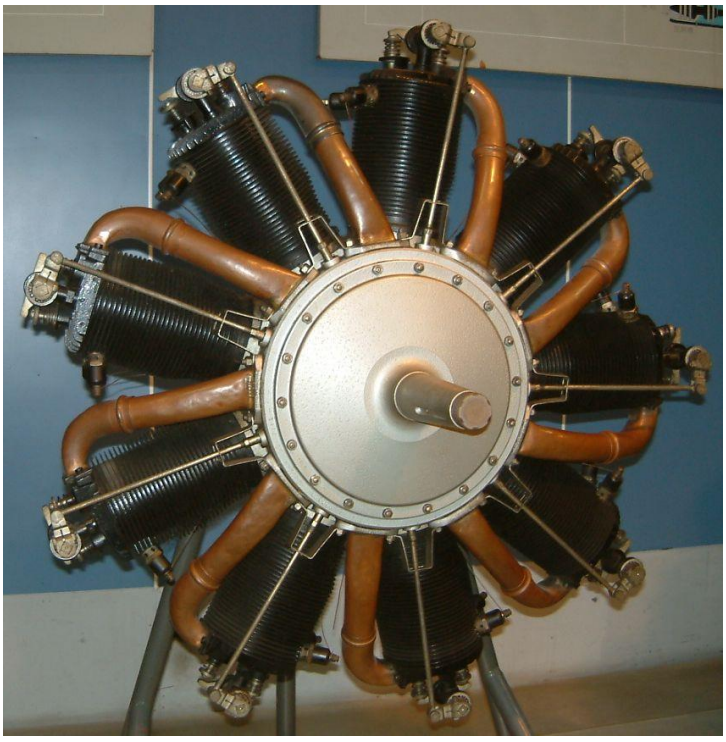
Gnome-Rhône 9A Jupiter

Le Jupiter 9A fut le premier moteur en étoile fixe de neuf cylindres produit par Gnome-Rhône. Fabrication sous licence du Bristol Cosmos, il avait la particularité d'être muni d'une pièce torique appelée spirale logée dans les conduits d'admission du mélange air-carburant.

La première version datait de 1923, fin 1926 fut produite une version à réducteur d'une puissance de 480 ch, vers 1930, apparu un modèle suralimenté par un compresseur mécanique qui fut le premier propulseur français de ce type construit en série. La garantie de fonctionnement était de cent heures en 1923, elle atteignait 150 heures en 1925, puis fut portée à 200 heures fin 1926.

Ce moteur fut monté sur certains Spad, Dornier, Farman, Potez, Heinkel et Piaggio, et sur certaines séries de Focke-Wulf A 17, Dewoitine D9 et Blériot Type III. Il fut également monté, en moteur central de 380 ch, sur le Farman F.300. Son poids était de 340 kg pour une longueur de 1,040 m et un diamètre de 1,416 m.



Source : http://jnpassieux.fr/www/html/Gnome_Rhone_9A.php

Version anglaise

The **Bristol Jupiter** was a British nine-cylinder single-row piston radial engine built by the Bristol Aeroplane Company. Originally designed late in World War I and known as the **Cosmos Jupiter**, a lengthy series of upgrades and developments turned it into one of the finest engines of its era. The Jupiter was widely used on many aircraft designs during the 1920s and 1930s. Thousands of Jupiters of all versions were produced, both by Bristol and abroad under licence. A turbo-supercharged version of the Jupiter known as the **Orion** suffered development problems and only a small number were produced. The "Orion" name was later re-used by Bristol for an unrelated turboprop engine.

Design and development

The Jupiter was designed during World War I by Roy Fedden of Brazil Straker and later Cosmos Engineering. The first Jupiter was completed by Brazil Straker in 1918 and featured three carburettors, each one feeding three of the engine's nine cylinders via a spiral deflector housed inside the induction chamber. During the rapid downscaling of military spending after the war, Cosmos Engineering became bankrupt in 1920, and was eventually purchased by the Bristol Aeroplane Company on the strengths of the Jupiter design and the encouragement of the Air Ministry. The engine matured into one of the most reliable on the market. It was the first air-cooled engine to pass the Air Ministry full-throttle test, the first to be equipped with automatic boost control, and the first to be fitted to airliners.

The Jupiter was fairly standard in design, but featured four valves per cylinder, which was uncommon at the time. The cylinders were machined from steel forgings, and the cast cylinder heads were later replaced with aluminium alloy following studies by the Royal Aircraft Establishment. In 1927, a change was made to move to a forged head design due to the rejection rate of the castings. The Jupiter VII introduced a mechanically-driven supercharger to the design, and the Jupiter VIII was the first to be fitted with reduction gears.

