DIGITAL AERONAUTICS

# Mi-2

# USER MANUAL

ENGLISH COCKPIT

# Contents.

## Introduction.



## Part I. Helicopter technical overview.



## Part II. Flight Operations.

Introduction

# Primary information

# Purpose of the guide.

This manual provides details on how to set up and operate the Mi-2 helicopter model in the Microsoft Flight Simulator 2020, PC version.

This guide offers an in-depth technical overview of the helicopter, including checklists and reference tables based on the official Mi-2 manuals. Created with input from experienced Mi-2 pilots, the content is highly accurate. Both aviation enthusiasts and professionals can use this manual to enjoy flights in Microsoft Flight Simulator.

We recommend thoroughly reviewing this manual before using the helicopter model in the flight simulator to ensure you make the most of all available features.

* ***IMPORTANT!*** *This manual is not intended to serve as an operational reference for real-world aircraft and must not be used for actual flight operations under any circumstances.*

# About the helicopter.

The Mi-2 is a Soviet multipurpose helicopter developed by the M.L. Mil Design Bureau in the early 1960s. Its maiden flight took place on September 22, 1961, and mass production began in 1965 at the PZL-Świdnik plant in Poland. In total, over 5,400 units were produced.

The Mi-2 is a twin-engine, single-rotor configuration helicopter with a anti-torque (tail) rotor and fixed tricycle landing gear. The cockpit accommodates one or two pilots, while the passenger cabin seats up to eight people or can carry an equivalent amount of cargo. It has a top speed of 210 km/h, a service ceiling of 4,000 meters, and a maximum flight time of up to 4 hours.

Up until the 1990s, the Mi-2 was primarily operated in Eastern European countries and the USSR. The Mi-2 was produced in a wide range of versions, designed for carrying passengers and cargo, agricultural tasks, search and rescue missions, medical evacuation, firefighting, police patrols, and was also extensively used for military purposes.

Its versatility, reliability, and distinctive design made the Mi-2 highly sought-after on the secondary market after the dissolution of the USSR. New operators included government and commercial organizations, military, police and rescue units, flying clubs, private owners, and collectors around the globe.

# Product use.

## 1. Purchase.

To purchase the Product please visit https://digitalaeronautics.com/store/ .

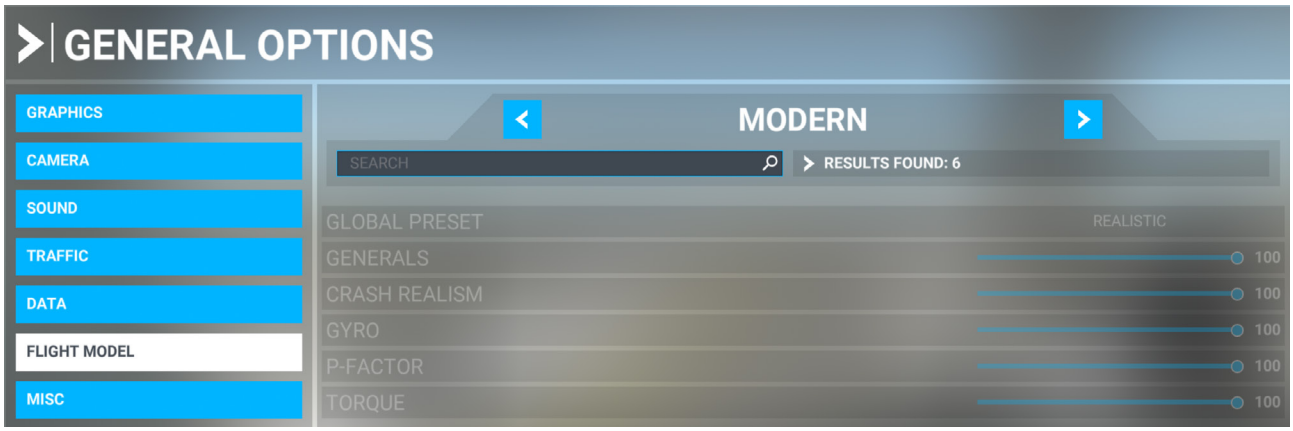
## 2. Installation.

Please note that Microsoft Flight Simulator 2020 must be correctly installed on your PC before using the Product.

The product is installed via SIMINSTALLER app.

## 3. Flight model settings.

In Microsoft Flight Simulator 2020 general options, select the "Modern" flight model for correct helicopter flight dynamics.




## 4. Assistance options.

In Microsoft Flight Simulator 2020 assistance options, set all parameters according to the attached screenshot for correct helicopter behavior.

# 5. Joystick settings in MSFS-2020.

It is highly recommended to use custom joystick settings for smooth model control in MSFS-2020:

**Axis:**

| |
|---|
| SET HELICOPTER THROTTLE AXIS |
| SET CYCLIC LATERAL AXIS |
| SET CYCLIC LONGITUDINAL AXIS |
| TAIL ROTOR AXIS |
| COLLECTIVE AXIS |
| SENSITIVITY |

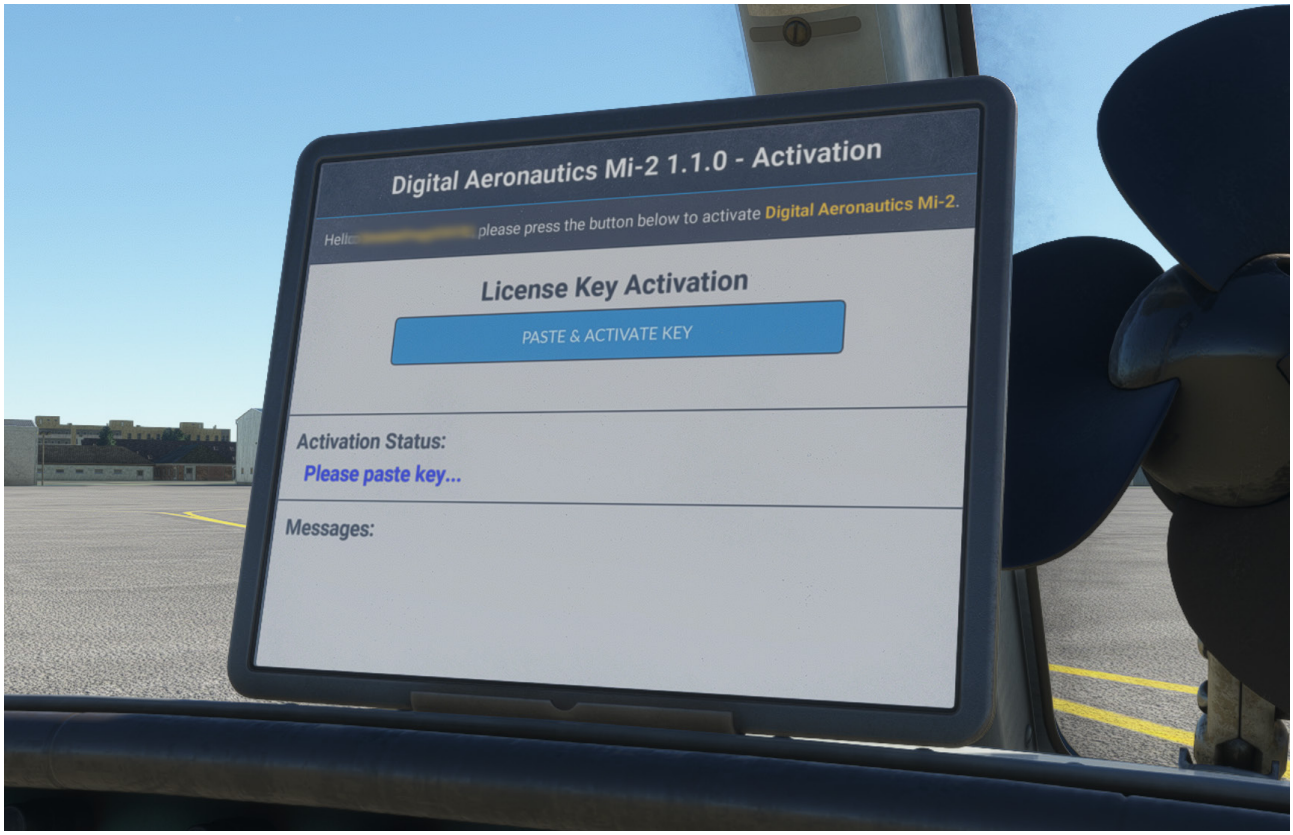
**Buttons:**

| |
|---|
| AUTO START ENGINE |
| ENGINE AUTOSTOP |
| ROTOR BRAKE ON |
| ROTOR BRAKE OFF |
| INCREASE ROTOR LATERAL TRIM |
| DECREASE ROTOR LATERAL TRIM |
| INCREASE ROTOR LONGITUDINAL TRIM |
| DECREASE ROTOR LONGITUDINAL TRIM |
| INCREASE CONDITION LEVER 1 |
| DECREASE CONDITION LEVER 1 |
| INCREASE CONDITION LEVER 2 |
| DECREASE CONDITION LEVER 2 |
| SET ADF LOWRANGE |
| SET ADF HIGHRANGE |
| BRAKES |
| TOGGLE PARKING BRAKES |
| SMOKE ON |
| TAXI LIGHTS ON |
| TAXI LIGHTS OFF |
| LANDING LIGHTS UP |
| LANDING LIGHTS DOWN |
| LANDING LIGHTS ON |
| LANDING LIGHTS OFF |

# 6. Product Activation.

To activate the product in the flight simulator, use the activation key provided after purchase.

Copy the activation key to your clipboard manually. Then open the aircraft's onboard tablet and press the "Paste" button. If the key is valid, the activation will complete automatically and the tablet interface will close.



