Mil Mi-2

For MS Flight Simulator 2004

Operation Manual

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GENERAL INFORMATION

Mil Mi-2 is a light multi-purpose twin-turbine helicopter, intended direct air support, antitank, armed reconnaissance, transport, medevac, airborne command post, mine laying, and training.

The first prototype, the V-2 (NATO reporting name Hoplite), flew in September 1961. Mi-2 was developed by the Mil bureau in the former Soviet Union, but based on an agreement from 1964, further development, production and sales of this type was passed over to Poland (as part of an Eastern-Europe Comecon rationalization programme) and the PZL Swidnik aircraft factory started the production. Over 5000 of these aircraft were built and it remained in production until 1985.

Due to its wide range utilization and low maintenance requirements the Mi-2 is popular and used by many country such as Azerbaijan, Burma, Bulgaria, CIS, Cuba, Czech Republic, Georgia, Germany, Ghana, Hungary, Libya, Nicaragua, Poland, Slovakia, Syria, Ukraine

Variants:

Mi-2R: Ambulance version

Mi-2T: Transport version

Mi-2URN: Armed reconnaissance variant, employs 57-mm unguided rockets, and mounts a gunsight in the cockpit for aiming all weapons.

Mi-2URP: The antitank variant. Carries 4x AT-3 Sagger wire-guided missiles on external weapons racks, and 4x additional missiles in the cargo compartment.

Mi-2US: The gunship variant, employs an airframe modification that mounted a 23-mm NS-23KM cannon to the portside fuselage. Also employs 2x 7.62-mm gun pods on external racks, and 2x 7.62-mm pintle-mounted machineguns in the cabin.

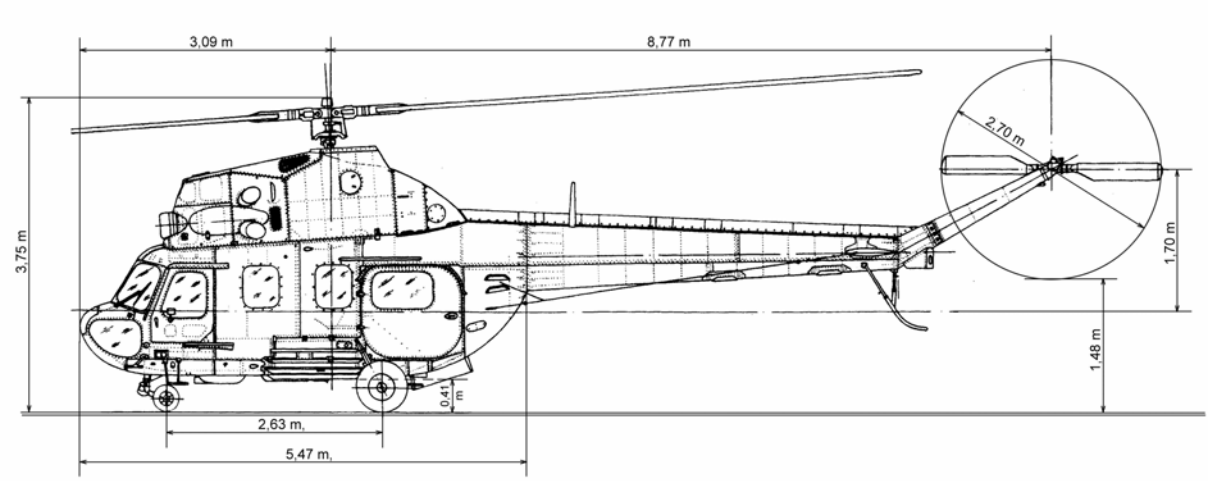
This addon represents an ambulance and two (9 seats military and 7 seats civilian) transport versions. The ambulance variant is based on the Budapest Aircraft Service's (BAS) HA-BGH rescue helicopter which is used by Hungarian Ambulance and Emergency Service. Its base is at Szeged Airport (LHUD) and responsible for the south-east region of Hungary.

The military version has russian, the civil version has english and the BAS version has hungarian panel configuration.

The helicopter has a three-bladed main rotor and a two-bladed tail rotor. The main rotor blades featured a metal spar and either metal or fibreglass skinning, both the main and tail rotors have electrical de-icing.

The Mi-2 has fixed landing gears with air-braked twin wheels on the nose gear and single wheels on the main gear.