In 1925, Fedden started designing a replacement for the Jupiter. Using a shorter stroke to increase the revolutions per minute (rpm), and including a supercharger for added power, resulted in the Bristol Mercury of 1927. Applying the same techniques to the original Jupiter-sized engine in 1927 resulted in the Bristol Pegasus. Neither engine would fully replace the Jupiter for a few years. In 1926 a Jupiter-engined Bristol Bloodhound with the registration G-EBGG completed an endurance flight of 25,074 miles (40,353 kilometres), during which the Jupiter ran for a total of 225 hours and 54 minutes without part failure or replacement.

Licensed production

The Jupiter saw widespread use in licensed versions, with fourteen countries eventually producing the engine. In France, Gnome-Rhone produced a version known as the Gnome-Rhône 9 Jupiter that was used in several local civilian designs, as well as achieving some export success. Siemens-Halske took out a licence in Germany and produced several versions of increasing power, eventually resulting in the Bramo 323 Fafnir, which saw use in German wartime aircraft. In Japan, the Jupiter was license-built from 1924 by Nakajima, forming the basis of its own subsequent radial aero-engine design, the Nakajima Ha-1 Kotobuki. It was produced in Poland as the PZL Bristol Jupiter, in Italy as the Alfa Romeo 126-RC35, and in Czechoslovakia by Walter Engines. The most produced version was in the Soviet Union, where its Shvetsov M-22 version powered the initial Type 4 version of the Polikarpov I-16 (55 units produced). Type 4 Polikarpovs can be identified by their lack of exhaust stubs, rounded NACA cowling and lack of cowling shutters, features which were introduced on the Shvetsov M-25 powered Type 5 and later variants (total production 4,500+ units). Production started in 1918 and ceased in 1930.

Variants

The Jupiter was produced in many variants, one of which was the Bristol Orion of 1926. Metallurgy problems with this turbo-supercharged engine caused the project to be abandoned after only nine engines had been built.

Brazil Straker (Cosmos) Jupiter I

(1918) 400 hp (300 kW); only two engines assembled.

Cosmos Jupiter II

(1918) 400 hp (300 kW); a single engine assembled.

Bristol Jupiter II
(1923) 400 hp (300 kW).

Bristol Jupiter III
(1923) 400 hp (300 kW).

Bristol Jupiter VII on display at the Shuttleworth Collection

Bristol Jupiter IV
(1926) 430 hp (320 kW); fitted with variable valve timing and a Bristol Triplex carburettor.

Bristol Jupiter V
(1925) 480 hp (360 kW).

Bristol Jupiter VI
(1927) 520 hp (390 kW); produced in both high- (6.3:1) and low- (5.3:1) compression ratio versions.

Bristol Jupiter VIA
(1927) 440 hp (330 kW); civil version of Jupiter VI.

Bristol Jupiter VIFH
(1932) 440 hp (330 kW); version of Jupiter VI equipped with gas starter motor.

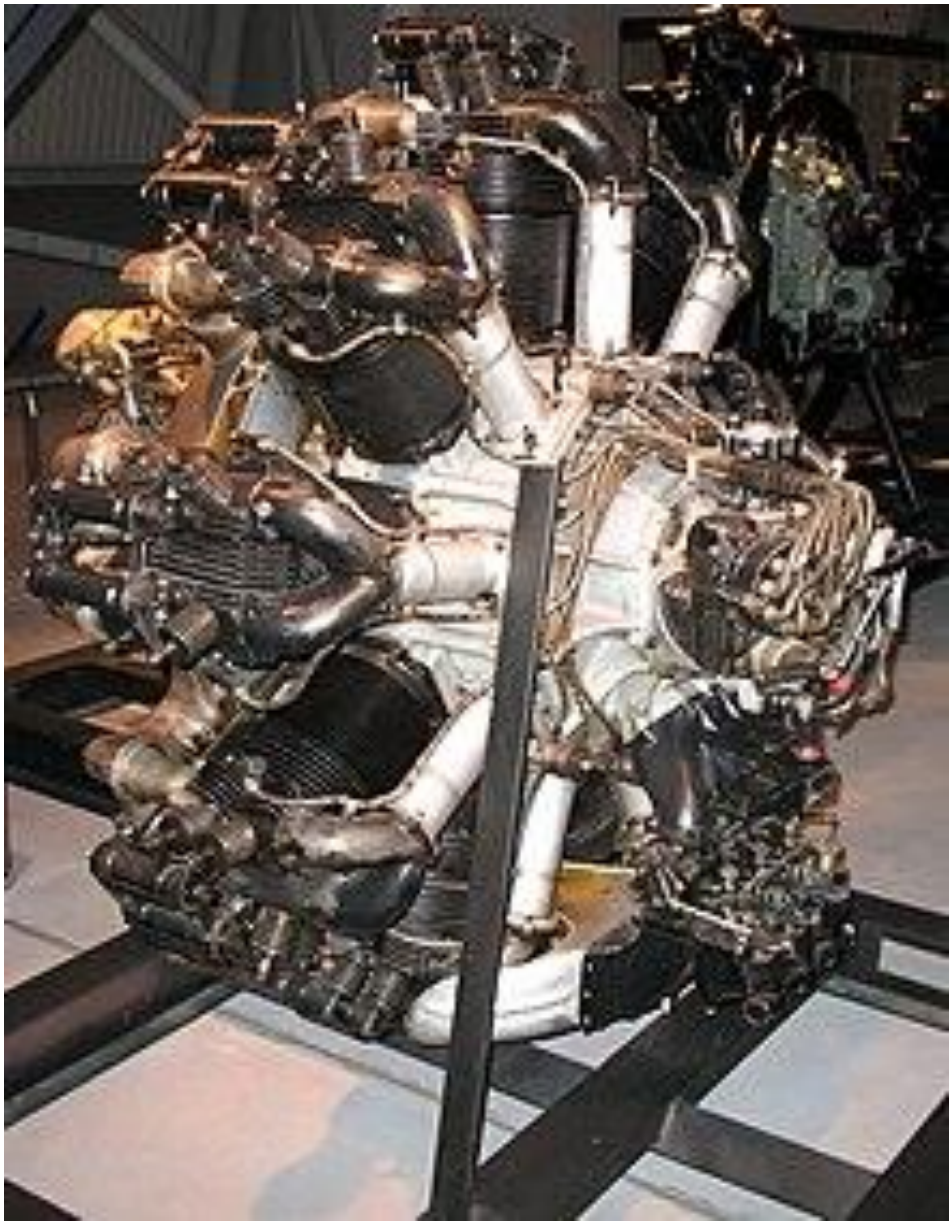
Bristol Jupiter VIFL
(1932) 440 hp (330 kW); version of Jupiter VI with compression ratio of 5.15:1.

