

= Tupolev Tu @-@ 142 =

The Tupolev Tu @-@ 142 (Russian : ??????? ?? @-@ 142 ; NATO reporting name : Bear F / J) is a maritime reconnaissance and anti @-@ submarine warfare (ASW) aircraft derived from the Tu @-@ 95 turboprop strategic bomber . A specialised communications variant designated Tu @-@ 142MR was tasked with long @-@ range communications duties with Soviet ballistic missile submarines . The Tu @-@ 142 was designed by the Tupolev design bureau , and manufactured by the Kuibyshev Aviation and Taganrog Machinery Plants from 1968 to 1994 . Formerly operated by the Soviet Navy and Ukrainian Air Force , the Tu @-@ 142 currently serves with the Russian and Indian Naval Air Arm .

Developed in response to the American Polaris programme , the Tu @-@ 142 grew out of the need for a viable Soviet ASW platform . It succeeded the stillborn Tu @-@ 95PLO project , Tupolev 's first attempt at modifying the Tu @-@ 95 for maritime use . The Tu @-@ 142 differed from the Tu @-@ 95 in having a stretched fuselage to accommodate specialised equipment for its ASW and surveillance roles , a reinforced undercarriage to support rough @-@ field capability , improved avionics and weapons , and enhancements to general performance . The Tu @-@ 142 's capability was incrementally improved while the type was in service , eventually resulting in the Tu @-@ 142MZ , the final long @-@ range Tu @-@ 142 with highly sophisticated combat avionics and a large payload . Tupolev also converted a number of Tu @-@ 142s as avionics (Tu @-@ 142MP) and engine (Tu @-@ 142LL) testbeds .

= = Design and development = =

= = = Early designs = = =

In the late 1950s the US Navy developed the UGM @-@ 27 Polaris , a submarine @-@ launched ballistic missile (SLBM) with a range of more of than 1 @,@ 800 kilometres (1 @,@ 000 nm) . The Navy test @-@ fired rocket boosters to perfect the design , culminating in the first underwater launch of a ballistic missile by USS George Washington on 20 July 1960 . Polaris became operational on 15 November that year , when the George Washington left Charleston , South Carolina , with a complement of nuclear @-@ armed Polaris missiles .

The Soviet government consequently ordered Tupolev and other aircraft design bureaus to study possible dedicated anti @-@ submarine warfare (ASW) designs . Tupolev initially designed the Tu @-@ 95PLO (protivolodochnaya oborona , or ASW) , a development of the Tu @-@ 95 equipped with sonobuoys , anti @-@ submarine mines and torpedoes . It was to carry a 9 @,@ 000 kg (19 @,@ 841 lb) payload with a maximum loiter time of 10 @.@ 5 hours . The design was dropped , however , because it lacked a powerful radar , thermal imaging (infrared) system and magnetic anomaly detector (MAD) . On 28 February 1963 , the Council of Ministers (the highest executive and administrative body of the Soviet Union) issued a directive to Tupolev requiring his bureau to develop a long @-@ range ASW aircraft .

The resultant design was named Tu @-@ 142 and had features in common with the Tu @-@ 95RT . The ventral and dorsal gun turrets were removed , as was the large dielectric radome housing the Uspeh radar system , which was replaced by a thermal imaging system located in a smaller fairing . This left the tail turret with twin 23 @-@ mm AM @-@ 23 cannons , along with electronic countermeasures , as the only defensive armament . The aircraft 's search @-@ and @-@ targeting system featured Berkut (Golden Eagle) 360 ° radar . A complex navigation system was integrated with the weapons targeting system . Structural differences included an airfoil change to the wing , expanding its area to 295 m2 (3 @,@ 172 ft2) . The area of the elevators was increased by 14 % , and improved hydraulic actuators were fitted . Metal fuel tanks replaced rubber bladders . To allow the Tu @-@ 142 to operate from semi @-@ prepared runways , the Tu @-@ 95 's four @-@ wheel main undercarriage bogies were replaced with six @-@ wheel units ; the main undercarriage fairings were also modified .

The first Tu @-@ 142 (construction number 4200) was built at the Kuibyshev Aviation Plant in Samara . It performed its first flight on 18 June 1968 , with test pilot I. K. Vedernikov at the controls , taking off from Zhukovsky Airfield southeast of Moscow . Early testing indicated that the fuselage needed to be lengthened by at least 1 @. @ 5 m (4 @. @ 9 ft) to accommodate new combat equipment . Therefore , the second prototype (c / n 4201) joined the flight @-@ test programme on 3 September with a 1 @. @ 7 @-@ metre (5 @. @ 6 ft) front fuselage stretch , a modification found on all subsequent Tu @-@ 142s . The third and final development Tu @-@ 142 entered flight test on 31 October , complete with the full equipment suite . In May 1970 , the Soviet Naval Aviation (AV @-@ MF) ? the air arm of the Soviet Navy ? began receiving production Tu @-@ 142s for operational trials .

