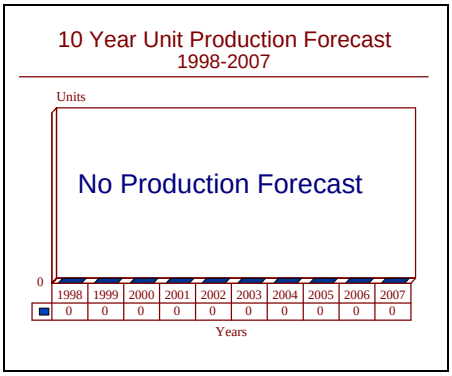
Outfit DEC - Archived 6/99

Outlook

- Believed in service with UK only
- International banning of anti-personnel laser weapons has restricted use/sales
- **BARRING NEWS OF ACTIVITY IN THE OUTFIT DEC PROGRAM, THIS REPORT WILL BE DROPPED NEXT YEAR (1999)**



Orientation

Description. Laser Dazzle Sight: a radar-directed or manually directed high-energy laser intended to blind pilots of attacking aircraft.

Sponsor

United Kingdom Ministry of Defence
St. George's Court
14 New Oxford Street
London WC1A 1EJ
United Kingdom
Tel: +44 171 632 6014

Contractors

Irwin Desman Ltd
Eurocrown House
23 Grafton Road
Croydon CR9 3AZ
United Kingdom
Tel: +44 181 686 6441
Fax: +44 181 681 8429

Licensee. No production licenses are known to have been granted.

Status. Production has likely ended.

Total Produced. An estimated 14 systems were built.

Application. All UK Royal Navy warships, including Type 42 destroyers, Type 22 and 23 frigates, Invincible class aircraft carriers and various auxiliaries, can potentially be fitted for Outfit DEC. Suitability for installation in maritime patrol aircraft and shipboard helicopters, as well on tanks, has been suggested but is not believed to have been exploited.

Price Range. The unit cost of these systems is as closely guarded a secret as the rest of the program, and could not be estimated since no well-revealed in-service systems have comparable capabilities.

Technical Data

	Metric	US
Characteristics		
Unit length:	1.5 m	5 ft
Maximum range:	5 km	2.7 nm

Main operating wavelength:	400-700 nanometers
Secondary operating wavelength:	700-1,400 nanometers

Design Features. Little specific data on the design features of Outfit DEC have been made available. Examination of photographs of the original Outfit DEC naval variant revealed it to be a twin mount. The original prototypes tested aboard HMS *Euryalus* and subsequently deployed to the ships participating in the Falklands campaign were directed by a pair of binoculars mounted on the rear of the system.

A more advanced generation of systems was developed as a result of combat experience in the Falklands. Photographs of Royal Navy warships taking part in the Persian Gulf War showed that the outward appearance of Outfit DEC had changed markedly since the system was first disclosed. The version then sighted consisted of a single laser in a rectangular housing. This was fitted with carrying handles and a rubber-covered manual sight. The mounting was more substantial (a strong indicator of power traverse rather than free-swinging), and the whole system had a more "finished" appearance. These systems were linked to, and targeted by, the Type 1007 radars forming part of the ships' onboard radar suite. This implies that the latest versions of Outfit DEC use a powered mount but retain the ability to revert to manual control. The new version is substantially longer-ranged than the original equipment. It has also been revealed that the Outfit DEC operates at a main and secondary wavelength spectra, a design intended to defeat protective lens coatings or other defensive measures.

Forecast International visited HMS *Gloucester* on its return from the Gulf. Although the Outfit DEC units had been removed by that time, the bridge-wing locations were clearly apparent. Cabling runs confirmed initial speculation that the Outfit DEC mounts were power-operated, as did alert notices that the mounts could train without warning. Signs warning that the electro-optical equipment presented extreme hazard to eyesight also had not been removed. Finally, it was apparent that the Outfit DEC equipment was slaved to the Type 1007 navigational radar, not the Type 911s; though uncharacteristic, this may reflect a desire to reduce the combat load on the Type 911 radars by exploiting the inherent, but largely unused in Royal Navy service, fire-control capabilities of Type 1007.

