

= Yakovlev Yak @-@ 15 =

The Yakovlev Yak @-@ 15 ( Russian : ??????? ?? @-@ 15 ; NATO reporting name : Feather , USAF / DOD designation Type 2 ) was a first @-@ generation Soviet turbojet fighter developed by the Yakovlev design bureau ( OKB ) immediately after World War II . It used a reverse @-@ engineered German Junkers Jumo 004 engine . Along with the Swedish Saab 21R , it was one of only two jets to be successfully converted from a piston @-@ powered aircraft and enter production . 280 aircraft were built in 1947 . Although nominally a fighter , it was mainly used to qualify piston @-@ engine @-@ experienced pilots to fly jets .

= = Design = =

= = Development and description = = =

On 9 April 1945 , the Council of People 's Commissars ordered the Yakovlev OKB to develop a single @-@ seat jet fighter to be equipped with a single German Jumo 004 engine . To save time , Yakovlev based the new design ( known as the Yak @-@ 3 @-@ Jumo or Yak @-@ Jumo ) on the latest version of his successful Yakovlev Yak @-@ 3 piston @-@ engined fighter . The piston engine was removed and the jet engine was mounted underneath the forward fuselage so that its exhaust exited underneath the middle of the fuselage . To protect the fuselage , a steel heatshield was added to its bottom . The deeper forward part of the fuselage gave the aircraft a " pod @-@ and @-@ boom " configuration . Very few changes were made to the metal fuselage other than at the aircraft 's nose . This was recontoured to accommodate the armament of two 23 @-@ millimeter ( 0 @-@ 91 in ) Nudelman @-@ Suranov NS @-@ 23 autocannon , an additional fuel tank above the engine and the engine itself . No changes were made to the wings other than the elimination of the air intakes for the oil cooler and the bending of the front wing spar into an inverted U @-@ shape to clear the engine . The vertical stabilizer was slightly enlarged , but the tail plane was unmodified . The conventional landing gear was also unmodified other than the tail wheel which now used several steel leaf springs as shock absorbers . The Yak @-@ Jumo carried a total of 590 kilograms ( 1 @-@ , @ 300 lb ) of fuel .

Taxi tests began in October 1945 , but the heatshield proved to be too short and the heat from the engine exhaust melted the duralumin skin of the rear fuselage as well as the rubber tire of the tailwheel . Modifications to rectify the problems took until late December . By this time a second prototype had been completed with a solid steel tailwheel and an enlarged tailplane . After a few taxiing tests , it was transferred to the Central Aerohydrodynamic Institute ( TsAGI ) for full @-@ scale windtunnel testing that lasted until February 1946 . On the 26th of that month , the Council of People 's Commissars issued requirements that the aircraft should have a maximum speed of 770 km / h ( 480 mph ) at sea level and a speed of 850 km / h ( 530 mph ) at an altitude of 5 @-@ , @ 000 meters ( 16 @-@ , @ 400 ft ) . It should be able to climb to that altitude in four and a half minutes or less and it should have a range of 500 kilometers ( 310 mi ) at 90 % of maximum speed . Two prototypes were to be ready for flight testing on 1 September .

According to aviation historians Bill Gunston and Yefim Gordon , representatives from Yakovlev and the Mikoyan @-@ Gurevich OKB tossed a coin on 24 April 1946 to determine which aircraft would be the first Soviet jet to fly . Yakovlev lost and the Yak @-@ Jumo made one circuit of the airfield before landing . The manufacturer 's flight testing of the aircraft was completed on 22 June , but its early success caused the Council of Ministers to issue a new requirement on 29 April for two aircraft powered by the Soviet @-@ built RD @-@ 10 engine ( known as the Yak @-@ 15 , Yak @-@ 15RD10 or Yak @-@ RD ) . Aside from the new engine , the requirement differed from the previous one only in a range of 700 kilometers ( 430 mi ) at optimum cruise speed and a reduction of the maximum ceiling to 14 @-@ , @ 000 meters ( 45 @-@ , @ 930 ft ) . Two prototypes were ordered to be available for flight testing on 1 September 1946 .