= = = Improved variants = = =

During early operations , the Tu @-@ 142 revealed several shortcomings . The aircraft 's rough @-@ field capability was found to be of limited use , so the two six @-@ wheel bogies used on the first 12 of 36 aircraft were replaced with four @-@ wheel reinforced bogies from the Tu @-@ 114 airliner ; consequently , the wheel @-@ wells in the engine nacelle were made slimmer . These changes , along with the deletion of the thermal imaging system and parts of the electronic countermeasure (ECM) equipment , reduced the empty weight by 4 @, @ 000 kg (8 @, @ 818 lb) . The modified aircraft also introduced a crew rest area for long @-@ duration missions , and was assigned the codename (" Bear F " Mod 1) ; from 1968 to 1972 the Kuibyshev Plant produced a total of 18 Tu @-@ 142s .

In the early 1970s , production of Tu @-@ 142s was switched to the Taganrog Machinery Plant near the Black Sea . It has been speculated that the change to the idle plant was to give employment to the workers there . The move required many improvements to the plant and the surrounding area , including the establishment of new assembly shops , the installation of new machinery and tooling , the re @-@ training of the workforce , and the building of a new airfield . Preparation took place until 1975 , when production of the first Tu @-@ 142 began . The Tu @-@ 142s built by Taganrog incorporated the changes found on the last of the Kuibyshev aircraft . Differences included a 30 @-@ centimetre (12 in) stretch to the front fuselage and a redesigned cockpit . Additional changes included new two @-@ axle main undercarriage bogies . This version was given the factory designation Tu @-@ 142M , which was not adopted by the Soviet Navy ; NATO codenamed it " Bear @-@ F " Mod 2 .

As the 1970s progressed , silencing technology in submarines rendered acoustic @-@ band sonobuoys and trigger devices ineffective . During 1961 and 1962 , the Soviet Union conducted research and development into an explosive sound system (ESS) ? used to locate deep @-@ diving submarines ? under the name Udar (Blow) . In 1965 , work had started on sonobuoy systems using ESS to be integrated with the Berkut radar . The programme was postponed when one of the aircraft intended to carry it , the Ilyushin Il @-@ 38 , was found to be incompatible . The developments instead resulted in the Udar @-@ 75 , which was featured in a new search and targeting system (STS) of the Taganrog @-@ built Tu @-@ 142Ms .

A new target acquisition system dubbed Korshun @-@ K , the cornerstone of which was the Korshun (Kite) radar , was installed on all subsequent Tu @-@ 142s . This system was used for detecting surfaced and submerged submarines , communicating with other ASW aircraft and ground bases , and performing navigational and tactical tasks . The first three Tu @-@ 142Ms were the first aircraft to be equipped with this system , and thus were redesignated Tu @-@ 142MK (" Bear F " Mod . 3) . It was the first Tu @-@ 142 to feature a MAD , its MMS @-@ 106 Ladoga system being mounted in an aft @-@ facing fairing atop the vertical stabiliser . The first of three Tu @-@ 142MKs that underwent Stage A of the trials programme made its first flight on 4 November 1975 ; despite the dismal performance figures , a production go @-@ ahead was given . Stage B , conducted during April ? October 1978 , found that the aircraft 's avionics were extremely unreliable ; like Stage A , these problems were apparently ignored when a directive issued on 19 November 1980 cleared the Tu @-@ 142MK for operational service .

= = = Technological upgrades = = =

Even as the Tu @-@ 142MK entered service , its Korshun @-@ K STS was already becoming obsolete . Work began on yet another improved Tu @-@ 142 , resulting in the Tu @-@ 142MZ (" Bear F " Mod . 4) with the Korshun @-@ KN @-@ N STS . This consisted of Nashatyr @-@ Nefrit (Ammonia / Jade) ASW avionics , which included the Zarechye sonar system . As well as the RGB @-@ 1A and RGB @-@ 2 buoys of the Berkut , the Tu @-@ 142MZ was compatible with the RGB @-@ 16 and RGB @-@ 26 buoys . When working with the ASW avionics , these buoys provided 50 % greater coverage . The Kuznetsov NK @-@ 12MV were replaced by the more @-@ powerful NK @-@ 12MP engines , and for the first time , the Tu @-@ 142 had an independent engine @-@ starting capability with the addition of the TA @-@ 12 auxiliary power unit . This variant was distinguished from earlier " Bear Fs " by the chin fairings housing several antennas .

