checking good repair of the extension lamp.
4. Preparing the ONE-11p bombsight, directional stabilizer and bombing equipment for night bombing (which is accomplished the same way as for day bombing).
5. When preparing the ONE-11p bombsight particular attention must be paid to assure the following:
  - (a) cleanliness of the bombsight optical system;
  - (b) proper operation and smooth adjustment of the bombsight reticle illumination;
  - (c) proper condition of the luminous coating on the bombsight and directional stabilizer dials and indices.

#### POST-FLIGHT INSPECTION AND MAINTENANCE

After every sortie all bombing equipment units and mechanisms should be thoroughly inspected; checks should be made for serviceability and proper assembly of the units, completion of the sets and proper connection of the electric conductors to units as required by the circuit diagrams. Make sure that all the plug connectors are fixed tight with union nuts and locked, that the items of equipment installed on



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shock-absorbers stand clear of the aircraft structure, that all the units are sealed and bonded, equipped with safety fuzes, indicator lights and light filters, that the electric conductors are located clear of sharp edges of the aircraft structure (otherwise the place of contact must be bandaged with BML p.v.c. tape, the extension being no less than 20 mm on both sides), that the conductors are not tightened or their sagging does not exceed 3 - 5 mm. The electric cables of the ONE-11p bombsight must provide for a free right- or left-hand turning of the bombsight through  $\pm 30^\circ$ .

Make sure that the units have not been damaged mechanically and that all the inscriptions are in good condition. All the circuit breakers, buttons and switches must smoothly and easily operate for ON and OFF, the operation being accompanied by a characteristic click.

After the switches and buttons are checked for proper operation, they must be turned to the OFF (ВЫКЛЮЧЕНО) or NEUTRAL (НЕЙТРАЛЬНО) positions. All the knobs and dials must rotate smoothly and without seizing.

All the faults and malfunctions disclosed during the inspection must be eliminated with no delay. The route of inspection is shown in Fig.1. The inspection procedure is as follows:

1. Turning a screw-driver counter-clockwise open the hatch for interlocking switches (Fig.40) and turn them on (See Fig.2).
2. Inspect the port side ЗКСН-39 signal flare launcher (Fig.41) and make sure that the tightening-up screw is screwed to its limit.
3. Pull out the closing plug and inspect the static vent of the ONE-11p bombsight transmitters (Fig.42).
4. Remove the cover from the dynamic pressure tube of the ONE-11p bombsight transmitters (Fig.43).
5. Check the outside connection of the ONE-11p bombsight with the АП 5-2M autopilot. Make sure that pin 2 of the bombsight tail end and pin 1 of the connecting rod are inserted

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in the seats to the limit and locked, and that the drift gear wheel spring is connected with pin 3 of the clutch of the directional stabilizer of the АП5-2M autopilot (Fig.44).

6. Inspect the starboard signal flare launchers (Fig.45) and make sure that the tightening-up screw is screwed to the limit.

7. Make sure that the limit switch of the bomb-bay red dome light is held in the ON position by the nose L.G. strut (Fig.46); this is done by pressing the stem of the terminal switch; the switch should not operate, the free travel of its stem being 1.5 to 2 mm.

8. On the navigator-operator's circuit breaker panel:

(a) inspect altitude transmitter 2 and speed transmitter 1 of the ONE-11p bombsight and their connection to static and dynamic lines (Fig.47);

(b) check operation of BOMB BAY LIGHTING (ОСВЕЩЕНИЕ БОМОТОТЦЕКА) circuit breaker 3 and BOMB BAY LIGHTING (ОСВЕЩЕНИЕ БОМОТОТЦЕКА) switch 4.

9. Inspect the ONE-11p bombsight control box (Fig.48) and make sure that the fusible cutout is intact.

10. Check operation of signal flare control panel circuit breaker АЗС-5 located on the co-pilot's circuit breaker panel (See Fig.18).

11. Check operation of bombing equipment control units on the starboard side of the navigator's cabin, for which:

(a) check operation of the switch and the signal flare release buttons; make sure that while turning the sleeve on the signal flare control panel the colour in the window of the cap changes;

(b) check operation of the circuit breakers on navigator's right-hand circuit breaker panel 3 (Fig.49);

(c) check operation of the toggle switches and bomb door control change-over switch 1;

(d) check operation of КОБ-492 bomb release button;

(e) inspect the altitude unit (Fig.50);

(f) check operation of change-over switch 1;

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(g) make sure of smooth rotation of altitude setting handle 2 and altitude scale 3.

12. Inspect the bombsight, for which:

(a) check operation of the following knobs: trail, time of falling, train. Make sure of their smooth rotation involving no seizing;

(b) check operation of bombsight eyepiece 5 and make sure of its smooth rotation without seizing (Fig.51);

(c) check operation of light filter mechanism 1, paying attention to the change of colour in the bombsight field of vision (Fig.52);

(d) check smooth movement of rheostat knobs for illumination of collimator (5) and optical (3) systems;

(e) check operation of automatic bomb release mechanism 4 and make sure that the knob intensively returns to its initial position;

(f) check operation of switches 1 and 2 (See Fig.51);

(g) check operation of the stop of gyroscope caging device handle 7;

(h) check for proper condition of the lamps illuminating the collimator and optical systems;

(i) check operation of the mechanism and knob of collimator 8;

(j) check operation of drift mechanism engagement knob and drift correction knob 7 (See Fig.52);

(k) check the position of the mechanical interlock screw of the erecting mechanism cutout relay and make sure that the screw spline is against BOMBING (БОМБОМЕТАННЕ);

(l) check drift knob 9 and sight turning knob 10 (See Fig.51) for smooth operation;

(m) check operation of the accelerated correction knob;

(n) check condition of the silica gel cartridge;

(o) make sure that WARNING (ПРЕДУПРЕЖДЕНИЕ) and RELEASE (СВООС) lamps are intact;

(p) check operation of the synchronization selector knob;

(q) check operation of the sighting button;

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(r) check the sighting knob and the synchronization knob for smooth operation;

(s) check the bombsight for proper mounting and proper connection with the AN-5-2M autopilot.

13. Inspect the computer (Fig.53), for which:

(a) check knob 14 and altitude scales 4, 11 for smooth rotation;

(b) check aircraft speed-setting knob 10, ground speed scale 6 and aircraft speed scale 5 for smooth rotation;

(c) check wind bearing scale knob 8 and wind velocity setting knob 7 for smooth rotation;

(d) check temperature setting knobs 2 and 3 for smooth rotation;

(e) check aerodynamic speed correction knob 1 for smooth rotation;

(f) check operation of the bomb ballistic coefficient setting knob;

(g) check operation of HV (13) and ТУФ(12) switches.

14. Check operation of the bombing equipment control units on the port side of the navigator's cabin:

(a) check operation of the switches, protective caps and the station status indicator button on left-hand bomb release panel 1 (Fig.54);

(b) inspect ССБП-49А intervalometer 2, make sure that the dials and knobs rotate smoothly, check operation of the switches;

(c) check operation of the switches on bottom bomb release control panel 3;

(d) inspect КВСС-48 bomb release variation box 1 (Fig.55);

(e) inspect HV-50 spark-extinguisher box 2;

(f) check all the circuit breakers on navigator's left-hand circuit breaker panel 1 (See Fig.56) for proper operation;

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(g) open the cover of A.C. fuse box 2 on the navigator's electric panel and check if the bombsight circuit fusible cutouts are available.

Note: Check switches, buttons and light filters for mechanical faults.

15. Energize the aircraft mains and perform the following operations:

(a) switch on the A3C-5 circuit breakers of the bomb door control and bombing equipment indication system on the navigator's left-hand circuit breaker panel and make sure that indicator light BOMB-BAY DOOR CLOSED (ЛЮК ЗАКРЫТ) on the bomb-bay door control panel is burning;

(b) by the pressure gauge on the pilot's middle panel make sure that the hydraulic system is under pressure. The pressure gauge readings may range within 70 to 80 kg/cm<sup>2</sup>;

(c) give the command CLEAR THE BOMB-BAY DOOR (ОТ ЛЮКОВ) and after receiving the report DOOR CLEARED (ЕСТЬ ОТ ЛЮКОВ) open bomb bay doors by the toggle switch. Make sure that the indicator light BOMB-BAY DOOR OPEN (ЛЮК ОТКРЫТ) comes on, while the indicator light BOMB-BAY DOOR CLOSED (ЛЮК ЗАКРЫТ) goes out;

(d) turn all the circuit breaker switches OFF;

(e) de-energize the aircraft mains.

16. Check the protective caps and emergency bomb release switches on the pilot's panel (Fig.57).

17. Check the protective caps, the switches of ARMED (B3PFB) and emergency bomb release with the mains de-energized on the pilot's panel (Fig.12).

18. Check operation of bomb-bay door closing toggle switch 1 of the stand-by control system on the pilot's hydraulic panel (See Fig.9).

19. Inspect the navigator-operator's instrument panel (Fig.58) and check operation of the KCE-49 bomb release button.

20. Set the interlocking switches to OFF.

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21. Inspect the following units:

(a) microswitch box 3 (Fig.59);

(b) solenoids 1 of hydraulic drive emergency unlocking device;

(c) bomb-bay red dome light 2;

(d) bomb-hoist power supply plug connectors on the forward distribution box of fuel pumps.

22. Inspect the following units of bombing equipment located in the bomb bay:

(a) bomb racks КД3-488 and КД4-388 and all parts, assemblies and units incorporated such as: ПБМ-48 bomb shackle release units, МВН-48 arming mechanism, pulleys for cable linkage, plug connectors, БК-47 boxes for interlocking switches, check operation of latch control handles;

(b) attachment fittings of the bomb racks to those of the aircraft;

(c) make sure that all the bomb release distribution boxes are locked;

(d) make sure that all the free electric bunch conductors are connected to the sockets;

(e) inspect the bomb hoist power supply plug connector on rear fuel pump distribution box 2.

23. Inspect the following hoisting units:

(a) БЛ-47.3M electromechanical bomb hoist assembly, two-sheave end pulley 1, twin guy, hoisting hook, single-sheave end block, КД3-547H guide, movable blocks, hoisting frame, hoisting sling (Fig.60), etc.;

(b) make sure that there are no breaks, frays or ruptures of the strands of the hoisting cables, that all the cables are lubricated with petrolatum and cable terminals are not damaged;

(c) inspect all the pulleys of the hoisting system, make sure that they are reliably secured in the brackets and properly rotate on the axles;

(d) inspect the attachment units of the hoisting system.

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Alignment of ONE-11p Bombsight  
Directional Stabilizer with Aircraft  
Longitudinal Axis

- Notes.** 1. The permissible angle of the directional stabilizer with the aircraft longitudinal axis should not exceed 15'.
2. The alignment of the directional stabilizer may be checked with the aircraft being either in the flight line position or resting on three points over an even concrete platform.

1. Draw a 20 - 30 m. line ahead of the aircraft to mark the longitudinal axis and a parallel line at a distance of 15 cm. to the left to denote the sight optical axis displacement relative to the aircraft axis.
2. Set the directional stabilizer in a horizontal plane by the bombsight spherical level.
3. Set the trail knob to zero.
4. Engage the bombsight clutch and disengage the auto-pilot clutch.
5. Disengage the drift stabilizer knob and by the bombsight turning knob set the bombsight to zero drift on the drift angle scale of the directional stabilizer.
6. Make sure that while turning the sighting knob the sighting beam travels along the auxiliary (second) line within the entire sighting range.
7. If the sighting beam deviates from the auxiliary line by more than 15' at sighting angles up to 75° and by more than 25' at sighting angles over 75°, it is necessary to loosen the forward bolts fastening the foot of the directional stabilizer bracket and turn the foot to an extent ensuring the deviation within the allowance specified above. Tighten up and lock the fastening bolts of the foot of the directional stabilizer bracket.
8. Make sure that the bombsight is set to the zero drift angle.

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Cleaning and Lubrication  
of 3KCH-39 Signal Flare Launchers

The launchers must be kept clean and properly maintained. Cleaning the launchers which are to be mounted in the aircraft is imperative in the following cases:

- (a) after firing;
- (b) after a prolonged idle period (5 to 10 days);
- (c) by an order of the unit armament engineer, which may concern the occasion when the launchers must be cleaned after flights involving no actual firing when they have been exposed to snow, rain or sand.

The launchers should be cleaned in places specially provided for cleaning aircraft gun armament.

The following materials are used for cleaning:

1. Kerosene for removing powder fouling and cleaning the launcher parts affected by powder gases as well as for cleaning the current-carrying and insulating parts of the launcher. After cleaning with kerosene all the parts should be rubbed dry.
2. Rifle oil for lubricating the launcher parts after cleaning in summer only.
3. Grease LHMATM-201 for lubricating the launcher parts for altitude flights in summer as well as for lubricating them in winter.
4. Rags for cleaning, rubbing and lubricating; short flax fibre is recommended for cleaning only.
5. Sponge for cleaning the tubes.
6. Brush for lubricating the tubes.
7. Handle for cleaning and rubbing the contact pins. Contact pins are cleaned with the assistance of the handle with a recess in its threaded part; the recess serves to hold a piece of soft clean cloth soaked with kerosene. The working parts of the contacts are cleaned of soot by bringing the handle into the casing, then they are rubbed with dry clean cloth.

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To avoid distortion and jamming, cleaning and wiping of plug contacts must be done with care.

**WARNING:** Never lubricate the current-carrying or insulating parts.

#### Bombing Equipment Storage

As a rule most of the units of the bombing equipment are not coated with protective paint, they are protected only by anodized or oxidized films; because of the specific operating conditions the surfaces of the units are liable to considerable damage.

To avoid damage all units which are not installed in the aircraft (such as: bomb racks, arming wire, hoisting system units) should be stored on racks in a dry, aired room protected from penetration of dust and sun rays.

All the units of the equipment installed in the aircraft must be provided with covers. The ОНБ-11р bombsight set, arming wire, БЛ-473М electromechanical bomb hoists and Т-СУИ bomb trolleys must be supplied with loose covers. The bomb hoisting equipment should be stored in bags.

After every operation the hoisting units must be cleaned of dirt, dust and moisture. All the hoisting cables must be constantly greased with petrolatum. Sheave axles, ball bearings, bomb hoist reduction gears, pressure rollers, drum disengaging mechanism, bomb hoist brake switch and the trolley wheel bearings should be periodically greased with ЦМЛТММ-201 grease.

The bombing equipment should undergo general inspection every 15 days and be checked for serviceability. Storage conditions must also be checked.

If any traces of corrosion are detected on the surfaces of the units, measures should be taken for their removal.

When performing general inspection follow the procedures outlined in Chapter 1 of the present Instructions.

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#### Preparation for Restationing

In case of changing the base of the aircraft all the bomb racks and hoisting equipment should be mounted in the stowed position (Fig.61). For this purpose the following procedure is adopted:

1. Put all the bomb racks in the stowed position in accordance with the diagram of bombing equipment arrangement for restationing. Mount the hoisting beams on the bomb racks.

2. Pack a set of arming wire in a special bag and hoist it to the bomb racks.

3. Into two special bags pack the hoisting equipment, which comprises: КИЗ-547 guides, two-sheave end pulleys, single-sheave end pulleys, НКЗ-53 hoisting hooks, rip cord fastening cables, bomb rack hoisting pulley, movable blocks, hoisting sling, fastening slings, twin guy, hoist crank, hoist cables, attachment straps fastening end pulleys to hoists, and other items.

A complete list of the equipment is given on the plate attached in the ИОСAB compartment.

4. Put the bags with the equipment on the rack in the ИОСAB compartment and secure them with straps (Fig.62).

5. Mount two БЛ-473М bomb hoists on the stowed position brackets in the ИОСAB compartment. The other two hoists should be mounted on the Т-СУИ bomb trolley.

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Chapter II  
BOMB RELEASE CONTROL  
RELEASING BOMBS FROM BOMB BAY

The combat bomb release performed by the navigator or the navigator-operator is closely connected with aiming in range and in azimuth by means of the OIB-11p bombsight or the PEI-4 radar bombsight. Here we assume that the preparatory work with the OIB-11p and PEI-4 bombsights is finished and that the engagement of the bomb release switches and preparing bombing equipment units is performed as is outlined in the Instructions for Navigation and Bombing.

To perform sight-controlled bomb release the navigator should do the following:

1. Make sure that all the circuit breakers of the bombing equipment are switched on.
2. By means of knobs and switches on the intervalometer set the required method of bomb release (SEL or TRAIN), bomb-release interval and the number of bombs (salvoes) to be dropped.
3. Make sure that all the bombing equipment controls are in the initial position.

Note: Items 1 to 3 are fulfilled prior to assuming the bombing run.

4. Turn on the master bombing switch on the bomb-bay door control panel.
5. When the sighting angle equals 55 or 60°, cock the lever of the automatic release mechanism on the OIB-11p bombsight.

6. Turn on the switches of the rack selector relay and the salvo switch SINGLE BOMB or IN PAIRS.

Note: Items 4 to 6 are fulfilled when aiming during the bombing run.

7. By the station status indicator lights make sure all the bombs are released.

Turn off the switches of the rack selector relay, close the bomb-bay doors, turn off the master bombing switch and the bombsight ground speed motor.

To release bombs by the bomb release button the navigator must do the following:

1. Make sure that all the circuit breakers of the bombing equipment are switched on.
2. By means of knobs and switches on the intervalometer set the required method of bomb release (SEL or TRAIN), bomb release interval and the number of bombs (salvoes) to be dropped.
3. Make sure that all the bombing equipment controls are in the initial position.
4. Turn on the master bombing switch on the bomb-bay door control panel.
5. After assuming the bombing run open the bomb-bay doors by the switch.
6. When the green warning light on the bombsight flashes on, turn on the rack selector relay switches and the salvo switch.
7. When the sighting angle index aligns with the dropping angle index in the field of vision push the bomb release button.

