= Petlyakov Pe @-@ 8 =

The Petlyakov Pe @-@ 8 was a Soviet heavy bomber designed before World War II , and the only four @-@ engine bomber the USSR built during the war . Produced in limited numbers , it was used to bomb Berlin in August 1941 . It was also used for so @-@ called " morale raids " designed to raise the spirit of the Soviet people by exposing Axis vulnerabilities . Its primary mission , however , was to attack German airfields , rail yards and other rear @-@ area facilities at night , although one was used to fly the People 's Commissar of Foreign Affairs (Foreign Minister) Vyacheslav Molotov from Moscow to the United States in 1942 .

Originally designated the TB @-@ 7 , the aircraft was renamed the Pe @-@ 8 after its primary designer , Vladimir Petlyakov , died in a plane crash in 1942 . Supply problems complicated the aircraft 's production and the Pe @-@ 8s also had engine problems . As Soviet morale boosters , they were also high @-@ value targets for the Luftwaffe 's fighter pilots . The loss rate of these aircraft , whether from mechanical failure , friendly fire , or combat , doubled between 1942 and 1944 .

By the end of the war , most of the surviving aircraft had been withdrawn from combat units . After the war , some were modified as transports for important officials , and a few others were used in various Soviet testing programs . Some supported the Soviet Arctic operations until the late 1950s .

= = Design and development = =

Development of the Pe @-@ 8 began in July 1934 , when the Soviet Air Forces (VVS) issued requirements for an aircraft to replace the obsolete and cumbersome Tupolev TB @-@ 3 heavy bomber . These requirements specified a bomber that could carry 2 @,@ 000 kg (4 @,@ 400 lb) of bombs 4 @,@ 500 km (2 @,@ 800 mi) at a speed greater than 440 km / h (270 mph) at an altitude of 10 @,@ 000 metres (32 @,@ 808 ft) , figures that were twice the range , speed and service ceiling of the TB @-@ 3 . The task was assigned to the Tupolev Design Bureau (OKB) where Andrei Tupolev handed the work to a team led by Vladimir Petlyakov and the project received the internal bureau designation of ANT @-@ 42 . The resulting aircraft , a four @-@ engined , mid @-@ wing cantilever monoplane , was initially designated as the TB @-@ 7 (Russian : ??????? ????????????? , Tyazholy Bombardirovschik ? Heavy Bomber) by the VVS and owed more to the streamlined design of the Tupolev SB than to the block @-@ like design of the TB @-@ 3 .

The bomber was built mainly of duralumin , with two steel spars in the wings , although the ailerons were fabric @-@ covered . The pear @-@ shaped monocoque fuselage required the pilots to sit in tandem , offset to the left . In the prototype , space for a fifth engine , an auxiliary Klimov M @-@ 100 , was reserved inside the fuselage , in a fairing above the wing spars and behind the pilots . It was intended to drive a supercharger that supplied pressurized air to the Mikulin AM @-@ 34FRN engines , with the installation designated ATsN @-@ 2 (Russian : Agregat tsentral 'novo nadduva ? Central Supercharging Unit) . Subsequent models omitted the internal engine , and provided seating for a flight engineer and radio operator , behind and below the pilots . The bombardier sat in the nose and manned a turret armed with a 20 @-@ millimeter (0 @.@ 79 in) ShVAK cannon that covered a 120 ° cone ahead . A prominent chin gondola , nicknamed the ' beard ' , protruded beneath the nose . The dorsal gunner sat at the rear of the ATsN fairing with a sliding hood covering a 7 @.@ 62 @-@ millimeter (0 @.@ 300 in) ShKAS machine gun and another ShKAS mounted in a ventral hatch . The tail gunner had a powered turret with a ShVAK and , most unusually , there were manually operated ShVAK cannon mounted at the rear of each inner engine nacelle . Crewmen had access to these positions through the wing or by a trapdoor in the upper wing surface . The large internal bomb bay racks held up to 4 @,@ 000 kg (8 @,@ 800 lb) of bombs ; external racks held a single 500 @-@ kilogram (1 @,@ 100 lb) FAB @-@ 500 (Fugasnaya AviaBomba - high explosive bomb) bomb under each wing .

