= Polikarpov I @-@ 3 =

The Polikarpov I @-@ 3 (Russian : ?????????? ? @-@ 3) was a Soviet fighter designed during the late 1920s . It entered service in 1929 , but was retired in 1935 with the advent of fighters with higher performance .

= = Design and development = =

Development of the I @-@ 3 began in mid @-@ 1926 after investigations into the loss of the Polikarpov DI @-@ 1 were completed . Although the new biplane shared many of the characteristics of the earlier design , including the staggered sesquiplane layout of the wings , it was a new design . It was designed by the OSS (Russian : Otdel Sookhoputnykh Samolyotov ? Landplane Department) of Aviatrest (Aviation Trust) under the supervision of Nikolai Nikolaevich Polikarpov , head designer of the department . There was much debate within the OSS about the proper powerplant for the new fighter , but Polikarpov rejected the Wright Tornado radial engine and decided in favor of the BMW VI liquid @-@ cooled V12 engine . A wooden mock @-@ up was completed in April 1927 , but formal approval of the design did not come until 3 June 1927 . Static tests of a full @-@ sized model began in October at the same time as negotiations for a license for the BMW engine were finished .

The I @-@ 3 had an oval @-@ section semi @-@ monocoque fuselage covered with ' shpon ' , molded birch plywood , with a small headrest faired into the fuselage , although the engine was enclosed in a metal cowling . The two @-@ spar wings were covered in plywood and fabric and had a Clark Y profile . Internal bracing wires were fitted to reinforce the wings . The control surfaces were framed in duralumin , but covered in fabric . It was provided with differential Frise @-@ type ailerons . The duralumin N @-@ type struts that separated the wings , and attached the upper wing to the fuselage , had a teardrop profile . They were reinforced with steel bracing wires . The conventional undercarriage was fixed with rubber shock absorbers and the tailskid was made from duralumin . The main gear could be replaced by skis like those fitted to the Polikarpov R @-@ 1 . The engine 's semi @-@ retractable radiator extended below the fuselage behind the rear main gear struts . Two fuel tanks were fitted , the main one in the fuselage , but a small 2 @.@ 5 @-@ litre (0 @.@ 55 imp gal ; 0 @.@ 66 US gal) tank , mainly used to start the engine , was in the center section of the upper wing , along with the engine coolant tank . A total of 210 kg (460 lb) of fuel was carried . Initially the I @-@ 3 was fitted with two fixed 7 @.@ 62 mm (0 @.@ 300 in) synchronized Vickers machine guns , but these were later replaced by PV @-@ 1 machine guns . A central OP @-@ 1 optical gunsight was provided with a KP @-@ 5 ring sight offset to starboard . Some aircraft had bomb racks to carry two 11 @.@ 5 kg (25 lb) bombs .

The first prototype was completed in early 1928 and made its first flight on 21 February . Its manufacturer 's trials were finished by 10 March and the state acceptance trials by 14 April . The pilots of the NII VVS (Russian : Naoochno @-@ Issledovatel 'skiy Institoot Voyenno @-@ Vozdooshnykh Seel ? Air Force Scientific Test Institute) criticized the lack of directional stability at high speeds and a slight problem in control response between maneuvers . The area of the vertical tail was increased and the elevators were given horn balances to alleviate the first problem while split ailerons addressed the second problem . Since production had begun before the aircraft was actually approved for service use , the first forty aircraft were completed with the smaller tailplane . A second prototype was completed in August 1928 and tested a different propeller optimized for high speed which increased the top speed to 283 km / h (176 mph) , although it lengthened the take @-@ off run . The first 39 aircraft completed , plus the two prototypes , used imported engines , but the remainder used the license @-@ built Mikulin M @-@ 17 .

Approximately 400 were built , with Gordon and Dexter citing sources that state 389 or 399 . They also provide a yearly production table that lists 35 built in 1928 , 47 in 1929 , 250 in 1930 and 55 in 1931 , which add up to 389 when the two prototypes are included .

= = Operational use = =

Initial deliveries in 1929 were to units in the Belorussian Military District where they replaced the Grigorovich I @-@ 2 . They equipped the 4th and 7th Squadrons (Russian : Aviaeskadril 'ya ? Air Squadron) , later the 106th and 107th Fighter Squadrons (Russian : Istrebitel 'naya aviaeskadril 'ya ? Fighter Air Squadrons) at Smolensk ; the 13th and 5th Squadrons , later the 108th and 7th Fighter Squadrons , at Bryansk , the 9th Squadron , and the 17th and 19th Squadrons , which later became the 116th and 117th Fighter Squadrons . Units based in the Ukraine began to receive theirs the following year . They equipped the 3rd Squadron , later the 109th Fighter Squadron , and the 73rd Air Detachment (Aviaotryad) at Kiev and the 91st Squadron , later the 33rd Fighter Squadron , at Bobruisk . Others were delivered to the 1st , 2nd and 3rd Schools of Military Pilots .

By 1 October 1930 252 I @-@ 3s were in service and 282 a year later . 297 were on hand on 1 January 1932 , although it fell to 249 a year later and 239 towards the end of 1933 . It was relegated to secondary roles in 1935 as newer and more powerful Polikarpov fighters entered service . Notably the I @-@ 5 , I @-@ 15 , and the I @-@ 16 .

= = Variants = =

The DI @-@ 2 (Russian : ?? @-@ 2) was an enlarged two @-@ seat variant . It had an extra frame added to the fuselage , an extended wingspan and an enlarged rudder . Two 7 @.@ 62 mm DA machine guns were mounted on a Scarff ring in the observer 's cockpit . A prototype was completed in early 1929 and made its first flight in May of that year . However the prototype crashed due to stabilizer failure in a dive later in 1929 , killing the pilot .

= = Operators = =

Soviet Union
Soviet Air Force

= = Specifications (I @-@ 3) = =

Data from Shavrov , Istoriia konstruktskii samoletov v SSSR do 1938 g .
General characteristics
Crew : One
Length : 8 @.@ 08 m (26 ft 6 in)
Wingspan : 11 m (36 ft 1 in)
Height : ( )
Wing area : 27 @.@ 85 m ² (299 @.@ 8 ft ²)
Airfoil : Clark Y
Empty weight : 1 @,@ 400 kg (3 @,@ 086 lb)
Loaded weight : 1 @,@ 846 kg (4 @,@ 070 lb)
Powerplant : 1 × BMW VI V12 engine , 545 kW (730 hp)
Performance
Maximum speed : 278 km / h (150 kn , 173 mph)
Range : 585 km (316 nmi , 364 mi)
Service ceiling : 7 @,@ 200 m (23 @,@ 620 ft)
Wing loading : 66 kg / m ² (14 lb / ft ²)
Power / mass : 295 W / kg (0 @.@ 18 hp / lb)
Time to altitude : 12 @.@ 6 min to 5 @,@ 000 m (16 @,@ 400 ft)
Horizontal turn time : 14 sec
Armament
2 × 7 @.@ 62 mm (0 @.@ 3 in) PV @-@ 1 machine guns