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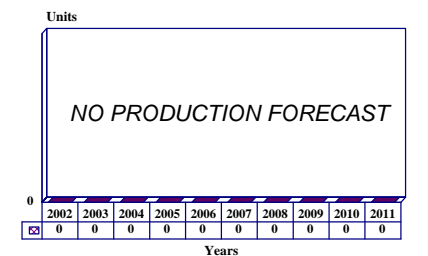
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Starburst - Archived 2/2003

Outlook

- No longer in production
- UK frontline units replaced their Javelins with the Starburst
- Starburst was deployed with the UK expeditionary forces during Operation Desert Storm (1990-1991)
- The Starburst is expected to be superseded by the new Starstreak
- Starstreak will meet UK close-range air defense needs into the next decade

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. Multipurpose surface-to-air missile system.

Sponsor. The United Kingdom's Ministry of Defence.

Contractors. Short Brothers plc, Defense Systems Division, Belfast, Northern Ireland, United Kingdom. In 2000, Thomson-CSF took full control of Short Missile Systems, buying Bombardier's share of the joint venture. Thomson-CSF has since changed its name to Thales, and Shorts to Thales Air Defence Ltd.

Status. In service with the British Royal Army since early 1990. This system saw service during the recent Gulf War (Operation Desert Storm) against Iraqi combat aircraft. Operator tracking accuracy has increased by some 10 percent over that of the Javelin, although the Starburst is not backwardly compatible with its predecessors (Blowpipe and Javelin). The Starburst was deployed with the UK 10 Air Defence Battery, Royal Artillery, during Operation Desert Storm. Such units are usually equipped with 36 missile launchers.

Total Produced. Starburst's production total was estimated at 13,389 as of the end of 2000. There were no specific figures pertaining to the number of Starburst missiles manufactured by Shorts until recently. Production was thought to be in the area of 3,000-4,000 units until Shorts released new figures stating that some 10,000 Starburst missiles had been manufactured. There is a possibility that the vast majority of Starburst missiles manufactured by Shorts might be reworked Javelins. The UK inventory of Javelin missiles has been placed at more than 8,000 missiles. British Territorial Army units began a conversion program to the Javelin missile in 1988.

Application. Manportable surface-to-air missile systems for use against close-range, low-level hostile aircraft attacking or egressing from the target area. The missiles are equally effective against helicopters.

Price Range. Although Shorts has declined to provide specific Starburst pricing information, the system is believed to cost in the area of \$100,000 per missile. However, a price of \$255,755 was mentioned in association with the South Korean competition.

Technical Data

	<u>Metric</u>	<u>US</u>
Dimensions		
Missile Length	139 cm	54.9 in
Missile Diameter	197 mm	7.75 in
Missile Weight (basic)	15.2 kg	33.4 lb
Aiming Unit	8.5 kg	18.7 lb
Performance		
Speed	Mach 2	Mach 2
Range (min)	500 m	1,640 ft
Range (max)	4,000 m	13,120 ft
Altitude	3,000 m	9,840 ft

Propulsion. The Starburst uses the same propulsion system as the Javelin. The Javelin uses an enhanced-performance propulsion system similar to that of the early Blowpipe (a Royal Ordnance/Imperial Metal Industries tandem double base solid-propellant booster and sustainer, the latter designated Crake). Upon triggering by the operator, thermal batteries in the aiming unit charge up, and, after about one second, initiate the first-stage motor to eject the missile from the tube. Motor burn duration is 0.2 seconds, ensuring that ignition is complete before the missile leaves the tube; when at a safe distance from the operator, the second-stage booster motor ignites, accelerating the missile to supersonic speed. A self-destruct facility is incorporated.

Control & Guidance. The major change to the Starburst in comparison to the Blowpipe/Javelin is in its guidance system. The Blowpipe is equipped with command-to-line-of-sight control, while the Javelin is outfitted with a semi-automatic command-to-line-of-sight (SACLOS) guidance. The SACLOS system allows the aimer to track the target only, while the missile automatically tracks to the sighted target. In the initial flight stage, Blowpipe is automatically gathered into the operator's line of sight by infrared (IR) tracking of exhaust flares. The operator guides the missile by tracking the target and steering the missile via a thumb control, flight instructions being transmitted to the missile by radio link. Steering and stabilization control is via four canard fins, with one pair providing roll control and the other providing yaw and pitch control.

For Javelin, SACLOS guidance means that the operator does not have to steer the missile in flight using the thumb-stick control, but simply retains the target within the aiming sight (red circular reticula); the missile is tracked onto its target by automatic commands. In the event of a sighting failure, the integral TV camera system tracks the missile flares and sends an "error

signal" by command link to the missile, adjusting its flight trajectory as required. SACLOS also increases Javelin's accuracy and reduces its minimum intercept range from 700 meters to 300 meters.