In the course of aiming by means of the PEI-4 sight all the operations enumerated in Items 1 to 5 are performed by the navigator. Bombs are released by the navigator-operator by means of pushing the bomb release button on his instrument panel at the moment when the target image aligns with the range mark on the indicator screen.

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8. By the station status indicator lights make sure all the bombs are released.

Turn off the bomb rack selector relay switches, close bomb-bay doors, turn off the master bombing switch and the bombsight ground speed motor.

To effect the emergency SAFE bomb release by the navigator or the emergency release switch on the navigator's left-hand release control panel should be turned on.

After dropping the bombs turn off the emergency release switch and close the bomb-bay doors.

In case of an ARMED bomb release it is necessary to turn on the ARMED switch on the pilot's instrument panel.

For the emergency SAFE bomb release by the pilot the emergency release switch on the pilot's instrument panel must be turned on. When dropping the bombs ARMED, it is necessary to turn on the emergency release ARMED switch on the same panel. After dropping the bombs, turn the switch off and close the bomb-bay doors.

To effect the emergency bomb release with the mains de-energized the pilot must unlock the release handle on the pilot's control panel and pull it as far as it goes. When dropping the bombs ARMED, it is necessary to turn on the ARMED switch on the same panel and to close the bomb-bay doors.

**Note:** In case of an emergency bomb release by the pilot the bomb-bay doors are closed only by the bomb-bay door closing switch of the stand-by control system on the pilots' hydraulic system control panel (Fig.63) after setting the emergency release switches in the OFF position.

NAVIGATOR'S OPERATIONS IN CASE BOMBING EQUIPMENT UNITS FAIL  
DURING BOMB RELEASE

**WARNING:** If a failure of one of the units of the bombing equipment is detected in the course of flight, it is necessary first to check the engagement of all the

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circuit breakers on the navigator's left- and right-hand circuit breaker panels.

1. If the bomb-bay doors cannot be opened by the bombsight it is necessary to make one of the following operations:

- (a) open the bomb-bay doors by the switch of the normal bomb-bay door control system;
- (b) open the bomb-bay doors by the bomb-bay door opening stand-by system switch located on the bomb-bay door control panel;
- (c) open the bomb-bay doors by the switch on the pilot's control panel.

2. If the bombs are not released from the bomb-bay by the sight it is necessary to check the following:

- (a) whether the bomb-bay doors are open (watch the bomb-bay door position indicator lights);
- (b) engagement of the bomb rack selector relay switches;
- (c) proper preparedness of the intervalometer;
- (d) reliability of contacts in plug connectors BOMBSIGHT (БОМБОПРИЦЕЛ) and STABILIZER (СТАБИЛИЗАТОР) on the autopilot directional stabilizer.

After the checking procedure perform another bombing run and release bombs by the bombsight. If the bombs are not released by the bombsight, release them by pressing the navigator's or navigator-operator's bomb release button.

3. If the bombs are not released by the bomb release buttons they must be released by the navigator's or pilot's EMERGENCY RELEASE (АВАРИЙНЫЙ СБРОС) switch which is first turned in the ARMED (ВЗРПН) position in case the bombs are to be released ARMED.

4. If the bombs are not released after taking all the possible measures, it is necessary to perform the following operations:

- (a) close the bomb-bay doors;
- (b) turn off all the switches on the navigator's panel;
- (c) switch off all the bombing equipment circuit breakers on the navigator's circuit breaker panels.

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5. If the bomb-bay doors are not closed by the switch of the bomb-bay door control panel it is necessary to do the following:

(a) check whether the EMERGENCY RELEASE (АВАРИЙНЫЙ СБРОС) switches on the pilot's and navigator's panels are in the OFF position;

(b) close the bomb-bay doors by the pilot's bomb-bay door closing stand-by system switch.

Chapter III  
REMOVING BOMBS FROM BOMB RACKS

Bombs may be removed from the bomb racks in case of failure to release them in flight or in case the loading variant has to be changed, etc. While removing bombs it is necessary to strictly follow all the instructions outlined in Chapter 1.

BOMB RACK UNLOADING

1. Screw out the bomb fuzes.
  2. Install the bomb hoists, end pulleys and other elements of the hoisting system.
  3. Arrange the cables in accordance with the bomb rack loading variant.
  4. Depending on the calibre of the bomb to be removed engage it with the hoisting hook or attach the hoisting sling to the bottom bomb.
  5. Take up the cable slack.
  6. Cock all the ИБЛ-48 bomb shackle release units if they have not been cocked.
  7. Put the latch group control handles in the UNLOADING (РАСПИВКА) position.
  8. Lift the bomb so as to sink the lower station latches.
- Note:** To avoid the upper bomb sliding out of its latches, see that the lower bomb does not touch the upper one during the removal.
9. Lower the bomb and detach the shackle from it.

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10. Remove all other bombs following the same procedure.
11. Put the latch group control handles in the LOADING (ЗАПВЗКА) position and mount the shackles on the appropriate bomb racks.
12. Release all the MEI-48 bomb shackle release units.

## SIGNAL FLARE LAUNCHER UNLOADING

1. Screw off the tightening-up screw of the launcher.
2. Extract the set of tubes with the magazine from the launcher case.
3. Press the catch pawl and open the magazine.
4. Extract the cartridges from the tubes.
5. Unlock the squib-initiated igniters and pull them out.
6. Close the magazine.
7. Fix the set of tubes in the jacket.

Note: If firing tock place the flare block should be primarily sent to the shop for cleaning.

8. Unload the other launchers.

## TAKING BOMBS AWAY FROM AIRCRAFT

Taking Away Bombs Removed from Bomb Racks

1. Bring ET-500 or ET3-49 bomb trolleys onto the bomb.
2. Fix the bomb trolley lifting device to the bomb suspension lugs.
3. By means of the hoist lift the bomb onto the trolley and fix it with sway braces.
4. Tow the bomb trolley loaded with the bomb to the place of packing and unpacking the bombs.
5. Lower the bomb from the trolley onto the supporting frame.
6. Grease the bomb suspension lugs with slushing grease. Screw the plugs into the nose and tail fuze adapters.
7. Similarly take away all the other bombs removed from the aircraft.

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8. Collect the hoisting accessories and put the working place in order.

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Chapter IV  
BOMB-BAY DOOR OPERATION CONTROL

GENERAL

1. The following types of bomb-bay door control are distinguished: normal, stand-by and emergency. Bomb-bay doors are controlled from the navigator's and pilot's control panels (Fig.63).

2. Prior to opening or closing the bomb-bay doors on the ground the following operations are required:

(a) make sure that there are no obstacles in the bomb bay or under it;

(b) give the command CLEAR BOMB BAY DOORS (ОТ ЛЮКОВ) and on receiving the return command BOMB BAY CLEARED (ЕСТЬ ОТ ЛЮКОВ) open or close the doors;

(c) make sure that the interlocking switches are ON;

(d) check the pressure in the hydraulic system by the pressure gauge installed on the pilot's middle instrument panel.

The reading of the instrument must be within 70 to 80 kg/cm<sup>2</sup>.

NORMAL CONTROL SYSTEM FOR OPENING BOMB-BAY DOORS

1. Make sure that A3C-5 circuit breakers NORMAL BOMB DOOR CONTROL (УПРАВЛЕНИЕ СТВОРОК БОМБОЛЮКА НОРМ.) and BOMBING EQUIPMENT INDICATION (СИГНАЛ. БОМБОБОРУЖ.) on the navigator's circuit breaker left-hand panel are ON.

2. Make sure that BOMB DOORS OPEN (ЛЮК ОТКРЫТ) indicator light 7 is not burning while BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light 8 is on (Fig.63).

3. Put switch 6 in the OPEN (ОТКРЫТ) position and hold it till the BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light flashes on.

4. Make sure that the BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light has gone out.

NORMAL CONTROL SYSTEM FOR CLOSING BOMB-BAY DOORS

1. Make sure that A3C-5 circuit breakers NORMAL BOMB-BAY DOOR CONTROL (УПРАВЛЕНИЕ СТВОРОК БОМБОЛЮКА НОРМ.) and BOMBING EQUIPMENT INDICATION (СИГНАЛ. БОМБОБОРУЖ.) on the navigator's circuit breaker left-hand panel are ON.

2. Make sure that BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light 7 is burning whereas the indicator light 8 BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) is off.

3. Put switch 6 in the CLOSED (ЗАКРЫТ) position and hold it for 5 or 6 sec. after the BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light flashes up.

4. Make sure that the BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light has gone out.

STAND-BY CONTROL SYSTEM  
FOR OPENING BOMB-BAY DOORS

1. Make sure that A3C-5 circuit breakers STAND-BY BOMB-BAY DOOR CONTROL (УПРАВЛЕНИЕ СТВОРОК БОМБОЛЮКА ЗАПАС.) and BOMBING EQUIPMENT INDICATION (СИГНАЛ. БОМБОБОРУЖ.) on the navigator's circuit breaker left-hand panel are ON.

2. Make sure that BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light 7 is not burning and BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light 8 is on.

3. Turn on switch 9 of the stand-by control system for opening bomb-bay doors and hold it till the indicator light BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) flashes up.

4. Make sure that the BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light has gone out.

5. Turn off the switch.

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## STAND-BY CONTROL SYSTEM FOR CLOSING BOMB-BAY DOORS

1. Make sure that A3C-5 circuit breakers STAND-BY BOMB-BAY DOOR CONTROL (УПРАВЛЕНИЕ СТВОРОК БОМБОЛЮКА ЗАПАСЧ.) and BOMBING EQUIPMENT INDICATION (СИГНАЛ. БОМБОБОРОПЪЖ.) on the navigator's circuit breaker left-hand panel are ON.
2. Make sure that BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light 7 is burning whereas BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light 8 is out.
3. Press switch 10 of the stand-by control system for closing the bomb-bay doors on the pilot's hydraulic control panel and hold it ON (ВКЛЮЧЕНО) for 5 or 6 sec. after the BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light flashes up.
4. Make sure that BOMB DOORS OPEN (ЛЮК ОТКРЫТ) indicator light is dead.

EMERGENCY CONTROL SYSTEM  
FOR OPENING BOMB-BAY DOORS

1. Make sure that A3C-5 circuit breaker EMERGENCY BOMB RELEASE (АВАРИЙНЫЙ СБРОС БОМБ) on the navigator's circuit breaker right-hand panel and A3C-5 circuit breaker BOMBING EQUIPMENT INDICATION (СИГНАЛ. БОМБОБОРОПЪЖ.) on the navigator's circuit breaker left-hand panel are ON.
2. Make sure that BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light 7 is not burning and BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light 8 is on.
3. Open the protective cap and turn on emergency release switch 11 on the top bomb release control panel or switch 14 on the pilot's instrument panel. After the BOMB DOORS OPEN (ЛЮК ОТКРЫТ) indicator light flashes up, turn the switch off.
4. Make sure that BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light has gone out.

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EMERGENCY OPENING OF BOMB-BAY DOORS  
WITH MAINS DE-ENERGIZED

Press switch 12 on the pilot's motor panel and hold it till the bomb-bay doors get open.

ADJUSTING MICROSWITCHES  
OF BOMB-BAY DOOR LIMIT SWITCH BOX

In the course of aircraft maintenance the adjustment of the bomb-bay door limit switches must be periodically checked. Improper switches should be adjusted for 68° of the bomb-bay door opening and for a complete opening.

Checking Procedure

1. Disconnect the bonding strips of all the rods from the doors.
2. Rocking the doors extract the bolts fastening the rods to the doors and take them out of the seats.
3. Turn on the safety switches.
4. Make sure that bomb door open position indication limit switch 2 (Fig.64) is engaged, for which:
  - (a) switch on A3C-5 circuit breakers BOMB-BAY DOOR CONTROL (УПРАВЛЕНИЕ СТВОРОК БОМБОЛЮКА) and INDICATION (СИГНАЛИЗАЦИЯ) on the navigator's circuit breaker left-hand panel;
  - (b) make sure that BOMB-BAY DOORS OPEN (ЛЮК ОТКРЫТ) indicator light on the bomb-bay door control panel is ON. This indicates that the microswitch is in the working position.
5. Make sure that emergency ARMED release relay switch 8 is engaged. For this purpose:
  - (a) remove the covers from the bomb release distribution box, emergency bomb release distribution box and from the emergency bomb release distribution box with the mains de-energized;

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(b) switch on A3C-10 circuit breaker EMERGENCY ARMED RELEASE (ВЗРПВ ПРИ АВАР.СБРОСА) on the navigator's circuit breaker right-hand panel;

(c) turn on switch ARMED (ВЗРПВ) on the pilot's instrument panel and make sure that the ПП-2 relay in the release distribution box has functioned.

6. Make sure that limit switches 5 engaging combat bombing relay have functioned. For this purpose switch on A3C-2 circuit breaker COMBAT BOMBING INTERLOCKING RELAYS (БЛОКИРОВОЧНЫЕ РЕЛЕ БОЕВОГО БОМБОМЕТАНИЯ) on the navigator's circuit breaker left-hand panel and make sure that ПП-6 relays in the release distribution box have functioned.

7. Make sure that limit switches 6 engaging ПП-2 emergency release control relay have functioned. For this purpose switch on A3C-2 circuit breaker EMERGENCY BOMB RELEASE CONTROL RELAYS (РЕЛЕ УПРАВЛЕНИЯ АВАРИЙН.СБРОСА БОМБ) on the navigator's circuit breaker right-hand panel and make sure that ПП-2 relays in the emergency release distribution box have functioned.

8. Make sure that emergency release circuit interlocking limit switch 3 with the mains de-energized has functioned. For this purpose:

(a) unlock the bomb release handle for emergency release with power supplied from the storage battery system and turn it on; make sure that the К-50И emergency release relays (for the mains de-energized) installed in the emergency release distribution box have functioned;

(b) push the handle back to the initial position.

9. Make sure that combat bombing relay limit switches 5 get connected to the circuit before emergency release control relay limit switches 6 are energized. For this purpose:

(a) put the bomb-bay door normal control switch in the CLOSED (ЗАКРЫТО) position;

(b) close the bomb-bay doors by slowly operating the hand pump till the ПП-2 emergency release control relays in the

emergency release distribution box return to the initial position;

Note: Communication between the personnel participating in the operation is accomplished through the interphone system.

(c) several times simultaneously switch off and on both A3C-2 circuit breakers EMERGENCY BOMB RELEASE CONTROL RELAYS (РЕЛЕ УПРАВЛЕНИЯ АВАРИЙН.СБРОСА БОМБ) on the navigator's circuit breaker right-hand panel and make sure that ПП-2 relays in the emergency release distribution box do not function;

(d) several times simultaneously turn off and on A3C-2 circuit breakers COMBAT BOMBING INTERLOCKING RELAY (БЛОКИРОВОЧНОЕ РЕЛЕ БОЕВОГО БОМБОМЕТАНИЯ) on the navigator's circuit breaker left-hand panel and make sure that ПП-6 relays in the release distribution box pick up and drop out.

10. Close the bomb-bay doors by operating the hand pump till roller 17 disengages wedge 14. Make sure that the BOMB DOORS OPEN (ЛЮК ОТКРЫТ) indicator light has gone out and that ПП-6 and ПП-2 relays in the release distribution box have returned to the initial position.

11. Operating the hand pump close the bomb-bay doors till roller 19 is disengaged from wedge 15. Make sure that К-50И relay in the emergency release distribution box (with the mains de-energized) does not function while performing the operations outlined in Item 8 of this Section.

12. Operating the hand pump close completely the bomb-bay doors and make sure that BOMB-BAY DOORS CLOSED (ЛЮК ЗАКРЫТ) indicator light on the bomb-bay door control panel comes on.

13. Open the bomb-bay doors.

14. Turn off all the circuit breakers and switches. Close the covers of all the distribution boxes.

#### Adjusting Limit Switches

15. Remove lock wire 20.

16. Fulfill the operations listed in Items 1, 2 and 3.

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17. Operating the hand pump place rollers 17 and 19 to the middle of the bevelled part of wedges 14 and 15.
18. Turn appropriate adjusting screw 21 clockwise until the microswitch clicks and make a check according to the appropriate Item of the Section.
19. Lock the adjusting screws with wire.
20. Fulfil the operations mentioned in Items 13 and 14.

Note: While removing the limit switch box to replace the switches follow the instructions of the Technical Description of the Bombing Equipment.

Chapter V

MAINTENANCE OF EJ-473M OR EJ-56 BOMB HOIST SYSTEM  
BOMB HOIST SYSTEM INSTALLATION IN AIRCRAFT

1. Bring the T-CYU-473 trolley (Fig.65) to the aircraft, extend the folding support and rest the trolley on it. Remove the canvas cover from the trolley, remove the cover and the power supply flexible cables.
2. Unlock the trolley locks, flap back the folding top, screw off the hoist attachment universal joint nuts and take out the electric hoists.
3. Place the mounting brackets on the hoist attachment platform and secure them with nuts (Fig.66).
4. Lower the bottom flap cover and take out the trolley and hoist power supply cables.
5. Install the bomb hoists on the butt ends of the bomb-bay doors (Fig.67) and tighten the universal joint nut (Fig.68). On some aircraft the joint is tightened by a tetrahedral nut with a special ratchet spanner.
6. In accordance with the diagram (Fig.69) connect the trolley power supply cables to the fuel pump distribution box plug connector.
7. Connect the power supply cables to the electric bomb hoist plug connector.
8. Put the electric bomb hoist brake clutch switch in the ON ( ВКЛЮЧЕНО) position.
9. Take the control panel out of the trolley and connect the power supply cable to it.

