

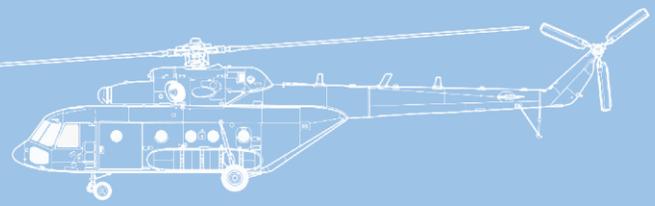
# MI 17 V-5

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Cera Sim



**QUICK START MANUAL**



*“Thank you for choosing our product. We are passionate about what we do, and your support is essential for our continued innovation and constant improvements. By purchasing our software legally, you are directly contributing to our work and helping us develop future experiences for all our users to enjoy*

## Installation Path

To install, ensure that the installation path is within the ‘Community’ folder of MSFS2020. The installer typically includes this path by default, below are examples of possible installation paths based on your version of Microsoft Flight Simulator:

### 1. For Microsoft Store Version:

If you installed Microsoft Flight Simulator (MSFS) from the Windows Store, the Community folder is usually located at:

`C:\Users\[YourUserName]\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\Packages\Community`

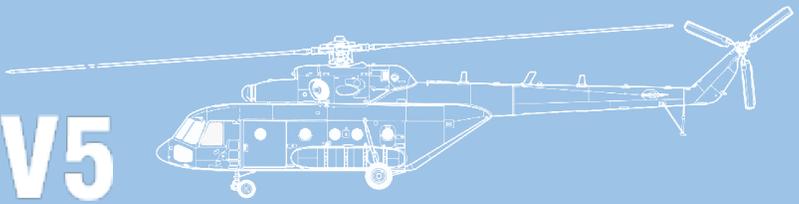
### 2. For Steam Version:

If you installed MSFS via Steam, the Community folder is generally found at:

`C:\Users\[YourUserName]\AppData\Local\Packages\Microsoft.FlightDashboard_8wekyb3d8bbwe\LocalCache\Packages\Community`

### 3. For Custom Installation Locations:

If you chose a custom location for your MSFS installation, the Community folder will be located in that directory. Please note that Windows 10 hides the “AppData” folder by default. To view it, open File Explorer, go to the "View" tab, and select "Hidden items."



## 1. Introduction.

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### Mi-17V-5 (Mi-8MTV-5) Helicopter Overview

The Mi-17V-5, also known as the Mi-8MTV-5, is a multipurpose helicopter within the Mi-17 family, representing a significant modernization of the renowned Mi-8. Known for its excellent flight performance, versatility, and efficiency, the Mi-17V-5 has become one of the most popular helicopters globally, with over 12,000 units of the Mi-8/17 family manufactured to date. This helicopter is developed and produced by Kazan Helicopters.

### Design and Versatility

The Mi-17V-5 is designed for various roles, including cargo transport both inside the cabin and on an external sling. It stands as one of the world's most advanced transport helicopters, capable of performing troop and arms transport, fire support, convoy escort, patrol, and search-and-rescue (SAR) missions.

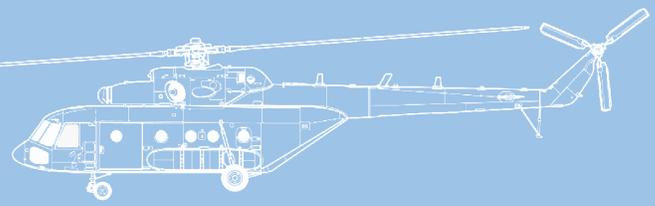
### Versatile Design

Based on the Mi-8 airframe, the Mi-17V-5 retains the exceptional performance characteristics of its predecessors. It is capable of operating in tropical, maritime, and desert conditions, making it highly adaptable to various environments.

### Cargo Capabilities

The Mi-17V-5 is highly efficient for cargo transportation, featuring a spacious 23 m<sup>3</sup> cargo compartment with sliding doors on both the portside and starboard, as well as a rear ramp to facilitate loading and unloading. It can accommodate up to 36 personnel in troop seats or transport lengthy cargo and vehicles. The helicopter has a loading capacity of 4 tons. Additionally, the external sling capability allows for the delivery of up to 4 tons of bulky cargo to hard-to-reach destinations and supports assembly operations. It can also be equipped with a water drop system for firefighting operations.

# Cera Sim MI-17 V5



## Engine and Performance

The Mi-17V-5 is powered by either the Klimov TV3-117VM engine, which produces a maximum power of 2,100hp, or the VK-2500 engine, providing a power output of 2,700hp. The helicopter boasts a maximum speed of 250 km/h and a standard range of 580 km, extendable to 1,065 km with the addition of two auxiliary fuel tanks. It can operate at a maximum altitude of 6,000 meters.

## Summary

The Mi-17V-5 helicopter's blend of advanced technology, versatility, and proven performance makes it an indispensable asset for a wide range of missions, from cargo and troop transport to firefighting and search-and-rescue operations. Its robust design and adaptability to various climatic conditions ensure its reliability and efficiency in diverse operational environments.

## 2. Specifications.

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### FLIGHT PERFORMANCE

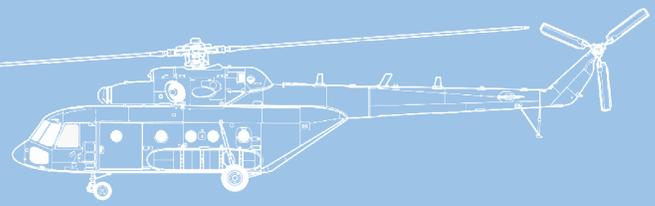
Maximum speed (VNE)	240 km/h	/	130 kts
Maximum cruise speed (VH).	230 km/h	/	125 Kts
Service ceiling.	6 000 m	/	19700 ft
Hover ceiling OGE.	3 980 m	/	13000 ft

### WEIGHT DATA

Empty helicopter weight.	7240 kg	/	15961 lbs.
Maximum payload in transport cabin.	4000 kg	/	8818 lbs.
Maximum payload on external sling.	5000 kg	/	11023 lbs.
Maximum take-off weight with external sling cargo.	13000 kg	/	28661 lbs.

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# Cera Sim MI-17 V5



## DIMENSIONS

Overall length (tip-cap to tail blade).	83.16 ft /	25.352 m
Overall width (main rotor diameter).	69.86 ft /	21.294 m
Overall height.	17.55 ft /	5.350 m
Wheelbase.	14.10 ft /	4.3 m
Main wheel tread.	14.76 ft /	4.5 m

## CABIN

Cabin length.	20.86 ft /	6.36 m
Cabin width.	7.62 ft /	2.34 m
Cabin height.	5.90 ft /	1.8 m

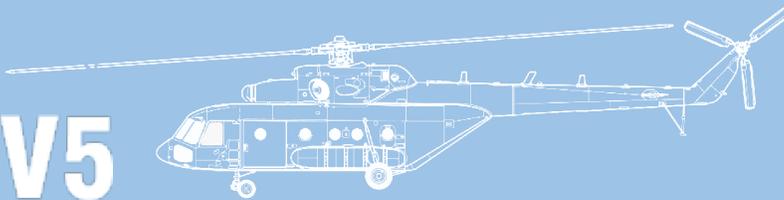
## POWERPLANTS

Engine.	2 /	TV3-117VM
2.5 Minute OEI contingency.	2200 shp /	1618 kw
30 Minute intermediate power.	2000 shp /	1471 kw
MAX continuous power.	1500 shp /	1103 kw

## FUEL CAPACITY

Service tank.	109.6 gal /	415 l
Right external tank.	294 gal /	1114 l
Left external tank.	294 gal /	1114 l

# Cera Sim MI-17 V5



## 2.1 Aircraft Dimensions.

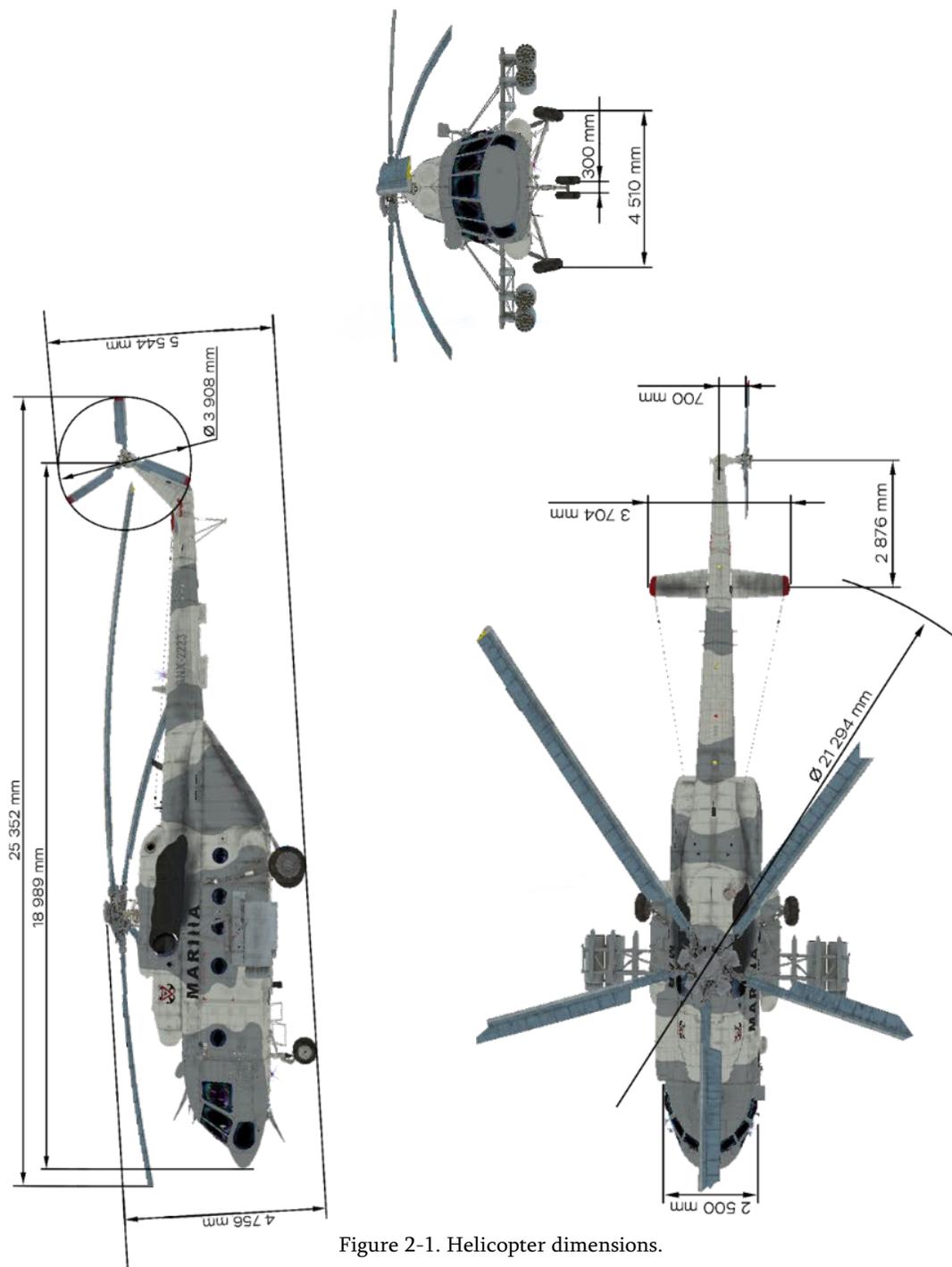
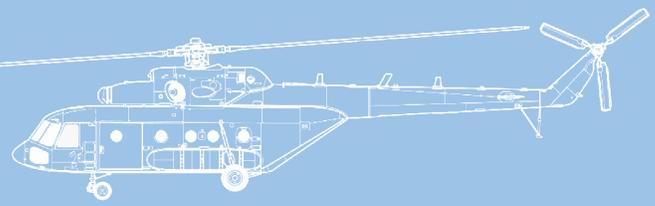
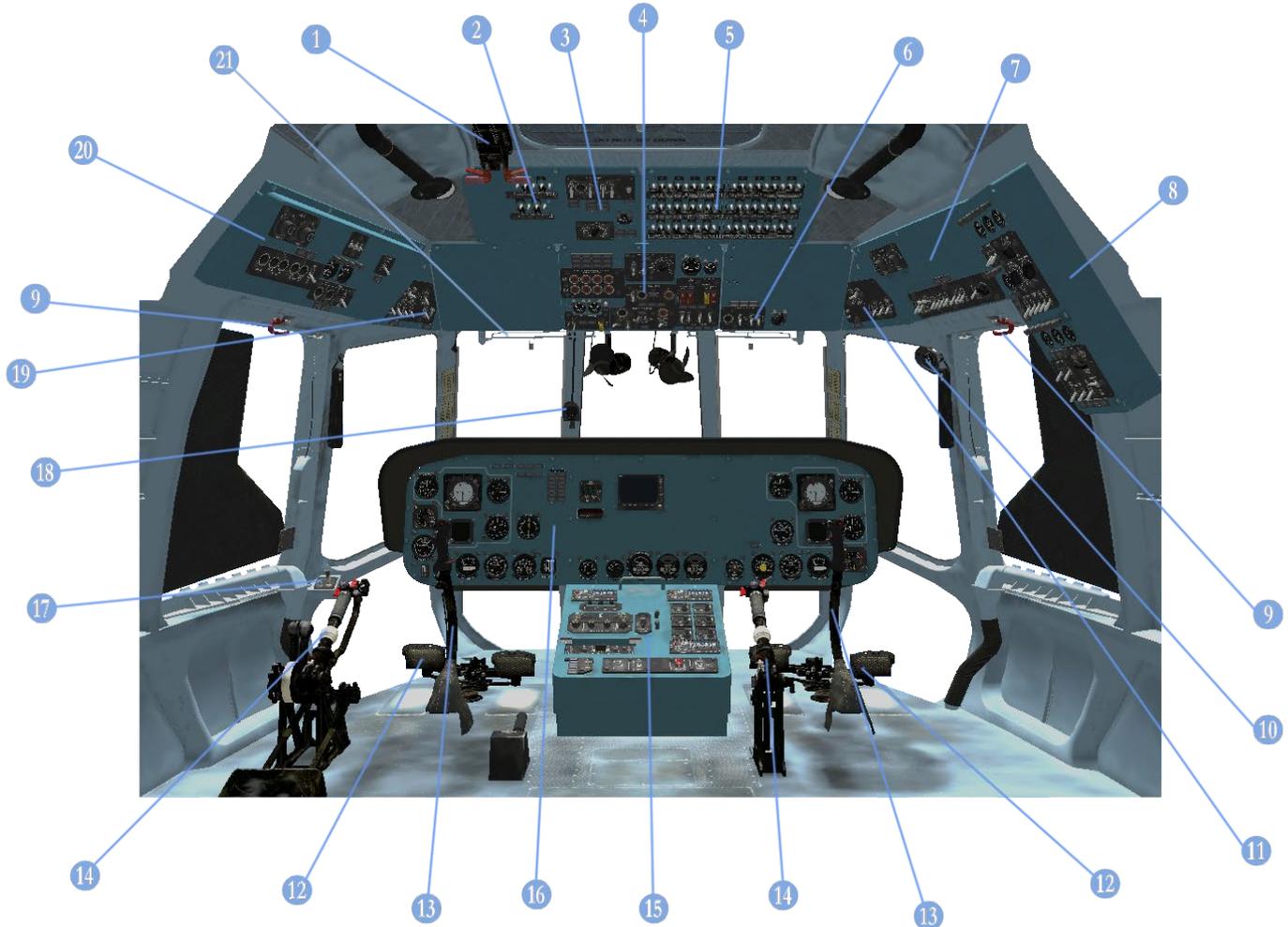


Figure 2-1. Helicopter dimensions.



## 3. Cockpit.

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**Figure 3-1. Cockpit Components**

- 1. Engine Fuel Shutoff Levers:** Controls to stop the fuel supply to the engines.
- 2. Left Circuit Breaker Panel:** Contains circuit breakers for electrical systems on the left side.
- 3. Anti-Icing System Panel:** Controls the helicopter's anti-icing systems.
- 4. Upper Central Console:** Houses various critical flight controls and displays, including switches for engine start, auxiliary power unit (APU), and fuel valves and pumps.
- 5. Right Circuit Breaker Panel:** Contains circuit breakers for electrical systems on the right side.

**6. Kerosene Heater Control Panel:** Manages the helicopter's cabin heating system.

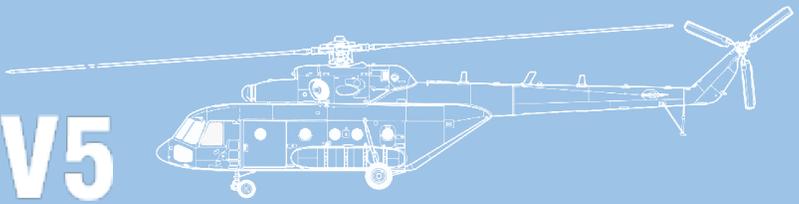
**7. Right Side Overhead Panel:** Includes controls for exterior lights and dust engine control.

**8. Electric Switch Panel:** Contains electrical switches for different systems AC / DC.

**9. Sliding Window Emergency Release:** Mechanism to release the sliding window in case of emergency.

**10. Free-Air Temperature Gauge:** Displays the temperature of the air outside the helicopter.

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**11. Right Corner Switch Overhead Panel:** Includes the co-pilot wiper control, ADI (Attitude Direction Indicator) co-pilot switch, and cabin light.

**12. Directional Control Pedals:** Pedals used to control the helicopter's yaw (left and right movement).

**13. Cyclic Stick:** Controls the helicopter's pitch and roll (forward, backward, and sideways movement).

**14. Collective Stick:** Controls the pitch angle of the rotor blades, affecting the helicopter's lift.

**15. Lower Console:** Contains the autopilot panel, radios, and ramp control.

**16. Instrument Panel:** Displays crucial flight information such

as speed, altitude, and navigation data.

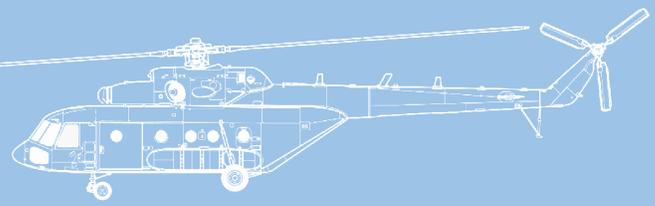
**17. Landing and Taxi Light Panel:** Controls the helicopter's landing and taxi lights.

**18. Standby Magnetic Compass:** Provides heading information if other navigation systems fail.

**19. Left Corner Switch Overhead Panel:** Includes the pilot wiper control and ADI (Attitude Direction Indicator) switch and fan for the pilot.

**20. Left Switch Overhead Panel:** Includes voice warning controls, flight recorder controls, and air brakes indicators.

**21. Sun Visor:** Adjustable visors to block sunlight and improve pilot visibility for both pilot and co-pilot.



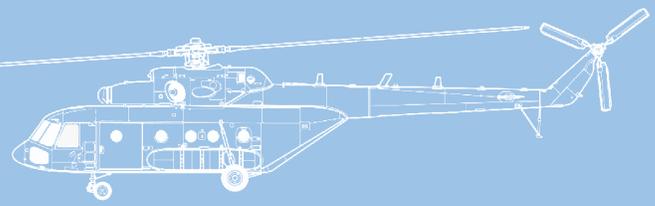
## 4. Instrument Panel.

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Figure 4.1 Instrument Panel.

- 1. Airspeed Indicator:** Displays the helicopter's airspeed.
- 2. Radar Altimeter:** Measures altitude above ground level.
- 3. Main Rotor Tachometer Indicator:** Shows the RPM speed of the main rotor.
- 4. Pilot Radar Altimeter Switch:** On/Off control the radar altimeter for the pilot.
- 5. Attitude Indicator:** Displays the helicopter's orientation relative to the horizon.
- 6. HSI Indicator:** Horizontal Situation Indicator for navigation.
- 7. Main Rotor Pitch Indicator:** Shows the pitch angle of the main rotor blades.
- 8. Turn Indicator:** Indicates the rate of turn.
- 9. Master Warning Lights:** Alerts the pilot to critical warnings.
- 10. Vertical Speed Indicator:** Shows the rate of climb or descent.
- 11. Barometric Altimeter:** Displays altitude based on atmospheric pressure.
- 12. Engines RPM Indicator:** Shows the RPM speed of the engines.
- 13. Caution Advisory Panel:** Displays caution and advisory messages.
- 14. Radio Magnetic Indicator:** Used for navigation, shows aircraft position relative to a radio beacon.
- 15. Turbine Inlet Temperature Indicator:** Displays the temperature of the air entering the turbine.
- 16. Engine Pressure Ratio Meter Indicator:** Shows the ratio of engine pressure.
- 17. Clock:** Displays the current time and chronometer.
- 18. DME Indicator:** Distance Measuring Equipment for navigation.
- 19. Passenger Cabin Thermometer Indicator:** Measures the temperature in the passenger cabin.
- 20. Main Gearbox Oil Temperature Indicator:** Displays the temperature of the main gearbox oil.
- 21. GPS:** Global Positioning System for navigation.
- 22. Main Gearbox Oil Pressure / Intermediate Gearbox Oil Temperature / Tail Gearbox Oil Temperature Indicator:** Displays oil pressures and temperatures for various gearboxes.
- 23. Engine Left Oil Pressure / Oil Temperature Indicator:** Shows the oil pressure and temperature for the left engine.
- 24. Engine Right Oil Pressure / Oil Temperature Indicator:** Shows the oil pressure and temperature for the right engine.
- 25. Fuel Quantity Switch:** Switches to measure fuel quantity.
- 26. Low Fuel Annunciator:** Alerts the pilot when fuel is low.
- 27. Fuel Quantity Indicator:** Displays the amount of fuel remaining.



## 4.1 Airspeed Indicator.

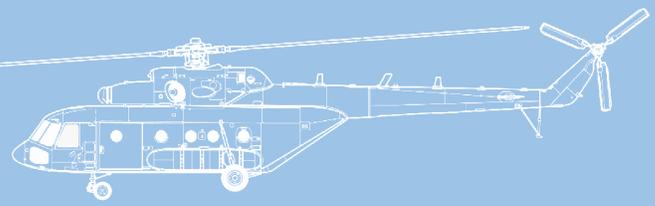


Figure 4-2. Airspeed Indicator.

Two airspeed indicators are installed on the instrument panel, one for the pilot and one for the copilot. These indicators are differential pressure instruments that measure the difference between impact pressure and static pressure. The airspeed operating range is from 0 knots to 150 knots.

### Airspeed Limits:

- **Maximum Speed:**
  - **Normal Weight:** 130 knots
  - **Maximum Weight:** 124 knots
- **Cruise Speed:**
  - **Normal Weight:** 119 knots to 130 knots
  - **Maximum Weight:** 111 knots to 116 knots
- **Other Speeds:**
  - **Speed with Rear Doors Partially Open:** 124 knots
  - **Speed without Rear Doors:** 108 knots
  - **Minimum Speed:** 32 knots
  - **Best Climb Speed:** 65 knots
  - **Turbulence Penetration Speed:** 85 knots to 104 knots
  - **Taxiing Speed (maximum allowed):** 16 knots



## 4.2 Radar Altimeter.

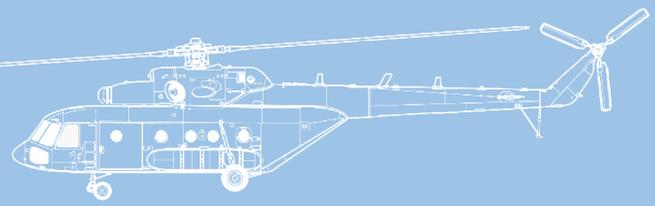


Figure 4-3. Radar Altimeter.

- 1. Decision Height Lamp:** Alerts the pilot if the aircraft descends below the preset decision height.
- 2. Set Bug:** A movable marker that can be set by the pilot to indicate a specific altitude on the radar altimeter display.
- 3. System OFF Flag:** A visual indicator that shows when the radar altimeter system is turned off or not functioning.
- 4. Set Altitude Knob:** A control knob used to set the desired decision height on the radar altimeter.
- 5. Altitude Pointer:** The needle or pointer that shows the current altitude above ground level as measured by the radar altimeter.
- 6. Test Button:** A button used to test the functionality and accuracy of the radar altimeter system.

The radar altimeter set provides an instantaneous indication of actual terrain clearance height. Altitude, in feet, is displayed on two radar altimeter indicators on the instrument panel in front of the pilot and copilot. The radar altimeter indicators each contain a pointer that indicates altitude on a linear scale from -20 to 2000 feet.

An altitude bug low-level warning set knob is located on the lower right corner of each indicator. Pressing the **PUSH TO TEST** control provides a testing feature of the system at any time and altitude. Loss of system power will be indicated by the indicator pointer moving to 0 feet and the **OFF** flag appearing on the right side of the instrument.



The radar altimeter is powered by 27 VDC and 115 VAC. Circuit breakers ([see Fig. 10-1, Item 28](#)) marked **ALTIMETER** and a master switch are installed on the instrument panel.

### 4.3 Main Rotor Tachometer Indicator.

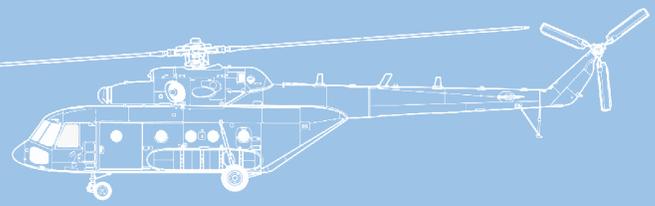


**Figure 4-4. Main Rotor Tachometer.**

Two tachometers are installed on the instrument panel, positioned in front of the pilot and copilot. These tachometers display the RPM of the main rotor speed as a percentage, ranging from 0 to 110 percent.

