The Foundacion Infante de Orleans' (FIO) Polikarpov I-16 flown by FIO President Carlos Valle. [All images Luigino Caliaro]

Spain's Historic Polikarpov

The Polikarpov I-16 was the star of vintage aviation periodicals in the late nineties when several were rebuilt to fly. *Luigino Caliaro* explores why the famously stubby little Russian fighter is an important part of Spain's aviation heritage.

In Spain, the Foundacion Infante de Orleans (FIO) is an historic aviation flying museum. It is a non-profit organisation, formed by a group of enthusiast pilots in 1989, dedicated to the collection, restoration and presentation of Spanish aviation history, not least by keeping their collection of historic aircraft in flying condition. The museum publically displays its flyable collection once a month at its home base, Cuatro Vientos airport, near Madrid. The collection has around 38 aircraft, spanning more than seventy years of Spanish aviation; all of them are airworthy or if not regularly flown, kept in flying condition by FIO's own maintenance workshop.

The foundation is named in honour of Don Alfonso de Orléans y Borbón (1886-1975), a famous Spanish pioneer pilot. He was Spain's first military pilot, graduating in 1910, and flew late into his 88 years, amassing more than 6000 flying hours and becoming one of the oldest active pilots in the world at the time.

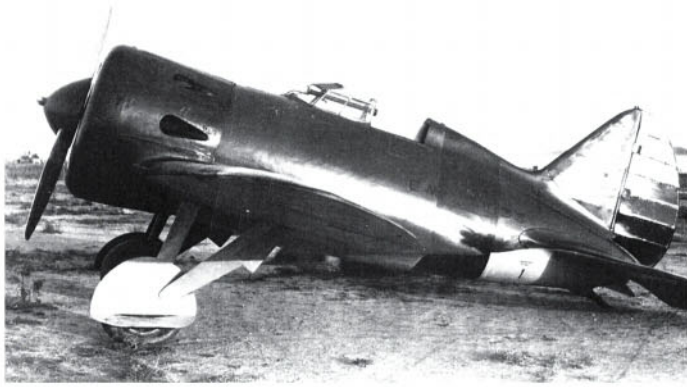
The 'Rata' in Spain

Spain has a rich and varied aviation history, although one notable period was the tragic

The wing surfaces, other than the leading edges, are fabric covered.

The cables that retract the undercarriage can be seen in this photo.

A type 5 'Mosca', taken circa 1937. Two wing machine guns, M-25 725 hp (540 kW) engine, and early type forward opening enclosed cockpit.



Spanish Civil War between 1936 and 1939. Spain was used by the Fascist dictatorships of Italy and Germany as a testing ground for their aircraft and tactics while supporting rebel Nationalist Francisco Franco. Meanwhile, supporting the left wing government was the Soviet Union and a remarkable, motley array of aircraft obtained via a multitude of legal (and illegal) methods. When, in November 1936, the Nationalist armies were about to take Republican Madrid, the attacking bombers were surprised by a number of small, dark, monoplanes that "looked like as if they were coming out of the drains" that attacked them at an unbelievably high speed. This was one claim for how they became dubbed the 'Rata' ('Rat') by their enemies, while on the Republican side they were nicknamed the 'Mosca' ('Fly'), partly due to a misinterpretation of the Russian name of the city of Moscow (MockBá) on the shipping crates. Whatever the name, the two squadrons of Polikarpovs that joined the Battle for Madrid outperformed the Nationalist's Fiat CR 32 biplane fighters, and the arrival of the Polikarpov, a pioneering, modern monoplane fighter, contributed to the Madrid Republican forces' obtaining a major defensive success.

The first delivery to Spain had been 31 Polikarpov I-16 Type 5 fighters, paid for in gold to Stalin's Russia, and were followed by further examples in early 1937, with 93 Polikarpovs in service by the middle of that year, despite some early losses. The new delivery of I-16 Type 10s solved one of the major shortcomings of the aircraft, the inadequate firepower of the two original ShKAS 7.62mm machine guns. The new type was armed with four guns and was nicknamed 'Super Mosca' by the Republican pilots.

