

**TYPE-6 PRIMARY TRAINER**

**MAINTENANCE MANUAL**

**Vol. II**

**INSTRUMENT AND ELECTRICAL  
EQUIPMENT**

REPRODUCED IN THIS FORM

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# **CAUTION**

## **ENGINE MANAGEMENT**

**BEFORE STARTING THE ENGINE ENSURE INLET MANIFOLDS ARE DRAINED IN ACCORDANCE WITH THE MAINTENANCE MANUAL IF THE ENGINE HAS NOT BEEN STARTED FOR TWO DAYS OR MORE**

**AN ATTEMPT TO START THE ENGINE WITHOUT DRAINING THE INLET MANIFOLDS MAY RESULT IN DAMAGE TO THE ENGINE**

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# **CHAPTER I**

## **AIRCRAFT PREPARATION**

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## CHAPTER I AIRCRAFT PREPARATION

Article 1 Aircraft preparation is an important link of engineering support, for it will directly influence the mission completion and flying safety. Maintenance personnel must have to accomplish aircraft preparation accurately, conscientiously and timely so as to keep the aircraft constantly in a good condition.

Aircraft preparation can generally be divided into preliminary aircraft preparation, preflight aircraft preparation and between-flight aircraft preparation.

### SECTION 1 PRELIMINARY AIRCRAFT PREPARATION

Article 2 Preliminary aircraft preparation, which forms the most basic part of aircraft preparation, is one that is carried out in advance of a new mission after a day's flight is finished. Preliminary aircraft preparation of instruments and electrical equipments mainly comprises post-flight inspection, trouble shooting, washing and lubricating.

Those who are working on the aircraft must follow the relevant regulations laid down in Appendix I and adopt safety measures.

Article 3 Preparation. Inventory check must be carried out on tools, dusters and instrumental equipments and, the tools must be ready before exercising preliminary aircraft preparation.

### POST-FLIGHT INSPECTION

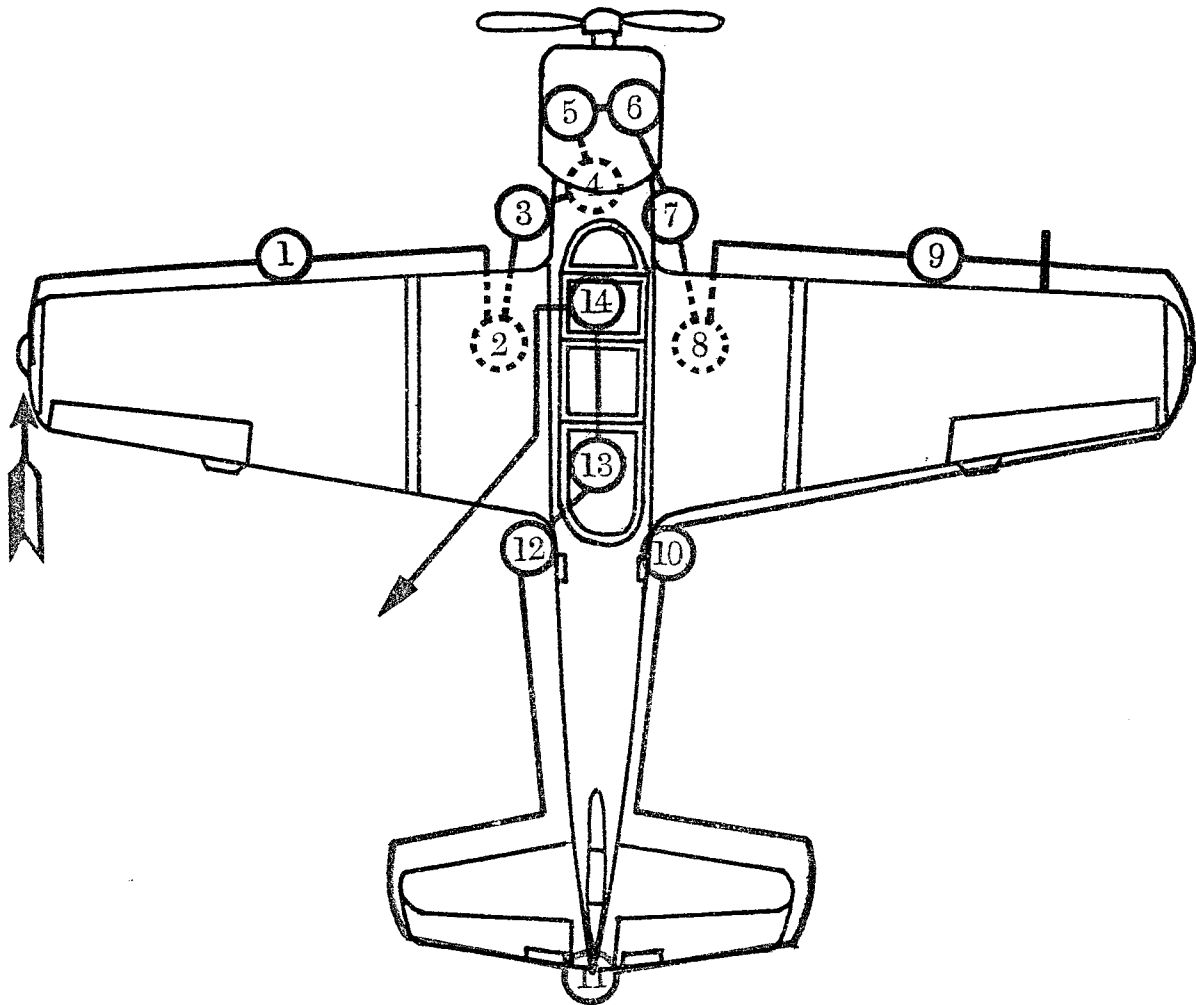
Article 4 Post-flight inspection is an important link to ensure the quality of aircraft preparation. The components of the aircraft will, after flight, undergo changes to different extents and therefore any inadvertence or carelessness may lead to trouble or hidden hazard. Maintenance personnel must perform post-flight inspection conscientiously and get to know the changes in the components so as to find out the defectives existing on the aircraft in time. The contents and requirements prescribed in this section must be followed and Fig. 2-1 checkout circuit should be taken a reference during the check. At the same time, the check on some components and relative positions should be strengthened according to the concrete condition, service characteristics and breakdown law of the instruments and electrical equipments, and opinions from the pilots.

Post-flight inspection includes exterior check and power-on check.

### EXTERIOR CHECK

#### LEFT WING

Article 5 Check left navigation light. The lamp housing should be intact, fixing tightness of which should be proper.



**Fig. 2-1 Post-flight Checkout Circuit**

- (1) Left Wing (2) Left Landing Gear Bay (3) Fuselage Front Left Side (4) Nose Gear Bay (5) Engine Left Side (6) Engine Right Side (7) Fuselage Front Right Side (8) Right Landing Gear Bay (9) Right Wing (10) Fuselage Right Side (11) Empennage (12) Fuselage Left Side (13) Rear Cockpit (14) Front Cockpit

Article 6 Check the access cover of compass transmitter. The fixing of the cover should be reliable.

Article 7 Check the access cover of fuel quantity gauge transmitter. The fixing of the cover should be reliable.

Article 8 Check the landing light. The perspex housing should be intact, the fixing of which should be reliable. The bulb should not be blackened and the filament not broken.

## LANDING GEAR BAY

Article 9 Check the accessories in the landing gear bays.

(1) The lamp housing, lamp holder and fixing clamp of the landing gear exterior signal light should be free from crack and looseness.

(2) Cables should be free from abrasion and damage, the fixing of which should be reliable.

(3) Check microswitches.

A. The fixing of microswitch must be secure and the fixing support free from deformation. Transmission pressing rod should not be bent and the mark on the fixing nut not misaligned.

B. When landing gear level is put at "DOWN" position, slightly push the foldable stay rod of landing gear upward, the microswitch should not be opened.

C. When the landing gear lock hook is pushed, the operating sound of "UP" microswitch should be clear.

NOTE: When landing gear, retraction and extension actuator, foldable stay rod and "DOWN" microswitch are assembled after disassembly, the residual travel of microswitch should be checked and adjusted, which should not be less than 4.5mm.

## FORWARD FUSELAGE AND ENGINE

Article 10 Check access covers of instruments. The fixing of covers should be secure.

Article 11 Check the generator.

(1) The fixing of generator and its ventilation pipe, protective belt and cables should all be secured well.

(2) Check whether the elastic steel shaft is broken.

(3) If there are too much carbon powder containing tin and metal chips in the ventilation outlet, the reason must be traced.

Article 12 Check the ducting of manifold pressure gauge, gasoline pressure gauge and oil pressure gauge, the pipes should be free from obvious deformation and damage, the fixing of which should be secure.

Article 13 Check the starting ignition coil.

(1) The fixing of the starting ignition coil and its cable should be secure, the fitting bracket free from crack.

(2) The fixing screws of the upper cover and adjusting access should be free from looseness, the security of which should be intact.

Article 14 Check the transmitter and flexible shaft of tachometer.

(1) The fixing of the transmitter should be secure, the mark should be clear and not misaligned, mounting bracket should be free from looseness and crack.

(2) The flexible shaft connection should be reliable, security intact, and the shaft sleeve free from dislocation, leakage and damage.

Article 15 Check the thermocouples. The thermocouples are not allowed to lean against the cooling fin of the cylinder. The fixing of the compensating cable should be secure and the asbestos ropes not loose.

Article 16 Check the transmitters of thermometers. The fixing of transmitters and their plugs should be reliable, security good, and there should be no evidence of oil seepage at the joint of transmitter and fixing seat.

Article 17 Check the fixing of plug and cable of the compressed-air solenoid valve.

#### RIGHT WING

Article 18 Check the access cover of fuel quantity gauge transmitter. The fixing of the cover should be reliable.

Article 19 Check pitot-tube.

(1) The fixing of the pitot-tube inspection access cover should be reliable.

(2) Pitot-tube and extension tube should be free from crack and deformation, the fixing of which should be reliable, pitot and static holes and the water-dump hole as well should be through.

(3) Pitot-tube sleeve should be good and inside must be clean.

Article 20 Check right navigation light. The lamp housing should be intact, fixing tightness of which should be proper.

#### AFT FUSELAGE AND EMPENNAGE

Article 21 Check the convertor. The fixing of convertor and its plug should be reliable, mounting bracket free from crack.

Article 22 Check tail navigation light. The lamp housing should be intact, the fixing of which should be reliable.

Article 23 Check the ground power supply socket and power supply signal light. The fixing of the socket, socket cover and signal light should be reliable, pins clean and there should be no axial clearance.

Article 24 Check the battery compartment and batteries.

(1) Cables in the compartment should be free from abrasion and damage.

(2) The plugs and pins of batteries should be clean and intact, ventilation pipes should be through. The mounting bracket of batteries should be free from looseness and crack.

(3) Check the batteries.

A. Threaded plugs should not loose and the vent holes must be through. Bitumen must be free from blister, cleavage and leakage of electrolyte.

B. The fixing of wiring should be reliable, cables free from damage, "+" and "-" marks must be clear.

C. The fixing of the rollers and pins on the casing should be reliable, locking pins flexible and socket clean and intact.

D. Fit the batteries and check the voltage. With double loading applied, the voltage should not be lower than 24v. The plugs must be pulled out after checking.

A 12-HK-28 battery is applied with a loading of 12a.

A 12-HK-30 battery is applied with a loading of 6a.

NOTE: When the atmosphere temperature is below -15°C or the aircraft is parked in the hangar, the batteries must be removed and kept indoors, and anticold measures must be adopted.

## REAR COCKPIT

Article 25 Check the fixation of error correction cards of gyromagnetic compass, altimeter and air-speed indicator.

Article 26 Check fluorescent light.

(1) The exterior should be free from damage, the support and light shade rotation should be flexible and it can stay at any desirable position.

(2) The fixing of the support on the seat should be reliable, the small retaining screws of the rheostat knob should not loose.

Article 27 Check three-colour signal light and its button. The fixing should be reliable, lamp housing and button should be flexible, the shutter should be put at fully open position.

Article 28 Check the landing gear signal light box. The fixing screws of box cover should not loose, button fixation must be reliable and button pressing flexible, "DAY-NIGHT" shutter should be put at "DAY" position.

Article 29 Check the centre instrument panel. The fixing of the panel should be reliable and shock absorption satisfactory.

Article 30 Check the fixation of trim tab neutral signal light, generator failure signal light and residual fuel warning light. The lamp holder fixing should be reliable and the lamp housing can be rotated flexibly. The lamp housing shutter should be put at fully open position after checking.

Article 31 Check the exterior of the instruments.

(1) The fixing of the instruments should be reliable.

(2) The instrument faces should be free from obvious damage and the inner surfaces free from dirt and moisture.

(3) The pointers should be free from deformation and the fluorescent agent on the pointers and dials should not flake off and bulge.

(4) The position of instrument pointers should conform with the requirements in the following table:

Nomenclature	Pointer Position	Permissible Deviation
Altimeter	Zero	
Air-Speed Indicator	Zero	2mm Scale Arc
Rate-of-Climb Indicator	Zero	0.3m/second
Turn-and-Slip Indicator	Zero	Half of the Pointer's Width
Manifold Pressure Gauge	Present Field Pressure	10mm Mercury Column
Three-Purpose Gauge	Mechanical Zero	
Tachometer	Zero	60rpm, 20rpm After Tapping
Cylinder Head Temperature Gauge	Present Cylinder Temperature	10° C

Article 32 Check the clock for operation.

(1) Navigation clock.

A. Check the endurance time mechanism. Press the operating button three times, the index showing should be correct, endurance clock should operate normally. The zero error of endurance minute hand should not be more than half of a mini-scale.

B. Check the timing mechanism. Press the operating button three times, the stop watch should operate normally, the hand should be free from stagnation. The zero error of the hand should not be more than one-third of a mini-scale.

C. The operating sound of the clock should be clear, the paper pad of the clock face should not come out, the fixing screw of clock button should not loose. After being pressed down and rotated to any position, the button can spring out freely.

NOTE: When checking the other components of the aircraft, usually the "timing mechanism" and "endurance time mechanism" should not be used to count the time so as to reduce the damage. During the operation, try your best to stop the second hand within the scales of 3-4 and 8-9 and return to zero.

(2) Flight clock. The operating sound of clock should be clear and the hand should be free from stagnation.

Article 33 Check the cockpit light. The fixing should be reliable, the light can be rotated flexibly and it can stay at any desirable position. The lamp housing and lighting control knob should be fixed reliably and the button flexible.

#### FRONT COCKPIT

Article 34 Check the front cockpit. The check contents for the rear cockpit must be followed, additionally.

(1) Check the starting button. The button and cover should be free from damage, the fixing of which should be reliable, the button pressing flexible.

(2) Check magnetic compass.

A. The fixing of the compass should be reliable, the fitting mark line should not be misaligned.

B. Compass oil should be clean and there should be no evidence of oil seepage. The indication of compass card should be identical with the bearing of aircraft parking.

C. The fixing of illumination knob should be reliable.

(3) Check the position of the following instrument pointers:

A. Volt-ampere meter. The mark line of zero adjustment screw should not be misaligned, the pointer deviation from zero position should not exceed  $\pm 1.6a$ .

B. The pointer of inlet temperature gauge and fuel quantity gauge must rest at mechanical zero position.

#### POWER-ON CHECK

Article 35 Power-on check is the fundamental method for determining the normal operation of instrument and electrical equipment. Therefore, all energies must be concentrated and meticulous operation, observation, hearing and pondering must be closely combined together, and be good at discovering minor changes of instrument and electrical equipment during the check so that the doubts and troubles can be investigated clearly in time.

Article 36 Preparation. Connect the ground power supply, turn on the battery switch, the ground power supply signal light at this moment should be lit. Then check the voltage, which usually should not be lower than 27v (not lower than 24v for 12-HK-50 battery).

#### REAR COCKPIT

Article 37 Check signalling and lighting equipment.

(1) Check trim tab neutral signal light. When the trim tab is set at the neutral position, the light should be on, as it is set over the neutral, the light should go off.

(2) Check the landing gear signal light. After the switch being turned on, the green signal light both in the front and rear cockpit should be lit. When the checking button is pressed, the red signal light both in the front and rear cockpit should be lit.

(3) Check the cockpit light. Rotate the illuminating knob counterclockwise, lighting should evenly become strong. After turning off the illuminating knob, press the checking button, the cockpit light should be lit.

NOTE: When a night flight or hooded flight is carried out, the operation of fluorescent light and illuminating light of magnetic compass must be checked.

Article 38 Check three-purpose gauge. The pointer of oil temperature gauge should indicate the present oil temperature. The gasoline pressure gauge pointer deviation from zero position should not exceed  $\pm 0.04 \text{ kg/cm}^2$ . The oil pressure gauge pointer deviation from zero position should not exceed  $\pm 1 \text{ kg/cm}^2$ . The differential value of the two instruments' indications both in front and rear cockpit should not exceed the absolute value of the basic error.

Article 39 Check turn-and-slip indicator. When the indicator is in normal operation, press the left and right side of the instrument panel respectively, the pointer should indicate rightward and leftward respectively and there should be no stagnation. The pointer should rest at zero after returning back. If it fails to do so, after tapping, the pointer deviation should not exceed half of the pointer's width.

Article 40 Check the artificial horizon. Release the starting button after it is pressed down to the bottom, then turn on the switch. At the moment of starting, the starting current of convertor usually should not be greater than 30a (experienced datum). The spherical dial should usually swing for a few times, the time should not exceed one minute and a half before getting stable gradually, and the rotating sound of follow-up bracket can also be heard. The operating sound of gyro would not have any obvious change and the spherical dial should be free from swinging and shaking three minutes later. The ammeter should indicate stably at 3-4a after the artificial horizon is operating normally. The artificial horizon at this moment should point out the parking angle of the aircraft. As the small ball of sideslip indicator is in the centre of the two mark lines, the meridian should align with the zero index of bank scale, but the permissible deviation should not exceed  $\pm 1^\circ$ . Then press the upper and lower part of the instrument panel lightly, the artificial horizon should indicate the pitch angle correspondingly.