The Starburst incorporates guidance technology developed under the Starstreak program. Starstreak uses an undesignated SACLOS system that employs a laser beam. Avimo is the contractor for the electro-optical tracking system. However, as the Starstreak's main rocket motor burns out and the nose cone detaches (the three darts carried within automatically separate and begin to home in on the target), the Starburst remains in one piece.

The Starburst missile uses formation within a narrow 2D matrix established by two laser beams: one scanning horizontally, the other vertically with the line of sight as the axis. The Starburst is expected to use the matrix to improve hit probability. Target tracking and missile guidance are accomplished by either an electro-optical or a millimetric radar tracker (for more information please see the **Program Review** section).

The manportable Starburst model uses a Simrad Optronics Ltd (Crawley, England) image intensified sight system, while the lightweight multiple launcher is fitted with a thermal imaging sight produced by Thorn EMI Electronics Ltd, Feltham, England.

Launcher Mode. Manportable, shoulder-launched. In the manportable mode the missile comprises a single ready-to-fire missile in a hermetically sealed fiberglass container plus an aiming unit consisting of a monocular sight, guidance and firing controls. The aiming unit is clipped to the missile container and the system is ready to be used. After a round is fired, the aiming unit is disconnected, and the launch tube is discarded. The Starburst is being offered in four different launch configurations: shoulder-fired (one ready-to-fire missile); Lightweight Multiple Launcher (pedestal with three missiles); Naval Multiple Launcher (NML with

eight missiles); and mounted on a Stormer tracked vehicle (with eight missiles).

Warhead. The Starburst uses the same warhead as the Javelin: a high-explosive/fragmentation type with a

combination impact/proximity fuse. Two dual-purpose charges are used. One is shaped and one is blast type, each weighing approximately 1.81 kilograms (4 lb).

Variants/Upgrades

Starburst itself is a variant of the Javelin air defense missile system. However, additional Starburst upgrades are being developed. Shorts may add a radar proximity fuse, which is being developed by Thomson-CSF. According informed sources, the proximity fusing distance is increased by around 400 percent, about the maximum potential of the prefragmentation blast warhead. This fuse became available for integration

with the Starburst missile in early 1992. Other innovations include the introduction of a Crompton Eternacell Ltd (formerly Crompton Vidor) non-rechargeable lithium sulfur dioxide battery pack as an alternative to the three rechargeable NiCad batteries currently used to power the aiming unit. Though more expensive, it has a greatly increased life and obviates the need to carry spare batteries and a charging unit.

Program Review

Background. The Starburst program is an outgrowth of the British experience during the Falklands War. During this war, the British military encountered its own nationally produced Blowpipe anti-aircraft missiles in the hands of Argentinian soldiers. According to informed sources, the UK government commenced a development program to provide a jammer to neutralize command guided missiles (such as Blowpipe). However, the British authorities, considering the wide deployment of the Blowpipe and Javelin systems (both command guided systems), decided not to deploy a countermeasures capability that would highlight a theoretical vulnerability of its own weapons.

Instead, the United Kingdom initiated a new missile development effort that combined aspects of existing systems (Javelin) and developmental weapons (Starstreak). The Starburst integrates the Javelin missile with the laser optical command guidance technology of the new Starstreak, as part of an in-house project designated S15 (Starstreak had the designation S14). The British government viewed the imminence of the threat from radio command guidance system jammers to be sufficient to commission Shorts to proceed with S15 parallel with the S14 Starstreak.

Starburst. The Starburst uses the Javelin missile and aiming unit as its basis, but integrates the Starstreak laser command guidance system. Apart from differences in overall speed, the two missiles (Starstreak and Starburst) have substantially different configurations. In the Starburst's case, the missile body, containing the first- and second-stage motors, high-explosive warhead, and forward-mounted steering surfaces plus actuators, remains a single entity throughout its flight (the Starstreak slowly separates during flight). The Javelin's rear tail section is taken up

by the rocket exhaust nozzle plus housings for the four infrared (IR) tracking flares associated with the charge-coupled device (CCD) television guidance system. Four whisker antennas mounted on the missile forebody are used to receive course corrections from the ground, the signals being passed via a receiver adjacent to the forward-positioned onboard guidance control system.