Dimensions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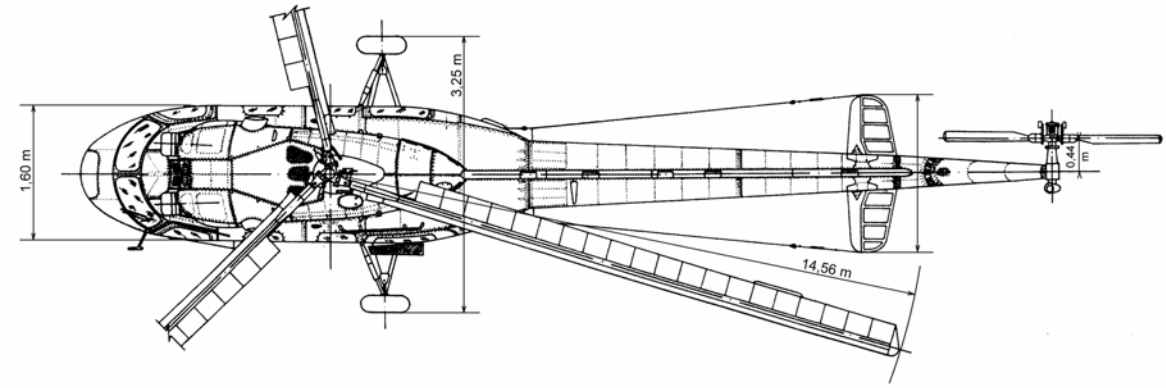
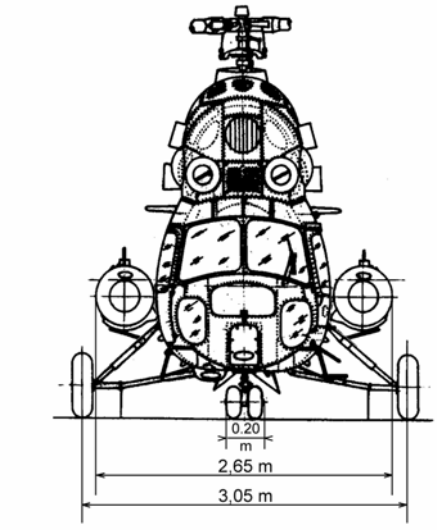
8,77 m
2,70 m
3,75 m
1,70 m
1,48 m
0,41 m
2,63 m,
5,47 m,


3,25 m
1,60 m
0,44 m
14,56 m


0.20 m
2,65 m
3,05 m

SYSTEMS OVERVIEW

Engines

The helicopter is powered by two Isotov GTD-350 400 Shp engines (2 x 300 kW), also manufactured by the Polish PZL Company under a licence (PZL-Rzeszow). The maximum certified performance is 2 x 320 shp at one hour continuous flight and the normal cruise performance is 2 x 285 shp. The turbine's revolution is controlled automatically and it is 23100-24900 RPM. It means 78-84% rotor RPM.

The engine starting is automatic and can be executed from the batteries, external power and a working engine's generator.

The performance could be setup with the collective lever, the rotor RPM handle and the separated throttle levers. During normal flight only the collective lever is used. The other two method is only for ground and emergency operations.

Fuel System

The main fuel tank is a 600L (158 US gallons) rubber tank and it is situated in the cabin under the passenger seats. The main and the auxiliary fuel pumps are attached to the bottom of the main tank. The auxiliary pump operates automatically when the main pump fails. Two 119L (31,5 US gallons) external auxiliary tanks can be attached to the fuselage and they are connected to the main tank with free-flux connection. The fuel quantity indicator measures only the main tank's fuel quantity so until the auxiliary tanks aren't exhausted it shows only that the main tank is full. The fuel valves can be opened with the two red fuel control lever which are on the floor at the right side of the pilot.

Oil System

The MI-2 helicopter has three oil tanks and every oil tank has its own cooler-radiator and oil pump system. Two ring-shaped oil tanks provide oil for the two turbines and are situated at the turbines' air intakes. The turbine-heated oil is cooled down in the cooler-radiators by an air ventilator between the turbines. An additional oil tank is for the alternator near the main gearbox.

Air System

The air system provides air for the air brakes of the landing gears and it is filled by a compressor which is connected to the alternator. It can be filled also from ground air supply.

Air-cooling system

This system cools the starter generators, the A.C. generator and the main shafts' pivots. The ventilator intake of this system can be seen on the front of the helicopter between the turbine inlets. The ventilator is connected directly to the alternator so it operates automatically and can't be overridden by the pilot.

Fire Fighting System

The fire fighting system consists of two main sections: the sensors with the extinguisher-heads and the tanks. One tank is in the radio chamber and two others are under the alternator's covering panel. Every tank connected to all of the controlled systems via the electromagnetic valves. There are sensors in the main

gearbox and the separated turbine chambers. The first tank is automatic (take action at 150 $C^{o;}$ or $2C^{o}$/sec temperature difference) and the other two is manual.

Hydraulic System

The Mi-2 has one hydraulic system which is pressurized by a hydraulic pump. The hydraulic pump is driven by the alternator and operates only when at least one of the engines are working. It can be feed also by ground hydraulic supply (during ground operations).

Ice-protection System

This system functions are the heating of the main and tail rotor blades, the turbine-intakes, the pitots, the pilot-side windshield and the batteries

The de-icing of the blades, the battery aperture and the windshield are electrical and powered by a 208V 400Hz one-phase AC generator which is connected to the alternator.

The turbine-intakes are hated by the warm air which is lead away from the compressors of the turbines.

The Mi-2 uses the RIO-3 ice alerting system (similar to the one used on Mi-17s) which sensor is in the oil-cooler ventilator's intake. If the RIO-3 is in automatic mode the signal of the sensor operates the connected de-icing systems (main and tail rotor, turbines) and if it is in manual mode the de-icing is always on. But notice that the automatic is only able to turn online the de-icing systems, those can be turned off only manually. The de-icing of the turbines also can be turned on separately. Windshield de-icing and the battery heating are only manual.

The pitot heating is powered by the 27V DC rail and can be turned on manually.

Operation of the de-icing system is forbidden under 78% rotor RPM.

DC Electrical System

The DC system is the main electrical system of the Mi-2 helicopter. Most of the consumers use this power directly or indirectly via the 115V and 36V transformers except the rotor filaments and the windshield heater.

It consists of two 24V batteries situated in the nose and two 27,5V 3KW generator which are on the turbines and they also function as starter engines.

