

# Yakovlev Yak-42

Narrow-body Jet airliner / VIP transport



The **Yakovlev Yak-42** (Russian: **Яковлев Як-42**; NATO reporting name: **Clobber**) is a 100/120-seat three-engined mid-range passenger jet. It is the first airliner produced in the Soviet Union to be powered by modern high-bypass turbofan engines.

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Yak-42	
<b>Role</b>	Regional jet / VIP transport
<b>National origin</b>	Soviet Union
<b>Manufacturer</b>	Saratov Aviation Plant
<b>First flight</b>	March 7, 1975
<b>Introduction</b>	December 22, 1980
<b>Status</b>	In service
<b>Primary users</b>	Izhavia KrasAvia Turukhan Airlines
<b>Produced</b>	1979–2003
<b>Number built</b>	185

## Design and development

In 1972, the Yakovlev design bureau started work on a short- to medium-range airliner capable of carrying 100–120 passengers. It was intended to be a replacement for the Tupolev Tu-134 jet as well as the Ilyushin Il-18, Antonov An-24 and An-26 turboprop airliners. While the new airliner was required to operate out of relatively small airfields while

maintaining good economy, as many Soviet airports had been upgraded to accommodate more advanced aircraft, it did not have to have the same ability to operate from grass strips as Yakovlev's smaller Yak-40. The requirement resulted in the largest, heaviest and most powerful aircraft designed by Yakovlev, until the even larger MC-21 took flight in 2017.



Option Yak-42D 8 first class and 96 economy class (Izhavia)

Initial design proposals included a straight-wing airliner powered by two Soloviev D-30 turbofans and resembling an enlarged Yak-40, but this was rejected as it was considered uncompetitive compared to Western airliners powered by high bypass ratio turbofans. Yakovlev settled on a design powered by three of the new Lotarev D-36 three-shaft high-bypass turbofans, which were to provide 63.90 kN (14,330 lbf) of thrust. Unlike the Yak-40, the new airliner would have swept wings.



Side view of a Yak-42 (Izhavia)

The Yak-42 is a low-winged monoplane of all-metal construction, with a design lifespan of 30,000 one-hour flights. It has a pressurised fuselage of circular section, with the cabin designed to carry 120 passengers in six-abreast layout (or 100 passengers for local services with greater space allocated to carry-on luggage and coat stowage). The aircraft is flown by a flight crew of two pilots sitting side by side in a flight deck forward of the cabin. Access is via two airstairs, one in the underside of the rear fuselage, like that of the Yak-40, and one forward of the cabin on the port side. Two holds are located under the cabin, carrying baggage, cargo and mail.

All of the prototypes had main landing gear with two wheels each, with the first serial production aircraft, four main wheels were introduced. The wing layout underwent considerable revision during the design process, with the first prototype being built with a wing sweep of 11 degrees and the second prototype with a sweep of 23 degrees. After evaluation, the greater sweep of the second prototype was chosen for production. Early aircraft had a clean wing leading edge with no control surfaces, and plain trailing edge flaps. This changed in later aircraft, which were fitted with leading edge slats, with the trailing edge flaps slotted.

Two engines were mounted in pods on either side of the rear fuselage, with the third embedded inside the rear fuselage, fed with air via an "S-duct" air inlet. An auxiliary power unit (APU) is also fitted in the rear fuselage. No thrust reversers are fitted. The aircraft has a T-tail, with both the vertical fin and the horizontal surfaces swept.



Yak-42 seen from behind with rear airstair deployed

## Operational history

### Testing

The first of three prototypes, which was fitted with an 11-degree wing and registered SSSR-1974, made its maiden flight on 7 March 1975. It was followed by the second prototype, (SSSR-1975) with the 23-degree wing and a cabin with 20 rows of windows instead of 17 in the first prototype, and a third prototype (SSSR-1976) fitted with improved de-icing gear.

### In service

The first production aircraft was completed on 28 April 1978, with the first scheduled passenger flight, on the Aeroflot Moscow-Krasnodar route taking place on 22 December 1980. Production was at first slow, with only 10 flown by mid-1981. Initial aircraft were fitted for 120 seats in a three-plus-three arrangement. This was soon changed to a first class section with two-plus-two seating, and a main cabin with 96 seats, giving a total of 104 seats.

In its first year of operation, Aeroflot's Yak-42s carried about 200,000 passengers, mainly on routes from Moscow, but also on international services from Leningrad to Helsinki and from Donetsk to Prague, with the type being planned to enter wider service throughout the Aeroflot fleet.

An export order for seven aircraft was announced in 1982 by Aviogenex of Yugoslavia, but the contract lapsed. The availability of the longer-range Yak-42D variant from 1991 onwards gave rise to a few more export sales, to Cuba and China. As of 1 January 1995 a total of 185 Yak-42 had been produced, including 105 Yak-42Ds.



