= Lavochkin La @-@ 150 =

The Lavochkin La @-@ 150 (also known as the Izdeliye 150 ? Aircraft or Article 150 , USAF / DOD designation Type 3) , was designed by the Lavochkin design bureau (OKB) in response to a 1945 order to build a single @-@ seat jet fighter using a single German turbojet . By this time both the Americans and British , as well as the Germans , had already flown jet fighters and the single Soviet jet engine under development (the Lyulka TR @-@ 1) was not yet ready for production . The design was completed quickly , but the construction of the five flying prototypes was protracted by the factory 's inexperience in building metal aircraft . The aircraft made its first flight in September 1946 , but proved to require extensive modifications to meet the Soviet Air Forces ' requirements . These took so long to make and test that the aircraft was essentially obsolete by the time that they were completed . Even one variant with a much more powerful engine was inferior to other aircraft that the OKB had under development and all work was terminated in 1947 .

= = Design and development = =

The Lavochkin OKB was ordered to design a fighter using a single Junkers Jumo 004B axial @-@ flow turbojet in February 1945 . Much like their rivals at the Mikoyan @-@ Gurevich OKB with their MiG @-@ 9 , the OKB chose a " pod @-@ and @-@ boom " layout for their new fighter , based on advice from the Central Aerohydrodynamic Institute (TsAGI) , although their design had a shoulder @-@ mounted wing . The wings of the all @-@ metal aircraft had fixed leading edges and slotted flaps . The cockpit was well forward , giving the pilot good visibility , and he was protected by an armored headrest . The windscreen of the teardrop @-@ shaped canopy was also armored . Two 23 @-@ millimetre (0 @.@ 91 in) Nudelman @-@ Suranov NS @-@ 23 autocannon were mounted on the lower side of the fuselage with 75 rounds per gun . The tricycle landing gear retracted into the fuselage which gave the 150 a very narrow track . The Soviet derivative of the Jumo engine , the RD @-@ 10 , was rated at 900 kilograms @-@ force (8 @.@ 8 kN ; 2 @,@ 000 lbf) and was mounted behind the cockpit . A steel heat shield protected the bottom of the rear fuselage from the engine 's exhaust . Air was supplied by an intake in the aircraft nose that split around the cockpit before reaching the engine . Seven tanks , five in the fuselage and one in each wing , carried a total of 500 kilograms (1 @,@ 100 lb) of fuel .

Construction of a full @-@ scale mockup was completed in June 1945 by Factory No. 81 , but the order for five prototypes was given to Factory No. 381 as Factory No. 81 was already fully committed to other programs . Manufacturing drawings were delivered to Factory No. 381 by the end of August , but the prototypes were delayed because the plant had no experience building metal aircraft and lacked the necessary tooling . By the end of the year , the factory had only managed to complete a single airframe for static load testing . This showed that the rear fuselage , wings and tail needed to be reinforced , and the opportunity was taken to enlarge the vertical stabilizer as well . These tests and modifications required six months of work so that the first flying prototype was not completed until July 1946 . Manufacturer 's testing of the first prototype began on 27 August , after ground testing had required replacing the engine twice , and the first flight was made on 11 September .

The following day , the Council of Ministers ordered that a small batch of jets from each OKB were to participate in the 7 November parade commemorating the October Revolution . Because of the tight deadline , the components for the two incomplete prototypes were turned over to Factory No. 301 at Khimki , the new headquarters for the Lavochkin OKB , for assembly by Factory No. 381 . Factory No. 21 in Gorky joined the program with three more aircraft built in record time with support from Factory No. 301 . Tooling was constructed in 5 ? 10 days with the first aircraft completed in a week and a half .

= = = Testing and evaluation = = =

All eight aircraft were complete by 1 November and had been tested to ensure their readiness to

participate in the parade . They were later given the unofficial service designation of La @-@ 13 . It was considered too risky to fly the aircraft from Gorky to Moscow and their wings could not be dismounted which meant that they could not be railed to Moscow either . Special three @-@ wheeled trailers were built and the aircraft were driven to Moscow , but the flypast was cancelled because of bad weather .

