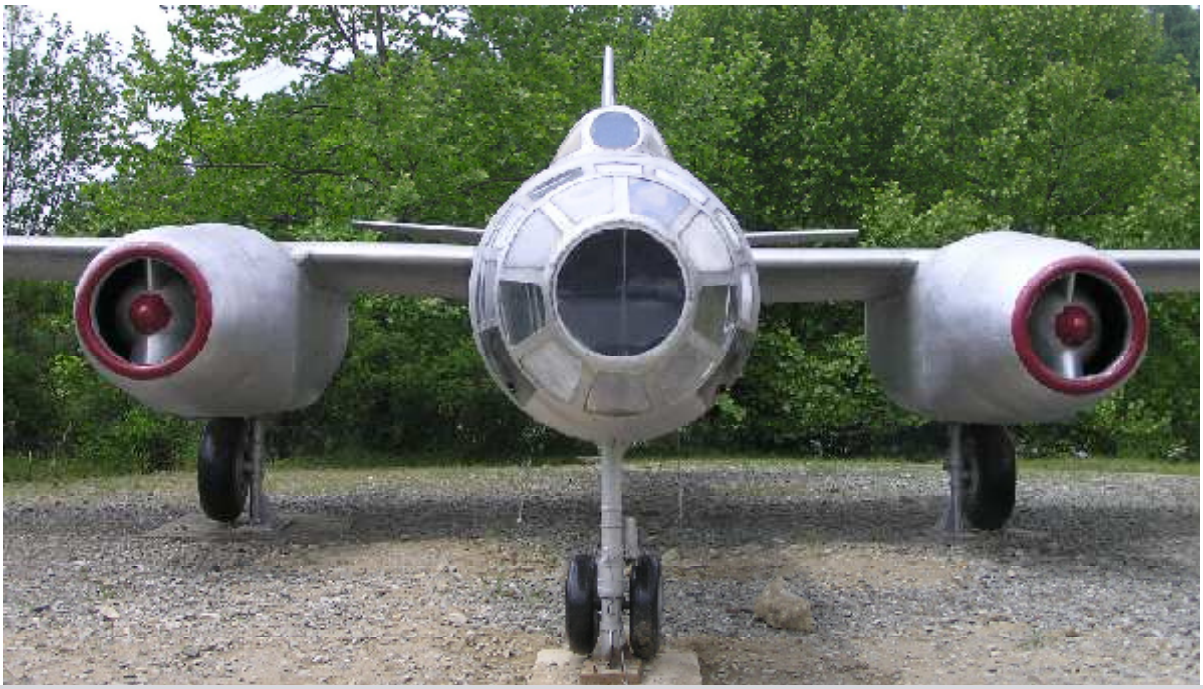
Ilyushin IL-28P



The Aircraft

History

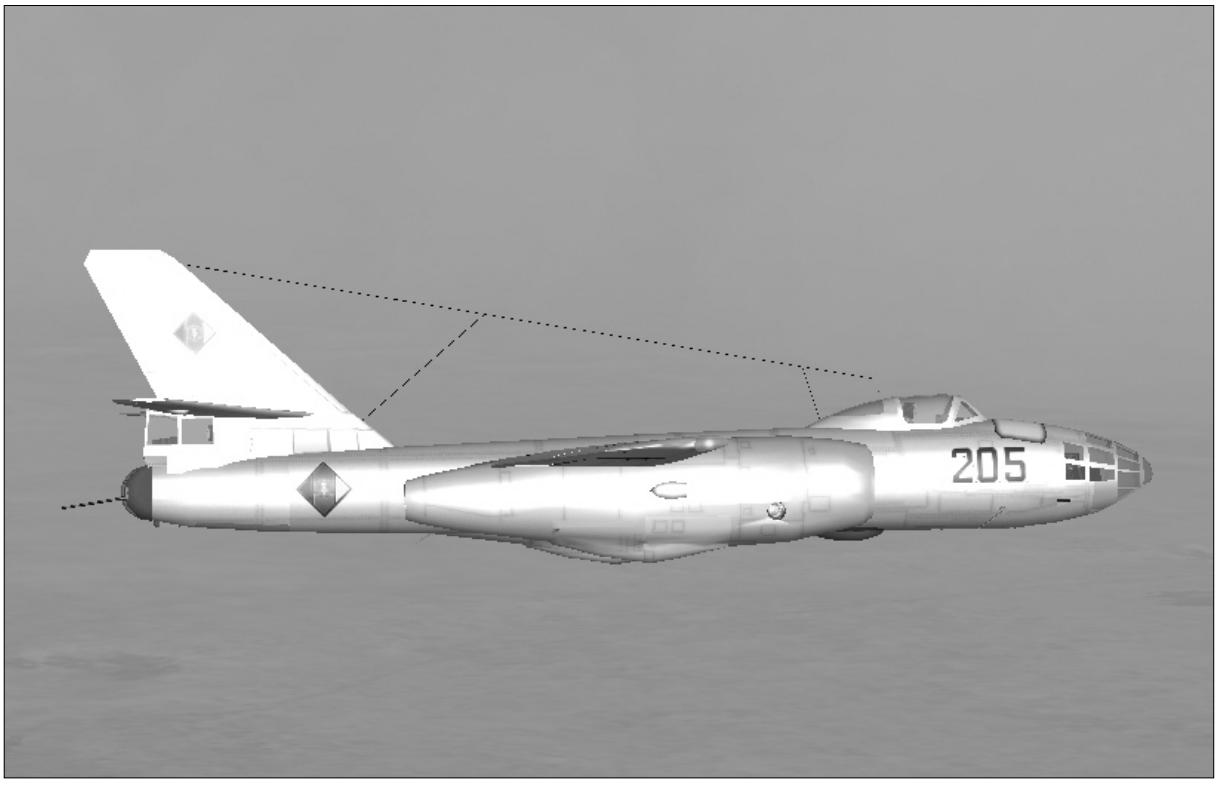
The Il-28 was the first jet bomber of the Soviet Air Force. It was developed in the end