Part I

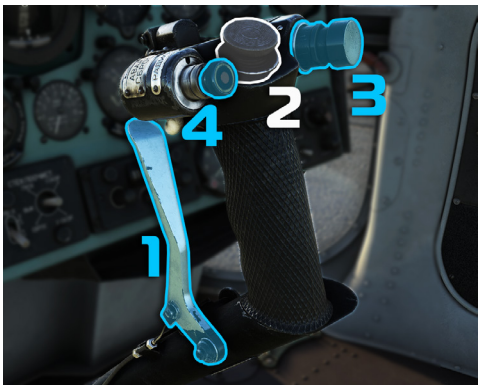
# Helicopter technical overview

# A Flight controls

**1 -** helicopter control stick
**2 -** collective pitch and throttle control lever
**3 -** directional control pedals
**4 -** single engine control and test levers
**5 -** fuel shut-off valve levers
**6 -** main rotor brake lever
**7 -** fuel fire shut-off handles

## 1. Helicopter control stick.

Used to control the movement of the helicopter around the pitch and roll axes using the swash-plate mechanism.




**1.1 -** wheel brake control lever
**1.2 -** four-way trim control switch
**1.3 -** "СПУ" ("INTERCOM") button
**1.4 -** "РАДИО" ("RADIO") button

The wheel brake control lever [1.1] is used to operate the wheel brakes and lock them in the parking position.

The four-way trim control button [1.2] is used to adjust the helicopter's trim along both the longitudinal and lateral axes.

The "СПУ" ("INTERCOM") button [1.3] allows for internal communication between crew members.

The "РАДИО" ("RADIO") button [1.4] is used for external radio communications.

## 2. Collective pitch and throttle control lever.

This lever manages the collective pitch of the main rotor, engine power, and the stabilizer pitch angle. It's connected to the swash-plate and the fuel levers located on the engines. Additionally, the stabilizer control is also connected to the collective pitch-throttle control lever.


**2.1 -** pitch-throttle control lever
**2.2 -** throttle control twist grip

The pitch-throttle control lever [2.1] is used to adjust the collective pitch of the main rotor and engine power.

Moving up the collective pitch and throttle control lever increases the collective rotor pitch, simultaneously boosting engine power, and increasing the stabilizer pitch angle.

The throttle control twist grip [2.2] is used to change the main rotor's rotation speed at a constant collective pitch. This twist grip is only connected to the fuel levers on the regulator pumps.

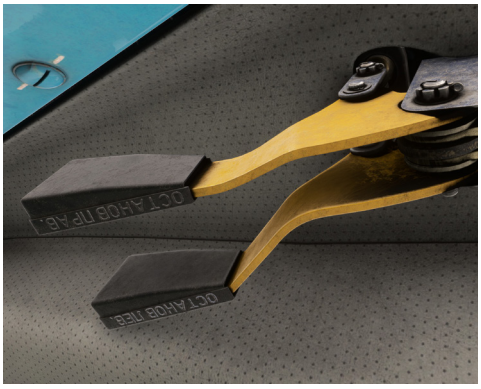
## 3. Directional control pedals.

These pedals are used to control the helicopter's direction by changing the tail rotor thrust by pressing the pedal in the desired direction.

## 4. Single engine control and test levers.

Used to check the performance of each engine individually on the ground, without changing the collective pitch of the main rotor, as well as to allow separate engine control during flight. Before starting the engine, set the levers to the central position and lock them there. Keep them locked throughout the flight. Engine power during flight is controlled using the collective pitch-throttle control lever.

## 5. Fuel shut off valve levers.



These are used to shut down the engines. The movement of the levers is transmitted to the fuel pump shut-off valve, which cuts off the engine's fuel supply. To turn off the engines, move down the lever.

## 6. Main rotor brake lever.

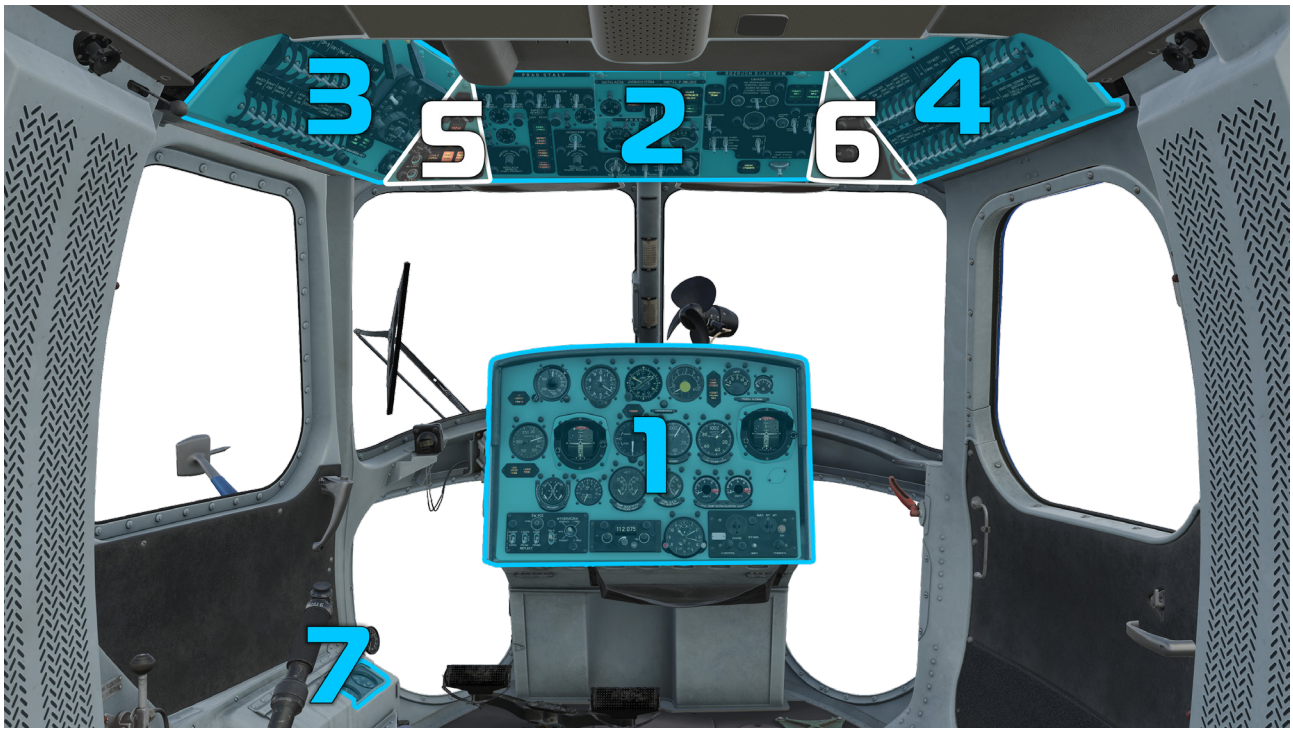
This lever is used to reduce the run-down time and bring the main rotor to a stop after the engines are shut off, as well as to lock the transmission while parked. When the helicopter is parked, the main rotor must be braked, i.e. the lever should be in the upper position. Before starting the engines, the main rotor should be released by moving the lever to the down position.
After the engines are shut down, do not brake the main rotor unnecessarily until it has come to a complete stop.

## 7. Fuel fire shut-off handles.

These handles are used to stop fuel flow to the engines in the event of a fire. When the helicopter is parked, the fuel fire shut-off valves must be closed—the handles should be positioned upward. Before starting the engines, once the fuel pump is turned on, move the handles to the lower position to open the fuel fire shut-off valves. These valves should only be closed after the engines have completely stopped, while the fuel pump is still running. The fuel fire shut-off valve may only be used to shut down the engine if there is an engine fire or if the engine shutdown control fails.

# B Cockpit components

**1** - main instrument panel
**2** - upper central panel
**3** - upper left panel
**4** - upper right panel
**5** - fire extinguishing system panel
**6** - red lighting system panel
**7** - air system panel
**8** - additional cockpit components



# 1. Main instrument panel.

**1.1** - radio altimeter
**1.2** - pressure altimeter
**1.3** - ADF and gyromagnetic compass indicator
**1.4** - fuel quantity indicator
**1.5** - main gearbox oil temperature indicator
**1.6** - main gearbox oil pressure indicator
**1.7** - airspeed indicator
**1.8** - gyrohorizon
**1.9** - variometer
**1.10** - main rotor RPM indicator
**1.11** - engine RPM indicator
**1.12** - trim position indicator
**1.13** - main rotor pitch indicator
**1.14** - engine oil temperature indicator
**1.15** - engine oil pressure indicator
**1.16** - turbine inlet gas temperature indicator
**1.17** - lower left electrical panel
**1.18** - VHF radio station control unit
**1.19** - aircraft clock
**1.20** - HF radio station control unit
**1.21** - caution light: "RW-3 INDICATIONS INVALID"
**1.22** - caution light: "HOOK DOWN"
**1.23** - caution light: "CARGO HOOKED"
**1.24** - warning light: "FIRE"
**1.25** - warning light: "FILTER CONTAMINATION"
**1.26** - warning light: "FUEL LOW LEVEL"

## 1.1 Radio altimeter.


Used to indicate absolute flight height and alert the pilot when the helicopter descends to a preset height between 0 and 300 m.

**1.1.1 -** height indicator needle
**1.1.2 -** alert height set knob
**1.1.3 -** alert height light
**1.1.4 -** triangular height alert pointer

> The radio altimeter is switched on using the "RW-3" switch [1.17.4] on the lower left electrical panel [1.17] after engine startup;
>
> To set the height alert pointer [1.1.4], turn the height set knob [1.1.2] to the desired position;
>
> The alert height light [1.1.3] remains illuminated during climb until the indicator needle [1.1.1] reaches the set mark. During descent, when the height indicator needle [1.1.1] passes the mark, an audio and visual "dangerous altitude' alarm [1.1.3] activates;
>
> The radio altimeter should be turned off before shutting down the engines.