Rotor RPM Operating Limits:

- Emergency Regime: 101%
- Maximum Takeoff Regime: 101%
- Maximum Governor Beep Setting: 97%
- Cruise and Normal Regime: 95%
- Minimum Governor Beep Setting: 93%



**Operational Note:** Aggressive cyclic movements, whether in-flight or on the ground, can cause a significant drop in rotor RPM. Even steady movements approaching the cyclic limits during taxiing can result in RPM loss. It is crucial to handle the cyclic controls smoothly to maintain optimal rotor speed.

## 4.4 Attitude Indicator.



Figure 4-5. Attitude Indicator.

**1. Attitude OFF Flag:** Indicates when the attitude indicator is not functioning or powered off.

**2. Cage Button:** Used to lock the attitude indicator in a neutral position, often during extreme maneuvers or when resetting the instrument.

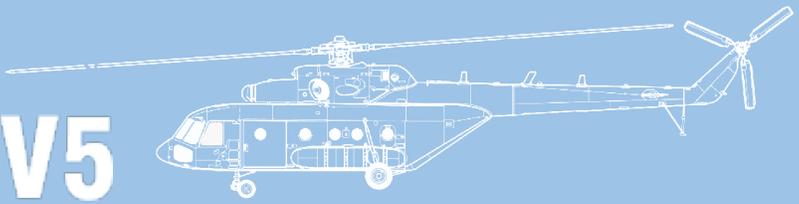
**3. Miniature Airplane:** Represents the aircraft relative to the horizon bar, showing pitch and roll attitude.

**4. Turn Rate Indicator:** Displays the rate of turn, helping the pilot maintain a standard rate turn.

**5. Pitch Trim Knob:** Allows the pilot to adjust the pitch reference for accurate attitude indication.

**6. Sphere:** The primary display element that rotates to show the aircraft's pitch and roll against the fixed miniature airplane.

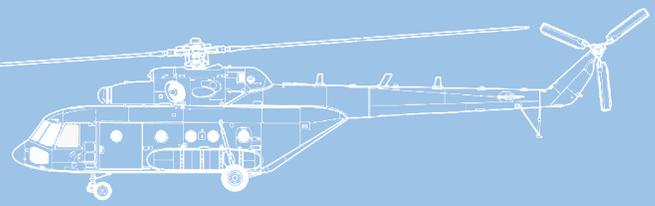
The Attitude Indicator provides the pilots with visual feedback on the helicopter's pitch, roll attitude, and turn rate.



## Power Supply

- **Pilot Attitude Indicator:** Powered with 27 VDC and 36 VDC, controlled by a switch on the left corner switches overhead panel, labeled **GYRO HOR** ([see Fig. 7-1, Item 7](#)).
- **Copilot Attitude Indicator:** Powered with 115 VAC, controlled by a switch on the right corner switches overhead panel, labeled **GYRO HOR** ([see Fig. 12-1, Item 4](#)).

**Operational Note:** Remember to uncage and configure the horizon/attitude indicator, noting that the helicopter sits with a slightly nose-high attitude.



## 4.5 HSI Indicator.



Figure 4-6. Horizontal Situation Indicator

**1. Range Indicator:** Displays the distance to the navigation station.

**2. Course Indicator:** Shows the selected course to or from a navigation station.

**3. Compass Card:** Rotates to indicate the aircraft's heading.

**4. Course Arrow:** Indicates the selected course on the compass card.

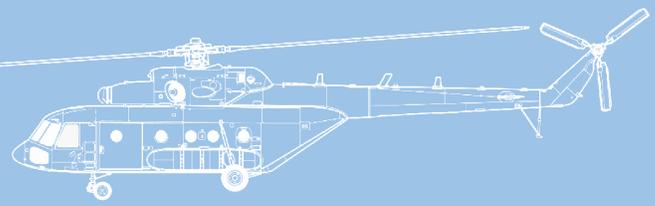
**5. Bearing Pointer:** Points to the bearing of the navigation station.

**6. ADF Pointer:** Points to the bearing of the Automatic Direction Finder (ADF) station.

**7. Heading Knob:** Used to set the desired heading.

**8. Course Knob:** Used to set the desired course.

Two HSIs are installed on the instrument panel, one in front of each pilot. The HSI consists of a compass card, bearing-to-station pointers with back-course markers, a course bar, heading set (HDG) knob and marker, a course set (CRS) knob, a COURSE card readout, a to-from arrow, a NAV flag, and a compass HDG flag.



The pilot HSI is powered with 27 VDC, through circuit brake ([see Fig. 8-1, Item 7](#)), labeled **HSI LEFT**.

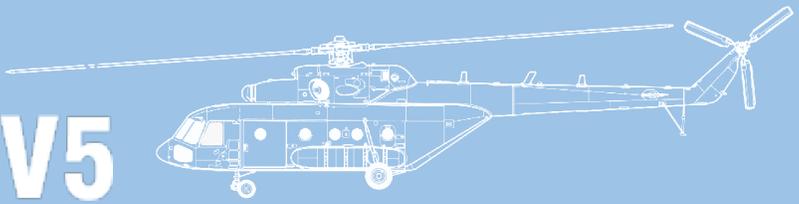
The Copilot HSI is powered with 27 VDC, through switch ([see Fig. 10-1, Item 18](#)), labeled **HSI RIGHT**.

#### 4.6 Main Rotor Pitch Indicator.



Figure 4-7. Main Rotor Angle Pitch.

The main rotor pitch indicator is designed to remotely display the pitch angle of the main rotor blades. It is installed on the instrument panel in front of the pilot. This indicator provides crucial information for maintaining optimal rotor performance and ensuring safe flight operations. The main rotor pitch indicator is powered by both 27 VDC and 36 VDC.



## 4.7 Turn Indicator.



Figure 4-8. Turn Indicator.

The electric turn indicator is an essential instrument for indicating the helicopter's rotation around the vertical axis, allowing the pilot to control the accuracy of turns. This combined instrument includes:

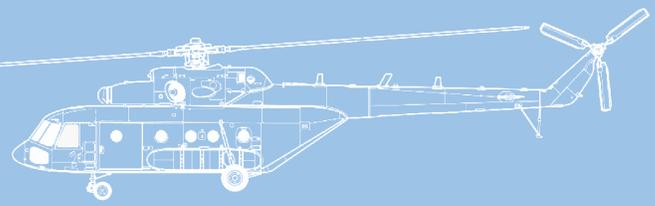
- **Gyroscopic Direction Indicator:** Indicates the helicopter's angular velocity and direction relative to the vertical axis.
- **Slip Indicator:** Displays the helicopter's lateral sliding direction.

The electric turn indicator is installed on the instrument panel in front of the pilot. It is powered by 27 VDC through a circuit breaker marked **TURN IND** on the right circuit breaker overhead panel ([see Fig. 10-1, Item 16](#)).

## 4.8 Master Warning System.



Figure 4-9. Master Warning.



The caution advisory panel is located on the left side of the instrument panel in front of the pilot. It illuminates whenever a caution light is activated, alerting the pilot and directing attention to specific issues on the caution/advisory panel.

#### Key Functions:

- **Master Caution Lights:** These lights should be reset immediately to ensure that subsequent warnings can be clearly indicated, even if the initial condition or malfunction is still present. The master caution light can be reset from the pilot's position.
- **Warning Lights:** The panel includes one red warning light and one amber warning light. These lights require immediate action when illuminated.
- **Markings:** The master warning panel is clearly marked with **WARNING** (red) and **CAUTION** (amber).

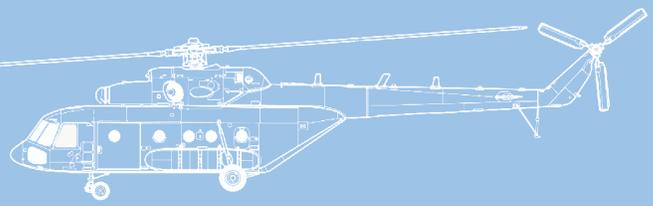
This setup ensures that pilots are promptly alerted to critical conditions and can take necessary actions to maintain safety.

## 4.9 Vertical Speed Indicator.



Figure 4-10. Vertical Speed.

The vertical speed indicator, or variometer, measures the rate of ascent or descent of the helicopter and helps control horizontal flight.



## Key Functions:

- **Level Flight:** During level flight, the variometer needle should be at zero, indicating that the flight altitude is constant.
- **Ascent/Descent:** If the flight is not level, the needle deviates from the zero position, indicating whether the helicopter is ascending or descending.
- **Operating Range:** The variometer has an operating range from -6000 feet to +6000 feet per minute.

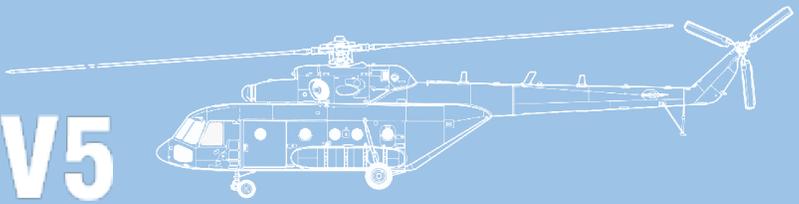
This instrument is crucial for maintaining desired flight altitudes and ensuring smooth transitions between different flight levels.

## 4.10 Barometer Altimeter Indicator.



Figure 4-11. Barometric Altimeter.

- 1. Barometric Scale Set Knob:** Used to adjust the barometric pressure setting.
- 2. 1000-Foot Altitude Counter:** Displays altitude in increments of 1,000 feet.
- 3. Encoder Warning Flag:** Indicates a failure in the signal transmission to the transponder.
- 4. 100-Foot Altitude Counter:** Displays altitude in increments of 100 feet.
- 5. 100-Foot Altitude Needle:** Points to the current altitude in 100-foot increments.
- 6. Barometric Pressure Scale:** Shows the current barometric pressure setting.



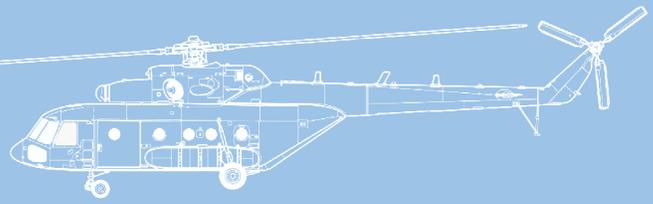
Two altimeters are installed on the instrument panel. The system is equipped with a continuously operating vibrator to improve altitude measuring accuracy. The altimeter's operating range is from -1,000 feet to 50,000 feet. The face of the instrument has a marked scale from zero to nine in 50-foot units. The operating indicators and controls are a 100-foot pointer, 100-foot drum, 1,000-foot drum, 10,000-foot drum, barometric pressure set knob, barometric pressure scale window, and warning flag. The warning flag is only used in conjunction with the encoder. A counter window next to the sweep hand contains the three digital drums that rotate to indicate the altitude of the helicopter. Another window in the upper left section of the instrument face indicates the normal code operation. When the system fails to transmit signals to the transponder, a flag marked **CODE OFF** will appear in the window. A window on the lower right section of the instrument face indicates the barometric pressure setting. The barometric pressure set knob is on the lower left corner of the indicator bezel.

## 4.11 Engine RPM Indicator.



Figure 4-12. Engine Tachometer RPM.

The two-pointer tachometer is designed for continuous remote measurement of engine speed as a percentage of maximum speed (N1 RPM). The tachometer's operating range is from 0 percent to 110 percent.



- **Needle "1"**: Indicates the engine speed percentage for the left engine.
- **Needle "2"**: Indicates the engine speed percentage for the right engine.

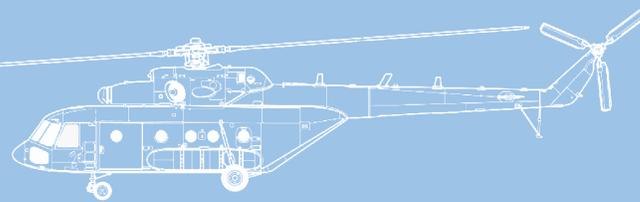
This dual-pointer design allows for simultaneous monitoring of both engines, ensuring optimal performance and safety.

## 4.12 Caution Advisory Panel.



Figure 4-13. Caution Advisory panel.

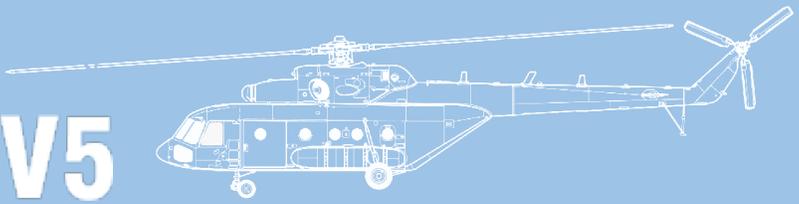
# Cera Sim MI-17 V5



Legend	Illuminating parameter or fault
<b>SHUT DOWN L ENG</b>	Left engine shut down.
<b>SHUT DOWN R ENG</b>	Right engine shut down.
<b>LOW P OIL MAIN GBOX</b>	Main gearbox oil pressure is below limits.
Legend	Illuminating parameter or fault
<b>CHIP IN MAIN GBOX</b>	Metal chips detected in main gearbox.
<b>CHIP IN INTM GBOX</b>	Metal chips detected in intermediate gearbox.
<b>CHIP IN TAIL GBOX</b>	Metal chips detected in tail gearbox.

Legend	Illuminating parameter or fault
<b>APU GEN ON</b>	APU generator is running.
<b>PARKING BRAKE ON</b>	Parking brake is engaged.

Legend		Illuminating parameter or fault
<b>LOW P OIL L ENG</b>	<b>LOW P OIL R ENG</b>	Left engine oil pressure is below limits/ Right engine oil pressure is below limits.
<b>CHIP IN L ENG</b>	<b>CHIP IN R ENG</b>	Metal chips detected in left engine / Metal chips detected in right engine.
<b>FUEL FILTER CLOG L ENG</b>	<b>FUEL FILTER CLOG R ENG</b>	Left engine fuel filter clogging / Right engine fuel filter clogging.
<b>L ENG HI VIBR</b>	<b>R ENG HI VIBR</b>	Indicates high vibration in left engine / Indicates high vibration in right engine.
<b>FREE TURB OVERSP L ENG</b>	<b>FREE TURB OVERSP R ENG</b>	Indicates left engine free turbine overspeed / Indicates right engine free turbine overspeed.
<b>OEI L ENG</b>	<b>OEI R ENG</b>	Indicates left engine emergency power one engine inoperative / Indicates right engine emergency power one engine inoperative.
<b>ECC OFF L ENG</b>	<b>ECC OFF R ENG</b>	Indicates left engine governor inoperative / Indicates right engine governor inoperative.



The caution advisory panel is located on the left side of the instrument panel. It has two main sections:

- **Warning Section:** Displays critical conditions with red lights.
- **Caution Section:** Indicates malfunctions or unsafe conditions with amber lights.

Each light on the panel has its own operating circuit and will remain illuminated as long as the condition that caused it to light up exists. The caution and advisory lights are powered by 27 VDC.

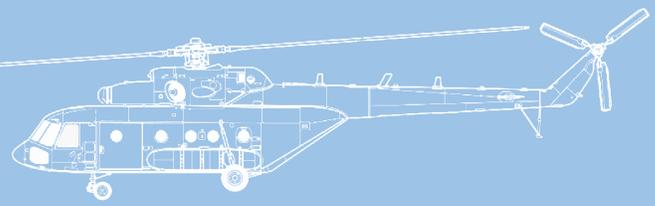
## 4.13 Radio Magnetic Indicator.



Figure 4-14. RMI.

1. **VOR Pointer:** Indicates the bearing to a VOR (VHF Omnidirectional Range) station.
2. **ADF Pointer:** Indicates the bearing to an ADF (Automatic Direction Finder) station.
3. **Compass Card:** Rotates to display the aircraft's current heading.

The Radio Magnetic Indicator (RMI) provides bearing information to either ADF or VOR stations by means of two pointers, each of which is read against the compass card. The RMI is installed on the



instrument panel in front of the pilot and is powered by 27 VDC through a circuit breaker marked NAV on the left circuit breaker overhead panel ([see Fig. 8-1, Item 3](#))

## 4.14 Turbine Inlet Temperature Indicator.



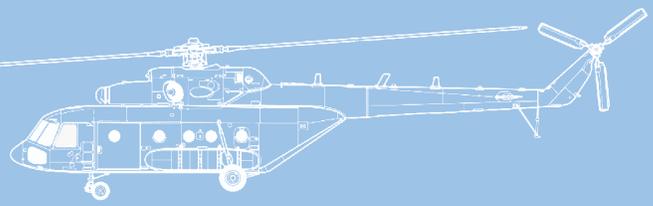
Figure 4-15. Turbine Inlet Temperature.

1. **Left Engine Pointers:** Indicate the temperature for the left engine.
2. **Right Engine Pointer:** Indicates the temperature for the right engine.

The Turbine Inlet Temperature (TIT) indicator is designed to measure the temperature of gases entering the compressor turbines of TV3-117 engines. The gauge has two scales:

- A primary scale ranging from 0 to 1200 °C with 100 °C divisions.
- A fine reading scale ranging from 0 to 100 °C with 5 °C divisions.

The operating principle of the TIT indicator is based on the compensation method for measuring the thermocouple.



When the button "GROUND" ([see Fig. 6-7, Item 2](#)) is pressed, the TIT readings should be more than 950 °C. When the button "AIR" ([see Fig. 6-7, Item 3](#)) is pressed, the readings should be less than 150 °C.

## 4.15 Engine pressure ratio Indicator.

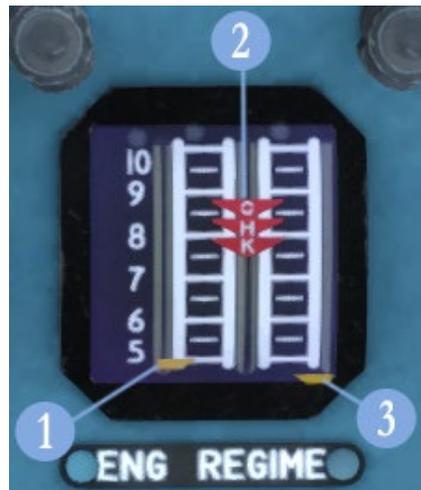


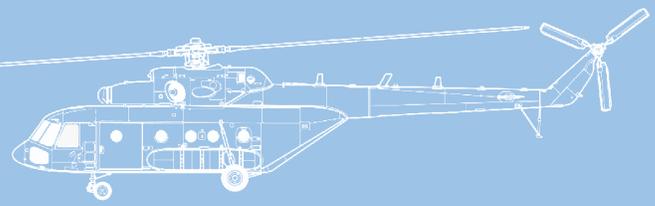
Figure 4-16. Engine Pressure Ratio.

- 1. Left Engine Pointer:** Indicates the pressure ratio for the left engine.
- 2. Central Pointer:** Indicates the reference mode, proportional to atmospheric pressure and ambient air temperature.
- 3. Right Engine Pointer:** Indicates the pressure ratio for the right engine.

The Engine Pressure Ratio (EPR) indicator measures the air pressure behind the compressor and converts it into the movement of the lateral pointers on the meter. These pointers are then compared with the modes indicated by the central pointer, whose position is proportional to atmospheric pressure and ambient air temperature. The engine's operating flight mode is determined by the position of the lateral pointers relative to the central pointer.

### Key Operating Modes:

- **Takeoff Mode:** The lateral pointer is above the central index "H".



- **Nominal Mode:** The lateral pointer is above the central index "K" but below the position opposite the index "H".
- **Cruising Mode:** The lateral pointer is opposite or below the central index "K".

This setup allows for precise monitoring and adjustment of the engine operating modes to ensure optimal performance and efficiency during different phases of flight.

## 4.16 Digital Clock.



Figure 4-17. Digital Clock.

**1. Select Button:** Cycles through different display modes: GMT, Local Time, Flight Time, and Elapsed Time.

**2. Control Button (CTL):** Starts, stops, and resets the Elapsed Time.

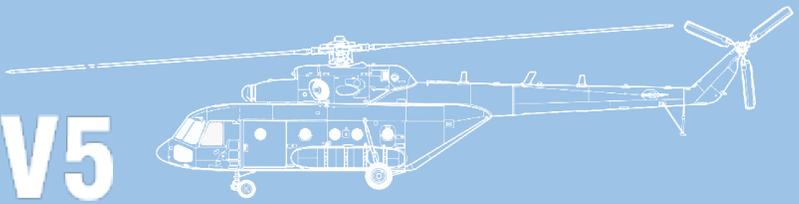
**3. Dimming Knob:** Adjusts the brightness of the display.

**4. Display:** Shows the selected time mode or elapsed time in the four-digit window.

The **Select** button is used to choose what is displayed in the four-digit window. By pressing the **Select** button, the display will cycle sequentially through GMT, Local Time, Flight Time, Elapsed Time, and back to GMT.

The **Control (CTL)** button is used to manage the displayed information. When momentarily pushed, the **CTL** button starts, stops, and resets the Elapsed Time.

The digital clock is powered with 27 VDC and is protected by a circuit breaker marked **CLOCK** located on the left circuit breaker overhead panel ([see Fig. 8-1, Item 9](#)).



## 4.17 DME Indicator.



Figure 4-18. DME display.

The DME Master Display offers simultaneous readouts of distance, groundspeed, and time-to-station. Slant-range distance is computed digitally and displayed up to a maximum range of 389 nautical miles.

### Key Components:

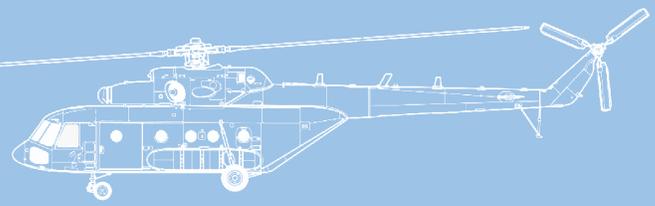
- **Control Switch:** Includes settings for **ON/OFF**, **NAV 1**, **NAV 2**, and **DME HOLD**.
- **Display:** Shows distance, groundspeed, and time-to-station.

The DME Master Display is powered by 27 VDC through a circuit breaker marked **DME** on the left circuit breaker overhead panel ([see Fig. 8-1, Item 8](#)).

## 4.18 Cabin Thermometer Indicator.



Figure 4-19. Thermometer Cabin.



The cabin thermometer is used to measure the air temperature in the passenger cabin of a helicopter.

**Operating Range:**

- From -6 °C to 6 °C.

This instrument ensures that the cabin environment is monitored and maintained within a comfortable range for passengers.

## 4.19 Main Gearbox Oil Temperature Indicator.



Figure 4-20. Main Gearbox Temperature.

The gearbox oil temperature indicator senses the oil temperature of the main gearbox and displays it in degrees centigrade.

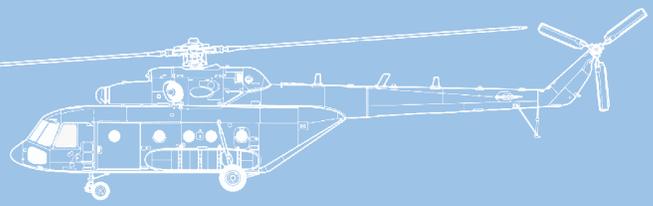
**Operating Range:**

- From -50 °C to 150 °C.

**Power Supply:**

- Powered by 27 VDC.

This instrument ensures accurate monitoring of the gearbox oil temperature to maintain optimal operating conditions and prevent overheating.



## 4.20 Main gear box oil pressure / Inter gear box oil temp / Tail gear box oil temp. indicator.



Figure 4-21. Three pointer gauge.

1. **Gearbox Intermediate Oil Temperature Pointer:** Displays the oil temperature of the intermediate gearbox.
2. **Tail Gearbox Oil Temperature Pointer:** Displays the oil temperature of the tail gearbox.
3. **Main Gearbox Oil Pressure Pointer:** Displays the oil pressure of the main gearbox.

The gauge receives and displays three indications from:

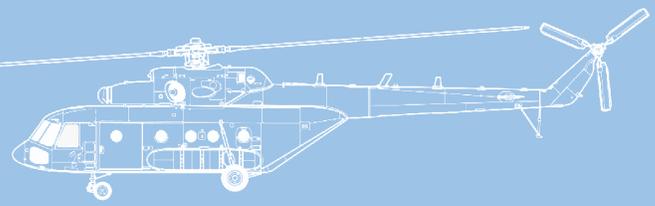
1. **Intermediate Gearbox Oil Temperature Sensor**
2. **Tail Gearbox Oil Temperature Sensor**
3. **Main Gearbox Oil Pressure Sensor**

### Temperature Display:

- **Units:** Degrees Centigrade
- **Operating Range:** -50 °C to 150 °C

### Pressure Display:

- **Units:** kg/cm<sup>2</sup>
- **Operating Range:** 0 kg/cm<sup>2</sup> to 8 kg/cm<sup>2</sup>



This instrument ensures accurate monitoring of both the temperature and pressure of the gearbox oil, maintaining optimal operating conditions and preventing potential issues such as overheating or pressure loss.

## 4.21 Engine (left and right) Oil pressure / Oil temperature indicator.



Figure 4-22. Engine oil pressure and temperature.

The gauge receives and displays two indications from the engine oil pressure and oil temperature sensors:

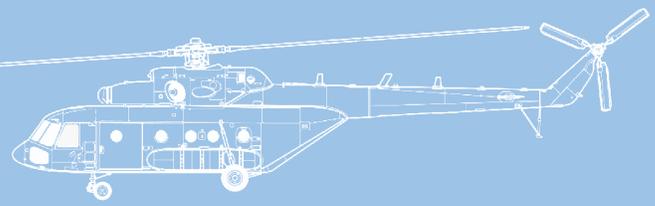
### Pressure Display:

- **Units:** kg/cm<sup>2</sup>
- **Operating Range:** 0 kg/cm<sup>2</sup> to 8 kg/cm<sup>2</sup>
- **Power Supply:** 36 VAC

### Temperature Display:

- **Units:** Degrees Centigrade
- **Operating Range:** -50 °C to 150 °C
- **Power Supply:** 27 VDC

This indicator ensures accurate monitoring of both the oil pressure and temperature for the left and right engines, maintaining optimal operating conditions and preventing potential issues.