The flight test programme started in 1985 with the maiden flight of a converted Tu @-@ 142M fitted with the advanced avionics ; state acceptance trials began within two years . Test results proved excellent , as the aircraft successfully tracked nuclear @-@ powered submarines of the Northern and Pacific Fleets . The aircraft became operational with Russian Naval Aviation (AV @-@ MP) in 1993 . The last Tu @-@ 142MZ rolled off the Taganrog production line the following year , bringing an end to a 26 @-@ year production run during which 100 Tu @-@ 142s were produced .

A communications variant designated Tu @-@ 142MR (" Bear J ") was the last production version of the Tu @-@ 142 . It was tasked with long @-@ range communications duties with Soviet ballistic missile submarines , a role similar to that of the Boeing E @-@ 6 Mercury . The Tu @-@ 142MR differed from the ASW Tu @-@ 142s in having less @-@ sophisticated avionics , but had a long trailing wire radio aerial to relay messages to submerged Soviet submarines in times of nuclear war . This was amongst the many distinctive features of the Tu @-@ 142MR that allows it to communicate with satellites , airborne and ground @-@ based command posts , and submarines . The aircraft replaced the Ilyushin Il @-@ 80 in the airborne command and control role . Tu @-@ 142s are currently operated by the 76th Naval Aviation Regiment from Kipelovo . Other developments of the Tu @-@ 142 include the one @-@ off Tu @-@ 142MRT maritime reconnaissance variant , and the unbuilt Tu @-@ 142MS missile @-@ carrying variant .

= = Operational history = =

To prepare for Tu @-@ 142 operations , on 22 June 1960 the Soviet Navy began selecting personnel for conversion training . The first group began its three @-@ month training period on 4 March 1970 at the seaside town of Nikolayev (since renamed Mykolaiv) . Meanwhile , the first Tu @-@ 142s were delivered to the Northern Fleet at Kipelovo AB , where they were initially tasked with tracking and monitoring nuclear @-@ powered submarines as part of the type 's operational trials . Throughout the test programme , effort focused on the verification of the ASW avionics , notably the Berkut @-@ 95 radar , as the airframe itself was not a major concern . The Tu @-@ 142 reached initial operational capability in December 1972 after a successful flight @-@ test programme . Prior to that , in December 1971 , the second group selected for Tu @-@ 142 operations started its own conversion training . Deliveries of the aircraft at first proceeded slowly ; as more Tu @-@ 142s were produced , the type was allocated to the Pacific Fleet .

Throughout its operational history , the Tu @-@ 142 demonstrated significant capabilities . On 19 ? 22 August 1974 , four Tu @-@ 142s shadowed a foreign submarine in the Barents Sea ; one of the aircraft was reported to have maintained continuous contact for 2 hours and 55 minutes . In 1975 , a Tu @-@ 142 managed to trail a Soviet submarine for 3 hours and 16 minutes . On 10 October 1977 , a group of five Tu @-@ 142s tracked a US submarine in the Philippine Sea ; one of the Tu @-@ 142s reportedly trailed the submarine for 4 hours and 5 minutes . Soviet Tu @-@ 142s , besides operating domestically , were sent to friendly overseas bases in Angola , Cuba , Ethiopia , Vietnam , and Yemen . In the early 1990s , with the dissolution of the Soviet Union , the Soviet fleet of Tu @-@ 142s was handed to the Russian Navy , although the Ukrainian Air Force gained a few Tu

@-@ 142s that had been left in its territory . Ukrainian Tu @-@ 142s were later dismantled as a result of the bilateral START I treaty signed between the United States and the Soviet Union in 1991 , which came into effect in late 1994 .

Besides the Tu @-@ 142 's military applications , a one @-@ off Tu @-@ 142MP was used to test a new ASW suite . Another Tu @-@ 142 was converted to replace the Tu @-@ 95LL for the testing of turbojet engines . Designated Tu @-@ 142LL , the ASW equipment and armament were removed to allow an engine test bed to be carried under the belly . Some of the engines installed were the NK @-@ 25 for the Tu @-@ 22MZ , RD36 @-@ 51A for the Tu @-@ 144D , and the NK @-@ 32 for the Tu @-@ 160 . The first Tu @-@ 142MK was converted for an airborne laboratory role , setting several altitude @-@ in @-@ horizontal and time @-@ to @-@ altitude records in its class .

In 1981 the Indian Navy began considering a long @-@ range maritime reconnaissance and anti @-@ submarine warfare aircraft for its Naval Air Arm . The Soviet Union initially offered to refurbish some of its own Tu @-@ 142s for India , rather than construct new aircraft . The Indian Navy was at first hesitant about the large Tu @-@ 142 , which was heavy and thus would require runways to be reinforced and lengthened at potential operating bases . Consequently , the service requested three Ilyushin Il @-@ 38s ? then being phased out of service with the Soviet Navy ? be refurbished for Indian operations . This request fell through , and so in December 1984 an agreement to purchase eight Tu @-@ 142s was signed .