## 1.2 Pressure altimeter.


Used to measure and maintain flight altitude according to the pressure set on the barometric scale.

**1.2.1 -** needle indicating altitude in thousands of meters
**1.2.2 -** needle indicating altitude in hundreds of meters
**1.2.3 -** altitude scale
**1.2.4 -** barometric pressure scale ranging from 670 to 790 mmHg
**1.2.5 -** atmospheric pressure setting knob
**1.2.6 -** indexes for use at airfields where pressure is below 670 mmHg

## 1.3 ADF and gyromagnetic compass indicator.


Used to display the gyromagnetic heading, magnetic bearing, and relative bearing of the radio station.

**1.3.1 -** relative bearing scale (fixed)
**1.3.2 -** gyromagnetic heading scale (rotable)
**1.3.3 -** ADF needle
**1.3.4 -** desired course arrow
**1.3.5 -** desired course setting knob

The gyromagnetic compass is activated using the switch on the upper left panel and the converter switch (~36V) [2.2.1] on the upper central panel;

To align the gyromagnetic compass, press the "pasing" button five minutes after turning the device on;

The desired course is set by turning the setting knob [1.3.5];

The ADF needle [1.3.3] shows the magnetic bearing of the radio station on the inner rotable scale [1.3.2] and the relative bearing of the radio station on the outer fixed scale [1.3.1].

## 1.4 Fuel quantity indicator.

Displays fuel quantity in the main tank. The gauge is calibrated for 600 liters. If the remaining fuel drops below 100 liters, the emergency indicator light "FUEL LOW LEVEL" [1.26] turns on.


## 1.5 Main gearbox oil temperature indicator.

Used to show the oil temperature in the main gearbox lubrication system. Normal readings range from 30 to 80°C.


## 1.6 Main gearbox oil pressure indicator.

Displays oil pressure in the main gearbox lubrication system. Normal values are between 2 and 8 kg/cm².

## 1.7 Airspeed indicator.

Displays the helicopter's indicated airspeed in km/h.


## 1.8 Gyrohorizon.

Used to determine the helicopter's spatial attitude. Two instruments are installed in the cockpit.


**1.8.1 -** bank angle scale
**1.8.2 -** spherical pitch scale
**1.8.3 -** movable aircraft silhouette
**1.8.4 -** triangular turn indicator
**1.8.5 -** slip indicator
**1.8.6 -** artificial horizon adjustment knob
**1.8.7 -** artificial horizon reference line
**1.8.8 -** cage knob
**1.8.9 -** blinker

The gyrohorizon is activated by turning on the ~36V converter on the central panel of the upper central panel;

Bank and pitch are displayed based on the relative position of the aircraft symbol [1.8.3] and the instrument scales [1.8.1] and [1.8.2];

Triangular pointer on the turn indicator [1.8.4] moves in the direction of the helicopter's turn;

Ball of the slip indicator [1.8.5] moves toward the direction of the helicopter's slip;

The artificial horizon reference line [1.8.7] is adjusted using the knob [1.8.6];

The gyrohorizon is caged by pulling knob [1.8.8] toward you.

## 1.9 Variometer.

Displays the helicopter's rate of climb or descent. The instrument is rated for a maximum climb or descent speed of up to 10 m/s.


## 1.10 Main rotor RPM indicator.

Shows the main rotor revolutions per minute (RPM) as a percentage.


## 1.11 Engine RPM indicator.

Used to display engine RPM as a percentage.


## 1.12 Trim position indicator.

Indicates the position of the trims. Trimming mechanisms are controlled by a switch located at the top of the helicopter control stick.

## 1.13 Main rotor pitch indicator.

Displays the main rotor blade pitch angle within a range of 1 to 15°.


## 1.14 Engine oil temperature indicator.

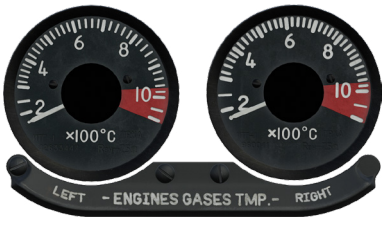
Used to indicate engine oil temperature. The scale value is in 10°C. Normal oil temperature ranges from 60 to 150°C.


## 1.15 Engine oil pressure indicator.

This indicator displays the oil pressure in the engine lubrication system. Normal oil pressure ranges from 2.5 to 3.5 kg/cm².


## 1.16 Turbine inlet gas temperature indicator.

Used to display the turbine inlet gas temperature during engine operation. The scale value is 100°C. The maximum allowed gas temperature is 970°C for takeoff, 925°C for nominal mode, and 890°C for cruise.



## 1.17 Lower left electrical panel.


**1.17.1 -** pressure gauge transformer selector-switch
**1.17.2 -** taxi/landing light brightness selector-switch
**1.17.3 -** navigation lights brightness control selector-switch
**1.17.4 -** radio altimeter power switch
**1.17.5 -** wiper mode selector
**1.17.6 -** "CODE" button

The transformer selector-switch for pressure gauges [1.17.1] is used if the power supply to the engine pressure gauges, main gearbox pressure gauges or hydraulic system pressure gauges fails;

The landing/taxi light brightness selector-switch [1.17.2] lets you choose the brightness level of the retractable light. Set the selector-switch to "TAXI" during taxiing, and to "LANDING" for takeoff and landing;

The brightness control for the navigation lights [1.17.3] lets you choose the intensity of the aircraft's navigation lighting;

The radio altimeter power switch [1.17.4] is used to turn on the radio altimeter before flight and switch it off after landing;

Selector [1.17.5] is used to set the wiper operating modes and has a ("RESET") position setting to return the wipers to their initial position;

The "CODE" (NAV light signal) button [1.17.6] is used to send coded visual signals.

## 1.18 VHF radio station control unit.

This is the main radio communication station.


**1.18.1 -** frequency tuning knobs
**1.18.2 -** set frequency display window
**1.18.3 -** volume control knob
**1.18.4 -** squelch switch

To turn on the radio, activate the "VHF" circuit breaker on the left panel of the upper electrical console, provided the helicopter has 27V DC power onboard;

The required communication frequency is set using the knobs [1.18.1] within the range of 118.000 to 135.975 MHz.
Radio communication can be monitored and conducted when the "SPU" circuit breaker is switched on at the left panel of the upper electrical console. To transmit voice, press the "RADIO" button on the helicopter control stick.

## 1.19 Aircraft clock.

Used to show current time, count elapsed time, and stop-watch.

**1.19.1 -** main scale displays current time and stopwatch operation
**1.19.2 -** "ВРЕМЯ ПОЛЕТА" ("ELAPSED TIME") scale, used to count elapsed flight time
**1.19.3 -** "СЕК" ("SEC") scale, showing the stopwatch's runtime in minutes
**1.19.4 -** central hour hand
**1.19.5 -** central minute hand
**1.19.6 -** central stopwatch second hand
**1.19.7 -** hour hand for the "ВРЕМЯ ПОЛЕТА" ("ELAPSED TIME") scale
**1.19.8 -** minute hand for the "ВРЕМЯ ПОЛЕТА" ("ELAPSED TIME") scale
**1.19.9 -** stopwatch minute hand
**1.19.10 -** winding crown-button
**1.19.11 -** "ПУСК" ("START") crown-button

To wind the clock, turn the winding crown-button [1.19.10] counterclockwise:

- *Place your cursor over the crown and scroll the mouse wheel;*

To set the hands, pull out the winding crown-button [1.19.10] and then turn it:

- *Place your cursor over the back of the winding crown-button axle [1.19.10];*
- *While holding the left mouse button, pull the crown-button [1.19.10] toward you;*
- *For quick hand adjustment, point your cursor at the red zone on the button [1.19.10] and scroll the mouse wheel;*
- *For slow hand adjustment, place the cursor over the back of the knob's axle and scroll the mouse wheel;*
- *To reset the crown-button [1.19.10] to its neutral position, place your cursor over the back of its axle, hold the left mouse button, and push the knob away from you;*
- *Place your cursor over the winding crown-button [1.9.10] and left-click.*

Start and stop the clock by turning the crown-button [1.19.11]:

- *Move the cursor to the "START" crown-button [1.19.11] and scroll the mouse wheel;*

Start, stop, and reset the elapsed time keeping by pressing the winding crown-button [1.19.10] in sequence;

- *Move your cursor to the red area of the winding crown-button [1.19.10] and left-click;*

Start, stop, and return the stopwatch hands to their initial position by pressing the crown-button [1.19.11] in sequence.

## 1.20 HF radio station control unit.

Used to provide radio communication between the helicopter crew and ground stations within the shortwave frequency range in areas not covered by VHF radio.


## 1.21 Caution light: "RW-3 INDICATIONS INVALID".

Use of the radio altimeter is prohibited.


## 1.22 Caution light: "HOOK DOWN".

This caution light illuminates when the cargo hook is deployed on the relevant helicopter model.


## 1.23 Caution light: "CARGO HOOKED".

Illuminates when there is cargo attached to the cargo hook in the corresponding helicopter version.

## 1.24 Warning light "FIRE".

Illuminates when a fire is detected in any protected compartment.


## 1.25 Warning light: "FILTER CONTAMINATION".

The warning light illuminates when a filter contamination is detected. Takeoff and flight continuation are not allowed.


## 1.26 Warning light: "FUEL LOW LEVEL".

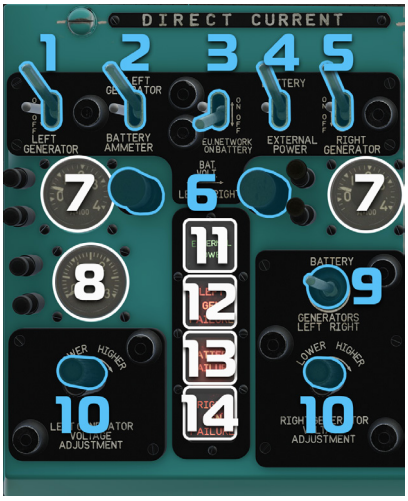
The warning light illuminates when the main fuel tank reaches a critical low level.

