Attack Helicopter

KA-52 Alligator

Dimesions (mm):	14,5props/16,0 x ?
Maximum speed (km/h):	350
Alt.:	5500
Weight (kg):	10800
Engine:	2 TVD, TV3-117B, 2 x 1'638 kwt
Range (km):	455
Armament:	AS Vihr 80 NURS 30mm DP
Crew:	2

Combat helicopters had to experience harsh times, when their combat role was completely denied, only to be acknowledged as an indispensable weapon for any successful modern operation of ground forces. Today, many countries have developed combat action concepts based on employment of army aviation helicopters. According to published data, combat helicopters in the late 1970s and early 1980s always enjoyed the upper hand in duels with tanks during military exercises at a ratio of 1:10, 1:14 and even 1:20 in their favor. This led to urgent rigging of tank units with air defense artillery and air defense missile systems to protect them from combat helicopter attacks. Then combat helicopters, fitted with antitank guided missiles boasting a range of up to 5 km, became easily vulnerable targets for air defense artillery and air defense missile systems.

The development of the Ka-50 Black Shark and AN-64A Apache combat helicopters aimed to redress this disparity and make the helicopters able to defeat tanks armed with air defense weapons.

The Ka-50 combat helicopter can be used to defeat targets on the battlefield within wide ranges of launching high-precision supersonic antitank missile systems, including launches from more than a 6-km range within a stand-off zone of air defense artillery and air defense missile systems. The Ka-50 combat helicopter is intended to defeat modern armored and mechanized materiel, air targets and hostile manpower.

This co-axial helicopter features a high flight performance and ease of piloting via automated flight devices. It can successfully execute combat missions day/night owing to high survivability under hostile fire, powerful armament and comfortable pilot's cockpit.

The helicopter was tested in simulated combat conditions. It met all the requirements for combat helicopters and won a Ministry of Defense tender.

The Ka-50 helicopter is unrivalled in the world in terms of the 'cost-efficiency' criteria. In 1995 the Ka-50 combat helicopter entered service and is now series produced at Progress Arsenyevsk-based aviation complex.

The success of any combat operation to support ground forces on the battlefield depends to a large extent on the joint combat actions of group combat helicopters. A group commander flying in a combat formation is responsible for control over subordinate helicopters. His helicopter should be fitted with more sophisticated equipment compared to the rest of the group to make him see better targets on the battlefield and be able to ensure target designation and distribution, provide for constant control over group combat helicopters and maintain communications with a ground command post. The scope of tasks assigned to the commander frees him from helicopter piloting. Consequently, he should fly in a two-seat flying combat vehicle.

The Ka-52, designated Alligator, multi-role all-weather combat helicopter, is intended for this purpose as a two-seat modification of the Ka-50 combat helicopter. Pilots accommodated side-by-side in one cockpit can fly this helicopter and handle all on-board systems. The Alligator retained all combat capabilities of its predecessor, including the whole array of weaponry. It is outfitted with a multifunctional on-board integrated electronic flight, navigation and weapon control system. Its passive/active observation/search and sighting systems ensure target search and their attack

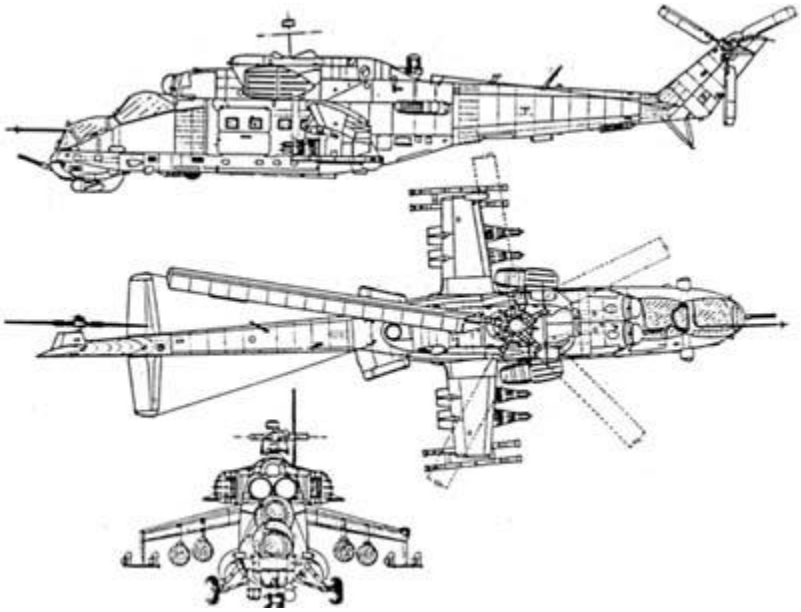
day/night in any weather conditions. The Sextant Avionic of France and Thomson company take part in creation of this helicopter. The Ka-52 Alligator is 85 percent identical to the Ka-50 base helicopter in terms of its airframe and main systems. Pilots escape via an ejection system. The Ka-52 Alligator can also be used as a trainer. Pilot accommodation and the availability of new multifunctional equipment system led to an increase in the weight of the empty helicopter and a certain deterioration in flight performance, compared to the Ka-50. However, it did not affect the integrated quality of this flying machine as a whole.