of the 40ies. After WW II the Soviets (also the Americans, British and French) got access to research results, development results and also to the engineering stuff of the german aeronautical industry. Some german jets, like the Messerschmitt M-262 and the Arado Ar-234 were tested and some german engineers and technicians, like Brunolf Baade, worked in the Soviet Union for a while. The Soviets thought about the production of german jets, but in the end they decided to make their own constructions. The IL-28 was one of these. It got the NATO codename “Beagle”. The influence of german engineering is still visible looking at the mounting of the engines. There were some prototypes built, also a sweptwing aircraft. The Soviets didn’t have so much experience in high speed flying and especially in flying near the sonic barrier. So finally the unswept wing type was chosen by the constructors because they didn’t expect many problems with the moving of the aerodynamic center on higher speed using a unswept wing.

The IL-28 is a high-wing aircraft. The wing has a unswept leading edge and a negative swept trailing edge with landing flaps. The engines mounted in big nacelles on the wing. These nacelles are also used to storage the retracted main gear. The tail fins are swept.

German engines were also tested, but the results weren’t good enough. The construction was complicated and the life cycle was to short. In this time 4 Rolls Royce “Nene” were bought by the soviet administration from the british government. (Shortly after the war the relationships weren’t so bad, and the British did a lot of things for money.) The parameters of this engine were so much better, and so the Soviets decided to design a own jet engine on base of the “Nene”. In truth, the differences weren’t so big – it seems like the soviets changed only the name. The Rolls Royce Nene became the RD-45. Of course this wasn’t the one and only

difference. The British used (and they are still using) their own units of measurement (inch and feet), the Soviets the metric system. They had to reverse construct the british engine using the metric system and the soviet standards. After this the Soviets increased the thrust. The measures of the engine stayed the same, but the thrust was 45% higher. This engine got the name Klimov WK-1. In the end the Russians got a good and reliable jet engine, used also in the famous fighter Mikoyan-Gurevich MiG-15.
The performance of the IL-28 wasn't bad for this time. It was designed to transport 3000 kg of bombs (6600 lbs) over a distance of 1000 kilometers with a cruising speed of 770 kilometers per hour on an altitude of 8000-10000 meters. Anti aircraft units were armed with guns only and anti aircraft missiles were still under development in this time. So it wasn't necessary to increase the speed and the flight altitude of this aircraft. The cruising range was enough for tactical purposes. The limitation of weight made it possible to use airfields with shorter runways and so this way the infrastructure costs were also limited. The development of navigation systems and bombing equipment wasn't on a high level in this time and so the precision of bombing attacks was low. That's why the tactical concept was massive bombing – like in WW II - using a mass of bombers and bombs. The IL-28 was made for this. The aircraft was armed with two Nudelmann-Richter guns NR-23 in the front section and 2 others in a tail turret for self defense. The tail turret remembers the WW II aircraft. Such a turret wasn't used on western bombers on this time, but it was useful. The soviets didn't have the illusion that a jet bomber will fly to fast and to high for fighter aircraft. They also didn't think that a bomber will win a dogfight with a fighter and that's why a strong armament was built in. The experience in Korea, the Middle East and also in Vietnam verified this point of view.
There isn't a lot of information about the instrumentation equipment. Different



antennas are shown on photos and so it's sure that an Automatic Direction Finder (ADF) was used. The RSBN navigation system (Radioteknichiskaya systema blishnoy navigacii – Short Range Navigation System – it's like the western TACAN but with a higher precision) was also used. Such navigation systems like VOR and

ILS were only partly used in the Warsaw Pact Countries and so there was no need to install such systems. Later the onboard RSBN equipment could also be used for navigation with VOR / ILS systems. There was no need for a long distance navigation system because the cruising range was limited. A short wave radio was used as primary communication system and maybe also UHF / VHF radios for tactical use. Of course a interphone system was used, the crew members couldn't change their places during the flight.
In later series also a ground radar was installed to improve the navigation and made it possible to find the target also in bad weather conditions and at night.
The aircraft was equipped with to engines Klimov WK-1. This engine was an radial shaft jet engine and had a thrust of 26.5 kN. The tanks were located inside the fuselage in the upper part behind the canopy. There were 5 tanks with different volumes. The bomb compartment was situated in the lower part of the fuse. There were different bomb racks in use. It was possible to carriage bombs of 3000 kg, 1000 kg 500 kg 250kg and 100 kg weight, also mines and torpedos.
The IL-28 was flown by an crew of 3 members: the pilot, the navigator sitting in the nose and a gunner in the tail. The gunner was also the radio operator. Both pilot and navigator were sitting on ejection seats but in an emergency case the gunner had to leave the aircraft by a ground hatch.

