

# ARCHIVED REPORT

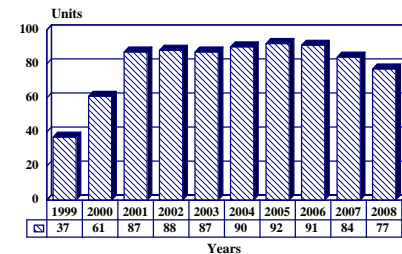
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## CASOM - Archived 3/2000

### Outlook

- UK MoD selects Matra BAe Storm Shadow to fulfill its CASOM requirement in 1996
- Contract could result in production of 500-1,000 missiles; estimated value placed at between \$1 billion and \$1.2 billion
- Storm Shadow expected to enter UK Royal Air Force service by 2001

10 Year Unit Production Forecast  
1999 - 2008



### Orientation

**Description.** Air-to-surface missile system.

**Sponsor.** United Kingdom Ministry of Defence, London, England.

**Contractors.** Matra BAe Dynamics has been selected to fulfill the CASOM requirement. The company will provide its Storm Shadow weapon system. Competitors included British Aerospace, McDonnell Douglas, Rafael/Lockheed Martin Corporation, Hughes (formerly General Dynamics), Matra, Aerospatiale, Daimler-Benz Aerospace SA (Messerschmitt-Bolkow-Blohm), Loral Vought Systems, and Brunswick.

**Status.** The CASOM contract was awarded to British Aerospace and Matra in July 1996. The team will provide the Storm Shadow weapon system which is based on the Matra APACHE missile.

CASOM Request For Proposals was delayed to late 1994, finally being issued in December of that year (although other sources say January 1995). Previously

the CASOM RFP was to have been issued before the end of 1993. The system was to be in service around 1996-1997, but due to the delay in issuing the RFP, it will probably not reach its in-service date until 2001.

**Total Produced.** No production has taken place. The Storm Shadow/CASOM is expected to enter service of the UK Royal Air Force in 2001. The CASOM requirement could include the procurement of between 500 and 2,000 missiles. Reports say that the UK may order 900 missiles.

**Application.** Stand-off air-to-surface missile system for the destruction of fixed targets such as hardened aircraft shelters, runways, bunkers, and other stationary facilities.

**Price Range.** No specific estimates are available concerning potential per unit prices for the Storm Shadow CASOM, although it is likely to be in the area of \$600,000.

### Technical Data

**Design Features.** No technical data on the Storm Shadow have been released. The Storm Shadow retains the airframe and propulsion system of the Matra APACHE, but is outfitted with a revised warhead and guidance system. The missile carries more fuel than the

standard APACHE, thereby providing greater range (supposedly in excess of the requirement). The CASOM requirement called for a range of 250 kilometers and a single unitary warhead, although a submunition-dispensing capability could eventually be added. The

CASOM missile is required to penetrate 1.5-2 meters of concrete with a three-meter CEP. Other features

reportedly include low observable radar and infrared signatures, and a terrain-following capability.

|                     | <u>Metric</u> | <u>US</u>     |
|---------------------|---------------|---------------|
| <b>Dimensions</b>   |               |               |
| Length              | 510 cm        | 16.75 ft      |
| Diameter            | 63 cm         | 24.80 in      |
| Height              | 48 cm         | 18.90 in      |
| Weight (at launch)  | 1,300 kg      | 2,860 lb      |
| Wingspan (Deployed) | 300 cm        | 9.85 ft       |
| <b>Performance</b>  |               |               |
| Speed               | Mach 0.9      | Mach 0.9      |
| Range               | 250+ km       | 155.25+ miles |

**Propulsion.** The Storm Shadow will be powered by a 4.41 kN thrust turbojet with a maximum speed of Mach 0.9. Turbomeca and Microturbo could provide this propulsion system.

**Control & Guidance.** The Storm Shadow is outfitted with an alternative guidance to that used by the APACHE. The Storm Shadow's guidance system combines an inertial navigation system (INS) and global positioning system (GPS) receiver, supplied by Sextant Avionique SA, with a terrain reference navigation system for cruise flight phase. Terminal guidance is provided by a GEC-Marconi high-resolution imaging infrared seeker

and automatic target recognition software. Thomson-Thorn Missile Electronics is involved in providing the Storm Shadow's guidance equipment.

**Launcher Mode.** The Storm Shadow will be launched from the Tornado GR.4, Harrier GR.7 and EuroFighter 2000. The Royal Navy's Sea Harrier FRs.2 may also be equipped with the Storm Shadow.

**Warhead.** The Storm Shadow will be outfitted with a unitary warhead provided by the British Aerospace subsidiary Royal Ordnance. Royal Ordnance will provide its BROACH-EP (Bomb Royal Ordnance Augmentation Charge - Earth Penetrating) system.