Yakovlev was able to adapt the two existing prototypes to the RD @-@ 10 with little trouble and

one aircraft participated in the August 1946 Tushino flypast . The day after the aerial display , Joseph Stalin summoned Artem Mikoyan and Aleksandr Yakovlev to his office and ordered that each OKB build 15 aircraft to participate in the 7 November parade in Red Square commemorating the anniversary of the October Revolution . Factory No. 31 in Tblisi was chosen to build the new aircraft because it was still building conventional Yak @-@ 3s and could easily switch to the jet fighter . All 15 aircraft were built before the deadline , although they lacked any armor , were provided with an enlarged fuel tank in lieu of armament , and had an incomplete avionics outfit . The parade was canceled and two of the aircraft were modified with a single 23 mm cannon and began State acceptance trials which lasted until April 1947 .

The tests revealed a number of problems in that the thick wing inherited from the Yak @-@ 3 limited the top speed of the aircraft , the engine exhaust damaged the surface of the airfield , the cockpit often filled with smoke from kerosene and oil that had dripped onto the engine , and the aircraft was very short @-@ ranged . Despite these problems , the Yak @-@ 15 proved to be very easy to fly , even for pilots accustomed to piston @-@ engined fighters , and caused the VVS to accept the fighter as a conversion trainer .

Even before the State acceptance trials were completed , the Council of Ministers ordered the aircraft into production in December 1946 . 50 aircraft were to be built between January and April 1947 , equally split between single @-@ seat aircraft and two @-@ seat trainers , armed with only a single cannon . The trainer ran into serious development difficulties and all the aircraft of the first batch were single @-@ seaters . Fifty of these participated in the May Day flypast in Moscow in 1947 . A total of 280 Yak @-@ 15s were produced through the end of the year , exclusive of prototypes . The aircraft were distributed in small numbers to fighter aviation regiments based in the USSR , Poland , Romania , Hungary , and Manchuria for use as conversion trainers . The aircraft 's manoeuvrability led it to be used by a number of informal acrobatic display teams throughout the late 1940s .

A single prototype of the two @-@ seat trainer was the first aircraft of the first production batch built by Factory No. 31 in the fall of 1946 . The prototype did not begin manufacturer 's flight testing until 5 April 1947 , even though the primary differences from the single @-@ seat version were limited to a redesigned forward fuselage that accommodated an additional cockpit for the trainee where the armament used to be and a common , sideways @-@ opening , canopy . The trainer was initially designated as the Yak @-@ Jumo vyvoznoy , but it was eventually designated as the Yak @-@ 21 although some documents refer to it as the Yak @-@ 15V , Yak @-@ 15UT or Yak @-@ 21V . Further work on the trainer was cancelled with the success of the trainer version of the Yak @-@ 17 with its tricycle undercarriage .

One Yak @-@ 15 was used to test a prototype aerial refueling system in 1949 , although the installation on the fighter and the Tupolev Tu @-@ 2 bomber used as the tanker were both dummies to test procedures and fit .

== Yak @-@ 17 @-@ RD10 ==

On 29 April 1946 , five days after the Mikoyan @-@ Gurevich I @-@ 300 and the Yak @-@ Jumo made their first flights , the Council of Ministers ordered that the Yakovlev OKB begin design of a new aircraft similar to the Yak @-@ Jumo , using the RD @-@ 10 engine with improved aerodynamics . This generally resembled the original aircraft , but the wings were entirely redesigned with laminar flow airfoils , the tail structure was enlarged and an ejection seat was fitted .

The back of the seat was armoured and the pilot was also protected by a bullet @-@ proof windscreen . The entire canopy was also redesigned to accommodate the new windscreen . The landing gear could not be housed in the thin wings so it was redesigned to retract into the fuselage . Low and high wing loading wing versions were considered , but the low wing loading 15 @-@ square @-@ meter ( 160 sq ft ) wings were chosen for the prototype .

At an altitude of 5000 meters , the Yak @-@ 17 @-@ RD10 , as the new fighter was designated , was expected to have a top speed of 822 km / h ( 511 mph ) ; a significant improvement over that of

the production Yak @-@ 15 . The aircraft was completed on 3 September and ground tests lasted until 26 September , but it never flew as the Yak @-@ 15 had already been ordered into production and its conventional landing gear was already deemed obsolete .