NOTE: If it is needed to energize again before the gyro rotor stops rotating, it is prohibited to press the starting button.

## FRONT COCKPIT

Article 41 Check signalling and lighting equipment. Follow the check contents described in Article 37.

Article 42 Check the operation of navigation light and landing gear exterior signal light.

Article 43 Check three-purpose gauge. The check contents described in Article 38 must be followed, additionally the scavenge oil temperature indicated by the temperature gauge should also be checked.



Article 44 Check the operation of inlet temperature gauge and fuel quantity gauge.

Article 45 Check turn-and-slip indicator. Follow the check contents described in Article 39.

Article 46 Check the artificial horizon. Follow the check contents described in Article 40. The normal operating current for the convertor should be 4-5a.

Article 47 Check gyro magnetic compass. Turn on the switch, waiting for one minute, then press down the synchronizing button, the operating sound of relay in gyro body should be heard and the pointer should move evenly to the heading of the aircraft parking, the constant swing, ten seconds later, should not exceed  $\pm 1^\circ$ . The indicated bearing by the indicator in the rear cockpit, through careful observation, should be identical with that in the front cockpit, but the permissible difference should not exceed  $2^\circ$ . Release the synchronizing button, rotating the knob, the pointer should not move away from the indicated position or touch the fixed index.

Article 48 Ensure all switches and buttons are set to "OFF" after accomplishing power-on check.

Article 49 The inspection occasion of the following contents can be determined in accordance with the concrete condition, but it should be checked once within not more than 4 flying days.

(1) Check compass transmitter. The fixing and plug connecting of the transmitter should be secure, cables free from abrasion, fitting bracket free from crack and fitting mark line free from misalignment.

(2) Check fuel quantity gauge transmitter.

A. The fixing and plug connection of the transmitter should be secure, there should be no evidence of fuel seepage at the joint of transmitter and fuel tank.

B. There should be no fuel droplets on the inner surface of the perspex cover, if there are, the reason must be traced.

(3) Check the transmitters of gasoline and oil pressure gauges and the plug of dilution solenoid valve.

A. The fixing and plug connection of the transmitters should be secure.

B. There should be no evidence of oil seepage at the joint of gasoline pressure gauge and oil pressure gauge pipes.

C. The fixing of the solenoid valve plug should be secure.

(4) Check the ground leads. The fixing of the ground leads should be reliable and the cables intact.

(5) Check the back side of instrument panels in the front and rear cockpit.

A. The support and shock absorption pad of the panel should be fixed reliably, the instrument fixing ring and locking pin should be free from crack.

B. Plugs, pipes and cables should not abrade, the fixing and connecting of which should be secure, and the shunted terminal boxes should be free from crack.

C. The components of power consuming equipment should be fixed reliably.

D. The fixing and plug connection of the accessories of power supply system and gyro magnetic compass should be secure and shock absorption pad satisfactory.

(6) Check the generator failure signal light bulb and landing gear signal light bulb. The bulb should not be blackened or whitened, the filament not too loose and the joining of the lamp holder and glass must be close.

(7) Check batteries.

A. The threaded plugs should be free from damage and the valves flexible.

B. Check the height of electrolyte. By visual observation, the electrolyte surface of a 12-HK-28 battery should not be lower than the protective plate, as for a 12-HK-30 battery, it should not be lower than the partition of the plate. If the height is not enough, the reason must be traced. If the electrolyte is spilt out, the electrolyte with the same specific weight can be replenished, otherwise it should be taken to the charging station.

C. Check battery container. Follow the regulations described in Appendix X.

(8) Check LTC-1 gyro magnetic compass with power on.

A. Check homogeneity of compass indication. Press down the synchronizing button to attract the compass card to rotate one circle clockwise and counterclockwise respectively with the angular speed of  $360^\circ/\text{min}$ , the indication of the indicator should be uniform. If there is fluctuation, fluctuation magnitude should not exceed  $2^\circ$ .

B. Check quick synchronizing speed. Attract the compass card to rotate and make non-synchronization angle  $100^\circ$ ; press down the synchronizing button while pressing the stop watch, as the indicator pointer stops moving, stop the watch, the time should not be more than 5 seconds (namely the quick synchronizing speed is not less than  $20^\circ/\text{second}$ ).

C. Check slow synchronizing speed and speed difference. Attract the compass card to rotate and make the non-synchronization angle  $20^\circ$ ; press the stop watch and observe for three minutes, the moving angle of the indicator pointer should be  $3-12^\circ$  (namely the slow synchronizing speed should be  $1-4^\circ/\text{min}$ ).

The speed difference of clockwise and counterclockwise synchronization should not exceed  $2^\circ/\text{min}$ .

D. Check alignment error. Press down the synchronizing button to attract the compass card to rotate, compare with the indicator every  $30^\circ$ , the error indicated by the indicator and transmitter should not exceed  $\pm 2^\circ$ .

NOTE: "B" and "C" check contents can be made as a reference for the check of LTC-2 gyro magnetic compass, but the quick synchronizing speed should not be less than  $8.5^\circ/\text{second}$ , and the slow synchronizing speed should be within  $1.5-4.5^\circ/\text{minute}$ . The speed difference of clockwise and counterclockwise slow synchronization should not exceed  $1.5^\circ/\text{min}$ .

(9) Check the operation of fluorescent light and magnetic compass illuminating light with power on. Rotate the lamp holder and tap the holder casing, the light should not go off.

(10) Check the operation of heating equipment of clock and pitot tube with power on. When the switch is turned on and off, the ammeter pointer should swing (power-on check on the ground should not exceed one minute).

## TROUBLE SHOOTING

Article 50 Trouble is the "enemy" of flight safety. The troubles discovered in flight and inspection must be traced to the source and removed thoroughly. In removing the troubles, it is compulsory to:

(1) Gain a clear understanding of conditions. It is, first of all, necessary to know in detail the symptom and peculiarities of the troubles and the occasion they took place and other relevant conditions before removing the troubles.

(2) Analyse the cause. Upon the symptom of trouble and the understanding of the conditions, one must have to discard the dross and select the essential, eliminate the false and retain the true, proceed from the one to the other and from the outside to the inside so as to find out the true cause.

(3) Remove the troubles thoroughly. A correct method must be adopted to remove the troubles according to the cause. After removal of the troubles, test or flight test must be carried out if necessary.

## CONCLUSIVE WORK OF PRELIMINARY AIRCRAFT PREPARATION

Article 51 After accomplishing preliminary aircraft preparation, it is necessary to:

(1) Recall all the work done must be reliable and effective.

(2) Check up tools, dusters and instrument equipments.

(3) Report the accomplishment of preliminary aircraft preparation to the higher level.

## SECTION 2 PREFLIGHT AIRCRAFT PREPARATION

Article 52 Based on preliminary aircraft preparation, preflight aircraft preparation is a preparation that is carried out within a period of time before the starting of a flight according to the concrete flight mission. The purpose of doing so is to make the aircraft meet the need of the flight mission and give a final appreciation of the reliability of the aircraft technical equipments so that the aircraft can be put into a defined preparation state on time. The main contents of preflight aircraft preparation for instrument and electrical equipment is to carry out the inspection prior to flight.

Article 53 Preparation. Check up and get the needed tools and equipments ready.

## PREFLIGHT INSPECTION

Article 54 Preflight inspection is the final inspection before the aircraft is released to fly. The aircraft may undergo some changes under the influence of external condition during the parking period, inadvertence must be overcome although preliminary aircraft preparation has been done already. The contents and requirements regulated in this section must be acted on during the inspection. The check on some components and relative positions, at the same time, should be

strengthened in accordance with the present day flight mission, the work done in preliminary aircraft preparation and climatic change.

Preflight inspection includes exterior check and power-on check.

### EXTERIOR CHECK

Article 55 Check batteries. The fitting of batteries should be reliable and the voltage must conform to the regulations.

Article 56 Check the fixation of navigation light, landing light, landing gear exterior signal light and access covers.

Article 57 Check pitot tube. Pitot and static holes should be through, the fairing should be fixed reliably and, the extension tube free from deformation. The pitot-tube sleeve should be removed after inspection.

Article 58 Check the front and rear cockpit.

(1) Carry out time-check and wind up the clock if necessary.

(2) All the instrument faces should be free from obvious damage and the pointers should stay at the normal positions. At the same time, the altimeter pointer should be adjusted to zero.

NOTE: When a ferry flight is performed, the pressure scale of the altimeter should be adjusted to the present field pressure, the error should not exceed three mini-scales.

(3) Check the fixation and exterior of signalling and lighting equipment. All the lamp shades should be put at the maximum position in day time while in night flight they should be put at the minimum position (inclusive of landing gear signal light shutter) with the exception of red signal light shade.

(4) All the switches and knobs should be set to "OFF" position.

### POWER-ON INSPECTION

Article 59 Preparation. Follow Article 36.

Article 60 Check the operation of landing gear signal light and trim tab neutral signal light.

Article 61 Check the operation of three-purpose gauge, inlet temperature gauge and fuel quantity gauge.

Article 62 Check the operation of turn-and-slip indicator and artificial horizon.

Article 63 Check the operation of gyro magnetic compass. After the synchronizing button being pressed down, the mini-aircraft on the indicator should point out the bearing of the aircraft parking.

NOTE: When a night flight is performed, the operation of fluorescent light, cockpit light and magnetic compass illuminating light should also be checked.

Article 64 Ask the engine running personnel about the operation of engine instruments and power supply system.

NOTE: Special equipment personnel should check the operation of engine instruments and power supply system by means of engine running once every 3-4 flying days.

### CONCLUSIVE WORK OF PREFLIGHT PREPARATION

Article 65 After having finished preflight aircraft preparation, one must:

- (1) Check up tools and equipments.
- (2) Report the accomplishment of preflight aircraft preparation to the higher level and sign the "Preflight Preparation Report Form".

### SECTION 3 BETWEEN-FLIGHT AIRCRAFT PREPARATION

Article 66 Between-flight aircraft preparation is a preparation done after landing and before another dispatching so that the aircraft can be ensured for successive starting-out. The characteristics for the preparation are that the time is pressed and the task is urgent. One therefore must try his best to accomplish the preparation within the shortest possible time with the prerequisite of ensurance of preparatory quality.

Between-flight aircraft preparation of instrument and electrical equipment is, in the main, to carry out between-flight inspection and trouble shooting.

#### BETWEEN-FLIGHT INSPECTION

Article 67 The performing of between-flight inspection must be acted upon in conformity with the contents regulated in this section. It is essential to take the initiative to ask opinions from the pilot before the inspection, for it is the pilot who knows best the operating of instrument and electrical equipment in the air. Therefore the problems reflected by the pilot must be made clear, reported in time and dealt with conscientiously.

Article 68 Check the fixation and exterior of access covers, navigation light, landing gear exterior signal light and pitot tube.

Article 69 Survey the front and rear cockpit. Follow the items (1), (2), (3) and (4) in Article 58.

Article 70 Check the voltage of batteries. With double loading applied, the voltage should not be lower than 24v.

NOTE: The frequencies of between-flight inspection can be determined according to piloting tasks.

## INTERMEDIATE INSPECTION

Article 71 Intermediate inspection must be carried out for individual aircraft taking part in two-shift flight when the shifting personnel are doing the handing-over. The main contents for intermediate inspection are as follows:

- (1) Follow the contents for Preflight Inspection (exterior check).
- (2) Check all the passage joints on the engine. All the passage joints should be free from oil seepage.

# **CHAPTER II**

## **PERIODIC INSPECTION**

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## CHAPTER II PERIODIC INSPECTION

Article 72 Periodic inspection is a periodic maintenance work carried out after the aircraft technical equipment has been used for a given number of service hours (times). The periodic inspection of instrument and electrical equipment is mainly to make a profound investigation of their technical conditions so as to find out the performance change of the components and the early wearing and damage inside the components, thoroughly remove the troubles discovered and carry out the servicing work such as adjustment, cleaning and washing, lubricating, etc. so that the tactical and technical performance of instrument and electrical equipment can be well kept and restored.

Periodic inspection covers a large quantity of work and deals with various aspects, the technics are rather complicated. The engineering personnel must therefore strictly obey the regulations, continuously improve the working method, closely organize and strengthen the co-operation, develop the spirit of industriousness and consecutive operation, raise working efficiency and accomplish the periodic inspection task for every aircraft accurately and speedily with the prerequisite of quality insurance.

Article 73 The periodic inspection of instrument and electrical equipment is based on the flying hours of the aircraft, it can be divided into:  $50 \pm 5$  hours,  $100 \pm 10$  hours and  $200 \pm 10$  hours three kinds, the inspection is carried out simultaneously with that of the aircraft. When carrying out 100-hour periodic inspection, 50-hour periodic inspection must be incorporated; while the contents for 50-hour and 100-hour periodic inspection must be included in 200-hour periodic inspection when it is being carried out.

The periodic inspection for the generator to be sent to the factory together with the engine for major overhaul should be done with that of the engine.

Article 74 The general requirements for the periodic inspection of instrument and electrical equipment:

(1) The requirements for exterior, performance, insulating resistance removal, disassembling and assembling of the network and components must be fulfilled in accordance with the regulations in Appendix III.

(2) The inspection of commutator, carbon brush, brush bracket assembly and casing of various electric machines should be done in accordance with the regulations in Appendix IV.

(3) The cleaning, inspection and lubricating grease (oil) replenishment of bearings of various electric machines should be carried out in accordance with the regulations in Appendix V.

## SECTION 1 PERIODIC INSPECTION OF INSTRUMENT EQUIPMENT

### 50±5-HOUR PERIODIC INSPECTION

#### WORK TO BE DONE ON THE AIRCRAFT

Article 75 Remove the artificial horizon and tachometer and have them sent and checked in the operating room. After the quality being gained, fit it back to the aircraft.

NOTE: In fitting the artificial horizon, the rigging mark must be aligned.

Article 76 Check GHC-2 transmitter.

(1) The mounting bracket should be free from crack and looseness.

(2) Check stagnation error. Attract the compass card to rotate to the left and right for 10° respectively, the error for the compass card to restore to the original position should not exceed 7°, after the transmitter being tapped, it should not exceed 1°.

(3) Check the contact reliability of potentiometer and brush. Connect the ohmmeter between "+" and "-" pins, the resistance value should be within the range of 300-450 ohms. Attract the compass card to rotate with the speed of 360°/min, there should be no cutout in the ohmmeter indication.

Article 77 Check the fuse on the terminal box of LTC-2 gyro magnetic compass. The copper cap should be free from looseness and the fuse-wire free from obvious spot and deformation.

#### WORK TO BE DONE IN THE OPERATING ROOM

Article 78 Check the artificial horizon.

(1) Check the operating switch, there should be free from obvious carbon deposit and damage on the contact block of operating switch and the inside of the notch should be clean. If there is carbon deposit, unsolder the cable and remove the block and have it ground and polished, then wash it with No. 70 aviation gasoline; if the deposit is too much, the five-way conductive ring must be removed and the contact point on the spring leaf should be ground and polished. After fitting it well, the pressure of contact point must be measured and the fitting correctness of the operating switch be checked. The operating method and requirements refer to Appendix VIII. After removing the five-way conductive ring, check the contacting between the spring leaf and conductive ring with an ohmmeter, the ohmmeter indication should be free from swinging.

NOTE: After washing with gasoline, a layer of white material may be left on the contacting surface, mop them clean with silk cloth (or tuft of silk thread) (It holds good hereinafter).

(2) Check the reverser. Rotate the balance ring manually, observe through the hole of reverser that the two half-rings and the inside of the notch should be clean, it should be free from short circuit; the contacting surfaces should be free from obvious deposit and damage, they must be wiped up if there are. After

cleaning the reverser, check the fitting correctness of the brush: as the contact point lies in the notch, the spherical dial should indicate 90°.

(3) Check conductive ring and spiral switch. The conductive ring and spiral switch should be free from obvious carbon deposit and damage. Wipe up the conductive ring if there is deposit. Wrap a soft wooden stick with a piece of silk cloth and dip it with a little No. 70 aviation gasoline, then lean the stick against the conductive ring, move the gyro chamber and wipe the conductive ring with care. In case serious carbon deposits or burns occurred, remove the brush and polish it with silk thread tuft till the surface of the conductive ring becomes as bright as a mirror.

NOTE: (a) Whether the operating switch, the reverser, the conductive ring and the spiral switch of BDP-2 artificial horizon need wiping should be determined according to the concrete condition. Wiping is not necessary if there is only a little carbon deposit, contact is satisfactory and normal operation can be ensured in the period.

(b) Before the installation of brush, it is essential to check whether there is fibre left on the conductive ring. Use feeler gauge to measure the opening of every group of brushes: Use the feeler gauge with diameter of  $6 \pm 0.5\text{mm}$  to measure the four-way and five-way brushes of BDP-2 artificial horizon (the opening of  $6 \pm 0.5\text{mm}$  is equal to the contact pressure of 0.8-1.3g); Use the feeler gauge with diameter of  $5.5 \pm 0.5\text{mm}$  to measure the six-way conductive ring (the opening of  $5.5 \pm 0.5\text{mm}$  is equal to the contact pressure of 2-4g). For the brush quality of the artificial horizon varies from batch to batch, so the brush opening can only be taken as a reference.