Externally, the Ka-52 combat helicopter differs from its predecessor in the front part of the fuselage, shape of the cockpit and arrangement of round-the-clock observation/search and sighting systems. Pilots are rigged with pressurized helmets fitted with built-in displays to provide for required flight and sighting data. The Ka-50 and Ka-52 helicopters feature interchangeability, thereby reducing costs for series production and joint operation in combat units.

Naturally, Alligator is more expensive than Black Shark. However, this is attributable to payments for the capability to perform combat missions on higher and more efficient levels. The advent of Ka-52 does not mean its automatic substitution by the Ka-50. They can be used more effectively in the interests of the ground forces, owing to their optimal joint employment in groupings. A similar approach is also adopted by the U.S. army aviation. The more costly and sophisticated AN-64D and AN-64D LongBoy helicopter versions do not replace, but instead reinforce the AN-64A Apache helicopter groupings, thereby increasing their efficiency.

In the near future the Ka-52 will be subjected to tests. The Kamov company and its foreign partners are convinced of the successful results of the tests that will enable the Ka-52 helicopter to occupy a leading position in its class. It is up to foreign buyers to decide whether to choose the Ka-50 or the Ka-52 or a hybrid to meet their requirements

Attack Helicopter MI-24 Hind



Dimesions (mm):	17,3props/21,5 x ?
Maximum speed (km/h):	315
Alt.:	4500
Weight (tons):	8.5- 11.5
Engine:	2 TVD, TV3-117B, 2 x 1'619 kwt
Range (km):	450
Armament:	AS Sturm 132 NURS 23mm DP
Crew:	3

Crew, men	2 (pilot and weapon operator)
Engines	2xTV-3-117VM
Engine maximum take-off power, hp	2x2,20
Overall dimensions,m: - main rotor diameter - tail rotor diamtere - length: overall rotors turning - height: overall, rotor turning	 17.3 3.908 21.35 5.47
Take-off weight kg,: - normal - max.	 11,200 11,500
Weight empty, kg:	8,620
Speed, km/h - max. speed - cruising speed	 310-330 260-275
Hovering ceiling in ground effect, m: - at international standard atmosphere (ISA) - at international standard atmosphere (ISA) +10o	 2,200 1,750

Zoom altitude, m	4,500
Range with max. internal fuel, 5% reserve, km	450
Transit range, km	1000
Transport-assault load: - troops with individual weapons, men - load inside compartment (cabin), kg - load on pylons ,kg	 8 1,500 2,400

Flying Infantry Combat Vehicle

Development of aviation technology closely mirrors the military and political situation worldwide. For example, cost curve to picture aircraft and helicopters production in the USA features clear-cut peaks: 1954-1957, 1966-1968 and 1985-1986. These refer to wars in Korea, Vietnam and the so-called Reagonomics era (Afghanistan). At every such peak unique specimens of air technology emerged.

The helicopters included the Sikorsky S-55 in Korea, Bell UH-1 Irokez and Bell AH-1 Cobra in Vietnam; AH-64 Apache - Reagonomics. Our helicopter-building industry reacted adequately and produced Mi-4, Mi-8, Mi-24 and Mi-28 helicopters respectively. Today we will tell our readers about Mi-24 gunship helicopter with transport capability.

Such a unique helicopter 'flying infantry combat vehicle' was the brainchild of M.L.Mil, helicopters general designer.