# 2. Upper central panel.

**2.1** - direct current power section
**2.2** - alternating current power section
**2.3** - hydraulic system section
**2.4** - anti-icing system section
**2.5** - engine start section
**2.6** - interior lighting section


## 2.1 DC power section.

**2.1.1** - left generator switch
**2.1.2** - ammeter source selector switch
**2.1.3** - emergency battery power switch
**2.1.4** - power source selector switch
**2.1.5** - right generator switch
**2.1.6** - battery voltage measurement buttons
**2.1.7** - ammeters
**2.1.8** - voltmeter
**2.1.9** - voltmeter source selector switch
**2.1.10** - generator voltage regulators
**2.1.11** - indicator light: "GROUND POWER"
**2.1.12** - warning light: "LEFT GENERATOR FAILURE"
**2.1.13** - warning light: "BATTERY FAILURE"
**2.1.14** - warning light: "RIGHT GENERATOR FAILURE"



The generator switches [2.1.1], [2.1.5] connect the left or right generator to the onboard electrical system after the corresponding engine is started;

The "AMMETER" source selector switch [2.1.2] selects the data source for the ammeter display between the left generator and the battery;

The "EL. NETWORK ON BATTARY" switch [2.1.3] supplies specific systems with battery power if the generators fail;

The three-position power source selector [2.1.4] switches power to consumers either from the ground power supply or from the batteries, and de-energizes the aircraft's electrical network on the ground when set to neutral;

The voltage measurement buttons [2.1.6] are used to check voltage in the left or right batteries;

The left ammeter [2.1.7] displays the current in the left generator circuit or the battery circuit, depending on the position of switch [2.1.2];

The right ammeter [2.1.7] shows the current from the right generator. Each scale value is 20A. Measurement range: -40A to 400A;

The voltmeter [2.1.8] indicates the voltage of the DC power sources. Each scale value is 1V. Measurement range: 0–30 V. Voltage is checked using the three-position switch [2.1.9] and the buttons [2.1.6];

The voltage regulators [2.1.10] are used to set the standard 28.5V level for the DC power system;

The "GROUND POWER" annunciator [2.1.11] lights up when the helicopter systems are connected to an ground power source;

Warning lights [2.1.12], [2.1.13], [2.1.14] alert the crew to battery or generator failures.

## 2.2 AC power section.

**2.2.1** - power source selector switches
**2.2.2** - voltmeter
**2.2.3** - ammeter
**2.2.4** - voltage regulator
**2.2.5** - rotors anti-icing system switch
**2.2.6** - "GEN FAILURE" warning light
**2.2.7** - warning light "CONVERT AC 115V FAILURE"

**2.2.8 -** warning light: "CONVERT AC 36V FAILURE"

Power source selectors [2.2.1] are used to switch to emergency power from the generator via transformer if the main AC sources (converters) fail. The left switch supplies power for the ADF, radio altimeter, and manometers, while the right switch supplies power to the gyrohorizon and the gyromagnetic compass;

The voltmeter [2.2.2] displays the voltage in the 208V 400Hz AC network. The measurement range is 0–250 V;

The ammeter [2.2.3] is used to measure current in the 208V 400Hz AC network. The measurement range is 0–100 A;

The regulator [2.2.4] is used to adjust the proper 208V voltage in the AC network;

The switch [2.2.5] is used to monitor the operation of the main and tail rotor blade anti-icing systems, using the voltmeter [2.2.2] and ammeter [2.2.3];

Warning lights [2.2.6], [2.2.7], and [2.2.8] notify the crew of generator or converter failures.

## 2.3 Hydraulic system section.

**2.3.1 -** hydraulic system pressure gauge
**2.3.2 -** hydraulic system switch
**2.3.3 -** warning light: "HYDRAULIC SYSTEM FAILURE"


The gauge [2.3.1] measures hydraulic system pressure. Each scale value is 10 kg/cm², with a measurement range from 0 to 100 kg/cm². Normal hydraulic pressure should stay between 63 and 84 kg/cm²;

The switch [2.3.2] is used to activate and test the hydraulic system;

The warning light [2.3.3] signals when hydraulic system pressure drops to critical levels.

## 2.4 Anti-icing system section.


**2.4.1 -** antiicing system mode switch
**2.4.2 -** windshield heating switch
**2.4.3 -** warning light: "DE-ICING SYSTEM SWITCH ON"
**2.4.4 -** annunciator: "DE-ICING SYSTEM OPERATE"

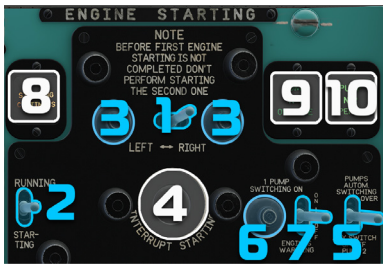
Switch [2.4.1] in the upper position is used to test the system, and also manually activates the blade anti-icing system. In the lower position, the system switches to its main mode, enabling automatic activation via the ice sensor;

Switch [2.4.2] turns on the heating for the left windshield;

Warning light [2.4.3] shows when the ice sensor is activated;

Indicator light [2.4.4] signals when the blade anti-icing system is operating.

## 2.5 Engine start section.




**2.5.1 -** engine selector-switch
**2.5.2 -** "STARING – RUNNING" mode selector-switch
**2.5.3 -** engine start buttons
**2.5.4 -** engine start discontinuation button
**2.5.5 -** fuel pump selector-switch
**2.5.6 -** pump No. 1 activation button
**2.5.7 -** engine heater switch
**2.5.8 -** annunciator: "STARTING CONTINUES"
**2.5.9 -** annunciator: "PUMP №1 OPERATE"
**2.5.10 -** annunciator: "PUMP №2 OPERATE"

Switch [2.5.1] is used to select which engine will be started;

Switch [2.5.2] sets the engine start mode or cranking mode;

Buttons [2.5.3] initiate engine start or cranking, depending on the position of switch [2.5.2];

Button [2.5.4] aborts the engine start or cranking procedure;

Normally [2.5.5] is in the upper position, it enables the automatic switching on of pump No. 2 in the event of failure of pump No. 1; in the lower position, only the pump No. 2 is activated.

The button [2.5.6] is used to turn on the main pump No. 1 when switch [2.5.5] is set to the upper position.

The switch [2.5.7] activates the engine air intake heaters.

Annunciators [2.5.8], [2.5.9], and [2.5.10] indicate the proper operation of each corresponding system.

## 2.6 Interior lighting section.

**2.6.1 -** cockpit light switch
**2.6.2 -** passenger compartment light switch
**2.6.3 -** annunciator brightness control switch
**2.6.4 -** annunciator lamp test switch
**2.6.5 -** warning light "DOOR OPENED"


Switches [2.6.1], [2.6.2] control the lighting modes for the cockpit and passenger compartment;

Switch [2.6.3] is used to adjust the brightness of the annunciators;

The switch [2.6.4] is used to check if the annunciators are working properly;

The warning light [2.6.5] indicates that the passenger cabin door is open.

# 3. Upper left panel.

**3.1** - circuit breakers
**3.2** - ADF control panel
**3.3** - ADF operating frequency selector panel
**3.4** - sensor heating test section


## 3.1 Circuit breakers.

These are used to protect the circuits and turn-on the flight and navigation instruments, communication, utility and auxiliary equipment, as well as exterior lighting systems.


## 3.2 ADF control panel.

**3.2.1** - frequency tuning knobs
**3.2.2** - fine frequency tuning knobs
**3.2.3** - tuning indicator
**3.2.4** - mode selector switch
**3.2.5** - loop antenna control momentary switch
**3.2.6** - "ТЛФ - ТЛГ" ("TLF–TLG") selector-switch
**3.2.7** - volume control knob
**3.2.8** - ADF master control panel selector button

Knobs [3.2.1] are used for setting the primary (Д) and backup (Б) radio station frequency in hundreds and tens of kHz;

Knobs [3.2.2] are intended for fine-tuning the primary (Д) and backup (Б) radio station frequency in kHz;

The indicator [3.2.3] displays the strength of the incoming signal;

The switch [3.2.4] is used to select the operating mode of the ADF;

- *"ВЫКЛ."– turns off the device;*
- *"КОМП." – main ADF operating mode, automatic radio bearing finding mode with indication of the radio's magnetic bearing;*
- *"АНТ" – signal reception mode without determining the radio's bearing;*
- *"РАМ." – manual radio-bearing finding mode for the radio station. Works together with switch [3.2.5] and indicator [3.2.3].*

The switch [3.2.5] allows manual control of the ADF's loop antenna during station tuning;

The switch [3.2.6] lets you choose between ADF's telephone and telegraph modes;

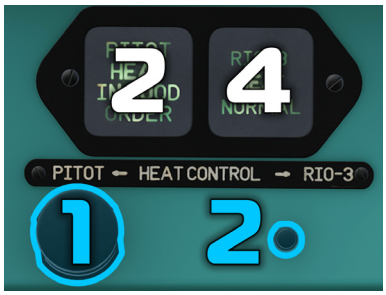
The control knob [3.2.7] adjusts the volume level while listening to the selected radio station;

Button [3.2.8] is inoperative on the Mi-2 helicopter.

## 3.3 ADF operating frequency selector panel.

The switch is used to select the ADF needle indication on the ADF and gyromagnetic compass indicator between the pre-tuned primary ("Д") and backup ("Б") frequencies.