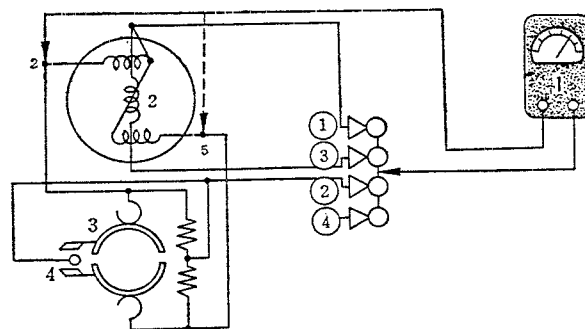
(c) Measure the contact pressure of the brushes whose spiral switch has been removed and assembled. The contact pressure should be within the range of 4-8g.

(d) The lead wires of the conductive ring and brush can only be soldered by means of a low melting point tin solder.

(4) Check the follow-up bracket circuit.

A. Use hand to feel the resisting moment of force of the follow-up bracket so as to determine its normal operation.

B. Use the method for measuring the contact resistance value of the reverser and operating switch in the follow-up system. The measuring method is as follows:



**Fig. 3-1 Connection Diagram for Measuring Follow-up Bracket Circuit of Artificial Horizon**

1. Ohmmeter 2. Follow-up Bracket Motor 3. Reverser 4. Operating Switch

(a) Short-circuit (1), (2), (3) and (4) pins of the artificial horizon as shown in Fig. 3-1, connect them to one end of the ohmmeter and connect the other end of the ohmmeter to No. 2 and No. 5 wires of SF-2 motor respectively.

(b) Incline the spherical dial to the left (or right); when the operating switch is turned on and the spherical dial is moving in the "ON" range, the ohmmeter indication should be stable (usually the contact resistance, according to experience, does not exceed 1ohm). Then incline the spherical dial to the other direction for measurement.

(c) Keep the operating switch in "ON" state, turn the spherical dial upward (or downward), as the reverser is being energized, the ohmmeter indication should be stable.

(5) Check the artificial horizon for performance. Connect the tester as shown in Fig. 3-2 and make the tester and artificial horizon level by adjustment. Tap the instrument, the small ball of side-slip indicator should be located in the centre of the two mark lines.

A. Check the time needed by the bimetallic strip relay to open. It should take 40-150 seconds from the turning on of power supply to the beginning of indication of voltmeter connected to (2) and (4) circuits.

B. Check the time needed by the gyro to restore its level for the first time. It should not take more than 1.5min from the turning-on of power supply to the first coincidence of the horizontal line of the spherical dial with the mini-aircraft.

C. Check the time needed by the gyro rotor to reach the rated speed. The time should not exceed 3min from turning on the power supply to the stabilization of the current (0.5-0.6a) in phase (3).

D. Check the normal operating current of each phase. When the A.C. voltage is stabilized at 36v, the current of each phase should not exceed 0.6a.

E. Check the level error. The meridian and horizon should not deviate from the fixed index more than 1°.

F. Check the angle at which the lateral correction stops. Incline the artificial horizon slowly to the left and right about the longitudinal axis respectively, when the voltage between (2) and (4) raises from 2-18v to 33-36v drastically, the inclining angle of the tester bank dial should be within the range of 6-13°.

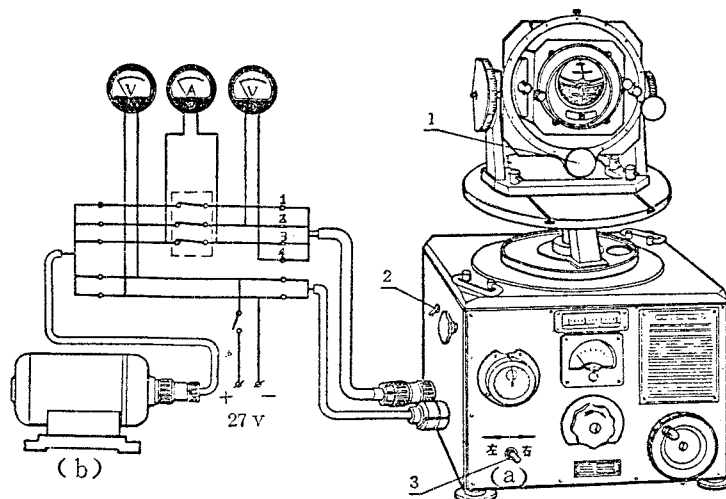


Fig. 3-2 Connection Diagram for Checking Artificial Horizon Performance

(a) Left-Right (b) Convertor

Article 79 Check the tachometer for performance. Connect the tester well as shown in Fig. 3-3. Disconnect zero indicator switch, set the error change-over switch to zero and put the speed change-over switch at the scale of 1000 rpm. Rotate the speed governing lever counterclockwise and adjust the friction disk to the stopping position.

(1) Check the basic error. Energize the tester motor and rotate the speed governing lever clockwise; when the inspected instrument indicates 1000rpm, turn on the zero indicator switch, adjust the error change-over switch to make the zero indicator indicate zero. The scale value indicated by the error change-over switch at this moment is the error of the inspected instrument. Turn off the zero indicator switch after reading.

With the reference of the above-mentioned method, check the error on other scales in turn, the climbing and descending error on other scales should go with the requirements in the following table:

Scale to Be Checked (rpm)	Permissible Error (rpm)
1000, 1500, 2000, 2500	$\pm 35$

The differential value indicated by the two instruments in the front and rear cockpit should not exceed the absolute value of the basic error.

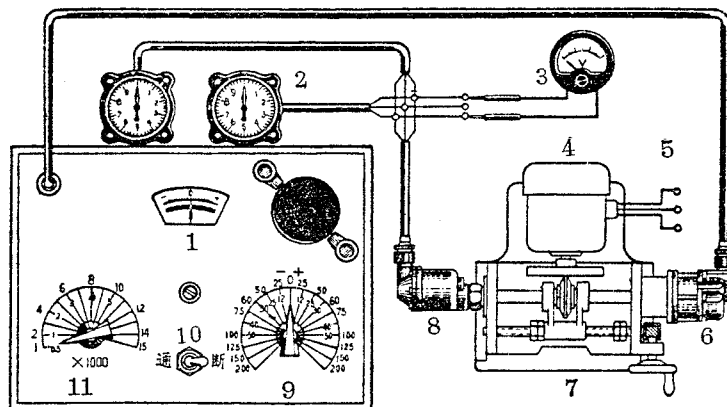


Fig. 3-3 Connection Diagram for Checking Tachometer Performance

1. Zero Indicator 2. Inspected Instrument 3. Voltmeter 4. Motor 5. Power Supply  
6. Typical Transmitter 7. Friction clutch 8. Tachometer Transmitter 9. Error Change-Over Switch 10. ON-OFF 11. Speed Change-Over Switch

(2) Check stagnation error. The value indicated on each scale for climbing and descending should not exceed 70 rpm.

(3) Check the moving system for balance. When the inspected instrument indicates 2000 rpm, incline it to the left and right by 45°, the additional error indicated by the instrument at this moment should not exceed  $\pm 20$  rpm.

(4) Check the pointer for swing magnitude. The swing magnitude of the pointer should not exceed 2 mini-scales (namely 40 rpm.) within the range of 1000-2500 rpm.

(5) Check the pointer for zero position error. As the instrument stops working, the pointer should not deviate from zero position more than three mini-scales (namely 60 rpm). The deviation should not exceed 1 mini-scale (namely 20 rpm.) after tapping the instrument.

NOTE: (a) The basic error can be checked by means of the following method: Make the pointer of zero indicator stabilize at zero point (error change-over switch is at zero) on each inspected scale. While write down the indicating error of the inspected instrument.

(b) The typical instrument of the same series can be used as a calibration reference for the check of the basic error of the instrument. This method holds good for the other instruments.

## 100±10-HOUR PERIODIC INSPECTION

### WORK TO BE DONE ON THE AIRCRAFT

Article 80 Remove turn-and-slip indicator, the whole set of tachometer and convertor, and have them sent to the operating room. After the quality being gained, fit it back to the aircraft.

Article 81 Check the pitot-static system for air tightness.

(1) Check the pitot system.

A. Set the operation selector switch of the tester to "PRESSURE", close the air source cock and equalizer cock, connect the rubber hose to the pitot pressure nipple of air speed indicator and to the pitot hole of pitot tube respectively as shown in Fig. 3-4

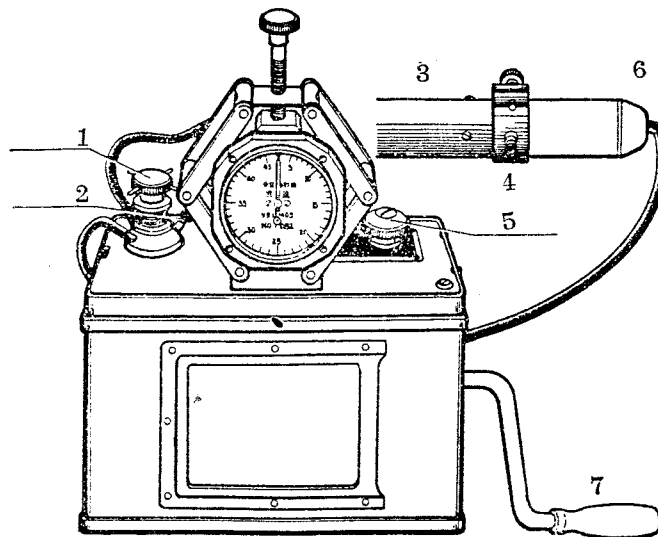


Fig. 3-4 Connection Diagram for Checking Pitot System Air Tightness

1. Air Source Cock 2. Equalizer Cock 3. Pitot-tube 4. Circular Joint 5. Selector Switch 6. Pitot Hole 7. Piston Rod Handle

B. Open the air source cock slowly, as the air speed indicator on the aircraft indicates 300 km/hr, close the air source cock. The indication of the air speed indicator should not drop within one minute.

(2) Check the static system.

A. Set the operation selector switch of the tester to "VACUUM", close the air source cock and equalizer cock, connect the rubber hose to the static pressure nipple of air speed indicator and to the circular joint of the pitot-tube static hole respectively as shown in Fig. 3-4.

B. Open the air source cock slowly, as the air speed indicator on the aircraft indicates 300 km/hr, close the air source cock, after the pointer of the rate-of-climb indicator returns to zero, the indication dropping of air speed indicator should not exceed 15 km/hr within one minute.

NOTE: Attention must be drawn in checking pitot-static system:

(a) Make sure of the conditions of the nipples and cocks before inspection. The rubber hose connection must be reliable and free from twisting, compression and looseness.

(b) Coordination is badly needed if two persons are engaged in the checking, one who is to observe the instruments in the cockpit should count off the indication value of the instruments accurately so that the other one can handle the speed of deaeration and compression, and the occasion of closing the cock.

(c) In checking the static system, the indication of the rate-of-climb indicator should not be more than 7m/second, and, the rubber hose can be removed only when all the pointers of the instruments are returned to zero.

(3) Check all the instruments of the pitot-static system for indication. In the course of checking the air tightness of the system, the instrument indication in the front and rear cockpit should be normal.

Article 82 Check the transmitter of fuel quantity gauge.

(1) Check the inside of the transmitter. The fixing of all components should be reliable, the cables should be free from unsoldering, strand-breaking and short-circuit and, the potentiometer must be clean. Remove the upper cover to check and clean it if necessary.

(2) Check the bulb of the residual fuel warning signal light.

Article 83 Check GHC-2 transmitter.

(1) Mounting bracket should be free from crack and looseness.

(2) Measure the resistance value between the pins.

The resistance value between pins (1) and (2) should be within the range of 6.6-8.4 ohm.

The resistance value among pins (3), (4) and (5) should be within the range of 45-55 ohm.

The transmitter can be swung and swayed lightly during the measurement, but the pointer of the ohmmeter should not swing.

## WORK TO BE DONE IN THE OPERATING ROOM

Article 84 Check the artificial horizon for performance.

(1) Check the gyro chamber for upward and downward balance. Stick 0.76g counter weight (generally the rubber putty can be used) to the circle centre of the brown dial, turn the follow-up bracket to make the shaft of the gyro rotor parallel

with the ground surface, the meridian of the spherical dial should align with the level index of the bank dial, and the horizon passes through the centre hole of the mini-aircraft. Then, vibrate the artificial horizon lightly, at this moment, the meridian and horizon should stay stably at the original position, yet it is allowed to bank not more than 15° to the side where there is a counter weight.

(2) Check the balance ring for upward and downward balance. Place the spherical dial at pitch-up and pitch-down position by 40° respectively, vibrate the artificial horizon lightly, the spherical dial should go back to the range of 20±5°.

(3) Check the gyro for recovery time of upward, downward, leftward and rightward inclination by 20° (See Fig. 3-2).

A. Check the recovery time of upward and downward inclination. When the artificial horizon is put into normal operation, press down and hold the starting button, and make the artificial horizon turn to the right about the longitudinal axis so as to let the gyro enter into precessional motion. As the horizon indicates 22-25° above the mini-aircraft, release the button, then restore the artificial horizon to the level position. When the horizon restores to 20°, depress the stop watch, as the horizon coincides with the mini-aircraft, stop the watch and record down the time.

With the reference of the above-mentioned method, check the gyro for recovery time of downward inclination by 20°.

B. Check the recovery time of leftward and rightward banking. Manipulate the two-way switch 3 to make the disk of the tester turn 90° clockwise, follow the checking method in A to make the spherical dial pitch up by 22-25°. Manipulate the two-way switch reversely to make the disk restore to its original position, incline the artificial horizon rightward by 20° about its longitudinal axis, as the horizon coincides with the mini-aircraft, depress the stop watch. When the horizon recovers to 14-15°, turn the artificial horizon to the left by 8-10° about its longitudinal axis, as the horizon restores to 5°, return the artificial horizon to the level position. Stop the watch until the horizon returns to coincide with the mini-aircraft, record down the time.

With the reference of the above-mentioned method, check the recovery time of left banking by 20°. The recovery time after the gyro being inclined should conform to the requirements in the following table:

Recovery Time of Upward and Downward Inclination by 20°	3.5-7.5 min
Recovery Time of Leftward and Rightward Banking by 20°	2-6 min

C. Neither the pitch angle in the inclination recovery nor the bank angle in the pitching recovery should exceed 3°.

D. The recovery time after the gyro being inclined upward, downward, leftward and rightward should not exceed 2.5 minutes.

NOTE: When the casing of the artificial horizon is opened, the recovery time of upward, downward, leftward and rightward inclination can be checked by means of turning the spherical dial to incline by 20° to the desired direction.

Article 85 Clean and check turn-and-slip indicator.

(1) Clean the commutator and check whether there are scars of scratch and burns on the surface of it.



A. Wiping-up. Wrap up a soft wooden stick with a piece of silk, dip with a little No. 70 aviation gasoline, lean the end of the wooden stick against the commutator through the mounting hole of the carbon brush bracket. Then, turn the rotor with a nonmetal stick till the carbon powder is wiped up.

B. The carbon brush length should not be shorter than 6 mm. In assembly, the brush and the fixing screws of the brush should not be wrongly fitted, and the spring of the brush should not be elongated and deformed.

(2) Wipe the inner wall and piston of the damping cylinder of the buffer clean with silk cloth. Then check the piston for movement in the damping cylinder: block the atmosphere hole and choking hole, put the damping cylinder vertical, the piston should fall to the bottom slowly after it is fitted in.

(3) Check the gyro motor for operation with power-on. Connect the tester as shown in Fig. 3-5. The gyro motor should operate normally after the power supply switch is turned on. When the voltage of the power supply is 27v, the operating current should not exceed 0.13a.

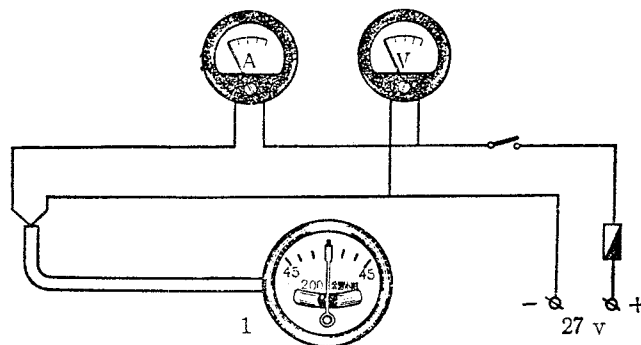


Fig. 3-5 Connection Diagram for Checking Turn-And-Slip Indicator With Power-On

1. Turn-and-Slip Indicator

Aircle 86 Disassemble and check the convertor.

(1) Disassembly. Remove the cover, carbon brush, bearing cap and bonding strip, then take the two bolts out, disassemble the convertor.

Precautions must be taken in disassembly:

A. Mark must be made before removing the carbon brush; in the removal of rear cover and whole process of operation, special attention must be drawn to the connecting cable between the rear cover and the seating, it is forbidden to pull it with force so as to avoid breaking.

B. The armature should not be taken out after disassembly so as to prevent the permanent magnet from being demagnetized. Cover it with soft iron cover if it is necessary to take it out.

C. Don't get mixed up in placing the front and rear bearings (the bearings of Type SBL-125 convertor may not be removed).

(2) Washing, cleaning and checking.

A. The contacting between the carbon brush and commutator should not be less than 75% of the cambered surface.

B. Wash and clean the front and rear covers and the carbon brush bracket, and blow the inner chamber of the convertor clean with compressed air.

C. Check the rolling sound of the bearings after washing, put them in a drying oven to bake with the temperature of 60-80°C. Then smear it with No. 7 precision instrument grease.

D. Check and wipe up the commutator. Scrape away the carbon powder in the grooves of the commutator with soft wooden stick, use fine cloth to dip a little No. 70 aviation gasoline to wipe up the commutator, the surface of the commutator should be free from burns and obvious wearings.

(3) Assembly. Precautions must be taken in assembly:

A. Don't change the front bearing with the rear one, the thick wall part of the ball race should face the armature. The concave of the compression washer should face the bearing. The bearing grease should not be smeared too much.