IL-28R
There where any special variants built. The IL-28R ("R" for reconnaissance) was equipped with tip tanks and bigger wheels. There was also a special hydraulic mechanism to rotate the wheels on the main gear before landing to make the touch down more softly and reduce the tires' slitage. Different cameras were built in instead the bombing equipment and the guns in the front section were removed.
Some IL-28R were used by the soviet air force as target tug. In this case a pylon was mounted under the left wing carrying the target.
The German Air Force of the GDR used a completely different system for air targeting. They also used a towed target, but this target was a ballonet. It could by used only for training anti aircraft artillery The ballonet and the mechanism were installed in the bomb compartment. Approaching the aaa site, the pilot has to reduce the speed to 300 kph, set the flaps to position 1 and open the bomb compartment. The ballonet was moved out and filled with air. It has a length of 6 meters and a diameter of 1 meter. The ballonet now was drew by an cable wired on a drum. The pilot increased the length of the cable to get the target in a distance of 1000 meter behind his aircraft. The artillery has to fire on the ballonet now, not on the aircraft. After shooting the ballonet and the cable were dropped down.

Abbildung 1 The second protoype 152 V II (model by R. Mehlin)

Two aircraft were bought by the civil aeronautical industry of the GDR (VEB Flugzeugwerk Dresden – Dresden Aircraft Factory) and used as testbed. In the mid of the 50ies the first german jet airliner B-152 was constructed and built in Dresden. This aircraft should be equipped with new jet engines Pirna-014 constructed by the VEB Stroemungsmaschinenwerke Pirna. There was a need to test this new engine also on the flight. The soviet bomber Tupolev Tu-4 (it was a non-legal copy of the Boeing B-29) should be used for this, but the production of this type was finished and the technical support couldn't be warranted by the Soviets. So an IL-28R was chosen. In the first the engine Pirna-014 should built in replacing one of the engines of the aircraft but it was to difficult to construct a new mounting for the Pirna-014. The performance of the IL-28R flying with only one engine was also unknown and that's why it was decided to place the Pirna-014 under the fuse. This way the IL-28R became the second flying 3-engine jet "bomber". The other IL-28R was used for testing different systems and also for photo shooting. Of course these aircraft were disarmed. The 3rd tank and the radar system were also removed. In 1961 the aeronautical program was stopped and both aircraft were given to the German Air Force (GDR).

IL-28T

A limited quantity of IL-28T ("T" for Torpedo) was especially built for the Soviet Navy. The bomb section on these aircraft was longer to make it possible to carriage the standard torpedo of the Soviet Navy.

IL-28U

The IL-28U ("U" for utchebnoy – training) was a special training aircraft. In concordance with the NATO standards it got the codename "Mascot". The construction of the nose was different. The nose was "closed" and a special compartment for the flight instructor was built in.

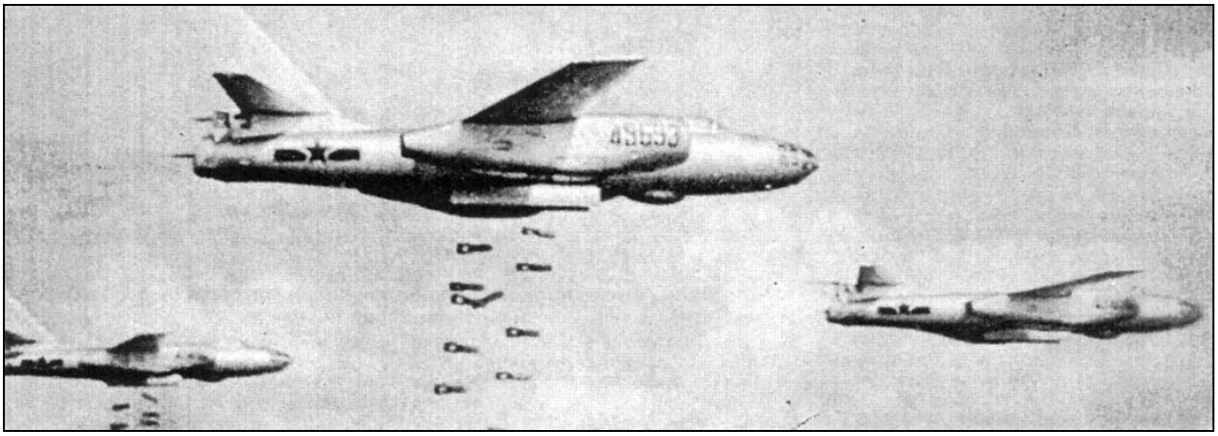
Ilyushin IL-28P

The Ilyushin IL-28P („P" for „potschta"=mail, also known as IL-20) was the civil variant of the light bomber IL-28. This aircraft was primary used as a training aircraft for the pilot stuff of the soviet airline "Aeroflot". "Aeroflot" started using the first soviet jet airliner Tupolev Tu-104 in the 50ies. "Aeroflot" was after the British Overseas Airlines Cooperation (BOAC) the second company using jet airliners in regular

