

ARCHIVED REPORT

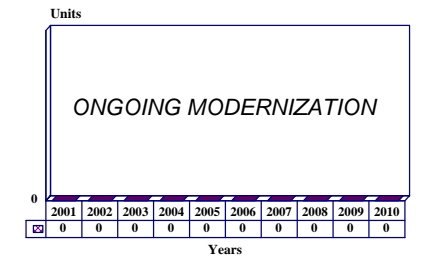
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BAe Harrier I - Archived 2/2002

Outlook

- No further production
- Pegasus 11-61 re-engining launched for Royal Navy FA.2s
- Indian Navy likely to opt for Israeli-managed upgrades

10 Year Unit Production Forecast
2001 - 2010



Orientation

Description. Single-engine, single- and twin-seat transonic vertical/short take-off and landing fighter/attack aircraft.

Sponsor. The United Kingdom Ministry of Defence.

Contractors. British Aerospace plc, BAe (Defence Systems) Ltd, formerly the Military Aircraft Division, Preston, Lancashire, UK.

Status. Production completed; modifications continue.

Total Produced. Through 1998, 395 Harrier and Sea Harrier aircraft, including 15 P.1127 prototypes, had been produced.

Application. Tactical ground attack, anti-ship attack, armed reconnaissance, air defense.

Price Range. Harrier/AV-8A, \$6.7 million; Sea Harrier FRS.2, \$14 million unit flyaway cost in 1988 dollars; \$18 million in 1991 US dollars.

Technical Data

Design Features. Shoulder-wing configuration, with retractable bicycle-type landing gear supplemented by underwingtip-mounted outriggers. Pegasus vectored thrust, turbofan engine features four nozzles (two-fan air; two-exhaust) which can be rotated to permit transition from conventional flight to hover mode. Two-seat trainer versions include a lengthened fuselage and enlarged canopy. The FRS.2 incorporates the

Ferranti Blue Vixen pulse Doppler radar, provision for AMRAAM, an advanced navigation and communication system, a self-protection suite, and Smiths Industries head-up and head-down displays. Additional FRS.2 Sea Harrier changes include a 35 cm fuselage plug aft of the wing to accommodate the new avionics, and longer wingtips.

	<u>Metric</u>	<u>US</u>
Dimensions		
Length (AV-8A/Sea Harrier)	13.89/14.5 m	45.57/47.57 ft
Height (AV-8A/Sea Harrier)	3.45/3.71 m	11.32/12.17 ft
Wingspan	7.7 m	25.26 ft

Weight (Sea Harrier)

	<u>Metric</u>	<u>US</u>
Empty	6,374 kg	14,052 lb
Max gross	11,880 kg	26,200 lb

Performance (Sea Harrier)

Max level speed, low altitude	1,185 km/h	645 kt
STO run, max gross wt	305 m	1,000 ft

Propulsion

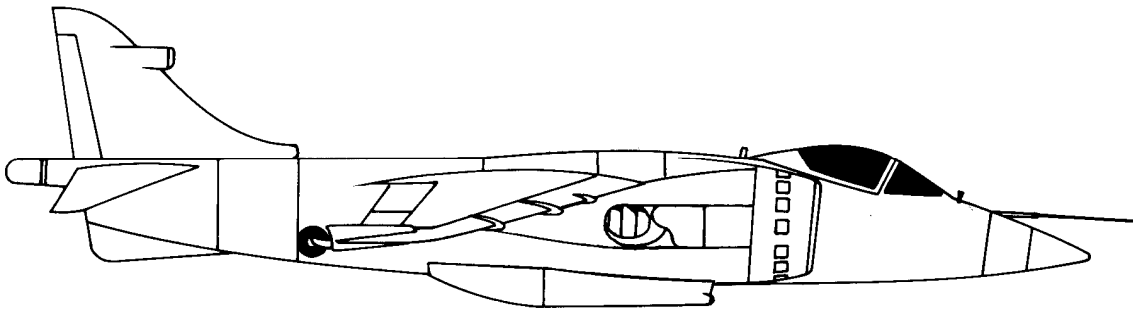
Harrier/AV-8A	(1)	Rolls-Royce Pegasus 11 Mk 103 vectored thrust turbofan rated 95.63 kN (21,500 lbt) with water injection thrust augmentation.
Sea Harrier	(1)	Rolls-Royce Pegasus 11 Mk 104 rated 95.63 kN (21,500 lbt) with water injection thrust augmentation.

Armament

Four underwing, one underfuselage pylons accommodate up to 3,630 kilogram (8,000 lb) external stores, which can include 30 mm Aden gun pods, bombs, rockets and flares. AV-8A and Matador versions have provisions for AIM-9 Sidewinder air-to-air missile installation; Sea Harrier FRS.1 has provisions for four AIM-9 or Matra Magic air-to-air missiles, or for two Sea Eagle or Harpoon air-to-surface missiles. In addition to the internal 30 mm Aden gun, Sea Harrier FRS.2 can carry four AIM-120 AMRAAM or AIM-9L Sidewinder air-to-air missiles, Sea Eagle anti-ship missiles, and a variety of conventional bombs and rockets.