Most consumers get power from 24 volt main bus. From battery bus a 115V one-phase 400Hz PO-250 converter and a 36V PT-125 three-phase 400Hz converter feeds 115V and 36V instruments. The radio equipments, the radio altimeter and the pressure meters are connected to the 115V; the attitude indicator and the gyro-compass are connected to the 36V.

AC Electrical System

The AC system's function is to direct feed the de-icing systems and the other contingent AC consumptives (agricultural or weapon equipments). It also powers the DC consumptives if engines and the generator are operating. The generator is a 208V three-phase 400Hz AC generator which is connected to the alternator and operational only above 78% rotor RPM.

SPECIFICATIONS

Country of Origin:	Russia (Soviet Union), MIL Design Bureau Moscow
Builder:	PZL Swidnik
Date of Introduction:	1965
Role:	Transport, cargo, reconnaissance, trainer, search and rescue, liaison, armed support
Blades Main rotor:	3
Tail rotor:	2
Rotor diameter:	14.6 m (48 ft)
Length rotors turning:	17.4 m (57 ft)
Fuselage:	11.9 m (39 ft)
Height:	3.7 m (12 ft)
Weight:	
Maximum Gross:	3700 kg (8157 lbs)
Normal: Takeoff:	3550 kg (4826 lbs)
Empty:	2372 kg (5229 lbs)
Engines:	2x 400-shp PZL GTD-350 (series III and IV) turbo-shaft
Performance:	
1 hour max. continuous:	2x320 shp
Normal cruise:	2x285 shp
Maximum speed:	220 km/h (118,8 kts)
Cruising speed:	194 km/h (104,7 kts)
Fuel Internal:	600 litres (158,5 US gallons)
External Fuel Tank:	238 litres ea. (62,9 US gallons)
Range Maximum Load:	580 km (313 nm)
Normal Load:	340 km (184 nm)
With Aux Fuel:	790 km (427 nm)
Ceiling Service:	4000 meters (13123 ft)
Hover (out of ground effect):	1000 meters (3281 ft)
Hover (in ground effect):	2000 meters (6562 ft)
Vertical Climb Rate:	4.5 m/s (886 ft/min)
Standard Payload:	Transports 6-8 passengers or 700 kg (1543 lbs) internal cargo or 800kg (1764 lbs) external load on 4x external hardpoints.

LIMITATIONS

Airspeed in dry weather conditions:

Altitude (m)	Indicated airspeed (km/h)			
	Max. weight 3550 kg		Max. weight 3551-3700kg	
	Min.	Max.	Min.	Max.
0-20	0	70	0	70
500	40	210	40	190
1000	40	200	50	180
2000	40	160	60	140
3000	60	120	70	110
3500	65	105	80	100
4000	70	90	-	-

Sideward and rearward moving speed must be less than 10 km/h.

In rainy weather the airspeed limit is 150 km/h.

The vertical speed is not limited during sloping descend but on hovering descend the maximum allowable descend rate is 3 m/s.

The helicopter is allowed to be flown only in less than 18 m/s wind speed

During takeoff and landing procedure the cumulative wind speed couldn't exceed 5 m/s.

Maximum altitude with 3550kg gross weight is 4000m and 3500m with 3550-3700 kg gross weight under standard weather conditions.

Rotor RPM:

Length of time	Revolutions (%)	
	Min.	Max.
short	76[x]	86[xx]
long	78	84

x: max. 15 sec
xx: max. 30 sec

Maximum allowable roll rate is 30^{o}.

Maximum allowable turning speed during hover (zero airspeed) is 20^{o}/sec. Normal turning rate is $11,5^{o}$/sec which means a full turn around in 32 sec.

The helicopter is not certified for one engine operations.

Warning: Air acrobatics FORBIDDEN!

Engine RPM limitations for max. 6 min. operation time (takeoff mode):

Outside air temperature (C^o)	RPM of the compressor (%)
-50	93
-40	93
-30	94
-20	95
-10	96
0	96
10	97
15	97
20	98
25	97
30	96
40	95
50	94

The engine RPM mustn't exceed 101% under any circumstances.

Engine RPM limitations for max. 1 hour continuous operation time (extended mode):

Outside air temperature	RPM of the compressor (%)
-50 – -40	84
-40 – -15	87
-15 – +60	90

Engine RPM limitations for continuous operation without time limitation (cruise mode):

Outside air temperature	RPM of the compressor (%)
-50 – -40	82
-40 – -15	85
-15 – +60	89