service. The pilot stuff didn't have any experience with higher and faster flying jets at this time and so the use of a special training aircraft became necessary. The development of navigation equipment of the airliners and also on ground infrastructure wasn't on a level high enough for those new aircraft types, that's why there was a need to develop new processes and new equipment. An other problem was the understanding about the weather on higher flight levels that's why there was also a need for special research and training flights.
An other purpose was the transport of mail. The most soviet newspapers were printed and published in Moscow, the capitol of the Soviet Union. In this time it wasn't possible to transport information on a electronic way over long distances. To publish these information in other parts of the Soviet Union they made the master mats for printing in Moscow and transported them by aircraft to other places. The IL-28P was used for transporting on the route Moscow –Sverdlovsk (now Yekaterinenburg) – Novosibirsk.
Different information about the aircraft was published by different sources. It seems like a quantity of 4 IL-28P was produced in the 50ies. A unknown quantity of aircraft were disarmed and used as IL-28P after withdraw the IL-28 from service of the Soviet Air Force in the end of the 60ies.
There aren't so many information published about the IL-28P, but it seems like there are not such big differences between the IL-28 and the civil variation. Of course the weapons are missing and also the radar equipment was disarmed.

Other variants
An attack aircraft IL-28Schtsch ("Schtsch" for Schturmovik – attacker) was also constructed but not built. This aircraft had the possibility to carriage bombs and unguided rockets under the wing.
Also constructed was an aircraft with a bigger radar system. This radar was placed in the nose and was able to detect also flying aircraft.
An new variant with a swept wing was tested, also a variant with 4 engines. Both variants were not taken into serial production. In the mid of the 50ies it became more and more clear that guided missiles will be the most powerful armament for anti aircraft attacks both on ground also in the air. The IL-28 couldn't carriage such missiles and wasn't mobile enough to outmaneuver such missiles. The American experience in Viet Nam also shows that fighters like the F-4 Phantom II or special attack aircraft like the A-4 Skyhawk are more fit for tactical ground attacks. That's why there wasn't a need for further development.

Harbin H-5

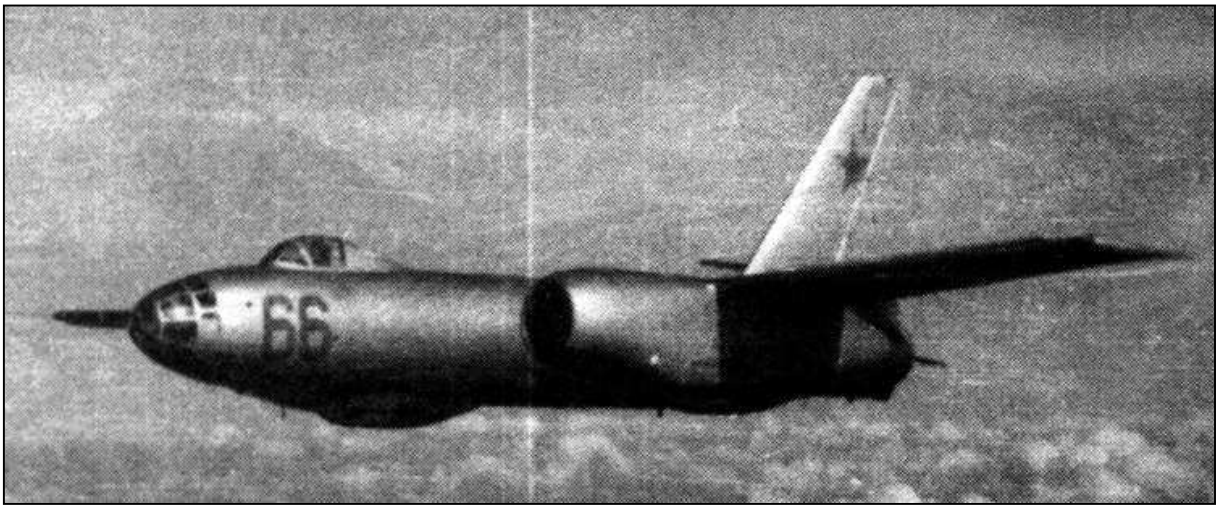


The IL-28 was also used by the Chinese Air Force. The Chinese would built the aircraft and made an agreement, but the documentation given by the Soviets was not