## 4.22 Fuel Quantity Selector Switch.



Figure 4-23. Fuel quantity switch.

The selector switch determines which fuel quantity indications are displayed on the fuel quantity gauge:

- **TOTAL Position:** Combines signals from all fuel quantity probes to indicate the total fuel quantity in liters.
- **LEFT Position:** Displays the fuel quantity from the left cell probe.
- **RIGHT Position:** Displays the fuel quantity from the right cell probe.
- **SVC TANK Position:** Displays the fuel quantity from the central service cell probe.

This configuration allows for precise monitoring of fuel levels in different tanks, ensuring accurate fuel management during operations.

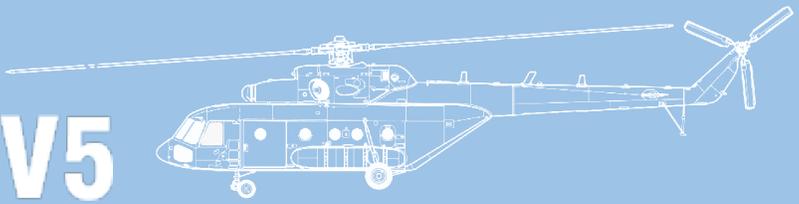
## 4.23 Low Fuel Annunciator.



Figure 4-24. Low fuel annunciator.

The low fuel annunciator is located on the instrument panel in front of the co-pilot. It flashes when the fuel level drops to approximately 270 liters, alerting the crew to the low fuel condition.

## 4.24 Fuel Quantity Indicator.



#### 4.24 Fuel Quantity Indicator.

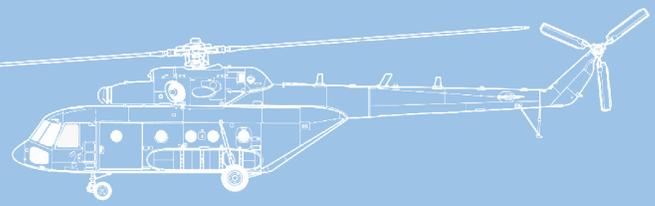


Figure 4-25. Fuel quantity indicator.

The fuel quantity gauge indicates the amount of fuel measured by a sensing unit in each fuel tank and displays the quantity in liters.

- **Outer Scale:** Reads the total fuel from 0 to 2800 liters.
- **Inner Scale:** Reads the selected tank's fuel quantity from 0 to 1200 liters.

The gauge is installed on the instrument panel in front of the co-pilot and is powered by 27 VDC through a circuit breaker marked **FUEL QTY IND** on the right circuit breaker overhead panel ([see Fig. 10-5, Item 28](#)).



## 5. Lower Console.

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Figure 5-1. Lower Console.

**1. Audio Box Control:** Manages audio inputs and outputs for communication and navigation systems.

**2. Actuator Autopilot Indicator:** Displays the status and operation of the autopilot actuators.

**3. Autopilot Control Panel:** Controls the engagement and settings of the autopilot system.

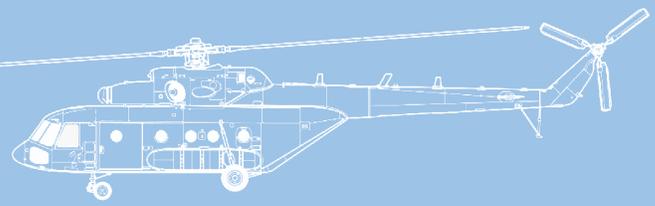
**4. Engine Electronic Control Panel:** Manages electronic settings and monitoring for the engines.

**5. Rear Ramp Control Panel:** Controls the operation of the rear ramp for loading and unloading.

**6. Tail Rotor Pitch Limit Panel:** Adjusts and limits the pitch of the tail rotor for stability and control.

**7. Miscellaneous Panel:** Contains various controls for additional systems and functions.

**8. Radio Stack:** Houses the radio equipment for communication.



## 5.1 Audio Box Control.



Figure 5-2. Airspeed Indicator.

**1. Com 1 Radio Select Switch:** Selects the audio channel for communication radio 1.

**2. Com 2 Radio Select Switch:** Selects the audio channel for communication radio 2.

**3. NAV 1 Audio Select Switch:** Controls the audio reception from navigation radio 1.

**4. NAV 2 Audio Select Switch:** Controls the audio reception from navigation radio 2.

**5. ADF Audio Switch:** Manages the audio signals received from the Automatic Direction Finder (ADF).

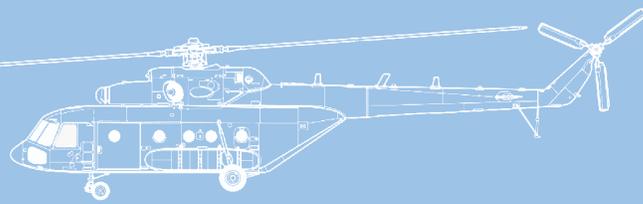
**6. DME Audio Switch:** Controls the audio signals from the Distance Measuring Equipment (DME).

**7. Marker Beacon Audio Switch:** Manages the audio signals from marker beacons.

The audio box panel provides an audio interface and control for the following functions:

- **Communication Radios:** Manages audio for communication between the crew and external contacts.
- **Navigation Audio Reception:** Controls audio signals from navigation aids.
- **ADF Audio Indicator Reception:** Receives audio signals from the Automatic Direction Finder (ADF) system.
- **Marker Beacon Indicator Reception:** Manages audio signals from marker beacons.

This panel is essential for ensuring clear and effective audio communication and navigation signal reception in the helicopter.



## 5.2 Actuator Autopilot Indicator.

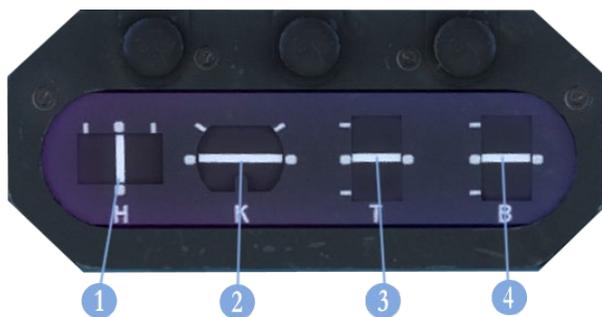


Figure 5-3. Actuator Indicator.

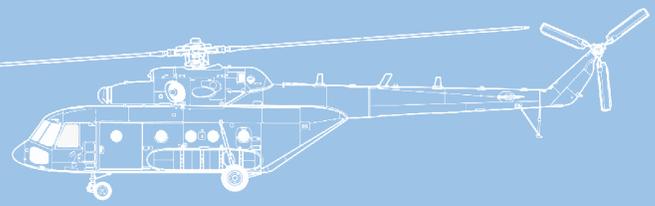
**1. Indication Yaw Channel:** Displays the position of the yaw control actuator.

**2. Indication Roll Channel:** Displays the position of the roll control actuator.

**3. Indication Pitch Channel:** Displays the position of the pitch control actuator.

**4. Indication Altitude Channel:** Displays the position of the altitude control actuator.

The actuator indicator provides real-time information on the position of the steering control cylinders for each autopilot channel (yaw, roll, pitch, altitude). This indicator is essential for monitoring the autopilot system and provides the pilot with precise feedback on the positions of the control surfaces.



## 5.3 Autopilot Control Panel.



Figure 5-4. Autopilot Panel.

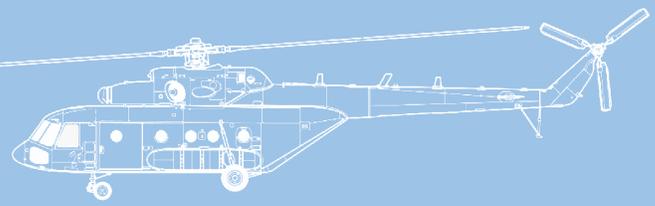
- |  |   |
|--|---|
| <p><b>1. Yaw Channel Button Enabling:</b> Activates the yaw control channel.</p> <p><b>2. Roll and Pitch Channels Button Enabling:</b> Activates the roll and pitch control channels.</p> <p><b>3. Altitude Channel Button Enabling:</b> Activates the altitude control channel.</p> <p><b>4. Altitude Channel Button Disabling:</b> Deactivates the altitude control channel.</p> | <p><b>5. Altitude Adjust Switch:</b> Adjusts the altitude setting.</p> <p><b>6. Pitch Adjust Knob:</b> Adjusts the pitch angle.</p> <p><b>7. Roll Adjust Knob:</b> Adjusts the roll angle.</p> <p><b>8. Yaw Adjust Knob:</b> Adjusts the yaw angle.</p> <p><b>9. Yaw Channel Button Disabling:</b> Deactivates the yaw control channel.</p> |
|--|---|

The autopilot panel allows for the activation and control of the autopilot system, which includes channels for yaw, roll, pitch, and altitude.

### Components:

#### 1. Green Light Buttons:

- **Yaw Channel:** Activates the yaw control.
- **Roll and Pitch Channels:** Activates the roll and pitch controls.
- **Altitude Channel:** Activates the altitude control.



## 2. Red Light Button:

- **Disables** the yaw and altitude channels.

## 3. AP OFF Button:

- Located on the control cyclic stick ([see Fig. 16-1, Item 4](#)), this button disengages the autopilot.

### Functionality:

When the yaw, roll, and pitch channels are enabled, small corrections can be made to the helicopter's position angles. To adjust these angles, turn the knob on the control panel. The scale visible in the window above the knob will rotate, with divisions from 0 to 10, each representing one degree of rotation of the helicopter.

### Power Supply:

The autopilot system is powered by 27 VDC and 36 VDC through a circuit breaker labeled **AUTOPILOT MAIN** on the circuit breaker overhead panel ([see Fig. 10-1, Item 10](#))

This panel provides essential control and feedback for maintaining the desired flight path and stability, ensuring safe and efficient operation of the autopilot system.

## Autopilot System Operation

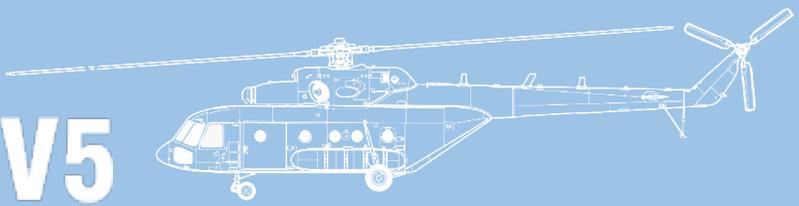
Below is a description of each channel's function and the steps required for operation.

**Important:** Ensure that the Autopilot **Pitch/Roll** button is engaged at all times, as the helicopter becomes unflyable/uncontrollable without them. Additionally, the helicopter must be above 300 feet AGL (Above Ground Level) to avoid ground effect and wind resonance issues that can affect the autopilot's performance. Cruising speeds will provide more stable flight conditions.

### Yaw Channel

The Yaw channel controls the tail rotor's yaw and the helicopter's bank angle to maintain the current heading (HDG). ([see Fig. 5-4, Item 1](#))

- **Activation:** Ensure the helicopter is in straight and level flight at a speed above 45 knots and an altitude above 300 feet AGL. Press the "**AP YAW Enable**" button on the autopilot control panel. The system senses and stores the current heading, sending control signals to the cyclic to maintain this heading with slight corrections.



- **Deactivation:** If variables such as torque effect, strong turbulence, or crosswinds disrupt the heading, deactivate the Yaw channel by pressing the "**AP YAW Disable**" button and manually regain the desired course. Reactivate the Yaw channel once the helicopter is back on the desired heading, in straight and level flight.
- **Adjustment:** Adjust the heading up to 10 degrees left or right using the "**AP Yaw Knob**." If the helicopter's bank angle exceeds 25 degrees, the Yaw channel will automatically deactivate to prevent undesirable movements.

## Roll and Pitch Trim Channels

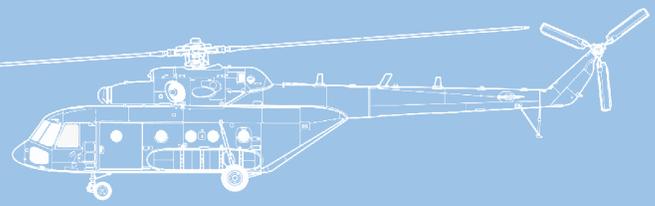
The Roll and Pitch channels maintain nearly centered bank and pitch angles, assisting the pilot in making minor cyclic adjustments. ([see Fig. 5-4, Item 2](#))

- **Activation:** Press the "**AP Roll/Pitch Enable**" button on the autopilot control panel. These channels should be active before takeoff and throughout the flight. **They must remain engaged at all times to ensure controllability.**
- **Deactivation:** Press the "**AP Roll/Pitch Disable**" button located on the cyclic stick ([see Fig. 16-1, Item 4](#)) only when on the ground if necessary.
- **Adjustment:** Use the "**Roll Trim Knob**" to adjust the helicopter's lateral axis and the "**Pitch Trim Knob**" to adjust the pitch axis.

## Altitude Channel

This channel maintains the helicopter's current altitude ([see Fig. 5-4, Item 3](#)). If strong vibrations occur due to winds or turbulence, slightly adjust the collective until the vibration ceases. If vibrations become uncontrollable, immediately deactivate the Altitude channel

- **Activation:** Ensure the helicopter is flying straight and level at a speed above 50 knots and an altitude above 300 feet AGL, with the cyclic in a nearly neutral position. Adjust the altitude and climb/descent rate using the collective until the Vertical Speed Indicator needle remains at 0 for more than 3 seconds. Press the "AP Altitude Activation" button on the autopilot control panel.
- **Deactivation:** If the helicopter experiences strong vibrations, deactivate the channel by pressing the "AP Altitude Deactivation" button, return to straight and level flight, and repeat the activation steps.
- **Adjustment:** Use the "**AP Altitude Switch**" on the autopilot control panel to increase or decrease altitude. Hold the left mouse button on the switch to reach the desired altitude or use the mouse wheel for fine adjustments.



**Note:** The autopilot system is an adaptation designed to replicate the real helicopter's autopilot while meeting the needs of users and the capabilities of MSFS2020. Please note that movements are not exact due to MSFS2020's current simulation dynamics, which do not fully support a fully functional helicopter autopilot.

## 5.4 Rear Ramp Control Panel.



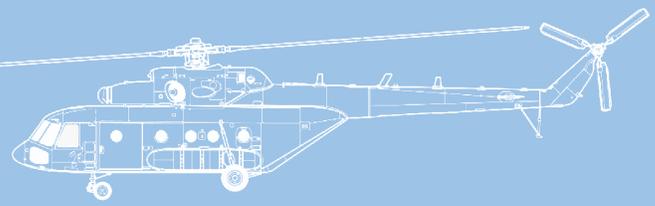
Figure 5-5. Ramp control panel.

1. **Annunciators Ramp Panel:** Displays the status of the rear ramp with illuminated indicators.
2. **Open and Close Control Switch:** Used to control the opening and closing of the rear ramp.

The rear ramp provides a means of quickly loading or unloading cargo/passengers. The ramp is not to be opened below floor level for takeoff and landing. Hydraulically operated by the utility hydraulic system and 27VDC through circuit breaker marked **RAPM CNTRL** (see Fig. 10-1, Item 15), the cargo ramp provides closure automatically sequences to extend and retract.

The rear ramp control panel has a section of annunciators that indicate to the pilot the opening status of the ramp. It has a switch that transfers control of the ramp, cockpit or cabin cargo. Before operating the ramp, make sure that the switch **RAMP CNTRL** is in the **COCKPIT** position (see Fig. 5-6, Item 3).

Legend	Illuminating parameter or fault
<b>POWER</b>	Illuminates when the cockpit ramp panel, has the control.
<b>LOCKS</b>	Illuminates when the rear ramp is secure and locked.
<b>DEPLOYMENT</b>	Illuminates when the rear ramp is deployment.



<b>RETRACTION</b>	Illuminates when the rear ramp is retraction.
<b>OPEN</b>	Illuminates when the rear ramp is open.

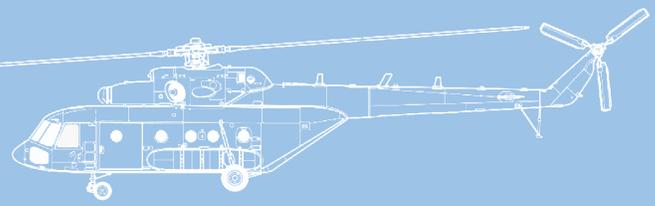
## 5.5 Miscellaneous Panel.



Figure 5-6. Miscellaneous panel.

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|---|---|
| <p><b>1. Annunciators Lamp Test Switch:</b> Tests the functionality of all warning and caution lights.</p> <p><b>2. 36 VAC Transformer Switch:</b> Selects between the main and standby 36V transformers.</p> | <p><b>3. Ramp Power Control Switch:</b> Transfers control of the ramp between the cockpit and cargo crew.</p> <p><b>4. Right Landing Lights Switch:</b> Controls the operation and extension/retraction of the right landing light.</p> |
|---|---|

SWITCH	FUNCTION
<b>LAMP TEST</b>	<b>Up:</b> Tests all <b>Warning lights</b> . <b>Middle:</b> OFF <b>Down:</b> Tests all <b>Caution lights</b> .
<b>TRANSF 36V</b>	<b>Up:</b> Main Transformer 36V. <b>Middle:</b> OFF <b>Down:</b> Standby Transformer 36V.
<b>RAMP CONTR</b>	<b>Cockpit:</b> Cockpit crew has ramp control. <b>Cargo:</b> Cargo crew has ramp control.
<b>LAND LT</b>	<b>Up:</b> Right landing light <b>ON</b> and <b>Extend</b> . <b>Middle:</b> Right landing light <b>OFF</b> . <b>Down:</b> Right landing light <b>Retract</b> .



## 5.6 Radio Comm.

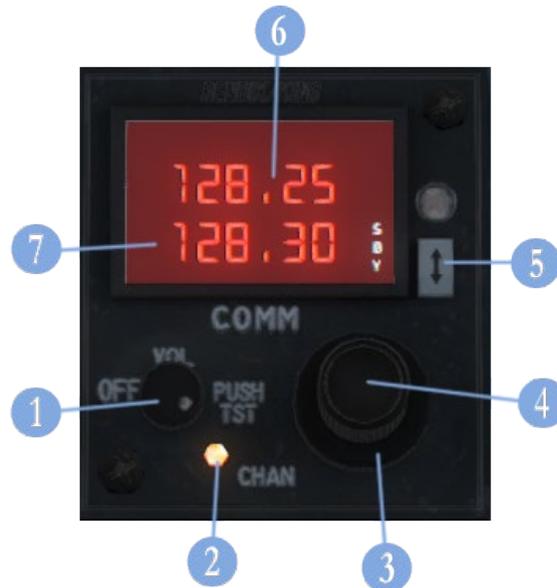


Figure 5-7. Com Controls.

1. **ON / OFF Switch:** Turns the radio on or off.

2. **LED Channel Indicator:** Displays the active communication channel.

3. **MHz Selector Knob:** Adjusts the frequency in MHz.

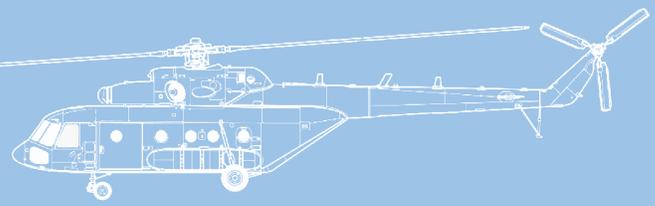
4. **kHz Selector Knob:** Adjusts the frequency in kHz.

5. **Transfer Button:** Transfers the frequency between Active and Standby.

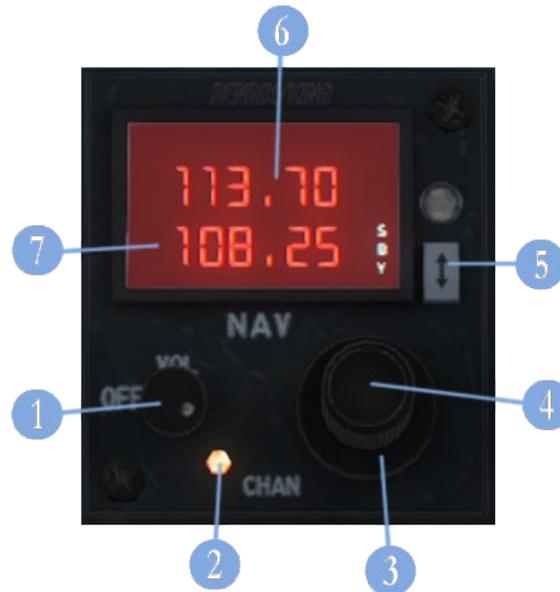
6. **Active Frequency Window:** Displays the currently active frequency.

7. **Standby Frequency Window:** Displays the standby frequency ready to be activated.

RADIO COM 1 / COM 2	
SWITCH	FUNCTION
<b>ON / OFF Switch</b>	Turns the radio <b>ON/OFF</b>
<b>MHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>kHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>Transfer Button</b>	Transfers frequency between Active and Standby.



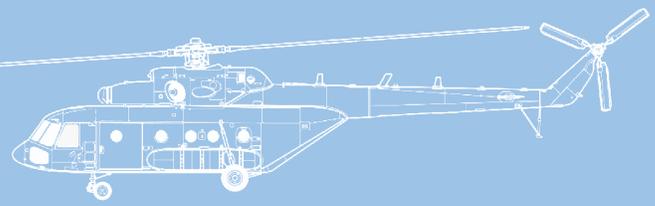
## 5.7 Radio NAV.



**Figure 5-8. NAV Controls.**

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| <ul style="list-style-type: none"> <li>1. <b>ON / OFF Switch:</b> Turns the radio on or off.</li> <li>2. <b>LED Channel Indicator:</b> Displays the active NAV channel.</li> <li>3. <b>MHz Selector Knob:</b> Adjusts the frequency in MHz.</li> <li>4. <b>kHz Selector Knob:</b> Adjusts the frequency in kHz.</li> </ul> | <ul style="list-style-type: none"> <li>5. <b>Transfer Button:</b> Transfers the frequency between Active and Standby.</li> <li>6. <b>Active Frequency Window:</b> Displays the currently active frequency.</li> <li>7. <b>Standby Frequency Window:</b> Displays the standby frequency ready to be activated.</li> </ul> |
|--|--|

RADIO NAV 1 / NAV 2	
SWITCH	FUNCTION
<b>ON / OFF Switch</b>	Turns the radio ON/OFF
<b>MHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>kHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>Transfer Button</b>	Transfers frequency between Active and Standby.



## 5.8 Radio ADF.

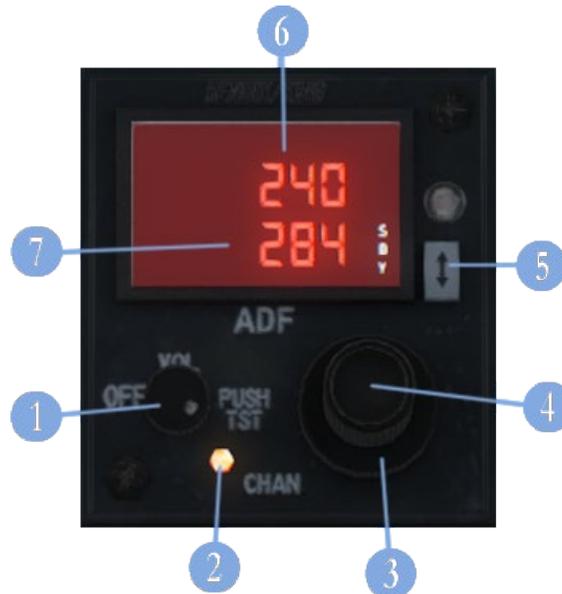
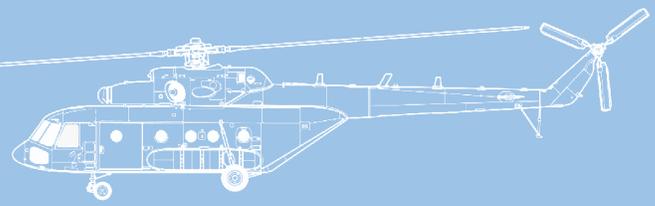


Figure 5-9. ADF controls.

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. <b>ON / OFF Switch:</b> Turns the radio on or off.</li> <li>2. <b>LED Channel Indicator:</b> Displays the active ADF channel.</li> <li>3. <b>MHz Selector Knob:</b> Adjusts the frequency in MHz.</li> <li>4. <b>kHz Selector Knob:</b> Adjusts the frequency in kHz.</li> </ul> | <ul style="list-style-type: none"> <li>5. <b>Transfer Button:</b> Transfers the frequency between Active and Standby.</li> <li>6. <b>Active Frequency Window:</b> Displays the currently active frequency.</li> <li>7. <b>Standby Frequency Window:</b> Displays the standby frequency ready to be activated.</li> </ul> |
|--|--|

RADIO COM 1 / COM 2	
SWITCH	FUNCTION
<b>ON / OFF Switch</b>	Turns the radio ON/OFF
<b>MHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>kHz Selector Knob</b>	<b>Right mouse move / Up wheel:</b> Increase frequency. <b>Left mouse move / Down wheel:</b> Decrease frequency.
<b>Transfer Button</b>	Transfers frequency between Active and Standby.