The maiden flight of the unarmed prototype , piloted by M. M. Gromov and without the ATsN installation , occurred at Khodynka Aerodrome on 27 December 1936 . After successful initial trials , the ATsN system was installed for the State acceptance trials in August 1937 and the AM @-@

34RNB engines were fitted during the tests . Gromov reported that the rudder was ineffective and that the outer engines overheated . Subsequent wind tunnel testing identified a problem with the aerodynamics of the radiators and nacelles . To solve this problem , the outer engines ' radiators were moved into deep ducts under the inner nacelles and the rudder was enlarged and redesigned with a smooth skin .

Construction of a second prototype began in April 1936 , incorporating lessons from the first aircraft and feedback from the VVS . Designers widened the fuselage by 100 mm (3 @.@ 9 in) ; the ' beard ' was also widened and the tail section was modified to lessen resistance and improve rudder function . A reconfigured control system included an autopilot and the engineers redesigned portions of the electrical system . The engines were changed to the more powerful AM @-@ 34FRNVs and a redesigned undercarriage was fitted to the airframe . Two additional fuel tanks increased the craft 's range . The defensive and offensive armament was revised , and the bomber 's weaponry expanded to twin ShKAS guns in the nose , nacelle and tail turrets and a dorsal turret with a ShVAK ; this design eliminated the ventral gun . The bomb bay was modified to allow for a single 5 @,@ 000 @-@ kilogram (11 @,@ 000 lb) FAB @-@ 5000 bomb to be carried and provisions were added to carry VAP @-@ 500 or VAP @-@ 1000 poison gas dispensers under the wings .

The arrests of both Tupolev and Petlyakov in October 1937 , during the Great Purge , disrupted the program and the second prototype did not make its first flight until 26 July 1938 . Although this prototype served as the basis for the series aircraft , further modifications were made to the armament . New weaponry included a retractable ShVAK in the MV @-@ 6 dorsal turret , another ShVAK in a KEB tail turret and a 12 @.@ 7 @-@ millimeter (0 @.@ 50 in) Berezin UBT machine gun in each ShU barbette in each inner engine nacelle . Another fuel tank further increased the range , and the ' beard ' was removed entirely , replaced by a more streamlined nose . Authorization for production was slow for several reasons , including the Great Purge , but also due to the scarcity of resources , and a shortage of workers . Although production facilities in the Kazan Factory No. 124 were ready as early as 1937 , the order to begin was not given until 1939 .

= = = Manufacture and supply problems = = =

Engine supply problems complicated the construction of the aircraft . Production of the ATsN superchargers could not be organized in any systematic way and only the first four Pe @-@ 8s were equipped with them . Factory No. 124 shut down its Pe @-@ 8 production line at the beginning of 1940 while alternative engines were evaluated . Somewhere in the massive Soviet chain of command , the decision was made to proceed without the superchargers . The unavailability of the Klimov M @-@ 100 engine of the ATsN @-@ 2 installation required a design change , although this modification allowed a commander and radio operator to be carried in its place . Then , to compound the problem further , the production of AM @-@ 34FRNV engines ended in the second half of 1939 . Only two or four Pe @-@ 8s were equipped with them . Eighteen of the aircraft produced by the end of 1940 were fitted with AM @-@ 35A engines .

In 1940 , six aircraft without engines were fitted with Mikulin AM @-@ 35A engines , while VVS officials evaluated both the Charomskiy ACh @-@ 30 and Charomskiy M @-@ 40 aircraft Diesel engines . At least nine Pe @-@ 8s were fitted with Diesel engines in 1941 , but neither the ACh @-@ 30 nor the M @-@ 40 were entirely satisfactory , despite greatly increasing the range of the aircraft . All surviving Pe @-@ 8s were re @-@ engined with AM @-@ 35As by the end of 1941 . Production continued slowly at Factory No. 124 ; most of the factory 's resources were devoted to the higher @-@ priority Petlyakov Pe @-@ 2 , a successful light bomber . At this time , most of these aircraft , re @-@ designated as the Pe @-@ 8 after Petlyakov was killed in a Pe @-@ 2 crash on 12 January 1942 , were built with out @-@ of @-@ production AM @-@ 35A engines .