complete. In the end of the 50ies the relationships between China and the Soviet Union became badly and the Chinese didn't get new documentation or any support. So the Chinese had to disassembly an aircraft to learn the construction. One IL-28 was given by the Soviets to Albania, who was a member of the Warsaw Pact on this time. The Chinese got this aircraft from the Albanians in 1971 – it was on a newer level of construction and that's why useful for the chinese project – and returned a quantity of chinese built IL-28.
During production the Chinese made some modifications. The used the hydraulic system and some other components of the Harbin H-6, a copy of the Tupolev Tu-16. Some photos shows different antennas, but the purpose of these aircraft was not published.
In the end the chinese project was successful and the IL-28 was built in China. It got the name "Harbin H-5" and became the standard bomber of the air force of the Chinese People's Liberation Army for the next 25 years. Some chinese built IL-28 were given to North Korea, Romania and Viet Nam.

Avia B-228
The Ilyushin was also built in the Czechoslovakian Socialist Republic under the name Avia B-228.

Deployment



Soviet Air Force
The IL-28 was not only the first soviet jet bomber, it was also one of the most successful types at this time. A quantity of more then 3000 aircraft were built and used in the Soviet Union. The aircrafts were withdrawn from service in the 70ies. The Soviet Air Force operated IL-28, IL-28R and IL-28. The Il-28R was also used as an

target tuck. Some IL-28 were used in the 1950ies as an carrier for nuclear bombs. Soviet IL-28 take part in the fight against Hungarian insurgents in 1956 and also during the soviet invasion in the Czechoslovak Socialist Republic in 1968. These aircraft were wearing the “invasion stripes”.
The IL-28T was also used by the Soviet Navy as an Torpedo Bomber.
Some aircraft were also used by different Air Forces. The Il-28 was operated by all members of the Warsaw Pact (excluding Bulgaria) and also in Iraq, Morocco, Algeria, Cuba, Indonesia, Viet Nam, Nigeria, Finland and Afghanistan. Chinese built Harbin H-5 were operated by the Air Force of China, North Korea, Romania and Albania.

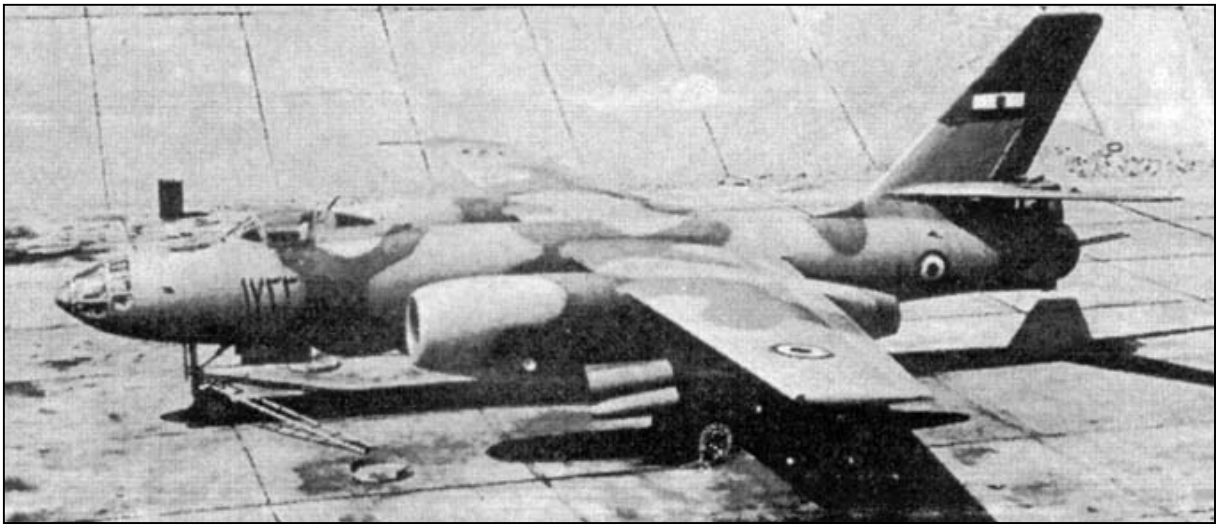
German Air Force
The Air Force of the German Democratic Republic (GDR) used some IL-28 (both IL-28 and IL-28P) as an target tug and also one IL-28U for training. Some new aircraft were bought in the Soviet Union. A limited quantity the German Air Force got from the Group of the Soviet Forces in Germany (GSFG) and two from the aeronautical industry after stopping the civil aeronautical program. The first crews were also trained by Soviet Forces in Germany. The procurement of the IL-28U was curiously. It was recommended by the flying stuff to order a training aircraft, but the headquarter decided to buy an other IL-28R. The officers made a “mistake”, and the “R” became an “U”.

One of the IL-28 was lost by an accident. The airplane stalled flying a turn to to final approach. The aircraft crashed down and burned out. The ammunition of the guns exploded. After this incident all german aircraft were disarmed.

Viet Nam
The IL-28 was used in different conflicts. The serial production of this type started to late to use it during the Korean war, but it was used in Viet Nam by the North Viet Nam Army. The Americans had the air supremacy since 1964 until the end of the war and so the Ilyushin didn’t have any critical influence.

