DCS: Black Shark 3

Development Report

The main features of the well-known Black Shark project, which are dedicated to the Ka-50 attack helicopter include: a Missile Warning System, Air-to-Air Igla missiles, a realistic model of an Inertial Navigation System, which requires alignment before the flight and accumulates an error and a new, detailed 3D helicopter model.

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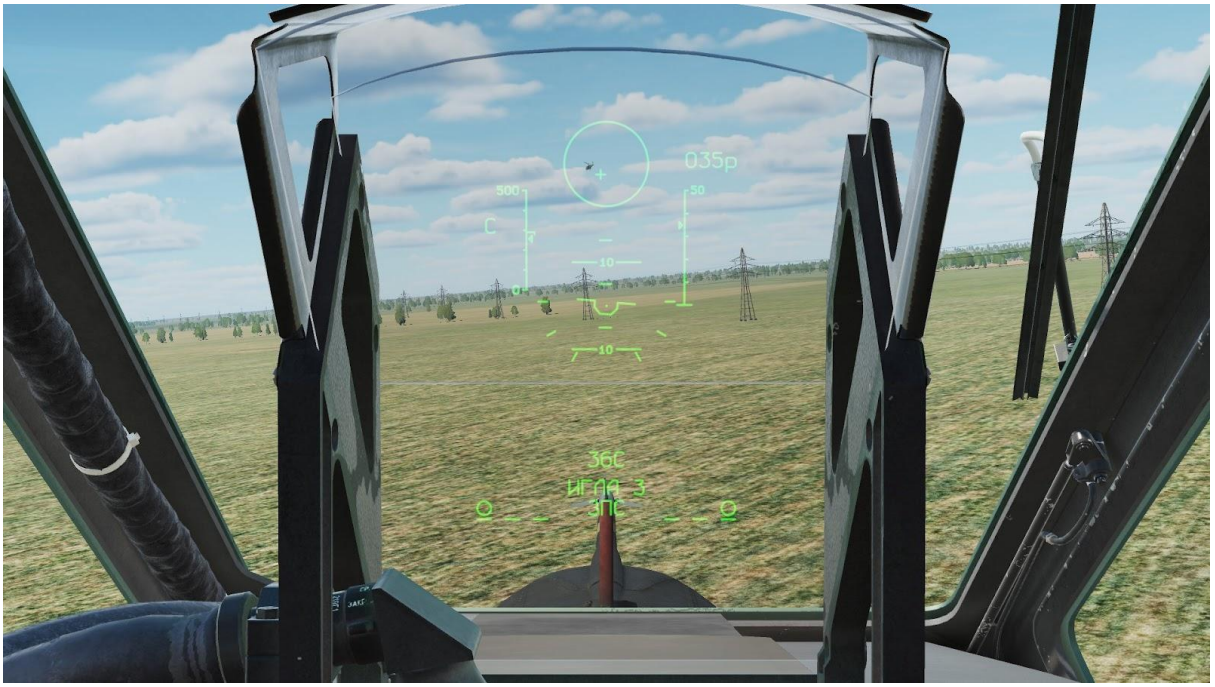
Missile Warning System

The sensors of the MWS integrated into the onboard defense system has the ability to display information about detected threats on the ABRIS display.

Four combined MWS sensors operating on the IR and UV ranges are located in pairs in the nose and tail of the helicopter. They cover the space around the helicopter 360 degrees. When a launch is detected, a warning about this and an indication of the launch direction is displayed on the ABRIS display. In automatic mode, dispensing of flares is possible.

Igla Air-to-Air Missiles

The Igla missiles are similar to those used in MANPADS, they can hit any subsonic aircraft at ranges of up to 5 km. New wingtip pylons have been added. Thus, the helicopter is equipped with two additional hardpoints to the four existing ones.



The pilot will be able to use these missiles in the boresight mode. To do this, activate the power supply unit, point the axis of the seeker at the target and launch after locking on to the target.

Inertial Navigation System

The inertial navigation system in the Ka-50 is now based on complex information processing algorithms using the Kalman filter - just like in real navigation systems.

The calculator receives data from several navigation sensors:

- Gyroscopic heading, inertial velocities and coordinates calculated from from INS
- Doppler velocities from Doppler system
- Airspeed from Air data system

Based on this input data, the Kalman filter vector is calculated, consisting of three-axis coordinates, velocities, heading, drift angle, and wind speed. Thanks to the filter, even if one or more navigation sensors fail or give out data with a large error, the navigation parameters will continue to be calculated indirectly through data from other sensors.

In particular, the Ka-50 uses several dead reckoning modes:

- Inertial Doppler - most accurate
- Inertial
- Course Doppler
- Air course - less accurate

To eliminate the accumulating error of the inertial system in flight, correction methods are applied according to known fixpoints specified in the Mission editor:

- Flyby method - where the aircraft flies over a fixpoint and at that moment the pilot makes a correction.
- Through the Squall targeting system - where the pilot locks on to the fixpoint with subsequent correction.

This model of the inertial navigation system is the most advanced in DCS and will be used in the development of new aircraft.

3D Helicopter Model

The new, more accurate and detailed 3D model of the Ka-50 helicopter was made based on new data, drawings and photographs. The model uses all the new technologies and materials used in the ED studio, which makes the Black Shark 3 one of the most modern DCS models. A deeper modeling of internal spaces, compartments, engines, transmission and control elements has been performed. All this can be seen under the opening hatches.

The Black Shark 3 project fixed a number of old bugs and made some improvements from the customers wishlist and builders of home cockpits.

Changes in the flight dynamics model include the implementation of the engine gas-dynamic instability during rocket launches from the inboard launchers, from hover and at low speeds. This is due to hot rocket gasses entering the air intakes, which can lead to a drop in thrust, surgeon and shutdown of the engines.

For enthusiasts of the classic Ka-50, the Mission Editor enables the removal of the MWS sensors and Igla missiles, returning the helicopter to the original version.