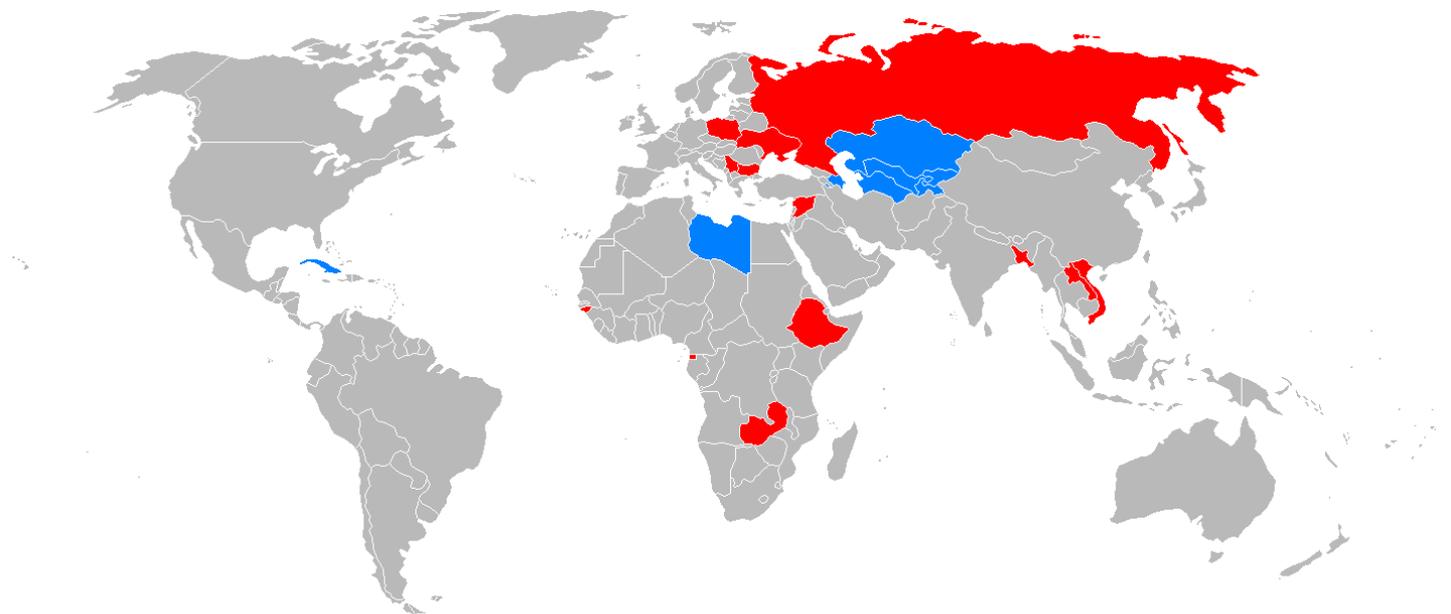
A Yak-42D cockpit

## Variants

- **Yak-42** – Original production version. Max. takeoff weight 54,000 kg (119,050 lb).
- **Yak-42ML** – Version with modified avionics for use on international use (mezhdunarodnyye linii – international services). Entered service in July 1981 on the Leningrad-Helsinki route.
- **Yak-42D** – Long-range version (Dahl'niy – long range) increased fuel. Replaced standard Yak-42 in production.
- **Yak-142** – Derivative of Yak-42D with updated, western AlliedSignal avionics, spoilers to allow faster descent and enlarged cabin door to accommodate jet bridge. Also designated Yak-42A, Yak-42-100 and Yak-42D-100.
- **Yak-42R** – Yak-42 used as testbed for radar for Yakovlev Yak-141 fighter.
- **Yak-42F** – Conversion of a Yak-42 for geophysical survey and environmental monitoring. Fitted with large underwing pods containing electro-optical sensors.
- **Yak-42LL** – Conversion as testbed for Progress D-236 propfan engine. Single D-236 (rated at 8,090 kW (10,850shp)) mounted in place of starboard engine, on special pylon to give sufficient clearance for 4.2 m (13 ft 9¼ in) propellers. First flew 15 March 1991.
- **Yak-42M** – A projected but unbuilt stretched airliner. Planned to be powered by three Progress D-436 turbofans, a stretched fuselage and new wings. Design developed into Yak-242.
- **Yak-242** – Further developed Yak-42M, with two underwing Aviadvigatel PS-90 turbofans. Design evolved into Irkut MC-21.



Grozny Avia Yak-42 disembarking passengers



Yak-42 operators (exclusively civil operators in blue)

## Operators

As of July 2018, 23 Yak-42s remained in commercial airline service. Operators are Izhavia (10), KrasAvia (9), Black Sea Airlines (2), Turuhan Aviacompany (2), Air Force of the People's Republic of China (2). The rest of the aircraft are operated by private companies or in storage.

## Specifications (Yak-42D)

### General characteristics

- **Crew:** 3 (two pilots plus optional flight engineer)
- **Capacity:** up to 120 passengers (but usually 8 first class and 96 economy class)
- **Length:** 36.38 m (119 ft 4 in)
- **Wingspan:** 34.88 m (114 ft 5 in)
- **Height:** 9.83 m (32 ft 3 in)
- **Wing area:** 150.0 m<sup>2</sup> (1,615 ft<sup>2</sup>)
- **Empty weight:** 33,000 kg (72,752 lb)
- **Max. takeoff weight:** 57,500 kg (126,765 lb)
- **Powerplant:** 3 × Lotarev D-36 turbofans, 63.75 kN (14,330 lbf) each

### Performance

- **Maximum speed:** 810 km/h (437 knots, 503 mph) (maximum cruise)
- **Cruise speed:** 740 km/h (399 knots, 460 mph) (economy cruise)
- **Range:** 4,000 km (2,158 nmi, 2,458 mi) (with maximum fuel)
- **Service ceiling:** 9,600 m (31,500 ft)

### See also

#### Related development

- Yakovlev Yak-40
- Yakovlev Yak-46
- Irkut MC-21

#### Aircraft of comparable role, configuration and era

- Boeing 737
- Airbus A318
- Hawker Siddeley Trident
- Sukhoi Superjet 100 (SSJ 100)
- Tupolev Tu-154
- Antonov An-158

#### Related lists

- List of jet airliners

## Yakovlev Yak-42 (Drawing)