Hungary
In 1956 the Ilyushin was used in Hungary by the hungarian insurgents and also by the Soviet Air Force. The Hungarian Air Force was one of the biggest air forces inside the Warsaw Pact and equipped with new aircraft types. During the insurgency the Hungarian Air Force tried to bomb soviet troops, but they weren’t successful – they couldn’t find the target in their own small country. The soviets answered with an attack on the Dunabe bridges in Hungary’s capitol Budapest.

Middle East



In the same year the Egyptian Air Force used the Ilyushin during the Suez Crisis. The use of some Algerian Ilyushin is also reported. Egypt also operated this aircraft during the military campaign in Yemen in the 60ies and in 1967 during the Six-Days-War and again 1973. In 1967 and 1973 the IL-28 became a primary target for the Israel Air Force. Most of the Ilyushins were destroyed in the first hours of the war.

Cuba
Some IL-28 were also given to the air force of the Revolutionary Forces of Cuba. In results of the “Cuba Crisis” these aircraft were withdrawn from Cuba still in 1962.

Indonesia
One of the biggest operators was Indonesia. The Soviet Union supported the administration of president Sukarno in the 50/60ies. The main goal of the indonesian foreign policy in this time was the liberation of all islands of the indonesian archipelago, including the territories still occupied by the Netherlands. That’s why a powerful air force was built up and equipped not only with modern soviet jet fighters, also equipped with medium range bombers Tupolev Tu-16 (Indonesia was the first country outside the USSR using this aircraft) and front bombers IL-28. The Indonesian air force used both types in military campaigns, but in the end of the 60ies the administration of Sukarno was finished by force and in a very short time the Indonesian Air Force lost the capability to operate modern jet aircrafts.

Nigeria
Any Ilyushin were also used in Nigeria during the 60ies. The Nigerian government got them from Egypt and also from the Soviet Union.

Afghanistan
In the 70ies the IL-28 was used by the Afghan Air Force in some campaigns against Islamic terrorists. In 1979 Soviet Forces moved into Afghanistan to protect the afghan government. The IL-28 was withdrawn from service in the Soviet Air Force, but still in use by the Afghan Air Force. By the meaning of the Afghan Air Force the IL-28 was the most useful aircraft for tactical purposes in Afghanistan because the terrain in the afghan mountains was to difficult – modern aircraft were to fast to find their targets. The afghan government wished to get more IL-28 from the Soviets, but the production was cancelled and the aircraft withdrawn not only from service but also from the storage units.

NATO
NATO officers were afraid about the capabilities of this brand new aircraft and so the wished to get one Ilyushin in their own hand to verify the performance. But the Soviets didn't want to sell this aircraft to everybody and so the Americans advised a quantity of more then 100 kg of gold for the crew who will fly this aircraft to the Americans. In the end such people were found, a chinese crew flow their Ilyushin to Taiwan in 1965. It was the first full operational IL-28 in the west. The pilot got 70kg of gold, the navigator 35kg. The circumstances of this action were dubiously. The navigator attempted a suicide arriving in Taiwan and the gunner was found dead and so his part of gold – 35kg - was divided between the pilot and the navigator.

Still in use
The IL-28 is still in use in North Korea. The Romanian Air Force was the last european operator and used the IL-28 until 2001.

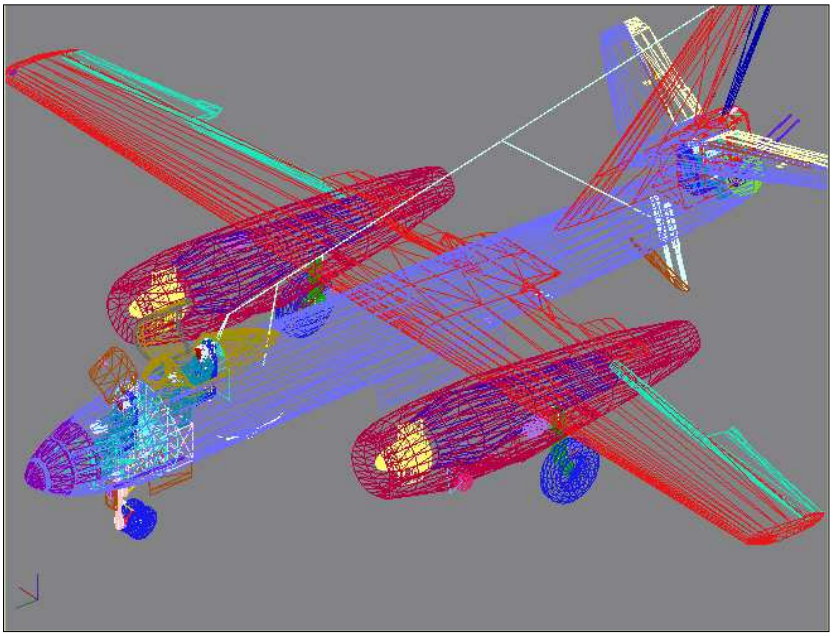
Aircraft in Museum
Some aircraft are shown in different European museums. An IL-28 of the National People's Army of the GDR is shown in the German Air Force museum in Gatow, but it is in a very bad condition. The condition of the polish aircraft is also bad of course, the best jets you will find in Hungary and the states of the former Soviet Union.