Bristol Jupiter VIFM
(1932) 440 hp (330 kW); version of Jupiter VI with compression ratio of 5.3:1.

Bristol Jupiter VIFS
(1932) 400 hp (300 kW); version of Jupiter VI with compression ratio of 6.3:1.

Bristol Jupiter VII
(1928) 375 hp (280 kW); fitted with supercharger, with compression ratio of 5.3:1; also manufactured by Gnome-Rhone as the **9ASB**.

Bristol Jupiter VIIF
(1929) 480 hp (360 kW); version of Jupiter VII with forged cylinder heads.



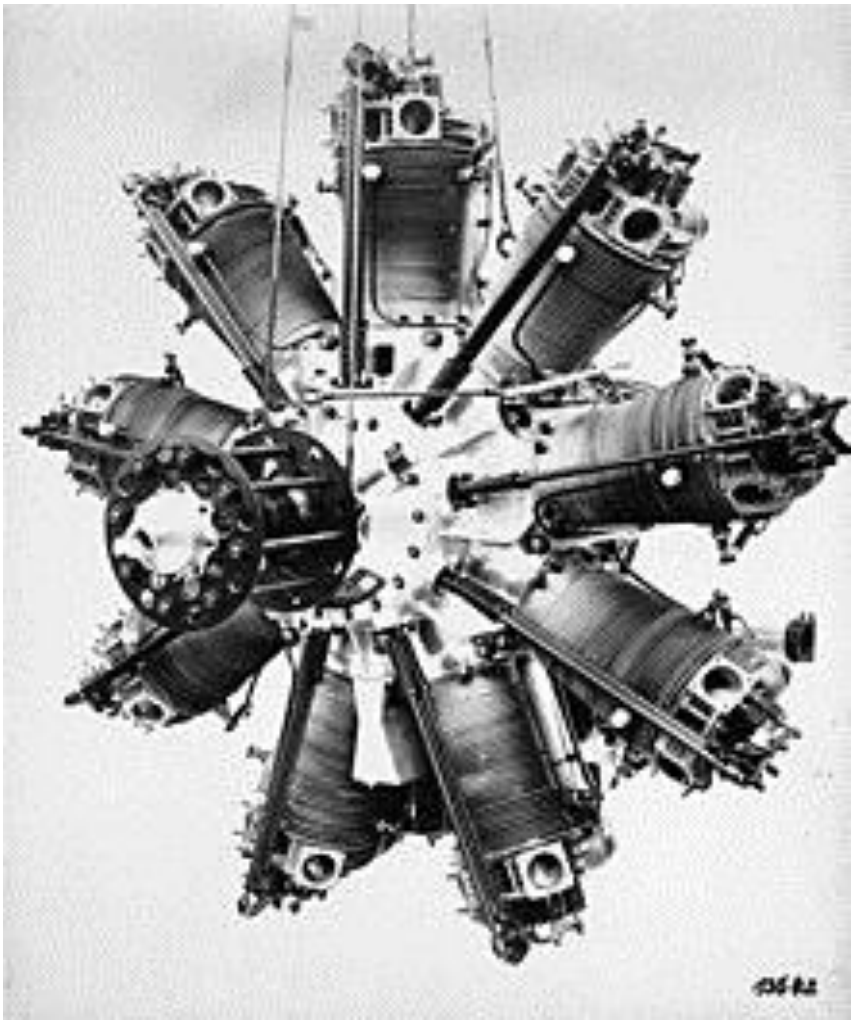
Preserved Bristol Jupiter VIIIF

Bristol Jupiter VIIFP
(1930) 480 hp (360 kW); version of Jupiter VII with pressure feed lubrication to wrist-pins.

Bristol Jupiter VIII
(1929) 440 hp (330 kW); first version with propeller reduction gearing; compression ratio 6.3:1.

Bristol Jupiter VIIIF
(1929) 460 hp (340 kW); version of Jupiter VIII with forged cylinder heads and lowered compression ratio (5.8:1).

Bristol Jupiter VIIIFP
(1929) 460 hp (340 kW); version of Jupiter VIII with pressure feed lubrication (time between overhauls at this stage in development was only 150 hours due to multiple failures).



Jupiter IX

Bristol Jupiter IX
480 hp (360 kW); compression ratio 5.3:1.

Bristol Jupiter IXF
550 hp (410 kW); version of Jupiter IX with forged cylinder heads

Bristol Jupiter X
470 hp (350 kW); compression ratio 5.3:1.

Bristol Jupiter XF
540 hp (400 kW); version of Jupiter X with forged cylinder heads

Bristol Jupiter XFA
483 hp (360 kW)

Bristol Jupiter XFAM
580 hp (430 kW)

Bristol Jupiter XFBM
580 hp (430 kW)

Bristol Jupiter XFS
Fully supercharged.

Bristol Jupiter XI
Compression ratio 5.15:1.

Bristol Jupiter XIF
500 hp (370 kW); compression ratio 5.15:1.

Bristol Jupiter XIFA
480 hp (360 kW); version of Jupiter XIF with 0.656:1 propeller gear reduction ratio

Bristol Jupiter XIFP
525 hp (391 kW); version of Jupiter XIF with pressure feed lubrication.

Bristol Orion I
(1926) Jupiter III, turbo-supercharged, abandoned programme.