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## CHECKING AND TESTING BEFORE OPERATION

1. Turn on the DRIVE (ПРИБОИ) switch on the control box and by the trolley voltmeter (Fig.7c) check the mains voltage which should be  $27 \pm 2.7$  v.

Note: While working at temperatures below zero it is necessary to do the following:

- (a) 5 or 10 sec. before lifting or lowering the load turn ON the DRIVE (ПРИБОИ) switch;
- (b) make 10 or 15 revolutions of the bomb hoist by manual drive.

2. Press the START (ИВЧК) button on the control panel.

Note: While operating a single bomb hoist, push the respective START (ИВЧК) button; while operating two bomb hoists simultaneously, first press one START (ИВЧК) button and without releasing it press the other one.

3. Unreel the required length of the bomb hoist cable by smoothly turning the handles on the control panel to the START (ИВЧК) side.

## HOISTING WITH SINGLE HOIST

1. Make sure that the cable is reliably attached to the load and smoothly pulling the appropriate handle on the panel start the hoisting.

Note: The operator must turn the handle smoothly and watch the hoisting. If the handle is turned sharply, the hoist stops. To continue the hoisting, first turn the handle to the original position and then turn it smoothly for hoisting.

2. When the bomb shackle is approaching the rails of the bomb rack, the station latches or the place of suspension it is necessary to slow down the speed of hoisting.

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Note: In case of jamming while hoisting, smoothly push the handle of the control panel to LOWERING (ИВЧК) and lower the load a little. Detect and eliminate the cause of jamming and proceed with hoisting watching the operation.

3. To stop hoisting at any height, smoothly turn the handle to the original position.

4. After  $1\frac{1}{2}$  hours of continuous operation of the hoist system, an interval must ensure for cooling it down.

Note: When hoisting, the electrician should constantly check the current consumed by the hoist drive motors by the ammeters installed on the T-CYU-473 trolley.

5. After finishing the work roll up the cables on the hoist drum holding them by hand (Fig.71) and switch off the system by pressing the STOP (СТОП) button on the control panel.

## HOISTING WITH TWO HOISTS

1. On receiving the command HOIST THE BOMB (ПОДНЯТЬ БОМБУ), smoothly and simultaneously turn the two handles of the control panel to the maximum angle for hoisting.

Note: When the lifting speed of one of the hoists increases, the load turns to one side rolling on the hoisting cables. To level the load it is necessary to decrease the angle of turn of the appropriate hoist handle located on the control panel to such an extent that the lifting speeds of both hoists equalize. A sharp turning of one of the handles on the control panel brings the hoist to a stop. To continue the hoisting both handles should be smoothly turned to the original position and then smoothly turned for hoisting.

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2. When the bomb shackle is approaching the bomb rack rails, the latches or its station, it is necessary to slow down the hoisting speed of the hoists.

Note: In case of jamming while hoisting smoothly push both handles of the control panel for LOWERING (СНУЖ), and having lowered the load a little, eliminate the cause of the jamming and then continue the hoisting procedure in a usual way, watching the operation.

3. A further hoisting should be performed in the same way as with a single hoist.

To avoid damage to the cable the following measures are taken:

- (a) while releasing the cable from the load see that the cable is not slack on the drum;
- (b) before putting the cable under load pull it to arrange its turns on the drum properly;
- (c) while hoisting the load or rolling the cable on the drum see that its turns run on properly, otherwise help them to be arranged correctly.

#### MANUAL OPERATION

When the electromechanical hoist system is de-energized, it is operated manually, for which the following is necessary:

1. Remove protective cap from the crank adapter.
2. Put manual drive crank on the adapter (Fig.72) and lock it.
3. Put the hoist brakes in the OFF (ВЫКЛЮЧЕН) position, the trigger in these circumstances must be released.
4. Press the trigger to the crank grip, turn the crank clockwise to lift the load and counter-clockwise to lower it.
5. To stop the load movement at any height, lock the handle by smoothly releasing the trigger.

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WARNING: Prior to removing the manual drive crank from the hoist, put the hoist brake switch to the ON (ВКЛЮЧЕН) position.

#### ROUTINE MAINTENANCE OF БЛ-473М OR БЛ-56 ELECTROMECHANICAL HOISTS

To provide normal operation of the hoists in summer and winter it is recommended to check and adjust the hoist friction clutches every 50 and 100 hours of operation by the ammeter installed on the trolley.

1. Mount the hoist under check on the rear butt end of the bomb-bay starboard door. Install a two-sheave end pulley on frame No.33 and a single-sheave end pulley on frame support No.49, port side (Fig.73).

2. Lay the cable from the hoist under check through the single-sheave end pulley, bomb rack bottom pulley and attach the cable terminal to the two-sheave end pulley.

3. Press the appropriate START (ПУСК) button on the hoist control panel.

4. Pressing to the appropriate side the FRICTION CLUTCH CHECK (ПРОВЕРКА ФРИКЦИОНА) toggle switch on the hoist control box, smoothly turn the handle of the control panel through an angle of 10 or 15° for hoisting; it will correspond to a hoisting speed of 0.5 - 1 m/min.; throughout the operation watch the readings of the ammeter on the trolley.

The hoist friction mechanism slips when current reaches 22 or 25 A, that is the ammeter pointer must stop against these figures, which corresponds to a load of 850 - 1150 kg applied to the hoist cable.

WARNING: Do not increase current beyond 27 A. If the current breaks the above limits, reduce the load applied to the cable by turning the handle on the control panel for LOWERING (СНУЖ) and then return it to the initial position.

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5. Adjust the friction clutch as follows:

- (a) unscrew the plug nut from the hollow axle end of the electromagnetic brake;
- (b) through the hole in the electromagnetic brake axle insert a screw-driver into the adjusting nut spline and turn it clockwise to decrease the friction or counter-clockwise to increase it.

Note: The friction clutch should be adjusted for a slipping effort exceeding the effort which causes the PM overload relay to operate. The PM overload relay must operate before the friction clutch slips.

When adjusting the friction clutch a safety clearance of not less than 0.5 mm between the axle of the electromagnet and the friction clutch spring adjusting nut must be provided.

The clearance is measured by a gauge. The rectangular recess of the gauge must not protrude beyond the axle butt end of the electromagnet.

After adjusting the friction clutch its operation should be checked by the ammeter as is outlined in Items 1, 2, 3, 4.

6. In case lubricant shows around the gland in the hoist cover the felt gasket should be replaced with a spare one in the following way:

- (a) remove the protective shield and the motor cover;
- (b) screw off the bolts fastening the electromagnet and remove it;
- (c) unscrew the friction clutch adjusting nut, remove the brake clutch and wash it with alcohol;
- (d) replace the gland in the cover with a new one taken from spares;
- (e) reassemble the hoist in the reverse order and by means of the manual drive make 10 or 15 revolutions of the reduction gear;
- (f) adjust the hoist friction clutch as is outlined in Items 1, 2, 3 and 4. If the current consumed by the motor exceeds 12.5 A, the load should be lowered and the reduction gear must be turned again with the crank.

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7. In the course of maintenance of the tumb hoist the state of the commutator and contact brushes of the MJ-500 electric motors and ANV-1 electric amplifier should be periodically checked.

The commutator and contact brushes must be checked after every 1500 - 2000 hoisting or lowering operations as well as when preparing the hoists for summer or winter service.



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## Chapter VI

## PROBABLE FAULTS AND REMEDIES

Trouble	Cause	Remedy
1	2	3
<p>1. Normal control system switch fails to open bomb-bay doors whereas OIB-11p bomb-sight opens them</p> <p>2. OIB-11p sight fails to open bomb-bay doors whereas normal opening system switch opens them</p>	<p>CONTROL AND RELEASE SYSTEMS</p> <p>1. Poor quality of IH-45 switch of normal control system</p> <p>2. Improper contact or break of connection with IH-45 switch</p> <p>1. OIB-11p sight circuit is broken</p> <p>2. No contact in OIB-11p sight plug connector</p> <p>3. Bombight pulse circuit in wires YH-1 and YH-2 is broken (Figs 74, 75)</p>	<p>Replace the switch</p> <p>Provide for contact of wires with IH-45 switch</p> <p>Send OIB-11p sight to workshop for repair</p> <p>Tighten up OIB-11p sight plug connector</p> <p>Restore connection</p>
<p>3. Normal control switch and OIB-11p sight fails to open bomb-bay doors</p> <p>4. Stand-by system opening switch fails to open bomb-bay doors whereas switch for opening bomb-bay doors on the ground (power supply from storage battery) opens them</p> <p>5. Switch for opening bomb-bay doors on the ground (power supply from storage battery) fails to open bomb-bay doors whereas bomb-bay door stand-by opening switch opens them</p>	<p>1. A3C-5 circuit breaker in normal opening circuit is out of order</p> <p>2. 3M-12 bomb-bay opening solenoid is faulty</p> <p>3. Connection of wires YH-1 and YH-2 of control circuit is broken</p> <p>1. A3C-5 circuit breaker of stand-by opening circuit is faulty</p> <p>2. BH-45 stand-by system opening switch is faulty</p> <p>3. Circuit of YH-1 wire of bomb-bay door opening by stand-by control system is broken</p> <p>1. Switch for opening bomb-bay doors on the ground (power supply from storage battery) is faulty</p> <p>2. Opening control circuit of 3C or YH-2 conductors is broken</p>	<p>Replace A3C-5 circuit breaker</p> <p>Replace 3M-12 solenoid</p> <p>Restore connection</p> <p>Replace A3C-5 circuit breaker</p> <p>Replace switch</p> <p>Restore connection</p> <p>Replace BH-45 switch</p> <p>Restore connection</p>

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1	2	3
6. Switches of bomb-bay doors stand-by opening on the ground fail to open bomb-bay doors (power supply from storage battery)	3. Storage battery is not connected 1. 3MC-1 solenoid of bomb-bay door stand-by opening system is faulty 2. Bomb-bay stand-by opening control circuit YH-2 is broken 1. A3C-5 circuit breaker of normal control circuit is faulty 2. IH-45 switch of normal control circuit is faulty 3. Bomb release circuit interlocking switch is OFF or faulty 4. Bomb-bay door closing control circuit YH-1, YH-4, YH-7 is broken 5. 3M-12 bomb-bay door closing solenoid is faulty 1. Stand-by control system circuit breaker (A3C-5) is	Connect storage battery Replace 3MC-1 solenoid Restore connection Replace A3C-5 circuit breaker Replace IH-45 switch Replace or turn on switch in interlocking switch circuit YH Restore connection Replace 3M-12 solenoid Replace circuit breaker
7. Normal closing system switch fails to close bomb-bay doors		
8. Stand-by closing system switch fails to		

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1	2	3
9. Emergency and top emergency systems fail to open bomb-bay doors	2. BH-45 bomb-bay door stand-by closing switch is faulty 3. Bomb release circuit interlocking switch is OFF or faulty 4. 3M-12 bomb-bay door stand-by closing solenoid is faulty 5. Bomb-bay door stand-by closing control circuit YH-1, YH-4, YH-5 is broken 1. 3MC-1 emergency opening system solenoid is faulty 2. Bomb-bay door emergency opening circuit BA-5 is broken 1. A3C-5 emergency release control circuit breaker is faulty 2. B-45 emergency release switch on pilot's	Replace BH-45 switch Replace or turn on switch in the interlocking switch circuit YH Replace 3M-12 solenoid Restore connection Replace 3MC-1 solenoid Restore connection Replace A3C-5 circuit breaker Replace B-45 switch
10. Emergency system fails to open bomb-bay doors, whereas top emergency system opens them		

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1	2	3
<p>11. Top emergency system fails to open bomb-bay doors, whereas emergency system opens them</p>	<p>or navigator's control panels is faulty</p> <p>3. A3C-2 two circuit breakers of emergency release control relay circuit are OFF, so PI-2 emergency release control relays do not function</p> <p>4. Emergency release control circuit BA-1, BA-2, BA-5 is broken</p> <p>1. Storage batteries are not connected</p> <p>2. Storage battery on pilot's panel does not provide for functioning of microswitch in bomb release box</p> <p>3. Power supply micro-switch is faulty</p> <p>4. Circuit 3C, 3C-6 of top emergency system control for bomb-bay door</p>	<p>Switch on two A3C-2 circuit breakers of emergency release control relay circuit</p> <p>Restore connection</p> <p>Connect storage batteries</p> <p>Adjust the cam to provide for functioning of the microswitch</p> <p>Replace microswitch</p> <p>Restore connection</p>

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1	2	3
<p>12. Indicator lights do not burn when packet-type switch on the upper release panel is turned on</p> <p>13. One of the indicator lights does not burn when packet-type switch is turned on</p> <p>14. Station status indicator lights do not burn when the check button (with the bomb-bay doors closed) is pressed</p>	<p>1. A3C-5 indication system circuit breaker is OFF</p> <p>2. Bombing equipment indication circuit CB-1 is broken</p> <p>1. Indicator light is faulty</p> <p>2. No contact in indicator light socket or light socket</p> <p>3. No contact on packet-type switch lamels</p> <p>4. Appropriate indicator light circuit is broken</p> <p>1. A3C-5 indication system circuit breaker is OFF</p> <p>2. Station status checking button is faulty</p> <p>3. No contact of lamels 5 - 6 of packet-type switch</p>	<p>Switch on A3C-5 indication system circuit breaker</p> <p>Restore connection</p> <p>Replace indicator light</p> <p>Provide for contact in indicator light socket</p> <p>Provide for contact in packet-type switch</p> <p>Restore connection</p> <p>Switch on A3C-5 indication circuit breaker</p> <p>Replace BK2-1A2B station status checking button</p> <p>Provide for contact of lamels 5 - 6 of packet-type switch</p>

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1	2	3
<p>15. One of station status indicator lights does not burn when the check button (with bomb-bay doors closed) is pressed</p> <p>16. Bomb-bay door open or closed position indicator light does not burn</p>	<p>4. Indicator light circuit CB-2, CB-3 is broken</p> <p>5. A3C-5 indication system circuit breaker is faulty</p> <p>1. Indicator light is faulty</p> <p>2. No contact in indicator light socket</p> <p>3. No contact of appropriate lamels of packet-type switch</p> <p>4. No contact in plug connector of appropriate bomb rack</p> <p>5. No minus in MBH-48 arming mechanism circuit</p> <p>6. Appropriate indicator light circuit is broken</p> <p>1. A3C-5 indication system circuit breaker is OFF</p> <p>2. Indicator light is</p>	<p>Restore connection</p> <p>Replace A3C-5 circuit breaker</p> <p>Replace CHH-51 indicator light</p> <p>Provide for contact in indicator light socket</p> <p>Provide for contact of appropriate lamels of packet-type switch</p> <p>Tighten up rack plug connector of bomb rack</p> <p>Provide for minus in MBH-48 arming mechanism circuit</p> <p>Restore connection</p> <p>Switch on A3C-5 indication system circuit breaker</p> <p>Replace indicator light</p>

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1	2	3
<p>17. In case of tactical release ARMED (B3PHE) indicator lights on navigator's and pilot's control panels do not burn and the bombs are released SAFE (HEB3PHE)</p>	<p>3. No contact of lamels 21 - 22 (or 17 - 18) of packet-type switch</p> <p>4. Bomb-bay door open or closed position indication limit switches are faulty</p> <p>5. No minus in circuit CB-23, CB-26</p> <p>6. Appropriate indicator light circuit CB-22, CB-23, CB-12, CB-26 is broken</p> <p>1. A3C-10 tactical release circuit breaker is OFF</p> <p>2. A3C-10 tactical release circuit breaker is faulty</p> <p>3. No contact in relay 14 - 15 interlocking intervalometer ARMED (B3PHE) release circuit</p> <p>4. Interlocking switch in circuit BB-10 is faulty</p>	<p>Provide for contact of packet-type switch lamels</p> <p>Replace EK2-142B limit switch</p> <p>Provide for minus in circuit CB-23, CB-26</p> <p>Restore connection</p> <p>Switch on A3C-10 circuit breaker</p> <p>Replace A3C-10 circuit breaker</p> <p>Provide for contact in PT-40 interlocking relay or replace the relay</p> <p>Replace 2B-45 interlocking switch</p>