B. In assembling the fixing cap of the bearings, set the spring right.

C. After the carbon brush being assembled, it should be flexible in upward and downward movement in the holder. Cable insulation of the brush should be satisfactory and free from touching the casing. The spring of the brush should press against the centre of brush and the rotation of armature must be flexible.

(4) Check the convertor for performance.

A. Connect the tester as shown in Fig. 3-6. Turn off the load switch and set the voltage of power supply to 27v.

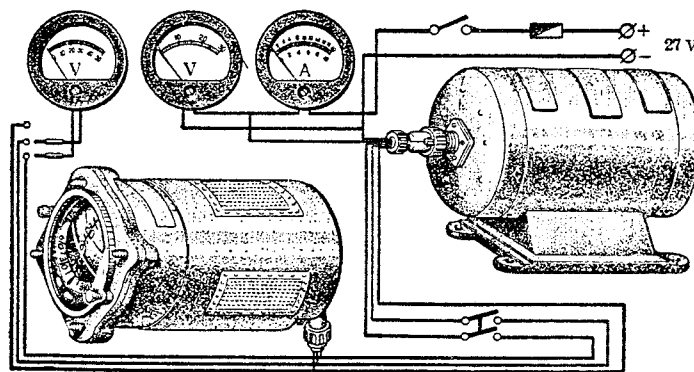


Fig. 3-6 Connection Diagram For Checking Convertor Performance

B. Check zero-load current. Turn on the power supply switch, the zero-load should not exceed 2.2a after the convertor is stabilized in operation (it is not more than 2.4a for Type SBL-53 convertor).

C. Check the operating current and output voltage. Turn on the load switch and power supply switch, the starting current of convertor usually should not be more than 30a (experienced datum). As the artificial horizon is in normal operation, the operating current should not be more than 3.5a (for Type SBL-53 convertor

it is not more than 4.5a). Then measure the output voltage, the value should be within the range of  $36 \pm 4v$  ( $36 \pm 3.6v$  for Type SBL-53 convertor).

D. Check the sparking. The spark at the joining surfaces between the brush and commutator should not exceed  $1\frac{1}{2}$  grade. (See Appendix IX).

NOTE: The above-mentioned method can be taken as a reference for the inspection of Type SBL-125, the operating current should not be more than 8a and the output voltage should be within the range of  $36 \begin{matrix} + 7.3v. \\ - 2.1v. \end{matrix}$ .

Article 87 Clean and check the flexible shaft of tachometer.

(1) The wearing of the outer layer steel wire of shaft core should not exceed  $\frac{1}{2}$  of the diameter of a single strand. The steel wire of the inner layer should be free from wire-breaking and both ends of the core should be soldered reliably.

(2) Smear the flexible shaft with No. 2 low temperature lubricating grease after washing and cleaning. The shaft core should rotate flexibly after assembly.

## 200±10-HOUR PERIODIC INSPECTION

### WORK TO BE DONE ON THE AIRCRAFT

Article 88 Remove altimeter, air speed indicator, rate-of-climb indicator, whole set of gyro magnetic compass (exclusive of terminal box), whole set of three-purpose gauge (exclusive of oil temperature gauge transmitter), inlet temperature gauge (exclusive of transmitter), manifold pressure gauge, compressed air pressure gauge, cylinder head temperature gauge and whole set of fuel quantity gauge, and have them sent and checked in the operating room. After the quality being gained, fit them back to the aircraft.

NOTE: After removal of the instruments, wrap up all the plugs and pipes and check whether the mark on the rubber hose of pitot-static pressure is clear or not.

Article 89 Blow the pitot-static system clean. Pull out the rubber hoses from the instruments and their accessories, blow every hose of the pitot-static system clean from the cockpit to outside by means of compressed air of  $1.5-2 \text{ kg/cm}^2$ . Remove the precipitation trough and clean the dust inside if necessary.

Article 90 Survey the terminal box of gyro magnetic compass. The fixing of wiring should be reliable and the bakelite seat free from crack.

Article 91 Check thermocouples. The root of thermocouples should be free from damage and lead wires free from unsoldering. Wash and clean the bronze ring if necessary.

Article 92 Replace the error correction cards of altimeter and air speed indicator.

Article 93 Check the engine instruments for operation by means of engine running.

(1) The instrument pointers should be free from friction and fluctuation.

(2) When the engine is in normal operation, the indicating range of engine instruments should conform to the requirements in the following table:

Classification	Rated Regime	Take-off Regime	Idling
R.P.M.	2250±1%	2350±1%	500±50
Oil Pressure (kg/cm <sup>2</sup> )	4-7	4-7	Not Less Than 1.5
Gasoline Pressure (kg/cm <sup>2</sup> )	0.2-0.5	0.2-0.5	Not Less Than 0.15
Oil Temperature (°C)	30-75	Not More Than 75	
Cylinder Head Temperature (°C)	Not More Than 230	Not More Than 230	
Manifold Pressure (Mercury Column mm)	P <sub>0</sub> +80±10	P <sub>0</sub> +80±10	

NOTE: (a) The data in the table are an indicating range of the engine instruments of Type-6A piston aeroengine in engine running.

(b) The speed for Type-6 piston aeroengine running in rated regime is 2050±1%rpm, manifold pressure is P<sub>0</sub>+30±10mm in mercury column, the manifold pressure for take-off regime is P<sub>0</sub>+35±10mm in mercury column, the rest data are just the same as that in the above table.

(c) P<sub>0</sub> represents the present field pressure.

(3) The swing magnitude of the pointers of engine instruments and the differential value indicated by the two instruments in the front and rear cockpit should not be beyond the requirements in the following table:

Instruments	Swing Magnitude of Instrument Pointers	Differential Value Indicated by the Two Instruments in Front and Rear Cockpit
Tachometer	2 Mini-scales	35rpm
Oil Pressure Gauge	1 Mini-scale	0.6kg/cm <sup>2</sup>
Gasoline Pressure Gauge	1 Mini-scale	0.04 kg/cm <sup>2</sup>
Oil Temperature Gauge	2mm Scale Camber	4° C
Cylinder Head Temperature Gauge	2mm Scale Camber	30° C
Inlet Temperature Gauge	2mm Scale Camber	3° C
Manifold Pressure Gauge	2mm Scale Camber	10mm Mercury Column

## WORK TO BE DONE IN THE OPERATION ROOM

Article 94 Check the altimeter for performance. Zero the pointer of the altimeter and set the pressure scale to the present atmosphere pressure before inspection.

(1) Check the instrument case for air tightness. Connect the altimeter to the vacuum air source. Then evacuate the air till the altimeter indicates 6000m, close the air source cock, the indicating dropping of the altimeter should not exceed 100m within one minute.

(2) Check the basic error.

A. By means of a mercury barometer.

a. Set the pressure scale of the inspected instrument to 760, the pointer at this moment should indicate the theoretical height corresponding to the present atmosphere pressure.

b. Connect the altimeter, mercury barometer and vacuum air source. Then evacuate the air till the mercury barometer indicates 500m, close the air source, record down the error of the inspected instrument. By following the above-counted method, check the basic error on other scales in turn, the climbing and descending error on each scale should meet the requirements in the following table.

Inspected Scales (m)	Permissible Error (m)
500	+30 -40
1000	+30 -50
2000	±50
3000, 4000	±60
5000, 6000	±90

The differential value indicated by the two instruments in the front and rear cockpit should not exceed the absolute value of the basic error.

B. By means of an opening single-column mercury barometer.

a. Set the pressure scale of the inspected instrument to 760, the pointer at this moment should indicate the theoretical height corresponding to the present atmosphere pressure.

b. Connect the altimeter, mercury barometer and vacuum air source.

c. Look up the relative pressure equal to the theoretical height of 500m in Appendix XII according to the present atmosphere temperature, make pressure correction of this value.

The relative pressure after correction = the relative pressure prior to correction + (present atmosphere pressure - 760).

d. Open the air source slowly, as the indication of the mercury barometer corresponds to the value calculated above, record down the error of the inspected instrument.

Check the indicating error on other scales by following the method mentioned above.

(3) Check homogeneity of indication. The fluctuation magnitude of the instrument pointers: not more than 30m for the long one and not more than 50m for the short one.

Calculate the mean value of climbing and descending error on each inspected scale, fill the error correction card.

Article 95 Check the air speed indicator for performance.

(1) The error for the pointer to deviate from zero should not exceed 2mm scale camber.

(2) Check the indicator case for air tightness. Connect the nipple of static pressure to the vacuum air source. Then evacuate the air till the air speed indicator indicates 400 km/hr, close the air source, the indicating dropping of the air speed indicator should not exceed 15 km/hr within one minute.

(3) Check the bellow for air tightness. Connect the nipple of pitot pressure to the compressed air source. Then compress the air till the air speed indicator indicates 400 km/hr, close the air source cock, the indication of the air speed indicator should not drop within one minute.

(4) Check the basic error. Connect air speed indicator, water column pressure gauge and the compressed air source. Open the air source cock slowly to make indication of water column pressure gauge equal to 50km/hr, close the air source cock and record down the indication error of the inspected instrument.

By following the method mentioned above, check the basic error on other scale in turn, the error of climbing and descending on each scale should meet the requirements in the following table:

Inspected Scales (km/hr)	Permissible Error (km/hr)
50, 100, 150, 200, 250, 300, 400	$\pm 6$

The differential value indicated by the two instruments in the front and rear cockpit should not exceed the absolute value of the basic error.

(5) Check homogeneity of indication. The swing magnitude of the instrument pointer should not exceed 1mm scale camber.

Calculate the mean value of the basic error of climbing and descending on each scale and fill the error correction card.

Article 96 Check the rate-of-climb indicator for performance. Zero the indicator prior to inspection.

(1) Check the instrument case for air tightness. Connect the rate-of-climb indicator, water column pressure gauge and vacuum air source. Open the air source cock slowly to make the water column pressure gauge indicate 700 mm, close the air source cock, the water column dropping should not exceed 3mm within one minute.

(2) Check the basic error.

A. Connect the test set well as shown in Fig. 3-7, adjust the inclining alcohol pressure gauge to the fixing point of 12° of the arc support. Then regulate the graduated ruler and make the liquid surface align with zero of the inspected scale.

B. Open the air source cock slowly to make the alcohol liquid surface keeping on the scale of climbing with 1 m/sec, record down the indicating error of the inspected instrument. Check the indicating error of the other climbing scales in turn. Then close the air source cock.

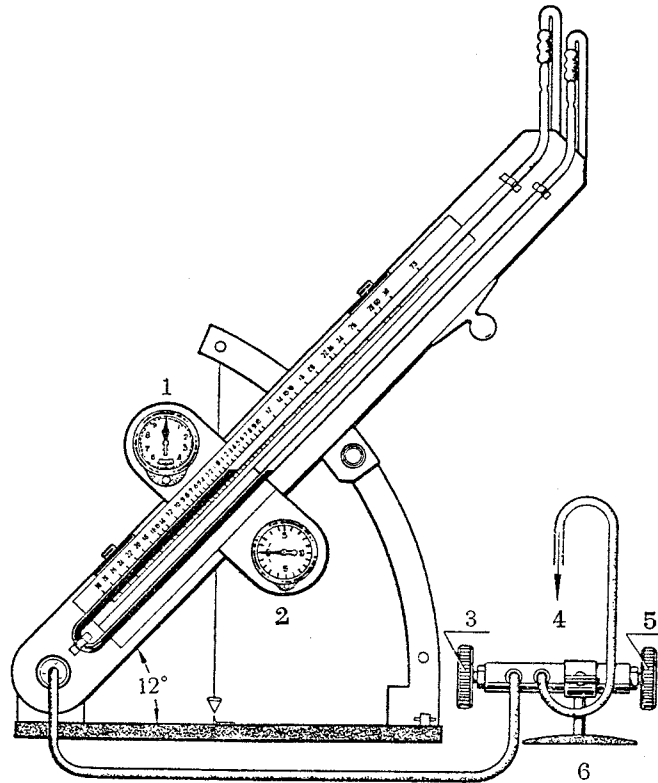


Fig. 3-7 Connection Diagram for Checking Rate-of-Climb Indicator Performance

1. Altimeter 2. Inspected Instrument 3. Air Evacuation 4. Vacuum 5. Air Deflation 6. Controlling Cock

C. Open the equalizer cock to deflate the air slowly, check the indicating error of descending scales of the instrument by following the method mentioned above.

The error of the inspected scale should meet the requirements in the following table:

Inspected Scales (m/sec)	Permissible Error (m/sec)
1, 3, 5, 9	±1

(3) Check homogeneity of indication. The fluctuation magnitude of the instrument pointer should not exceed 0.25 m/sec.

Article 97 Check the manifold pressure gauge for performance. Set the pointer to the present atmosphere pressure prior to inspection.

(1) Check the instrument case for air tightness. Connect the manifold pressure gauge, mercury barometer and the compressed air source. Then compress the air till the mercury barometer indicates 1000 mm, close the air source cock, the mercury column dropping should not exceed 10 mm within one minute.

(2) Check the basic error.

A. Connect the manifold pressure gauge, mercury barometer and vacuum air source. Then evacuate the air till the mercury barometer indicates 700 mm, close the air source cock, record down the indicating error of the inspected instrument. By following the method said above, check the indicating error on the scales of 600, 500 and 400 in turn. Then open the equalizer cock slowly, check the indicating error on each scale for the reverse direction.

B. Connect the manifold pressure gauge, mercury barometer and the compressed air source. Check the indicating error on the scales of 800, 900 and 1000 with the reference of the above method.

The error of each inspected scale should meet the requirements in the following table:

Inspected Scales (mm of Mercury Column)	Permissible Error (mm of Mercury Column)
400, 500, 600, 700	$\pm 20$
800, 900, 1000	$\pm 10$

The differential value indicated by the two instruments in the front and rear cockpit should not exceed the absolute value of the basic error.

(3) Check homogeneity of indication. The fluctuation magnitude of the instrument pointer should not exceed 1 mm scale camber.

Article 98 Check the turn-and-slip indicator for performance. Connect the test set as shown in Fig. 3-8, turn the change-over switch 2 to "MANUAL OVERRIDE", turn on the power supply switch.

(1) Check the error of the pointer deviating from zero. After tapping the instrument case, the pointer deviation from the zero position should not be more than  $\pm 1.5^\circ$ .

(2) Check the moving system for balance. As the instrument is in normal operation, bank the instrument to the left and right by  $90^\circ$  respectively, the additional indicated error should not be more than  $\pm 1^\circ$ .

(3) Check sensitivity.

A. Fix the perspex dial to the face of the turn-and-slip indicator as shown in Fig. 3-9, make the "O" point and zero index line of the dial align with the centre of the pointer axis of the indicator and the centre line of zero index respectively.

B. Manipulate the two-way switch 3, as the horizontal disk is rotating, adjust the voltage to 27v, then rotate the speed governor wheel to adjust the angular speed to 4°/sec. Then turn the two-way switch 3 to the left and right respectively,



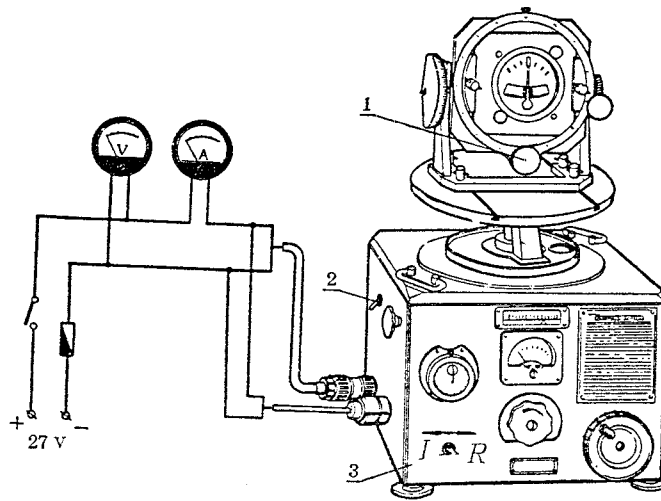


Fig. 3-8 Connection Diagram for Checking Turn-And-Slip Indicator Performance

at this moment, the value of leftward and rightward indication of the pointer of the turn-and-slip indicator should not be less than  $10^\circ$

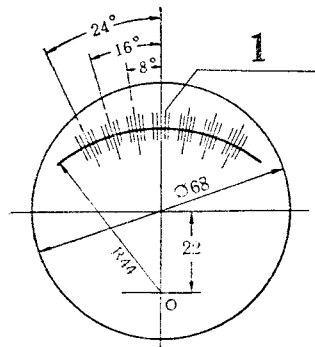


Fig. 3-9 Dial for Checking Turn-And-Slip Indicator

1. Every Mini-scale Represents  $2^\circ$  of the Indicating Value of the Pointer.

Article 99 Check the convertor.

(1) Open the base plate to check the components and cables for connection and fixation.

(2) Measure the carbon brush length. The maximum length on the two sides should not be shorter than 10 mm.

Measure the spring pressure of the carbon brush if necessary, the value should be within the range of  $225 \pm 25$ g.

NOTE: The above method and content can be taken as a reference for the check of Type SBL-125 convertor. The carbon brush length should not be shorter than 12mm and the spring pressure should be within the range of 120-160g.

Article 100 Check the tachometer transmitter for the condition and output voltage.

(1) Exterior should be intact, rotate the transmission part with hand, the rotation of rotor should be flexible and judge the bearing is good or not according to the rotation sound.

(2) Measure the output voltage. (This check can be carried out in the inspection of tachometer indicator for performance). The output voltage should meet the requirements in the following table:

Type	Loading (Indicator)	R.P.M.	Voltage (v)	Voltage Difference Among Cables (v)
GZ-9	Two ZZ35	3000	Not Lower Than 27	Not More Than 0.5

Article 101 Check the inlet temperature gauge and oil temperature gauge for performance. Connect the test set well as shown in Fig. 3-10. Put the "GROUP CHANGE-OVER SWITCH" to "RESISTANCE THERMOMETER," and "MEASUREMENT CHANGE-OVER SWITCH" to "RESISTANCE INDICATOR", turn on the power supply switch. Use the "VOLTAGE ADJUSTMENT KNOB" (the upper knob) to adjust the voltage to 27v.