Technical Data

spec	metric	english
wingspan	21.45 meters	70 feet 4 inches
wing area	60.8 sq_meters	654 sq_feet
length	17.65 meters	57 feet 11 inches
height	6.7 meters	22 feet
empty weight	12,890 kilograms	28,420 pounds
max loaded weight	21,000 kilograms	46,300 pounds
maximum speed	900 KPH	560 MPH / 487 KT
service ceiling	12,300 meters	40,350 feet
range	2,400 kilometers	1,490 MI / 1,300 NMI

The Model

3D-Model



This aircraft model was developed for and tested in Microsoft Flight Simulator 9. Maybe it will work also in MSFS X, but there will be any problems with glass surfaces (the texture for this surfaces is still missing) and the air file. I don't use the MSFS X and that's why I will not support any further development for this simulator.
The 3D-model was made using gmax by discreet. There are

- animated rudders
- animated flaps
- animated trimtabs
- animated gear
- animated landing light
- animated hatches of the bombing section

- animated canopy and hatches for the navigator and the gunner
- animated crew.

This package includes 3 different models:

- IL-20 (IL-28P) without armament and radar
- IL-28
- Harbin H-5
- Harbin H-5 mat (camouflage)

Configuration Files

The flying performance of this aircraft is nearby reality. Nearby means nearby and not exactly. In fact the speeds, also the vertical speed, are higher and the cruising range is also to high.
The aircraft.cfg and the air-file will also work using the model as an ai-aircraft. But there are a lot of polygons (more than 26,000 vertex) and different texture files so that's why it's not recommended using this model for ai-traffic.

Cockpit

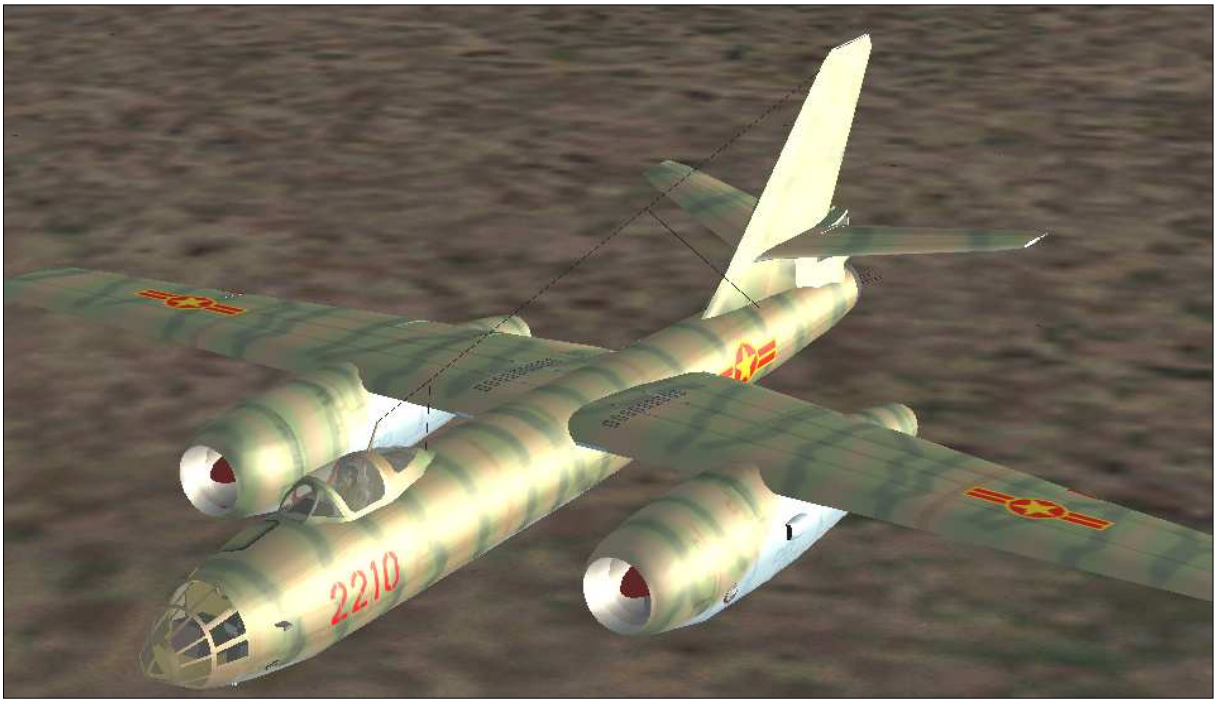
I didn't make a virtual cockpit. Flying this aircraft needs booth pilot and navigator but they are sitting on completely different places. That's why it's difficult to build an functionally virtual cockpit.
The gauges made by Dimtri Samborski for the Tupolev Tu-124 are used in compliance to the primary purpose of the IL-28P. I made only a panel bitmap for the pilot und modified some special gauges.