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1	2	3
<p>18. In case of tactical release pilot's and navigator's ARMED (B3PHB) release indicator lights do not burn (but bombs have been released)</p> <p>19. In case of tactical release navigator's ARMED (B3PHB) indicator light does not burn, whereas pilot's ARMED (B3PHB) indicator light does burn</p>	<p>5. No contact in PI-2 feed relay of MBH-48 arming mechanisms</p> <p>6. Tactical release circuit BB-1, BB-2, BB-40, BB-41, BB-6, BB-7 is broken</p> <p>1. No contact in ARMED (B3PHB) signalling relay, type PI-2</p> <p>2. ARMED (B3PHB) signalling circuit 9C-5, BB-42 is broken</p> <p>1. Indicator light is faulty</p> <p>2. No contact in indicator light socket</p> <p>3. No contact of lamels 9 - 10 of packet-type switch</p> <p>4. ARMED (B3PHB) circuit BB-42 is broken</p>	<p>Replace PI-2 relay</p> <p>Restore connection</p> <p>Replace PI-2 relay</p> <p>Restore connection</p> <p>Replace indicator light</p> <p>Provide for contact in socket</p> <p>Provide for contact of lamels 9 - 10 of packet-type switch</p> <p>Restore connection</p>
<p>20. In case of tactical release pilot's ARMED (B3PHB) indicator light does not burn, whereas navigator's indicator light does burn</p> <p>21. Release is taking place but navigator's and navigator-operator's READY TO DROP (TOBOB K CFPCBAHMO) indicator lights do not burn</p> <p>22. Navigator's READY TO DROP (TOBOB K CFPCBAHMO) indicator light does not burn, whereas navigator-operator's indicator light does burn</p>	<p>1. Indicator light is faulty</p> <p>2. No contact in indicator light socket</p> <p>3. Pilot's ARMED (B3PHB) signalling circuit BB-9 is broken</p> <p>1. No contacts of terminals 5 - 6 of PI-6 combat bombing relay</p> <p>2. No contacts of lamels 13 - 14 of packet-type switch</p> <p>3. READY TO DROP (TOBOB K CFPCBAHMO) signalling circuit BB-6, BB-9, BB-40 is broken</p> <p>1. Indicator light is faulty</p> <p>2. No contact in indicator light socket</p> <p>3. Signalling circuit BB-40 is broken, or no minus in it</p>	<p>Replace indicator light</p> <p>Provide for contact in socket</p> <p>Restore connection</p> <p>Provide for contact or replace PI-6 relay</p> <p>Provide for contact of lamels 13 - 14 of packet-type switch</p> <p>Restore connection</p> <p>Replace indicator light</p> <p>Provide for contact in socket</p> <p>Restore connection</p>

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1	2	3
23. Navigator-operator's READY TO DROP (YOTOB K CEPACHAHM) indicator light does not burn, whereas navigator's indicator light does burn	1. Indicator light is faulty 2. No contact in indicator light socket 3. Signalling circuit BE-9 is broken, or no minus in it 1. A3C-15. combat bombing circuit breaker is OFF 2. A3C-15 combat bombing circuit breaker is faulty 3. Master bombing switch is faulty 4. No contact in terminals 18 - 19 of interlocking relay 5. 3CEP-49A intervalometer is faulty 6. A3C-5 rack selector relay circuit breaker is faulty	Replace indicator light Provide for contact in socket Restore connection Switch on A3C-15 combat bombing circuit breaker Replace A3C-15 circuit breaker Replace 2B-45 switch Provide for contact or replace PT-40 relay Replace 3CEP-49A intervalometer Replace A3C-5 circuit breaker
24. Both bomb release button and OHE-11p sight fail to perform tactical release		
25. In case of tactical release not all stations perform ARMED (B3FHB) release		
26. In case of tactical bomb release not all stations release bombs		

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1	2	3
	7. No contact in terminals 11 - 12 of PI-6 combat bombing relay 8. Circuit BE-1, BE-2, BE-3, BE-5, BI-2, BF-1, BF-2 is broken 1. Fuse 5A in MDH-48 arming mechanism circuit is blown 2. MDH-48 arming mechanism is faulty 3. Appropriate station circuit BEal, BE01, BEF1, BB01 is broken 1. KBCF-48 bomb release variation box is faulty 2. PBM-48 bomb shackle release unit is faulty 3. Circuit BE-8, BE-7 or respective circuit of PBM-48 unit are broken	Replace PI-6 relay Restore connection Replace fuse Replace MDH-48 arming mechanism Restore connection Replace KBCF-48 box Replace PBM-48 release unit Restore connection

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1	2	3
<p>27. TRAINSEL (ОМНОЧНО-СЕРИЯ) switch being in SEL (ОМНОЧНО) position, intervalometer ЗСЕР-49А indicator light does not burn</p> <p>28. The TRAINSEL (СЕРИЯ-ОМНОЧНО) switch being in the TRAIN (СЕРИЯ) position, ЗСЕР-49А intervalometer indicator light does not burn. Counter knob is in any but zero position</p>	<p>1. Indicator light is faulty</p> <p>2. No contact between indicator light cap and socket</p> <p>3. No contact in TRAINSEL (ОМНОЧНО-СЕРИЯ) switch</p> <p>1. Indicator light is faulty</p> <p>2. No contact between indicator light cap and socket</p> <p>3. Poor contact of limit switch in engaged position</p>	<p>Replace indicator light</p> <p>Provide for contact</p> <p>Identify wires of terminals В-К of ЗСЕР-49А intervalometer plug connector. In case of no contact, replace ЗСЕР-49А intervalometer</p> <p>Replace indicator light</p> <p>Provide for contact in socket</p> <p>Check plug connector connection to ЗСЕР-49А intervalometer; if the defect cannot be eliminated, replace intervalometer</p>

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<p>29. Pilot's and navigator's emergency bomb release control systems are inoperative</p> <p>30. Pilot fails to accomplish emergency bomb release, whereas navigator succeeds in doing it (and vice versa)</p> <p>31. In case of emergency ARMED (ВЗРПВ) release by navigator or pilot, SAFE (НЕРЗРПВ) release takes place and ARMED (ВЗРПВ) indicator light does not burn</p>	<p>1. АЗС-5 circuit breaker of emergency release circuit is faulty</p> <p>2. 2В-45 interlocking switch of bomb release circuit BA is faulty</p> <p>3. One of K-50II emergency bomb relays is faulty</p> <p>4. Fuse 50 A of emergency release circuit is blown</p> <p>5. Emergency release circuit BA-2, BA-8, BA-9, BH-1, BH-2 is broken</p> <p>1. B-45 emergency bomb release switch is faulty</p> <p>2. B-45 emergency bomb release switch circuit is broken</p> <p>1. АЗС-10 circuit breaker of emergency ARMED (ВЗРПВ) release circuit is faulty</p> <p>2. B-45 interlocking switch is faulty</p>	<p>Replace АЗС-5 circuit breaker</p> <p>Replace 2В-45 switch</p> <p>Replace K-50II relay</p> <p>Replace 50 A fuse</p> <p>Restore connection</p> <p>Replace B-45 switch</p> <p>Restore connection</p> <p>Replace АЗС-10 circuit breaker</p> <p>Replace B-45 switch</p>
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1	2	3
<p>32. In case of emergency ARMED (B3PHE) release some stations release bombs SAFE (HEB3PHE)</p> <p>33. In case of emergency release control from storage battery, no release takes place</p>	<p>3. PI-2 relay of MBH-48 arming mechanism feed line is faulty</p> <p>4. Emergency bomb release circuit BB-2, BB-4, BB-43, BB-7 is broken</p> <p>See Item 25</p>	<p>Replace PI-2 relay</p> <p>Restore connection</p>
<p>34. In case of emergency ARMED (B3PHE) release (system is fed from storage batteries), SAFE (HEB3PHE) release takes place</p>	<p>1. Storage batteries are not connected</p> <p>2. Microswitch actuating cam on release control panel is not adjusted</p> <p>3. Microswitch is faulty</p> <p>4. BX2-142B interlocking circuit limit switch faulty</p>	<p>Connect storage batteries to feeder</p> <p>Adjust cam</p> <p>Replace microswitch</p> <p>Replace BX2-142B switch</p>

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1	2	3
<p>34. In case of emergency ARMED (B3PHE) release (system is fed from storage batteries), SAFE (HEB3PHE) release takes place</p> <p>35. No power is supplied to BI-473M hoist system</p>	<p>5. One of K-50M relays of emergency release system fed from storage batteries is faulty</p> <p>6. Top emergency release circuit 3C, 3C-3, 3C-4, 3C-2 is broken</p> <p>1. ARMED (B3PHE) switch for system with mains de-energized is faulty</p> <p>2. Emergency ARMED (B3PHE) release circuit 3C-5 is broken</p> <p>1. 100 A fuse is blown</p> <p>2. No contact in bomb hoist power supply plug connector</p> <p>3. Bomb hoist plug connector circuit is broken</p>	<p>Replace K-50M relay</p> <p>Restore connection</p> <p>Replace switch</p> <p>Restore connection</p> <p>Replace 100 A fuse</p> <p>Tighten up plug connector</p> <p>Restore connection</p>

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1	2	3
3HCII-39 SIGNAL FLARE LAUNCHER SYSTEM		
<p>1. Failure in firing. Some cartridges in the tubes and squib-initiated igniters fail to fire</p> <p>2. Signal flare cartridges in the tubes and electric squibs fail to operate</p>	<p>1. A3C-5 signal flare control panel circuit breaker is faulty</p> <p>2. Control panel feed circuit (See Fig.76) is broken</p> <p>1. Poor connection in launcher plug connector</p> <p>2. Mechanical damage of launcher</p>	<p>Replace circuit breaker</p> <p>Restore connection</p> <p>Tighten up and lock launcher plug connector</p> <p>Inspect launcher.</p> <p>If damage of laminated contacts, bending or seizing of pin contacts or buffer devices are detected or if contact panel is broken, launcher should be replaced</p> <p>Replace firing switch</p> <p>Restore connection</p>
<p>3. Squib-initiated igniters fail to operate</p> <p>4. Signal flare cartridge stays unfired in tube, no shot has taken place</p>	<p>3. Firing circuit switch is faulty</p> <p>4. Firing switch feed</p>	<p>Provide for 28+0.5 V power supply</p> <p>Replace button</p> <p>Replace squib-initiated igniter</p> <p>Restore circuit</p> <p>Replace signal flare cartridge</p> <p>Replace A3C-15 circuit breaker</p> <p>Restore connection</p> <p>Replace EM bombsight switch</p>
2		
<p>1. Bombsight OMB-11p does not function (not energized)</p>	<p>Voltage in mains does not meet requirements</p> <p>1. Signal flare control button is faulty</p> <p>2. Squib-initiated igniter is faulty</p> <p>3. Firing circuit of the given cartridge is broken</p> <p>4. Poor quality of signal flare cartridge (traces of contact by igniter on the primer cap)</p> <p>OMB-11p BOMBSIGHT SET</p>	<p>1. A3C-15 bombsight engagement circuit breaker is faulty</p> <p>2. Bombsight engagement circuit EM-1 is broken</p> <p>3. EM bombsight engagement switch on directional stabilizer is faulty</p>
1		
<p>1. Bombsight OMB-11p does not function (not energized)</p>		<p>1. A3C-15 bombsight engagement circuit breaker is faulty</p> <p>2. Bombsight engagement circuit EM-1 is broken</p> <p>3. EM bombsight engagement switch on directional stabilizer is faulty</p>

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1	2	3
2. Bombsight gyro does not function	<ol style="list-style-type: none"> <li>No contact in <math>\text{IMP-14}</math> plug connector (27 V)</li> <li><math>\text{IMP-14}</math> plug connector circuit <math>\text{EJ-1}</math> is broken</li> <li><math>\text{Y\&amp;-1C}</math> dynamotor does not function</li> <li>Bombsight gyro feed circuit is defective</li> </ol>	<p>Provide for contact in <math>\text{IMP-14}</math> plug connector (27 V)</p> <p>Restore connection</p> <p>Tighten up <math>\text{IMP-1}</math> connector on dynamotor</p> <p>Send bombsight to workshop after gyro circuit is tested by identifying wires</p> <p>Unscrew the cap and replace fuse (Fig. 77)</p> <p>Tighten up <math>\text{IMP-1}</math> plug connector on dynamotor</p> <p>Replace the valve having removed the box cover</p> <p>Restore connection</p> <p>Replace 115 V fuse</p>
3. Gyro erecting system does not function	<ol style="list-style-type: none"> <li>Fuse in control box is blown</li> <li><math>\text{Y\&amp;-1C}</math> dynamotor does not function</li> <li>One of the valves in control box is faulty</li> <li>Erecting system circuit is broken</li> </ol>	<p>Replace 115 V fuse is blown</p>
4. Computer system does not function	<ol style="list-style-type: none"> <li>115 V fuse is blown</li> </ol>	<p>Replace 115 V fuse is blown</p>

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1	2	3
5. No automatic solution of one of the problems	<ol style="list-style-type: none"> <li><math>\text{IMP-16}</math> plug connector on the electronic relay unit is not tightened</li> <li><math>\text{IO-4500}</math> inverter of A.C. power supply circuit is OFF</li> <li>Voltage quenching coils of magnetic amplifier magnetizing feed windings are damaged</li> <li>Valve of appropriate electronic relay is faulty</li> </ol>	<p>Tighten up and lock <math>\text{IMP-16}</math> plug connector</p> <p>Switch on <math>\text{IO-4500}</math> inverter</p> <p>Send electronic relay unit to workshop</p> <p>Remove electronic unit from the control desk.</p> <p>Unscrew two attachment screws of appropriate relay cap. Replace the valve (Fig. 78)</p> <p>Repeat operation No. 1 and replace the relay (Fig. 79)</p> <p>Solder up appropriate fuse</p> <p>Restore connection</p>
	<ol style="list-style-type: none"> <li>Relay is faulty</li> <li>Fuse is damaged</li> <li>Appropriate control circuit is broken</li> </ol>	

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1	2	3
<p>6. Continuous oscillations on dials of computer or sight</p>	<p>Excessive sensitivity in follow-up system of appropriate problem</p>	<p>Take electronic unit from the control desk. Unscrew two attachment screws of appropriate relay cap. Slacken check nut and with a screw-driver turn potentiometer spline (Fig. 80) until the system is balanced</p> <p>Repeat Item 6 till proper response is attained</p> <p>Send bombsight to workshop for elimination of the seizure</p>
<p>7. Poor response of H(VK) system to altitude (speed or bearing) variations</p> <p>8. Jerky movement of sighting system in AUTOMATIC (ABTOMAT) mode of operation</p> <p>9. Computer illuminating lamp does not burn (collimator and optics illumination)</p>	<p>Rough adjustment of appropriate problem follow-up system</p> <p>Seizing of blind of optics in sighting system of OIB-11p bombsight</p> <p>1. Lamp is faulty</p> <p>2. No contact in lamp socket</p> <p>3. Appropriate lamp circuit is broken</p>	<p>Replace lamp (Fig. 81)</p> <p>Provide for contact in socket</p> <p>Restore connection</p>
<p>10. Computer speed (altitude) dial reduces the reading to minimum value</p> <p>11. In testing the bombight by tabular data for computing dropping angle, bomb ballistic coefficient, trail and drift values above permissible are obtained</p> <p>12. At any values of problem drift angle values get to one side only, up to limit switch</p>	<p>1. Shorting in speed (altitude) transmitter circuit</p> <p>2. Short-circuit in transmitter proper</p> <p>3. Closing of altitude (speed) potentiometer limit switches</p> <p>4. Shorting in feed circuit</p> <p>Drapping angle or drift angle follow-up system is out of balance</p> <p>1. Drift potentiometer circuit wire is broken</p> <p>2. Drift gear wheel fork is not engaged with the pin</p>	<p>Eliminate short-circuit</p> <p>Send to workshop and replace transmitter if necessary</p> <p>Send to workshop for repair</p> <p>Eliminate short-circuit</p> <p>Unscrew ground speed motor cover and lift it a little. With system energized, turn appropriate adjusting resistor spline with a screw-driver (Fig. 82)</p> <p>Restore connection</p> <p>Engage drift gear wheel fork with pin</p>

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1	2	3
13. In case OMB-11p sight and PEBL-4 radar sight operate simultaneously, the trace is shifted aside by constant value	1. Appropriate value control circuit is short-circuited or broken 2. Altitude unit is short-circuited or broken 3. Bombsight is short-circuited or has a broken wire 4. Appropriate system is not adjusted	Eliminate short-circuit having rung out cable No.10 with TT-1 tester Send altitude unit to workshop and eliminate the defect Send bombsight to workshop Send the sight and altitude unit to workshop for adjustment Set preliminary wind course to 0, and unscrew four eyepiece attachment screws (Fig.83). Carefully remove eyepiece and wipe the optics with cotton wool soaked with alcohol (Fig.84). Mount the eyepiece in its place and drive in attachment screws
14. Blurred image in optical system	Optical system is dirty	

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1	2	3
15. During tests of follow-up from zero drift angle, "α" value does not correspond to that indicated in the table (above or below the value)	Drift correction circuit is out of balance	1. Unscrew four screws (Fig.85) of adjusting resistor caps 221, 222 on "α" potentiometer 2. With a screw-driver turn the screw of adjusting resistor of appropriate arm (Fig.86) to get tabulated value of "α"
16. Computer testing brings about higher or lower values of speed on speed dial	PI-OMB-11p sight computer speed circuit is out of balance	1. Unscrew four screws of plate with table data on OMB-11p sight computer 2. With a screw-driver turn the screw of adjusting resistor 221, 222 to respective side

- Notes: 1. Prior to replacing a switch or a circuit breaker check whether the circuit concerned is not defective.  
2. When defects due to the misadjustment of a microswitch in the micro-switch box are detected, the adjustment should be performed in accordance with the instructions outlined in Chapter IV.  
3. When wire breakage in bombing equipment occurs, the wires selected for replacement should be of appropriate cross-section and length as specified by the Tables in the Technical Description of Ty-16 Aircraft.