His idea implied the development of a helicopter similar to an American Cobra helicopter, capable of carrying a powerful armament systems and boasting at the same time high flying performance, combat survivability and a capacity to accommodate eight troops (full strength squad) with personal weapons and extra ammunition owing to a decrease in its combat load.

As the gestation period for the new types of armament and observation-sighting devices took longer than the helicopter's development, M.L.Mil decided to fit the first version of the Mi-24 with armaments and sights currently used at that time. Such a new armament system was first tried on the

Mi-4 (K-4V) helicopter. The rapid tempo of the Mi-24 development can be attributed to partial or complete unification of the most complicated and vital units, which were previously intended for Mi-8 and Mi-14 helicopters. These units comprised a hub and blades of the main rotor, swash plate, tail rotor, main gear box, rotor drive system and finally the TV3-117 engine. It took one year only to pass from the drawing board (August 1968) to the maiden flight of this helicopter.

The development of new armament systems and devices was carried out simultaneously with the flying trials of the first helicopter prototype. This led to the development of a more roomy cockpit for the crew. This updated cockpit accommodated armament systems and sighting systems similar to those mounted on the first prototype. The first production version of the Mi-24 helicopter, the Mi-24A, became operational that way. This helicopter differed from the first prototype by a stub-wing anhedral of -12 deg. with pylons at wingtips for the Phalanga (Phalanx) antitank missiles. This was done to compensate for the lateral instability which appeared during flying trials of the prototype.

At least 200 Mi-24A helicopters were manufactured during the five years of their production. The operation of these helicopters, including combat missions, contributed greatly to their further development, updating and improved reliability. This also allowed training pilots and maintenance personnel both in our country and abroad.

The operational experience of the Mi-24A revealed in particular the poor external view from the pilot's cockpit. This drawback forced a radical change in the helicopter nose to accommodate the new weapon systems and sights. In the final version, the pilot and weapon operator were seated in tandem, stepped cockpits under individual canopies. The unfixed mount with the YaKB-12.7 (Yakushev-Borzov) machine gun, boasted a high rate of fire (4,000-4,500 r.p.m) and was remotely controlled via the KPS-53AV sighting station and housed in the exterior front part of the weapon operator's cockpit. The cartridge box previously housed in the pilot's cockpit was installed under the cockpit floor and handled from the outside. There was another problem to solve: it involved the provision of a broad view (±60 deg. in azimuth) for the Raduga observation device used by the weapon operator, which would not impair visibility by structural members and similar view for the command radio link antenna. They were installed on both sides of the fuselage, below the outline of the machine-gun mount. This marked the final general appearance of the crew cockpit and of Mi-24D and Mi-24V as a whole. These helicopters jointly underwent state trials and were launched into series production.

As mentioned earlier, the D version differed from the A version owing to the Phalanga-P antitank missile system incorporating Raduga-F semiautomatic guiding system, which increased the accuracy of antitank missiles two times. In addition, the gyrostabilizing guidance device provided for helicopter's maneuverability within ±60 degrees in yaw during missile guidance, thereby increasing its effectiveness. The provision of a remotely controlled machine gun USPU-24 for the equipment of the Mi-24D ensured automatic introduction of the corrections into firing. The system also comprised an analogue computer compatible with the airborne system of modulating transducers. The unguided armament of the Mi-24D helicopter was not changed, as was the case with the Mi-24A helicopter.

Adoption of the final version of the helicopter Mi-24V was delayed by the development of a new generation Shturm-V antitank missile system. It should be noted here that the Shturm-V system was reviewed as a helicopter version of the ground system Shturm-S. However, the helicopter version was the first to become operational. In addition to the Shturm-V system, the ASP-17V, an automatic pilot's sight was mounted on the Mi-24V. This sight was a modification of the sight developed for the Su-17 aircraft.

Consequently, the main work on the army transport-combat helicopter came to an end and the Mi-24D and Mi-24V became operational in conformity with Government Decree dated March 1976.

The Mi-24 helicopter remained for a long time the powerful and effective combat vehicle. As a reward of their efforts, the main developers, including Designer General M.N.Tischenko, were awarded Lenin prizes. Meanwhile a large group of designers, workers and customer's representatives were given government awards. However, work on the Mi-24 was still not over. A roomy compartment to accommodate troops predetermined further development of utility versions, including: ? Mi-24P

helicopter intended for chemical and radiation reconnaissance. This helicopter underwent a baptism of fire when determining the scope of the disaster at the Chernobyl nuclear power station; ? Mi-24K reconnaissance artillery spotting helicopter intended for ground forces.