For the twelve @-@ month period starting from May 1987 , the Indian Navy sent 40 pilots and observers , 16 technical officers and 128 sailors to Riga for training . On 30 March 1988 , the first three Tu @-@ 142s arrived at the Indian naval air station of INS Hansa , Goa , after a flight from Simferopol (Gvardeyskoye Air Base) in the Crimean peninsula . On 13 April two more aircraft arrived , prior to the commissioning of INAS 312 , the operator of Indian Tu @-@ 142s ; by the end of October the fleet of eight Tu @-@ 142s was delivered . In May 1992 , the squadron was relocated to its current operating base at INS Rajali on the Indian east coast . The Tu @-@ 142s are expected to be replaced by twelve smaller Boeing P @-@ 8ls .

= = Variants = =

Tu @-@ 142

A lengthened Tu @-@ 95 with much defensive armament removed , and instead incorporating ASW systems . Twelve aircraft initially had six @-@ wheel main undercarriage bogies . Six later aircraft had four @-@ wheel bogies . Built by Kuibyshev Aviation Plant .

Tu @-@ 142M

A 30 @-@ centimetre (12 in) stretch to front fuselage , redesigned cockpit and two @-@ axle main undercarriage bogies . Built by Taganrog .

Tu @-@ 142MK

Greatly improved variant with new Korshun radar , avionics and ASW equipment . 43 Tu @-@ 142MKs were constructed by Taganrog .

Tu @-@ 142MK @-@ E

Eight downgraded Tu @-@ 142MKs purchased by the Indian Naval Air Arm . E stands for " export " .

Tu @-@ 142MZ

The last production variant of the " Bear F " , with new NK @-@ 12MP engines and a new avionics suite . Can be distinguished from other Tu @-@ 142s by its chin fairings . Built by Taganrog .

Tu @-@ 142MZ @-@ K

Proposed commercial cargo variant of the Tu @-@ 142MZ (the K standing for " kommercheskiy ") , with ASW avionics removed . Also designated Tu @-@ 142MZ @-@ C.

Tu @-@ 142MP

Modified single Tu @-@ 142M used as avionics testbed .

Tu @-@ 142MR

Modified Tu @-@ 142MKs built as submarine communications relay aircraft . Has distinctive external fairings and components . NATO codename " Bear J " .

Tu @-@ 142LL

Two converted earlier Tu @-@ 142s used for testing of turbofan engines . ASW equipment was removed .

= = Operators = =

India

The Indian Naval Air Arm had 8 Tu @-@ 142MKEs in service as of December 2010 , based at INS Rajali , Arakkonam , Tamil Nadu .

Russia

The Russian Naval Aviation had 15 Tu @-@ 142s in service as of December 2010 .

Former

Soviet Union

The Soviet Naval Aviation 's Tu @-@ 142s were distributed between the Russian Naval Aviation and Ukrainian Air Force following the collapse of the Soviet Union .

Ukraine

The Ukrainian Air Force inherited an unknown number of Tu @-@ 142s following the collapse of the Soviet Union . These were dismantled in accordance with the START I agreement .

= = Notable accidents = =

On 7 November 2009 , eleven crew were killed when their Tu @-@ 142 crashed over the Strait of Tartary near Japan during a training flight . Flights of aircraft belonging to the Pacific Fleet were suspended pending an investigation into the crash . There was no indication that the crew made use of emergency equipment , although a lifeboat on board the plane was fitted with a device that transmits a signal in the event of an accident . Chief of the General Staff Nikolay Makarov believed an engine failure could have caused the crash . A memorial service was held for the crew on 16 December 2009 . A search for the bodies of the eleven crew members was suspended several times due to ice floes and bad weather .

= = Specifications (Tu @-@ 142MZ) = =

Data from Donald and Lake

General characteristics

Crew : 11 ? 13

Length : 53 @. @ 08 m (162 ft 5 in)

Wingspan : 50 @. @ 00 m (167 ft 8 in)

Height : 12 @. @ 12 m (39 ft 9 in)

Wing area : 311 @. @ 10 m ² (3 @, @ 348 @. @ 76 ft ²)

Empty weight : 90 @, @ 000 kg (198 @, @ 000 lb)

Max. takeoff weight : 185 @, @ 000 kg (407 @, @ 848 lb)

Powerplant : 4 x Kuznetsov NK @-@ 12MP turboprops , 11 @, @ 033 kW (14 @, @ 795 shp)
each

Performance

Maximum speed : 925 km / h (500 kt , 575 mph)

Cruise speed : 711 km / h (384 kt , 442 mph)

Combat radius : 6 @, @ 500 km (3 @, @ 454 nmi , 3 @, @ 977 mi)

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