Crew

Operational aircraft seat one; trainer versions seat two in tandem.



BAe SEA HARRIER

Source: Forecast International

Variants/Upgrades

Harrier GR.Mk 1, 1A, 3. These are single-seat variants specifically designed and configured for the Royal Air Force.

Harrier T.Mk 2, 2A, 4, 4A, 4RN. These five derivatives are two-seat trainers with lengthened nose sections and tailcones and enlarged fin sections.

AV-8A. US Navy/Marine Corps designation for Harrier I nearly identical to the GR.Mk 3.

TAV-8A. Two-seat trainer version of USMC AV-8A.

AV-8S Mk 55. Spanish Navy version known as Matador.

Sea Harrier T.Mk 60. Two-seat trainer for Indian Navy.

Sea Harrier FRS.Mk 1 and Mk 51. Maritime versions for UK and India, respectively; Sea Harrier FRS.Mk 2 is mid-life upgrade of 31 FRS.Mk 1 versions, with first redeliveries to the Royal Navy in 1993.

Sea Harrier F/A.Mk 2. Formerly designated FRS.Mk 2, differs from Mk 1 in featuring a Ferranti Blue Vixen

pulse Doppler, look-down/shoot-down radar and provisions for carrying up to four AIM-120 Advanced Medium Range Air-to-Air Missiles (AMRAAMs). It also has a less pointed nose than the FRS.Mk 1, a longer rear fuselage, a new HUD, and dual multipurpose Head Down Displays. Avionics architecture is based upon the MIL-STD-1553B standard. Thirty-five Royal Navy

Sea Harriers are being modified to this standard and were redelivered by BAe by the end of 1996. Eighteen new-production F/A.Mk 2s were ordered in January 1994, with first deliveries in early 1995.

Harrier II GR.Mk 5/7 and US Marine Corp AV-8B.
See Boeing/BAe Harrier II report in this section.

Program Review

Background. Development of the West's first operational V/STOL combat aircraft began in 1958; six Hawker Siddeley P.1127 prototypes were built and evaluated. Nine additional aircraft, designated Kestrels, were ordered in 1965 and Harrier prototypes were ordered in 1966. The first of 124 aircraft entered RAF service in 1969, the same year in which the US Marine

Corps purchased the first of 110 units. The Spanish Navy subsequently placed a 13-unit order; deliveries of these have been completed.

Maritime Sea Harrier version flew in 1978, subsequently ordered by the Royal Navy (78 units) and Indian Navy (26 aircraft).

Funding

UK MoD funding is not available.

Recent Contracts

None noted.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1966	Multinational evaluation of Kestrels
	1966	Harrier prototypes ordered
	1969	Initial USMC order; Harrier enters RAF service
	1971	AV-8A enters US service
Late	1973	Sea Harrier proposed
	1975	Royal Navy orders Sea Harrier
Aug	1977	Carrier deck ski jump STO tests begin
Aug	1978	Sea Harrier first flight
Jun	1979	Initial Sea Harrier deliveries
Sep	1988	First flight of FRS.Mk 2 Sea Harrier
	1994	UK MoD orders 18 FRS.Mk 2 Sea Harriers
	1995	Redeliveries of new and upgraded FRS.Mk 2 Sea Harriers begin
Early	1998	Production of new aircraft completed

Worldwide Distribution

(As of November 1, 2000)

The Harrier/Sea Harrier/AV-8A is currently in service with the following countries:

India	23	
Thailand	9	
UK Royal Navy	26	(plus 12-14 in storage)

Forecast Rationale

Britain's Ministry of Defence has authorized studies to re-engine some 15 FA.2s with uprated Pegasus 11-61 powerplants, as the aircraft labors somewhat under hot/high operating conditions.

India appears to have ruled out its originally planned Mk 51 upgrade but is now believed to be in favor of a

less ambitious modernization featuring Israeli-designed systems.

In any case, there will be no additional production of this, the West's first operational V/STOL design.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Aircraft	(Engine)	thru 00	High Confidence Level			Good Confidence Level			Speculative			Total 01-10	
			01	02	03	04	05	06	07	08	09		10
BRITISH AEROSPACE A/C GROUP													
AV-8A/HARRIER(a)	PEGASUS 11-21 (MK 103)	291	0	0	0	0	0	0	0	0	0	0	0
SEA HARRIER	PEGASUS 11-21 (MK 104)	60	0	0	0	0	0	0	0	0	0	0	0
SEA HARRIER (INDIA)(b)	PEGASUS 11-21 (MK 151-32)	26	0	0	0	0	0	0	0	0	0	0	0
SEA HARRIER FRS. MK 2	PEGASUS 11-21 (MK 104)	18	0	0	0	0	0	0	0	0	0	0	0
Total Production		395	0	0	0	0	0	0	0	0	0	0	0

(a)Includes 15 P.1127 Kestral research and development demonstrators.

(b)Includes 23 single seat FRS. Mk 1s and three T. Mk 51 trainers.