The 1 @,@ 380 @-@ kW (1 @,@ 850 @-@ hp) Shvetsov ASh @-@ 82 radial engine was proposed as a replacement to alleviate the shortage of engines and this modification went into production in late 1942 . The exhaust arrangements of the ASh @-@ 82 were not compatible with the gun turrets in the rear of the engine nacelles and the guns were removed , reducing the aircraft 's defensive capability . At the end of 1943 , the nose turret was deleted in favor of a manually

operated ShKAS machine gun in a more streamlined nose . This version of the aircraft proved to have much the same range as the diesel @-@ engined versions , but reliability was greatly improved . Production of the Pe @-@ 8s totaled 93 .

The last Pe @-@ 8s were completed in 1944 as Pe @-@ 8ONs (Russian : Osobovo Naznacheniya ? Special Mission) with Charomskiy ACh @-@ 30B engines and a fillet at the base of the vertical stabilizer . These were special VIP transports with a seating capacity of twelve and a cargo capacity of 1 @,@ 200 kilograms (2 @,@ 646 lb) . Sources disagree if the armament was removed and , if it was , whether partly or entirely .

= = Operational history = =

= = = Wartime use = = =

When Operation Barbarossa began on 22 June 1941 , only the 2nd Squadron of the 14th Heavy Bomber Regiment (Russian : Tyazholy Bombardirovochnyy Avia Polk ? TBAP) , based at Boryspil was equipped with Pe @-@ 8s , but was not ready for combat . Two of its nine Pe @-@ 8s were destroyed by German air strikes shortly after the war began , before the Pe @-@ 8s were withdrawn out of reach of German bombers to Kazan . Stalin ordered that the squadron be reformed into a regiment , and that it strike targets deep inside German territory . Theoretically , this tactic would boost Soviet morale by demonstrating the vulnerability of the enemy . The squadron was re @-@ designated on 29 June as the 412th TBAP and began training for long @-@ range missions . On or about 27 July it was again renamed , this time as the 432nd TBAP . On the evening of 10 August , eight M @-@ 40 @-@ engined Pe @-@ 8s of the 432nd TBAP , accompanied by Yermolaev Yer @-@ 2s of the 420th Long @-@ Range Bomber Aviation Regiment (DBAP) , attempted to bomb Berlin from Pushkino Airfield near Leningrad . One heavily loaded Pe @-@ 8 crashed immediately upon take off , after it lost an engine . Only four managed to reach Berlin , or its outskirts , and of those , only two returned to their base . The others landed elsewhere or crash @-@ landed in Finland and Estonia . The aircraft of the commander of the 81st Long @-@ Range Bomber Division , Combrig Mikhail Vodopianov , to which both regiments belonged , was attacked mistakenly by Polikarpov I @-@ 16s from Soviet Naval Aviation over the Baltic Sea and lost an engine ; later , before he could reach Berlin , German flak punctured a fuel tank . He crash @-@ landed his aircraft in southern Estonia . Five more Pe @-@ 8s were lost during the operation , largely due to the unreliability of the M @-@ 40s . Seven Pe @-@ 8s were lost during the month of August alone , rendering the regiment ineffective . During this period , the surviving aircraft were re @-@ equipped with AM @-@ 35As , which gave them a shorter range , but a more reliable engine .