(1) Check the basic error. Rotate the "RESISTANCE TYPICAL TRANSMITTER KNOB" (lower knob) gently to make the inspected instrument indicate the scale to be inspected, observe the indication of the typical indicator and record down the indicating error.

Check the error on other scales in turn by following the method said above. The error on the inspected scales should meet the requirements in the following table:

Instruments	Inspected Scales (°C)	Permissible Error (°C)
Oil Temperature Gauge	30, 50, 100	±4
	0, 150	±8
Inlet Temperature Gauge	-20, 0, 30, 50, 100	±3
	-50, 150	±6

The differential value indicated by the oil temperature gauges in the front and rear cockpit should not exceed the absolute value of the basic error.

(2) Check stagnation error. The differential value of the climbing and descending indication on each scale should not exceed the absolute value of the basic error.

(3) Check homogeneity of indication. In checking the basic error, rotate the "RESISTANCE TYPICAL TRANSMITTER KNOB" (lower knob) uniformly, the swing magnitude of the oil temperature gauge pointer should not exceed 1 mm scale camber, the inlet temperature gauge should be free from fluctuation.

(4) Check the moving system for balance. In checking the basic error, incline the instrument to the left and right by 90° respectively on any scale, the additional indicated error should not exceed the basic error on the appropriate scale.

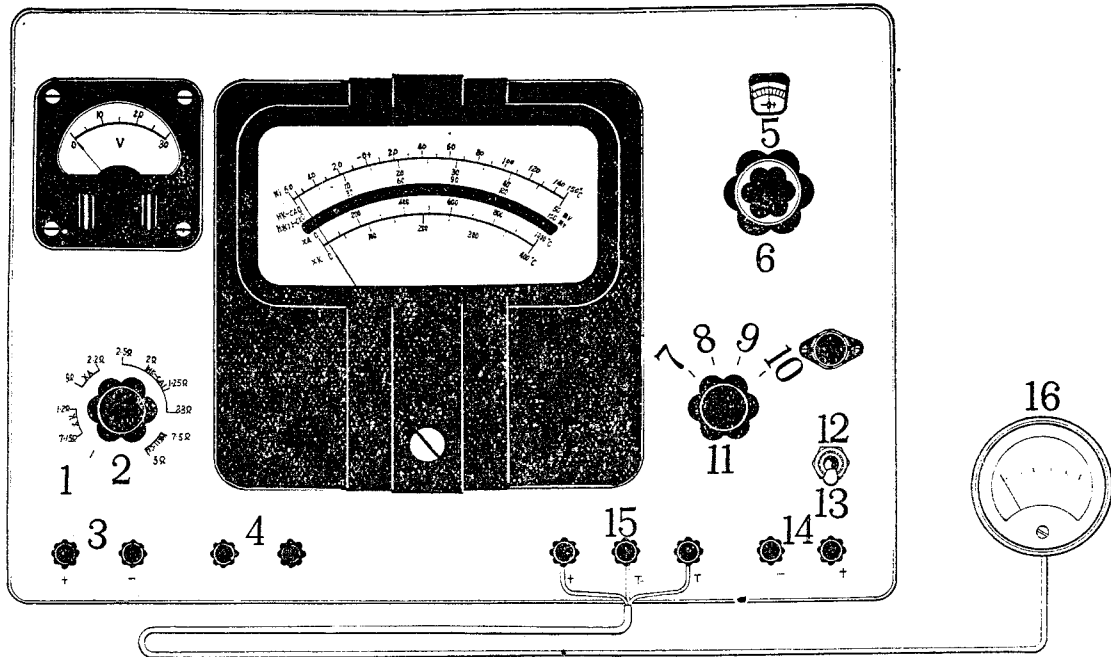


Fig. 3-10 Connection Diagram for Checking Inlet Temperature Gauge Performance

1. Resistance Thermometer
2. Group Change-Over
3. Thermocouples Indicator
4. Resistance Transmitter
5. Resistance Typical Transmitter
6. Voltage Adjustment
7. Locking
8. Resistance Indicator
9. Resistance Transmitter
10. Thermocouples Indicator
11. Measurement Change-Over
12. ON
13. OFF
14. Power Supply
15. Resistance Indicator
16. Inlet Temperature Gauge

Article 102 Check the cylinder head temperature gauge for performance.

(1) Check the basic error.

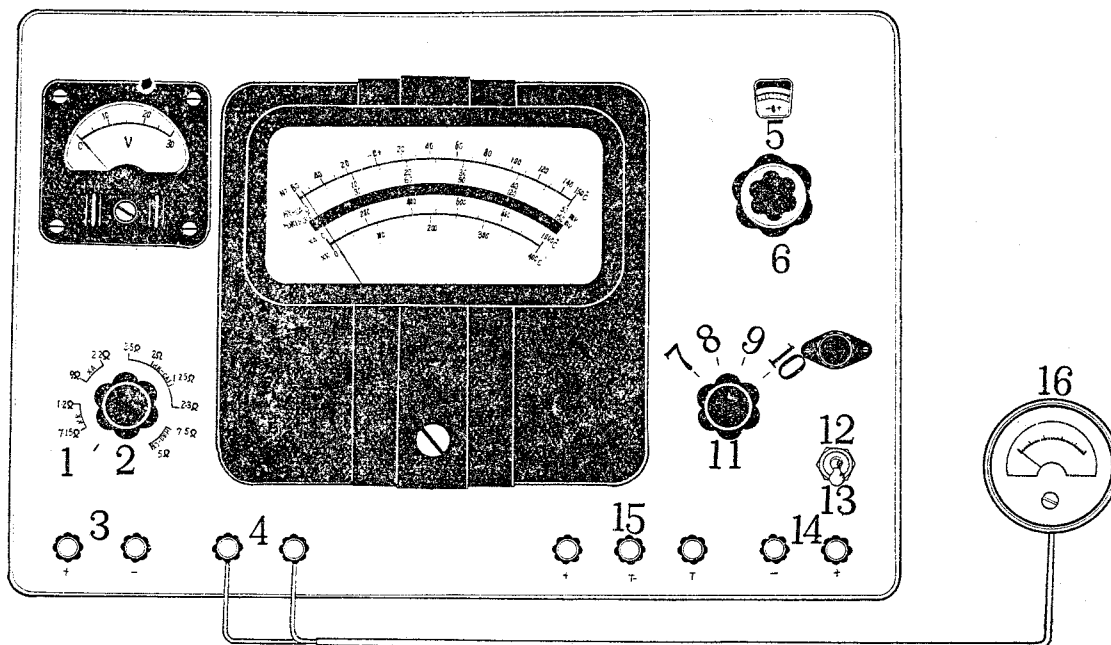
A. Connect the test set well as shown in Fig. 3-11. Adjust the pointer of the cylinder head temperature gauge to make it indicate the present atmosphere temperature, and set all the knobs on the test set at the following positions:

Nomenclature	Position
Typical Indicator Dial	The Pointer Aligning with Present Atmosphere Temperature
Measurement Change-Over Knob	Thermocouples Indicator
Group Change-Over Knob	XK 7.15ohm
Voltage Adjustment Knob (Upper One)	Rotating to the Bottom Counter-Clockwise

B. Turn on the power supply switch, adjust the voltage adjustment knob to make the typical indicator read 100° C, record down the indicating error of the

inspected instrument. Check the basic error on other scales in turn by following the above method, the climbing and descending error on each scale should meet the requirements in the following table:

Inspected Scales (°C)	Permissible Error (°C)
100, 140, 200, 240	±10



**Fig. 3-11 Connection Diagram for Checking Cylinder Head Temperature Gauge Performance**

1. Resistance Thermometer
2. Group Change-Over
3. Thermocouples Indicator
4. Resistance Transmitter
5. Resistance Typical Transmitter
6. Voltage Adjustment
7. Locking
8. Resistance Indicator
9. Resistance Transmitter
10. Thermocouples Indicator
11. Measurement Change-Over
12. ON
13. OFF
14. Power Supply
15. Resistance Indicator
16. Cylinder Head Temperature Gauge

The differential value indicated by the two instruments in the front and rear cockpit should not exceed twice as much the absolute value of the basic error.

(2) Check stagnation error. The differential value of climbing and descending indication on each inspected scale should not exceed 20° C.

(3) Check the moving system for balance. Checking the basic error, simultaneously incline the instrument to the left and right by 15° respectively, the additional indicated error of the instrument at this moment should not exceed the basic error.

(4) Check homogeneity of indication. The instrument should be free from fluctuation and stiction in the course of indication.

Article 103 Check the gasoline pressure gauge and oil pressure gauge.

(1) Check the transmitter. The internal cables should be free from unsoldering, wire-breaking and short-circuit. The fixing of the components should be reliable. Clean the potentiometer.

(2) Check the gasoline pressure gauge and oil pressure gauge for performance. Connect the pressure gauge transmitter and typical pressure gauge to the hand pressure gauge, and connect the three-purpose gauge indicator and power supply well.

A. Check the basic error. Switch on the power supply and adjust the voltage to 27v. Then rotate the piston rod handle clockwise to make the typical pressure gauge indicate on each inspected scale, compare the indicating values of the inspected instrument and record down the indicating error.

The climbing and descending error on each scale should meet the requirements in the following table:

Instruments	Inspected Scales (kg/cm <sup>2</sup> )	Permissible Error (kg/cm <sup>2</sup> )
Gasoline Pressure Gauge	0, 0.2, 0.4, 0.6	±0.04
	0.8, 1	±0.08
Oil Pressure Gauge	2, 4, 8	±0.6
	0, 15	±1

The differential value indicated by the two instruments in the front and rear cockpit should not exceed the absolute value of the basic error.

B. Check stagnation error. The differential value of the climbing and descending indication on each inspected scale should not exceed the absolute value of the basic error.

(3) Check the transmitter of gasoline pressure gauge for air tightness.

A. Oil pressure system. In checking the basic error, the indication of the pressure gauge would not be allowed to drop after holding on the maximum scale for one minute.

B. Static system. Connect the transmitter, static pressure nipple of air speed indicator to the vacuum air source. Then evacuate the air till the air speed indicator reads 450 km/hr, close the air source cock, the indication dropping of the air speed indicator should not exceed 15 km/hr within one minute (The inspection can be omitted if the transmitter is separate in connection with the static system of the aircraft).

Article 104 Check the compressed-air pressure gauge for performance. Fit the instrument to the weights piezometer as shown in Fig. 3-12, open the needle valve of oil-storing cup, rotate the piston rod handle to the extreme end counter-clockwise, then close the needle valve and open the oil passage valve.

(1) Check the basic error. Place the weights corresponding to the inspected scale on the top disk, rotate the piston rod handle clockwise, as the top disk is raised to the extent that it can be just turned, record down the indicating error of the inspected instrument.

Check the error on other scales by following the method mentioned above. The error on each inspected scale should meet the requirements in the following table

Inspected Scales (kg/cm <sup>2</sup> )	Permissible Error (kg/cm <sup>2</sup> )
20, 40, 50, 60	±3.2

(2) Check homogeneity of indication. In checking the basic error, change the pressure uniformly, the swing magnitude of the instrument pointer should not exceed 0.8 kg/cm<sup>2</sup>.

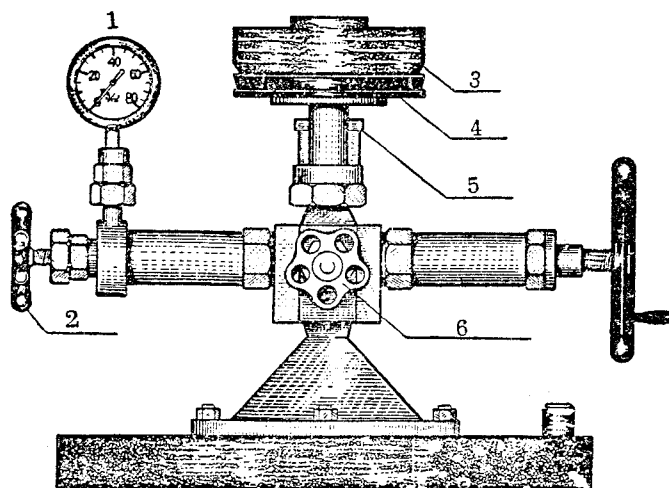


Fig. 3-12 Scheme for Checking Compressed-Air Pressure Gauge Performance

1. Inspected Instrument 2. Oil Passage Valve 3. Weights 4. Weight Disk  
5. Oil-Storing Cup 6. Needle Valve of Oil-Storing Cup

Article 105 Check LTC-1 gyro magnetic compass for performance. Make a reference with Fig. 3-13 and carry out the check according to the items and requirements listed in the inspection form on the instrument. If the performance datum is out of keeping with the requirement in this article, this article should be taken as the standard one.

(1) Check the gyro body.

A. The performance can be checked only when the gyro has been put into operation for three minutes.

B. The gyro precession can be checked only after 4-5 minutes and the precession should be calculated according to the indicating variation of the typical indicator.

C. The checking of synchronizing speed should be done only after 2-3 minutes and the synchronizing speed can be calculated according to the indicating variation of the typical indicator.

D. The quick synchronizing speed can be calculated in accordance with the time that the typical indicator pointer needs to rotate 360°.

(2) Check the amplifier.

A. Prior to the inspection of amplifier performance, check the fixation of the external components, the cables should be free from unsoldering, wire-breaking and short-circuit.

B. The synchronizing speed can be checked only after 2-3 minutes and it could be calculated according to the indicating variation of the typical indicator. The synchronizing speed difference in clockwise and counter-clockwise direction should not exceed 2°/min.

(3) Check the transmitter.

A. In checking the basic error, compare and check it with the typical indicator once every 30°, and the basic error should not exceed 1°.

B. Attract the compass card to rotate with the angular speed of one circle in every minute clockwise and counter-clockwise respectively for the inspection of push contact reliability.

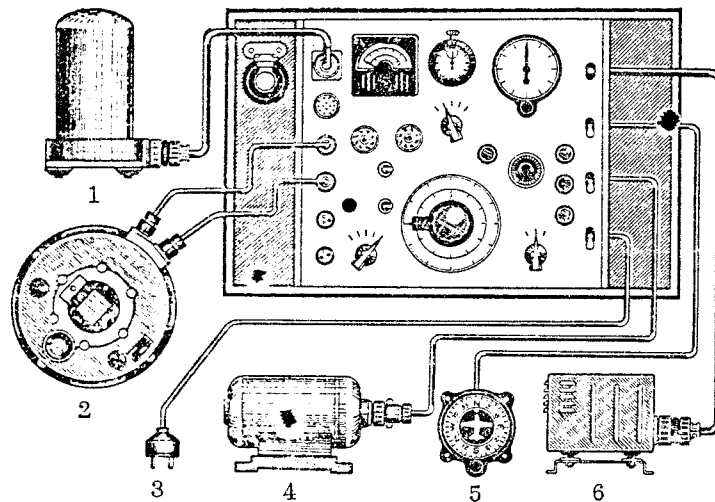


Fig. 3-13 Connection Diagram for Checking LTC-1 Gyro Magnetic Compass Performance

1. Gyro Body 2. Transmitter 3. Power Supply 4. Convertor  
5. Indicator 6. Amplifier

A. Compare and check it with the typical transmitter once every 30° (the scale outer circle) in the inspection of the basic error. The error should not exceed 1.25° and it is allowed not to exceed  $\pm 1.75^\circ$  on any two scales.

B. Rotate the typical transmitter one circle clockwise and counter-clockwise respectively in checking stagnation error, check and compare the differential value indication of the inspected indicator on the identical scale.

C. Adjust the pointer of the indicator to the vertical position first in checking the moving system for balance and record down the indicating value. Then incline the indicator to the left and right by 45° respectively, the pointer deviation should not exceed the basic error.

(5) Check the whole set of compass for performance.

A. The performance can be checked only when the power supply has been switched on for three minutes.

B. Check and compare once every 30° in checking alignment error. And the error should not exceed  $\pm 2^\circ$ .

C. The indicating homogeneity of the indicator should also be determined simultaneously with the inspection of alignment error. The fluctuation should not exceed  $2^\circ$  if there is.

D. Press down the synchronizing button, as the indicator has been synchronized, the swing magnitude of the mini-aircraft should not exceed  $\pm 1^\circ$ .

NOTE: (a) The above mentioned methods and requirements can be taken as a reference for inspecting the performance of LTC-2 gyro magnetic compass.

(b) Generally, it is only allowed to check LTC-2 gyro magnetic compass amplifier and the whole set of compass for performance. The performance of accessories should also be checked in conformity with the above requirements if doubts arise.

Article 106 Check the fuel quantity gauge.

(1) Open the upper cover of the transmitter to carry out checking and cleaning.

(2) Check the whole set for the basic error.

A. Fit the transmitter to the fixing frame and connect the cables as shown in Fig. 3-14. And adjust the pointer on the lever of the tester perpendicular to the dial, turn switch  $\Pi_2$  to "TRANSMITTER" and switch  $\Pi_8$  to "2" position. Then, turn on the power supply switch  $\Pi_1$ , adjust the voltage to 27v.

