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SEPECAT Jaguar – Archived 3/2010

Outlook

- HAL has completed a final batch of 20 Jaguars for the Indian Air Force
- No further Jaguars are on order

Orientation

Description. Single-seat strike/reconnaissance aircraft; twin-seat trainer versions have also been produced.

Sponsor. Originally, the French Ministry of Defense and the British Ministry of Defence. Later, the Indian Ministry of Defence.

Status. SEPECAT production was completed in 1985. Licensed production by Hindustan Aeronautics Ltd (HAL) ended in 2008.

Total Produced. Through 1985, SEPECAT produced 504 Jaguar/Jaguar International aircraft, including seven prototypes. Through 2008, HAL license-built approximately 128 units, including 45 assembled from SEPECAT-produced components.

Application. Tactical ground attack, anti-shipping, armed reconnaissance.

Price Range. Estimated at \$15.5-\$16.5 million in 2006 U.S. dollars.

Contractors

Prime

SEPECAT	Zone Aeronautique Louis Breguet, PO Box 12, Velizy-Villacoublay, France, Prime
Hindustan Aeronautics Ltd	http://www.hal-india.com , 15/1 Cubbon Rd, PO Box 5150, Bangalore, 560 001 India, Tel: + 91 802 286 5197, Fax: + 91 802 286 7140, Licensee

Subcontractor

Dunlop Aircraft Tyres Ltd	http://www.dunlopaircrafttyres.com , 40 Fort Pkwy, Erdington, Birmingham, B24 9HL United Kingdom, Tel: + 44 121 384 8800, Fax: + 44 121 377 7150, Email: enquiries@dunlopatl.co.uk (Tires)
Goodrich Lighting Systems GmbH	http://www.goodrich-lighting.com , Bertramstrasse 8, Lippstadt, 59557 Germany, Tel: + 49 2941 767 60, Fax: + 49 2941 767 6 8432 (Interior & Exterior Lighting Equipment)
Hindustan Aeronautics Ltd - Engine Division, Bangalore Complex	http://www.hal-india.com , PO Box 9310, C V Raman Nagar, Bangalore, 560 093 India, Tel: + 91 80 5243628, Fax: + 91 80 5244686 (Adour Turbofan)
Meggitt Aircraft Braking Systems	http://www.meggitt-mabs.com , Holbrook Ln, Coventry, CV6 4AA United Kingdom, Tel: + 44 2476 66 6655, Fax: + 44 2476 66 2294 (Wheels; Hydraulic Brakes)
Messier-Dowty International	http://www.messier-dowty.com , Zone Aéronautique Louis Breguet, BP 10, Velizy-Villacoublay, 78140 France, Tel: + 33 1 46 29 18 00, Fax: + 33 1 46 29 18 03 (Landing Gear)
Rolls-Royce Turbomeca Ltd	4-5, Grosvenor Pl, London, SW1X 7HH United Kingdom, Tel: + 44 207 2594090 (Adour Turbofan)

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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Design Features. The Jaguar features a shoulder-high swept wing and is fitted with retractable tricycle-type landing gear, Dunlop wheels, and dual low-pressure tires for operating out of grass strips. The fuselage is an all-metal (mostly aluminum) structure.

The tail unit is a cantilever all-metal two-spar structure, covered with aluminum alloy sandwich panels. The tailplane is all-moving slab type. Ventral fins are found under the rear fuselage.

	<u>Metric</u>	<u>U.S.</u>
Dimensions (HAL Jaguar International)		
Length	16.96 m	55.63 ft
Height	4.81 m	15.79 ft
Wingspan	8.69 m	28.51 ft
Wing area, gross	24.03 sq m	258.7 sq ft
Weight (HAL Jaguar International)		
Typical weight empty	7,000 kg	15,432 lb
Max TOW with external stores	15,700 kg	34,612 lb
Performance (HAL Jaguar International)		
Max level speed at SL	1,200 km/h	649 kt
Range, max external fuel	2,593 km	1,400 nm

Propulsion

Jaguar A/B/E/S	(2)	Rolls-Royce Turbomeca Adour Mk 101 two-spool, axial-flow, augmented turbofans rated 30.82 kN (6,930 lbst) each (with afterburner), or Rolls-Royce Turbomeca Adour Mk 102 turbofans rated 32.5 kN (7,305 lbst) each (with afterburner). British RAF Jaguars were retrofitted with Adour Mk 104 engines rated 35.1 kN (7,900 lbst) each (with afterburner). The engines on some RAF Jaguars were later upgraded to the Mk 106 standard.
Jaguar International (early)	(2)	Rolls-Royce Turbomeca Adour Mk 804 turbofans rated 35.8 kN (8,040 lbst) each (with afterburner).
Jaguar International (later)	(2)	Rolls-Royce Turbomeca (or HAL) Adour Mk 811 turbofans rated 37.4 kN (8,400 lbst) each (with afterburner).

