

New Russian Rotorcraft

THERE is no doubt whatever that the Soviet Union has achieved remarkable success in the evolution of helicopters—a type of flying machine which poses considerable demands and which often fails to reach a satisfactory state of development without becoming virtually obsolete in the process. Russian helicopters, although to some extent based upon Western designs, have now captured a high proportion of the available categories of international records for speed or altitude with load.

One of the pioneer Soviet rotorcraft, and the first to go into wide service, was the Mi-1, designed by Mikhail Milla and exclusively described by us on April 20, 1956. A three-view drawing on this page depicts the new Mi-3, which is a progressive development of the Mi-1. The principal aim of the new design was an all-round improvement of performance, which was limited in the Mi-1 by rotor-blade stalling and excessive oscillation encountered in certain flying conditions. It is claimed that the new helicopter has met all expectations and successfully completed all its tests. There are no limits imposed on it, and speeds and altitudes will only be restricted by the power available.

THREE RUSSIAN HELICOPTERS

Type	Mi-3	Ka-10	Ka-15
Powerplant ...	Asz-21, 740 h.p.	Al-4G, 55 h.p.	Al-14R, 260 h.p.
Main rotor diam. (ft) ...	46.91	20.07	—
Length, less rotor (ft) ...	39.73	12.79	—
Empty weight (lb) ...	3,968	—	—
Gross weight (lb) ...	5,180	827	—
Max speed (m.p.h.) ...	124.2	72	—
Cruising speed (m.p.h.) ...	93.2	—	74.5
Hovering ceiling (ft) ...	6,561	985	2,230
Max. ceiling (ft) ...	14,763	8,200	9,840

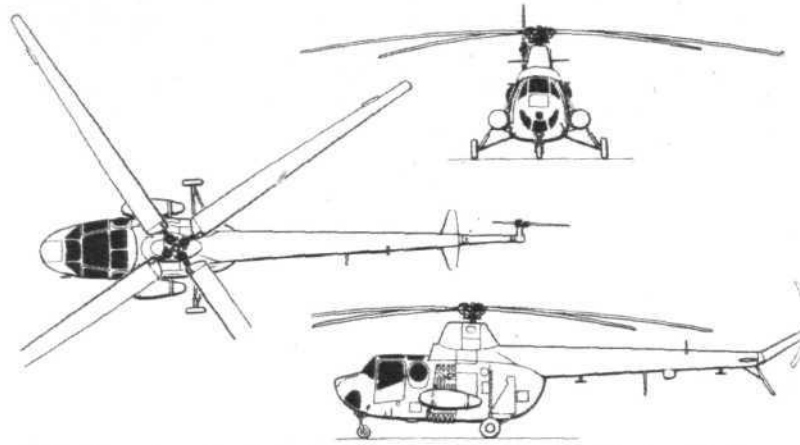
The main rotor has been redesigned and now has four, instead of three, blades. The articulated blades are connected through hinges in the same way as those of the earlier Mi-1, and are of similar construction, having a single metal tube spar, wooden ribs and plywood/fabric covering. The nose of the Mi-3 has been slightly revised and the cabin widened. There are now blisters on each side of the fuselage, giving further improved visibility from the bench-type seat (for three passengers) located behind the pilot. The Mi-3 instrument panel is more compact and includes a compass, which in the original machine was fitted in the fairing at the base of the windscreen; there is also a new radio-compass. The flying controls are almost unchanged.

From the constructional point of view the fuselage and the tail

Not previously illustrated in a Western journal, the Mi-4P is a refined passenger transport. It is referred to in the text (right).



Smaller than it looks in this view, the Kamov Ka-15 is in production for the Soviet Air Force as a general-purpose machine.



This three-view drawing depicts the Milla Mi-3, with four-blade rotor and several important refinements.

boom differ little from those of the Mi-1. However, the stressed metal skin of the fuselage has been considerably stiffened and now forms a semi-monocoque structure. Three attachments at each side of the fuselage permit the fitting of a variety of external panniers for different duties. In the ambulance version, they can carry a stretcher case which, after removal of the fuselage panels containing the blisters, is accessible during flight from the cabin through a short tunnel. In the agricultural version fertiliser containers can be carried, or, alternatively, a spraying manifold with nozzles can be fitted. For extra long range, two external fuel tanks, each of 32.9 Imp. gal capacity, can be fitted. The sheet-metal panels covering the engine bay have been redesigned, and the exhaust pipe has been modified to prevent fumes from entering the panniers. Luggage space is now provided at the rear of the fuselage. Improved radio equipment is fitted and new aerials are attached to the tail boom. For anti-icing, de-icing fluid is spread continuously over the main and tail rotor blades and the windscreen. Asymmetric load tests, with a pannier attached only on one side of the fuselage, gave satisfactory results.

Now very widely used throughout the Soviet Union, the Mi-4 appears to owe something to the S-55, but is appreciably larger and, in fact, almost corresponds with the S-58. All available information indicates that the Mi-4 is a very fine helicopter, with plenty of power (the engine is an M.62IR rated at 1,000 h.p.) and with a particularly good four-blade rotor. Compared with the Mi-1, the stick forces are reduced and manoeuvrability and stability at low forward speeds are improved. It is claimed to be very easy to fly, even by pilots with little rotary-wing experience.

One of the specially developed passenger versions is the Mi-4P. This differs from the standard utility variant in having no ventral "bath" container and in special refinements including rectangular cabin windows and spats on the four wheels. Most Mi-4Ps have a comfortably furnished cabin seating ten passengers, with very effective heating and sound-proofing.

Externally identical with the Mi-4P is a special record-breaking version which, in April 1956, established three international records: an altitude of 19,920ft with 4,410 lb useful load; an altitude of 20,022ft with 2,205 lb useful load; and an average speed of 116 m.p.h. on a 500-km (311-mile) closed circuit. The record-breaking machine was virtually stripped of all removable non-essential equipment, and even the metal skinning of the rear part of the fuselage (not the tail boom) was replaced by fabric.

Yet another variant is a special fire-fighting version. The entire cabin in this machine is occupied by a large tank of extinguishing fluid. In the ventral bath-tub container a monitor-type spray nozzle is mounted on hinges for directing the jet at various parts of a fire.

N. I. Kamov has been designing helicopters for almost 30 years, and has a predilection for the co-axial configuration. His first design, completed in 1928 with the assistance of N. K. Skrzynski, was named *Vyertolet*, a word now regarded as being

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The latest version of the little Kamov Ka-10 has a single fin and rudder, in place of the paired surfaces originally used.