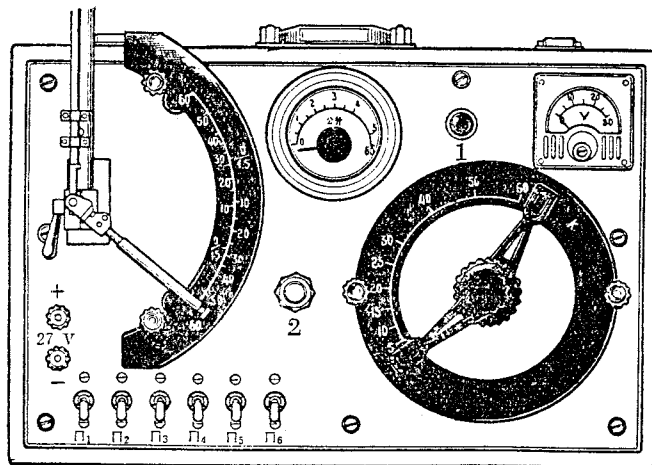


Fig. 3-14 Panel of Fuel Quantity Gauge Tester

1. Signal light 2. Voltage Adjustment

B. Move the lever along the typical dial to make the pointer align with the maximum scale, record down the indicating error of the inspected instrument. Then, check the error on other scales by following the method mentioned above. The error should meet the requirements in the following table:

Inspected Scales (litre)	Permissible Error (litre)
0	$\pm 1.5$
60, 50, 30, 10	$\pm 3$



(3) Check the error of the residual fuel signal device. In checking the basic error, at the moment when the signal light is lit, the typical scale indicated by the pointer should be within the range of 10-12 lit.

## **SECTION 2 PERIODIC INSPECTION OF ELECTRICAL EQUIPMENTS**

### **50±5-HOUR PERIODIC INSPECTION**

Article 107 Check the generator.

(1) The fixing of wiring should be reliable and the bakelite terminal board free from crack.

(2) The commutator should be free from obvious damage and its surface clean. Wipe it up if necessary.

(3) The connecting wire of carbon brush should be free from short-circuit and the brush spring in a good compressed position.

Article 108 Check the landing light.

(1) The bulb should not be blackened and the filament not be seriously loose.

(2) The reflecting mirror and perspex cover should be free from obvious damage. Remove the perspex cover and mop it with chamois or flannel if necessary.

Article 109 Check the wiring of regulating box and filter. The cable connecting to the terminals should be reliable, the bakelite terminal board should be free from crack and the insulated sleeve free from damage.

Article 110 Check the signal light bulbs in the cockpit. Follow the check contents described in (6), Article 49.

Article 111 Check the fuse on the relay box of power supply. The copper cap should be free from looseness and the fusing wire free from obvious spot and deformation.

Article 112 Check the distribution board. The fixing of all switches and wiring should be reliable and the inside clean.

### **100±10-HOUR PERIODIC INSPECTION**

#### **WORK TO BE DONE ON THE AIRCRAFT**

Article 113 Remove the starting ignition coil and have it sent and checked in the operating room. After the quality being gained, fit it back to the aircraft.

Article 114 Check the relay box of power supply. The fixing of inner components should be reliable and bakelite parts free from crack and cables must be free from wire-breaking and short-circuit.

Article 115 Disassemble and check the starting button. The button base should be free from damage, wipe the contact point of button and button base clean. The elastic force of contact segment should be adjusted if necessary.

Article 116 Check the starting ignition coil for operation.

(1) Close the valve of the main compressed-air system and deflate all the compressed air in the compressed-air system passage. Make sure that the air has really been deflated.

(2) Pull out the high-tension wire of the starting ignition coil and connect the spark plug of the starting ignition coil.

(3) Make sure that the magneto switches in front and rear cockpit are really at "O" position.

(4) Give out the order "CLEAR THE PROPELLERS!". After hearing "CLEARED!" turn on the battery switch and starting switch, press down the starting button, the plug sparks should be satisfactory, at the same time, observe V-Ameter, the indication of current should not be greater than 5a, and the starting solenoid valve and starting ignition coil should operate simultaneously. Test it twice or three times, the operation should be normal. Turn off the switches, remove the plugs and connect the high-tension wire.

**CAUTION:** It is not allowed to carry out this operation on the aircraft that the engine has been preserved.

#### WORK TO BE DONE IN THE OPERATING ROOM

Article 117 Check the starting ignition coil.

(1) Open the upper cover to carry out the inspection. Clean the contact point of high-tension plug and contact breaker; it is not necessary to carry out polishing if there are some uniform spots on the contact point; if the contact point has been burnt seriously (burnt area up to 70%), grind it with smooth file, then polish it with "000" emery paper; afterwards, use silk cloth to dip with No. 70 aviation gasoline (alcohol) to clean it and, finally blow it clean with compressed air. Check that the bitumen should not spill out.

(2) Check performance.

Connect the tester well as shown in Fig. 3-15. Turn on the power supply switch and adjust the voltage of power supply to 24v.

A. Check the primary coil for operating current. When the distance between the main poles of three-pole discharger is 5 mm, the operating current should be within the range of 1.5-2a.

B. Check the secondary coil for spark strength. In checking the primary coil for operating current, the discharging sparks should form an uninterrupted spark beam. The sparks between the contact points should not burst out.

C. Check the secondary coil for insulation strength. When the distance between the main poles of the three-pole discharger is 9.5 mm, check it with power-on for about 10 seconds, the spark beam between the main poles is allowed to have instantaneous interruption. There should be no breakdown spark between the bakelite case and metal case, but corona phenomenon is allowed.

D. Measure the clearance between the armature and iron core which should be 0.8-1.2mm (try to adjust it to 1mm).

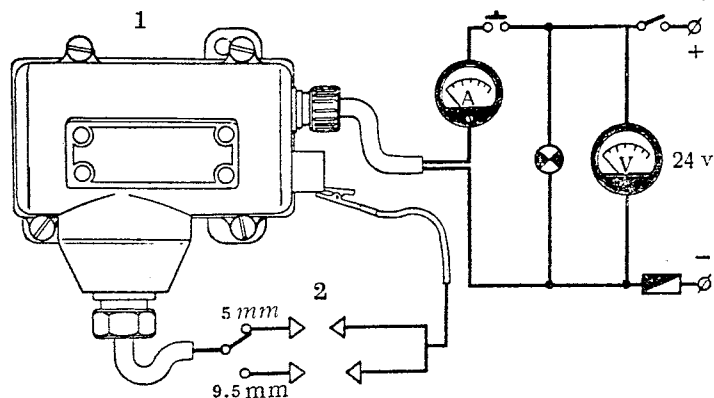


Fig. 3-15 Connection Diagram for Checking Starting Ignition Coil Performance

1. Starting Ignition Coil 2. Discharger

NOTE:

- (a) It is prohibited to adjust the power supply voltage by means of series resistors.
- (b) The test should be done with the alternation of one minute operation and one minute interruption.
- (c) After the quality has been gained through testing, it is not allowed to turn the contact points.
- (d) It is forbidden to bend the armature sheet in inspection and adjustment. If the clearance between the contact points wants adjusting, it should be done by means of increasing or decreasing the spacers under the armature.

## 200±10-HOUR PERIODIC INSPECTION

### WORK TO BE DONE ON THE AIRCRAFT

Article 118 Remove the generator, the regulating box, the power supply relay box and V-Ameter, and have them sent and inspected in the operating room. After the quality has been gained, fit them back to the aircraft.

**CAUTION:** It is not allowed to prop off the propellers in the removal and fitting of the generator.

NOTE: When the generator and regulating box have been removed, check whether the marks on the cables are clear or not (“+” — red, “—” — blue and “B” white). It should be repainted if necessary.

Article 119 Check the landing gear microswitch. After the landing gear has been fitted well, adjust the transmission pressing rod of the microswitch from open to close position, then screw the pressing rod out by 1.5-2 turns (experienced datum), tighten the security nut and paint the mark. Check the microswitch for operation in combination with landing gear retraction and extension.

Article 120 Disassemble and check the exterior signal light of landing gear and navigation light. The bulb should not be blackened or whitened, the filament

not be too loose and the joint between the lamp holder and glass should be secure. The connection of lamp holder cables should be reliable and it should be free from wire-breaking and short-circuit.

Article 121 Disassemble and check the cockpit light. The fixing and cable connection of the rheostat should be reliable. The check of the bulb should follow the check contents in item (6), Article 49.

Article 122 Measure the insulating resistance of the positive pole circuit of power supply system (this act should be done after removing the generator, the regulating box and the power supply relay box). Turn on the generator switch, measure the insulating resistance between "+" of ground power supply, "+" of battery, "+" of generator, "B" and the airframe respectively by means of using megohmmeter, the value should not be less than 2 megohm.

Article 123 Check the power supply system for operation with engine running.

(1) Check the generator for voltage at initial power supply. The generator failure signal light should be off at 1040-1200 rpm, at this moment, the V-Ameter should indicate the charging current to the battery (reverse indication). Press the button of V-Ameter, the voltage of generator should be within the range of  $25.5 \pm 1v$ .

(2) Check the regulating box for regulating range. Turn on the radio compass switch as the engine is at 1600 rpm, the generator failure signal light at this moment should not flash, the voltage of generator should be within the range of  $27.5 \pm 1v$ .

When the engine is at 2350 rpm, the voltage of generator should not be greater than 28.5v.

(3) Check the reverse-current value (using the aircraft battery). When the engine is at 1200 rpm, retard the throttle slowly, observe the difference of current value at the moment when the V-Ameter pointer starts returning and after it has returned back, i.e. reverse-current value, which should be within the range of 4-15a.

**CAUTION:** Turn off the battery switch immediately if the reverse-current value is more than 15a.

#### WORK TO BE DONE IN THE OPERATING ROOM

Article 124 Disassemble and check the generator.

(1) Disassemble the generator by following the sequence as follows:

A. Remove the carbon brush and wires and mark down the fitting sequence of the brushes.

B. Remove oil baffling ring, make mark before removing the oil baffling nut.

C. Pry the safety plate open, fix the rear end of the shaft tightly, screw out the oil baffling nut counter-clockwise and take out the safety plate.

D. Remove the fan cover, fan and pin.

E. Screw out the fixing bolt of the front cover, then remove the front cover by tapping it symmetrically with a rubber hammer or a mallet. The front cover can

also be removed by means of using a catch-hook. (Attention not to damage the wirings).

F. Push the armature out by using the armature-removing tools and punch down the front and rear bearings with a copper or an aluminium punch.

(2) Washing, cleaning and inspecting.

A. Wash and clean the front cover, case and bearings, and wipe the commutator clean.

B. All the components should be free from crack and damage, the contacting surface of the carbon brush and commutator should not be less than 75% of the cambered surface, the brush length (the maximum length on both sides) should not be shorter than 15 mm.

C. Put the front cover, case, armature and bearings in a drying oven with temperature of 60-80° C and bake them for about 30 minutes, then smear the bearings with No. 7 precision instrument grease.

(3) Assembling. In assembly, fit the reverser pin and carbon brush in the original position. After assembly, rotate the fan with hand, the rotation of armature should be flexible.

(4) Running with power-on. Connect the test set well as shown in Fig. 3-16. Then, turn on the power supply switch, after the generator is in normal operation, adjust the voltage of power supply to 15-20v, check the sparks between the carbon brush and commutator, and the sparks should not exceed 1½ grade (See Appendix IX).

(5) Measure the insulating resistance. After power-on check, measure the insulating resistance between the terminal and case with a megohmmeter, the value should not be less than 2 megohm.

NOTE: Measure the spring pressure of the carbon brush if necessary, the pressure value should be within the range of 900-1000 g.

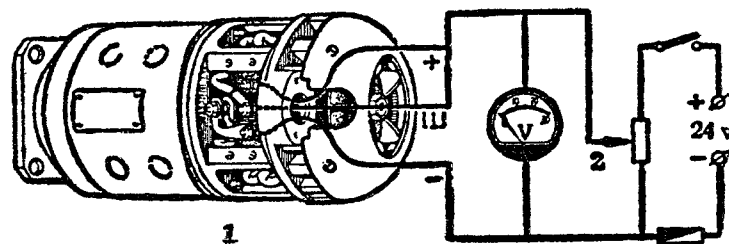


Fig. 3-16 Schematic Diagram of Generator Being Energized

1. Generator 2. Potentiometer

Article 125 Check the regulating box.

(1) Check the internal condition.

A. The fixing of components and parts should be reliable, cables should be free from unsoldering, wire-breaking and short-circuit, and the insulating sleeves intact. Be gentle in opening the base plate so as to prevent breaking the connecting wires of the resistors.

B. All the contacting points must be cleaned with silk cloth dipped in alcohol, if the burns are very serious, use silver emery paper (or "0000" emery paper) to grind. Polish the tungsten contact-point with flannel felt, and finally clean and blow it with compressed air.

It must be disassembled if the voltage regulating contact points need to be wiped and ground.

C. Check the closing sequence of the contact points of low-limit relay. The sequence should be (1) parallel contact point, (2) arc-extinguishing contact point and (3) the main contact point (See Fig. 3-17).

(2) Adjust the voltage regulator.

Connect the regulating box to the test bench.

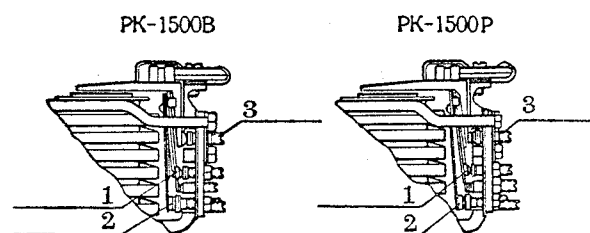


Fig. 3-17 Position Diagram of Contact Points of Low-Limit Relay

1. Parallel Contact Point 2. Arc-extinguishing Contact Point 3. Main Contact Point

A. Adjustment and inspection of the contact pressure (working point) of contact point. Screw in the fixed contact point to make it just contact with the moving contact point, screw in  $3/4$  turn further. Keep the generator speed at 4500-5000 rpm, rotate the adjusting wheel clockwise, adjust the zero-load voltage to 29v, press the fixed contact point with hand lightly along the axial direction of the fixed contact point, the voltage keeps constant or raising 0.2-0.3v, the voltage would drop if pressing continuously; it means a precise adjustment (working point is normal). Otherwise the contact pressure must be readjusted.

B. Adjustment and inspection of beating voltage. Keep the generator speed at 5900 rpm, rotate the adjusting wheel counter-clockwise to make the voltage drop, at the same time, turn off and on the excitation switch continuously to excite the beating (otherwise the measured beating voltage would be low). When the voltage is 25.5v or above, the voltage regulator should not be in the state of beating (it is allowed to beat once or twice at 25.5v, but it must stop immediately afterwards); when the voltage is within the range of 25.5-22v, the voltage regulator should enter into the beating state; when the voltage is 22v or below, the voltage regulator should not beat. If the beating voltage is out of keeping with the requirements, adjust the camber of limiting plate:

NOTE:

(a) In the adjustment and inspection of voltage regulator, keep the hand off the steel frame, otherwise the adjustment and inspection would not be accurate.

(b) Observe visually that there must be clearance between the limiting plate and the spring leaf under the condition of no load and high speed within the range of  $27.5 \pm 1v$ .

(c) For the repaired voltage regulator, the contact pressure of the contacting points must be measured, which should be within the range of 800-1200g.

(3) Check performance.

A. Check the voltage regulator.

a. When the load is zero or the rated loading of 54a is applied, adjust the speed to maximum, the output voltage should be within the range of  $27.5 \pm 1v$ .

b. When the speed is at 3800 rpm (low), 4500 rpm (medium) and 5900 rpm (maximum) respectively, adjust the loading from zero to maximum, the output voltage should be within the range of  $27.5 \pm 1v$ .

c. As the loading and voltage are constant, the voltage alternation usually should not exceed 0.25v; when there is no load, the voltage alternation should not exceed 0.5v (instantaneous alternation is allowed to reach 0.8v).

B. Check the low-limit relay.

a. Check the voltage and speed when it is energized. Manipulate the speed governing handle slowly to make the speed increase till the low-limit relay is energized, at this moment, the speed should be 2600-3000 rpm and the voltage should be within the range of  $25.5 \pm 1v$  (better within 25-26v).

b. Check reverse-current value. Turn on the battery switch (the voltage should not be lower than 24v), as the charging current is stable, decrease the speed slowly to make the contact points open, at this moment, the contact points should open agilely and the signal light should not flash, the sparks of the arc-extinguishing contact point should not be too large, the reverse-current value should be within the range of 4-15a (better within 12-15a).

C. Check the high-limit relay. Adjust the speed to 5900rpm, then increase the loading, as the high-limit relay begins operating (namely the voltage drops drastically), the loading current should be within the range of 80-95a.

**CAUTION:** It is not allowed to exceed one minute for checking the high-limit current.

Article 126 Check power supply relay box.

(1) Check the armature assembly and contacts of the contactor.

A. The movement of the armature assembly should be flexible.

B. Checking the contacts. The exterior of the contacts should be smooth and clean, if it is not up to the standard, handle them as follows:

a. If there are uniform spots, slight burns and dirt on the surface of the contacts, wipe them with chamois dipped with No. 70 aviation gasoline or alcohol first, then clean them with dry chamois or silk cloth, but grinding is not allowed. For the contacts of the relays, it is better to wash and clean them with brush-pen dipped with carbon tetrachloride.

b. If obvious unevenness occurred on the surface of the contacts, employ dead-smooth file or fine emery paper (or emery cloth) to grind them.

c. If the copper coating or copper grain appeared on the surface of the contacts, they would be no longer used.

(2) Check the contactor for operation.

Selecting the connecting method as shown in Fig. 3-18 or Fig. 3-19 in accordance with the internal circuit of the power supply relay box, connect the tester well.