Turbine oil temperature: min. 30^o
max. 140^o

Alternator oil temperature: max. 90^o

Turbine oil pressure: min. 2,5 KPa/cm^2
max. 3,5 KPa/cm^2

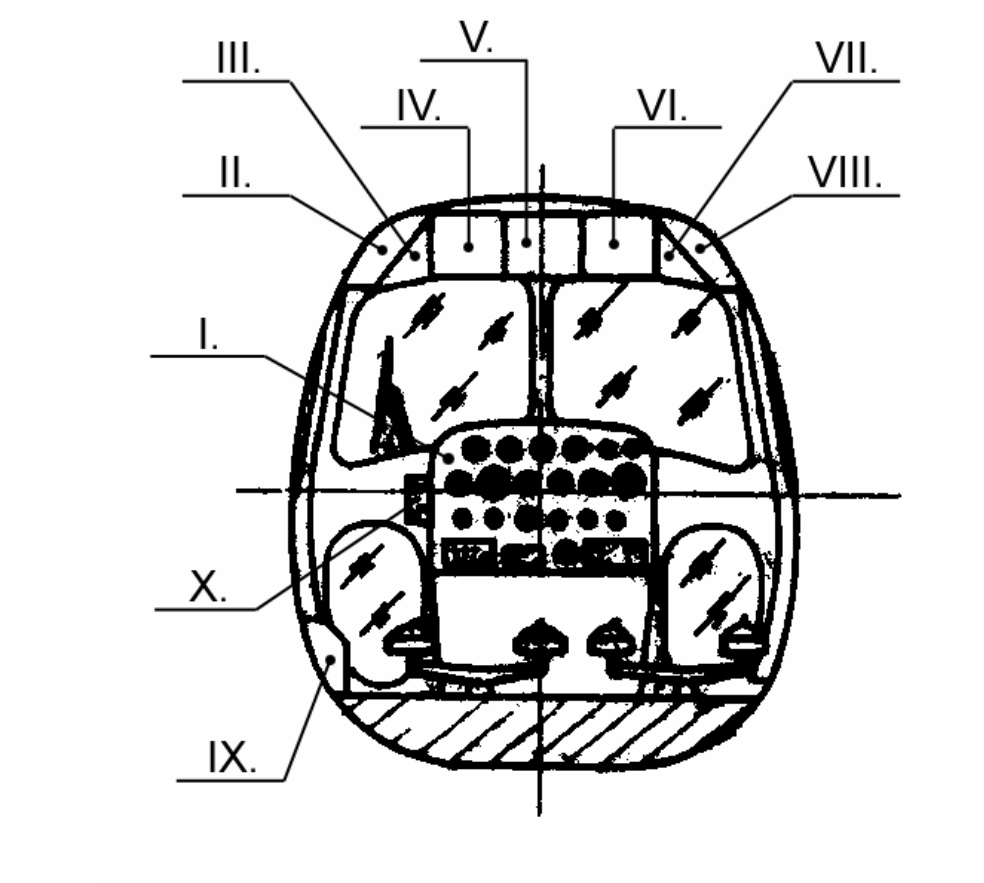
Alternator oil pressure: min. 2 KPa/cm^2
max. 8 KPa/cm^2

Continuous operation time:

- Takeoff mode: 6 min
- Extended mode: 60 min
- Cruise (normal) mode: no limit
- Neutral: 20 min

INSTRUMENTS

Overview



I. – Main Panel

II. – Left Side Fuses *(and ADF receiver in HA-BGH)*

III. – Fire-fighting System

IV. – DC Electronics

V. – Hydraulics System, De-Ice System and AC Electronics

VI. – Engine Starter Automatics and Interior Lights

VII. – Red Lightings *(Not operational)*

VIII. – Right Side Fuses

IX. – Air System

X. – Radio panel *(in military version)*

Main Panel

1a. RV-3 radio altimeter.

1b. RV-3 fail annunciator. Signs on radio altimeter malfunction or above 300m.

2. Altimeter. Shows the altitude in meter. (x1000 and x100m)

3. VOR indicator (radio compass in HA-BGH)

4a. Fuel quantity indicator. (x100l)

It only measures the fuel quantity of the main tank. Until the auxiliary fuel tanks aren't empty it is on maximum.

In the military version it is the place of a combined ADF/VOR2 indicator, the fuel quantity indicator and its annunciator are at the bottom-right corner of the main panel. (where the UKV2 is in HA-BGH)

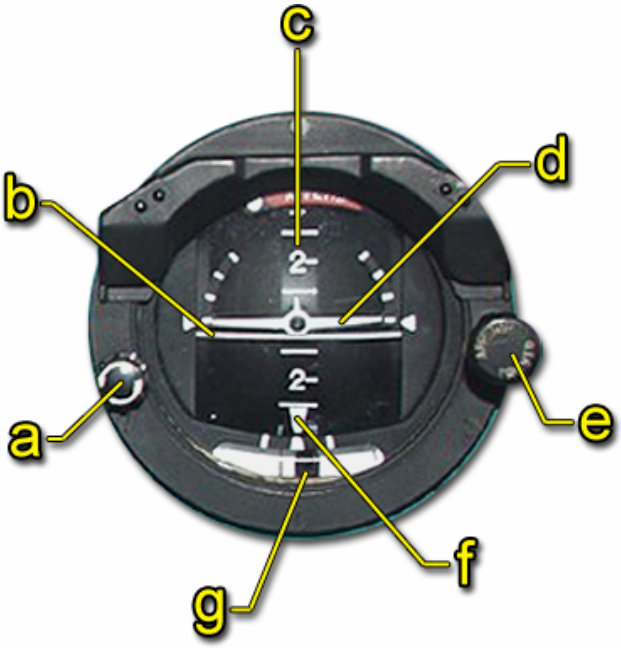
4b. "Fuel low" annunciator. Annunciates if there is less than 100l fuel in the main tank (fuel consumption on reserve).