### 3.4 Sensor heating test panel.

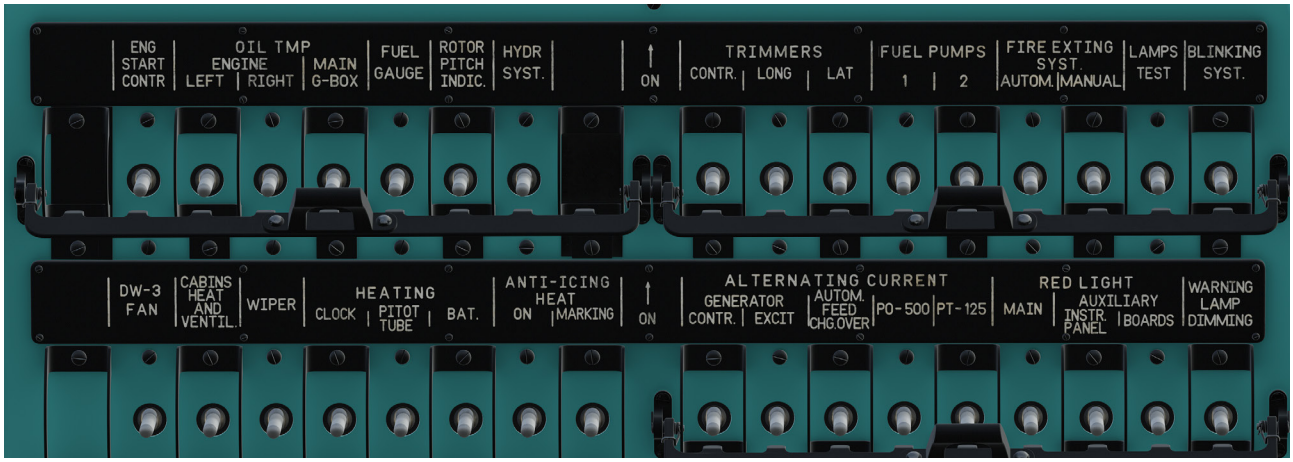



**3.4.1 -** pitot heating test button
**3.4.2 -** ice sensor heating test button
**3.4.3 -** annunciator: "PITOT HEAT IN GOOD ORDER"
**3.4.4 -** annunciator: "RIO-3 HEAT NORMAL"

> The [3.4.1] button is used to test the pitot heating system. If the system is working correctly, pressing the button will light up the [3.4.3] annunciator;
>
> The button [3.4.2] is used to test the ice sensor heating system. If the system is working properly, pressing this button will light up the annunciator [3.4.4].

## 4. Upper right panel.

The upper right panel (the circuit breaker panel) contains the circuit breakers for the helicopter's instruments and systems. These breakers automatically shut off the corresponding systems in case of overvoltage.




## 5. Fire extinguishing system panel.


**5.1 -** system operation mode switch
**5.2 -** three buttons for testing and manually activating the first stage of fire extinguishing
**5.3 -** two buttons for activating the second and third stages of fire extinguishing
**5.4 -** annunciators

> The upper position of switch [5.1] arms automatic activation in case of fire, while the lower position is used to check the

fire extinguishing system;

The [5.2] buttons are used to test the system in "TEST" mode and to manually activate the first stage of fire extinguishing if the automatic system fails. Each button has an warning light above it showing the compartment where a fire is detected;

The [5.3] buttons allow you to manually activate the second and third fire extinguishing stages if the first stage cylinder does not extinguish the fire. When the second or third stage cylinders are activated, the corresponding caution light will illuminate;

Warning and caution lights [5.4] illuminate in the event of a fire in the compartment and indicate the operation of the fire extinguishing system.

## 6. Red light intensity control panel.

Used to adjust the brightness of red backlighting for control panels, dashboards and instruments using four separate knobs.


## 7. Air system panel.

**7.1 -** wheel brake pressure gauge
**7.2 -** air system pressure gauge

The gauge [7.1] indicates the pressure in the wheel brake system. Normal operating pressure is 24 kg/cm².

The gauge [7.2] indicates the pressure in the air system cylinders. Normal pressure is 50 kg/cm².


## 8. Additional cockpit components.

**8.1 -** magnetic compass
**8.2 -** interphone control unit

## 8.1 Magnetic compass.

Used for determining the magnetic heading and as a backup if the gyromagnetic compass fails.

## 8.2 Interphone control unit.

Used to operate the interphone system, which delivers signals from the ADF, VHF and HF radios directly to crew headsets. Also provides an aural alert for dangerous height.


**8.2.1 -** headset audio source selector-switch
**8.2.2 -** INTERCOM-RADIO operation mode selector
**8.2.3 -** "ОБЩАЯ" volume control knob
**8.2.4 -** "ПРОСЛ" volume control knob
**8.2.5 -** "ЦВ" general call push-button
**8.2.6 -** "СЕТЬ 1-2" selector-switch

The headset audio source selector-switch [8.2.1] connects the headset to the helicopter's installed radios and ADF;

The INTERCOM-RADIO selector-switch [8.2.2] is used to turn-on the microphone for internal or external communications;

The "ОБЩАЯ" knob [8.2.3] adjusts the volume for communications on the network selected by the INTERCOM-RADIO switch;

The "ПРОСЛ" knob [8.2.4] adjusts the volume for communications not selected by the INTERCOM-RADIO switch, meaning those heard at a lower volume;

The "ЦВ" button [8.2.5] allows you to transmit over the internal communication system, with all users hearing the message at full volume;

The "СЕТЬ 1-2" switch [8.2.6] is inoperative on Mi-2 helicopter.

# C Helicopter systems

**1 -** helicopter control system
**2 -** hydraulic system
**3 -** pneumatic system
**4 -** engine powerplant
**5 -** fuel system
**6 -** oil system
**7 -** power plant cooling system
**8 -** fire extinguishing system
**9 -** anti-icing system
**10 -** electrical equipment
**11 -** lighting equipment
**12 -** radio navigation equipment
**13 -** communication equipment
**14 -** flight and navigation equipment
**15 -** heating and ventilation system

## 1. Helicopter control system.

The hand controls are used to steer the helicopter in pitch and roll channel. This is accomplished by changing the angle of the main rotor's thrust vector via the swashplate system. Movement in the pitch and roll channel is managed by repositioning the helicopter control stick [**A-1**].

The foot pedals are used to control the direction of the helicopter's flight. Change of flight direction is managed by changing the tail rotor thrust, press pedal [**A-3**] in the desired direction.

* *A detailed explanation of all control elements can be found in the "Flight controls" section.*

## 2. Hydraulic system.

This system powers the hydraulic boosters in the pitch and roll control systems as well as the collective pitch control of the main rotor.

It is a self-contained hydraulic unit mounted on the main gearbox drive, ensuring normal operation of the hydraulic system even if both engines fail.

The system works by increasing the pilot's control forces on the helicopter controls, using pressure from the working fluid.

The hydraulic system is activated by the hydraulic circuit breaker, which is located on the upper right panel (on the circuit breaker board) [**B-4**], as well as the toggle switch [**B-2.3.2**] on the upper central panel;

To test the hydraulic system, gently move the control stick forward-backward and right-left, and the collective pitch-throttle control lever up and down. The pressure indicated by the gauge [**B-2.3.1**] should be within 63–84 kg/cm².

* *After checking the hydraulic system, turn off the hydraulic system toggle switch **[B-2.3.2]**. If the pressure drops to 35 kg/cm², the red "HYDRAULIC SYSTEM FAILURE" annunciator **[B-2.3.3]** should light up;*
* *Once the switch **[B-2.3.2]** is turned on, pressure should increase and the annunciator will turn off.*

# 3. Pneumatic system.

This system is used for braking the main landing gear wheels, as well as operating agricultural equipment and the external cargo sling.

The system operates on compressed air stored in cylinders, which are used as the main landing gear struts. The cylinders are automatically charged while the engines are running.

Pressure in the air cylinders and brake system is monitored using two pressure gauges [**B-7.1**] and [**B-7.2**]. Normal cylinder pressure is 50 kg/cm².

To test the system, press the brake trigger on the helicopter control stick: when pressed, the pressure gauge should read 24 kg/cm² without any drop in cylinder pressure. When the trigger is released, the pressure in the brake system should fall to zero, with no residual pressure remaining.

# 4. Engine power plant.

The power plant is used to generate the energy required to rotate the main and tail rotors, as well as to drive auxiliary units. It converts the energy from fuel combustion into mechanical rotational energy, enabling flight and control of the helicopter. The power plant includes two gas turbine engines and a main gearbox.

Monitoring the performance of the power plant is carried out by tracking the following parameters according to the tables of operation limitations [**2-A-6**]:
- engine and main gearbox oil temperature [**B-1.5**]
- engine and main gearbox oil pressure [**B-1.6**]
- engine turbocharger revolutions per minute (RPM) [**B-1.11**]
- main rotor RPM [**B-1.10**]
- engine turbine inlet gas temperature [**B-1.16**].

# 5. Fuel system.

Used to supply fuel from the tanks to the engines.

The helicopter's fuel system comprises a main tank with a capacity of 600 liters, mounted on the lower central section of the fuselage. It also includes two external tanks with a capacity of 238 liters each, booster pumps, filters, fuel lines, a fuel quantity indicator, and fire shutoff valves. Fuel is supplied to the engines via booster pumps arranged in parallel: if the main pump fails, a backup pump automatically activates to keep fuel flowing to the engines without interruption.