## 5.9 Transponder.

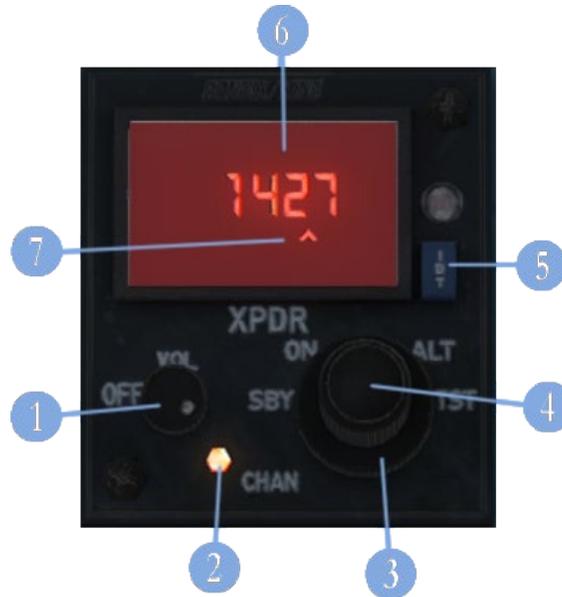


Figure 5-10. XPDR controls.

**1. ON / OFF Switch:** Turns the radio on or off.

**2. LED Channel Indicator:** Displays the active communication channel.

**3. Function Selector Knob:** Selects the desired function or mode.

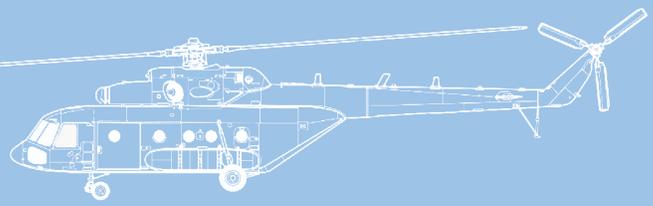
**4. Code Number Knob / Code Select Knob:** Adjusts the code number or selects the code.

**5. IDT Button:** Identifies the transmitter.

**6. Code Flight Window:** Displays the selected flight code.

**7. Digit Select Cursor:** Indicates the current digit being adjusted or selected.

TRANSPONDER	
SWITCH	FUNCTION
<b>ON / OFF Switch</b>	Turns the radio <b>ON/OFF</b>
<b>Function Selector Knob</b>	<b>Left click mouse:</b> Decrease Mode. <b>Right click mouse:</b> Increase Mode. Mode: <b>Standby / ON / ALT / TEST</b>
<b>Code number Knob</b>	<b>Left click mouse:</b> Decrease frequency. <b>Right click mouse:</b> Increase frequency.
<b>Code select knob</b>	<b>Wheel mouse:</b> Increase /Decrease active digit.
<b>Ident Button</b>	Transfers frequency between Active and Standby.



## 6. Left Side Overhead Panel.

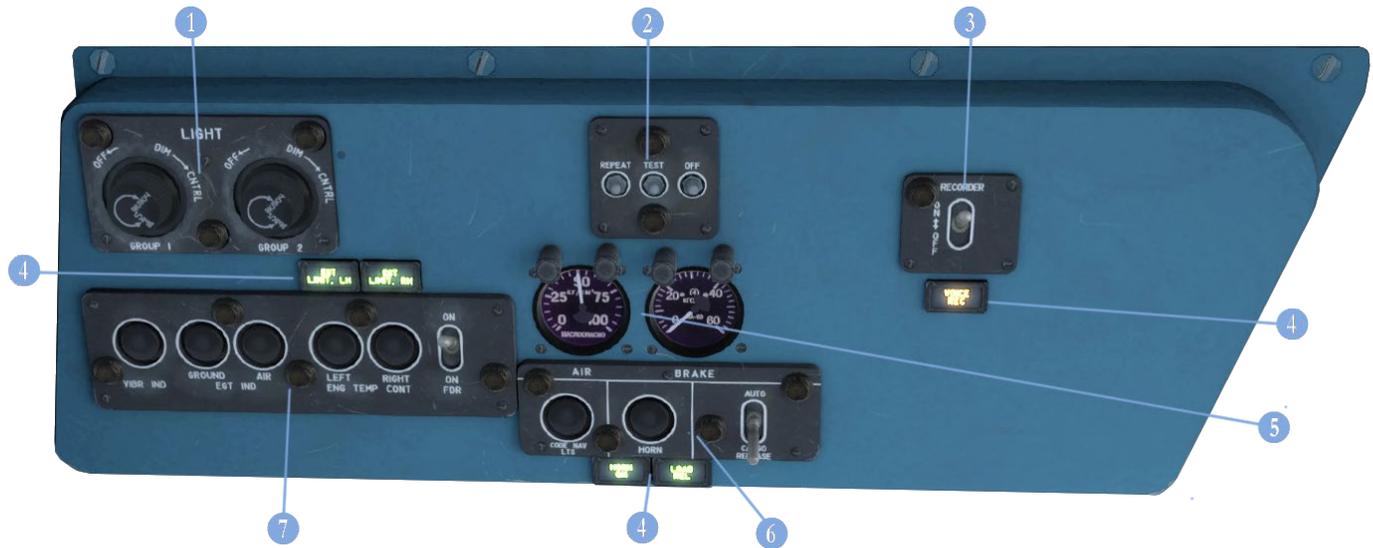


Figure 6-1. Left side overhead Panel.

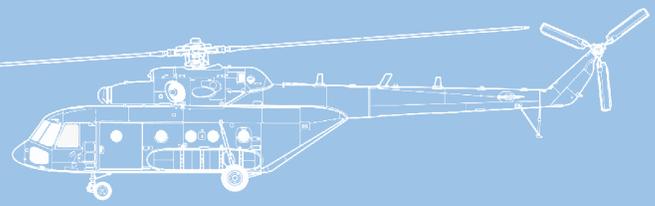
- 1. Rheostat's Illumination Control:** Adjusts the brightness of the panel illumination.
- 2. Voice Warning System:** Provides audible alerts and warnings to the crew.
- 3. Voice Record System:** Records cockpit communications and radio transmissions.
- 4. Annunciators:** Displays visual alerts and status indicators.

- 5. Air Pressure Monitoring Gauges:** Monitors the air pressure levels within the aircraft systems.
- 6. Miscellaneous Panel:** Hosts various additional controls and switches.
- 7. Engine Test Panel:** Facilitates the testing and diagnostics of the engine systems.

### 6.1 Rheostats Illumination Control.



Figure 6-2. Rheostat controls.



1. **Left Side Overhead Lights:** Adjusts the brightness of the overhead lights on the left side.
2. **Pilot Panel Lights:** Adjusts the brightness of the pilot's instrument panel lights.

SWITCH	FUNCTION
GROUP 1 OFF / DIM CNTRL. Knob	<b>Right mouse move / Up wheel:</b> Increase lighting. <b>Left mouse move / Down wheel:</b> Decrease lighting.
GROUP 2 OFF / DIM CNTRL. Knob	<b>Right mouse move / Up wheel:</b> Increase lighting. <b>Left mouse move / Down wheel:</b> Decrease lighting.

## 6.2 Voice Warning System.

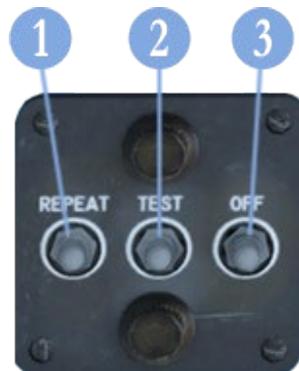
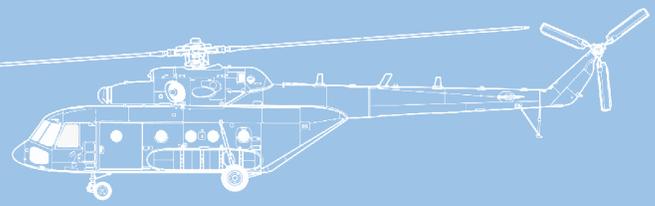


Figure 6-3. Voice warning control.

1. **REPEAT Button:** Pressing this button repeats the last voice message.
2. **TEST Button:** Pressing this button triggers a voice message stating, "UNIT RI-65 IS OK."
3. **OFF Button:** Pressing this button disables the voice warning system.



The voice warning system consists of three buttons: **REPEAT**, **TEST**, and **OFF**.

The system is powered by 27 VDC through a power switch labeled **INF REP**, located on the left corner switch overhead panel ([see Fig. 7-1, Item 8](#)).

Channel Voice Warning Information:

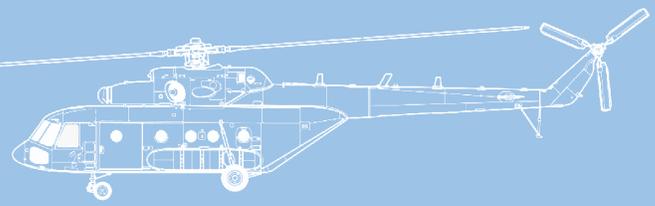
CHANNEL	VOICE WARNING INFORMATION
1	"FIRE IN LEFT ENGINE COMPARTMENT"
2	"FIRE IN RIGHT ENGINE COMPARTMENT"
3	"FIRE IN TRANSMISSION COMPARTMENT"
4	"DANGEROUS VIBRATION OF LEFT ENGINE"
5	"DANGEROUS VIBRATION OF RIGHT ENGINE"
6	"MAIN HYDRAULIC SYSTEM FAILED"
7	"EMERGENCY FUEL RESERVE"
8	"SERVICE FUEL TANK PUMP FAILED"
9	"MAIN FUEL TANK PUMPS FAILED"
10	"ICE FORMATION"
11	"GENERATOR No.1 FAILED"
12	"GENERATOR No.2 FAILED"
13	"UNIT RI-65 IS OK"

This table provides a detailed list of the voice warnings associated with each channel, ensuring pilots are aware of the specific alerts issued by the system.

## 6.3 Annunciators Left Side Overhead.



Figure 6-4. Annunciators Left Overhead.



Legend	Illuminating parameter or fault
<b>HORN ON</b>	Indicates the horn is operative.
<b>LOAD REL</b>	Indicates the cargo hook is released.
<b>ENG LIMIT. LH</b>	Indicates the left engine regulator temperature is in test mode.
<b>ENG LIMIT. RH</b>	Indicates the right engine regulator temperature is in test mode.
<b>VOICE REC</b>	Indicates the voice recording system is disabled.

## 6.4 Air Pressure Monitoring Gauges.



Figure 6-5. Air pressure gauges.

1. Pneumatic System Pressure Gauge.
2. Landing Wheels Brake Pressure Gauge.

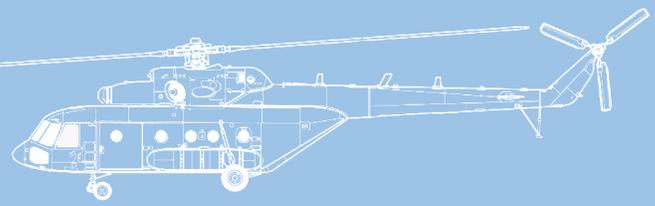
The air brake system includes two primary air pressure gauges: the pneumatic system pressure gauge and the landing wheels brake pressure gauge.

### Pneumatic System Pressure Gauge:

Designed to measure the pressure in the common air system in kg/cm<sup>2</sup>.

### Landing Wheels Brake Pressure Gauge:

Used to measure the air pressure in the brake system of the landing wheels in kg/cm<sup>2</sup>.



## Operation Guidelines:

- The compressor will start charging when the air pressure in the system drops below 50 kg/cm<sup>2</sup> and the **Main Rotor RPM** is above 20%.
- Avoid completely discharging the system. If the air pressure level drops below 20 kg/cm<sup>2</sup>, do not operate the brakes and wait for the system to recharge.
- If the system becomes blocked and does not charge, and the helicopter is fully powered on, open the tablet and press "**Ready To Fly**." This will unblock the system and immediately recharge it.

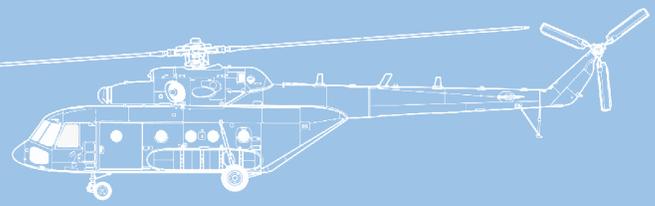
## 6.5 Miscellaneous Panel.



Figure 6-6. Miscellaneous panel.

1. **Code Nav Lights Button:** Controls the navigation lights' coding.
2. **Horn Jump Alert Button:** Activates the horn for jump alerts.
3. **Cargo Hook Switch:** Controls the operation of the cargo hook.

SWITCH	FUNCTION
CODE NAV LTS	Nav Lights morse code function.
HORN	Inoperative.
AUTO/ CARGO RELEASE	Inoperative.



## 6.6 Miscellaneous Test Panel.

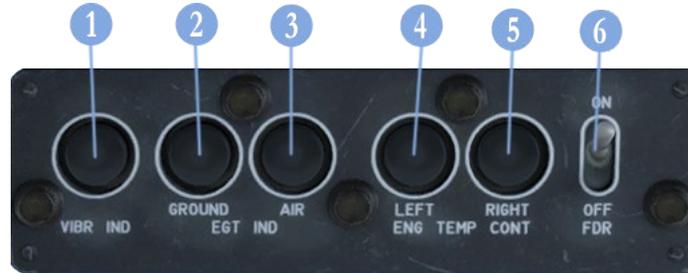
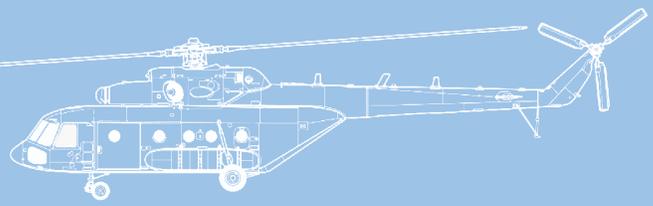


Figure 6-7. Miscellaneous test panel.

- 1. Engine Vibration Test Button:** Tests the engine vibration monitoring system.
- 2. EGT Indicator Ground Test Button:** Tests the Exhaust Gas Temperature (EGT) indicator in ground mode.
- 3. EGT Indicator Air Test Button:** Tests the Exhaust Gas Temperature (EGT) indicator in air mode.

- 4. Left Engine Control Temperature Test Button:** Tests the temperature control system for the left engine.
- 5. Right Engine Control Temperature Test Button:** Tests the temperature control system for the right engine.
- 6. Flight Data Record Switch:** Activates the flight data recording system.

SWITCH	FUNCTION
VIBR IND	Engine vibration test. Voice warnings: “DANGEROUS VIBRATION OF LEFT ENGINE” and “DANGEROUS VIBRATION OF RIGHT ENGINE”
GROUND EGT IND	EGT indicator ground test.
AIR EGT IND	EGT indicator air test.
LEFT ENG TEMP CONT	Left engine control temperature test.
RIGHT ENG TEMP CONT	Right engine control temperature test.
ON OFF FDR	Inoperative.



## 7. Left Corner Switch Overhead Panel.

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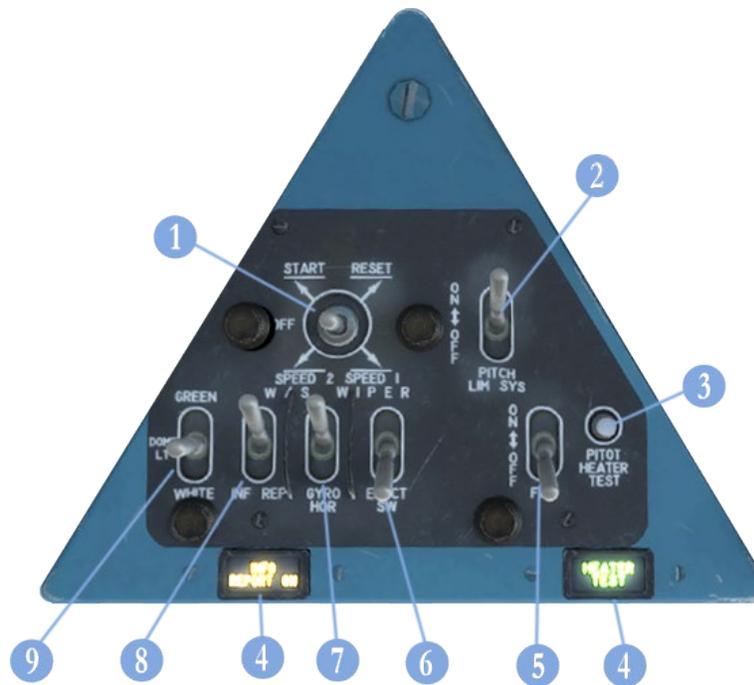


Figure 7-1. Left switch overhead panel.

**1. Pilot Windshield Wiper Switch:** Controls the wiper for the pilot's windshield.

**2. Pitch Limit System Switch:** Activates or deactivates the pitch limit system.

**3. Pitot Heater Test Button:** Tests the pitot heater system.

**4. Annunciator:** Displays status alerts and warnings.

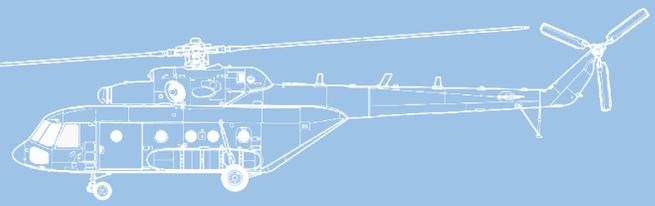
**5. Pilot Fan Control Switch:** Controls the fan for the pilot's cooling system.

**6. Erect Switch:** Resets the Attitude Director Indicator (ADI) to the erect position.

**7. Pilot Gyro Horizon Switch:** Activates or deactivates the pilot's gyro horizon instrument.

**8. Voice Warning Master Switch:** Enables or disables the voice warning system.

**9. Dome Light Switch:** Controls the cockpit dome light.



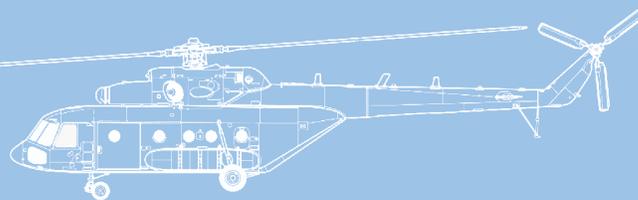
SWITCH	FUNCTION
<b>W/S WIPER</b>	<b>START:</b> Left click mouse - Pilot windshield wiper runs at high speed. <b>SPEED2:</b> Left click mouse - Pilot windshield wiper runs at low speed. <b>SPEED1:</b> Left click mouse - Pilot windshield wiper runs at medium speed. <b>RESET:</b> Left click mouse - Pilot windshield wiper resets to initial position. <b>OFF:</b> Left click mouse - Pilot windshield wiper is not activated.
<b>PITCH LM SYS</b>	Inoperative.
<b>PITOT HEATER TEST</b>	Tests the left pitot heater system (Only when the left pitot system is enabled).
<b>FAN</b>	<b>Pilot fan</b> turn ON / OFF
<b>ERECT SWITCH</b>	Inoperative.
<b>GYRO HOR</b>	Turns the <b>Pilot Attitude Master</b> (gyro horizon) ON/OFF.
<b>INF REP</b>	Turns the voice warning system master ON/OFF.
<b>DOME LT</b>	<b>Up mouse move / Down wheel:</b> Turns on the <b>GREEN</b> light. <b>Down mouse move / Up wheel:</b> Turns on the <b>WHITE</b> light.

## 7.1 Annunciators Left Corner Overhead.



Figure 7-2. Annunciators Left Corner overhead.

Legend	Illuminating parameter or fault
<b>INFO REPORT OFF</b>	Indicates that voice warning system is disable.
<b>HEATER TEST</b>	Indicates that left pitot heater system is ok.



## 8. Left Circuit Breaker Panel.

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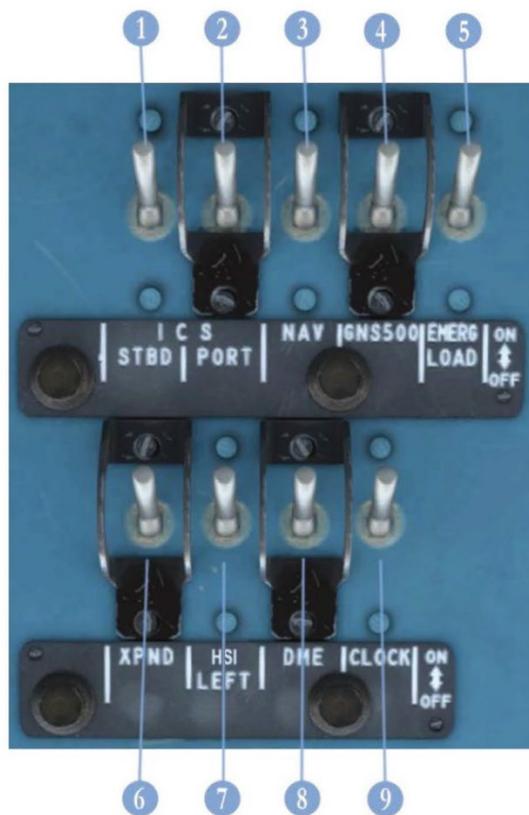


Figure 8-1. Left circuit breaker panel

**1. ICS Starboard Circuit Breaker:** Protects the starboard side intercom system (ICS).

**2. ICS Port Circuit Breaker:** Protects the port side intercom system (ICS).

**3. NAV System Circuit Breaker:** Protects the navigation system.

**4. GPS Circuit Breaker:** Protects the GPS unit.

**5. Emergency Load Circuit Breaker:** Protects the emergency load circuits.

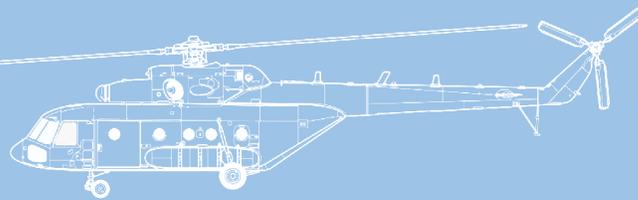
**6. Transponder Circuit Breaker:** Protects the transponder system.

**7. HSI Pilot Circuit Breaker:** Protects the Horizontal Situation Indicator (HSI) for the pilot.

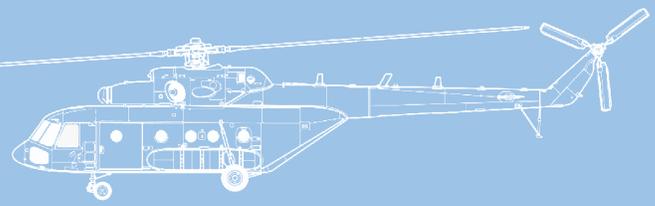
**8. DME Circuit Breaker:** Protects the Distance Measuring Equipment (DME).

**9. Clock Circuit Breaker:** Protects the cockpit clock.

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SWITCH	FUNCTION
<b>ICS STBD</b>	Inoperative.
<b>ICS PORT</b>	Inoperative.
<b>NAV</b>	Master <b>NAV</b> system <b>ON / OFF</b> .
<b>GNS500</b>	Master <b>GNS530(GPS)</b> <b>ON / OFF</b> .
<b>EMERG LOAD</b>	Inoperative.
<b>XPND</b>	Master <b>Transponder ON /OFF</b> .
<b>HSI LEFT</b>	<b>Pilot HSI</b> master <b>ON / OFF</b> .
<b>DME</b>	<b>DME</b> master <b>ON / OFF</b> .
<b>CLOCK</b>	<b>Clock</b> master <b>ON /OFF</b> .



## 9. Anti-icing system panel.

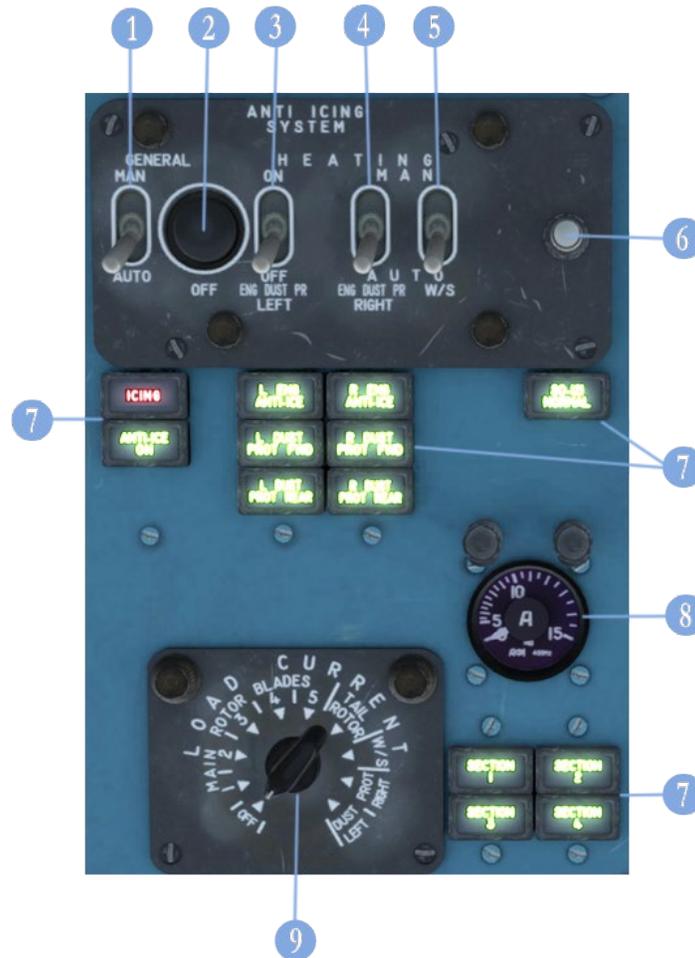


Figure 9-1. Anti-icing system panel.

**1. Anti-Icing Control Mode Switch:** Selects the control mode for the anti-icing system.

**2. Anti-Icing System OFF Button:** Turns the anti-icing system OFF.

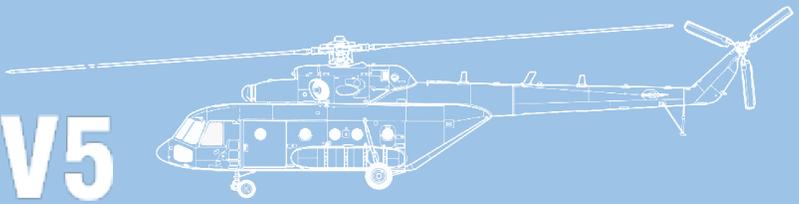
**3. Left Engine Dust Switch:** Controls the dust protection system for the left engine.