In British Army use, a prototype Laser Dazzle Sight was a single laser mounted alongside, and coaxial with, the 120 mm cannon on the Chieftain and Challenger main battle tanks. This was a very simple, experimental installation using the tank's existing fire-control system. It is believed that further tank application was not pursued.

Operational Characteristics. Outfit DEC is a blue-light laser directed at the canopy of an aircraft, illuminating it and "dazzling" the pilot. If the attacking aircraft is equipped with a head-up display, the optics of the HUD cause the full power of the laser to be concentrated into the pilot's eyes. The system causes blindness by burning out the optic nerves, thermally bleaching the retina, and/or rupturing the blood vessels inside the pilot's eyes.

Variants/Upgrades

It appears that two types of this system have been fielded. The original Outfit-DEC is a simple, manually pointed system used in the Falklands. It has appeared on mine warfare vessels, amphibious warfare ships and underway replenishment vessels. A more "finished" and complex version was originally associated mainly with Seawolf-equipped ships, but subsequently spread to other British frigates and destroyers.

Program Review

Background. The development of the Laser Dazzle Sight, or Outfit DEC, for the Royal Navy is believed to date from 1981. Prototype systems were made available for early trials that same year. These were carried out by HMS *Euryalus* in the Irish Sea. The success of these tests can be judged from the fact that a year later the high-value ships deployed to the Falkland Islands, including HMS *Hermes*, HMS *Invincible*, HMS *Brilliant* and HMS *Broadsword*, all carried the Outfit DEC. It is believed that Outfit DEC was instrumental in the destruction of three Argentine A-4B Skyhawks during the Falklands campaign, two crashing during their attack runs and the third "wandering erratically into friendly AA fire."

Following the Falklands campaign, Outfit DEC installation extended to other ships in the fleet. In 1987/1988, Royal Navy warships assigned to patrol in the Arabian Gulf were fitted with DEC systems for the duration of their duty. It was when HMS *Beaver* and HMS *Brazen* were photographed with their Outfit DEC systems uncovered that the existence of Outfit DEC was first revealed.

British Army experimentation with Laser Dazzle Sight technology followed that of the Navy. It followed an extensive debate in MoD circles over the relative merits of hard-kill and soft-kill systems. At that time, the widespread introduction of Chobham-style composite armor and the deployment of Soviet and Israeli explosive reactive armor systems made the development of efficient tank-killing munitions questionable. Laser Dazzle Sight technology offered the possibility of knocking out a tank by blinding the crew, without actually destroying the vehicle. These experiments are reported to have started in 1983. In 1989, a number of Challenger tanks were seen at the Army's Armored Trials and Development Unit (Bovington) with an LDS module mounted on the side of the gun barrel. At that time, UK MoD sources stated that, while the system had been extensively tested, it had not been deployed to front-line British units. The British Army appears never to have adopted any Outfit DEC-style solution.

During the 1991 Persian Gulf War, all deployed UK Royal Navy warships, including minesweepers and amphibious warfare vessels, were equipped with Outfit DEC. In mid-March 1994, Forecast International visited Portsmouth Naval Base in the UK and was able to photograph the Royal Navy underway replenishment ship RFA *Olmeda* using a telephoto lens. Examination of the photographs revealed the ship was mounting two Outfit DEC systems (of the newer type) on the forward superstructure, and that one of the three Racal 1226 navigation radars had been replaced by a Type 1007.

In early 1994, the International Committee of the Red Cross renewed its campaign to have laser weapons such as Outfit DEC banned. The ICRC argued that "they are weapons calculated to cause unnecessary suffering." This ICRC claim is based on Article 23 of the 1907 Hague Convention on Land Warfare, initially aimed at banning explosive or poisoned bullets.

In mid-1994, UK Junior Defense Minister Viscount Cranbourne stated in the House of Commons that he refused to rule out the future development of a portable laser weapon aimed at inflicting temporary blindness. This statement was made in response to reports issued by the ICRC accusing the British (among others) of developing portable weapons aimed at causing permanent blindness. Early in 1995, the UK MoD stated that "a major objective of the Department's laser research program is to understand the threat and develop appropriate countermeasures. The UK has no plans to develop, test or procure a laser weapon designed to permanently blind human targets. The feasibility of making use of temporary blinding effects was investigated in 1983 and tests on one system were conducted which were subsequently discontinued." The date given suggests that this refers to the British Army experimental variant of the system rather than the Royal Navy's Outfit DEC.

