

# RUSSIAN GUNSHIP HELICOPTERS



Yefim Gordon  
and Dmitriy Komissarov



## FLIGHTCRAFT 2

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Above: This photo of two *Hokum-As* flying over the Russian countryside shows why the Ka-50 has been dubbed Black Shark.

# Introduction

The successful use of helicopters armed with machine-guns and rocket launchers by the US Army during the Vietnam War gave rise to a new class of combat aircraft, namely gunship helicopters. Several nations began developing helicopters intended for destroying enemy personnel and ground vehicles (including armoured ones) as a complement to fixed-wing attack aircraft. The Soviet Union did not miss this trend either; the first attempts to create an attack helicopter dated back to the early 1950s when the Mil' Mi-1 (NATO reporting name *Hare*) was equipped with anti-tank guided missiles, but this version saw only limited use with the Soviet Air Force.

In Poland, which was entrusted with licence production of the Mil' Mi-2 *Hoplite* light utility helicopter for all customers, a number of armed versions were developed (the Mi-2PPK, Mi-2URN and the like); these saw service with the air arms of Poland, East Germany and a few other countries but failed to attract interest on the part of the Soviet military. On the other hand, the eminently successful Mi-8 *Hip* medium utility helicopter had several mass-produced armed versions and saw action in numerous conflicts, including the Afghan War. It also paved the way for the Mi-24 combat helicopter described here – the first of the kind in the Soviet Union. In turn, the positive experience



with the Mi-24 triggered the development of other helicopters tailored for combating enemy ground forces in situations when using fast jets is inexpedient and providing close air support to friendly ground forces.

This book deals with the principal attack helicopters of the present-day Russian Army. It will be of interest not only to readers with an interest in military history but also to scale modellers; the book gives an overview of the plastic kits of the helicopters described here and includes line drawings and colour schemes that will help modellers choose the best kit and build a good and correctly painted model.



**Above:** Aply coded '52 Yellow', a pre-production Ka-52 powers up before a flight.

**Left:** '29 Yellow', an updated Mi-24PN sporting a rather faded camouflage scheme.

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# Mil' Mi-24

## The 'Flying Crocodile'

**A**s early as 1958 the Moscow-based OKB-329 design bureau led by General Designer Mikhail L. Mil' (*opytno-konstruktorskoye byuro* – experimental design bureau) began development of an armed assault/transport version of the Mi-4 *Hound* piston-engined medium helicopter. Initially the Soviet military failed to show interest; it was not until 1965 that the Mi-4AV was fielded. When the Mi-4's successor, the twin-turboshaft Mi-8, was developed and built in the early 1960s, Mikhail L. Mil' floated the idea of developing a dedicated troopship/assault helicopter which would be a kind of airborne counterpart of the BMP infantry fighting vehicle (IFV).

In 1966 the OKB's prototype construction facility built a full-size mock-up of such a helicopter which bore the in-house designation **V-24** (V stood for *vertolyot* – helicopter). Despite having almost nothing in common with the actual Mi-24 prototype that appeared several years later (in fact, the mock-up looked like a Bell UH-1 Huey with stub wings added), it incorporated the principal features of the future assault helicopter: a crew of two – a pilot and a weapons systems operator (WSO), a troop/cargo cabin big enough to accommodate eight troops with full kit, and heavy armament. The latter comprised a 23-mm (.90 calibre) cannon, four to six anti-tank guided missiles (ATGMs) or two to four rocket pods, each holding sixteen 57-mm (2.24-in) S-5 folding-fin aircraft rockets (FFARs). The cockpit, troop cabin and vital systems had armour protection.