Fuel pump operation is controlled from the engine start section [**B-2.5**] on the top central panel. To activate the fuel pumps, you must turn on two circuit breakers located on the upper right panel [**B-4**];

Preparing the fuel system for engine start:

* *Move the fuel pump switch **[B-2.5.5]** to the upper position; this will turn on the backup pump and illuminate the green indicator light "PUMP №2 OPERATING" **[B-2.5.10]**;*
* *Activate the primary pump by pressing the button **[B-2.5.5]**. The backup pump will shut off, and the "PUMP №2 OPERATING" indicator light **[B-2.5.10]** will go out. At the same time the "PUMP №1 OPERATING" indicator light turns on.*

If the primary pump fails, the backup pump activates and the "PUMP №2 OPERATING" indicator [**B-2.5.10**] lights up. The primary pump shuts off, and the "PUMP №1 OPERATING" indicator [**B.2.5.9**] goes out. In this case, move the switch [**B.2.5.5**] to the lower position;

The fuel quantity in the main tank is monitored using the indicator [**B-1.4**]. When the caution light illuminates "FUEL REMAINING 100 LITERS" [**B-1.26**], you can continue cruising for up to 17 minutes.

# 6. Oil system.

Used to provide lubrication and cooling for the power plant components.

The oil system consists of three independent subsystems: one for the first engine, one for the second engine, and one for the main gearbox. Each has its own oil circulation loop. Pressurized oil from the reservoir flows to the power plant components to lubricate friction parts. Used hot oil is sent to the oil radiator, where it is cooled down before flowing back into the oil tank.

The engine oil systems are monitored using oil pressure indicators [**B-1.15**] and oil temperature indicators [**B-1.14**]. Normal pressure is between 2.5 and 3.5 kg/cm², and normal temperature ranges from 60 to 150°C;
The gearbox oil system is monitored with oil pressure indicators [**B-1.6**] and oil temperature indicators [**B-1.5**]. Normal operating pressure is 2–8 kg/cm², and temperature should be

between 30 and 80°C.

## 7. Power plant cooling system.

This system cools the powerplant's components and includes a fan, driven by the main gearbox, and a network of air ducts. Cool air enters through an inlet above the cockpit, passes through the fan, and is directed through ducts to the powerplant components.

## 8. Fire extinguishing system.

This system is used to detect and extinguish fires in the engine compartments and the main gearbox compartment.

The system includes fire detectors for the engines and gearbox, a three-stage fire extinguishing system, and a control panel for fire extinguishing. A handheld fire extinguisher is also available in the helicopter cabin.

The fire extinguishing system control panel [**B-5**] includes fire warning lights and fire-extinguisher discharge indicators. Fire extinguishing is controlled by pushbuttons on the panel.

The fire extinguishing system is powered from a 27V DC power supply via circuit breakers "FIRE EXTING. SYST. AUTOM./MANUAL", located on the upper right panel [**B-4**];

Procedure for checking the fire warning and caution indicator lights:

* *Set the "LAMPS TEST" switch to the upper position on the upper right panel **[B-4]**;*
* *Set the "BLINKING SYST" switch to the upper position on the upper right panel **[B-4]**;*
* *Turn the "CHECKING OF WARNING LAMP" switch to "ON" **[B-2.6.4]** on the upper central panel;*
* *Confirm the red flashing "FIRE" signal **[B-1.24]** appears on the pilot's instrument panel, as well as on all lights of the fire extinguishing system panel **[B-5]**;*
* *Set the "CHECKING OF WARNING LAMP" switch to "OFF" **[B-2.6.4]** on the upper central panel.*

Fire extinguishing system check:

* *Set the switch to "TEST" position. Switch **[B-5.1]** on the fire extinguishing panel **[B-5]**. The "SENSORS TEST AFTER TEST SWITCHOFF" caution light will light up;*
* *Alternatelly press and release the manual activation buttons for the first fire extinguishing stage **[B-5.2]** under the corresponding warning lights: "LEFT ENGINE", "MAIN GEARBOX", and "RIGHT ENGINE". The red indicators "VALVE OPENED" and "LEFT ENGINE", "VALVE OPENED" and "MAIN GEARBOX", "VALVE OPENED") and "RIGHT ENGINE") will illuminate and go out sequentially on the fire extinguishing panel;*
* *Set switch **[B-5.1]**. The "SENSORS TEST AFTER TEST SWITCHOFF" to "ON" position. All indicators on the fire extinguishing panel will go out.*

The first stage of fire extinguishing activates automatically if a fire is detected in any protected compartment. Preliminarily, the "FIRE" warning light [**B-1.24**] will start flashing on the pilot's instrument panel, along with the "FIRE" and emergency compartment indicators on

the fire extinguishing control panel. When the first stage activates, the "VALVE OPENED" and "BOTTLE HAS OPER AUTOM" lights illuminate.

If the first stage of the fire extinguishing system does not activate automatically, you can start it manually by pressing the button located beneath the indicator for the corresponding compartment.

The second and third stages are activated manually by pressing the buttons [**B-5.3**]. When pressed, the corresponding "2-ND BOTTLE HAS OPER" or "3-RD BOTTLE HAS OPER" indicator lights will turn on.

# 9. Anti-icing system.

Used to prevent ice formation on critical helicopter components.

The system includes anti-icing system for the main and tail rotor blades, heating for the left windshield and pitot tube, engine air intakes and guide vanes heating system, an ice detector, and a windshield wiper.

The anti-icing system for the main and tail rotors, as well as the left windshield, uses electric heaters. The heating elements for the main and tail rotors are powered by alternating current at 208 V and 400 Hz from a generator. The anti-icing system for the left windshield operates from a generator via the transformer. Engine air intakes and inlet devices are heated by circulating hot air and oil controls.

The anti-icing system for the main and tail rotor blades are located on the upper central panel, in the anti-icing system section [**B-2.4**] and the AC power section [**B-2.2**]:

* *After engine start, check the AC voltage on the voltmeter **[B-2.2.2]**. The normal voltage should be 208 V;*
* *Set switch **[B-2.4.1]** to "MANUAL"; the "DE-ICING SYSTEM OPERATE" indicator will light up;*
* *Measure the current consumed by the main and tail rotor blade heaters using the ammeter **[B-2.2.3]**, and sequentially set switch **[B-2.2.5]** to positions "1-2-3-TAIL ROT". Normal current values for each section: 1 — 55-65 A, 2 — 55-65 A, 3 — 50-60 A, TAIL ROTOR - 15-20 A.*

Manual activation of the anti-icing system is done by setting switch [**B-2.4.1**] to "MANUAL", the windshield heating switch [**B-2.4.2**] to "ON", and switching on the "PITOT HEATING" on the circuit breaker panel [**B-4**] during flight if icing conditions exist (outside temperature +5°C or below) or if the "DE-ICING SYSTEM SWITCH ON" advisory light [**B-2.4.3**] is illuminated; To check the operation of the pitot heater and the ice detector, use the buttons [**B-3.4.1**] and [**B-3.4.2**] on the upper left panel.

# 10. Electrical equipment.

## 27V DC electrical system.

This system powers part of onboard equipment and provides energy for engine startup. The main sources of DC power are two generators, one installed on each engine. If needed, two backup batteries located in the helicopter's nose compartment serve as emergency power sources.

The controls and monitoring devices for the DC power sources are located in the DC section *[B-2.1]* on the upper central panel *[B-2]*.

> Before starting the engines, check the battery voltage using the voltmeter [**B-2.1.8**] by pressing the buttons [**B-2.1.6**] one after another. The voltage should not be below 24 V. The "EL. NETWORK ON BATTERY" switch [**B-2.1.3**] must be set to "OFF".
>
> To connect the generators to the onboard network, use switches [**B-2.1.1**] and [**B-2.1.5**] in sequence, after each engine is started. Once the generators are connected, check their voltage with the voltmeter [**B-2.1.8**] by setting the selector switch [**B-2.1.9**] to the appropriate lower position.
>
> If one generator fails, electrical consumers are automatically switched to the serviceable generator.
>
> If both generators fail, some electrical consumers are disconnected, but those essential for continued flight remain powered by the onboard batteries. If it becomes necessary to use the disconnected equipment, activate the "EL. NETWORK ON BATTERY" switch on the upper central panel [**B-2.1.3**].

## Single-phase AC electrical system, 115V, 400 Hz.

Supplies power to the ADF, radio altimeter, and manometers.

Main power for this network comes from the PO-250 converter. If it fails, the equipment automatically switches to AC generator power through a step-down transformer.

> The converter is switched on using the left switch [**B-2.2.1**] located on the upper central panel in the AC section [**B-2.2**];
>
> If the converter fails, the warning light [**B-2.2.7**] lights up. Emergency power from the generator is activated automatically. In this case, set the left switch [**B.2.2.1**] to the "GENERATOR" position.

### Three-phase AC power system, 36V, 400 Hz.

Provides power for the gyrohorizon and the gyromagnetic compass.

The main power supply for the network is the PT-125C converter. If it fails, the flight and navigation equipment automatically switches to power from the AC generator via a step-down transformer.

> The converter is switched on using the right switch [**B-2.2.1**] located on the upper central panel in the AC section [**B-2.2**];
>
> If the converters fail, the warning light [**B-2.2.8**] lights up. Emergency power from the generator is activated automatically. In this case, set the right switch [**B-2.2.1**] to the "GENERATOR" position.

### Three-phase AC power system, 208V, 400 Hz.

This system provides power for the heating elements of the main and tail rotor blade anti-icing systems, the cockpit glass heating, and the electric motors of agricultural equipment. The system uses a three-phase generator as the power source.

> The voltage level is monitored using the voltmeter [**B-2.2.2**]. If needed, it can be adjusted with the regulator [**B-2.2.4**].

## 11. Lighting equipment.

### External lighting signals.

These lights ensure the helicopter stays visible both in flight and on the ground. The system includes two side and one tail navigation lights, along with a flashing beacon.

> The navigation lights and beacon are switched on from the upper left panel [**B-3**];
>
> The brightness of the navigation lights is selected with the "BRIGHT–DIM" selector-switch [**B-1.17.3**] on the lower left electrical panel [**B-1.17**] of the main instrument panel [**B-1**].

### Landing and taxi light.

Used to illuminate the ground during taxiing, takeoff, and landing operations.