> "Spain's first 31 Polikarpov I-16 Type 5 fighters were paid for in gold to Stalin's Russia"

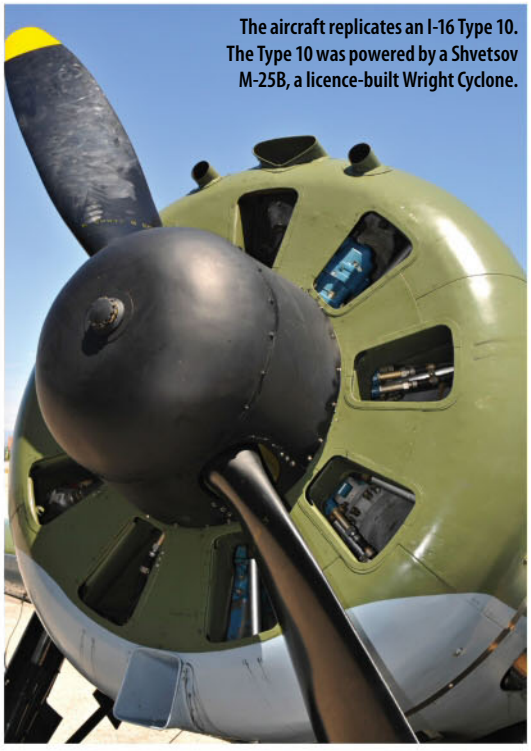
From September 1938, twelve I-16s from the last two consignments were locally refitted with American Wright Cyclone engines that had been brought through the Fascist blockade. Most of the aircraft converted were used by 4ª Escuadrilla 'Mosca'. Further modifications included improvements to what became, in turn, known as 'Mega Moscas', mostly intended to confront the superior Bf 109E at higher altitudes. Oxygen equipment, four ShKAS machine guns, a reflector gun sight, some pilot armour, and twin exhaust stacks and a chin air intake for the Wright Cyclone were among these enhancements.

After its combat debut over Madrid, the 'Moscas' carried on for the following two and a half years, achieving their most notable successes in the battle of Guadalajara, the Northern Campaign, where they fought in very difficult conditions, as well as in Brunete, Teruel, and finally in the Battle of Ebro, the beginning of the end, which itself came six months later with the final collapse of Catalonia. 'Mosca' pilots learned from experience that attacks on Fiat CR 32 biplanes had to be based on

LEFT: Carlos Valle is the president of an organisation that operates one of the most valuable historic aircraft collections in Europe.

BELOW: The original enclosed canopy of earlier variants was removed as it had a tendency to jam. Many pilots flew with it locked in the open position.

BOTTOM: The gun 'levers' in the spade grip were cable operated and the force required to operate them, while aiming the aircraft, made precision targeting difficult.



The aircraft replicates an I-16 Type 10. The Type 10 was powered by a Shvetsov M-25B, a licence-built Wright Cyclone.

a fast pass and break off, as the Fiat had superior manoeuvrability.

It is estimated that 278 I-16 fighters were received from the Soviet Union during the civil war, of which 112 were lost in combat and over seventy in accidents or on the ground. At the end of the civil war in 1939, the 53 remaining examples fell into nationalist hands. Several went on to serve in the new Francoist Ejército del Aire for fourteen years for advanced fighter pilot training. The last was withdrawn in 1953, but none survived the scrapyard.

THE FIO's 'Mosca'

The I-16 of FIO was a modern rebuild based on remains found in 1992 near Kirkkojärvi lake (now Polyany) in Karelia, a region of the northern Russian frontier with Finland. Manufactured in 1937, it belonged to 122 Squadron of the Soviet Northern Fleet. A total of six were rebuilt by the Aeronautical Research Bureau of Novosibirsk for the Alpine Fighter Collection of New Zealand (a seventh was built later) and the example later obtained by the FIO made its maiden post-restoration flight in 1997. It was shipped to New Zealand with the others to star at the 1998 Warbirds over Wanaka airshow. As soon as the FIO knew of the existence of an airworthy I-16, an aircraft of enormous importance in Spanish history, a campaign was begun to bring one to Spain. A glass case was placed in the Museum hangar, next to the borrowed Museo del Aire (Spanish Air Force Museum) static I-16 full scale model, for fundraising and it garnered notable income. However it was only with the support of the Council of the City of Getafe, which signed an agreement with FIO to build a new museum, and financed part of the I-16's acquisition, that it was possible to see this part of Spanish history flying in the skies above Madrid. After negotiation, the 'Mosca' was bought by FIO for around €262,000 (A$387,500) and arrived in Spain in early 2005.

It made its official public debut on 4 May 2008 and the aircraft was painted in the colours of CM-249, a 'Super Mosca' flown by the commanding officer of 3ª Escuadrilla, Captain José María Bravo, with white squadron leader's code numbers. Although designated as Captain Bravo's aircraft, it was also flown on occasion by Sergeant J.L.Tarazona.

The 3ª Escuadrilla was formed in 1937, originally commanded by the Russian Boris Smirnov (all the original I-16 pilots in Spain were Soviets) and fought during the battles of Guadalajara and Segovia. Subsequent commanders were the Russians Ukhov and Yevseviev, during the battle of Brunete. After operating with the 2ª Escuadrilla, the aircraft also fought during the battle of Belchite and Teruel. After this battle, as part of the transition to Spanish aircrew, the 3ª Escuadrilla was selected to be commanded by José María Bravo, who took on command in Salou on March 1938, and participated in all the air battles until February 1939 when, after the Battle of Ebro, the Fuerzas Aéreas de la República Española (Spanish Republican Air Force) was disbanded.