Mil' submitted his 'flying IFV' concept to the command of the Soviet Armed Forces. He found supporters among the younger military theoreticians, but he had his share of opponents as well; these were mainly high-ranking Ministry of Defence officials headed by the then-Minister of Defence, Marshal of the Soviet Union Rodion Ya. Malinovskiy, who preferred more traditional weapons systems to helicopters. In 1967 Mil' persuaded the Minister's First Deputy, Marshal of the Soviet Union Andrey A. Grechko who had always favoured combat helicopters, to form a special expert panel and look more deeply into the matter. The opinions of military experts ranged from open support to blunt rejection, but the supporters won and Mil' received the go-ahead. On 29th March 1967 the USSR Council of Ministers' Presidium's Commission on Defence Industry Matters issued a ruling ordering the Mil' OKB to pre-

pare and submit a project of a battlefield support helicopter. Two preliminary design projects were prepared in short order – a 7-tonne (15,430-lb) helicopter with a single Izotov TV3-117 turboshaft engine and a 10.5-tonne (23,150-lb) helicopter powered by two TV3-117s. The military approved the twin-engine version but specified that the helicopter be armed with a fast-firing heavy machine-gun and the Shtoorm (Assault) supersonic ATGMs then under development. The helicopter was to have a weapons control system comprising a stabilised sight for the WSO, a computing sight for the pilot and a laser rangefinder. Night-capable targeting systems and defensive avionics were to be incorporated as they became available.

The Mi-24 programme was officially launched by a joint Communist Party Central Committee/Council of Ministers directive issued on 6th May 1968. Work on the advanced development project began immediately under the overall supervision of Mikhail L. Mil' (succeeded after his death in 1970 by Marat N. Tishchenko). The design effort was led by Deputy Chief Designer V. A. Kuznetsov.

The V-24, also known by the in-house product code *izdeliye* (product) 240, utilised a conventional single-rotor layout with a five-blade main rotor and a three-blade tail rotor. The slender fuselage was very clean aerodynamically. The crew sat in tandem under a common angular canopy, with the pilot behind and to the left of the WSO. The latter detected and identified targets, fired the ATGMs, worked the flexible machine-gun in the nose and dropped bombs. The pilot could fire the rockets or podded guns on the wing stations and the machine-gun, providing the latter was aligned and fixed in the direction of flight. Later, in service, the crew of the Mi-24 was increased to three by adding a flight engineer. The centre fuselage was occupied by a troop/cargo cabin accommodating up to eight troopers back to back, with the engines and the main gearbox above it. The cabin had horizontally split doors on both sides (the upper and lower halves of each door opened simultaneously by means of mechanical linkages and the lower half incorporated boarding steps); the cabin windows could be opened, allowing the troopers to use their assault rifles in flight. Further aft the fuselage blended into a tapered tailboom terminating in a fairly large tail rotor pylon with an asymmetrical airfoil to offload the tail rotor in forward flight.

A distinctive feature of the V-24 was the small stub wings with zero dihedral and strong incidence located aft of the cabin; the wings not only carried the weapon pylons but reduced rotor disc loading in forward flight by 19-25%. Another novel feature was the retractable tricycle undercarriage, the main units stowing in bays aft of the cabin and the nose unit under the cockpit floor.

To speed up development the General Designer took the decision to use, inasmuch as possible, the dynamic components from the Mi-8's naval amphibious derivative, the Mi-14 *Haze* – the powerplant, rotor system and parts of the power train. The new TV3-

117 turboshaft designed for the Mi-14 by the Leningrad-based OKB-117 under General Designer Sergey P. Izotov was then one of the best helicopter engines, on a par with foreign engine types. If one engine failed, the other automatically went from 1,700-shp nominal power to 2,200-shp take-off/contingency rating. The main rotor shaft (and the whole powerplant package) was inclined 2.5° to starboard relative to the vertical plane. This made it possible to significantly reduce the V-24's bank and side-slip in straight and level flight (phenomena which are inevitable for all single-rotor helicopters); thereby the weapons aiming and firing accuracy could be appreciably enhanced.



**Left and below:**

A mock-up of the very first V-24 project looking remarkably like the Bell UH-1 with stub wings. Note the horizontally split cabin doors, the twin-barrel cannon on the starboard skid and the odd 'shoot the sky' angle of the 9M17M Falanga ATGMs (apparently no one had considered the wing incidence).