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Appendix

TABLE OF YBП-TYPE ARMING WIRES  
EMPLOYED IN Ty-16 AIRCRAFT FOR LOCKING  
FUZES INSTALLED IN AERIAL BOMBS

Nos	Arming wire Nos	Types and calibres of bombs used
1	YBП No.1	50 to 100-kg bombs (ФAB, ЗAB, CAB, ФOTAB, etc.)
2	YBП No.2M	250- and 500-kg bombs (ФAB except ФAB-500 M43, OФAB, ЗAB, CAB, ФOTAB, PБK, etc.)
3	YBП No.3	ФAB-500 M43
4	YBП No.6	ФAB-3000 M46

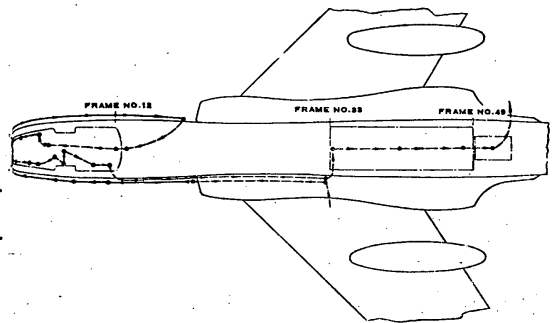


FIG.1. INSPECTION ROUTE

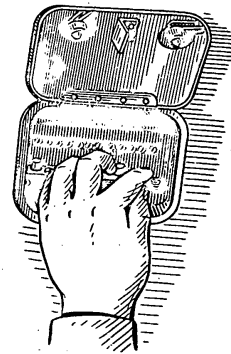


FIG.2. ENGAGEMENT OF INTERLOCKING SWITCHES

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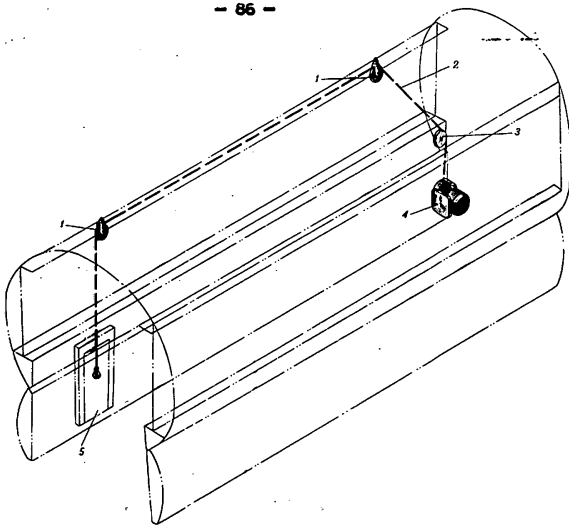


FIG. 3. ARRANGEMENT OF CABLES FOR HOISTING AND LOWERING BOMB RACKS  
1 - hoisting pulley; 2 - hoisting cable; 3 - end pulley; 4 - ISJ - 473M electromechanical bomb hoist;  
5 - bomb rack.

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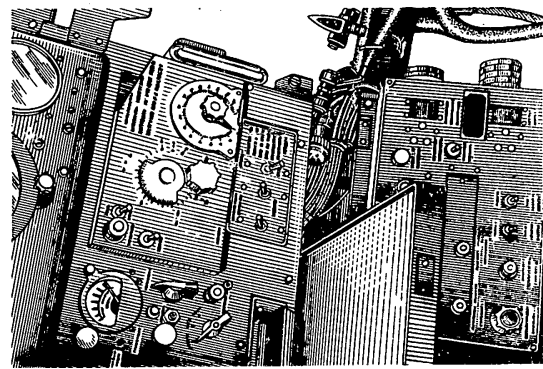


FIG. 8. 7.7H - 4M INTERVALOMETER AND BOTTOM BOMB RELEASE CONTROL PANEL

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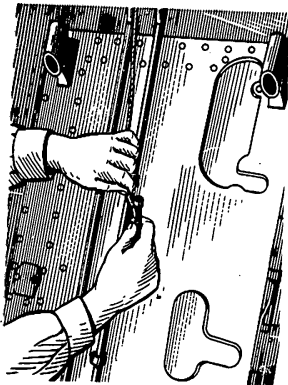


FIG. 4. CABLE CONNECTION TO BOMB RACK FOR HOISTING OR LOWERING OPERATIONS

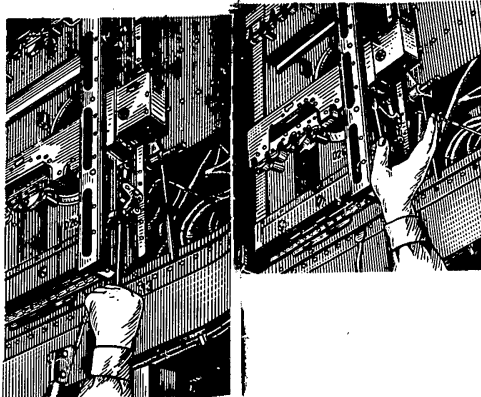


FIG. 5. SETTING LATCH GROUP CONTROL HANDLE IN UNLOADING POSITION

FIG. 6. SETTING LATCH GROUP CONTROL HANDLE IN LOADING POSITION

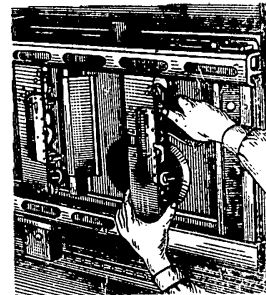


FIG. 7. ENGAGING SPECIAL CLAMP WITH SHACKLE

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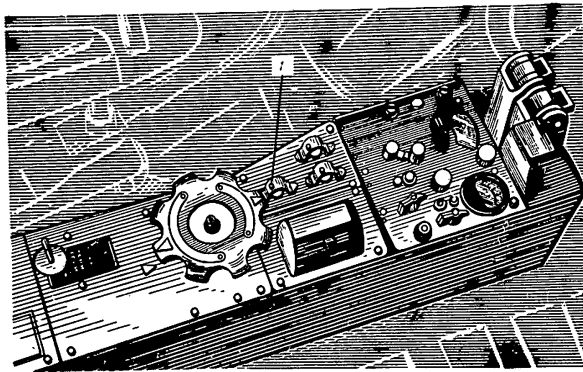


FIG. 9. PILOTS' HYDRAULIC SYSTEM CONTROL PANEL  
1 - bomb-bay door closing switch of stand-by system.

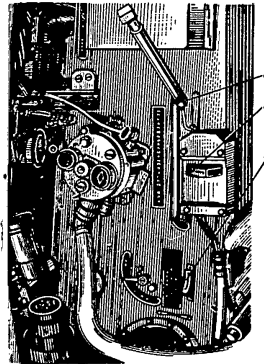


FIG. 13. PILOT'S MOTOR CONTROL PANEL  
1 - switch to open bomb-bay doors on the ground;  
2 - armed switch; 3 - emergency release and bomb-bay door opening handle (with mains de-energized).

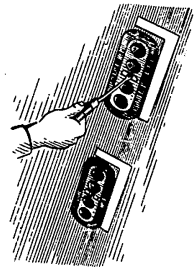


FIG. 14. UNSCREWING OF J10CT-39 SIGNAL FLARE LAUNCHER

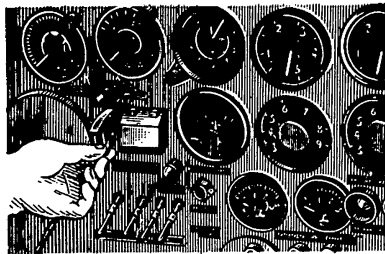


FIG. 10. ARMED SWITCH ON PILOT'S INSTRUMENT PANEL

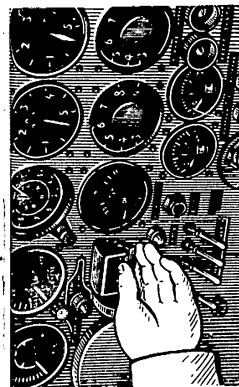


FIG. 11. ENGAGEMENT OF EMERGENCY BOMB RELEASE SWITCH ON PILOT'S INSTRUMENT PANEL

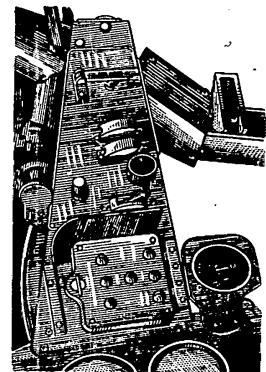


FIG. 12. EMERGENCY RELEASE SWITCH ON LEFT-HAND BOMB RELEASE PANEL  
1 - emergency release switch.

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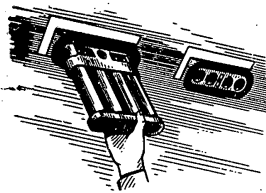


FIG.15. REMOVING 3KC11-39 LAUNCHER

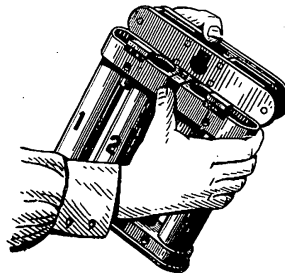


FIG.16. OPENING MAGAZINE OF 3KC11-39 LAUNCHER

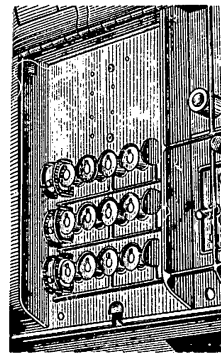


FIG.19. 3KC11-39 LAUNCHER CONTROL PANEL  
1 - power switches; 2-release buttons.

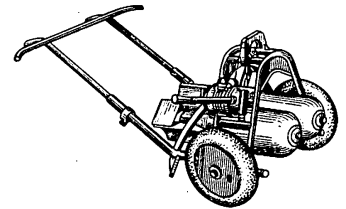


FIG.20. HT-500 BOMB TROLLEY LOADED WITH M1-250 BOMBS

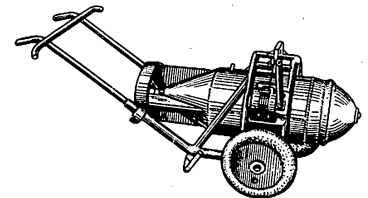


FIG.21. HT-500 BOMB TROLLEY LOADED WITH M1-500 BOMB

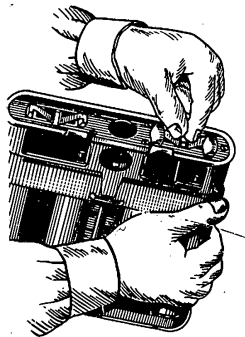


FIG.17. LOCKING WITH SPRING-TYPE LOCK

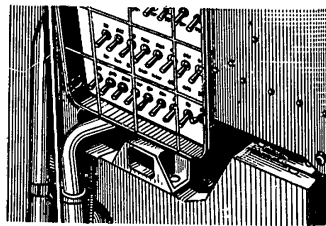


FIG.18. CO-PILOT'S CIRCUIT BREAKER PANEL  
1 - circuit breaker of signal flare control panel.

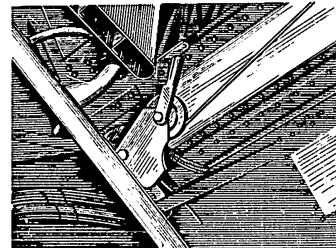


FIG.22. INSTALLATION OF TWO-SHEAVE END PULLEY

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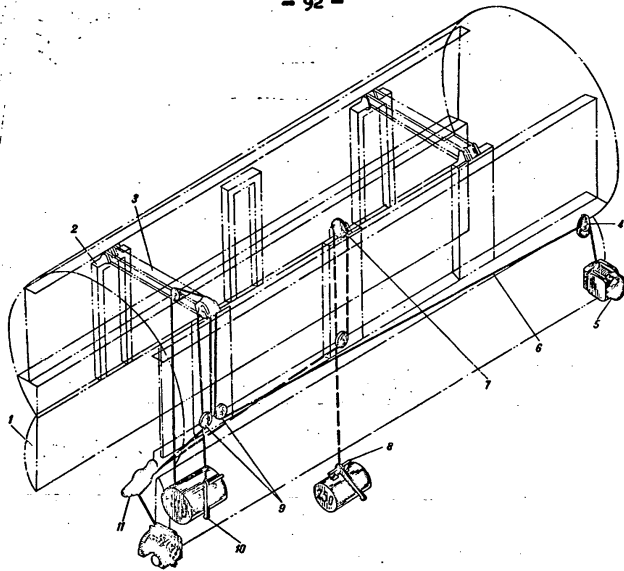


FIG.23. DIAGRAM OF BOMB HOISTING TO KД3-488 BOMB RACK  
1 - bomb-bay door; 2 - KД3-488 bomb rack; 3 - hoisting beam; 4 - single-sheave end pulley.  
5 - БЛ-473М bomb hoist; 6 - hoist cable (20 m. long) of БЛ-473М hoist; 7 - top pulley of bomb rack  
8 - Дер-3,48 bomb shackle; 9 - bottom pulleys of bomb rack; 10 - ПХ-3-53 hoisting hook; 11 - two-sheave end pulley.

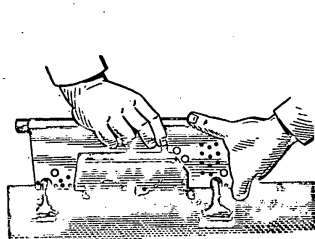


FIG.24. BOMB SHACKLE CLOSING

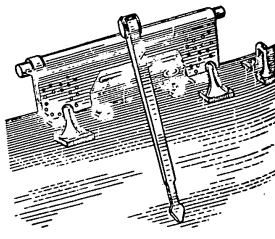


FIG.25. HOISTING HOOK ATTACHMENT TO SHACKLE OF KД3-488 BOMB RACK

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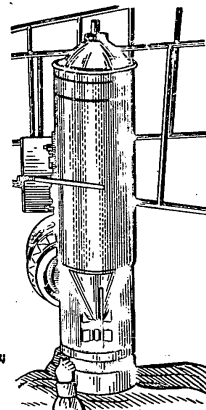


FIG.26. HOISTING BEAM 500 BOMB

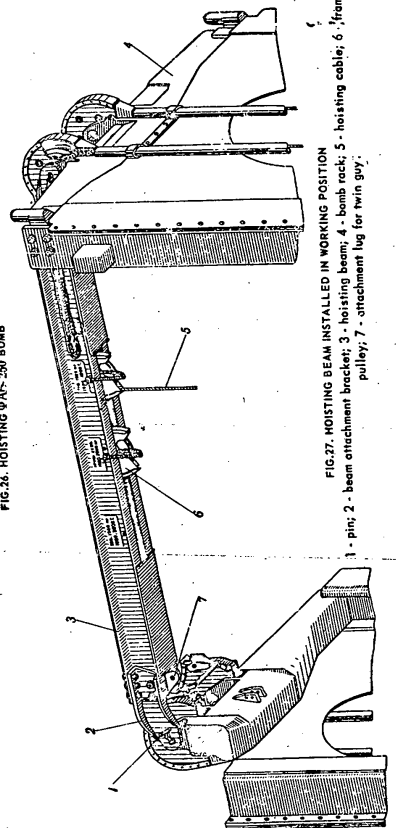


FIG.27. HOISTING BEAM INSTALLED IN WORKING POSITION  
1 - pin; 2 - beam attachment bracket; 3 - hoisting beam; 4 - bomb rack; 5 - hoisting cable; 6 - frame and pulley; 7 - attachment lug for twin guy.

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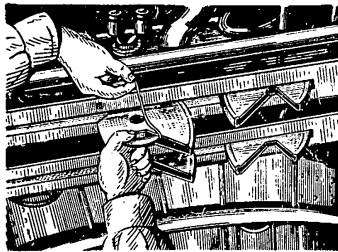


FIG.28. MOUNTING OF HOISTING PULLEY ON HOISTING BEAM

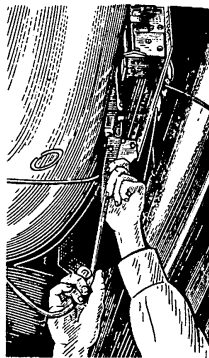


FIG.30. DETACHMENT OF HOISTING HOOK FROM SHACKLE WHEN BOMB IS HOIST

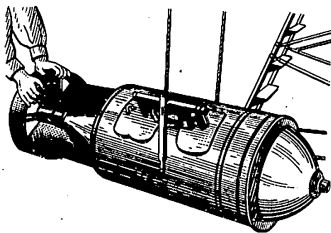


FIG.29. ATTACHMENT OF HOISTING HOOK TO AS-500 BOMB

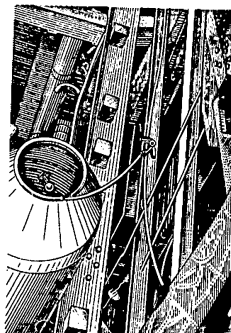


FIG.31. FLARE BOMB RIP CORD ATTACHMENT

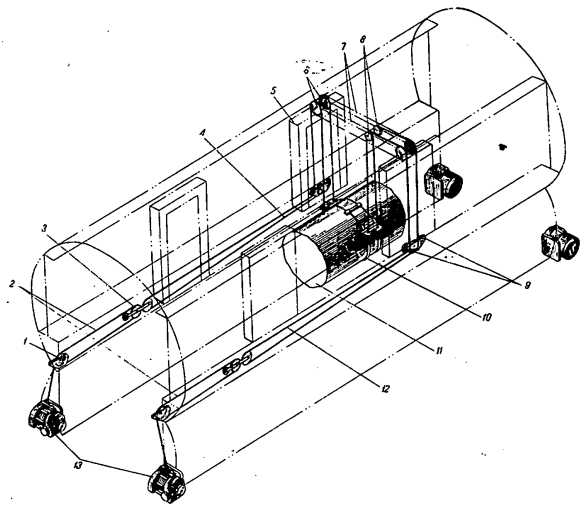


FIG.32. BOMB HOISTING TO KД4-388 BOMB RACK

- 1 - two-sheave end pulley; 2 - hoisting cable, 20 m. long; 3 - movable block; 4 - hoisting sling cable, 13.75 m. long; 5 - KД4-388 bomb rack; 6 - top pulley of KД4 bomb rack; 7 - hoisting beam; 8 - hoisting beam pulley; 9 - bottom pulley of KД4 bomb rack; 10 - hoisting sling; 11 - load; 12 - hoisting sling cable, 14.8 m. long; 13 - БЛ-473М electromechanical hoist.