**4. Right Engine Dust Switch:** Controls the dust protection system for the right engine.

**5. Windshield Anti-Icing Switch:** Selects the anti-icing mode for the windshield.

**6. Anti-Icing System Test Button:** Tests the anti-icing system.

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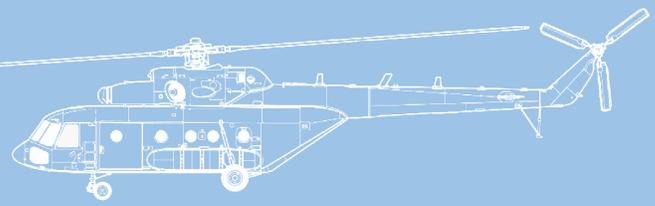


**7. Anti-Icing Annunciator:** Displays status and alerts related to the anti-icing system.

**9. Current Measurement Ammeter Selector:** Selects the component whose current is being measured.

**8. Anti-Icing AC Amperemeter Indicator:** Measures the load current of the anti-icing system.

SWITCH	FUNCTION
MAN AUTO	Selects the Anti-Icing control mode: <b>MANUAL</b> or <b>AUTO</b> .
OFF	Turns the Anti-Icing system <b>OFF</b> .
ENG DUST PR LEFT	Toggles the left engine dust protection <b>ON/OFF</b> .
ENG DUST PR RIGHT	Selects the right engine dust protection mode: <b>MANUAL</b> or <b>AUTO</b> .
W/S	Selects the windshield Anti-Icing mode: <b>MANUAL</b> or <b>AUTO</b> .
(Test System)	Tests the Anti-Icing system.
LOAD CURRENT	<p><b>RIGHT mouse move / Up wheel:</b> Increase lighting.  <b>LEFT mouse move / Down wheel:</b> Decrease lighting.</p> <p><b>Modes:</b>  Mode 1: Load current for main rotor blade 1.  Mode 2: Load current for main rotor blade 2.  Mode 3: Load current for main rotor blade 3.  Mode 4: Load current for main rotor blade 4.  Mode 5: Load current for main rotor blade 5.  Mode 6: Load current for tail rotor blades.  Mode 7: Load current for windshield.  Mode 8: Load current for right engine dust protection.  Mode 9: Load current for left engine dust protection.</p>



## 9.1 Annunciators Anti-icing Panel.

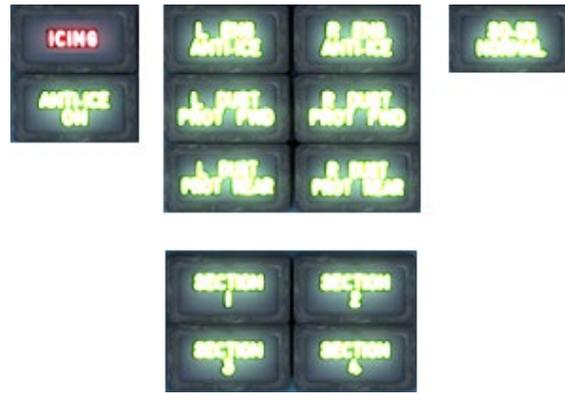
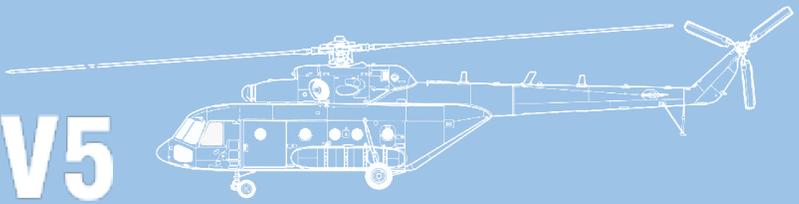


Figure 9-2. Annunciators anti-icing panel.

Legend	Illuminating parameter or fault
<b>ICING</b>	Illuminates when the ice formation is detected automatically.
<b>ANTI-ICE ON</b>	Illuminates when the anti-ice system is activated automatically or when the Anti-Icing control mode switch is in the MANUAL position.
<b>L ENG ANTI-ICE</b>	Illuminates when the left engine anti-ice system is enabled.
<b>L DUST PROT FWD</b>	Illuminates when the left engine forward dust protection is enabled.
<b>L DUST PROT REAR</b>	Illuminates when the left engine rear dust protection is enabled.
<b>R ENG ANTI-ICE</b>	Illuminates when the right engine anti-ice system is enabled.
<b>R DUST PROT FWD</b>	Illuminates when the right engine forward dust protection is enabled.
<b>R DUST PROT REAR</b>	Illuminates when the right engine rear dust protection is enabled.
<b>SO-121 NORMAL</b>	Illuminates when the anti-ice system is tested.
<b>SECTION 1</b>	Illuminates during operation when the cyclic timer energizes main and tail rotor blade section 1.
<b>SECTION 2</b>	Illuminates during operation when the cyclic timer energizes main and tail rotor blade section 2.
<b>SECTION 3</b>	Illuminates during operation, the cyclic timer energizes main and tail rotor blade section 3.
<b>SECTION 4</b>	Illuminates during operation, the cyclic timer energizes main and tail rotor blade section 4.



The anti-icing system is designed to prevent the formation of ice and to remove ice or water from the blades of the main and tail rotors, cockpit windshields, dust-protection devices, engines, and engine inlets. The rotors and windshields are heated electrically, while the dust-protection devices are heated both electrically and with bleed air from the engine compressor section.

The engines and engine inlet sections are heated with bleed air from the engine compressor section. To provide warning of ice formation, the helicopter is equipped with an ice detector and a visual ice-warning indicator.

The anti-icing systems for the rotors, windshields, and the right engine dust protector and inlet section can be activated automatically or manually. The left engine, left dust-protection device, and left engine inlet section can only be activated manually.

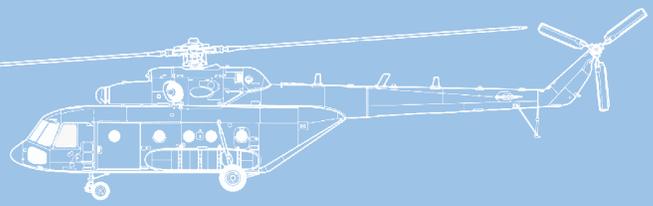
The controls for the ice protection system, along with annunciators and indicators related to its operation, are located on the Anti-Icing System Panel on the left side of the cockpit overhead panel.

## 9.2 Anti-icing AC amperemeter indicator.



Figure 9-3. AC amperemeter indicator.

The anti-icing AC amperemeter gauge is designed to measure the load current of the anti-ice system for the rotors, windshields, and dust-protection devices. The operating range is from 0 A to 150 A, with readings displayed in amperes.



## 10. Right Circuit Breaker Panel.

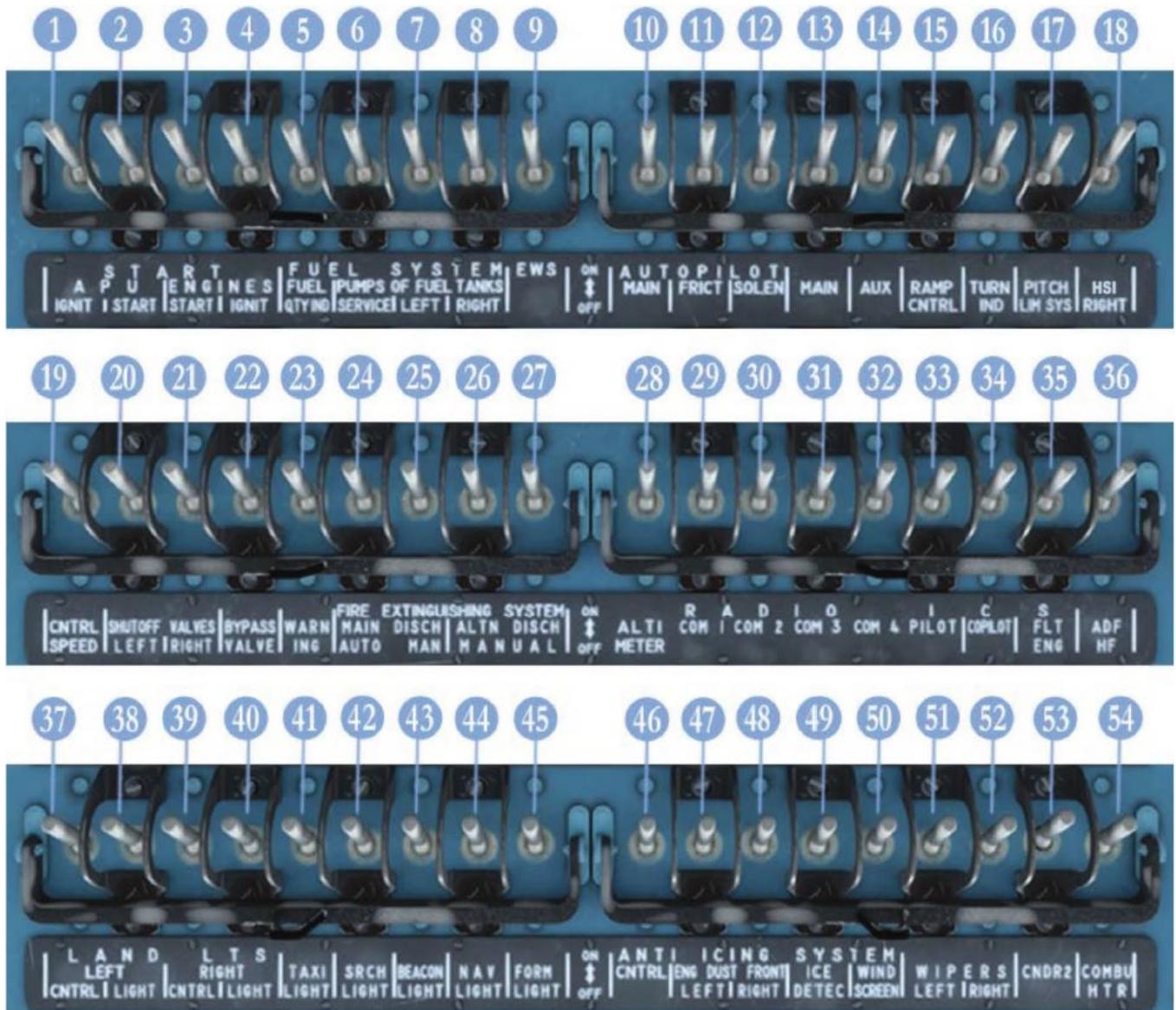
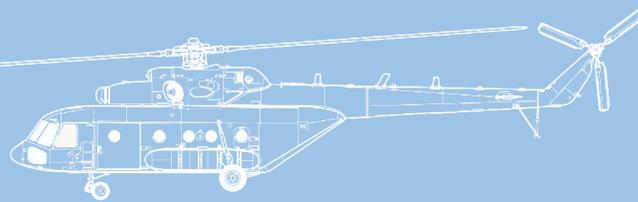


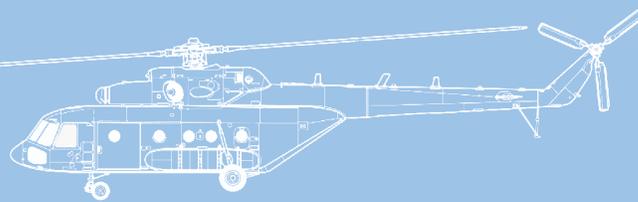
Figure 10-1. Circuit Breaker Panel.

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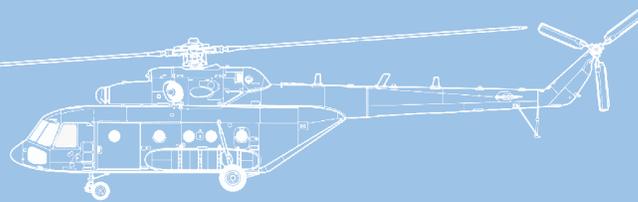
No	BREAKER	FUNCTION
1	START APU IGNIT	APU ignition current circuit breaker. Switch <b>ON / OFF</b> .
2	APU START	APU start circuit breaker. Switch <b>ON / OFF</b> .
3	ENGINES START	Engines start system circuit breaker. Switch <b>ON / OFF</b>
4	ENGINES IGNIT	Engines ignition system circuit breaker. Switch <b>ON / OFF</b> .
5	FUEL QYT IND	Fuel quantity indicator circuit breaker. Switch <b>ON / OFF</b> .
6	PUMP FUEL TANK SERVICE	Pump fuel tank service circuit breaker. Switch <b>ON / OFF</b> .
7	PUMP FUEL TANK LEFT	Pump fuel tank left circuit breaker. Switch <b>ON / OFF</b> .
8	PUMP FUEL TANK RIGHT	Pump fuel tank right circuit breaker. Switch <b>ON / OFF</b> .
9	EWS	Inoperative.
10	AUTOPILOT MAIN	Autopilot main system circuit breaker. Switch <b>ON / OFF</b> .
11	AUTOPILOT FRICT	Autopilot friction system circuit breaker. Switch <b>ON / OFF</b> .
12	AUTOPILOT SOLEN	Autopilot solenoid start system circuit breaker. Switch <b>ON / OFF</b> .
13	HYDRAULIC MAIN	Main hydraulic system circuit breaker. Switch <b>ON / OFF</b> .
14	HYDRAULIC AUX	Auxiliary hydraulic system circuit breaker. Switch <b>ON / OFF</b> .
15	RAMP CNTRL	Ramp control system circuit breaker. Switch <b>ON / OFF</b> .
16	TURN IND	Turn indicator circuit breaker. Switch <b>ON / OFF</b> .
17	PITCH LIM SYS	Inoperative.
18	HSI RIGHT	Copilot HSI indicator circuit breaker. Switch <b>ON / OFF</b> .

# Cera Sim MI-17 V5

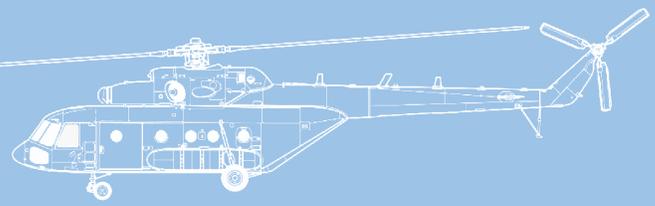


No	BREAKER	FUNCTION
19	CNTRL SPEED	Inoperative.
20	SHUTOFF VALVE LEFT	Shutoff valve left engine circuit breaker. Switch <b>ON / OFF</b> .
21	SHUTOFF VALVE RIGHT	Shutoff valve right engine circuit breaker. Switch <b>ON / OFF</b> .
22	BYPASS VALVE	Bypass valve circuit breaker. Switch <b>ON / OFF</b> .
23	FIRE WARNING	Fire warning annunciator system circuit breaker. Switch <b>ON / OFF</b> .
24	FIRE EXTINGUISHING MAIN DISCH AUTO	Fire extinguishing main discharge auto circuit breaker. Switch <b>ON / OFF</b> .
25	FIRE EXTINGUISHING MAIN DISCH MAN	Fire extinguishing main discharge manual circuit breaker. Switch <b>ON / OFF</b> .
26	FIRE EXTINGUISHING ALTN DISCH MANUAL	Fire extinguishing altn. discharge manual circuit breaker. Switch <b>ON / OFF</b> .
27	FIRE EXTINGUISHING ALTN DISCH MANUAL	Fire extinguishing altn. discharge manual circuit breaker. Switch <b>ON / OFF</b> .
28	RADIO ALTIMETER	Radio altimeter indicator circuit breaker. Switch <b>ON / OFF</b> .
29	RADIO COM 1	Radio com 1 system circuit breaker. Switch <b>ON / OFF</b> .
30	RADIO COM2	Radio com 2 system circuit breaker. Switch <b>ON / OFF</b> .
31	RADIO COM3	Inoperative.
32	RADIO COM4	Inoperative.
33	ICS PILOT	Inoperative.
34	ICS COPILOT	Inoperative.
35	ICS FLT ENG	Inoperative.
36	ADF HF	ADF system circuit breaker. Switch <b>ON / OFF</b> .

# Cera Sim MI-17 V5



No	BREAKER	FUNCTION
37	LAND LTS LEFT CNTRL	Landing lights left control system circuit breaker. Switch <b>ON / OFF.</b>
38	LAND LTS LEFT LIGHT	Landing lights left light system circuit breaker. Switch <b>ON / OFF.</b>
39	LAND LTS RIGHT CNTRL	Landing lights right control system circuit breaker. Switch <b>ON / OFF.</b>
40	LAND LTS RIGHT LIGHT	Landing lights right light system circuit breaker. Switch <b>ON / OFF.</b>
41	TAXI LIGHT	Taxi light circuit breaker. Switch <b>ON / OFF.</b>
42	SRCH LIGHT	Search light circuit breaker. Switch <b>ON / OFF.</b>
43	BEACON LIGHT	Beacon light system circuit breaker. Switch <b>ON / OFF.</b>
44	NAV LIGHT	Navigation light system circuit breaker. Switch <b>ON / OFF.</b>
45	FORM LIGHT	Formation light circuit breaker. Switch <b>ON / OFF.</b>
46	ANTI-ICE CNTRL	Anti-ice control system circuit breaker. Switch <b>ON / OFF.</b>
47	ANTI-ICE ENG DUST LEFT	Anti-ice engine dust left system circuit breaker. Switch <b>ON / OFF.</b>
48	ANTI-ICE ENG DUST RIGHT	Anti-ice engine dust right system circuit breaker. Switch <b>ON / OFF.</b>
49	ANTI-ICE ICE DETEC	Anti-ice ice detector system circuit breaker. Switch <b>ON / OFF.</b>
50	ANTI-ICE WIND SCREEN	Anti-ice windshield system circuit breaker. Switch <b>ON / OFF.</b>
51	WIPER LEFT	Wiper pilot system circuit breaker. Switch <b>ON / OFF.</b>
52	WIPER RIGHT	Wiper copilot system circuit breaker. Switch <b>ON / OFF.</b>
53	CNDR2	Inoperative.
54	COMBU HTR	Kerosene heater system circuit breaker. Switch <b>ON / OFF.</b>

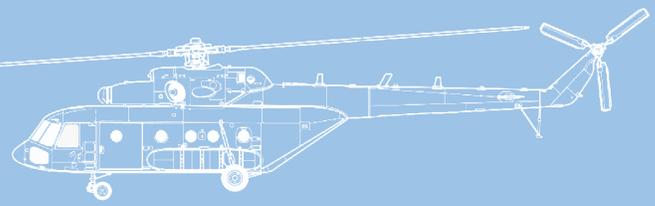


## 11. Upper Central Console.



Figure 11-1. Upper Central Console.

- |  |   |
|--|---|
| <p><b>1. Fire Extinguishing Manual Panel:</b> Allows manual activation of the fire extinguishing system.</p> <p><b>2. Fire Annunciators:</b> Displays visual alerts related to fire detection and extinguishing.</p> <p><b>3. Fire Detection Test Panel:</b> Tests the functionality of the fire detection system.</p> <p><b>4. APU Monitoring Gauges:</b> Monitors the status and performance of the Auxiliary Power Unit (APU).</p> <p><b>5. Cabin Passenger Temperature Control:</b> Controls the temperature settings for the passenger cabin.</p> | <p><b>6. KO-50 Kerosene Combustible Heater Control Panel:</b> Manages the operation of the KO-50 kerosene heater.</p> <p><b>7. Fuel Control Panel:</b> Controls various aspects of the fuel system.</p> <p><b>8. APU and Engines Starting Control Panel:</b> Controls the startup procedures for the APU and main engines.</p> <p><b>9. Hydraulic System Control Panel:</b> Manages the hydraulic systems of the aircraft, including activation and monitoring.</p> |
|--|---|



## 11.1. Fire Detection System.

The fire detection system is designed to detect fires in any helicopter compartment, alert the crew, and automatically activate the fire extinguishing system. It provides:

- Fire detection in protected helicopter compartments.
- Crew notification via annunciators.
- Additional warning signals through the voice warning system.

The system includes six groups of sensors, each group containing three sensors connected in series. The helicopter is equipped with three sets of sensor equipment, comprising 14 groups of sensors in total, which monitor the following areas:

- Main Gearbox and Service Fuel Tank compartments.
- Left and right TV3-117VM engine compartments.
- APU engine and KO-50 kerosene heater compartments.

The fire detection system is powered by 27 VDC through circuit breakers labeled **FIRE WARNING**, **FIRE FIGHTING SYSTEM**, **FIRE EXTINGUISHING MAIN DISCH AUTO**, and **FIRE EXTINGUISHING ALTN DISCH MANUAL** (located on the right circuit breaker overhead panel, see Figure 10-1). If the main system fire extinguisher does not activate automatically, the manual activation button for either the main or alternate system must be pressed.

### *Fire Extinguishing Manual Panel.*

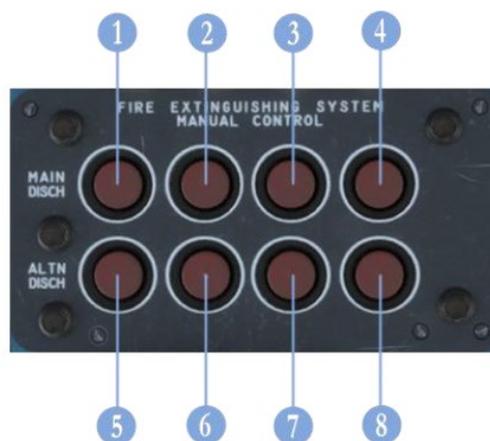
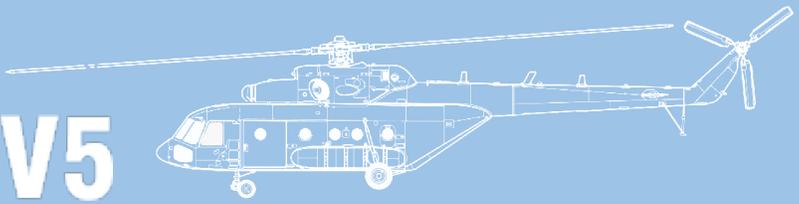


Figure 11-2. Fire Extinguishing Manual Control.



**1. Left Engine Main Fire Extinguishing Button:** Activates the main fire extinguishing system for the left engine.

**2. Right Engine Main Fire Extinguishing Button:** Activates the main fire extinguishing system for the right engine.

**3. Kerosene Combustible Heater Main Fire Extinguishing Button:** Activates the main fire extinguishing system for the kerosene combustible heater.

**4. APU Main Fire Extinguishing Button:** Activates the main fire extinguishing system for the APU.

**5. Left Engine Alternate Fire Extinguishing Button:** Activates the alternate fire extinguishing system for the left engine.

**6. Right Engine Alternate Fire Extinguishing Button:** Activates the alternate fire extinguishing system for the right engine.

**7. Kerosene Combustible Heater Alternate Fire Extinguishing Button:** Activates the alternate fire extinguishing system for the kerosene combustible heater.

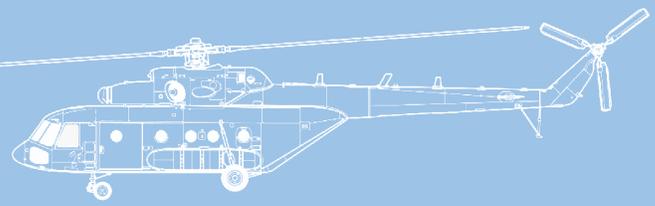
**8. APU Alternate Fire Extinguishing Button:** Activates the alternate fire extinguishing system for the APU.

The manual fire extinguishing control system is designed for manual activation of fire extinguishers. It features four "main discharge" buttons that control the discharge of the main fire extinguishing system, and four "alternate discharge" buttons that control the alternate fire extinguishing system.

### *Fire Annunciators.*



Figure 11-3. Fire Annunciators.



Legend	Illuminating parameter or fault
<b>LENG FIRE</b>	Illuminates when a fire is detected in the left engine.
<b>R ENG FIRE</b>	Illuminates when a fire is detected in the right engine.
<b>COMBUST HTR FIRE</b>	Illuminates when a fire is detected in the combustable heater.
<b>APU GEAR FIRE</b>	Illuminates when a fire is detected in the APU.
<b>TEST FIRE DET</b>	Illuminates when the fire detection system is tested (Fire Extin. Test switch in the "test" position).
<b>MAIN DISCH</b>	Illuminates when the main extinguisher is discharged.
<b>ALTN DISCH</b>	Illuminates when the alternate extinguisher is discharged.

### *Fire Detection Test Panel.*

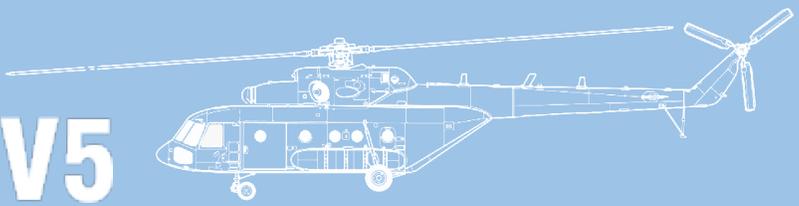


**Figure 11-4. Fire Detection Test Panel.**

- 1. Fire Detection Test Switch:** Used to test the fire detection system.
- 2. Fire Extinguisher Main/Alternate Switch:** Switches between the main and alternate fire extinguishing systems.

- 3. Fire Detection Channel Test Knob:** Tests individual fire detection channels.
- 4. Fire Test Annunciator:** Indicates the status of the fire detection test.