In 1995, the "Vienna Protocol" was adopted internationally, strictly prohibiting the use and transfer of anti-personnel lasers, those laser weapons designed for the purpose of causing permanent blindness in humans. National leaders are also exhorted to have their armed forces guard against permanent blinding through the legitimate use of other laser systems. There is no restriction on the development of lasers as electronic countermeasures.

The US has halted development of its laser weapons specifically intended to cause blindness. For example, after awarding a $12 million engineering and manufacturing contract to Sanders in late 1995 for the Laser Countermeasures System (LCMS), the Army canceled the program. No electro-optical countermeasure (EOCM) system has entered production in the US. Humanitarian concerns have led the US Army to seek methods in which the EOCM laser output is controlled to meet eyesafe criteria.

The threat of eye damage caused by lasers was spotlighted again in April 1997, when a US Navy intelligence officer sustained a retinal injury consistent with exposure to an Nd-YAG laser. The suspected source was the nearby Russian freighter *Kapitan Man*, but evidence was inconclusive.

Now that the concept of laser weapons has been introduced to the battlefield, the need to counter such systems has become apparent. To this end, the UK MoD placed a contract for the development of laserproof spectacles for pilots with the Institute of Aviation Medicine. These spectacles, available to Royal Navy, Royal Air Force and British Army pilots since the mid-1990s, employ reflecting filters.

Funding

The value and source of funding for this program have not been identified.

Recent Contracts

No contractual information has been made publicly available.

Timetable

Year	Major Development
1981	Development believed to have started; initial Royal Navy trials
1982	Combat use in Falklands campaign
1983	British Army trials of laser dazzle-type system
1987	Deployed on warships serving in Arabian Gulf
1990	Existence of Outfit DEC publicly revealed
1991	Outfit DEC deployed in Persian Gulf War
1995	Vienna Protocol banning use and transfer of anti-personnel lasers

Worldwide Distribution

As far as is known, Outfit DEC is limited to the **UK** Royal Navy.

Forecast Rationale

Only the UK Royal Navy is believed to possess Outfit DEC, and tight security restrictions limit the amount of information available about it. The system was produced in limited numbers in the 1980s, and it is not known when or if production ended. Yet the Royal Navy may continue to carry Outfit DEC, perhaps with claims that the laser's effects are only temporary. The internationally sanctioned prohibition seems to leave a bit of room for some weapons, perhaps including this one, to slide by and remain quietly within reach of their battle stations.

Like other nations, however, the UK continues to explore ways to utilize lasers in electronic warfare: As reported in *Flight International* (November 13-19, 1996), the Ministry of Defence has sought an advanced laser designed to defeat imaging-infrared-guided or electro-optically guided anti-ship missiles. It would enter service in about 10 years.

While the US has shown its willingness to comply with the Vienna Protocol, enforcement in other nations will be difficult. China, for example, has openly marketed an Outfit DEC-like weapon, the ZM-87 Portable Laser Disturber, and promoted its use for blinding human beings. The technology used is easily accessible to any nation with the desire to produce the equipment. Other countries, such as France, Russia, Germany and Israel, are widely thought to have pursued and even advertised EOCM or anti-personnel weapons covertly.

Clearly, this is a field that deserves continued attention. Outfit DEC has raised interesting arguments about what kinds of weapons are allowable in modern warfare. This report has been useful as a springboard for such discussions, but it only concerns one program active a decade ago for the UK Royal Navy. The system itself has not been newsworthy as a marketable technology, and the report can no longer be sustained. It will be archived next year.

Ten-Year Outlook

No further production is forecast. **BARRING NEWS OF ACTIVITY IN THE OUTFIT DEC PROGRAM, THIS REPORT WILL BE DROPPED NEXT YEAR (1999).**

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