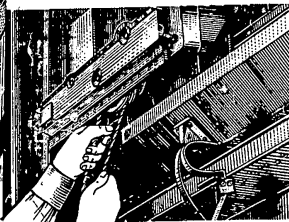


FIG.33. ARRANGEMENT OF HOISTING CABLE IN GUIDING TUBES OF KД4-388 BOMB RACK

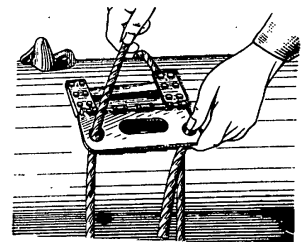


FIG.34. PASSING OF HOISTING CABLE THROUGH HOISTING SLING SPACER

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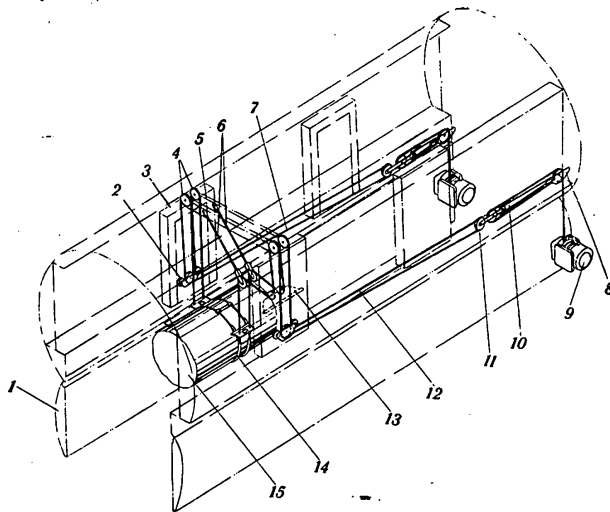


FIG. 35. HOISTING ФАБ-3000М-46 BOMB TO BOTTOM STATION OF КД4-388 STARBOARD BOMB RACK

1 - bomb-bay door; 2 - bottom pulley of КД-4 bomb rack; 3 - КД4 - 388 bomb rack; 4 - top pulley of КД-4 bomb rack; 5 - hoisting beam; 6 - twin guy; 7 - hoisting sling, 13.75 m. long; 8 - two-sheave end pulley; 9 - БЛ - 473М hoist; 10 - hoist cable, 20 m. long; 11 - movable block; 12 - hoisting sling cable, 14.8 m. long; 13 - hoisting frame; 14 - special hoisting sling; 15-load.

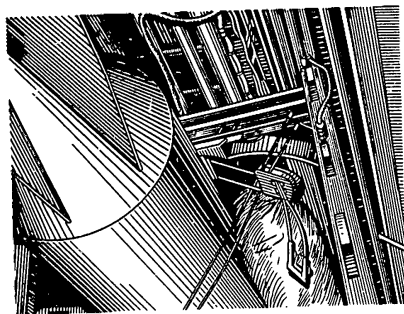


FIG. 36. REMOVAL OF HOISTING SLING FROM HOISTED ФАБ-3000 BOMB

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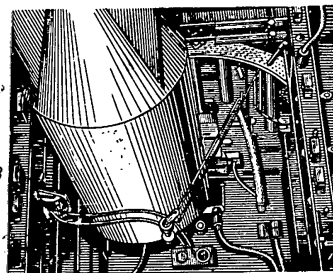


FIG. 37. HOISTING CABLE PASSED THROUGH TWIN GUY

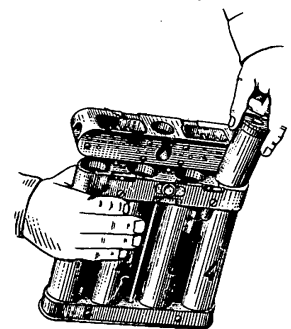


FIG. 38. LOADING SIGNAL FLARE LAUNCHER WITH FLARE CARTRIDGES



FIG. 39. LOADING SIGNAL FLARE LAUNCHER WITH IGNITERS



FIG. 40. ACCESS TO INTERLOCKING SWITCHES

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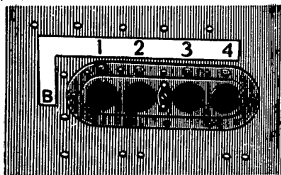


FIG. 41. 3KCI-98 PORT SIDE SIGNAL FLARE LAUNCHER

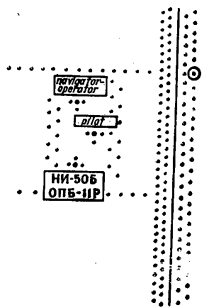


FIG. 42. STATIC VENT OF OPT-11P BOMB-SIGHT

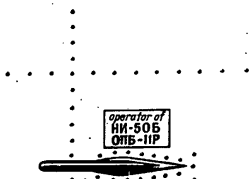


FIG. 43. IMPACT-PRESSURE TUBE OF OPT-11P BOMB-SIGHT

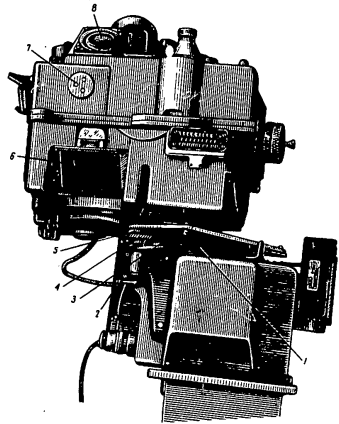


FIG. 44. OPT-11P BOMB-SIGHT (FRONT ELEVATION)  
 1 - directional stabilizer connecting rod pin; 2 - bombsight tail end pin; 3 - pin and spring fork; 4 - drift gear; 5 - plate; 6 - protecting glass; 7 - collimator illuminating lamp holder; 8 - silica gel cartridge.



FIG. 45. STARBOARD SIDE SIGNAL FLARE LAUNCHER

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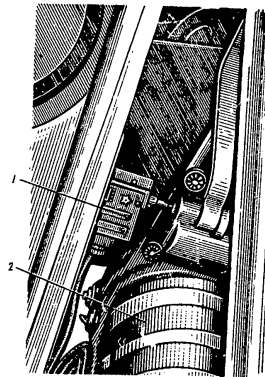


FIG. 46. BOMB-BAY RED DOME LAMP SWITCH

1 - microswitch; 2 - nose wheel strut.

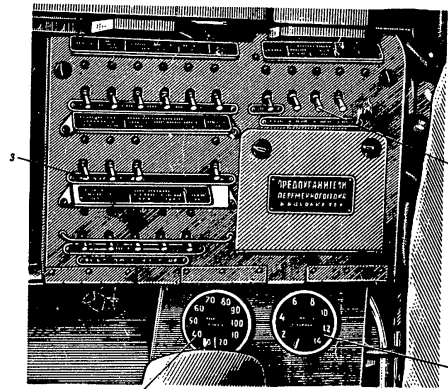


FIG. 47. NAVIGATOR-OPERATOR'S CIRCUIT BREAKER PANEL  
 1 - ДС - 1200 speed transmitter of ОПБ-11П bombsight set; 2 - ДВ - 15 altitude transmitter of ОПБ-11П bombsight set; 3 - BOMB-BAY LIGHTING (ОСВЕЩЕНИЕ БОМБОУТСЕКА) circuit breaker; 4 - BOMB-BAY LIGHTING (ОСВЕЩЕНИЕ БОМБОУТСЕКА) switch.

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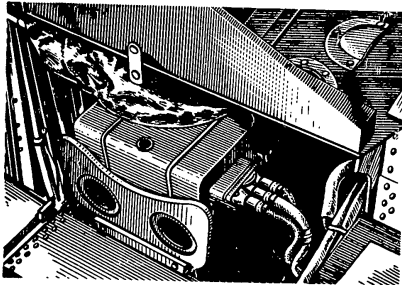


FIG. 48. OMB-11P BOMBSIGHT CONTROL BOX

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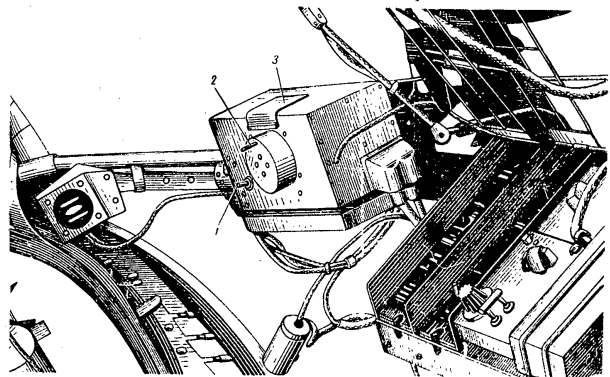


FIG. 50. OMB-11P BOMBSIGHT ALTITUDE UNIT  
 1 - altitude unit toggle switch; 2 - altitude setting knob; 3 - altitude scale.

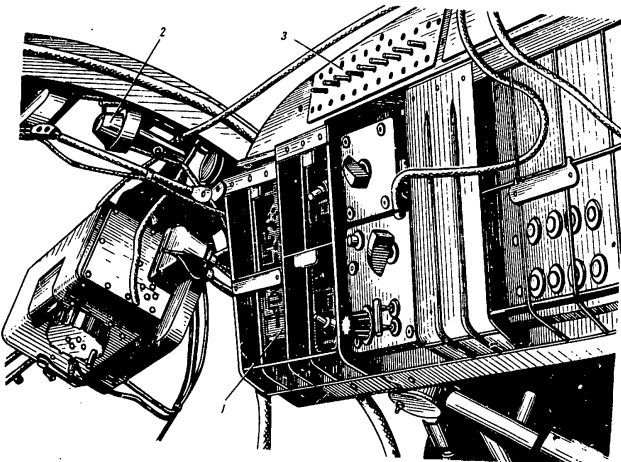


FIG. 49. BOMBING EQUIPMENT CONTROL UNITS ARRANGED ON NAVIGATOR'S CABIN STARBOARD SIDE  
 1 - bomb-bay door control panel; 2 - bomb release button; 3 - navigator's circuit breaker right-hand panel.

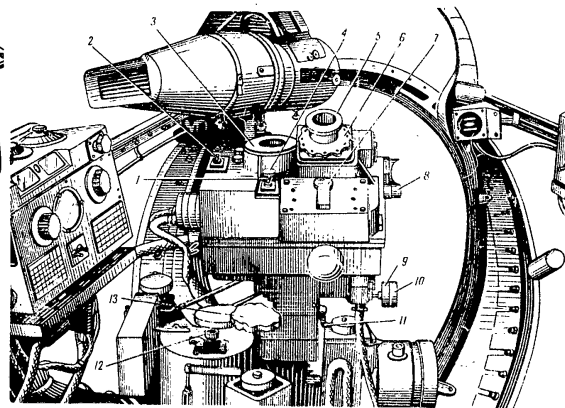


FIG. 51. REAR VIEW OF OMB-11P BOMBSIGHT  
 1 - gyroscope erecting mechanism switch; 2 - ground speed motor switch; 3 - initial sighting angle setting dial; 4 - level; 5 - eyepiece; 6 - rackgear with wind bearing scale; 7 - gyroscope caging device; 8 - collimator engagement knob; 9 - drift knob; 10 - bombsight turning knob; 11 - bombsight stop; 12 - autopilot clutch knob; 13 - pilot's course indicator knob.

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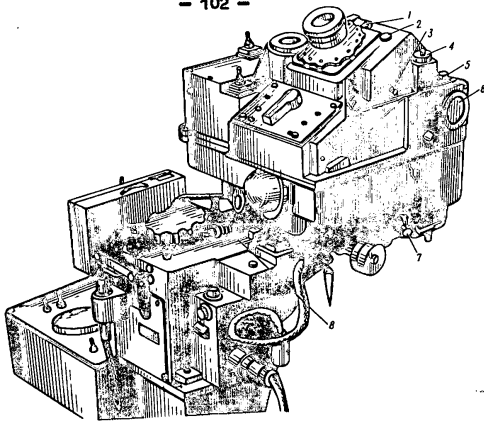


FIG.32. RIGHT-SIDE VIEW OF OIB-11P BOMBSIGHT  
 1 - light filter switch knob; 2 - RELEASE warning light; 3 - telescope reticle illumination knob; 4 - RELEASE cocking knob; 5 - collimator reticle illumination knob; 6 - collimator; 7 - drift angle correction knob; 8 - bombsight clutch knob.

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50X1

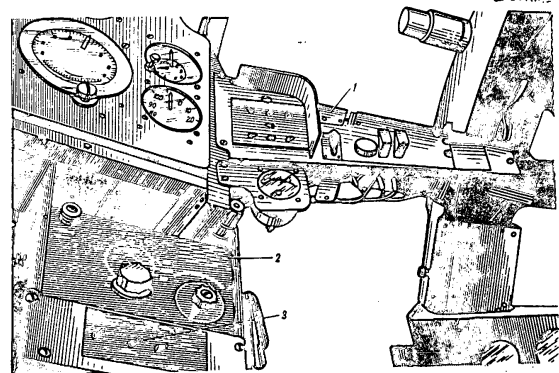


FIG.34. BOMBING EQUIPMENT CONTROL UNITS ON NAVIGATOR'S CABIN PORT SIDE  
 1 - left-hand bomb release panel; 2 - 9C5P-49A Intervalometer; 3 - bottom bomb release panel.

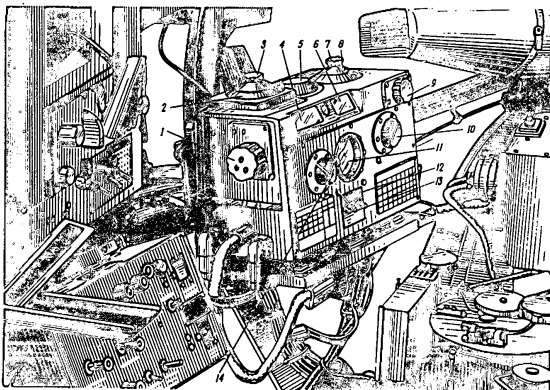


FIG.33. COMPUTER OF OIB-11P BOMBSIGHT  
 1 - aerodynamic speed correction setting knob; 2 - ground temperature setting knob; 3 - altitude temperature setting knob; 4 - altitude dial; 5 - speed dial; 6 - ground speed dial; 7 - wind velocity setting knob; 8 - wind bearing dial; 9 - wind bearing setting knob; 10 - aircraft speed setting knob; 11 - dial of terrain elevation over sea level; 12 - switch  $T_{yp}$ ; 13 - switch HV; 14 - altitude setting knob.

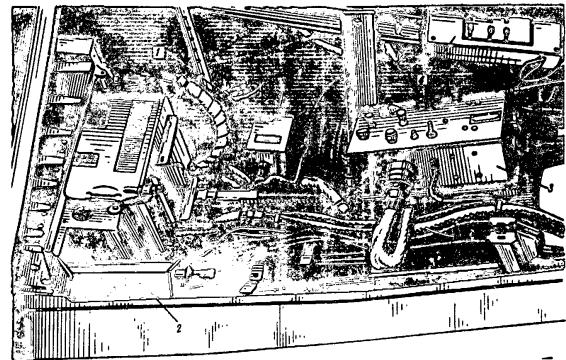


FIG.35. BOMBING EQUIPMENT CONTROL UNITS ON NAVIGATOR'S CABIN PORT SIDE  
 1 - KBCB-48 bomb release variation box; 2 - HV-50 spark extinguisher; 3 - P-9 unit of PBII-4 bomb release panel; 4 - bottom bomb release panel (for reference).

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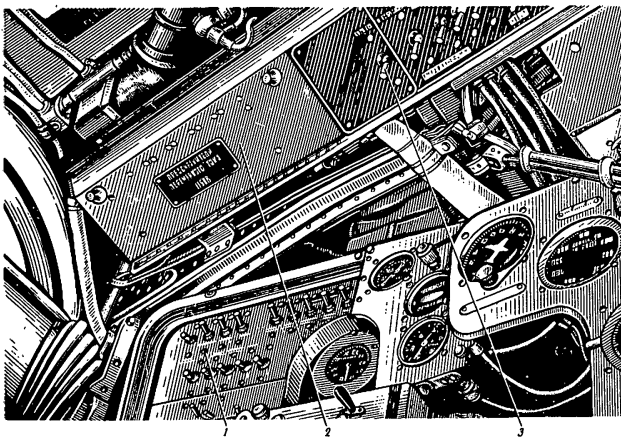


FIG.56. BOMBING EQUIPMENT CONTROL UNITS ON NAVIGATOR'S CABIN PORT SIDE  
1 - navigator's circuit breaker left-hand panel; 2 - 115 V A.C. fuse box; 3 - feed switch of ДГМК-7 (ДМК-49М) gyromagnetic compass.

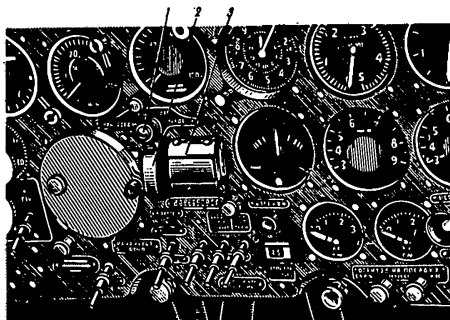


FIG.57. PILOT'S INSTRUMENT PANEL  
1 - armed indicator light for emergency release;  
2 - emergency ARMED release switch; 3 - emergency release switch .