5. Alternator oil temperature. (C^o)

6. Alternator oil pressure. (KPa/cm^2)

7. Airspeed indicator. (km/h)

8. Attitude indicator.



   a. Centre line setting knob
   b. Centre line
   c. Pitch angle indicator (x10 degrees; max. 90°)
   d. Bank angle indicator. (15 degrees between scale lines → max. 45°)
   e. Attitude cage lock/release lever (not featured)
   f. Bank coordinator
   g. Turn coordinator

9. Vertical speed indicator. (m/s)
10. Turbine RPM. (%)

    "I" needle indicates the N#1 turbine RPM
    "II" needle indicates the No#2 turbine RPM

11. Rotor RPM. (%)
12. Trim setting indicator.

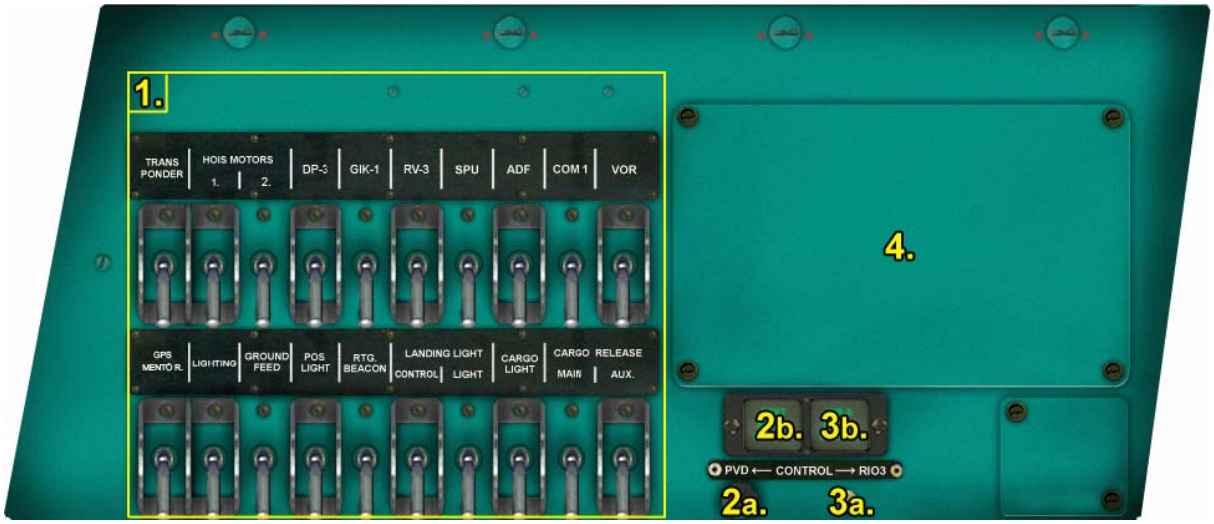
    The left needle belongs to the roll trims and the right needle shows the banking trims setting.

13. Rotor pitch (degrees)
14. Turbine oil temperature indicator (C°)
15. Turbine oil pressure indicator (KPa/cm^2)
16. Turbine gas temperature indicators (C°)

17. Front control panel
    a. Pressure meter main switch
    b. Position lights — Up → ON
    c. Landing light — Down → OFF
    d. RV-3 radio altimeter main switch
    e. Wiper
    f. Blinker
18. Combined communication (Com1) and navigation (Nav1) radio (UKV1 in HA-BGH)
19. Clock
20. General fire warning
21. Cargo inhibited annunciator
22. Cargo released annunciator
23. Icons button. Press to evoke the icons panel

Left to right: main panel; IFR panel; left overhead; fire fighting system (*and radios in the military version*); DC electronics; AC electronics; engine starter; right overhead

Left Overhead Panel



1. Fuses.

   These switches are safety automats and the main switches of the indicated systems.

2a. Pitot heater test button.

   2b. Pitot heater function annunciator

3a. RIO-3 test botton

   3b. RIO-3 function annunciator

(4. ADF receiver in HA-BGH)

1. ADF frequency display
2. ADF receiver main switch
3. Frequency setup knob (100 Khz)
4. Frequency setup knob (10 and 1 Khz)
5. Signal strength indicator

Fire Fighting System

1a. Fire fighting system switch. A three-position switch.

Center → OFF
Down → System check
Up → Fire system online

1b. System check annunciator. It lights when the system switch is in '"CHECK" position and the system is OK

2a. Activation button of the second extinguisher tank. (The first is activated automatically.)

2b. "Second extinguisher tank activated" annunciator

3a. Activation button of the third extinguisher tank.

3b. "Third extinguisher tank activated" annunciator

4. "Automatically controlled extinguisher tank activated" annunciator

5. General fire warning

6. Common electromagnetic valve of the fire fighting system is opened

7. Fire in the left engine annunciator

8. Fire in the gearbox annunciator

9. Fire in the right engine annunciator

10. Manual control button of the electromagnetic valve connected to the left engine.

11. Manual control button of the electromagnetic valve connected to the alternator.

12. Manual control button of the electromagnetic valve connected to the right engine

DC Electronics

1. Left generator switch

2a. Ammeter switch. Three-position switch

Center → OFF
Down → Ammeters (2b; 2c) on the batteries
Up → Ammeters on the generators

2b. Shows the current-strength of the left generator or left battery.

2c. Shows the current strength of the right generator or right battery.