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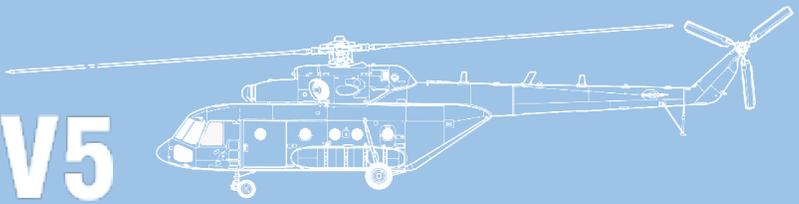


No	SWITCH	FUNCTION
1	FIRE EXTING FIRE DET	Fire detection system test. <b>FIRE EXTING / FIRE DET TEST.</b>
2	II SQUIBS	Fire extinguisher system discharge test. <b>MAIN/ ALTERNATE.</b>
3	Channels OFF/TEST/1 /2/3/4/5/6	<b>Right mouse move / Up wheel:</b> Increase Channel. <b>Left mouse move / Down wheel:</b> Decrease Channel.

SWITCH	POSITION	ANNUNCIATOR
Fire detection test	FIRE DET TEST	
Fire extinguisher system discharge test.	SQUIBS II	
Fire detection channels test	TEST	

SWITCH	POSITION	ANNUNCIATOR
Fire detection test	FIRE DET TEST	
Fire extinguisher system discharge test.	SQUIBS I	
Fire detection channels test	TEST	

SWITCH	POSITION	ANNUNCIATOR
Fire detection test	FIRE DET TEST	
Fire detection channels test	1, 2	



SWITCH	POSITION	ANNUNCIATOR			
Fire detection test	FIRE DET TEST	L. ENG FIRE	R. ENG FIRE		APU GEAR FIRE
Fire detection channels test	3				

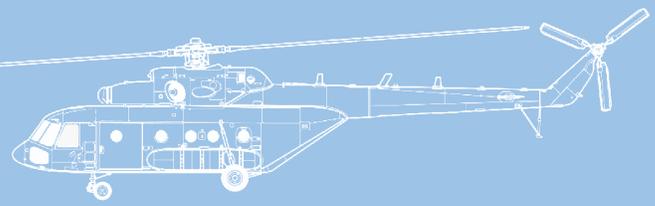
SWITCH	POSITION	ANNUNCIATOR			
Fire detection test	FIRE DET TEST				APU GEAR FIRE
Fire detection channels test	4, 5, 6				

## 11.2 APU Monitoring Gauges.



Figure 11-5. APU Monitoring Gauges.

1. **APU EGT Indicator:** Measures the EGT of the APU compressor turbines.
2. **APU AIR PRESSURE Indicator:** Measures the pressure in the common air system.



The **APU EGT** (Exhaust Gas Temperature) indicator is designed to measure the temperature of the gases at the inlet of the compressor turbines in the APU. The operating range is from 0 to 900 °C.

The **APU AIR PRESSURE** gauge is designed to measure the pressure within the common air system. The pressure is displayed in kg/cm<sup>2</sup>, with an operating range from 0 to 3 kg/cm<sup>2</sup>.

## 11.3. APU /ENGINES Starting Panel.

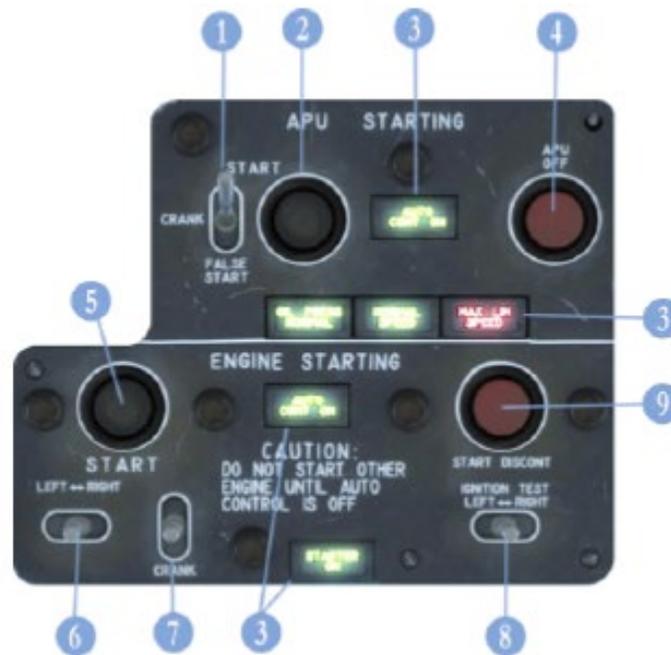
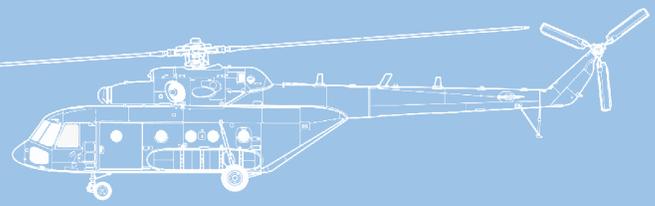


Figure 11-6. APU / ENGINES Starting Panel.

- |   |   |
|---|---|
| <p><b>1. APU Crank Switch:</b> Controls the cranking of the APU.</p> <p><b>2. APU Automatic Start Button:</b> Initiates the automatic start sequence for the APU.</p> <p><b>3. Annunciators:</b> Displays status and alert information.</p> <p><b>4. APU Off Button:</b> Shuts down the APU.</p> <p><b>5. Engine Automatic Start Button:</b> Initiates the automatic start sequence for the engine.</p> | <p><b>6. Engine Start Selector Switch:</b> Selects the engine to be started.</p> <p><b>7. Engine Crank Switch:</b> Controls the cranking of the engine.</p> <p><b>8. Engine Ignition Test Switch:</b> Tests the engine ignition system.</p> <p><b>9. Engine Start Disconnect Button:</b> Disconnects the engine start sequence.</p> |
|---|---|

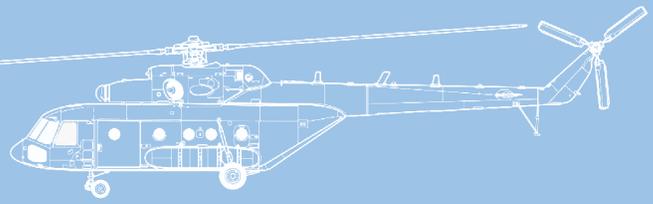


No	SWITCH	FUNCTION
1	APU CRANK START FALSE START	Up mouse move / Down wheel: switch <b>START</b> position. Down mouse move / Up wheel: switch <b>FALSE START</b> position.
2	APU START	APU Automatic <b>START</b> .
4	APU OFF	APU turn <b>OFF</b> .
5	ENGINE START	<b>ENGINE</b> Automatic starting.
6	LEFT / RIGHT	Right mouse move / Down wheel: switch <b>RIGHT ENGINE START</b> position. Left mouse move / Up wheel: switch <b>LEFT ENGINE START</b> position.
7	CRANK	UP mouse move / Down wheel: switch <b>ENGINE START</b> position. Down mouse move / Up wheel: switch <b>CRANK ENGINE START</b> position.
8	IGNITION TEST LEFT RIGHT	Right mouse move / Down wheel: switch <b>RIGHT IGNITION TEST</b> position. Left mouse move / Up wheel: switch <b>LEFT IGNITION TEST</b> position.
9	START DESCONT	<b>ENGINE START</b> turn <b>OFF</b> .



Figure 11-7. Annunciators Start Panel.

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Legend	Illuminating parameter or fault
<b>AUTO CONT ON</b>	Illuminates when the <b>APU START</b> button is pressed. After 30 seconds annunciator goes out.
<b>OIL PRESS NORMAL</b>	Illuminates when the <b>APU OIL PRESSURE</b> is normal.
<b>NORMAL SPEED</b>	Illuminates after the <b>APU START GENERATOR</b> is turned off and the APU is brought to idle mode.
<b>MAX LIM SPEED</b>	Inoperative.
<b>AUTO CONT ON</b>	Illuminates when the <b>ENGINES START</b> button is pressed. After 30 seconds annunciator goes out.
<b>STARTER ON</b>	Illuminates during <b>ENGINE START</b> .

## 11.4. Fuel Control Panel.

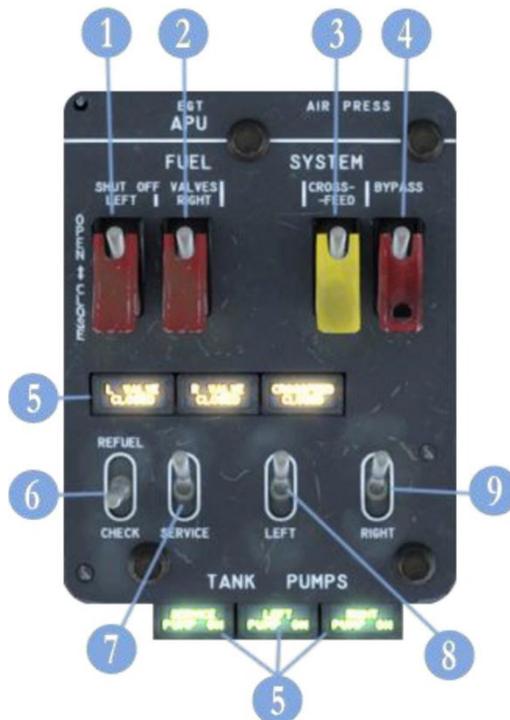
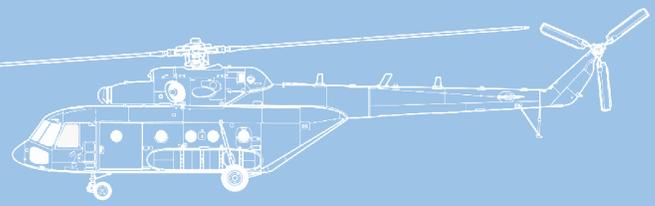


Figure 11-8. Fuel Control Panel.

# Cera Sim MI-17 V5



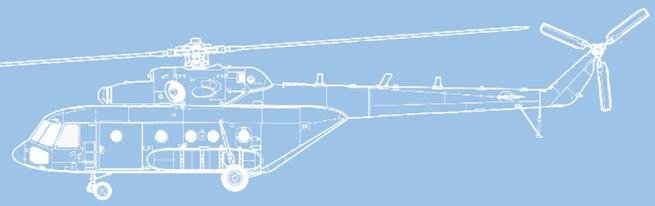
1. **Shut Off Valve Left Switch:** Controls the left fuel shut off valve.
2. **Shut Off Valve Right Switch:** Controls the right fuel shut off valve.
3. **Cross-Feed Valve Switch:** Controls the cross-feed valve for fuel transfer between tanks.
4. **Bypass Valve Switch:** Controls the bypass valve.
5. **Annunciators:** Displays status and alert information related to the fuel system.
6. **Refuel Control Switch:** Controls the refueling process.
7. **Service Pump Switch:** Activates the service pump.
8. **Left Pump Switch:** Controls the left fuel pump.
9. **Right Pump Switch:** Controls the right fuel pump.

No	SWITCH	FUNCTI ON
1	SHUT OFF VALVE LEFT	Left Shut off valve OPEN/ CLOSED.
2	SHUT OFF VALVE RIGHT	Right Shut off valve OPEN/ CLOSED.
3	CROOS-FEED	Cross-feed valve OPEN/ CLOSED.
4	BYPASS	Bypass valve OPEN/ CLOSED.
6	REFUEL CHECK	Inoperative
7	SERVICE	Service pump ON / OFF.
8	LEFT	Left pump ON / OFF.
9	RIGHT	Right pump ON / OFF.



Figure 11-9. Annunciators Fuel Panel.

Legend	Illuminating parameter or fault
L. VALVE CLOSED	Illuminates when the LEFT SHUT OFF valve is closed.
R.VALVE CLOSED	Illuminates when the RIGHT SHUT OFF valve is closed.
CROSSFEED CLOSED	Illuminates when the CROSS-FEED valve is closed.



<b>SERVICE PUMPON</b>	Illuminates when <b>SERVICE PUMP</b> is turn on.
<b>LEFT PUMPON</b>	Illuminates when <b>LEFT PUMP</b> is turn on.
<b>RIGHT PUMPON</b>	Illuminates when <b>RIGHT PUMP</b> is turn on.

## Fuel System

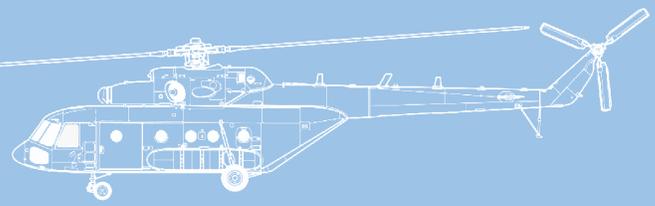
The purpose of the fuel system is to store fuel onboard the aircraft and supply it to the various consumers as needed. The fuel consumers on the Mi-17 V5 include the two engines (TV3-117VM), the APU (AI-9V), and the kerosene combustibile heater (KO-50). The fuel system comprises two rigid external fuel tanks, one flexible internal service tank, and the associated pipelines, pumps, valves, and monitoring instruments.

### External Fuel Tanks

The external fuel tanks are welded shells made of aluminum alloy; 1.5 mm (.059 in) thick. Each tank contains diaphragms with stamped holes to allow fuel flow throughout the tank. The fuel tanks are gravity-fed through filler necks located at the front of each tank. They are secured to the aircraft with four steel bands.

### Service Fuel Tank

The service fuel tank is mounted inside the fuselage, behind the main gearbox deck, and below the hydraulic block and APU. This flexible tank is constructed from layers of various types of rubber, with a rubberized nylon outer layer. The float valve, fuel quantity transmitter, filler neck, and bypass valve are attached to a plate on top of the tank. The service tank pump is connected to an adapter at the bottom of the tank.



## 11.5. Hydraulic System Panel.

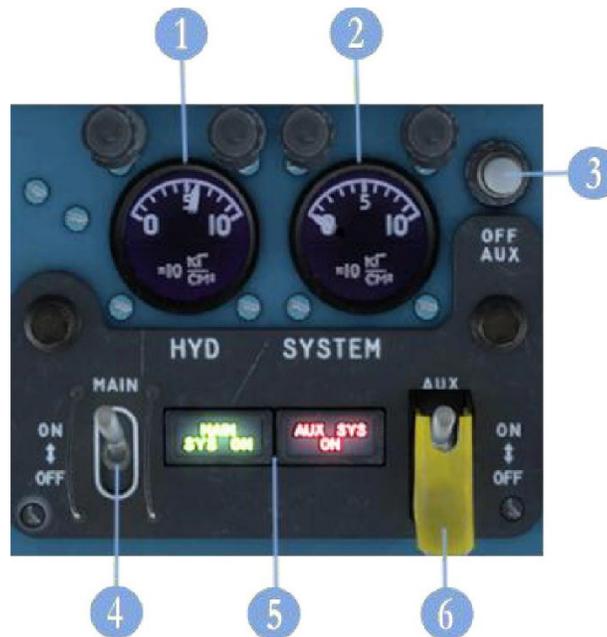


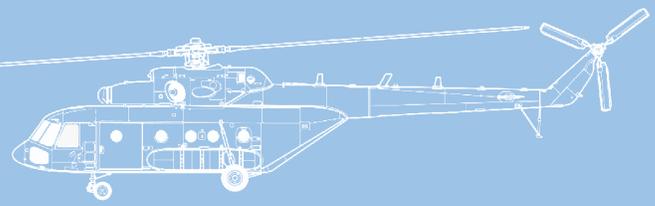
Figure 11-10. Hydraulic System Panel.

- 1. Main Hydraulic Pressure Indicator:** Displays the pressure of the main hydraulic system.
- 2. Auxiliary Hydraulic Pressure Indicator:** Displays the pressure of the auxiliary hydraulic system.
- 3. Auxiliary Hydraulic System OFF Button:** Button to turn off the auxiliary hydraulic system.
- 4. Annunciator:** Indicator light.

- 5. Main Hydraulic System Switch:** Switch for the main hydraulic system.
- 6. Annunciators:** Multiple indicator lights.
- 7. Auxiliary Hydraulic System Switch:** Switch for the auxiliary hydraulic system.

The main hydraulic pressure indicator is designed to measure the pressure in the hydraulic system. The pressure is displayed in kg/cm<sup>2</sup>, with an operating range from 0 kg/cm<sup>2</sup> to 100 kg/cm<sup>2</sup>. It is powered by 27 VDC through a circuit breaker marked **MAIN** (see Figure 10-1).

The auxiliary hydraulic pressure indicator is designed to measure the pressure in the auxiliary hydraulic system. The pressure is displayed in kg/cm<sup>2</sup>, with an operating range from 0 kg/cm<sup>2</sup> to 100 kg/cm<sup>2</sup>. It is powered by 27 VDC through a circuit breaker marked **AUX** (see Figure 10-1).



No	SWITCH	FUNCTION
3	OFF AUX	Auxiliar hydraulic system turn <b>OFF</b>
4	MAIN	Main hydraulic system <b>ON / OFF</b>
6	AUX	Auxiliar hydraulic system turn <b>ON</b> .

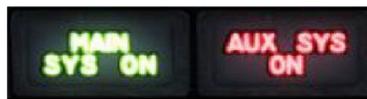


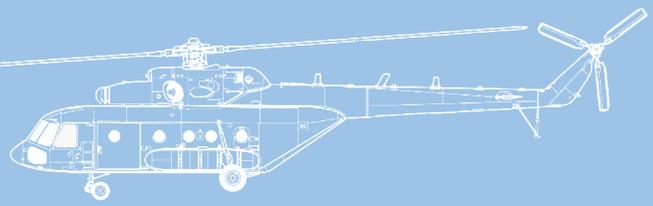
Figure 11-11. Annunciators Hydraulic Panel.

Legend	Illuminating parameter or fault
MAIN SYS ON	Illuminates when the main hydraulic system is turn ON.
AUX SYS ON	Illuminates when the auxiliar hydraulic system is turn ON.

## *Hydraulic System.*

The two hydraulic systems are designed to provide full flight control pressure. The components of the hydraulic systems include hydraulic pumps, hydraulic boosters, and hydraulic servos.

There are two hydraulic pressure supply systems: main and auxiliary. Both systems are completely independent and each is fully capable of providing essential flight control pressure, ensuring maximum system redundancy. This redundancy ensures that hydraulic power is maintained to both the main and auxiliary systems even if one or both pumps fail.



## 11.6. KO-50 Kerosene Heater Panel

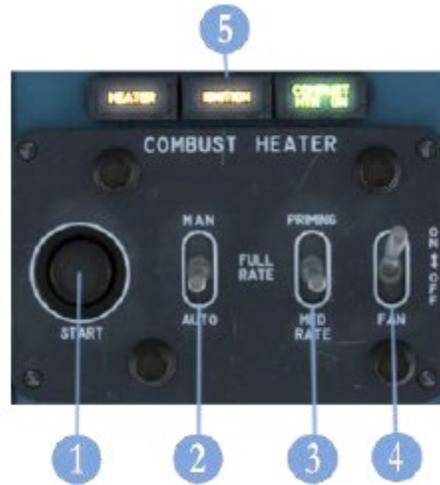


Figure 11-12. KO-50 Control Panel.

- |  |   |
|--|---|
| <p>1. <b>KO-50 Kerosene Heater Start Switch:</b> Switch to start.</p> <p>2. <b>KO-50 Kerosene Heater Mode Switch:</b> Switch to change the mode.</p> <p>3. <b>KO-50 Kerosene Heater PRIME Switch:</b> Switch to prime.</p> | <p>4. <b>KO-50 Kerosene Fan Switch:</b> Switch to control the fan.</p> <p>5. <b>Annunciators:</b> Indicator lights.</p> |
|--|---|

No	SWITCH	FUNCTION
1	START	KO-50 kerosene heater <b>START</b>
2	MAN AUTO	<b>UP mouse move / Down wheel:</b> switch <b>MANUAL</b> position. <b>Down mouse move / Up wheel:</b> switch <b>AUTO</b> position.
3	PRIMING MED RATE	Inoperative.
4	FAN	KO- 50 Fan turn <b>ON / OFF</b> .

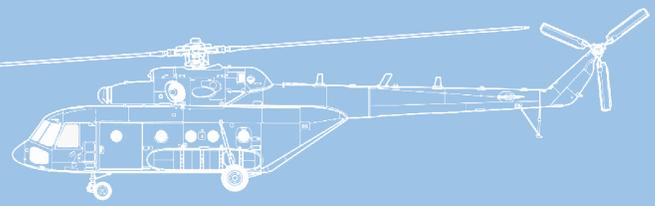


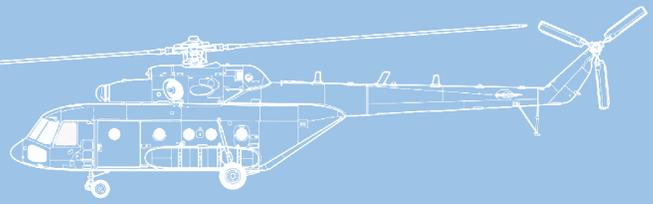
Figure 11-13. Annunciators KO-50.

Legend	Illuminating parameter or fault
HEATER	Illuminates when the KO-50 "START" button is pressed. After 15 seconds annunciator goes out.
IGNITION	Illuminates when ignition is turn on.
COMBUST HTRON	Illuminates when KO-50 kerosene heater is turn on.

The kerosene heater can operate in both heating and ventilation modes. In heating mode, both automatic and manual control of the air temperature in the cabins are provided.

In automatic heating mode, the air temperature is maintained at a constant level based on the position of the temperature controller, within a range from 10 to 30°C. Manual mode allows the heater to operate at maximum and average heat output levels.

In ventilation mode, the heater provides ventilation for the cabins during the warm season. The recirculation mode is used to successfully start the heater and quickly warm up the helicopter cabin in winter conditions.



## 12. Right Corner Switch Overhead Panel.

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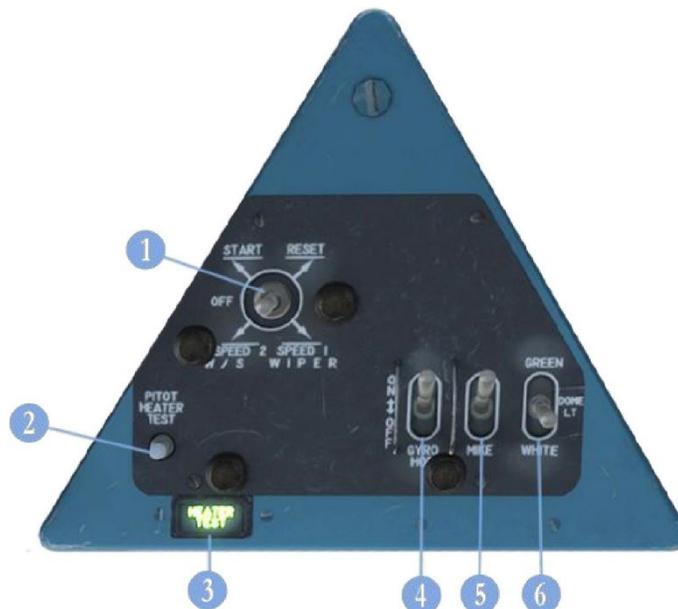
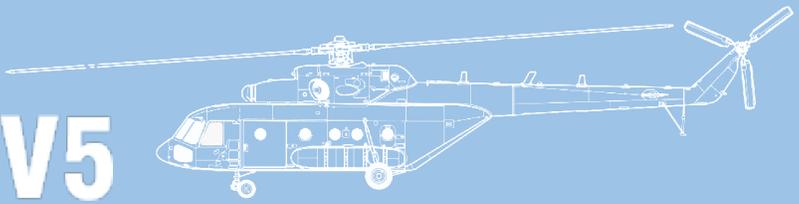


Figure 12-1. Right Switch Overhead Panel.

- |  |   |
|--|---|
| <p><b>1. Copilot Windshield Wiper Switch:</b> Controls the wiper for the Copilot windshield.</p> | <p><b>4. Pilot Gyro Horizon Switch:</b> Activates or deactivates the pilot's gyro horizon instrument.</p> |
| <p><b>2. Pitot Heater Test Button:</b> Tests the pitot heater system.</p>                        | <p><b>5. Mic:</b> Enables or disables the mic system.</p>   |
| <p><b>3. Annunciator:</b> Displays status alerts and warnings.</p>                               | <p><b>6. Dome Light Switch:</b> Controls the cockpit dome light.</p>                                      |



SWITCH	FUNCTION
<b>W/S WIPER</b>	<b>START:</b> Left click mouse - Copilot windshield wiper runs at high speed. <b>SPEED2:</b> Left click mouse - Copilot windshield wiper runs at low speed. <b>SPEED1:</b> Left click mouse - Copilot windshield wiper runs at medium speed. <b>RESET:</b> Left click mouse - Copilot windshield wiper resets to initial position. <b>OFF:</b> Left click mouse - Copilot windshield wiper is not activated.
<b>PITOT HEATER TEST</b>	Tests the right pitot heater system (Only when the right pitot system is enabled).
<b>GYRO HOR</b>	Turns the <b>Copilot Attitude Master</b> (gyro horizon) <b>ON/OFF</b> .
<b>MIKE</b>	Inoperative.
<b>DOME LT</b>	<b>Up mouse move / Down wheel:</b> Turns on the <b>GREEN</b> light. <b>Down mouse move / Up wheel:</b> Turns on the <b>WHITE</b> light.

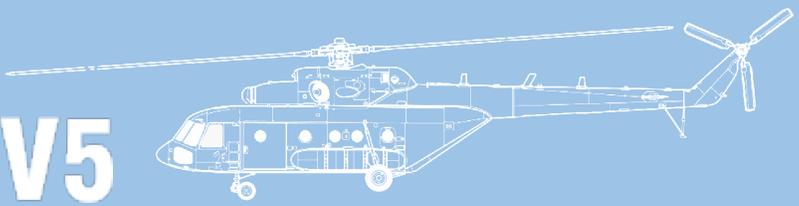
## 12.1 Annunciators Right Corner Overhead.