The tests conducted in preparation for the parade revealed a number of flaws in the design including poor directional stability , a cramped cockpit without heating or ventilation , poor access to the engine , inadequate fuel capacity , compounded by the lack of a fuel gauge , and poor elevator control forces . Five aircraft were modified to correct these issues before resuming the factory 's testing in late 1946 . The modifications were not entirely successful and the lateral stability was now too great and the elevator forces remained too weak . Engine problems , however , plagued the tests as the first prototype alone required four engine changes .

After the conclusion of the manufacturer 's trials in April 1947 , one aircraft was returned to the factory for extensive modifications as the 150M . The wing tips were angled downward 35 ° to reduce the lateral stability , the wing was redesigned to detach from the fuselage , and the aerodynamic balancing of the elevators was reduced from 24 % to 20 % . The fuel capacity was increased to 660 kilograms (1 @,@ 460 lb) , the cockpit was widened by 80 centimeters (31 in) and fitted with an ejection seat . Fore and aft armor plates were fitted to protect the pilot and a new radio aerial mast was installed . All these changes added 365 kilograms (805 lb) of weight and increased drag which reduced the aircraft 's top speed by 73 to 805 km / h (45 to 500 mph) , and slowed its time to 5 @,@ 000 meters (16 @,@ 400 ft) from 4 @.@ 8 to 7 @.@ 2 minutes in comparison to the unmodified aircraft . Given that a higher @-@ performance design , the Aircraft 156 , had already been submitted for state acceptance trials , Semyon Lavochkin decided not to continue the development of the 150M .

In the meantime , the OKB had been developing two afterburning versions of the RD @-@ 10 in an effort to increase the engine 's power . The more successful model was only 100 millimeters (3 @.@ 9 in) longer and weighed an additional 31 kilograms (68 lb) more than the original engine . Its power , however , was increased by an additional 340 kilograms @-@ force (3 @.@ 3 kN ; 750 lbf) , over 30 % more thrust . This engine was designated the izdeliye YuF by the bureau and was fitted into an aircraft 150 prototype in July 1947 , designated as the 150F . The additional power increased the aircraft 's top speed to 950 km / h (590 mph) at sea level and 915 km / h (569 mph) at an altitude of 4 @,@ 320 meters (14 @,@ 170 ft) . This made the 150F the second @-@ fastest Soviet fighter of the period , after the MiG @-@ 9 powered by two afterburning RD @-@ 21 engines . Nevertheless , Lavochkin decided not to submit the 150F for state acceptance trials as the fundamental design flaws of the airframe still had not been resolved .

= = Operators = =

Soviet Union
Soviet Air Force

= = Variants = =

150M ? One 150 prototype was modified with drooped wingtips , a wider cockpit and extra fuel .
150F ? One 150 prototype was modified with a Izdeliye YuF engine , an afterburning RD @-@ 10 .

= = Specifications (Aircraft 150) = =

Data from Early Soviet Jet Fighters
General characteristics
Crew : 1 , pilot
Length : 9 @.@ 42 m (30 ft 11 in)
Wingspan : 8 @.@ 20 m (26 ft 10 @.@ 83 in)

Height : 2 @.@ 6 m (8 ft 6 @.@ 36 in)
Wing area : 12 @.@ 15 m ² (130 @.@ 64 ft ²)
Empty weight : 2 @,@ 156 kg (4 @,@ 753 lb)
Loaded weight : 2 @,@ 973 kg (6 @,@ 554 lb)
Powerplant : 1 × RD @-@ 10 turbojet , 8 @.@ 8 kN (1 @,@ 984 lbf)
Performance
Maximum speed : 546 mph (878 km / h)
Range : 306 mi (493 km)
Service ceiling : 12,600m (41,338ft)
Rate of climb : 22 @.@ 1 m (4 @,@ 349 ft)
Wing loading : 244 @.@ 6 kg / m ² (50 @.@ 22 lb / ft ²)
Thrust / weight : 0 @.@ 303
Armament
2 × 23 mm Nudelman @-@ Suranov NS @-@ 23 autocannon with 75 rpg