3. Battery switch

4. Power source switch Three-position switch

Center → OFF
Down → DC bus is fed by ground supply
Up → DC bus is fed by the batteries

5. Right generator switch

6a. Voltmeter switch. Four-position switch

Center → OFF
Left → The voltmeter (6b) on the left generator
Right → The voltmeter on the right generator
Up → Voltmeter on the batteries

6b. Voltmeter. Shows the voltage of the generators or the batteries depending on the voltmeter switch position

7. Voltage regulator of the left generator
8. Voltage regulator of the right generator
9. Ground feed annunciator
10. Left generator failure annunciator
11. Right generator failure annunciator
12. Battery fail annunciator

Hydraulics System, De-Ice System and AC Electronics

1. Hydraulic system pressure indicator (KPa/cm^2)
2. Hydraulic system failure annunciator
3. Hydraulic system switch
4. De-ice switch. Three-position switch

   Center → OFF
   Down → Automatic. The de-ice system is controlled by the RIO-3 ice alerter
   Up → Manual. System is always on.
5. Ice alert.
6. De-ice system function annunciator
7. Windshield heater switch

8.-9. AC voltmeters

10. AC generator failure annunciator
11. 115V converter failure annunciator
12. 36V failure annunciator
13. AC voltage regulator

14. 115V three-position switch

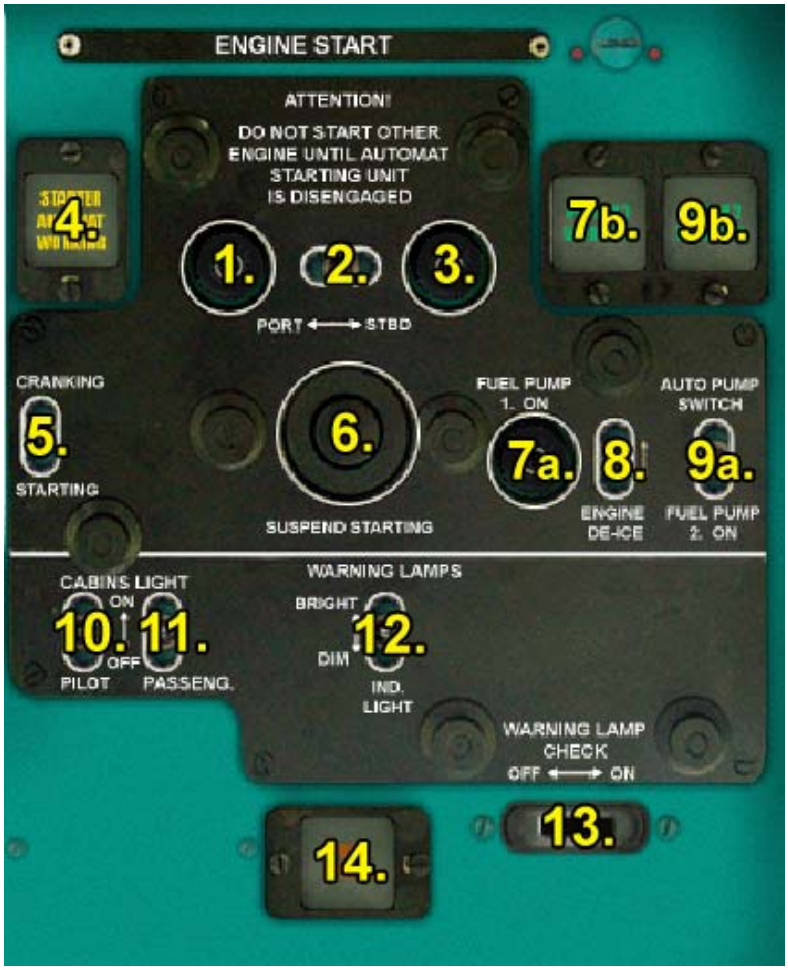
    Center → OFF
    Down → The DC 115V is produced from the AC 208V of the AC generator via 115V transformer.
    Up → The DC 115V is produced from the DC 24V of the batteries via 115V PO-250 converter

15. 36V three-position switch.

    Center → OFF
    Down → The DC 36V is produced from the AC 208V of the AC generator via 36V transformer.
    Up → The DC 36V is produced from the DC 24V of the batteries via 36V PT-125 converter

16. Ammeter switch of the rotor blades' de-ice system. Determines which sub-system's current-strength is shown on the ammeter. (9.)

Engine Starter Automatics and Interior Lights



1. Left engine starter button
2. Engine selector switch. Three-position switch.

   Center → Neutral
   Left → Left engine starter button active
   Right → Right engine starter button active
3. Right engine starter button
4. “Starter automat is working” annunciator. Don’t try to start the other engine until this led lights.
5. Starter automat main switch. Three-position switch

   Center → OFF
   Down → Starter automat is in starting mode. (The engines can be started.)
   Up → Starter automat is in cranking mode. (Starter automat test.)
6. Starting sequence suspender (not featured)

7a. Fuel pump N#1 button. Normally only this must be turned on.