Armament

Two 30mm ADEN or DEFA 553 guns in the fuselage aft of the cockpit in single-seat aircraft; one ADEN gun on the port side of the fuselage in the twin-seat version. Single centerline fuselage attachment point and two pylons under each wing. Inboard wing hardpoint and centerline point capacity is 1,134 kilograms (2,500 lb) each. Outboard wing point capacity is 567 kilograms (1,250 lb) each. Maximum external capacity is 4,763 kilograms (10,500 lb). Ordnance and missiles can include Martel AS.37 anti-radiation missile or Matra Magic R550 missile; air-to-ground unguided rockets including the SNEB 68mm variety; or free-fall, laser-guided, retarded, or cluster bombs. Overwing attachment points (on Jaguar International) are for Magic air combat missiles. Omani Jaguars are equipped to carry AIM-9P Sidewinder short-range air-to-air missiles on outboard underwing stations. Optional weapons on Jaguar International include Sea Eagle, Harpoon, Exocet, and Kormoran anti-ship missiles.

Crew

Jaguar A/S models are single-seaters; Jaguar B/E models seat two in tandem; Jaguar International has been produced in both single-seat and two-seat versions.

Variants/Upgrades

SEPECAT Jaguar

Jaguar S. U.K. Royal Air Force (RAF) single-seat attack variant with two 30mm cannon.

An RAF modification program, called Jaguar 97, included addition of a 152mm x 203mm (6 in x 8 in) active matrix liquid crystal display (LCD) and a BAE helmet-mounted sight. After modification, single-seat RAF Jaguars received the designation GR3A, while RAF two-seaters were redesignated T4.

Jaguar A. French Air Force single-seat attack variant with twin 30mm cannon.

Jaguar B. RAF two-seat trainer.

Jaguar E. French Air Force two-seat trainer.

Jaguar International. Modified version specifically for export customers; features uprated Adour engines and additional armament options.

Program Review

Background. The Anglo-French Jaguar program traces its beginnings to a 1965 Memorandum of Agreement whereby the two nations affirmed their intentions to jointly develop the Breguet Br 121 to fill the light strike, reconnaissance, and training requirements of both countries. Production commitments were subsequently firmed up at 400 units (200 for each nation), and BAC (since incorporated into British Aerospace, which is now called BAE Systems) and Breguet Aviation (since merged into Dassault Aviation) formed a joint company known as Societe Europeene de Production de l'Avion ECAT (SEPECAT) to manufacture the aircraft. At the same time, Rolls-Royce and Turbomeca entered into a similar arrangement with the formation of Rolls-Royce Turbomeca Ltd to handle development and production of the Adour powerplant.

Prototype first flights took place in September 1968 (E model), March 1969 (A), October 1969 (S), and August 1971 (B). Initial production deliveries to the French and British air forces began in May 1972 and May 1973, respectively. The uprated Jaguar International variant was announced in August 1974, and completed its maiden flight in August 1976.

Aircraft production was shared between the two nations without duplication of tools, except for final assembly, which took place at Toulouse in France and at Warton in the U.K. Dassault built the nose and center fuselage, while British Aerospace produced the tailplane, wing, and rear fuselage. Components were shipped to each of the countries for final assembly. Under the engine program, Rolls-Royce produced the hot parts and reheat sections, while Turbomeca provided the compressors and accessory gearbox sections.

HAL Licensed Production. Following the Indian Air Force's receipt of 40 British-built Jaguar International aircraft, Hindustan Aeronautics Ltd (HAL) assembled 45 additional aircraft for the service from European-supplied components. HAL then produced under license 31 more Jaguars for the Indian Air Force (IAF), with deliveries occurring between early 1988 and late 1991. Jaguar production at HAL later restarted for an additional batch of 15 aircraft for the IAF. Production of this batch was completed in 1999.

The IAF ordered 17 additional two-seat Jaguars from HAL in 1999, and 20 single-seat models in 2000.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1965	Anglo-French agreement on joint development
May	1966	SEPECAT formed
Jun	1966	Rolls-Royce Turbomeca Ltd formed
Oct	1966	Prototype construction begun
Sep	1968	First flight, Model E
Mar	1969	First flight, Model A
Oct	1969	First flight, Model S
Aug	1971	First flight, Model B
May	1972	Initial deliveries to French Air Force
May	1973	Initial deliveries to U.K. RAF
Aug	1974	Jaguar International announced
Aug	1976	Jaguar International first flight
Mar	1982	First HAL-assembled aircraft flown
Early	1985	SEPECAT production ended
	2008	HAL production ended

SEPECAT Jaguar

 Worldwide Distribution/Inventories

India	120
Oman	20

Forecast Rationale

HAL completed production of a final batch of 20 Jaguars for the Indian Air Force (IAF) in 2008. All 20 aircraft were single-seaters. Completion of these aircraft most likely means that the last Jaguar has now been built. The IAF does not plan to acquire any additional new Jaguars, and no orders from foreign customers are expected.

Meanwhile, HAL has been upgrading 68 of the IAF's oldest Jaguars with new avionics. Under this program, HAL has been equipping the aircraft with the new DARIN-3 (Display Attack and Ranging Inertial

Navigation) system, replacing the older DARIN-1 version of this system.

The IAF is also planning to re-engine its Jaguars. For this program, Honeywell has proposed its F125 turbofan engine, while Rolls-Royce has offered the Adour Mk 821.

The British Royal Air Force removed its last Jaguars from operational service in April 2007. The Jaguar was officially retired from the French Air Force in July 2005.

Ten-Year Outlook

No forecast.

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