Sounds

There's no sound set included.
The sound set I used for this aircraft was made by #### for the Hawker Hunter. Both engines, the Rolls Royce Avon of the Hunter and the WK-1 of the Ilyushin, are based on the Rolls Royce Nene and so I think the sounds are more or less similar. (And the set sounds great!)

Textures

I included some textures. Please notice that there are two different models of the



Harbin H-5. One model (H5) should be used for metal finished textures, the other (H5m) for camouflage textures. I didn't make a special camouflage model of the IL-28, that's why the camouflage textures don't look very good on this aircraft.
I didn't make a special repaint set and I will not make it. I'm using Corel Picture Publisher for painting. The files made with this program have a special format and can't be used by other programs.

Installation

Unzip the *.zip file to your aircraft folder of your Flight Simulator.
To use this aircraft you need the gauges for the Tupolev Tu-124 made by Dimitri Samborski avaible on avsim.com or avsim ru. You should copy the files and past them to the panel folder of the IL-28P:
Downloading this wonderful aircraft you will also get a scenery with RSBN stations. It's helpful for flying in Russia because there aren't so many VOR and ADF stations.
I included a panel section for the Groza Weather Radar designed by the Project Tupolev.
To use this aircraft it's recommended to use the sound set for the Hawker Hunter made by Dave Garwood aviable on avism.com. You should copy the files and past them to the sound folder of the IL-28P.

Flying This Aircraft

Pre Start

Please use Dimtri's instruction to start the engines and all technical onboard systems. All tanks are filled as standard configuration and also all load stations are in use. This configuration is to heavy and so you have to reduce the fuel and / or the weight on the load stations. Changing the fuel be careful about the center of gravity, it shall be between 45% and 65%. Otherwise it is difficult to control the flight attitude.
The fuel system of the Tupolev Tu-124 and the Ilyushin IL-28 are different. There is a different number of tanks and also the designations are different. That's why it's recommended to switch on only the fuel pumps on the overhead panel and to use the automatic fuel system mode.

Taxiing

Don't forget to engage the front wheel steering mechanism, otherwise it may be difficult to follow the taxiway.

Start

Set the elevator trim on 3 degrees (nose up). Starting on a short runway you should set the flaps on position 1.
This aircraft is equipped with an first generation jet engine and so it needs time to get the full power. That's why you should disengage the brakes only if you reached 90% of jet power.
Notice you are flying a soviet aircraft. All instruments are metric!
You can rotate reaching a speed of 220 kph and take off reaching 250 kph.
When the vertical speed indicator shows you a positive vertical speed you can move in the gear and set the flaps to position 0.
When you are using Dimtri's gauges, a copilot will announce the speed and also the altitude and give you some recommendations.

Climb

The vertical speed should be 10-15 m/s until reaching an altitude of 6000 m by an IAS of 450-600 kph. On this altitude you shall reduce the vertical speed to 5 m/s. You will need about 6 minutes to reach an altitude of 3000 meters and about 20 minutes to reach an altitude of 10,000 meters.

Cruise

You can reach an altitude of 12 500 m, but it's more difficult to control the flight attitude on this altitude. The speed will also be lower because the thrust is limited on this altitude. The best cruising altitude is between 8,000 and 10,000 m.
The cruise speed is 770 kph, the maximum speed 920 kph.
The change of thrust will work with delay, that's why be careful using the throttle.

Descent

Select a vertical speed between 5 and 20 m/s. In dependence of your selected vertical speed you have to reduce the thrust. Don't forget to increase the thrust a short moment before you reach your new flight level because the change of thrust will work with delay.

Final Approach

There's no speed brake and so you have to reduce your airspeed in time only using the throttle.

You can set the flaps to position 1 at an airspeed of 450 km/h and reaching an airspeed of 220 km/h you have to set flaps to position 4.
The landing speed shouldn’t be less than 200 kph.

Disclaimer

This aircraft model is freeware. All repaints, enhancements or modifications are welcome, but must remain free. No exceptions. User accepts all risk of use.

Contact

webmaster@derBruchpilot.de

Please notice:

I will not answer any message sent to the address above. I included this address only because it's a condition for publishing on avsim.com.
If you have any questions or suggestions please visit the forum on www.flightexpress.de. It's a german speaking forum but you'll find also a lot of people speaking english. My username is "derBruchpilot". You can ask your question in a section called "Software" or "Designer Forum"

I can not support the gauges made by Dimitri Samborski or the sound set made by … If you have any question about the gauges and the sound set please ask them.

I will not support the further development for Microsoft Flight Simulator X. Especially I will not make any changes on the model, the textures or the flight dynamics. I will not publish the gmax model.

I will develop and publish other variants of the Ilyushin IL-28. But it's my hobby and so I will do what I want whenever I want.

If you are thinking the model is not exactly and I made some mistakes: don't tell me, I know about it.

Happy landings!