By 1 October 1941 , the regiment mustered fourteen Pe @-@ 8s after having been replenished by new aircraft from the factory . It spent the rest of the year conducting night raids on Berlin , Königsberg , Danzig and as well as German @-@ occupied cities in the Soviet Union . The regiment was re @-@ designated as the 746th Separate Long @-@ Range Aviation Regiment (Russian : Otdel 'nyy Avia Polk Dahl 'nevo Deystviya ? OAPDD) on 3 December . No aircraft were reported on hand two days later after this designation , but eleven were on strength on 18 March 1942 . During the winter of 1941 ? 42 , the regiment was assigned the destruction of a railroad bridge over the Volga River , near Kalinin . In April 1942 , one aircraft flew diplomatic personnel and mail on a non @-@ stop flight from Moscow to Great Britain . This was a test run for a flight carrying Soviet Foreign Minister Molotov and his delegation from Moscow to London and then to Washington , D.C. and back , for negotiations to open a second front against Nazi Germany (19 May ? 13 June 1942) . The flight crossed German @-@ controlled airspace on the return trip without incident . From August 1941 to May 1942 , the regiment flew 226 sorties and dropped 606 tonnes (596 long tons ; 668 short tons) of bombs . In the course of these missions , they lost 14 bombers , five in combat , and the rest from engine malfunction . The regiment received 17 Pe @-@ 8s as replacements . Sixteen aircraft were on hand on 1 May 1942 , but the number had only increased to seventeen two months later ; the regiment was losing aircraft almost as fast as they were being replaced .

The 890th Long @-@ Range Aviation Regiment (Russian : Avia Polk Dahl 'nevo Deystviya ? APDD) was formed on 15 June 1942 and both regiments were used to bomb German @-@ held transportation centers of , among others , Orel , Bryansk , Kursk and Poltava . The pace of activity increased and the regiments flew as many missions in August as they had in the first ten months of the war . By the eve of the Soviet counterattack at Stalingrad , Operation Uranus , on 8 November the regiments had fourteen Pe @-@ 8s on hand . Under the command of the 45th Long @-@ Range Bomber Aviation Division (Russian : Dal 'nebombardirovochnaya Aviatsionnaya Diviziya ? DBAD) , they did not participate in the Stalingrad air attacks .

In 1943 , from the division 's primary airfield at Kratovo , southeast of Moscow , the regiments bombed transportation centers , airfields and troop concentrations . The railroad yard at Gomel was a favorite target and the regiment dropped approximately 606 tonnes (596 long tons ; 668 short tons) of bombs there between February and September 1943 . It is not clear if these sorties were made by Pe @-@ 8s alone or in combination with other aircraft . In addition , the regiment dropped the first FAB @-@ 5000 bomb on Königsberg in April 1943 , continuing the pin @-@ prick attacks against targets deep in the German rear . In May 1943 , efforts shifted to disrupt the German concentration of forces for the Battle of Kursk . In one sortie , the 109 bombers of the 45th DBAD struck the rail junction at Orsha during the evening of 4 May , most of which were not Pe @-@ 8s ; the German High Command reported the destruction of 300 rail wagons and three ammunition trains .

By 1 July , the regiment had 18 Pe @-@ 8s for deployment during the early phase of the Battle of Kursk . The long @-@ range aviation units continued to attack targets in the German rear areas at night , supporting the Soviet ground offensive in the Orel Bulge , called Operation Kutuzov , that began on 12 July . The Germans had transferred the nightfighters of the Fourth Group of Nightfighter Wing 5 (IV . / Nachtjagdgeschwader 5) , flying a mix of Junkers Ju 88 and Dornier Do 217 aircraft , to counter the Soviet raids near the Orel area . Initially , the night fighters were ineffective against the Soviet raids , until the deployment of their ground radar " eyes " . Once the Germans had use of their radar , after the night of 17 ? 18 July , Soviet losses increased sharply . Although the Germans flew only fourteen sorties that night , they claimed eight kills . On the night of 20 ? 21 July , Captain (Hauptmann) Heinrich Prinz zu Sayn @-@ Wittgenstein , commander of IV . / NJG 5 , shot down three himself . The exhaust plume of the ASh @-@ 82 engine may have been a contributing factor ; the engines lacked flame dampening exhausts , making their plume visible from a distance . Despite its losses , the 746th was re @-@ designated as the 25th Long @-@ Range Guards Aviation Regiment (GAPDD) on 18 September 1943 in recognition of its achievements .