> The landing and taxi light is activated using two switches located on the upper left panel [**B-3**];
>
> The light's brightness is selected using the "LANDING-TAXI" selector-switch [**B-1.17.2**] located on the lower left electrical panel [**B-1.17**] of the main instrument panel [**B-1**];

The direction of the light beam is controlled by a button on the collective pitch and throttle control lever.

### Cargo floodlight.

This light is used to brighten the loading and unloading area.

- The light is activated from the upper left panel [**B-3**].

### Cockpit and interior lighting system.

This system is used to illuminate instruments, lets you adjust the brightness of instrument panels, and offers general illumination for the cabin and interior during nighttime. It features red instrument lighting and main cabin illumination.

Red lighting is activated by three switches "RED LIGHT" on the circuit breaker panel [**B-4**];

The brightness of the red illumination for control panels, consoles, and instruments is adjusted using four knobs on the red illumination adjustment panel [**B-6**];

The brightness of the indicator lights is controlled by the selector-switch [**B-2.6.3**];

Main cabin and interior lighting can be switched on from the upper left panel [**B-3**], as well

## 12. Radio navigation equipment.

Used to provide navigation support during departure, enroute flight and approach procedures. The radio navigation equipment includes the ADF and a radio altimeter. The equipment operates on 115V AC power.

The ADF is used to determine the relative bearing of radio stations and is essential for navigation using non-directional beacons (NDB) and for NDB approaches. The ADF indicator is the combined with gyromagnetic compass indicator [**B-1.3**]. The gauge is mounted on the pilot's instrument panel.

The ADF is controlled and powered on using the control panel [**B-3.2**], located on the upper left panel [**B-3**];

Pilots can listen to NDB signals through their headsets by setting the source selector switch [**B-8.2**] to RK1.

The RW-3 low radio altimeter measures flight height (surface clearance) and warns the pilot when descending below the preset height.

# 13. Communication equipment.

Intended for communication between crew members, with other aircraft, and with ground services. It includes the interphone control unit, as well as VHF and HF radios.

The interphone control unit is used for internal crew communication, access to external radio communication, and for checking ADF signals. Additionally, it provides an aural "Dangerous height" alert to the pilot's headset from the radio altimeter. The communication system is controlled using interphone control unit [**B-8.2**] mounted at the ceiling of the pilot's cockpit, as well as the "RADIO" [**A-1.1.4**] and "INTERCOM" [**A-1.1.3**] buttons located on the collective pitch and throttlecontrol lever [**A-1.1**];

The VHF radio is used for communication between the crew and air traffic control. Radio operation is managed from the control unitx [**B-1.18**] located on the instrument panel [**B-1**].

The HF radio is used in areas where VHF communication is not available.

# 14. Flight and navigation equipment.

Used to display flight parameters. It includes: magnetic compass [**B-8.1**], airspeed indicator [**B-1.7**], barometric altimeter [**B-1.2**], variometer [**B-1.9**], clock [**B-1.19**], gyrohoryzon [**B-1.8**] and gyromagnetic compass [**B-1.3**]. All flight navigation instruments are located on the main instrument panel [**B-1**].

* *For detailed information, refer to the "Cockpit components" section of this manual.*

# 15. Heating and ventilation system.

This system manages the internal temperature of the helicopter. It features two heat exchangers, an air supply fan, an air intake, hot air supply ducts with shut-off valves , an overhead heating duct for the passenger cabin, and an air duct directing warm air to the pilot's feet.

When the outside air temperature is low, hot air taken from the engine compressors is used. In ventilation mode, the hot air supply from the engine compressors is shut off with valves, and fresh air is drawn from outside through an open flap and distributed by the fan through the heating system's ducts.

Cabin heating activation:

* *switch on the circuit breakers located on the upper right panel **[B-4]** then lift the air intake duct shutter handle upwards **[B-8.3.1]**. This closes off atmospheric air intake;*
* *open the hot air supply valves from the engine compressors **[B-8.3.2]**, open the heat exchanger dampers **[B-8.3.3]** and the damper for warm air flow to the pilot's feet **[B-8.3.4]**;*
* *if you need to turn on the cabin air supply fan, activate the switch on the upper right panel **[B-4]**.*

Part 2

# Flight operations.

# A Operating recommendations

1 - mass and center of gravity
2 - maximum allowable wind speeds
3 - bank angle
4 - altitude
5 - indicated airspeed
6 - power plant operating parameters
7 - instrument flight rules (IFR) conditions

## 1. Mass and center of gravity.

| | |
|---|---|
| maximum takeoff weight | 3700 kg |
| cargo weight in cabin | 0 - 700 kg |
| extreme forward center of gravity | 185 mm in front of the main rotor axis |
| extreme aft center of gravity | 10 mm behind the main rotor axis |

## 2. Maximum allowable wind speeds.

### 2.1 Headwind:

| | |
|---|---|
| engine start and shutdown | up to 15 m/s |
| takeoff and landing | up to 15 m/s |
| taxiing | up to 12 m/s |
| hovering | up to 15 m/s |

### 2.2 Crosswind:

| | |
|---|---|
| engine start and shutdown | 5 m/s |
| takeoff and landing | up to 7 m/s |
| taxiing | up to 12 m/s |
| hovering | up to 7 m/s |

### 2.3 Tailwind:

| | |
|---|---|
| engine start and shutdown | 0 during engine start, up to 5 m/s during shutdown |
| takeoff and landing | up to 5 m/s |
| taxiing | up to 12 m/s |
| hovering | up to 7 m/s |

## 3. Bank Angle.

| | |
|---|---|
| under standard conditions | up to 30° |
| for takeoff weight under 3550 kg at speeds of 100–150 km/h | up to 45° |
| in the self-rotation mode of the main rotor | up to 20° |

## 4. Altitude.

| | |
|---|---|
| flight altitude | up to 4000 m |
| IFR | up to 2500 m |
| hovering altitude | up to 10 m |

# 5. Indicated airspeed.

## 5.1 Climb speed.

| | |
|---|---|
| 0 - 1000 m | 60 - 175 km/h |
| 2000 m | 60 - 140 km/h |
| 3000 m | 70 - 90 km/h |
| 4000 m | 70 - 90 km/h |

## 5.2 In level flight with temperatures below 25˚C at altitudes below 1000 m.

| | |
|---|---|
| at ground level | 0 - 210 km/h |
| 500 m | 40 – 210 km/h |
| 1000 m | 40 – 200 km/h |

## 5.3 In level flight with temperatures of 25˚C or above at altitudes below 1000 m.

| | |
|---|---|
| at ground level | 0 – 180 km/h |
| 500 m | 40 - 180 km/h |
| 1000 m | 40 - 180 km/h |

## 5.4 In level flight above 1000 m at any temperature.

| | |
|---|---|
| 1000 - 1500 m | 40 - 180 km/h |
| 2000 m | 40 - 160 km/h |

| | |
|---|---|
| 3000 m | 60 - 120 km/h |
| 4000 m | 70 - 90 km/h |

### 5.5 Normal gliding speed.

| | |
|---|---|
| 4000 m | 70 - 90 km/h |
| 3000 m | 70 - 90 km/h |
| 2000 m | 60 - 140 km/h |
| 1000 m | 60 - 175 km/h |
| 0 - 500 m | 50 - 175 km/h |

### 5.6 Glide speed corresponding to minimum rate of descent.

| | |
|---|---|
| 4000 m | 80 km/h |
| 3000 m | 90 km/h |
| 2000 m | 95 km/h |
| 1000 m | 100 km/h |
| 0 - 500 m | 100 km/h |

# 6. Power plant operating parameters.

* *The engine operating mode is determined by the main rotor speed. The following are the corresponding modes and main rotor speed:*
*40-60% - idle throttle power*
*78 - 80% - takeoff power*
*81 - 83% - nominal power*
*83 - 84% - cruise power*

## 6.1 Engine oil temperature.

| | |
|---|---|
| at start-up | no less than 40˚C |
| at idle mode | no less than 30˚C |
| recommended for cruise mode | 60 - 140˚C |
| limits for cruising mode | 60 - 150˚C |

## 6.2 Main gearbox oil temperature.

| | |
|---|---|
| at start-up | no less than 25˚C |
| at idle mode | no less than 5˚C |
| recommended for operating modes | 80˚C |
| limits for operating modes | 30 - 90˚C |

## 6.3 Engine oil pressure.

| | |
|---|---|
| at idle mode | no less than 1.5 kgf/cm² |
| at operating modes | 2,5 - 3,5 kgf/cm² |

## 6.4 Main gearbox oil pressure.

| | |
|---|---|
| at idle mode | no less than 1.2 kgf/cm² |
| at operating modes | 2 - 8 kgf/cm² |

## 6.5 Continuous operation time.

| | |
|---|---|
| at idle mode | 20 minutes |

| | |
|---|---|
| at cruise mode | no limit |
| at nominal mode | 60 minutes |
| above nominal mode | 6 minutes |

### 6.6 Turbine inlet temperature.

| | |
|---|---|
| idle | max 790˚C |
| takeoff | max 970˚C |
| nominal | max 925˚C |
| cruise | max 890˚C |
| start-up | as per the graph |

### 6.7 Main rotor RPM.

| | |
|---|---|
| throttle control twist grip at right position | 78 - 84% |
| momentary at transient condition | 76 - 86% |
| momentary at idle mode | max 92% |

## 7. In IFR conditions.

### 7.1 Climb indicated airspeed.

| | |
|---|---|
| 0 - 2500 m | 110 - 120 km/h |

### 6.6 Level flight indicated airspeed.

| | |
|---|---|
| 0 - 1000 m | 100 - 180 km/h |

| | |
|---|---|
| 1000 - 2000 m | 100 - 150 km/h |
| 2000 - 2500 m | 100 - 120 km/h |

## 7.2 Descent indicated speed.

| | |
|---|---|
| 2000 - 2500 m | 110 - 120 km/h |
| 0 - 2000 m | 110 - 140 km/h |