Much attention was given to survivability and crew protection. The cockpit and cabin formed a single pressurised cell with a slight pressure differential being maintained to prevent ingress of radioactive dust, chemical or biological agents when operating in an NBC environment. The cockpit had a bullet-proof windscreen and an armoured pilot's seat; the cockpit and cabin sides were armour-plated, as were the engine cowlings. The cabin could also accommodate casualties on stretchers or up to 1,500 kg (3,310 lb) of cargo. Outsize loads weighing up to 2,000 kg (4,410 lb) could be carried externally slung.

Detail design work commenced in August 1968. In February 1969 the government commission reviewed and accepted the project and the full-scale mock-up. The first prototype was completed in June that year.

The intended weapons fit was not yet ready by the time the first V-24 was completed; therefore a decision was taken to equip the helicopter with the K-4V weapons system which had achieved a good service record on the Mi-4AV. Two detachable cantilever racks were mounted low on the centre fuselage sides, each carrying two launch rails for 9M17M *Falanga-M* (Solifuge-M; NATO code name AT-2 *Swatter*) ATGMs. The WSO guided the missiles manually, using radio control. A 12.7-mm (.50 calibre) Afanas'yev A-12.7 heavy machine-gun on an NUV-1 gimballed mount was installed in the nose; it was aimed by means of a PKV collimator gunsight. The wing pylons could carry UB-32 rocket pods (each holding thirty-two S-5 FFARs), four bombs of 100-/250-kg (221-/551-lb) calibre or two 500-kg (1,102-lb) bombs or napalm tanks.

The manufacturer's tests of the V-24 (Mi-24) began on 15th September 1969 with tethered flights. Four days later test pilot Gherman V. Alforyov performed the first free flight. Shortly thereafter the second prototype was built; it was followed by a test batch of ten helicopters – five manufactured by the OKB's prototype construction facility near Moscow (plant No. 329) and five by aircraft factory No. 116 in Arsen'yev, in the Soviet Far East (later known as AAPO *Progress* – the 'Progress' Arsen'yev Aircraft Production Association). The greater part of the manufacturer's test programme was conducted on these machines. One of the Arsen'yev-built helicopters was completed as a weapons test-bed for the Shtoom-V ATGM. Apart from Alforyov, test pilots Gurghen R. Karapetian, Marat A. Material'nyy and others took part in the test flights. Actually the *izdeliye* 240 prototype version with zero-dihedral wings was the *second* to become known in the West, hence its NATO reporting name *Hind-B*.

State acceptance (i.e., certification) trials began in June 1970, proceeding intensively for the next 18 months. They generally confirmed the designers' expectations. Despite a considerable increase in cruising speed compared to the Mi-8, the V-24's vibration levels turned out to be relatively low. However, the pilots encountered a number of problems which necessitated substantial changes to the helicopter's design. At speeds in excess of 200 km/h (124 mph) with the autopilot disengaged, the helicopter was prone to pitch and roll oscillations (known as Dutch roll) that persisted or subsided only slowly; these oscillations provoked by outside disturbances required the pilot to make corrective actions all the time. To improve lateral stability, the stub wings were

The unmarked first prototype V-24 at a military hardware display for the Soviet government. Note the zero-dihedral wings with four UB-32A FFAR pods and the launchers for Falanga ATGMs ahead of them.





This aspect of the V-24 prototype (with markings added) during trials shows clearly the cantilever racks carrying the ATGM launch rails. Here, dummy bombs are suspended under the wings. Note the two portside cockpit doors.

redesigned, gaining substantial anhedral (12°). Immediately, another problem arose: the ATGMs carried on the fuselage sides could be struck by the rockets leaving the underwing pods; besides, the launchers were located in line with the cabin doors, rendering the latter unusable. Therefore the fuselage-mounted launchers were abandoned in favour of vertical wing endplates with transverse bars carrying the missile rails; thus the V-24 acquired its signature drooped wings with downturned wingtips.