= = Survivors = =

The only known surviving aircraft is ' Yellow 37 ' at the Vadim Zadorozhny Technical Museum , outside Moscow .

= = Variants = =

Data from : OKB Yakovlev

= = = Yak @-@ 15 family = = =

Yak @-@ Jumo ( Yak @-@ 3 @-@ Jumo )

The first prototypes of the Yak @-@ 15 series , powered by captured Jumo 004 engines .

Yak @-@ 15 @-@ RD10

( also referred to as Yak @-@ RD ) Initial designation of prototypes and early production aircraft powered by Soviet built RD @-@ 10 engines ( 004 copies ) , with no or reduced armament .

Yak @-@ 15

Production aircraft with full armament

Yak @-@ 21

Two @-@ seat training version of Yak @-@ 15 . One built , but not proceeded with because of the success of the trainer version of the Yak @-@ 17 .

Yak @-@ 15V

( V - Vyvozny - familiarisation trainer ) Alternative designation for the Yak @-@ 21 .

Yak @-@ 15U

( U - Uchebnotrenirovochnyy - training ) Alternative designation for the Yak @-@ 21 .

= = = Yak @-@ 17 family = = =

Yak @-@ 15U ( Yakovlev Yak @-@ 15U @-@ RD10 )

( U - uloochshenny - improved ) Improved Yak @-@ 15 with tricycle undercarriage and drop tanks , became the prototype of the Yak @-@ 17 proper .

UTI Yak @-@ 17 @-@ RD10 ( Yak @-@ 21T )

( No relation to the earlier Yak @-@ 17 @-@ RD10 ) Two @-@ seat trainer version of the Yak @-@ 15U with long greenhouse canopy over tandem cockpits and tricycle undercarriage .

Yak @-@ 17UTI

( UTI - Uchebno @-@ trenirovochnyy Istrebitel - fighter trainer ) Production two @-@ seat Yak @-@ 17 trainers .

Yak @-@ 17

Production fighters with tricycle undercarriage .

Yak @-@ 21T

( T - Tryokhkolyosnoye shasse - tricycle undercarriage ) Alternative designation of the UTI Yak @-@ 17 @-@ RD10 , no relation to earlier Yak @-@ 21

= = = Similar but unrelated aircraft = = =

Yak @-@ 17 @-@ RD10

An experimental aircraft , similar in appearance to the Yak @-@ Jumo aircraft , but actually largely new , incorporating improved aerodynamics , an ejection seat and protection for the pilot . The sole prototype remained unflown after further development was cancelled on 26 September 1946 , as

taxi tests were being carried out .

= = Users = =

Soviet Union .  
Soviet Air Forces

= = Specifications ( Yak @-@ 15 ) = =

Data from OKB Yakovlev : A History of the Design Bureau and Its Aircraft

General characteristics

Crew : 1

Length : 8 @. @ 7 m ( 28 ft 7 in )

Wingspan : 9 @. @ 2 m ( 30 ft 2 in )

Wing area : 14 @. @ 85 m<sup>2</sup> ( 159 @. @ 8 sq ft )

Empty weight : 1 @, @ 852 kg ( 4 @, @ 083 lb )

Gross weight : 2 @, @ 638 kg ( 5 @, @ 816 lb )

Fuel capacity : 590 kg ( 1 @, @ 300 lb )

Powerplant : 1 × Klimov RD @-@ 10 turbojet , 8 @. @ 8 kN ( 2 @, @ 000 lbf ) thrust

Performance

Maximum speed : 786 km / h ( 488 mph ; 424 kn )

Combat range : 510 km ( 317 mi ; 275 nmi )

Service ceiling : 12 @, @ 000 m ( 39 @, @ 370 ft )

Rate of climb : 21 @. @ 6 m / s ( 4 @, @ 250 ft / min )

Wing loading : 197 kg / m<sup>2</sup> ( 40 lb / sq ft )

Armament

Guns : 2 × 23 mm Nudelman @-@ Suranov NS @-@ 23 cannon with 60 rounds each