However, most development work on the Mi-24 was geared to increase its combat and fire power.

Unguided rocket armament: - unguided rocket - caliber, mm - allowance	 S-8 80 up to 80	 S-13 122 20	 S-24 250 4
Other type of armament - bombs, pcs weight, kg - (KMGU-2) pod - helicopter universal pods with machine gun or grenade launcher - universal UPK-23-250 pod with GSh-23 cannon	 2-4 100 2 pods 2-4 pods 2 pods	 2-4 250 2 pods 2-4 pods 2 pods	 2-4 500 2 pods 2-4 pods 2 pods

At present, the Mi-28 is also being unified. For example, the Mi-24V, P and VP helicopters underwent trials to use the new generation of guided missiles nicknamed Ataka, which represent a further development of the Shturm antitank missile system. The guided missiles intended for the Mi-28 boast more armor-piercing capability, compared to the Shturm antitank missile system, including firing against targets with explosive-reactive armor. They have longer range of fire and various warheads to engage air targets.

The performance of the Mi-24 can be radically improved by using main and tail rotors of the Mi-28.

Day/night observation-sight systems intended for the Mi-28 can be also used by the Mi-24.

In short, the Mi-24 lives on. Far from all opportunities to improve its combat and flying performances have been exhausted.

FLYING INFANTRY COMBAT VEHICLE DERIVES NEW QUALITY

Thirty years ago, the Mi-24 helicopter, developed in compliance with the ideas of General Designer Mikhail Mil, has taken off for the first time. Over these three decades the helicopter has gone through many flashpoints and the legendary Mi-24 has been designated the flying infantry combat vehicle not without reason. However, thirty years is a long life for a combat helicopter. Therefore, in early March the Mil Experimental Design Bureau demonstrated a fundamentally modernized derivative, designated the Mi-24VM (Mi-35M), of the Mi-24 helicopter that has made a perfect showing under complicated combat conditions. The conspicuous features of the modernization, offered by the Mil Design Bureau, consist in modular updating of the Mi-24. In this case, any module (unit) can be individually modernized in accordance with the customer's request and financial potentialities.

Installation of a new main rotor provided with blades made of glass fiber plastics, a hub furnished with elastolar bearings, and an X-shaped tail rotor developed for the Mi-28N helicopter, makes it possible to decrease the mass of the flying machine, increase its hovering ceiling and rate of climb, and improve its overall operating characteristics and invulnerability.

In modernizing the airframe, armament system and communications facilities, the Mil Design Bureau offers to install a shortened wing and nonretractable landing gear and retrofit the hydraulic system. In addition to this, the client may wish to replace a number of equipment components, as well as install new bomb racks, missile launchers, and radio set.

The primary emphasis has been placed on an increase of weapon effectiveness. The Ataka air-to-ground guided missiles (ammunition establishment has been increased up to 16 missiles) have been introduced into the helicopter's armament system. The missiles can also be used against air targets similar to the Igla-V guided missiles.

The 12.7mm machine-gun mount has been replaced by a 23mm aircraft cannon. The most up-to-date BVK-24 computer and a laser range finder have been introduced into the heliborne equipment. A modernization program on this scale makes it possible to increase the accuracy against a single target 1.5 times, while increasing the kill zone 2 to 2.5 times when delivering cannon fire. The combat effectiveness of employing the guided missiles increases twofold on average.

The modernization will ensure the helicopter's round-the-clock combat readiness. The use of night-vision goggles with flight information displayed in the field of view, and equipping the helicopter with an optronic fire-control station comprising of thermal imaging and TV channels, control channel, and laser range finder, as well as display systems, enables the crew to detect and recognize targets at night and employ the heliborne weapons both by day and night.

It should be pointed out that this modernization program will prolong the service life of the Mi-24, designed thirty years ago, until the years of 2015 - 2020, and essentially increase the overhaul period of the helicopter and its accessories.

Much attention is given worldwide to the modernization of flying machines since it enables the developers to obtain their updated characteristics at minimum financial costs. At present, the Moscow Mil Helicopter Plant (a developer of the Mi-35) together with the Rostvertol PLC works on all-round modernization of the helicopter.