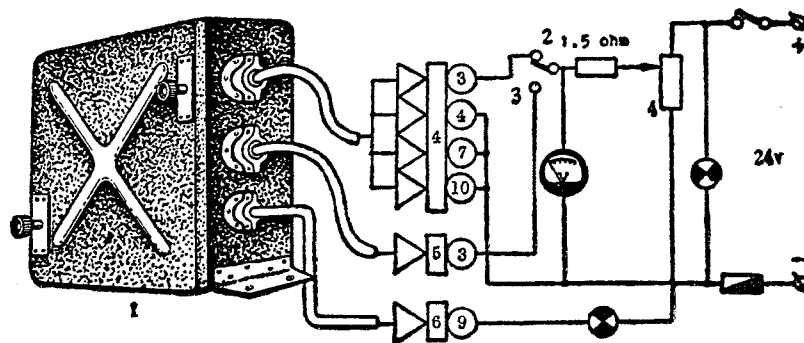


Fig. 3-18 Connection Diagram for Checking Contactor of Power Supply Relay Box

1. Power Supply Relay Box 2. Ground 3. Aircraft 4. Potentiometer

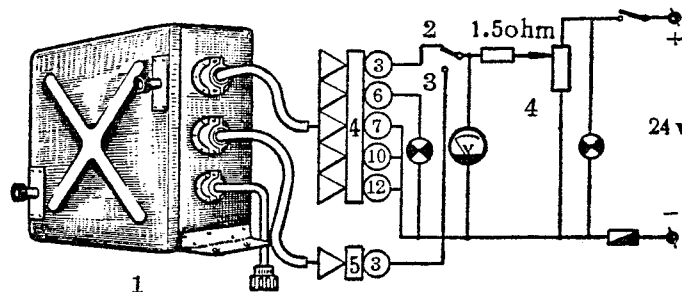


Fig. 3-19 Connection Diagram for Checking Contactor of Power Supply Relay Box

1. Power Supply Relay Box 2. Ground 3. Aircraft 4. Potentiometer

A. Check the voltage at the time when the contactor is energized. The value should not be more than 20v.

B. Check the voltage at the time when the contactor is de-energized. The value should not be more than 5v.

Article 127 Check the volt-ampere meter for performance.

(1) Check the basic error.

Carry out the check by comparing it with a typical instrument, the value must meet the requirements in the following table:

Classification	Inspected Scales	Permissible Error
Voltage (v.)	20, 25, 30	$\pm 0.8$
Current (a.)	10, 20, 30, 40	$\pm 1.6$

NOTE: If the indicator and current divider are combined in the checking, the error on each inspected scale should not exceed  $\pm 1.76a$ .

(2) Check the moving system for balance. In checking the basic error, incline the instrument to the left and right by  $45^\circ$ , the additional indicated error should not exceed 0.5mm scale camber.



# **CHAPTER III**

## **AIRCRAFT STORAGE**

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## CHAPTER III AIRCRAFT STORAGE

Article 128 Although the instruments and electrical equipments are no longer used during the period of aircraft storage, yet the components would ceaselessly undergo some changes under the influence of nature; if a proper care could not be taken in this period, rust and defectives would likely happen. Therefore the work of storage must be done conscientiously in conformity with the regulations prescribed in this chapter. When the natural condition changes drastically, be good at analysing the concrete condition and adopt the measures accordingly to strengthen the maintenance so as to make sure of the instruments and electrical equipments being free from rust, trouble and damage, once needed, they can be put into service immediately.

Article 129 As for the aircraft parking in the open, after raining or snowing, remove the pitot tube sleeve, open the inspection access covers of the fuel quantity gauge transmitter, covector and battery to carry out an airing and wipe up the moisture on the components, and, clean the external rust. Carry out power-on check if necessary.

### SECTION I THE STORAGE OF UNPRESERVED AIRCRAFT

Article 130 The maintenance work for every  $15\pm 2$  days.

- (1) Accomplish the contents of pre-flight inspection.
- (2) Wipe off the dust and rust on the external surface of instruments and electrical equipments.

Article 131 The maintenance work for every  $30\pm 5$  days. Accomplish the maintenance work for every  $15\pm 2$  days.

### SECTION 2 PRESERVATION AND DEPRESERVATION OF THE AIRCRAFT

#### PRESERVATION WORK

Article 132 The preservation work for three months (or six months).

- (1) Accomplish the contents of post-flight inspection.
- (2) Smear a thin layer of rust-proof oil on the surface of metal without protective coating and on the retaining screws of the external components of the aircraft.
- (3) Put a little talc powder on the rubberized-fabric hose and buffer pad.

(4) Wrap the front part of the pitot tube with polyvinyl chloride tape, then put the sleeve of pitot tube on.

Article 133 Re-preservation. Carry out power-on check for a rather long time by following the power-on check contents of post-flight inspection. Wipe off the dust and rust on the external surface of the equipments. Then carry out re-preservation in conformity with the contents of preservation work.

## DEPRESERVATION WORK

Article 134 If the preserved aircraft is needed to take part in flight, carry out depreservation in conformity with the following contents:

- (1) Accomplish the contents of post-flight inspection.
- (2) Clean out the dust, rust and inhibitory oil on the surface of the instruments and electrical equipments. If the inhibitory period is up to three months, also check the pitot-static system for air tightness.
- (3) If the preservation lasts longer than six months, check the aircraft components for performance by following the contents of 50-hour periodic inspection. If it is longer than one year, check the aircraft components for performance by following the contents of 100-hour periodic inspection.

# **APPENDIXES**

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## APPENDIXES

### APPENDIX I MAIN SAFETY MEASURES

To prevent ground accident and ensure safe operation must have to be the important condition for a successful accomplishment of the maintenance work. The engineering personnel must heighten the sense of responsibility, strictly obey the safety rules, proficiently master the operational skill, and check and supervise each other so as to prevent the occurrence of fire, electricity shock, misconducting of landing gear retraction and hurting people by the propeller's rotational motion.

(1) Those who are going to work on the aircraft, prior to work, must:

A. Not bring the inflammable and explosive things that have nothing to do with the maintenance work, and the articles that are easy to be left in the aircraft (for example, lighter, matches, knife and coins).

B. Check uniform dressing so as to prevent the buttons from being left in the aircraft (re-check it after work).

(2) Before entering into the cockpit, make sure that:

A. The magneto switches in the front and rear cockpit are really at "O" position, and the ignition control switch in the rear cockpit is set at "FRONT COCKPIT" position.

B. The battery switch and all the switches of power consumption equipments must be selected "OFF".

C. The landing gear lever in the front cockpit is at "DOWN" position, and that in the rear cockpit is at "NEUTRAL" position and locked with the safety pin.

(3) It is forbidden to prop off the propellers when the cylinder head temperature is higher than 80°C.

(4) The working personnel on the aircraft should not exceed 5 at one time, it should not exceed 3 when the aircraft is jacked up. It is not allowed to get aboard or get down the aircraft during the jacking-up or lowering-down of the aircraft.

(5) When connecting the ground power to the aircraft and switching the power on, obey the following regulations:

A. Prior to connecting the ground power to the aircraft, make sure that all the switches of power consumption equipments are set to "OFF".

B. Prior to disconnecting the ground power, inform the personnel who are carrying on check with power on and get consent from them.

(6) It is forbidden to switch on the power in the power consumption circuit which has gone wrong.

(7) It is forbidden to switch on the power to the aircraft under the following conditions:

A. Refueling the aircraft.

B. Defueling the aircraft.

C. Blowing and cleaning the engine with gasoline.

D. Removing or fitting the components which are not controlled by switches.  
E. Removing or fitting, or having already removed the components which would influence power feeding.

F. The components or circuits concerning power feeding in the power supply system have gone wrong and the troubles have not yet been removed.

NOTE: When coming across the cases in D, E, F mentioned above, hang a board inscribed "NO POWER-ON" on the receptacle socket of the ground power.

(8) It is forbidden to use the working lamp and electric solder iron with poor insulation on the aircraft.

## **APPENDIX II WORK TO BE DONE FOR ENGINE REPLACEMENT**

(1) Instrument equipment.

A. The work prior to engine removal.

Disconnect the thermocouples, the plug of inlet temperature gauge transmitter, the joint of oil pressure gauge hose, tachometer flexible shaft and the joint of manifold pressure gauge pipes, and, wrap them up and fix them on the fire wall.

B. The work after engine removal.

Use the stoppers to block the hose of oil pressure gauge, the nipple of tachometer flexible shaft and manifold pressure gauge pipe on the engine.

C. The work after engine mounting.

a. After cleaning and washing the thermocouples, plugs and joints removed from the aircraft, fit them back to the engine.

b. Check the engine instruments for operation with power-on.

c. Carry out engine running to check the engine instruments for operation. After engine test, check the joint of oil pressure gauge hose which should be free from oil seepage.

(2) Electrical equipment.

A. The work prior to engine removal.

a. Remove the high and low voltage wires of the starting ignition coil (or remove the starting ignition coil).

b. After removing the generator, block it well and fix the cables on the fire wall.

B. The work prior to engine mounting.

a. De-preserve the generator, clean the commutator and run the generator with power-on.

b. Fit the generator and vent pipe well.

c. Fit the insulating cylinder and mini-spring on the high-tension wire of the starting ignition coil.

C. The work after engine mounting.

a. Connect and secure the cables of the generator and starting ignition coil.

b. Carry out engine running to check the power supply system for operation.

c. Preserve the removed generator well and pack it together with the log book.



### APPENDIX III THE GENERAL REQUIREMENTS FOR THE OVERHAUL OF INSTRUMENTS AND ELECTRICAL EQUIPMENTS

- (1) The general requirements for the exterior of the components:
  - A. The exterior should be intact, parts complete, the insulating part of the cover port should be satisfactory.
  - B. The exterior should be clean, fixation reliable, and shock absorption good. The locking direction of the securing wires should be right and tightness proper.
  - C. The connecting, soldering and fixing of the cables are surely reliable. The external surface of the cables should be intact, if slight sticking and wearing occurred, they could continue to be used only when the insulating resistance is in keeping with the regulation.
  - D. The connection and fitting of the plugs and pipes must be correct and reliable, the index mark clear.
- (2) The requirements for the net-work.
  - A. The external surface of the cable bundle should be clean and intact. Preventive measures must be adopted for the locations that are vulnerable to oil and water dipping and wearing. If partial wirebreaking and wearing occurred on the shield and polyvinyl chloride tube, perform repairing or replacing.
  - B. The cable bundles should be arranged tidely and fixed in segment by every 30-40cm with fixing tape or clamps. The separated cables should be arranged into bundles, and the cables that are always in motion should be kept with a sufficient length.
  - C. The cable bundles must be separated from the passages and the isolation articles must be tied tightly (inclusive of cross fixing belt).
  - D. The cables should be free from abrasion and pressure of the wiring port and casing, and the wiring ends should not be exposed bare.
  - E. The external surface of the plugs and negative wires must be intact and clean, connection reliable and security satisfactory.
- (3) In removing and disassembling the components, caution that:
  - A. The locations that are easy to be mistakenly fitted must be marked before removal and disassembly.
  - B. The power supply switch must be OFF in removing power-consuming components, and in disassembling the plugs or replacing the cables.
  - C. The removed components must be put into a box, the nipples and plugs must be blocked with stoppers or cloth sleeves.
  - D. When cleaning the dirt on the inner surface of the instrument glass, attention not to erase the animal gum.
  - E. So long as the casing is opened, the components, cables and soldering points on the visible part inside must be checked for intactness and connection, and the dirt cleaned.
  - F. Before fitting the components, carry out the following checks:
    - a. The fixation of the terminals and the tightness of the retaining nuts.
    - b. Elasticity of the screw with stop spring.
    - c. Wipe the contacting part of the wiring and component clean.
    - d. Grind cleanly the contacting part of the component and body with capacitor and bonding by itself.

(4) Obey the following rules in checking the component for performance:

A. Use the accurate tester and typical instrument that have been calibrated in the defined calibration period. Deduct the error of the typical instrument when it is used. In connecting the tester, keep the passage sealing and circuit contacting in a reliable condition.

B. Besides the special regulations, the performance check of the bellow instruments and electromotive instruments must be done under the circumstances of vibration with 0.1-0.3g and 20-100hertz. If the condition is not available, tap the instrument casing or mounting bracket instead.

C. In checking the basic error of the instrument, attention not to make the instrument indication exceed the inspected point. If it does so, return it to below the inspected point first, then re-adjust it to the inspected point in the normal direction.

D. The correction must be employed in recording the basic error of the instrument. When the indication of the inspected instrument is less than the typical value, the correction is positive (presented by "+"), and vice versa (presented by "-"). Mean correction should be employed in the correction table on the aircraft (i.e. the correction of climbing plus that of descending on the same scale is divided by two). In checking the basic error, the temperature in the operating room should be kept at  $20\pm 5^{\circ}\text{C}$ . If the temperature is not up to the standard, the temperature error of the components should be considered in the calibration.

E. In checking the whole set for performance, the complete set of the appropriate aircraft should be used.

(5) The requirements for insulating resistance of the component:

A. Carry out the measurement within five minutes after checking the other performance, the insulating resistance should not be less than 2 megohm (unless otherwise it is regulated) under the condition of normal temperature and relative humidity of 30-80%.

B. The speed of cranking the handle of the megger should be uniform, the cranking speed should be in conformity with the regulations of this megger. If the indicating value is approaching to the low limit of the insulating resistance, the accurate reading should be taken after one minute cranking.

#### **APPENDIX IV THE CHECKOUT OF COMMUTATOR, CARBON BRUSH, BRUSH BRACKET ASSEMBLY AND CASING OF VARIOUS ELECTRIC MACHINES**

(1) Commutator.

A. Normal commutator: the surface is clean, smooth, of brownish metal lustre and free from burns and mechanical damage; the insulating material between the commutator segments should be lower than the commutator segments. If it is out of keeping with the requirements, remove the carbon brush or disassemble the machine, and handle them in conformity with the following regulations:

a. If there is oil dirt or carbon deposit on the surface, usually use cloth slices dipped with No. 70 aviation gasoline or washing gasoline to wipe it, it is forbidden to grind.

b. If there are serious burns or scratches on the surface, grind it with the emery cloth of same width with the commutator uniformly; during the grinding, it is forbidden to turn the armature with metal tools.

c. If the burning is very serious and scratch very deep, it should be repaired with a high precision lathe.

B. If the carbon powder between the commutator segments can not be blown off cleanly with compressed air, scrape it with soft wood strip.

C. The winding ends of the armature should be free from unsoldering and curling up.

D. Observe whether the insulating layer between the commutator segments is lower than the segments after the commutator has been repaired.

NOTE: Keep off hand touching or oil staining from the cleaned commutator.

(2) Casing and armature.

A. The insulating layer between the excitation coil and armature winding should be free from wear, and the steel wire hoop of the armature winding free from wire-breaking and unsoldering.

B. Clean off the carbon powder and oil dirt on the armature and in the casing. If it has been washed with aviation gasoline or neutral suds, use compressed air to blow it clean first, then put it into a drying oven to bake for ten minutes, but the temperature should not exceed 80° C.

NOTE: Only when necessary could it be allowed to soak the armature and magnetic pole, but it should not exceed 15 minutes.

(3) Brush bracket assembly.

A. The brush spring should be free from rust and deformation, security reliable and fixation satisfactory.

B. The brush spring should press straightly against the brush.

C. The brush holder should be free from looseness and deformation.

NOTE: If the brush spring has been replaced or any doubt arises about the spring pressure, measure the pressure of brush spring which should be in conformity with the defined value of various kinds of electric machines.

(4) Carbon brush.

A. Check the serial number in removing the carbon brush. Make up for it if there isn't.

NOTE: The numbering of generator carbon brush **should start** from the one adjacent to the terminal box in the rotating direction in turn; the numbering of brush of other machines can take this method as a reference.

B. The movement of the brush in the brush holder should be flexible, but free from swinging.

C. The external surface of brush should be free from moisture, softening, cracking or deformation with upper end widened and lower one narrowed. If the brush has been moistened, it can be sunned, usually baking is not allowed, even if it is necessary, the temperature should not exceed 80° C, but it is not allowed to get near to the heat source so as to prevent it from scorching.

D. The working surface of brush (shining part) should be more than 75%, and it should be free from obvious scratch, serious chip losing or angle missing or colour change due to overloading.

E. The brush cable should be free from looseness and strand breaking, the insulating sleeve free from wearing and looseness.

F. The maximum side of brush should be taken as the reference for measurement of brush length.

G. If the brush is out of keeping with the requirements, grind it as follows:

a. Wrap the commutator well with emery paper, there should not be any obvious concave or overlapping at the joint.

b. Fit the brushes according to the number in turn, then rotate the armature in the working direction of the machine, as the shining part of the working surface is almost distributed uniformly, grind it with power-on.

c. The voltage and loading for grinding the brush with power-on:

(a) Not more than 15v for series motor.

(b). Not more than 20v for parallel motor and compound-wound motor (For the generator, run it with "+" and "B" short-circuited).

(c). If the generator is fitted on the test bench, switch on 20% of the rated loading.

D. Of the ground brush, observe whether the spark grade on the commutator is in conformity with the defined value of various kinds of electric machines under the working state of rated voltage and rated loading.

NOTE: The tools and instruments must be kept clean, the surface of brush should be free from oil stain and don't touch the working surface with hand.

## **APPENDIX V CLEANING, CHECKING AND GREASE(OIL) REPLENISHING OF THE BEARINGS OF VARIOUS ELECTRIC MACHINES**

1. The cleaning and checking of the bearings.

(1). Unshielded bearings.

A. Put the bearings into No. 70 aviation gasoline mixed up with No. 8 or 20 aviation lubricating oil (approximately 6%) and clean them.

B. After initial cleaning, observe by means of using a 5-10 times magnifying glass: the components should be free from crack, dent and rust, the ball race free from looseness and unriveting, and the surface of ball rail free from spot, burr, crazing or metal flaking off.

C. Continue to wash it until the gasoline is free from impurity and colour change. In order to make sure, drop the washing gasoline from the bearings on a glass or a piece of white paper to observe carefully to see whether there are any impurities in it.