Mock-up studies showed that the first V-24s had not enough room to accommodate the envisaged fast-firing machine-gun and **Raduga-F** (Rainbow-F) guidance system for the improved 9M17P Falanga-PV ATGMs (the F suffix was a reference to the Falanga missiles). To cure the problem a slightly longer cockpit section was introduced. Besides, at the demand of the military the WSO's station was provided with rudimentary flight controls, allowing him to take over if the pilot was wounded and bring the chopper home. However, because of delays in the development of the intended armament the helicopter entered production at the Arsen'yev plant in 1970 with the old Falanga-M missile system and the A-12.7 machine-gun; in this guise it was known as the **Mi-24A** (*izdeliye* 245). Deliveries to Soviet Air Force units began in 1971. A year later, upon completion of the State acceptance trials, the Mi-24A was officially included into the inventory. The NATO reporting name was *Hind-A*.

Early-production Mi-24As had the tail rotor on the starboard side, as on the Mi-8; however, the helicopter had poor directional control in some flight modes, and service pilots were quick to point this out. Therefore in 1972 the tail rotor was relocated to port,

switching from pusher to tractor configuration (as on the Mi-14 and Mi-8MT/Mi-17 *Hip-H*) so that the forward blade went against the main rotor downwash; this increased tail rotor efficiency dramatically. The new design was introduced on production *Hind-As* in 1973. In 1970-74 the Arsen'yev plant built more than 240 Mi-24A helicopters.

A trainer version designated **Mi-24U** (*oochebnyy* – training, used attributively), or *izdeliye* 244, was tested in 1972 and built in small numbers. It lacked the nose-mounted machine-gun and provisions to carry ATGMs; the instructor occupied the former WSO's position which featured flight instrumentation and full flight controls. The Mi-24U was code-named *Hind-C*.

Concurrently with the introduction of the Mi-24A into service the Mil' OKB continued to perfect its armament on a development aircraft designated **Mi-24B** (*izdeliye* 241). It differed from the Mi-24A in featuring a USPU-24 powered nose barbette which mounted a Yakushev/Borzov YakB-12.7 four-barrel Gatling machine-gun; this was slaved to a KPS-53AV sighting system which automatically made corrections for the helicopter's movement during firing. The system included an analogue computer working in conjunction with an air data system. Also, the Mi-24B was armed with Falanga-PV ATGMs having semi-automatic command line-of-sight (SACLOS) guidance, which increased 'kill' probability three to four times. The Raduga-F guidance system featured gyro-stabilised low light-level television (LLTV) and forward-looking infra-red (FLIR) sensors and enabled the helicopter to make evasive manoeuvres while firing the missiles, thereby considerably enhancing combat survivability.



**This page:**  
'77 Red', the prototype of the Mi-24A, showing the anhedral wings with vertical endplates carrying the ATGM launch rails and the A-12,7 machine-gun in the nose. Note also the longer cockpit section.





The early-production Mi-24As with starboard-side tail rotors.



Mi-24As support a unit of T-55 main battle tanks during a Soviet Army exercise. Note that the wingman's helicopter is a late example with a portside tail rotor.



A pair of late-production Mi-24As with portside tail rotors.

**Right:** This late Mi-24A is preserved in the museum of the Aviakon repair plant in Konotop, the Ukraine.



**Below:** The full-size mock-up of the Mi-24B, showing the USPU-24 nose barbette with a YakB-12,7 machine-gun and the excrescence of the Raduga-F targeting/guidance system sensor pack. Note the V-24 style short nose, zero-dihedral wings and low-set ATGM launcher racks.

**Bottom:** One of the actual Mi-24B development aircraft converted from an early Mi-24A.



The Mi-24B successfully passed initial trials in 1971-72, but further development was discontinued. The reason was the Mi-24A's major weakness – the horizontally staggered seating of the crew created large 'blind spots', and the 'greenhouse' canopy with flat glazing panels created annoying reflections. Therefore, back in early 1971 the Mil' OKB undertook a radical redesign: the forward fuselage was more streamlined, the pilot and WSO being accommodated in individual vertically-staggered tandem cockpits. The narrow cockpits had extensive armour protection and bubble canopies with optically-flat bulletproof windscreens giving far better all-round visibility. Again, the USPU-24 barbette was incorporated. The redesign also afforded a wider field of view for the sensors and guidance antenna of the Raduga-F