Carlos Valle, FIO President and currently

RIGHT: While this aircraft is equipped with flaps, the full span of the original drooping ailerons can be seen here.

BELOW: The Spanish Air Force was the last operator of the diminutive fighter, with the final examples, operated by a fighter school, being retired in August 1953.

BOTTOM RIGHT: José María Bravo, leader of *3ª Escuadrilla de Moscas*, having a shave in front of his 'Mosca' Type 10, with the unit's double six domino on the tail, during the early days of the Ebro battle, September 1938. A few days later he was promoted to Second Commander of *Grupo 21 de Caza Mosca*, and received a new aircraft, CM-249, the colours the FIO machine replicates.

the only Spanish pilot authorised to fly the 'Mosca', is very satisfied with the aircraft:

"For a very experienced pilot, to fly an historic aircraft is always a challenge. Considering the fact that these are normally very rare, or unique, aircraft flying worldwide, it is important to note the great responsibility assigned to us, historic plane pilots, that we have to show them to the public but also to be sure to fly them safely. The FIO's I-16 Rata is one of these planes; with its unmistakable lines, and its stocky fuselage giving the plane great personality. It should be considered an example of the top of the Russian technology of mid thirties.

"I was lucky to get very precious advice from my Russian friend Jurgis Kairys, a highly skilled test pilot and aerobatic pilot, who I met and flew with during many aerobatic championships. The Rata flies well, without major problems. Able to fly at more than 400 km/h [250 mph] without canopy gave me some heavy buffeting and I have to wear a heavy protection helmet as the engine noise is extreme. Another unusual characteristic is the main gear retraction system. This is very complicated, as I have to turn the retraction wheel handle with my right hand while keeping my left hand steady on the control stick, without any control of the engine power in that period.

"However, while in the air the 'Rata' flies well, the landing is a really tricky affair, as the nose obstructs forward vision, made more problematic with a relatively high approach speed. You have to continuously look sideways outside the cockpit, and normally before touchdown I had to slightly bank in order to see the touchdown point. Given also that the Cuatro Vientos main runway is not very wide, I had to pay a lot of attention on the touchdown and the subsequent landing run. If there is no crosswind, the landing is relatively easy to maintain direction, but with any crosswind, I have to be careful with the brakes, as they are not very good. Taxiing is another difficult task requiring the pilot to zig-zag to be able to see forwards.

"In spite of these characteristics, I have to say that despite even flying many other different historic aircraft types, flying with the 'Rata' is something special, both for the performance but also for its important history in Spain, allowing me to be extremely proud to be both pilot and president of FIO."

JOSÉ MARÍA BRAVO

José María Bravo was a legend of Spanish aviation. Born in Madrid on 8 April 1917, and named José María Bravo Fernández-Hermosa, he was an engineering student in Madrid when the Spanish Civil War began. He enlisted as a volunteer pilot with the Republicans in November 1936 and was trained as a fighter pilot in 1937 at Kirovada flying school in Russia. He returned to Spain in June 1937 and was initially assigned to 1ª Escuadrilla de Chatos, but later moved to 1ª Escuadrilla 'Moscas' based at Los Llanos, Valencia, and commanded by Russian pilot Devotchenco. In December 1937 he was appointed as deputy commander of the Escuadrilla and in April of the same year become commander of the 3ª Escuadrilla de la Aviación Republicana. At the end of August he was promoted to chief of Grupo 21 and on February 1938 escaped from Spain, then via a French concentration camp to Russia, and, after having to fight on the ground, joined the Voenno-Vozdushnye Sily (Russian Air Force). In 1943 he was selected for a very special mission, escorting the aircraft that carried Joseph Stalin to the Teheran conference to meet Churchill and Roosevelt.

José María Bravo flew over 2,300 flying hours as a fighter pilot and was credited with 23 enemy aircraft shot down, either solo or jointly. After the end of W.W.II (where Franco's Spain had remained neutral, but sympathetic to the Axis powers throughout) Bravo chose to stay in Russia, teaching the Spanish language at university. He returned to Spain in 1960 and died in Madrid on 26 December 2009. He wrote an autobiography and was interviewed several times where he told the story of his first operational flight:

"My first fight was a bit of joke. It was historic. It was during the Belchite offensive. The Russian general Tuji, the top Russian pilot in Spain, got us all together, and said: 'Comrades, you have come through your training course in the Soviet Union with flying colours: but that was the theoretical part. You haven't finished yet! Now comes the practical part. Your training continues here in the war. That's why for your first few flights, you won't be fighting. You are going to see experienced Russian Squadron in combat, but you will just watch them.'