In integrating the Starstreak laser optical command system, a similar forward receiver position could not be used, since the rear of the Javelin missile might otherwise screen it from the ground-based guidance unit during in-flight maneuvers. In order to address this problem, Shorts added two strap-on pods, similar in size and function to the rear portion of the Starstreak dart, to the Javelin tail unit, thereby avoiding any major redesign of the missile itself. The electrically interlinked pods, which are fitted to ensure redundancy and circumvent any possible screen effects, incorporate a laser receiver, a signal processor, and a transmitter. The latter, in the nose of the pod, relays command uplink data from the ground to the electronics control unit at the forward end of the missile. These optical signals are detected by pop-up antennas connected to the electronic control unit, which is essentially unchanged apart from necessary software modifications.

No further alterations are required. The other major Javelin components (such as the two-stage rocket motor, dual mode fuse, or fragmentation warhead) remain the same. However, the redundant infrared flares were removed.

The Starburst aiming unit is outwardly also little changed, though the original CCD television tracker has been supplanted by a new laser transmitter, which, in effect, turns the missile into a laser beamrider. According to media reports, the operating principle of

the Starburst aiming unit is very similar to that of the Starstreak. The latter contains two laser diodes: one scans vertically and the other horizontally to establish a two-dimensional matrix in which the three Starstreak darts are disposed. However, since the Starburst is not equipped with the Starstreak warhead darts, the missile probably places its attack aiming point in the center of the matrix.

SR2000. Shorts Missile Systems and Radamac Defence Systems have jointly developed a new integrated air defense missile system for installation on naval vessels (from patrol boats to corvettes and auxiliaries). The new system, designated SR (Shorts/Radamac) 2000, combines the Shorts Starburst air defense missile system with a Radamac's 2400 electro-optical tracking system. The electro-optical tracker comprises a television camera, a thermal imager, and a laser rangefinder. The entire assembly, including six ready-to-fire missiles, weighs 750 kilograms; it is capable of

tracking targets out to ranges of 12 kilometers and can be operated by a single person. The system also has a limited anti-ship missile capability. Shorts and Radamac have already targeted 10 potential customers, including countries in the Middle East and Far East.

The SR2000 could also be used as the basis for fulfilling the United Kingdom's requirement for an Inner Layer Missile System (ILMS) for its new Horizon Common Next Generation Frigate (CNGF). Previously referred to by the UK Royal Navy as the Very Short Range Air Defense (VSRAD) system, the ILMS is to operate within the envelope of the PAAMS as a last-ditch defense. Italy was to be involved in the program, but backed out in 1992. France has a similar requirement and could cooperate with the United Kingdom in providing for it. However, the missile used could be the maritime version of Starstreak known as Seastreak.

Funding

No specific funding information has been provided by the UK Ministry of Defence. Shorts has also been reluctant to release funding figures on Starburst.

Recent Contracts

No contract announcements have been made by the British government or Short Brothers concerning the Starburst development/production program.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Mid	1980s	Development of Starburst well under way at Shorts
	1986	First Starburst shoulder launch
	1986	Development completed
	1989	Starburst enters service with Royal Army
		Initial deliveries under way
	1990-91	Starburst deployed to Saudi Arabia with British Expeditionary Force
	1992-93	Malaysia orders Starburst
	1994	Kuwait orders Starburst
	2000-2001	Production concluded

Worldwide Distribution

The Starburst could be marketed to operators of the Javelin as an upgrade to existing systems, in addition to potentially new customers. The prime Javelin users are the UK Royal Army and Royal Marines, although the Royal Navy has placed an order. Current operators of Javelin outside of the United Kingdom include two undisclosed countries – one in Africa and one in the Middle East (believed to be Jordan) – and **Malaysia**. The Malaysian purchase is part of an overall \$1.84 billion contract to purchase UK military equipment.

User Country(s). The **UK Royal Army, Kuwait, Malaysia, Qatar, Thailand**, and at least one unidentified country are presently operating the Starburst system. **Canada** has been named as one of the previously unidentified user countries.

Forecast Rationale

Although production of Starburst has been concluded, the British Army and other current operators are expected to keep this missile in service beyond 2010. Still, the arrival of the next-generation Starstreak has

caused Thales to cease actively marketing the Starburst to prospective overseas clients. No additional Starburst orders, either foreign or domestic, are anticipated.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Missile	(Engine)	High Confidence Level			Good Confidence Level			Speculative			Total 02-11		
		thru 01	02	03	04	05	06	07	08	09		10	11
THALES													
STARBURST (a)	UNSPECIFIED	13389	0	0	0	0	0	0	0	0	0	0	0
Total Production		13389	0	0	0	0	0	0	0	0	0	0	0

(a) Thru years do not include RDT&E units.