* *Flights in icing conditions are allowed only when outside air temperature is no lower than -6˚C.*

# B Flight operations

**1 -** preparing to start the engines
**2 -** engine start-up
**3 -** after engine startup
**4 -** warming up and engine test
**5 -** taxiing
**6 -** hovering
**7 -** takeoff
**8 -** climb
**9 -** level flight
**10 -** descent
**11 -** landing
**12 -** taxi to parking area
**13 -** shutting down the engines

## 1. Preparing to start the engines.

| | |
|---|---|
| flight controls | check for smooth movement |
| trims | neutral position |
| separate engine throttle control and test levers | neutral, latched |
| collective pitch-throttle control lever | at the lower limit stop |
| throttle control twist grip | full left position |
| wheel brake | brake on |
| pneumatic system | charged, pressure 50 kg/cm² |
| main rotor brake lever | on lower limit stop |
| altimeter setting | check |
| clock | wind up, turn on and set the time |

| | |
|---|---|
| fuel quantity | as required |
| electrical consumers | off |
| ground power / batteries | on, check voltage |
| "EL. NETWORK ON BATTERY" switch | off |
| annunciators | check |
| circuit breakers required for start-up | on |
| engine anti-icing system | check, off |
| pitot heating | check, off |
| fire extinguishing system | check, on |
| 115V converter | on |
| hydraulic system | on |

## 2. Engine start-up.

| | |
|---|---|
| beacon light | on |
| fuel pumps | check both |
| fuel pump No. 1 | on |
| fire shutoff valves | open |
| "START-RUNNING" switch | set to "START" |
| engine selector switch | select engine to start |

| | |
|---|---|
| engine start button | press |
| "STARTING CONTINUES" indicator | lights up |
| fuel shut-off valve lever | set to "OPEN" |
| oil pressure | increases to 1.5–3.0 by end of start |
| "STARTING CONTINUES" indicator | lights off |
| started engine generator | on |
| RPM of running engine | increase to 80–85% |
| engine selector switch | select the engine that not running |
| engine start button | press |
| "STARTING CONTINUES" indicator | lights up |
| second engine fuel shut-off valve lever | set to "OPEN" |
| oil pressure | increases to 1.5–3.0 by end of start |
| "STARTING CONTINUES" indicator | lights off |
| second started engine generator | turn on |
| engine selector switch | set to neutral position |

## 3. After engine start-up.

| | |
|---|---|
| generators | check on |

| | |
|---|---|
| "EL. NETWORK ON BATTERY" switch | off |
| 36V, 115V converters | on |
| fuel pump No. 1 | check and on |
| hydraulic system | on, pressure 63–82 |
| gyrohorizon | on and uncaged |
| radio altimeter | on |
| gyrosyn compass | on and slaved |
| ADF | on and tuned |
| VHF radio | on and tuned |
| engine operating parameters | check and within limits |
| throttle control twist grip | right position |
| engine, windshield, main and tail rotor anti-icing | activate if required |
| pitot heating | activate if required |

# 4. Warming up and engine test.

| | |
|---|---|
| collective pitch-throttle control lever | on lower limit stop |
| throttle control twist grip | full left position |
| RPM | 57% ± 3% |
| hydraulic system | pressure 63–84 kg/cm² |

| | |
|---|---|
| engine oil temperature | not below +30˚C |
| main gearbox oil temperature | not below +5˚C |
| throttle control twist grip | full right position |
| engine throttle control lever #2 | on lower limit stop |
| engine throttle control lever #1 | move up until the throttle control twist grip starts to turn to the left |
| collective pitch-throttle control lever | set RPM at 84% for 10 seconds |
| collective pitch-throttle control lever | set RPM at 82% for 10 seconds |
| collective pitch-throttle control lever | set RPM at 79% for 10 seconds |
| collective pitch-throttle control lever | on lower limit stop |
| * *At each mode, check that the powerplant parameters match the values specified in tables **A-6.1** - **A-6.7** of this section* | |
| throttle control twist grip | full right position |
| engine throttle control lever #1 | on lower limit stop |
| engine throttle control lever #2 | move up until the throttle control twist grip starts to turn to the left |
| collective pitch-throttle control lever | set RPM at 84% for 10 seconds |
| collective pitch-throttle control lever | set RPM at 82% for 10 seconds |
| collective pitch-throttle control lever | set RPM at 79% for 10 seconds |
| collective pitch-throttle control lever | on lower limit stop |
| * *At each mode, check that the powerplant parameters match the values specified in tables **A-6.1** - **A-6.7** of this section* | |
| engine throttle control lever #1 and #2 | locked in neutral position |

| | |
|---|---|
| throttle control twist grip | full left position |
| * *Confirm that both engines are set to idle* | |

# 5. Taxiing.

| | |
|---|---|
| chocks | removed |
| instrument readings | normal |
| collective pitch-throttle control lever | on lower limit stop |
| taxi light | on |
| throttle control twist grip | right position |
| main rotor RPM | 73-80% |
| * *Smoothly push the control stick forward to initiate forward motion. Make turns with smooth pedal input. Maximum taxi speed allowed is 10 km/h.* | |

# 6. Hovering.

| | |
|---|---|
| trims | -1° right, -1° back |
| wind direction | check, headwind |
| throttle control twist grip | full right position |
| main rotor RPM | 73-80% |
| * *Gently move the collective pitch-throttle control lever upward to lift the helicopter off the ground and reach the designated hover altitude (not more than 10 m). Once airborne, maintain control to prevent unwanted turning, banking, or moving using the flight controls. When you reach the required altitude, stop climbing by gradually reducing the collective pitch and maintain the hover altitude. Then, begin a descent to land or proceed with takeoff.* | |

# 7. Takeoff.

| | |
|---|---|
| trims | -1° right, -1° back |
| wind direction | check for headwind |
| throttle control twist grip | full right position |
| main rotor RPM | 73-80% |
| * ***Vertical takeoff:*** *perform the hover procedure [5]. Gently push the control stick forward to begin acceleration while gradually increasing engine power. Climb steadily as you pick up speed. Once you reach 50 meters, the recommended speed is 100 km/h;*<br>* ***Running takeoff:*** *push the control stick forward and, while smoothly raising the collective pitch-throttle control lever, start the takeoff run until you reach 30–50 km/h. Continue lifting the collective pitch-throttle control lever to take off. After liftoff, continue accelerating to 100 km/h and climb to the desired altitude.* | |

# 8. Climb.

| | |
|---|---|
| indicated airspeed | according to the table **A-5** |
| engine mode | recommended nominal |
| * *Time of climb at modes above the nominal should not exceed 6 minutes.* | |
| main rotor RPM | 79-84% |
| * *After reaching the required altitude, continue horizontal flight by setting the required speed with the control stick, and then smoothly using the moving collective pitch-throttle control lever set the engine operating mode corresponding to the desired speed.* | |

# 9. Level Flight.

| |
|---|
| * *Depending on the flight altitude and outside air temperature, level flight is performed within the speed ranges detailed in tables A-5 of this section. Maximum flight range is achieved at 180 km/h between altitudes of 50 and 1000 meters when outside temperatures are 25°C or higher, and at 190 km/h when temperatures are below 25°C. At altitudes above 1000 meters, maximum range is reached at maximum level flight speed.* |

## 10. Descent.

| | |
|---|---|
| * *The primary helicopter descent mode is gliding with engines running.* | |
| radio altimiter | on |
| safe altitude | set |
| altimiter | ground pressure |
| indicated airspeed | according to the table **A-5** |
| descent rate during gliding descent | 3–5 m/s down to 10 meters altitude,<br>0.2 m/s below 10 meters |
| descent rate during vertical descent | 3 m/s down to 10 meters altitude,<br>0.2 m/s below 10 meters |

## 11. Landing.

| | |
|---|---|
| wind direction | check for headwind |
| * ***Vertical landing:*** *starting from 100 meters height, gradually pull the control stick toward you so that by 50 meters, your indicated airspeed is 50 km/h. As you descend through 5–8 meters, continue pulling the stick smoothly while also increasing the collective pitch to reduce both forward and vertical speeds, bringing the helicopter to a hover at 2–3 meters. Gently lower the collective pitch so that the rate of descent does not exceed 0.2 m/s before the wheels touch the ground. Once on the ground, reduce the collective pitch to its minimum position.*<br>* ***Running landing:*** *glide at an indicated airspeed of 110 km/h. From 50 meters, gradually reduce indicated airspeed to 60 km/h by pulling back on the control stick. At 30 meters, further reduce forward speed and rate of descent so that at 1 meter, airspeed is 40 km/h and rate of descent is no more than 0.2 m/s. Land smoothly on the main wheels, then gently lower the nose wheel and reduce the collective pitch of the main rotor to minimum. Use the main rotor (by pulling back on the control stick) and the wheel brakes to brake the helicopter and thus reduce the landing roll.* | |

## 12. Taxiing to parking area.

| | |
|---|---|
| collective pitch-throttle control lever | on lower limit stop |
| taxi speed | no more than 10 km/h |

### At parking position:

| | |
|---|---|
| parking brake | set |
| landing light | off |
| electric consumers | off, except for powerplant control gauges |
| throttle control twist grip | full left position |
| engines | idle throttle mode |
| * *Allow the engines to cool down at idle for 4–5 minutes* | |
| trim | 1 degree to the right; -1 degree back |

## 13. Shutting down the engines.

| | |
|---|---|
| converters | off |
| generators | off |
| fuel shut off valve levers | set to «CLOSED» |
| * *wait until the engines come to a complete stop* | |
| fire shutoff handles | close |
| fuel pumps | off |
| beacon and navigation lighting | off |
| main circuit breakers | off |
| batteries | off |

| | |
|---|---|
| main rotor brake | set |
| wheel chocks | set |