Figure 12-2. Annunciators Right Corner overhead.

Legend	Illuminating parameter or fault
<b>HEATER TEST</b>	Indicates that Right pitot heater system is ok.





1. **Right Side Overhead Lights:** Adjusts the brightness of the overhead lights on the right side.
2. **Copilot Panel Lights:** Adjusts the brightness of the Copilot instrument panel lights.

SWITCH	FUNCTION
GROUP 1 OFF / DIM CNTRL. Knob	Right mouse move / Up wheel: Increase lighting. Left mouse move / Down wheel: Decrease lighting.
GROUP 2 OFF / DIM CNTRL. Knob	Right mouse move / Up wheel: Increase lighting. Left mouse move / Down wheel: Decrease lighting.

## 13.2 Right Miscellaneous Panel.

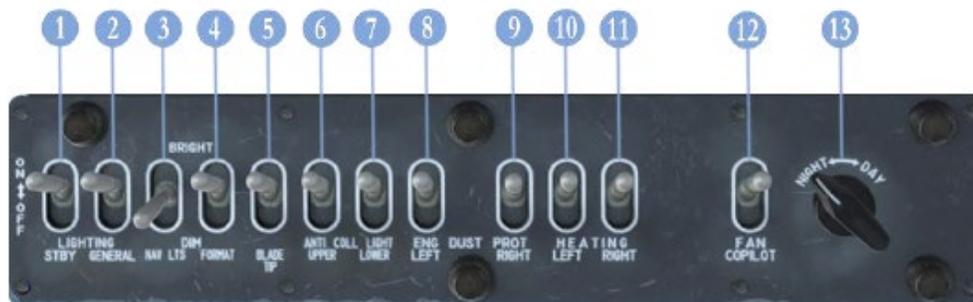
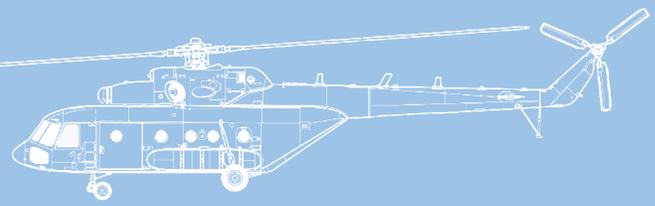


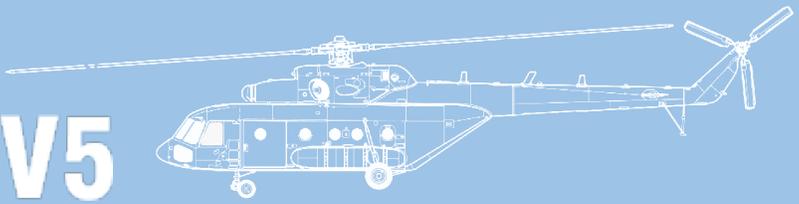
Figure 13-3. Left Side Overhead Panel

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. <b>Cabin Lighting Standby Switch:</b> Switch to control the standby lighting in the cabin.</li> <li>2. <b>Cabin Lighting General Switch:</b> Switch to control the general lighting in the cabin.</li> <li>3. <b>Navigation Lights Switch:</b> Switch to control the navigation lights.</li> <li>4. <b>Formation Lights Switch:</b> Switch to control the formation lights.</li> <li>5. <b>Blade Tip Lights Switch:</b> Switch to control the blade tip lights.</li> <li>6. <b>Anti-Collision Upper Light Switch:</b> Switch to control the upper anti-collision light.</li> <li>7. <b>Anti-Collision Lower Light Switch:</b> Switch to control the lower anti-collision light.</li> </ol> | <ol style="list-style-type: none"> <li>8. <b>Left Engine Dust Protection Switch:</b> Switch to activate the dust protection system for the left engine.</li> <li>9. <b>Right Engine Dust Protection Switch:</b> Switch to activate the dust protection system for the right engine.</li> <li>10. <b>Left Pitot Heater Switch:</b> Switch to control the heater for the left pitot tube.</li> <li>11. <b>Right Pitot Heater Switch:</b> Switch to control the heater for the right pitot tube.</li> <li>12. <b>Copilot Fan Switch:</b> Switch to control the fan for the copilot.</li> <li>13. <b>Annunciators Mode Switch:</b> Switch to change the mode of the annunciators.</li> </ol> |
|--|--|

# Cera Sim MI-17 V5



No	SWITCH	FUNCTION
1	LIGHTING STBY	Cabin lighting standby <b>ON / OFF</b> .
2	LIGHTING GENERAL	Cabin cargo lighting turn <b>ON / OFF</b> .
3	NAV LTS	<b>UP mouse move / Down wheel:</b> switch <b>BRIGHT</b> position. <b>Down mouse move / Up wheel:</b> switch <b>DIM</b> position.
4	FORMAT	<b>UP mouse move / Down wheel:</b> switch <b>BRIGHT</b> position. <b>Down mouse move / Up wheel:</b> switch <b>DIM</b> position.
5	BLADE TIP	Blade tip light <b>ON / OFF</b> .
6	ANTI-COLL UPPER	Anti-collision upper light <b>ON / OFF</b> .
7	ANTI-COLL LOWER	Anti-collision lower light <b>ON / OFF</b> .
8	ENG LEFT DUST PROT	Engine left dust protection <b>ON / OFF</b> .
9	ENG RIGHT DUST PROT	Engine right dust protection <b>ON / OFF</b> .
10	HEATER LEFT	Left pitot heater <b>ON / OFF</b> .
11	HEATER RIGHT	Right pitot heater <b>ON / OFF</b> .
12	FAN COPILOT	Copilot fan turn <b>ON / OFF</b> .
13	NIGHT DAY	<b>Right mouse move / Up wheel:</b> switch <b>BRIGHT</b> position. <b>Left mouse move / Down wheel:</b> switch <b>DIM</b> position.

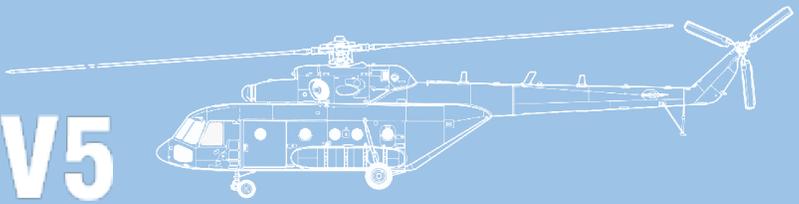


### 13.3. Annunciator Right Side Overhead.



Figure 13-4. Annunciators Right Side Overhead.

Legend	Illuminating parameter or fault
L DUST PROTON	Illuminates when left dust protection is turn ON.
R DUST PROTON	Illuminates when right dust protection is turn ON.



## 14. Electrical Panel.

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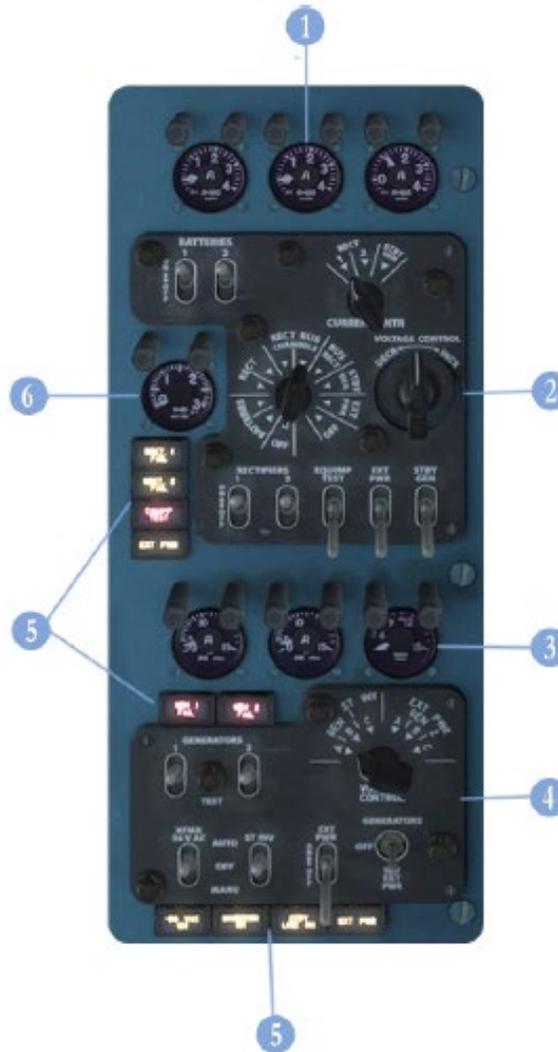


Figure 14-1. Electrical Panel.

**1. DC Power Ammeters Indicators:** Displays the current levels of the DC power systems.

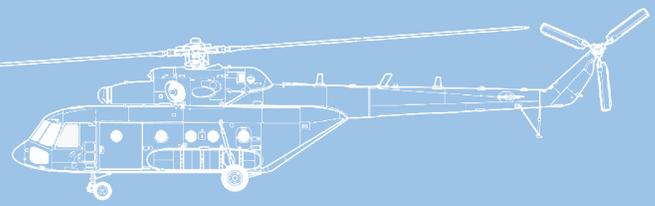
**2. DC Switch Panel:** Contains switches to control the DC power systems.

**3. AC Power Ammeters Indicators:** Displays the current levels of the AC power systems.

**4. AC Switch Panel:** Contains switches to control the AC power systems.

**5. Annunciators:** Indicator lights that provide system status notifications.

**6. DC Power Voltmeter:** Displays the voltage level of the DC power system.



## 14.1. DC Power Ammeters Indicators.

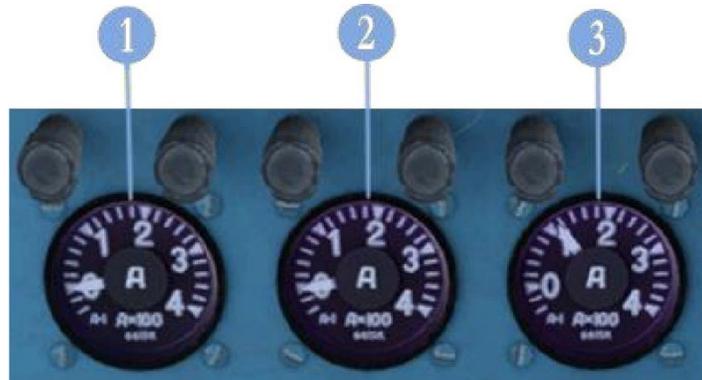
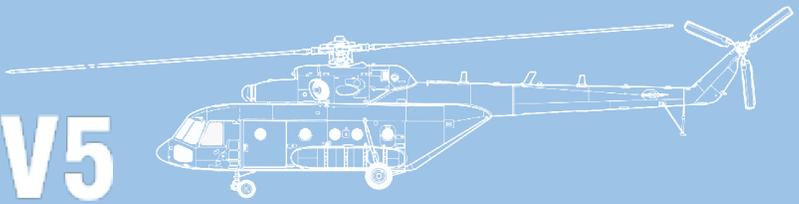


Figure 14-2. DC Ammeters Indicators.

1. **Battery 1 Discharge Ammeter:** Displays the discharge current of Battery 1.
2. **Battery 2 Discharge Ammeter:** Displays the discharge current of Battery 2.
3. **Rectifiers Bus Ammeter:** Displays the current on the rectifiers bus.

The **Battery 1** and **2** ammeters indicate the discharge current of the batteries when the rectifiers bus is not connected. To check the battery discharge current, turn off the rectifiers, set the DC voltmeter selector switch to **BATT 1** or **BATT 2**, and observe the corresponding battery discharge ammeter. The operating range is from 0 A to 400 A, with the readings displayed in amperes.

The rectifiers bus ammeter indicates the current for Rectifier 1 and Rectifier 2. To check the rectifiers' current, set the DC voltmeter selector switch to **RECT 1** or **RECT 2**, and observe the rectifiers bus ammeter. The operating range is from 0 A to 400 A, with the readings displayed in amperes.



## 14.2. DC Switch Panel.

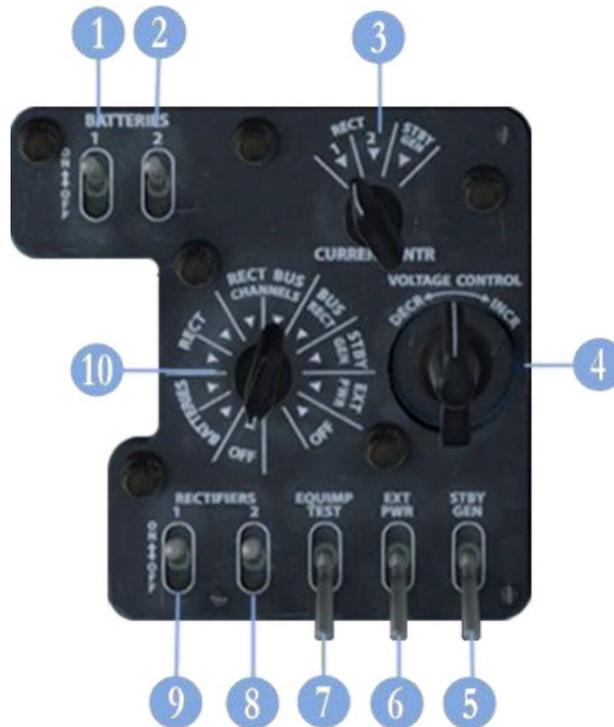
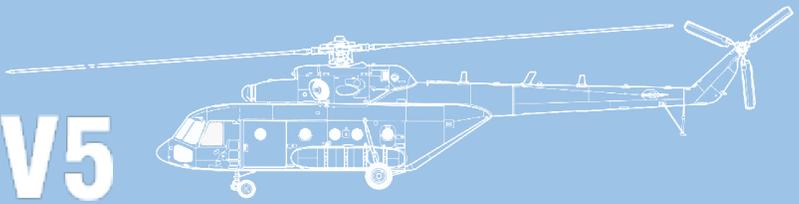


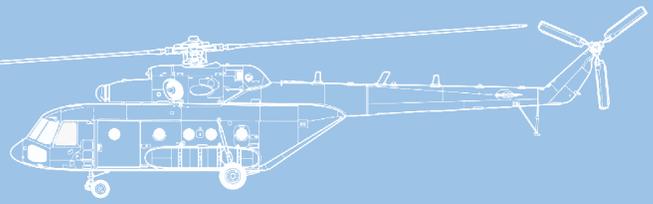
Figure 14-3. DC Switch Panel.

- |   |  |
|---|--|
| 1. <b>Battery 1 Switch:</b> Controls the connection and disconnection of Battery 1.                       | 6. <b>DC External Power Switch:</b> Controls the connection of external DC power to the system.                |
| 2. <b>Battery 2 Switch:</b> Controls the connection and disconnection of Battery 2.                       | 7. <b>Equipment Test Switch:</b> Used to test various onboard equipment systems.                               |
| 3. <b>Current Control Selector Switch:</b> Allows selection of various current monitoring functions.      | 8. <b>Rectifier 2 Switch:</b> Controls the connection and operation of Rectifier 2.                            |
| 4. <b>APU Standby Generator Voltage Control:</b> Adjusts the voltage output of the APU standby generator. | 9. <b>Rectifier 1 Switch:</b> Controls the connection and operation of Rectifier 1.                            |
| 5. <b>Standby Generator:</b> Switch to control the operation of the standby generator.                    | 10. <b>DC Voltmeter Selector Switch:</b> Allows selection between different DC voltage sources for monitoring. |

# Cera Sim MI-17 V5



No	SWITCH	FUNCTION
1	<b>BATTERY 1</b>	Battery No1 switch <b>ON / OFF</b> .
2	<b>BATTERY 2</b>	Battery No2 switch <b>ON/ OFF</b> .
3	<b>RECT 1 / 2 STBY GEN</b>	<b>Right mouse move / Down wheel:</b> Control <b>INCREASE</b> . <b>Left mouse move / Up wheel:</b> Control <b>DECREASE</b> .
4	<b>VOLTAGE CONTROL DECR-INCR</b>	Inoperative
5	<b>STBY GEN</b>	APU generator (After starting APU) <b>ON / OFF</b> .
6	<b>EXT PWR</b>	Inoperative
7	<b>EQUIPM TEST</b>	Inoperative.
8	<b>RECTIFIERS 2</b>	Left mouse button: Rectifier 2 <b>ON / OFF</b> .
9	<b>RECTIFIERS 1</b>	Left mouse button: Rectifier 1 <b>ON / OFF</b> .
10	<b>OFF / BATTERIES/ RECT / RECT BUS CHANNELS / BUS RECT / STBY GEN / EXT PWR / OFF</b>	<p><b>Right mouse move / Down wheel:</b> Control <b>INCREASE</b>. <b>Left mouse move / Up wheel:</b> Control <b>DECREASE</b>.</p> <p>Switch position <b>Battery 1:</b> Check <b>Battery 1</b> voltage (<b>DC multimeter</b>) and discharge amperes (<b>Battery 1 discharge ammeter</b>).</p> <p>Switch position <b>Battery 2:</b> Check <b>Battery 2</b> voltage (<b>DC multimeter</b>) and discharge amperes (<b>Battery 1 discharge ammeter</b>).</p> <p>Switch position <b>Rect 1:</b> Check <b>Rectifier 1</b> voltage (<b>DC multimeter</b>) and amperes (<b>Rectifier bus ammeter</b>).</p> <p>Switch position <b>Rect 2:</b> Check <b>Rectifier 2</b> voltage (<b>DC multimeter</b>) and amperes (<b>Rectifier bus ammeter</b>).</p> <p>Switch position <b>Rect bus 1:</b> Check <b>Rectifier 1</b> bus voltage (<b>DC multimeter</b>) and amperes (<b>Rectifier bus ammeter</b>).</p> <p>Switch position <b>Rect Bus 2:</b> Check <b>Rectifier 2</b> bus voltage (<b>DC multimeter</b>) and amperes (<b>Rectifier bus ammeter</b>).</p>



		<p>Switch position <b>Bus rect</b>: Check total <b>Rectifier</b> bus voltage (<b>DC multimeter</b>) and amperes (<b>Rectifier bus ammeter</b>).</p> <p>Switch position <b>Stby Gen</b>: Check <b>APU</b> generator voltage (<b>DC multimeter</b>)</p> <p>Switch position <b>EXT PWR</b>: Inoperative.</p>
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### 14.3. AC Power Ammeters Indicators.

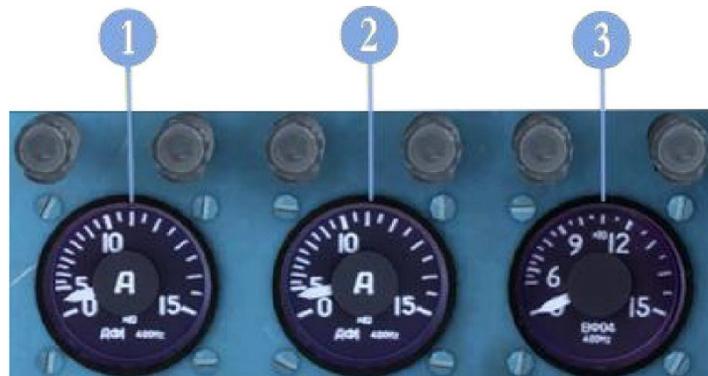
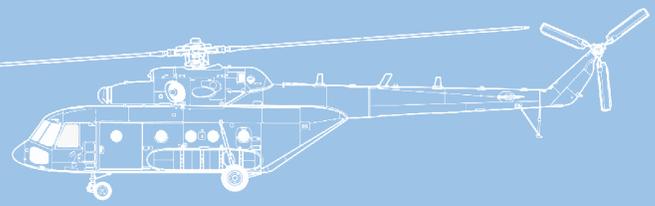


Figure 14-4. AC Ammeters Indicators.

1. **Generator 1 Ammeter**: Displays the current output of Generator 1.
2. **Generator 2 Ammeter**: Displays the current output of Generator 2.
3. **AC Power Voltmeter**: Displays the voltage of the AC power system.

The **Generator 1** and **2** ammeters indicate the load current of the generators. The operating range is from 0 A to 150 A, with the readings displayed in amperes.

The AC power voltmeter indicates the voltage of **Generator 1** and **2**, the standby inverter, and external AC power. The operating range is from 0 V to 150 V, with the readings displayed in volts.



### Generator 1 Voltage Check:

1. Set the **AC voltmeter** selector switch to **GENERATORS** (see Figure 14-5).
2. Set the **AC voltmeter** selector to **GEN 1-A/B/C** (see Figure 14-5, item 10) and check the generator voltage on the voltmeter.

### Generator 2 Voltage Check:

1. Set the **AC voltmeter** selector switch to **GENERATORS** (see Figure 14-5).
2. Set the **AC voltmeter** selector to **GEN 2-A/B/C** (see Figure 14-5) and check the generator voltage on the voltmeter.

### Standby Inverter Voltage Check:

1. Move the **ST INV** switch to the **AUTO** or **MANU** position (see Figure 14-3).
2. Set the **AC voltmeter** selector switch to **INV** (see Figure 14-5).
3. Set the **AC voltmeter** selector to **ST INV** (see Figure 14-5) and check the inverter voltage on the voltmeter.

## 14.4. AC Switch Panel.

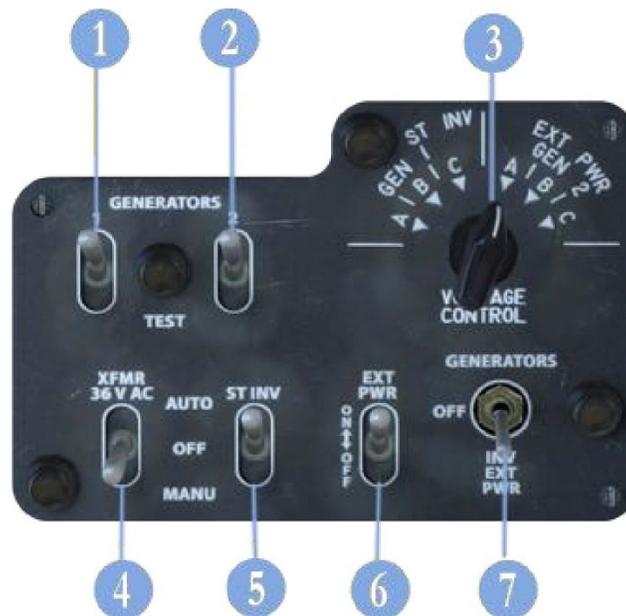
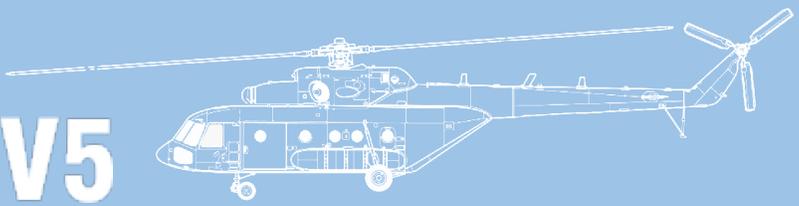


Figure 14-5. AC Switch Panel.

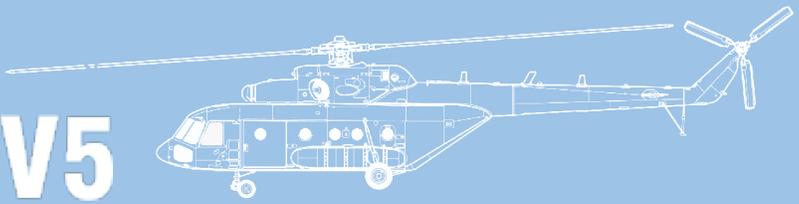
# Cera Sim MI-17 V5



1. **Generator 1 Switch:** Controls the operation of Generator 1.
2. **Generator 2 Switch:** Controls the operation of Generator 2.
3. **AC Voltmeter Selector:** Allows selection of different AC voltage sources for monitoring.
4. **Transformer 36 VAC Switch:** Controls the 36 VAC transformer.
5. **Standby Inverter:** Controls the operation of the standby inverter.

6. **AC External Power Switch:** Controls the connection of external AC power to the system.
7. **AC Voltmeter Selector Switch:** Allows selection between different AC voltage measurement points.

No	SWITCH	FUNCTION
1	GENERATOR 1	UP mouse move / Down wheel: switch ON position. Down mouse move / Up wheel: switch OFF position.
2	GENERATOR 2	UP mouse move / Down wheel: switch ON position. Down mouse move / Up wheel: switch OFF position.
3	/ ST INV/EXT PWR / GEN 1 A, B, C /GEN 2 A, B, C	Right mouse move / Down wheel: Control INCREASE. Left mouse move / Up wheel: Control DECREASE.  Switch position GEN 1 - A/8/C/: Check generator No 1 load current (AC Generator 1 ammeter)  Switch position GEN 2 - A/8/C/: Check generator No 2 load current (AC Generator 2 ammeter)  Switch position ST INV: Check standby inverter voltage (AC power multimeter)  Switch position EXT POWER: Inoperative.
4	XFMR 36 VAC	UP mouse move / Down wheel: switch AUTO position. Down mouse move / Up wheel: switch MANUAL position.
5	STINV	UP mouse move / Down wheel: switch AUTO position. Down mouse move / Up wheel: switch MANUAL position.
6	EXT PWR	Inoperative.
7	GENERATOR INV / EXT PWR /	UP mouse move / Down wheel: switch GENERATORS position. Down mouse move / Up wheel: switch INVERTES position.

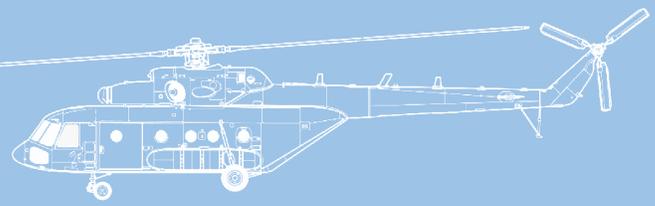


## 14.5. Electrical Panel Annunciator.



Figure 14-6. Annunciators Fuel Panel.