7b. N#1 fuel pump function annunciator

8. Manual engine de-ice switch

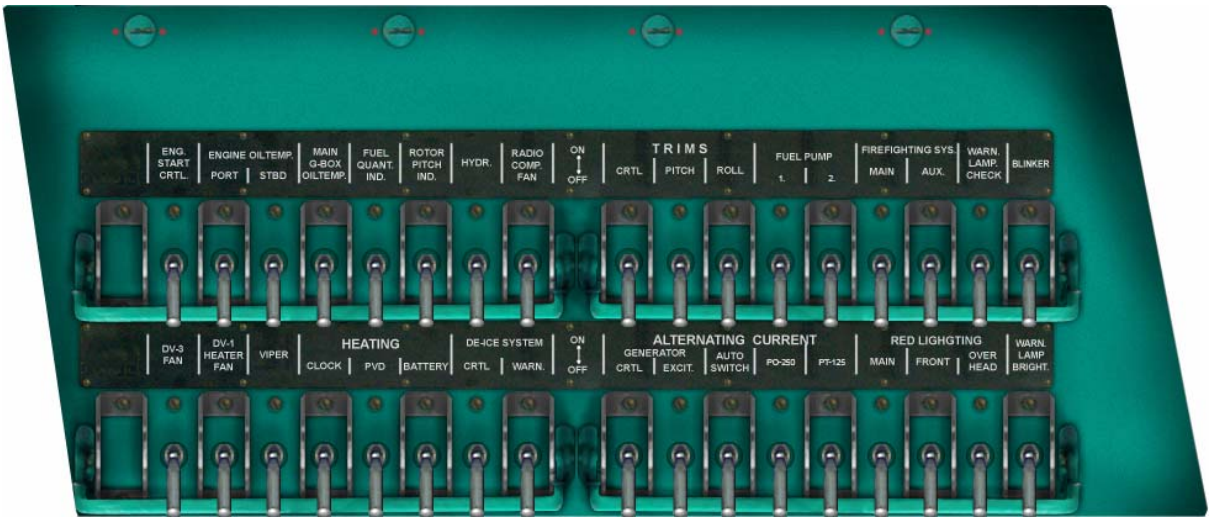
9a. Fuel pump N#2 manual/auto switch. Three-position switch.

Center → OFF
Down → ON
Up → Automatic mode. The N#2 fuel pump works only if the N#1 fails.

9b. N#2 fuel pump function annunciator

10. Cockpit light
11. Cabin light
12. Annunciator brightness setup switch (not featured)
13. Annunciator test switch
14. Cabin door opened warning light.

Right Side Fuses

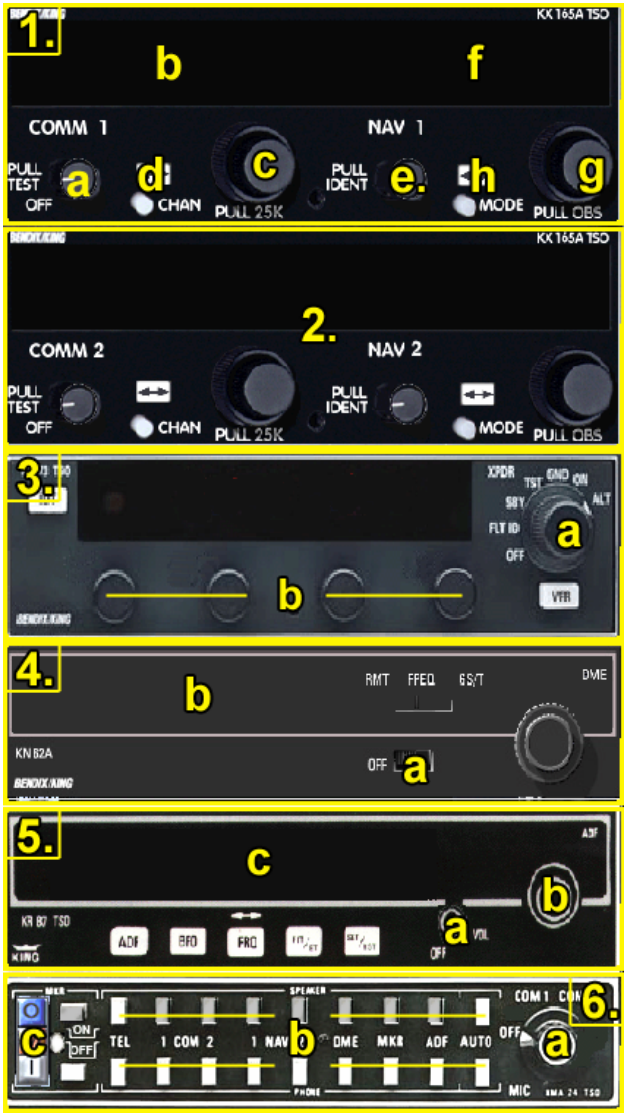


These switches are safety automats and the main switches of the indicated systems.

Air System

1. Brake system air pressure indicator
2. Indicator of the air system's air tank pressure

Radio panel
(only in military version)



1. Navcom 1
    a. Com 1 ON/OFF
    b. Com 1 frequency display
    c. Standby frequency setting knob
    d. Standby/active frequency swap button
    e. Nav 1 ON/OFF
    f. Nav 1 frequency display
    g. Standby frequency setting knob
    h. Standby/active frequency setting knob
2. Navcom 2. Works same as navcom 1.
3. Transponder
    a. Transponder ON/OFF
    b. Squwak number setting buttons

4. Distance measuring equipment
   a. DME on/off
   b. DME display (distance – remaining time – frequency)
5. ADF receiver
   a. ADF receiver ON/OFF
   b. ADF frequency setting knob
   c. ADF frequency display
6. Audio panel
   a. Audio panel ON/OFF
   b. Active audio channel selector buttons
   c. Marker beacon indicator

Trims
(stick)

Landing light control
(collective lever)

1. Trim main switch (ON/OFF)
2. Two-axis trim setting button. (roll trim also can be set with FS9's aileron trim keys, pitch trim with rudder trim keys)
3. Two-axis landing light control button

Separated throttle levers

The separated throttle levers are to control the engines separately. For takeoff both of them must be set to up position. These levers are situated on the floor at the left side of the pilot's seat.