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50X1

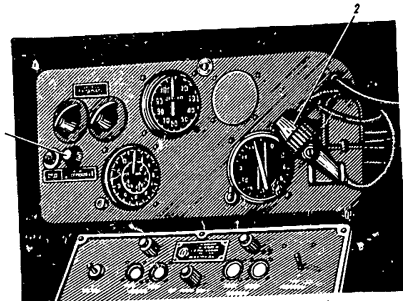


FIG.58. NAVIGATOR-OPERATOR'S INSTRUMENT PANEL  
1 - ready to drop indicator light; 2 - bomb release button .

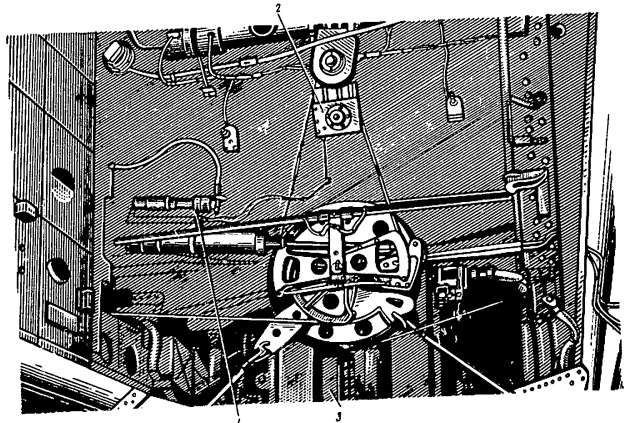


FIG.59. BOMBING EQUIPMENT UNITS ARRANGED ON FRAME NO.33  
1 - 3/ЛС-1 bomb-bay door hydraulic drive solenoids; 2 - red dome lamp to indicate work in bomb bay; 3 - limit microswitch box.

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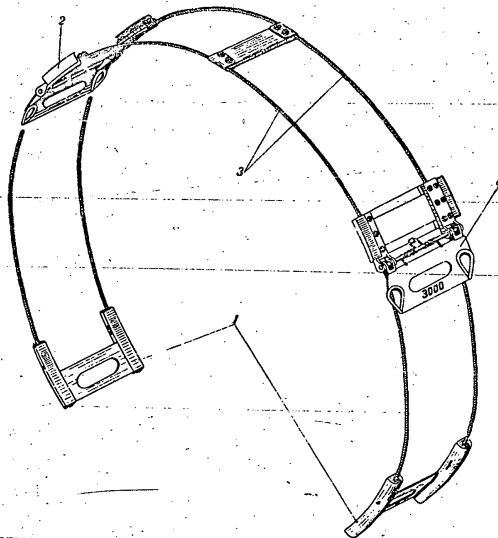


FIG. 60. HOISTING SLING  
 1 - socket for fastening hoisting sling cables; 2 - supporting platform;  
 3 - cable; 4 - spacer.

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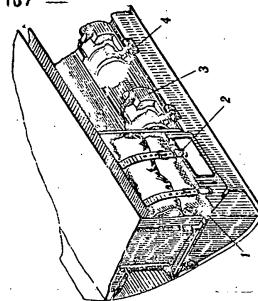


FIG. 62. ARRANGEMENT OF HOISTS AND HOISTING SYSTEM APPLIANCES IN STOWED POSITION IN LOCAS COMPARTMENT.  
 1 - bags with equipment; 2 - fastening straps; 3 - 4 - hoists

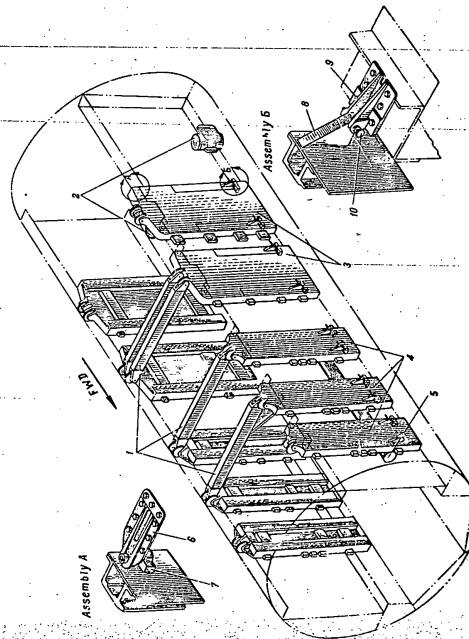


FIG. 61. INSTALLATION OF BOMB RACKS INTO STOWED POSITION  
 1 - hoisting beams; 2 - K1A-473M electromechanical hoists; 3 - K1A-388 bomb racks; 4 - K1A-488 bomb racks;  
 5 - case with Y31I arming wire; 6 - top attachment fitting for bomb rack fastening on horizontal beam; 7 - top attachment fitting of the bomb rack; 8 - bottom attachment fitting of bomb rack; 9 - beam attachment fitting for bomb rack;  
 10 - easy-to-remove bolt for fastening bomb rack.

50X1



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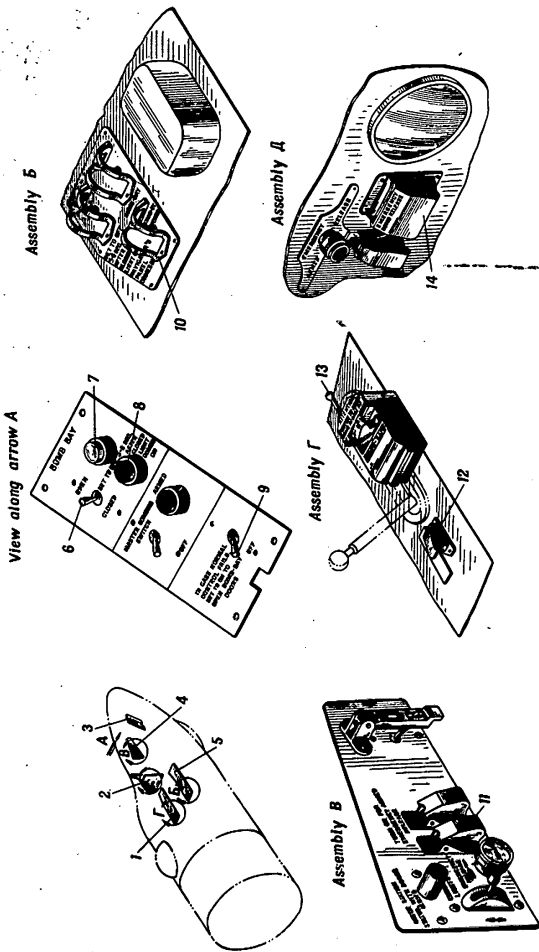


FIG. 43. BOMB-BAY DOOR CONTROL PANELS  
 1 - pilot's control panel; 2 - pilot's instrument panel; 3 - bomb-bay door control panel; 4 - bomb release panel; 5 - pilots' middle panel; 6 - bomb-bay door normal control system switch; 7 - BOMB-BAY DOORS OPEN indicator light; 8 - BOMB-BAY DOOR CLOSED indicator light; 9 - bomb-bay door stand-by opening switch; 10 - bomb-bay door stand-by closing switch; 11 - bomb-bay door emergency opening and emergency bomb release switch; 12 - switch for opening bomb-bay doors on the ground with aircraft main emergency; 13 - bomb-bay door emergency opening and emergency bomb release handle; 14 - bomb-bay door emergency

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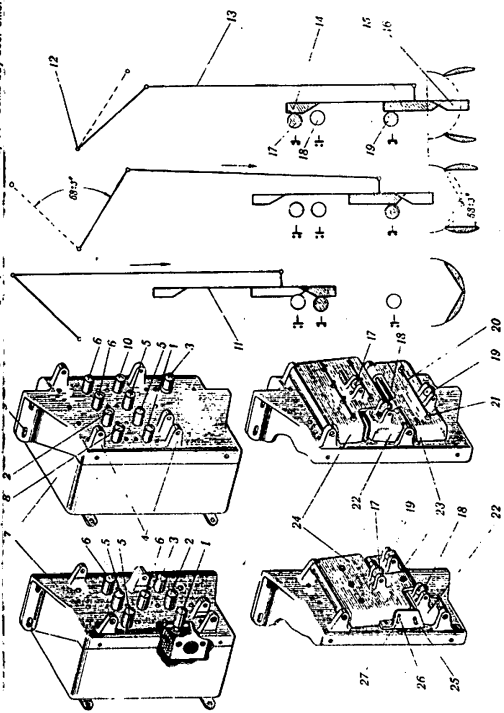


FIG. 44. BOMB-BAY LIMIT SWITCH BOX  
 1 - bomb-bay door closed position indication switch No. 1; 2 - bomb-bay door open position indication switch No. 2; 3 - emergency release circuit interlocking switch No. 3 used with aircraft mains de-energized; 4 - cover attachment lug; 5 - comb bombing switches Nos 4 and 5; 6 - emergency release switches Nos 6 and 7; 7 - box body; 8 - switch No. 9 to engage SAFE relay for emergency release; 9 - box attachment slots; 10 - duopilot interlocking switch No. 8; 11 - carriage; 12 - bomb-bay door control reel rotation axis; 13 - rod; 14 - carriage wedge to press cover 24; 15 - carriage wedge to press cover 23; 16 - carriage wedge to press cover 22; 17 - roller on covers actuating switches 2, 5, 6, 8 and 10; 18 - roller on cover actuating switch 1; 19 - roller on cover actuating switch 2; 20 - locking wire; 21 - adjusting screw; 22, 23, 24, 25, 26 - limiting screws; 27 - angle-piece.

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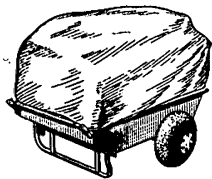


FIG. 65. T-CYЛ-47 TROLLEY IN TRAVELLING POSITION

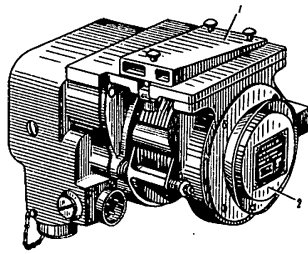


FIG. 66. INSTALLATION OF BRACKETS ON БЛ-473M HOIST  
 1 - bracket; 2 - БЛ-473M hoist.

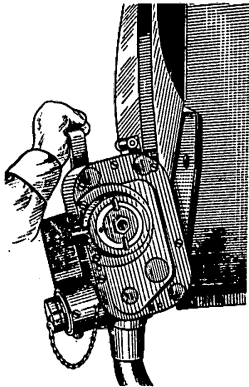


FIG. 67. INSTALLATION OF БЛ-473M HOIST ON BOMB-BAY DOOR BUTT END

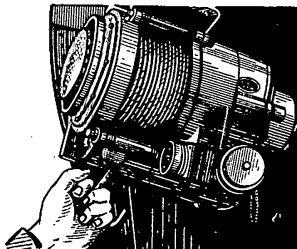


FIG. 68. TIGHTENING UNIVERSAL JOINT NUT OF БЛ-473M HOIST

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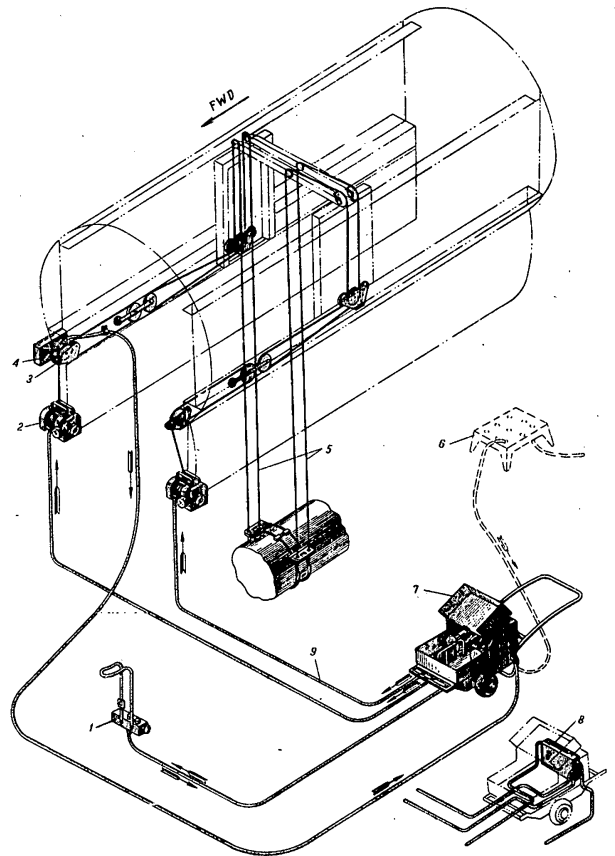


FIG. 69. ARRANGEMENT OF POWER SUPPLY FLEXIBLE CABLES OF БЛ-473M ELECTROMECHANICAL HOISTS  
 1 - ПУЛ-473 control panel; 2 - БЛ-473M electromechanical hoist; 3 - two-sheave end pulley;  
 4 - electromechanical hoist power supply system distribution box; 5 - hoisting cable;  
 6 - electromechanical hoist system ground power supply source; 7 - T-CYЛ-473 trolley;  
 8 - control box of T-CYЛ-473 trolley; 9 - local power supply flexible cables.

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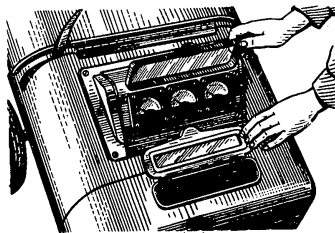


FIG. 70. T-CVЛ-473 TROLLEY CONTROL AND DIS-ENGAGEMENT INSTRUMENTS

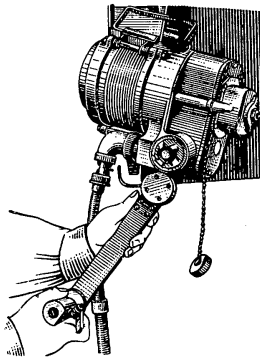


FIG. 72. INSTALLATION OF CRANK ON БЛ-473M HOIST

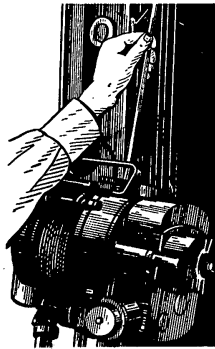


FIG. 71. ROLLING UP CABLE ON HOIST REEL

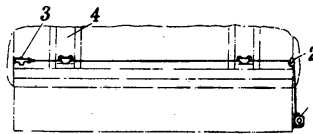
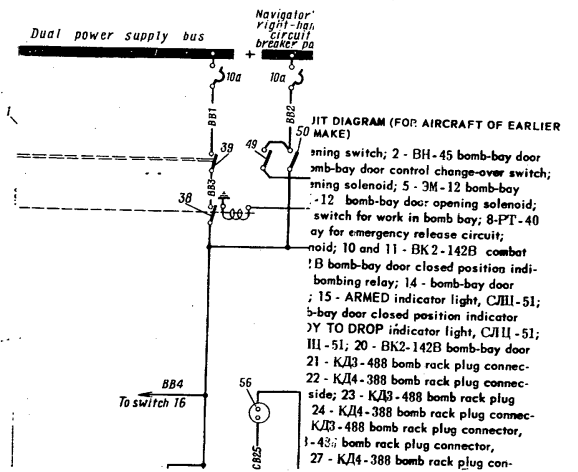
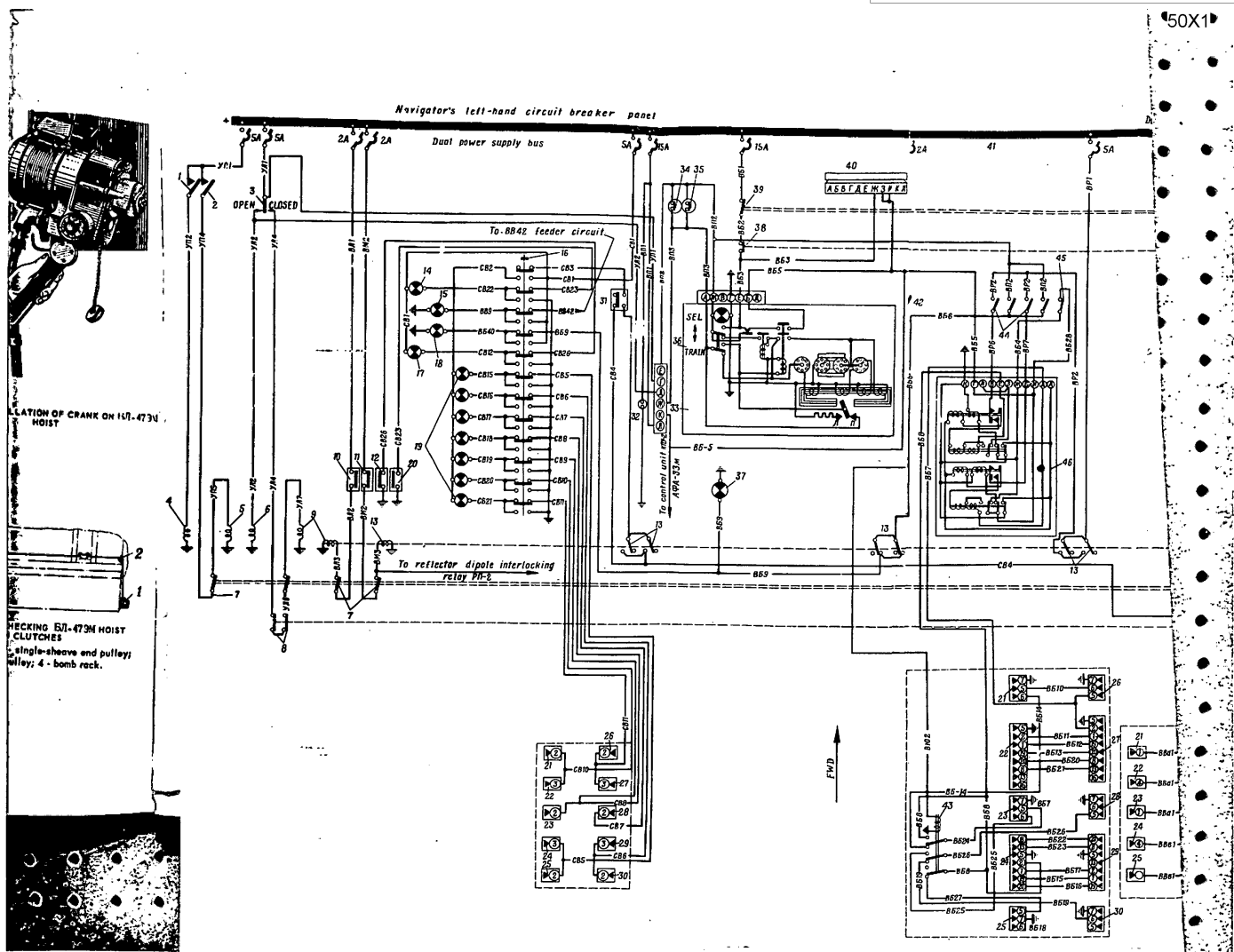


FIG. 73. DIAGRAM OF CHECKING БЛ-473M HOIST FRICTION CLUTCHES  
 1 - БЛ-473M hoist; 2 - single-sheave and pulley;  
 3 - two-sheave end pulley; 4 - bomb rack.