D. Check the bearings for rotation. Keep the axis approximately perpendicular to the ground, carry out quick and slow rotation check.

a. Rotate the outer ring clockwise and counterclockwise slowly, at the same time, incline it. During the rotation, the bearings should be free from detention and friction, and at last, the outer ring would stop rotating stably and uniformly.

b. Make the outer ring rotate as quick as possible with hand, the bearings should rotate flexibly and there should be no obvious noise and vibration.

E. Carry out the final cleaning, after the gasoline being volatilized, put the bearings into a drying oven to bake for 10 minutes, the temperature should not exceed 80°C.

(2) Shielded bearings.

A. Only when the tools are in conformity with the requirement, correct operation could be done and the sealing gland is available, could it be allowed to pry the sealing gland open. Otherwise it is only allowed to wash it by means of a cleaner.

B. After prying the sealing gland open, clean and check it by following the method and requirement said above, but it is prohibited to bake the rubber sealing ring.

2. The replenishing of lubricating grease (oil).

The replenishing of bearing lubricating grease (oil) of various electric machines should be carried out in accordance with the oil specification for instrument and electrical equipment, the replenishing amount must be proper (the replenishing amount of No.7 precision instrument grease should be two thirds of the bearing volume). The replenishing should be done with special tools and it is not allowed to use hand to replenish it directly, and pay special attention to the quality of the lubricating grease (oil) in replenishing.

### APPENDIX VI OIL SPECIFICATION FOR INSTRUMENTS AND ELECTRICAL EQUIPMENTS

Items	Component and Type	Destination	Bearing Code	Lubricant No.
1	SBL-40 SBL-53 Convertor	Front and Rear Bearings	6007 or 6027	No. 7 Precision Instrument Grease
2	BDP-2 Artificial Horizon	Rotor Bearing	A6005K or D6025K	No. 7 Precision Instrument Grease
		Front Bearing of Follow-up Bracket	A23Y or A23YM or A23YM <sub>1</sub>	No. 22 Precision Instrument Oil
		Rear Bearing of Follow-up Bracket	B-8	No. 22 Precision Instrument Oil
3	BZW-2A Turn-and-Slip Indicator	Rotor Bearing	A23Y	No. 22 Precision Instrument Oil or No. 8 Instrument Oil
		Front and Rear Bearings of Outer Ring	A23Y	No. 22 Precision Instrument Oil or No. 8 Instrument Oil
4	TH-3 Gyro Body	Rotor Bearing	A23Y or A23YM	No. 22 Precision Instrument Oil
		Bearings of Inner and Outer Rings	A23Y or A23YM	No. 22 Precision Instrument Oil

Item	Component and Type	Destination	Bearing Code	Lubricant No.
4	TH-3 Gyro Body	Speed Reducer		No. 22 Precision Instrument Oil or No. 8 Instrument Oil
		Potentiometer		No. 12 or No. 22 Precision Instrument Oil
5	TH-4 Gyro Body	Rotor Bearing	A23Y or A23YM	No. 22 Precision Instrument Oil
		Bearings of Inner and Outer Rings	A23Y or A23YM	No. 22 Precision Instrument Oil
		Speed Reducer		No. 22 Precision Instrument Oil or No. 8 Instrument Oil
		Potentiometer		No. 12 or No. 22 Precision Instrument Oil
6	GHC-2 Transmitter	Potentiometer and Ball Bearing		No. 12 or No. 22 Precision Instrument Oil
7	ZZ35 Tachometer	Front and Rear Bearings of Synchro Motor	A23Y, 1000095	No. 22 Precision Instrument Oil
8	GZ-9 Transmitter	Front and Rear Bearings	B23, H7 (H27)	No. 7 Precision Instrument Grease
9	Aircraft Clock	Moving Parts		Watch Oil or No. 22 Precision Instrument oil
		Winding Mechanism Box		No. 8 Instrument Oil
10	ZF-1.5 D.C. Generator	Front and Rear Bearings	302,205 or 80205	No. 7 Precision Instrument Grease

## APPENDIX VII REGULATIONS FOR COMPASS SWING

- (1) Compass swing must be done in the following cases:
  - A. 12±1 months.
  - B. Compass transmitter has been replaced.
  - C. The aircraft has undergone major overhaul.

D. Attachment and modification to the aircraft have affected the compass deviation.

E. Doubts arise about the accuracy of compass deviation in application.

(2) Under the normal power feeding of the generator, the current magnetic field of the output circuit of the generator would affect the indication of magnetic compass. In order to make the actual affection of the current magnetic field meet the compass indication and reduce the time of engine ground running, take the following method as a reference for the magnetic compass swing:

A. Remove the input "+", "-" and "B" wires of the regulating box, connect the "+" and "-" wires of ground power to the input "+" and "-" terminals of the regulating box through the right instrument inspection access at the front fuselage.

B. After pushing the aircraft to the preselected bearing, turn on the ground power switch first, then turn on the gyro-magnetic compass-artificial horizon switch, radio switch, interphone switch, radio compass switch and, the switch of artificial horizon in the rear cockpit, close the canopy and record down the indicating error of magnetic compass.

Calibrate the compass deviation on other bearings in turn by following the method mentioned above.

## **APPENDIX VIII THE METHOD OF CLEANING THE OPERATING SWITCH OF BDP-2 ARTIFICIAL HORIZON**

(1) The method of grinding and polishing the contact block.

A. Wash and clean the carbon deposits on the contact block with gasoline.

B. Use silver emery paper to polish the burnt place (or "0000" emery paper).

C. Polishing. Spread a piece of chamois over a plain board and stick some precipitated lapping paste on it, then polish the contact block repeatedly in the brush sliding direction on the chamois till it becomes as bright as a mirror.

(2) The method of polishing the contact point. Cut one end of a wooden stick into concave arc and wrap it with chamois, press it against the contact point to be polished. Rotate the wooden stick reciprocatingly until the surface of the contact point becomes as bright as a mirror.

(3) The method of measuring the contact pressure of operating switch. Using the small hook of a 0-3g spring scale to hook the inside of the contact point, lift up the spring scale vertically. As the contact point is just stuck up (it can be measured visually, or it can be done by means of connecting bulbs and batteries in series, just as the light goes off), the indication of the spring scale should be within 1-1.5g

(4) The method of checking the correct fitting of the operating switch. Fit the instrument on the test bench to energize, as the instrument is in normal operation, push the follow-up bracket upward and downward with hand, and use a ruler to measure the free motion range of the follow-up bracket (namely the operative angle of the operating switch). From the level position of the follow-up bracket, the upward and downward free motion of the outer edge of the follow-up bracket should be within the range of 1-2mm, the total range of upward and downward motion should be within 2-4mm.

NOTE: That the outer edge of the follow-up bracket moves one millimetre approximately equals to 1° angle change.

## APPENDIX IX SPARK GRADE UNDER THE CARBON BRUSH

Spark Grade	Spark Features	State of Commutator and Carbon Brush	Permissible Running Mode
1	Sparkless	No Burnt Mark on the Brush and No Black Mark on the Commutator	Permissible for Long and Continuous Running
1 <sup>1/4</sup>	Weak Spot Spark Partially Under the Brush		
1 <sup>1/2</sup>	Weak Sparks Under Most Part of the Brush	Black Marks Appeared on the Commutator and They Could be Cleaned by Gasoline, While There Are Burnt Marks on the Brush	
2	There Are Sparks Under the Brush	There Are Black Marks on the Commutator and They Could Not Be Removed with Gasoline, And There Are Burnt Mark Under the Brush	It Is Permissible For Short Time Overloading or Short Time Impacting Load
3	There Are Strong Sparks Under Whole Brush and Big Sparks Fly Out	Serious Black Marks Appeared On The Commutator And They Could Not Be Removed With Gasoline, The Brush Has Been Scorched and Damaged.	Permissible For Direct Starting (No Starting Rheostat) Or Starting of Running, But The Commutator And Brush Must Be Kept Suitable For Normal Running.

## APPENDIX X AIRCRAFT BATTERY MAINTENANCE

(1) Day-to-day inspection of the aircraft battery. The batteries at the charging station should be checked by following the requirements described below, it is allowed to fit them to the aircraft only when they are up to the standard.

A. The capacity should be in keeping with the requirement. It must be more than 20 ampere-hour for 12-HK-28 batteries, and more than 75% for 12-HK-30.

B. The bakelite casing should be clean and intact, and bitumen layer should be free from crack, blistering and electrolyte leaking.

C. The terminals should be intact and fixed reliably. The nuts and gaskets should be complete and all the parts free from rust.

D. The voltage should be more than 24v. If a loading checker of unit battery is used to check unit battery, the battery voltage should not be lower than 2v.



E. Specific weight of electrolyte should be in conformity with the regulations of individual battery instructions. Temperature correction table must be taken as a reference in the measurement.

F. The electrolyte height should be up to the requirement. For 12-HK-28 battery, 6-8mm higher than the protective plate; 10-15mm higher than the protective plate for 12-HK-30 battery. The inner diameter of the glass tube used for measurement should not be less than 4mm.

G. The threaded plugs and rubber gaskets should be intact. Rubber valves must be clean and flexible, and the vent holes free from blockage. After fitting the plugs, turn over the battery by 90° or 180°, the plugs and bitumen layer should be free from electrolyte leakage.

H. For the batteries that would be used for the first time or the lead bars and terminals of the battery have been repaired by welding, the connecting and welding of the lead bars must be checked: connect a volt-meter to the terminal, use a screw-driver to pry the lead bar or the repaired place, the indication of the volt-meter should be changeless.

#### **CAUTION!**

a. If the electrolyte heights is not enough, it is allowed to fill the electrolyte with the same specific weight as that in the battery only when making sure that the electrolyte spilt or splashed out. Otherwise it is only allowed to fill the distilled water and, charge it with 2a current for 30 minutes.

b. The batteries that the discharging capacity exceeds 25% (voltage lower than 24v) must be charged within 8 hours.

c. It is prohibited to put the batteries under the direct sun-light.

(2). Periodic inspection of aircraft battery.

A. 12-HK-28 battery in use must be overcharged once per month and, charging and discharging inspection done once every two months. When the service life is up, charging and discharging inspection should be done once per month.

B. 12-HK-30 battery in use should be over-charged once per month and, charging and discharging inspection done once every three months.

(3) The maintenance requirement of battery container.

A. The vent holes should be through.

B. The woolen felt should be intact, dry and clean; if it has been corroded by electrolyte, wash it with soda water first, then use plain water to rinse it, and, dry it. Replace it if the corrosion is too serious.

C. The steel belt must be intact, replace or rivet it if it has been worn or corroded.

D. The terminal lugs should be clean, the opening not too big, the root of which should be marked with red and blue paint for the sake of polarity distinction.

E. The socket should be clean, pins free from serious burns and obvious movement, bakelite free from the damage that would affect strength and insulation

F. The casing should be free from the damage that would affect the service, repaint the casing if the paint coating flaked off on large area, and the aircraft number should be marked on it.

## APPENDIX XI TECHNICAL DATA OF RELAYS AND CONTACTORS

### 1. Voltage regulator of the regulating box (PO-16)

State of Relay	Measurement Destination	Clearance Range (mm)	Means of Adjustment
Inoperative	Between Iron Core and Armature	0.3-0.65	Adjust Hand-wheel
Inoperative	Between Iron Core and Steel Frame	0.1-0.25	Adjust Spring Location
Inoperative	Between Limiting Plate and Spring	Not More Than 0.2	Bend Limiting Plate
Operative	Between Limiting Plate and Spring	Light Can Pass Through	Clamp Limiting Plate Lightly

### 2. Low-limit relay of the regulating box (Type-OP)

State of Relay	Measurement Destination	Clearance Range (mm)	Means of Adjustment
Armature Attracted to Iron Core	Between Armature and Steel Frame	0.25-0.75	Move Armature Near to or Away From Steel Frame
Armature Attracted to Iron Core	Between Armature and Iron Core	0.1-0.45	Move Armature Near to or Away From Steel Frame
Natural	Between Armature and Iron Core	1-1.4	Bend Limiting Plate
Natural	Between Main Contact Points	0.4-0.6	Screw Fixed Contact Point
Natural	Between Pressure Equalizing Contact Points (Parallel)	0.3-0.5	Screw Fixed Contact Point
Natural	Between Auxiliary Contact Points (Arc-Extinguishing)	0.7-1	Screw Fixed Contact Point

3. High-limit relay of the regulating box OP-13B (P)

State of Relay	Measurement Destination	Clearance Range (mm)	Means of Adjustment
Armature Attracted to Iron Core	Between Armature and Steel Frame	0.1-0.3	Move Armature Near to or Away From Steel Frame
Armature Attracted to Iron Core	Between Armature and Steel Core	0.35	Adjust Thickness of Gaskets
Natural	Between Armature and Iron Core	1.1-1.2	Bend Angle Bracket of Fixed Contact Point

4. Contactors and relays

Items	Data	Type					
		JKB-52A	JKB-53A	JKB-21A	JN-1	K-25A	MZJ-50A
Coil Voltage (v)		27±3	27±3	27±3	27±3	24±5	27±3
Cut-in Voltage Not More Than (v)		18	18	18	18	18	20
Cut-off Voltage Not More Than (v)		5	5	5	8	4.4	5
Loading At the Contact Point Inductive/Non-inductive (ampere)		8/5	8/5	/2	2/	25/	50/50
Pressure of Contact Point in Cool State Not Less Than (gramme)		40	40	—	40	0.17-0.24	—
Contact Resistance at Contact Point (ohm)		—	—	—	—	0.005	0.01
Current Needed Under Normal Temperature After Switching-on (ampere)		0.165	0.17	0.092	0.035	—	0.25
Coil Resistance at 20°C (ohm)		95±29	185±24	—	658	—	90±7.5
Clearance of Contact Points (mm)		—	—	—	0.4	1±0.1	1.3±0.15
Insulating Resistance (megohm)		2	2	2	20	—	2

## APPENDIX XII TABLES

Table 1. Standard Atmosphere

Temp. (°C)	Pressure	Altitude (m)							
		0	500	1000	2000	3000	4000	5000	6000
-5	Absolute	759.39	715.42	673.53	595.70	525.33	461.84	404.72	353.45
	Relative	0	43.97	85.86	163.69	234.06	297.55	354.68	405.95
0	Absolute	760.00	715.99	674.07	596.18	525.75	462.21	405.04	353.73
	Relative	0	44.01	85.93	163.82	234.25	297.79	354.96	406.27
5	Absolute	760.61	716.56	674.61	596.66	526.17	462.58	405.36	354.01
	Relative	0	44.05	86.00	163.95	234.44	298.03	355.24	406.59
10	Absolute	761.22	717.13	675.15	597.14	526.59	462.95	405.68	354.29
	Relative	0	44.09	86.07	164.08	234.63	298.27	355.52	406.91
15	Absolute	761.83	717.70	675.69	597.62	527.01	463.32	406.00	354.57
	Relative	0	44.13	86.14	164.21	234.82	298.51	355.80	407.23
20	Absolute	762.44	718.27	676.23	598.10	527.43	463.69	406.32	354.85
	Relative	0	44.17	86.21	164.34	235.01	298.75	356.08	407.55
25	Absolute	763.05	718.84	676.77	598.58	527.85	464.06	406.64	355.13
	Relative	0	44.21	86.28	164.47	235.20	298.99	356.36	407.87
30	Absolute	763.66	719.41	677.31	599.06	528.27	464.43	406.96	355.41
	Relative	0	44.25	86.35	164.60	235.39	299.23	356.64	408.19
35	Absolute	764.27	719.98	677.85	599.54	528.69	464.80	407.28	355.69
	Relative	0	44.29	86.42	164.73	235.58	299.47	356.92	408.51
40	Absolute	764.88	720.55	678.39	600.02	529.11	465.17	407.60	355.97
	Relative	0	44.33	86.49	164.86	235.77	299.71	357.20	408.83

NOTE: Pressure unit is in millimetre of mercury column.

Table II. Air-speed/pressure equivalents

Air-speed (km/hr)	Pressure in millimeter of water column					Water column correction of every 10°C (mm)
	4°C	10°C	20°C	30°C	40°C	
50	12.1	12.1	12.1	12.1	12.1	0
100	48.3	48.3	48.4	48.4	48.5	0-0.1
150	108.9	109.0	109.1	109.2	109.3	0.1
200	194.1	194.3	194.5	194.7	194.9	0.2
250	304.5	304.7	305.0	305.2	305.5	0.2-0.3
300	440.5	440.9	441.3	441.7	442.1	0.4
350	602.8	603.3	603.9	604.4	605.0	0.5-0.6
400	792.2	792.9	793.6	794.3	795.0	0.7

Table III. Air-speed/pressure equivalents

Air-speed (km/hr)	Pressure in millimeter of mercury column					Mercury column correction of every 10°C (mm)
	0°C	10°C	20°C	30°C	40°C	
50	0.89	0.89	0.89	0.89	0.89	0
100	3.55	3.55	3.56	3.56	3.56	0-0.01
150	8.01	8.02	8.04	8.05	8.07	0.01-0.02
200	14.28	14.30	14.33	14.35	14.38	0.02-0.03
250	22.40	22.44	22.48	22.52	22.56	0.04
300	32.40	32.46	32.52	32.58	32.64	0.06

Air-speed (km/hr)	Pressure in millimeter of mercury column					Mercury column correction of every 10°C (mm)
	0°C	10°C	20°C	30°C	40°C	
350	44.34	44.42	44.50	44.58	44.66	0.08
400	58.27	58.37	58.48	58.58	58.69	0.10-0.11
450	74.27	74.40	75.54	74.67	74.81	0.13-0.14

Table IV. Employing a typical resistance box to check resistance thermometer

Tempera- ture (°C)	Resistance (ohm)	Tempera- ture (°C)	Resistance (ohm)	Tempera- ture (°C)	Resistance (ohm)
-50	73.86	0	90.26	100	129.96
-40	76.86	30	101.06	130	143.56
-20	83.16	50	108.81	150	153.26

END