In the early March, the first qualification flight of the Mi-24VM helicopter (a baseline version of the export Mi-35M) has been made at the Mil Helicopter Plant's flight-test base near Moscow under the state test program. It is worthy of note that the Mi-35M's export version considerably differs from the Mi-24VM developed for the Russian Armed Forces.

Since 1978, the Rostvertol PLC has exported about 600 Mi-35 helicopters of various modifications to more than 25 countries. Today, about 1,000 helicopters, developed on the basis of the Mi-24, are in service with the Russian army aviation.

Modernization of the Mi-35 machine is highly topical taking into account the remaining service life margin and technical condition of helicopters being in service with foreign countries, Russia and the CIS, as well as numerous inquiries from potential customers of modernized versions of the Mi-35 and its current users.

A program involving the development of the Mi-35M, a full-scale mock-up of which was demonstrated for the first time at Le Bourget Air Show in 1995, is gradually being executed.

The main goals of modernization of the existing helicopters are the following:

- considerable prolongation of life cycle;

- improvement of performance characteristics;

- enhancement of combat effectiveness;

- provision for day-and-night combat employment;

- increase of maintainability.

These goals can be attained through the use of a number of modernization packages:

1. Prolongation of a calendar and estimated service life of the airframe, system units and equipment.

2. Decrease in empty weight of the helicopter and increase in the reliability and invulnerability of its systems to combat damage owing to retrofitting of its fuselage and mechanical systems.

3. Increase in the combat effectiveness of the armament system, which involves an introduction of the following weapons into armament suit:

- Ataka and Ataka-M antitank guided missiles of increased effectiveness;

- unguided aircraft rockets.

4. Ensuring of day-and-night employment of the helicopter by providing the crew with the night-vision goggles and adaptation of the cabin illumination, while providing the helicopter with a surveillance and fire-control station.

5. Modernization of the helicopter rotor system, increase of its aerodynamic effectiveness and decrease of its weight by using the main and tail rotors developed for the Mi-28 helicopter. This leads to a decrease of its weight by 300 kg and an increase of the main rotor effective thrust by 300 kgf.

6. The further increase in the combat effectiveness of the armament system and equipping the helicopter with the new communications facilities:

- introduction of the Igla-V air-to-air heat-homing missile system;

- replacement of obsolete analog computers by a heliborne unified BVK-24 computer system capable of solving air navigation problems;

- replacement of obsolete radio communications equipment.

7. Provision for day-and-night combat employment of all heliborne weapons via replacement of the Raduga-Sh day-vision guidance device by the gyro-stabilized surveillance and fire-control station. With due account for variations in customer requirements, the Rostvertol offers several modernization variants.

- installation of the surveillance and fire-control station furnished with infrared, TV and laser channels to ensure target detection and identification at long ranges at night; leading out of the helicopter onto a target and a combat run at night and under limited-visibility conditions; employment of unguided rockets at night and under limited-visibility conditions; performing search operations and ground surveillance at night and under limited-visibility conditions, as well as in the daytime under conditions of artificial or natural shadowing of objects.

One of the most promising variants involves the modernization to be performed during the helicopter major repair. This variant covers the following four modernization packages:

1. Modernization of the airframe, including:

- installation of nonretractable landing gear that ensures saving in weight and increases the low-altitude flight safety and a crew protection degree in emergency landing;

- retrofitting of the wing to decrease its weight, installation of launching frames with an increased ammunition load, and an increase in technological effectiveness of loading the helicopter with ammunition.

2. Modernization of the armament system:

- provision for employment of S-13 rockets in the 130mm rocket pod (B-13L1);

- equipping the helicopter with the Shturm-VM (9K113M) guided missile system.

3. Modernization of the helicopter rotor system and dismantling of the secondary hydraulic system that leads to savings in weight, enhancement of airfield performance, and an increase in invulnerability of the helicopter to combat damage.

4. Equipping the h All the aforementioned advantages and the best efficiency-to-cost ratio make us believe that modernized Mi-35 helicopters are sure to score a success on the international aircraft market. Rostvertol products are to be demonstrated at the IDET '99 International Fair in Brno (Czech Republic), Hall Z, Stand #70; and at the 43rd Paris Air Show (Le Bourget, France), Hall 5, Stand #d-1, Chalet 237, Row D.