= = = Removal from combat = = =

The loss of Pe @-@ 8s to all causes ? mechanical , combat , friendly fire ? had steadily increased from one aircraft per 103 flights in 1942 to one per 46 sorties in 1944 . Despite the losses , production kept pace with need . The number of aircraft belonging to the 45th DBAD continued to rise ; 20 were on hand on 1 January 1944 and 30 on 1 June . The Pe @-@ 8s flew 276 sorties in 1944 against such targets as Helsinki , Tallinn and Pskov . Aviation historian Yefim Gordon maintains that the Pe @-@ 8 flew its last mission on the night of 1 ? 2 August 1944 , but the Statistical Digest of the VVS contradicts this claim , showing 31 Pe @-@ 8s assigned to 45th DBAD on 1 January 1945 and 32 on hand on 10 May 1945 . However , during this period the 45th DBAD only had three regiments , none of which used the Pe @-@ 8 as their primary aircraft , so while the 45th DBAD may have had Pe @-@ 8s , these may not have been in use as the primary combat aircraft .

The 890th began to fly Lend @-@ Lease B @-@ 25 Mitchells in the spring of 1944 and was itself re @-@ designated as the 890th Bomber Aviation Regiment on 26 December 1944 . The 362nd APDD was formed in early 1944 with four Pe @-@ 8s received from the other two regiments , but these were returned in the spring of 1944 , when the regiment began to convert to the Lend @-@ Lease Mitchells .

= = = Post @-@ war use = = =

After the war , the Pe @-@ 8 was used extensively as a testbed for trials involving Soviet derivatives of the German V @-@ 1 flying bomb and it was designated as the Pe @-@ 8LL for prototype piston engine trials . It was also used as a mother ship for the experimental rocket @-@ engined Bisnovat 5 in 1948 ? 49 . Aeroflot received several of the surviving Pe @-@ 8s for polar exploration . Their military equipment removed , they had additional fuel tanks installed , were painted orange , and had their engines upgraded to either ASh @-@ 82FNs or Shvetsov ASh @-@ 73s . One landed at the North Pole in 1954 and others helped to monitor the drift ice stations NP @-@ 2 , NP @-@ 3 and NP @-@ 4 during the late 1950s .

= = Operators = =

Soviet Union
Soviet Air Forces

= = Specifications (Pe @-@ 8 / AM @-@ 35A) = =

Data from Gordon , Soviet Airpower in World War 2 , p . 398
General characteristics
Crew : Eleven
Length : 23 @.@ 2 m (76 ft ¼ in)
Wingspan : 39 @.@ 13 m (128 ft 4 in)
Height : 6 @.@ 20 m (20 ft 4 in)
Wing area : 188 @.@ 66 m ² (2 @,@ 030 @.@ 7 ft ²)
Empty weight : 18 @,@ 571 kg (40 @,@ 941 lb)
Loaded weight : 27 @,@ 000 kg (59 @,@ 400 lb)
Max. takeoff weight : 35 @,@ 000 kg (77 @,@ 000 lb)
Powerplant : 4 × Mikulin AM @-@ 35A liquid @-@ cooled V12 engine , 999 kW (1 @,@ 340 hp) each
Performance
Maximum speed : 443 km / h (275 @.@ 2 mph)
Range : 3 @,@ 700 km (2 @,@ 299 mi)
Service ceiling : 9 @,@ 300 m (30 @,@ 504 ft)
Rate of climb : 5 @.@ 9 m / s (1 @,@ 154 ft / min)
Wing loading : 143 kg / m ² (29 lb / ft ²)
Power / mass : 140 W / kg (0 @.@ 2 hp / lb)
Armament
Guns : 2 x 20 @-@ millimeter (0 @.@ 79 in) ShVAK cannons (dorsal and tail turrets)
2 x 12 @.@ 7 @-@ millimeter (0 @.@ 50 in) UBT machine guns (engine nacelles)
2 x 7 @.@ 62 @-@ millimeter (0 @.@ 300 in) ShKAS machine guns (nose turret)
Bombs : Up to 5 @,@ 000 kg (11 @,@ 000 lb)