Gnome-Rhône 9A Jupiter
French licence production primarily of 9A, 9Aa, 9Ab, 9Ac, 9Akx and 9Ad variants.

Siemens-Halske Sh20, Sh21 and Sh22
Siemens-Halske took out a licence in Germany and produced several versions of increasing power, eventually resulting in the Bramo 323 Fafnir, which saw use in wartime models.

Nakajima Ha-1 Kotobuki
In Japan, the Jupiter was licence-built from 1924 by Nakajima.

PZL Bristol Jupiter
Polish production.

Alfa Romeo Jupiter
Italian licence production, 420 hp (310 kW).

Alfa 126 R.C.35
Alfa Romeo developed variant

Walter Jupiter
Licence production in Czechoslovakia by Walter Engines

Shvetsov M-22
The most produced version; manufactured in the Soviet Union.

IAM 9AD Jupiter
Licence production of the Gnome-Rhône 9A in Yugoslavia

SABCA Jupiter
license production in Belgium by SABCA (*Société Anonyme Belge de Constructions Aéronautiques*)

Piaggio-Jupiter
License production by Piaggio

Specifications (Jupiter XFA)
General characteristics

- **Type:** Nine-cylinder, naturally aspirated, air-cooled radial engine
- **Bore:** 5.75 in (146 mm)
- **Stroke:** 7.5 in (190 mm)
- **Displacement:** 1,753 in^3 (28.7 L)
- **Diameter:** 54.5 in (1,384 mm)
- **Dry weight:** 995 lb (451 kg)

Components

- **Valvetrain:** Overhead poppet valve, four valves per cylinder, two intake and two exhaust
- **Supercharger:** Single speed, single stage
- **Fuel type:** 73-77 octane petrol
- **Cooling system:** Air-cooled

Performance

- **Power output:** * 550 hp (414 kW) at 2,200 rpm at 11,000 ft (3,350 m) - maximum power limited to five minutes operation.
- 525 hp (391 kW) at 2,000 rpm - maximum continuous power at 11,000 ft (3,350 m)
- 483 hp (360 kW) at 2,000 rpm - takeoff power
- **Specific power:** 0.31 hp/in^3 (14.4 kW/L)
- **Compression ratio:** 5.3:1
- **Power-to-weight ratio:** 0.55 hp/lb (0.92 kW/kg)

Source : https://en.wikipedia.org/wiki/Bristol_Jupiter