NORMAL OPERATION CHECKLIST

I. Before flight

Front doors are closed——Check
Rear door closed——Check
Air system pressure——Not less that 50 KPa/cm^2
Controls——Check
Separated throttle levers(next to pilot seat, on the left)-In neutral position (down)
Collective lever, RPM handle——Full down, minimum
Fuel valve levers (on the floor, between front seats)——Cut (full down)
Engine shutdown levers (on ceiling above the pilots head)——Backward (shut)
All fuses——Check OFF
Parking brake——ON
Brake air pressure——Check
Left generator——OFF
Ammeter on DC panel——OFF
Right generator——OFF
Batteries——OFF
De-Ice systems——OFF
Windshield heater——OFF
Engine de-ice——OFF

II. Before engine start

Batteries——ON
Power source switch——On battery (UP)
Ammeter switch (2a on DC panel)——On battery →Check voltmeter
Annunciators——Check with test switch
Right fuses panel——Upper row → ON
Pump N$^{\#}$2 switch (9a on start-up panel)——Auto (UP)
Pump N$^{\#}$1——Check
(press button → check led → press button)
Fuel valve levers——Open (pull up)
Trims (buttons are on the stick)——Neutral
Fuel——Check quantity
Rotating beacon switch (left fuse panel)——ON
Cockpit lights, cabin lights——Check (ON if needed)
Panel lights check——Check (ON if needed)

III. Engine start

Fire fighting system——Check → ON
Generators——ON
Pressure meters——ON
Ammeter switch——On generator
PO-250 switch on right fuse panel——ON
115V switch——UP
Engine shutdown levers——Forward
Engine selector switch——Left position

Left engine starter button——Press, then wait as long as the yellow annunciator of the starter automat expires (approx. 30 sec)
Turbine 1 RPM——Check runup to 60%
Turbine oil pressure and oil temperature——Check
Engine selector switch——Right position
Left generator——OFF
Right engine starter button——Press
Turbine 2 RPM——Check runup to 60%
Engine selector switch——Neutral
Left generator——ON
Separated throttle levers——Pull up
Rotor RPM——max
Warm up——1 min

Check turbine oil temperature rise to 30 C^o
Check turbine gas temperature rise to max. 790 C^o
Oil pressure min 1,5 KPa/cm^2
Rotor RPM 50%

Position lights——ON
Hydraulic system——ON
Right side fuses panel——AC system switches ON
De-ice system switches ON
Heating system switches ON
Red lighting switches ON
RV3 Radio altimeter——ON

IV. Before takeoff

PT-125 switch (right overhead)——ON
36V switch——UP
Navigation and communication equipments——ON (left overhead panel)

Setup proper nav and com frequencies, request takeoff, etc…

Doors——Check closed
Parking brake——Release
Taxi speed——max. 10 km/h

V. Takeoff

Attitude cage——Release

Pull the collective lever pending the helicopter starts to rise (about 90% rotor RPM). Reach 5-10 m elevation (check radio altimeter) and start to speed up to 90-100 km/h then start to climb to the desired altitude.

De-ice——As required

VI. Climb

In standard conditions the climb is executed in normal operation mode. (See limitations on page 8.)

Recommended airspeeds during climb:

Altitude to sea level (m)	Indicated airspeed (km/h)	
	Normal weight	Max. weight
0	110	110
1000	105	100
2000	95	95
3000	90	85
4000	80	-

The Mi-2 helicopter is not designed for hovering climb (lack of needed instruments). Climb with hover only if obstructing objects are in the way.

VII. Cruise

The optimal cruise altitude is 1000 m at 190 km/h airspeed with normal gross weight and 170 km/h with max. gross weight.

VIII. Descend

The optimal airspeed during descend is 80-110 km/h with 3-5 m/s descend rate.

Recommended airspeeds during descend:

Altitude to sea level (m)	Indicated airspeed (km/h)	Allowable speed (km/h)
4000	80	70-90
3000	90	70-90
2000	95	60-140
1000	105	60-175
under 500	110	60-150

IX. Before land

Engine de-ice, windshield de-ice, cabin heating——————Switches, fuses OFF

When 50 m altitude is reached (see radio altimeter) start to decrease the airspeed and slow down to zero during the descending to 10 m. At this altitude decrease descend rate to 0,5 m/s.

X. Landing

Touch down——————————————————————With 0,5 m/s
Collective lever——————————————————————Full down
Parking brake——————————————————————ON
Rotor RPM handle——————————————————————To minimum
Trims——————————————————————To neutral

XI. After landing

Communication and navigation equipments——OFF
36V switch, PT-125 switch——OFF
Radio altimeter——OFF
Radio compass——OFF

XII. Shutdown

All exterior lights——OFF
Engine shutdown levers——Full backward
Generators——OFF
Fuel valve levers——Cutoff(down)
115V switch——OFF
Fuel pump N#2 auto turnover switch——OFF
Fuel pump N#1 button——Push to OFF
Hydraulic system——OFF
Ammeter switch——DOWN
Voltmeter switch——OFF
All interior lights——OFF
Batteries——OFF
All fuses——OFF

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gauges, flight dynamics, models, sounds

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models, textures, animations, sounds

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