"I've always been very cheeky and I asked him through an interpreter 'Comrade José' (as we called him in Spain) 'Has the enemy agreed to that then?'

"He called me a Trotskyite – that was the worst thing anyone could call you then. … I don't remember what's happened next, but I think I hit the nail on the head. So one day the whole squadron took off together. I was flying ahead a classmate of mine, Gandia. … Suddenly the leader saw some aircraft below us and he dived to attack them. Gandia and I got stuck among a bunch of Fiats, and didn't see what the leader had done. So there we were, surrounded by all these Fiats. My colleagues said I was a hero, but I wasn't. I was petrified. I squeezed the machine gun trigger until I run out of ammunition. We'd been given orders not to leave the battle area while there were still enemy aircraft in the air. Anyway I looked around and I couldn't see anybody. I was alone. And suddenly the anti-aircraft guns started firing at me. I though myself 'this is not good!' so I turned around. Just as I turned the engine stopped. I'd run out fuel! I had a parachute, but it was a good thing I thought 'how can I jump out now?' with the aircraft intact. That would be disgraceful! And so on.

"So I said myself 'Right. Whatever happens, I'm going to try to land somewhere.' I did manage to find an airfield and I landed just fine. And it turned out to be my airfield. I had no idea it was, but I had landed there! Everybody was congratulating me, they all thought I'd been shot down because I got back so much later than everybody else. The aircraft was covered in bullet holes, on the wings, on the propeller."

The author thanks FIO Chairman Mr Carlos Valle for his support, the historic photos and the information provided regarding Bravo.

THE I-16 IN HISTORY

When it joined the Soviet air arms in 1935, the I-16 was revolutionary, and unarguably the most advanced fighter of its time, being the first production retractable undercarriage cantilever monoplane fighter in service. There had been fast monoplanes before, even prior to the Great War, but they were almost all externally braced. The Polikarpov was notable for being the first machine to combine these many innovations, make it into production and active service, then be successful in combat.

Designed by Nikolai Nikolaevich Polikarpov, who conceived it after developing the I-15 biplane, the design was based around a wooden semi-monocoque fuselage, a large, bluntly cowled radial engine (going against the streamlined, in-line engine fighter doctrine of the era) and a cantilever wing that was made possible by a chrome-molybdenum steel alloy wing spar. Other innovations included a retractable undercarriage, with the wheels being pulled up by a cable, manually wound by the pilot, a full cockpit canopy (that ultimately proved to be problematic in use and often removed) and ailerons that could be drooped as landing flaps. A very clean design apart from the blunt nose, it had fabric covering on the aft part of the wing and tail surfaces.

As a revolutionary aircraft, it required pilots that were able to manage a faster, and therefore less manoeuvrable machine than they'd seen before, and unsurprisingly faced problems being accepted on introduction, with aerobatics being banned for an initial period. The short-coupling of the undercarriage made it a handful on take-off and landing, where even today some have effectively been grounded in the USA due to these concerns. In flight it was found by the Russian and Spanish pilots that 'slashing' straight-line diving attacks were necessary, again, a radical departure from standard fighter doctrine of the time which favoured close-in, turning dogfights.

The type's flying characteristics have to be seen in the context of the era, when it was a major change in performance and speed, compared to what came before. Reports of a tendency to spin easily seem to depend on model and loading, as the actual spin tests done on a prototype showed better than normal spin entry and recovery. However the longitudinal stability was always marginal, the canopy could slam shut and distort the pilot's view, and the cable-operated gun triggers meant the effort required to fire the guns could cause pilots to drag the sights off target.

The I-16 was able to match the Messerschmitts up to the Bf 109D in Spain, and was just outclassed by the 109E in 1942 at the start of the Great Patriotic War. From being a superior type in the thirties, it was outclassed in the forties, but served the Soviet Union well in the east and west until better fighters were available.

Effectively forgotten, and traduced from the thirties onward in western accounts as a 'Soviet copy of a Gee Bee' or a Boeing, the type was revived by a joint project achieved in Siberia for the Alpine Fighter Collection in New Zealand. Replacing the original engine with a modern 725 hp (540 kW) Ash-62IR, as used on the Antonov An 2, with a modified propeller hub to carry two, rather than four, blades was the main variation, evidenced by a fatter prop spinner than original. However, for the first time in nearly half a century, this innovative design was back in the air amazing another generation of airshow goers - and pilots. Today one flyer is in private hands in Russia, another in Germany, the example featured here in Spain, and three in the United States. Original static examples exist in Finland (a two seater), China, and two more in Russia. **James Kightly**

A post-war 'Rata', bearing the *Ejército del Aire* roundel, and seen in 1952 at Tablada, Seville, just before they were finally withdrawn from use.