Legend	Illuminating parameter or fault
<b>RECT. 1 FAIL</b>	Illuminates when the rectifier 1 is turn off.
<b>RECT. 2 FAIL</b>	Illuminates when the rectifier 2 is turn off.
<b>EQUIP TEST</b>	Inoperative.
<b>EXT PWR</b>	Illuminates when service pump is turn on.
<b>GEN 1 FAIL</b>	Illuminates when the generator No1 fail.
<b>GEN 2 FAIL</b>	Illuminates when the generator No2 fail.



<b>36VAC ON</b>	Illuminates when the transformer 36 ACV is enabled.
<b>INVERTER ON</b>	Illuminates when the standby inverter is turn on.
<b>STBY LINE ON</b>	Illuminates when standby line is enabled.
<b>EXT PWR</b>	Inoperative.

## Electrical Power System

The electrical power system supplies electrical power to all consumers and devices, including various systems, indicators, and electronic equipment. It is divided into:

- Primary system.
- Secondary system.
- Auxiliary system.
- External power supply.

## AC Power System

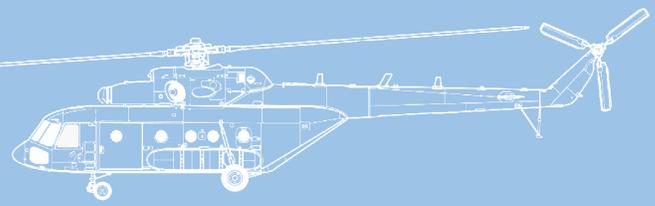
The primary AC power system supplies regulated three-phase 208VAC, 400Hz. The secondary AC power system supplies a single-phase 15VAC, 400Hz system, a single-phase 36VAC, 400Hz system, and a three-phase 36VAC, 400Hz system.

Components of the AC power system include:

- Two generators: 208 VAC, 400 Hz, 40 kW.
- Transformer: Single-phase 115 VAC, 400 Hz.
- Transformer: Single-phase 36 VAC, 400 Hz.
- Transformer: Three-phase 36 VAC, 400 Hz.
- Two rectifiers: 27 VDC.

## DC Power System

The DC power system is designed to power the helicopter equipment with a voltage of 27 VDC. The sources of the DC power system are:



- Two batteries: 12CAM28, 24 VDC, 28 Ah.
- Inverter: Single-phase PO500A, 115 VAC, 400 Hz.
- Inverter: Three-phase PT200U, 36 VAC, 400 Hz.
- APU standby generator.

## System Operation

The AC power system is provided by generators driven by the main transmission, supplying 204/208 VAC, 400 Hz, and 40 kW each. Each generator has a dedicated channel to distribute AC power to the helicopter's consumers.

Power from Generator No. 1 is sent to Rectifier No. 1, Transformer TC310, and the anti-icing system for the main and tail rotor blades.

Through the channel of Generator No. 2, power is routed to Rectifier No. 2, Transformer TC-1/2, the windshield defroster, and the anti-dust system heating.

In the event of a generator failure, an emergency system will supply power to the consumers, except for the rotor anti-icing system. This power is provided to the secondary sources via the channel of the operating generator. If both generators fail, the power supply for essential consumers required for a safe landing is provided by the auxiliary system sources: the APU standby generator for up to 30 minutes, batteries for 6 minutes, and the PO500 single-phase and PT200U three-phase inverters.

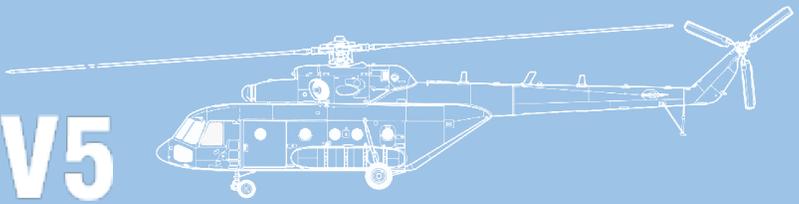
## Secondary System

The AC and DC supply of different voltages is provided by the following power sources:

- **Three-phase current 36 VAC:** This system is powered by Generator No. 1 through the TC310 transformer, which steps down the current from 204 VAC to 36 VAC, 400 Hz, 1 kW. In normal operation, it feeds the generator busbar and the inverter busbar.
- **Rectifiers:** Generator No. 1 feeds Rectifier No. 1, and Generator No. 2 feeds Rectifier No. 2. These rectifiers receive 204 VAC and output 28.5 VDC, 2 kW each. This ensures the operation of all circuits and DC consumers, as well as keeping the batteries constantly charged.

## Auxiliary System

The batteries, together with the PO500 and PT200 inverters, ensure flight and landing safety in case of emergency. An emergency landing is possible even with both generators inoperative, thanks to the



operation of the A1-9 APU, for up to 30 minutes. If the A1-9 does not start, the crew has six minutes to attempt an emergency landing.

The APU generator can also be used together with the PO500 and PT200 inverters on the ground, outside airports, or where no power supply is available. The generator system should not be overloaded, as the power is limited to 3 kW.

## **APU Standby Generator**

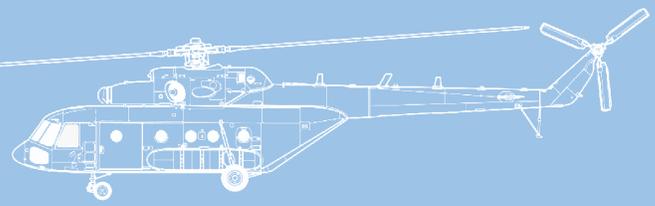
This starter generator is installed in the auxiliary power plant A1-9 and can be used in two situations:

- **On Land:** As a source of 28 VDC backup power for checking systems and equipment before the flight.
- **In Flight:** As a 28.5 VDC emergency power supply when AC generators fail.

The starter generator is used to start the APU and as a backup power supply of 28.5 VDC with 100 amps and 3 kW of power. The system includes a PH-120U voltage regulator to maintain a constant voltage between 27 VDC and 28.5 VDC.

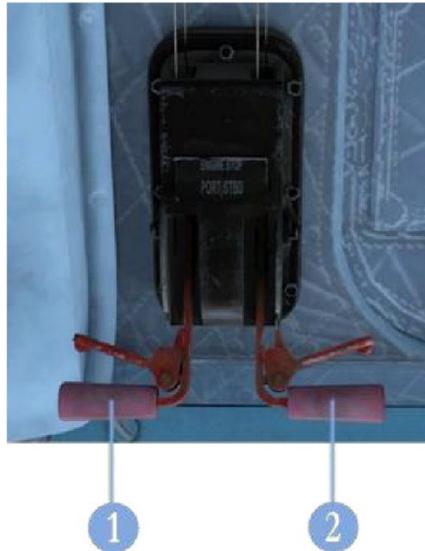
## **Batteries 12 CAM 28**

The system includes two 12 CAM 28, 24 V, 28 Ah acid batteries. By connecting the battery switches in the crew cabin, electrical power passes to the circuit to feed their respective bus and from there is distributed to the aggregates of the battery bus. The batteries are mounted in two compartments in the nose fuselage.



## 15. Engines Fuel Shutoff Levers.

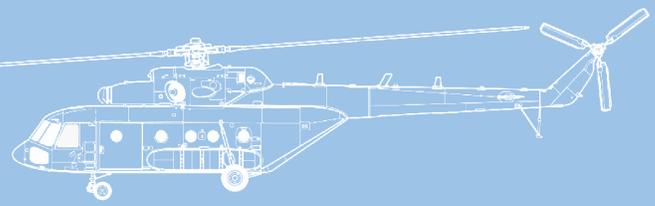
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**Figure 15-1. Engines Fuel Shutoff Levers.**

1. **Left Engine Shutoff Lever:** This lever is used to shut off the left engine
2. **Right Engine Shutoff Lever:** This lever is used to shut off the right engine.

No	LEVER	FUNCTION
1	<b>LEFT ENGINE SHUTOFF</b>	Left engine shutoff lever <b>OPEN /CLOSE</b> position.
2	<b>RIGHT ENGINE SHUTOFF</b>	Right engine shutoff lever <b>OPEN /CLOSE</b> position.



## 16. Cyclic Stick Control.

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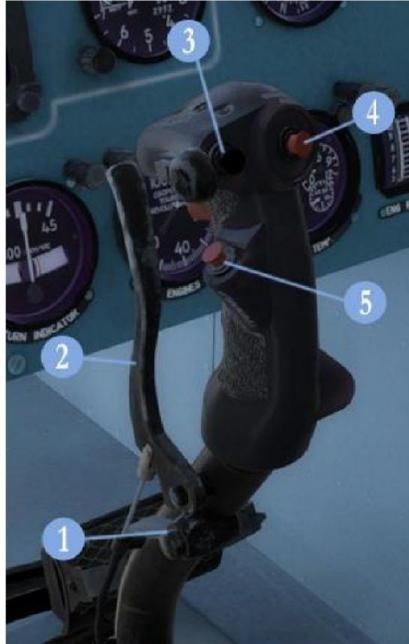
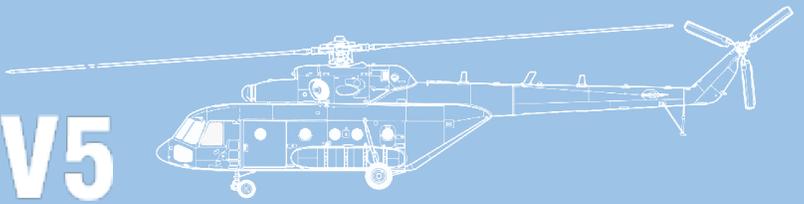


Figure 16-1. Cyclic Stick Grip Switch.

- |   |   |
|---|---|
| <p><b>1. Parking Brake Lever Lock:</b> Secures the parking brake lever.</p> <p><b>2. Brake Lever:</b> Engages and controls the brakes.</p> <p><b>3. Weapon Release Button:</b> Releases or deploys weapons.</p> <p><b>4. Autopilot OFF Button:</b> Disengages the autopilot system.</p> | <p><b>5. Force Trim:</b> Activates or deactivates the force trim of the cyclic control for better friction and stability.</p> |
|---|---|

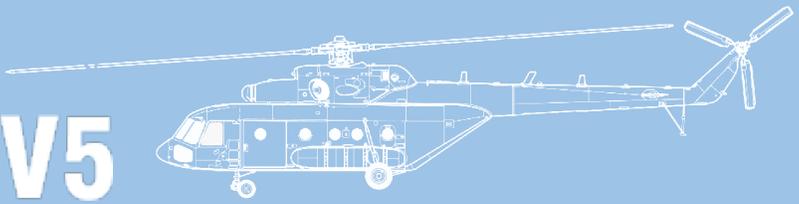
No	BUTTON	FUNCTION
1	<b>PARKING BRAKE LEVER LOCK</b>	Releases or holds the parking brake lever in position.
2	<b>BRAKE LEVER</b>	Engages the brake system.
3.	<b>WEAPON RELEASE</b>	Inoperative.
4.	<b>AUTOPILOT OFF</b>	Turns <b>OFF</b> the autopilot system.
5.	<b>TRIM</b>	Activates or deactivates the force trim of the cyclic control for friction and stability.

# Cera Sim MI-17 V5



**Note:** The Cyclic Friction system, lightly secures the cyclic's position, reducing its movement.

- **Activation/Deactivation:** Activate when flying straight and level at speeds above 20 knots. The system will automatically deactivate when **YAW** or **ALTITUDE CHANNELS** are activated.



## 17. Collective Stick Control.

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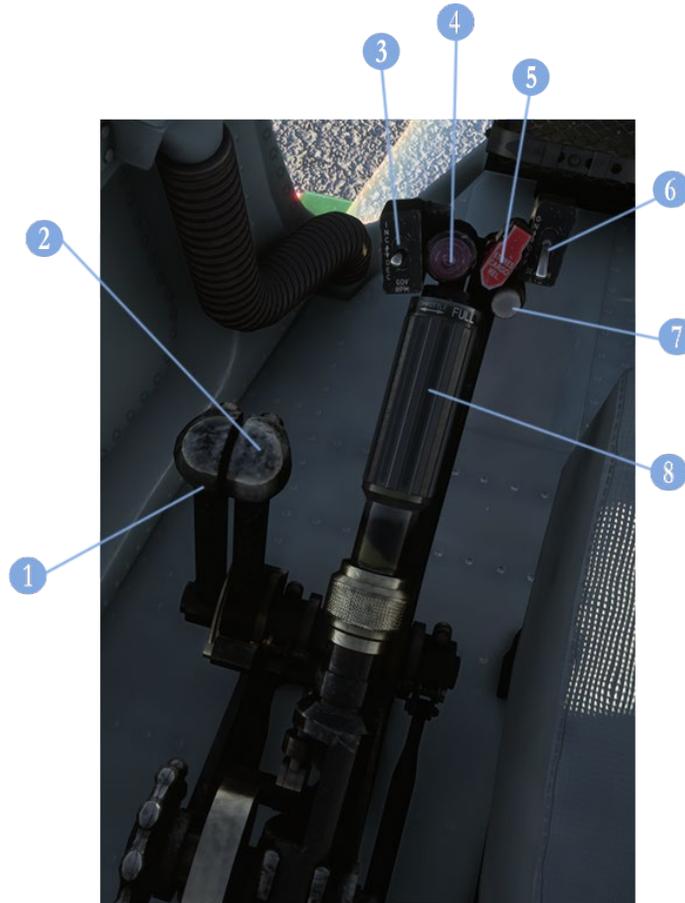
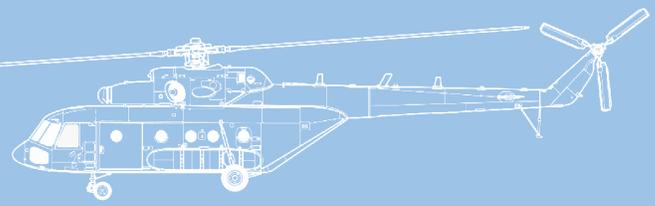


Figure 17-1. Collective Stick Grip and Engine Controls.

- 1. Left Engine Throttle Lever:** Controls the throttle for the left engine.
- 2. Right Engine Throttle Lever:** Controls the throttle for the right engine.
- 3. Governor Beep Rotor:** Adjusts the rotor RPM by fine-tuning the engine governor.
- 4. Search Light Control:** Adjusts the direction and focus of the search light.

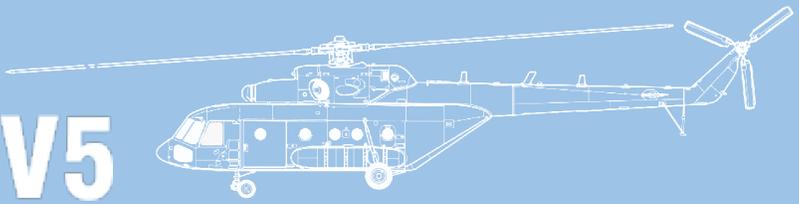
- 5. Weapon Stores Release:** Releases weapon stores.
- 6. Search Light Switch:** Turns the search light on or off.
- 7. Collective Friction Button:** Adjusts the friction of the collective control.
- 8. Engines Throttle Grip:** Grips for adjusting the throttles of both engines.

# Cera Sim MI-17 V5



No	LEVER/BUTTON	FUNCTION
1	<b>LEFT ENGINE THROTTLE LEVER</b>	Controls the left engine power from <b>MINIMUM</b> to <b>MAXIMUM</b> .
2	<b>RIGHT ENGINE THROTTLE LEVER</b>	Controls the right engine power from <b>MINIMUM</b> to <b>MAXIMUM</b> .
3.	<b>GOVERNOR BEEP ROTOR</b>	Adjusts the rotor RPM by fine-tuning the engine governor.
4.	<b>SEARCH LIGHT CONTROL DIRECTION</b>	Moves the search light <b>FORWARD/AFT</b> . Moves the search light <b>LEFT/RIGHT</b> .
5.	<b>WEAPON STORES RELEASE</b>	Releases weapon stores.
6	<b>SEARCH LIGHT SWITCH</b>	Turns the search light <b>ON/OFF</b> .
7	<b>COLLECTIVE FRICTION</b>	Toggles collective friction <b>ON/OFF</b> .
8	<b>ENGINES THROTTLE GRIP</b>	Decreases dual engine throttle (left). Increases dual engine throttle (right).

**Note:** The Collective Friction system, lightly secures the collective's position, reducing its movement.



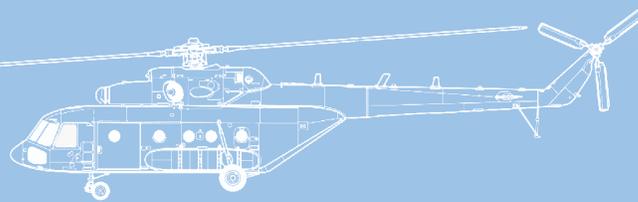
## 18. Collective Stick Control.

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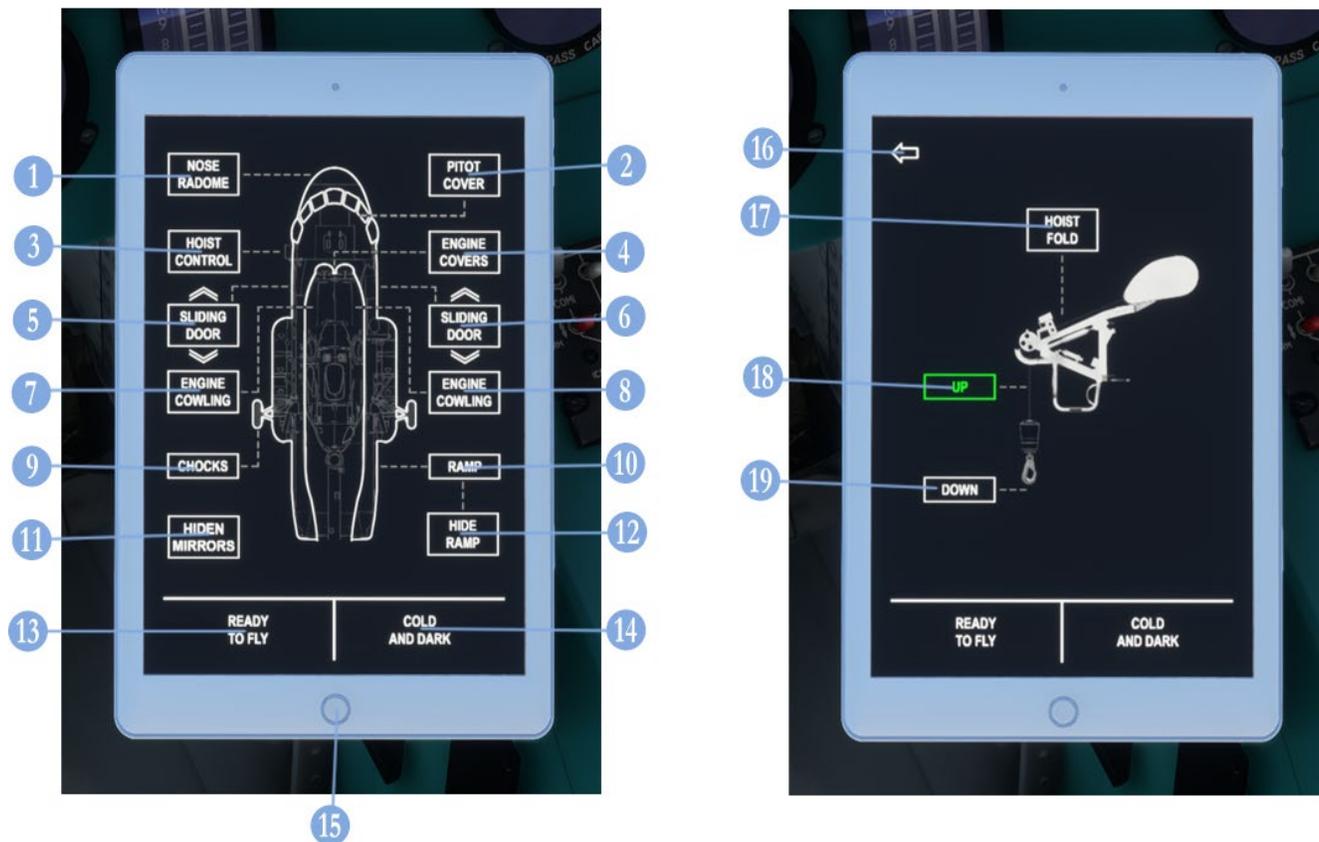


**Figure 18-1. Rotor Brake Lever.**

The rotor brake system allows the pilot to safely slow down and stop the main rotor. The brake lever is conveniently positioned on the right side of the pilot's seat and is designed to be engaged when the main rotor RPM is below 20%, ensuring safe and controlled deceleration of the rotor.

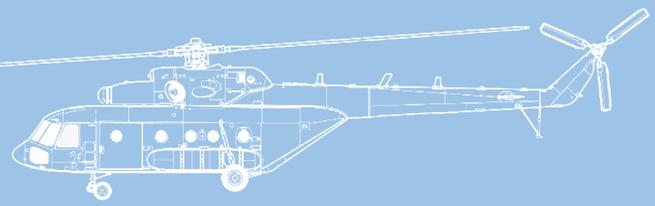


## 19. Tablet Animation Control.

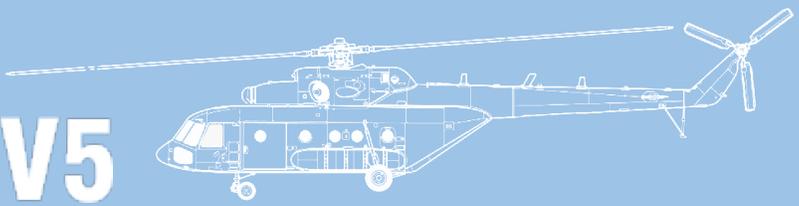


No	ANIMATION	FUNCTION
1	<b>NOSE RADOME</b>	Opens or closes the radar compartment.
2	<b>PITOT COVER</b>	Applies or removes the pitot tube covers when the helicopter is on the ground.
3	<b>HOIST CONTROL</b>	Opens the control panel for the hoist.
4	<b>ENGINE COVERS</b>	Applies the engine covers when the helicopter is on the ground and engines are off.
5	<b>SLIDING DOOR</b>	Opens or closes the left sliding door.

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6	<b>SLIDING DOOR</b>	Opens or closes the right sliding door.
7	<b>ENGINE COWLING</b>	Opens or closes the left engine cowling.
8	<b>ENGINE COWLING</b>	Opens or closes the right engine cowling.
9	<b>CHOCKS</b>	Places or removes the chocks when the helicopter is on the ground to secure it.
10	<b>RAMP</b>	Abre o Cierra la rampa trasera
11	<b>HIDE MIRROR</b>	Hides or shows the helicopter's side mirrors.
12	<b>HIDE RAMP</b>	Hides or makes the cargo ramp visible when the helicopter is on the ground.
13	<b>READY TO FLY</b>	Configures all systems to prepare the helicopter for flight, if powered down.
14	<b>COLD AND DARK</b>	Shuts down all systems, putting the helicopter into cold and dark mode.
15	<b>TABLET SWITCHS</b>	Turns the tablet on or off.
16	<b>RETURN</b>	Returns to the tablet's main menu.
17	<b>HOIST FOLD</b>	Deploys or retracts the cargo hoist.
18	<b>UP</b>	Raises the hoist hook cable.
19	<b>DOWN</b>	Lowers the hoist hook cable.



## Helicopter Control Mapping Guide for MSFS2020.

### 1. Access the Control Settings:

1. Open Microsoft Flight Simulator 2020 (MSFS2020).
2. In the main menu, click on **"Options"**.
3. Select **"Controls"**.

### 2. Select Your Device:

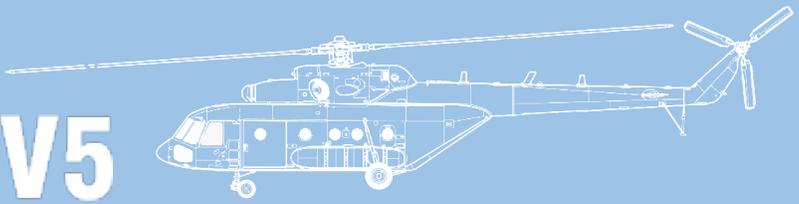
1. In the control settings screen, you'll see a list of all connected devices (joysticks, pedals, throttle, etc.).
2. Select the device where you want to assign the commands (e.g., your joystick or the collective grip control).

### 3. Assign the Helicopter Throttle Axis:

1. In the search bar at the top, type **"SET HELICOPTER THROTTLE AXIS"**.
2. Click on the command and select **"Clear Current Input"** to remove any previous assignments.
3. Click on **"Start Scanning"** and move the collective grip (or the control of your choice) to assign this axis.
4. Check the **"Reverse Axis"** box.
5. Save the changes by clicking **"Validate"**.

### 4. Assign the Beep Control (Governor Beep Increase/Decrease):

1. In the search bar, type **"Helicopter Engine"**.
2. Look for the options:
  - **"Helicopter Engine Beep Trim Increase"**
  - **"Helicopter Engine Beep Trim Decrease"**
3. For each command:
  - Click on the command.
  - Select **"Clear Current Input"**.
  - Click on **"Start Scanning"** and press the button on your joystick that you want to assign for increasing or decreasing the beep.
  - Save the changes with **"Validate"**.



## 5. Assign the Search Light Controls:

1. In the search bar, type "**Landing LIGHT**".
2. Assign the following commands to your joystick:
  - "**Landing Lights UP**": Moves the search light up.
  - "**Landing Lights DOWN**": Moves the search light down.
  - "**Landing Lights LEFT**": Moves the search light to the left.
  - "**Landing Lights RIGHT**": Moves the search light to the right.
3. Click "**Validate**" after assigning each command.

## 6. Final Checks and Adjustments:

1. Once all controls are assigned, return to the main menu.
2. Start a test flight to ensure all commands work as expected.
3. If needed, go back to the control settings to make any necessary adjustments.