## Variants/Upgrades

The United Kingdom is developing a number of stand-off missile system requirements for missions ranging from long-range fixed-target attack to anti-shipping. CASOM has taken over from the NATO Group Staff Target (Air) 1236 requirement, which was frozen when the Modular Stand-Off Weapon System (MSOW) was canceled. The Staff Target (Air) 1236 calls for the procurement of a stand-off missile for the engagement of static targets. Other UK requirements include the SR(A) 1238 and ST(A) 1241 for attacking mobile armored targets, and SR(A) 1246 for anti-shipping operations. Considering the number of stand-

off missile system requirements being developed by the United Kingdom, the eventual CASOM system could become the basis for a range of weapons for the Royal armed forces. A Pre-Planned Product Improvement program could be launched after the system enters service. The UK Royal Navy is considering adopting the CASOM for a ship-launched long-range bombardment/naval gunfire support role and possibly to arm its Sea Harrier FRS.2 fighters. The CASOM has been mentioned as an armament option for the Royal Navy's next-generation warships.

## Program Review

**Background.** The United Kingdom, although developing a number of air-to-surface missile system requirements, has been unable to procure any new airborne stand-off weapons due to a lack of funding. The lessons of Operation Desert Storm provided new impetus for the procurement of stand-off weapons. The CASOM (Conventionally Armed Stand-Off Missile) requirement, formerly known as NATO Group Air Staff

Target (NGAST) 1236, envisages a conventional weapon capable of destroying hardened aircraft shelters, runways, and other high-value (fixed) targets.

**Competitors.** Various companies were involved in the CASOM competition offering a diverse number of solutions. Potential competitors were: **Aerospatiale** and a version of its ASMP called ASMP-C (Conventional), and recently renamed ASURA, which was offered after

its loss to Matra for the French APTGD requirement, but the company withdrew from the CASOM competition; **British Aerospace**, which could have offered the MANTIS (MAN-in-the-loop Target Interdiction System) or the Golden Eagle (a modified Sea Eagle), teamed with Matra to offer the Storm Shadow; **Brunswick** and LOCLAD (Low Cost-Low Altitude Dispenser), but no offer was made; **CASMU** and Skyshark, but again no offer was made; **Daimler-Benz Aerospace SA**, with Hunting Engineering and Bofors, which are offering a member of their new TAURUS family of weapon systems which is based on the DWS39 – this system incorporates an earlier proposal designated KEPD 250 (Kinetic Energy Penetrating Destroyer 250), which is a 250 km version of its DWS dispenser system with a flying gun (see separate entry) warhead for deep penetration of hardened targets; **Hughes** (now part of Raytheon) with a modified BGM-109 Tomahawk, called Airhawk, the airframe incorporating a Teledyne Continental J402 and a guidance system made up of a global positioning system receiver/inertial navigation system and imaging infrared seeker and datalink (Hughes is teamed with Smith Industries); **Kentron** of South Africa, which was considering offering the MUPSOW (Multi-Purpose Stand-Off Weapon), but instead teamed with GEC-Marconi; **Lockheed Martin** and an entry based on its Tri-Service Stand-off Attack Missile (TSSAM) competition candidate which was considered, but with no offer being made; **Loral Vought Systems** (now part of Lockheed Martin) and its ALCAM version of the ATACMS, but the company declined to become involved; **Matra** and an APACHE-based proposal called Storm Shadow involving BAe; **McDonnell Douglas** (now part of Boeing) and a modified AGM-84E SLAM, based on the SLAM-ER design, known as Grand SLAM (McDonnell Douglas is teamed with Hunting Engineering and is considering allowing GEC-Marconi to provide the IIR seeker), although its final proposal was called Grand SLAM Plus; **Rafael** and **Lockheed Martin**, which could have made a cooperative proposal, but Rafael decided to offer an enhanced Popeye on its own; **Rockwell** (now part of

Boeing), which decided not to bid its extended-range AGM-130 equipped with a turbojet (a dispenser capability is being studied), or to team with British Aerospace; **Saab Missiles**, the Autonomous Stand-Off Missile, which option was dropped in favor of a joint bid with Daimler-Benz Aerospace; **Texas Instruments** (now part of Raytheon) and a version of its AGM-154A Joint Stand-Off Weapon (JSOW) system, called Griffin 36, in cooperation with Shorts Missile Systems; and **GEC-Marconi**, with a version of its El Hakim air-to-surface missile, developed for the United Arab Emirates. GEC-Marconi was intending to submit a joint bid with BAe based on the El Hakim, called Pegasus, although the latter is said to be the designation being used by the CASOM entry. The Pegasus was to be equipped with a BROACH warhead and use a updated version of the Microturbo TRI 60 that powers the Sea Eagle anti-ship missile. Matra was also rumored to have been interested in jointly bidding with BAe and GEC-Marconi, possibly resulting in one based around the APACHE. However, the BAe-GEC arrangement eventually collapsed, and each is pursuing its own bid independently. GEC-Marconi then teamed with Kentron.