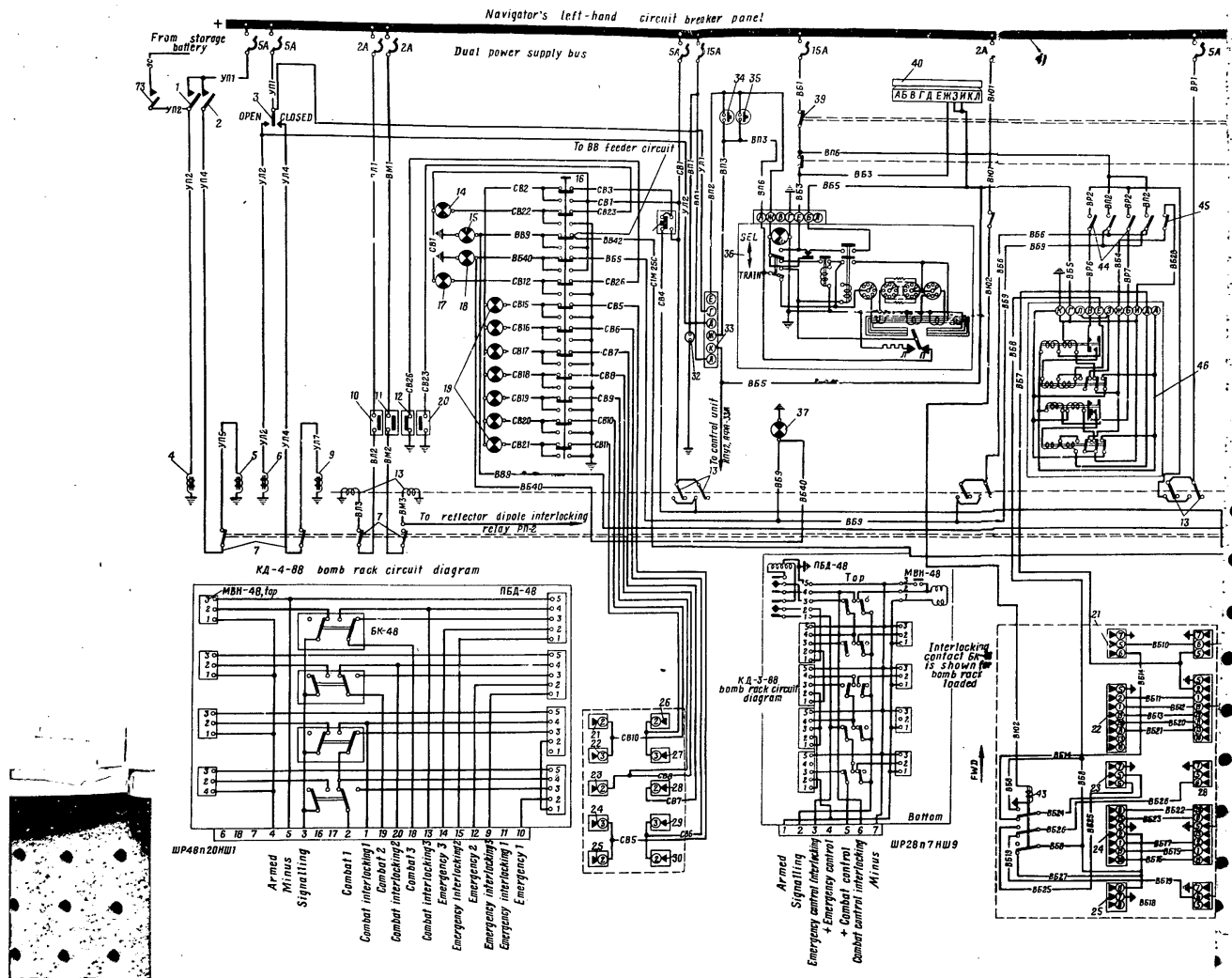




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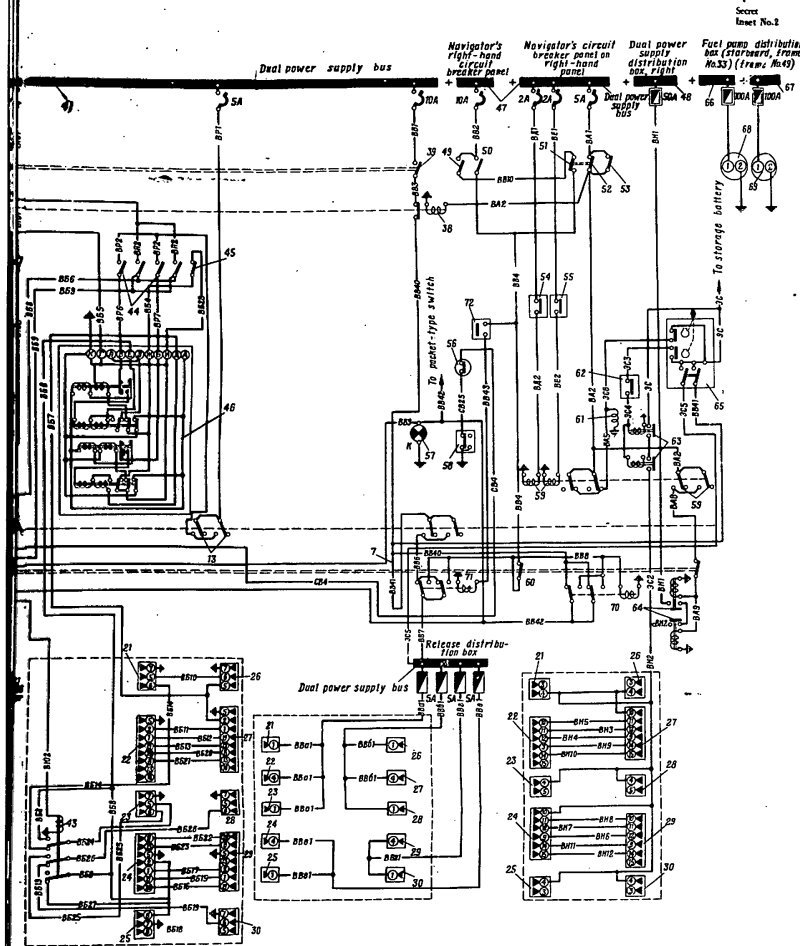


FIG. 75. BOMBING EQUIPMENT CIRCUIT DIAGRAM (FOR AIRCRAFT OF LATER MAKE)

1 - BH-45 bomb-bay door stand-by opening switch; 2 - BH-45 bomb-bay door stand-by closing switch; 3 - MH-45 bomb-bay door control change-over switch; 4 - 3/JC-1 bomb-bay door stand-by opening solenoid; 5 - 3M-12 bomb-bay door stand-by closing solenoid; 6 - 3M-12 bomb-bay opening solenoid; 7 - 2B-45 release circuit interlocking switch used during work in bomb bay; 8 - 3M-12 bomb-bay door closing solenoid; 9 - 11-11-4 pocket-type switch; 10 - 11-11-4 pocket-type switch; 11 - 11-11-4 pocket-type switch; 12 - 11-11-4 pocket-type switch; 13 - PI-1-6 combat bombing relay; 14 - bomb-bay door open position indicator light, C/III-51; 15 - ARMED release indicator light, C/III-51; 16 - 11-4 pocket-type switch; 17 - bomb-bay door closed position indicator light, C/III-51; 18 - navigator's READY TO DROP indicator light, C/III-51; 19 - station status indicator light, C/III-51; 20 - bomb-bay door open position indication limit switch, BK2-142B; 21 - K/J3-488 bomb rack plug connector, assemblies 1 - 2/3 - 4, port side; 22 - K/J4-388 bomb rack plug connector, assemblies 2 - 4, 5 - 7/6 - 9, port side; 23 - K/J3-488 bomb rack plug connector, assemblies 6 - 8, port side; 24 - K/J4-388 bomb rack plug connector, assemblies 10 - 12, port side; 25 - K/J3-488 bomb rack plug connector, assemblies 11 - 12, port side; 26 - K/J3-488 bomb rack plug connector, assemblies 1 - 2/3 - 4, starboard side; 27 - K/J4-388 bomb rack plug connector, assemblies 2 - 4, 5 - 7/6 - 9, starboard side; 28 - K/J3-488 bomb rack plug connector, assemblies 6 - 8, starboard side; 29 - K/J4-388 bomb rack plug connector, assemblies 10 - 12, starboard side; 30 - K/J3-488 bomb rack plug connector, assemblies 11 - 12, starboard side; 31 - BK2-140B station status check button with bomb bay doors closed; 32 - 48K bombsight power supply socket; 33 - AII-5-2N outpilot directional stabilizer; 34 - navigator's bomb release button, KC/1-49; 35 - navigator-operator's bomb release button, KC/1-49; 36 - 3/CHP-49A intervalometer; 37 - navigator-operator's READY TO DROP indicator light, C/III-51; 38 - ARMED and 3/CHP-49A intervalometer feed circuits interlocking relay, I/T-40; 39 - 2B-45 master bombing switch; 40 - 11V-50 spark extinguisher; 41 - dual power supply bus (navigator's left-hand circuit breaker panel); 42 - K/J3-488 bomb rack rear row disengagement relay switch, B-45; 43 - K/J3-488 bomb rack rear row disengagement relay, PI-1-3; 44 - bomb release selector relay switch, 2B-45; 45 - B-45 solvo switch; 46 - K/DC-48 bomb release variation box; 47 - dual power supply bus (navigator's right-hand circuit breaker panel); 48 - dual power supply bus; 49 - navigator's emergency ARMED release switch, B-45; 50 - pilot's emergency ARMED release switch, B-45; 51 - navigator's arming circuit interlocking switch, B-45; 52 - pilot's emergency release switch, B-45; 53 - navigator's emergency release switch, B-45; 54, 55 - emergency release limit switches, BK2-142B; 56 - KOC-45 dome lamp indicating interlocked condition of release and bomb door closing circuits during work in bomb bay; 57 - pilot's ARMED release indicator light, C/III-51; 58 - K/44 limit switch of KOC-45 dome lamp; 59 - PI-2 emergency bomb release control relay; 60 - B-45 signalling circuit interlocking switch, (work in bomb bay); 61 - 3/JC-1 bomb-bay door emergency opening solenoid; 62 - BK2-142B bomb release interlocking limit switch with mains de-energized; 63 - K-50/1 emergency bomb release relay with mains de-energized; 64 - K-50/1 emergency bomb release relay; 65 - bomb release control panel with mains de-energized; 66 - feeding bus of fuel pump distribution box, frame No.33; 67 - feeding bus of fuel pump distribution box, frame No.47; 68, 69 - 15/1-473M bomb hoist plug connector sockets.

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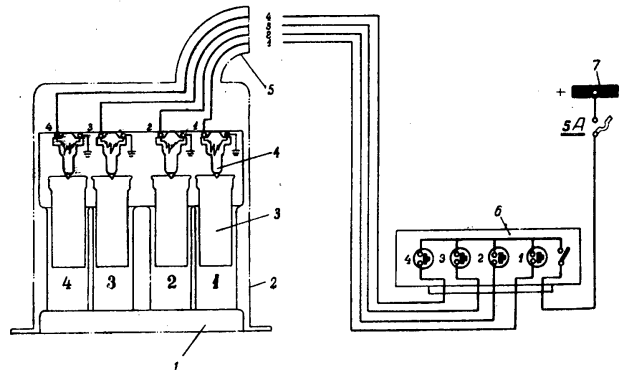


FIG.76. 3KCI-39 SIGNAL FLARE LAUNCHER CONTROL CIRCUIT DIAGRAM  
1 - set of tubes and magazine; 2 - 3KCI-39 launcher; 3 - signal flare cartridge; 4 - squib-initiated igniter; 5 - plug connector; 6 - signal flare control panel; 7 - co-pilot's circuit breaker panel.

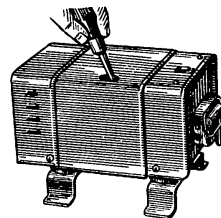


FIG.77. REPLACING FUSE IN OTH-11P NIGHT CONTROL BOX

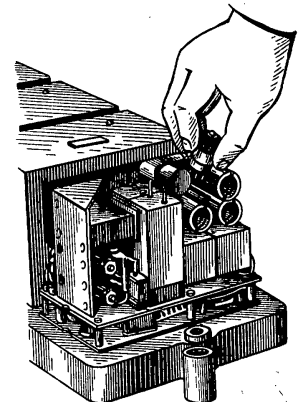


FIG.78. REPLACING VALVES IN ELECTRONIC RELAY UNIT



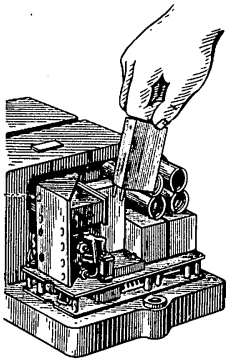


FIG.79. REPLACING RELAY IN ELECTRONIC RELAY UNIT

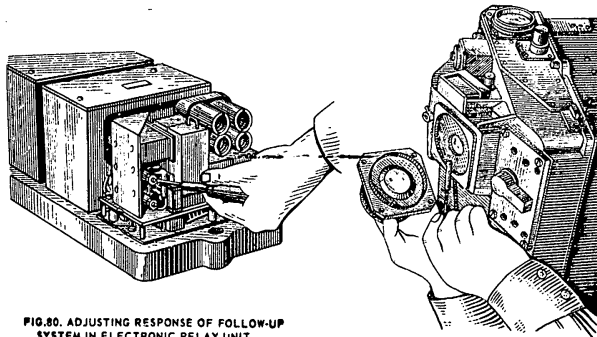


FIG.80. ADJUSTING RESPONSE OF FOLLOW-UP SYSTEM IN ELECTRONIC RELAY UNIT

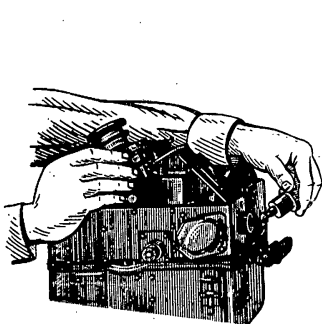


FIG.81. REPLACING COLLIMATOR ILLUMINATION LAMP

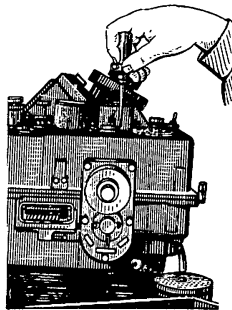


FIG.82. REGULATING SIGHT ADJUSTING RESISTORS

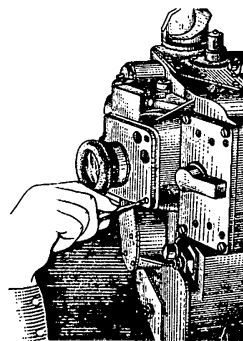


FIG.83. UNSCREWING SIGHT EYEPIECE FASTENING SCREWS

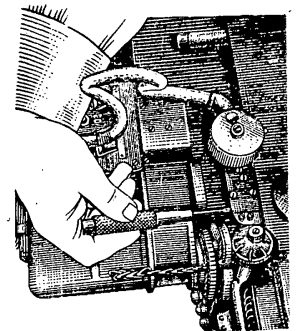


FIG.84. CLEANING BORESIGHT OPTICS OF DUST AND MOISTURE

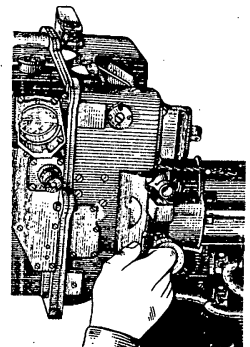


FIG.85. UNSCREWING DRIFT ANGLE ADJUSTING RESISTOR PROTECTIVE CAP

FIG.86. REGULATING DRIFT ANGLE ADJUSTING RESISTOR

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