The flying gun warhead is based on the Davis Gun principle, in which the warhead has a penetrator that is fired from the front of the missile at a set distance from the target. This increases the warhead's impact speed by one-third. The rest of the missile acts as a counterweight. On hitting the target, a shaped charge in the nose of the penetrator detonates to weaken the targeted structure, allowing a second charge to penetrate and explode within the target.

ST(A) 1241. This Air Staff Target calls for the development of a stand-off weapon able to engage moving targets (armored vehicles). If the requirement is endorsed and a weapon developed, this would fill the role originally intended for the guided cluster bomb developed in the late 1970s to meet the requirements of AST 1227, but later canceled due to technical problems. This requirement could be fulfilled with the system selected to meet the CASOM requirement.

## Funding

Overall, the CASOM could cost the UK Ministry of Defence over \$1 billion. However, budget cuts did take away any sense of urgency concerning the UK's procurement of a stand-off weapon, and a firm timetable for such an acquisition never was established. The CASOM has been under pressure since priority was given to funding the Eurofighter 2000 program.

## Recent Contracts

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The United Kingdom selected the Matra BAe Storm Shadow to meet its CASOM requirement in late 1996. A contract worth about £700 million (\$1.13 billion) was awarded in February 1997. This contract could involve the production of between 500 and 1,000 missiles.

## Timetable

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| <u>Year</u>         | <u>Major Development</u>  |
|---------------------|---|
| 1980s               | Cooperative NATO MSOW design effort terminated                    |
| 1980s               | NGAST 1236 frozen   |
| 1990-91             | Operation Desert Shield/Desert Storm                              |
| 1991-92             | CASOM announced   |
| 1994                | CASOM RFP issued  |
| 1996                | Matra and British Aerospace wins CASOM contract with Storm Shadow |
| 2001 <sup>(a)</sup> | Initial service entry of CASOM with the UK RAF                    |

<sup>(a)</sup> estimates

## Worldwide Distribution

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Securing the CASOM contract could help boost export sales of the APACHE/Storm Shadow. Potential export opportunities open to this system include Germany, Italy and certain Middle Eastern countries.

**User Country(s).** The **United Kingdom's Royal Air Force** is the initial operator of the SR(A) 1236 CASOM system.

## Forecast Rationale

Although the new Labour government has restructured defense policy in the United Kingdom, it has not commenced the wholesale cutting of procurement programs as some had once predicted. Defense spending in the United Kingdom remains relatively stable with no major weapon system program having been terminated.

The acquisition of the Storm Shadow remains a high priority for the United Kingdom, especially in light of the December 1998 raids on Iraq. Since Operation Desert Storm, the United Kingdom has known that it needs a stand-off missile if it is to participate in any similar future military action. As long-range stand-off missiles increasingly become the weapon of choice when diplomacy fails, London believes that it cannot afford to be without such a system in its arsenal.

The first Storm Shadow should enter service with the Royal Air Force just after the turn of the century. The UK Storm Shadow contract may involve the procurement of between 500 and 1,000 missiles. The final number purchased by the United Kingdom most likely will fall somewhere in between.

A UK Storm Shadow purchase could help stimulate export interest. Matra BAe Dynamics is already pitching this missile family to potential countries in the Middle East where it believes a market for upwards of 200 to 300 missiles may exist. Questions remain as to whether or not the Storm Shadow violates the Missile Technology Control Regime (MTCR), which could delay, or even derail, any planned export sales of these missiles.

# Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

| Missile            | (Engine) | thru 98 | <u>High Confidence Level</u> |    |    |    | <u>Good Confidence Level</u> |    |    |    | <u>Speculative</u> |    |     | Total 99-08 |
|--------------------|----------|---------|------------------------------|----|----|----|------------------------------|----|----|----|--------------------|----|-----|-------------|
|                    |          |         | 99                           | 00 | 01 | 02 | 03                           | 04 | 05 | 06 | 07                 | 08 |     |             |
| MATRA BAe DYNAMICS |          |         |                              |    |    |    |                              |    |    |    |                    |    |     |             |
| STORM SHADOW       | TRI 60   | 0       | 37                           | 61 | 87 | 88 | 87                           | 90 | 92 | 91 | 84                 | 77 | 794 |             |
| Total Production   |          | 0       | 37                           | 61 | 87 | 88 | 87                           | 90 | 92 | 91 | 84                 | 77 | 794 |             |