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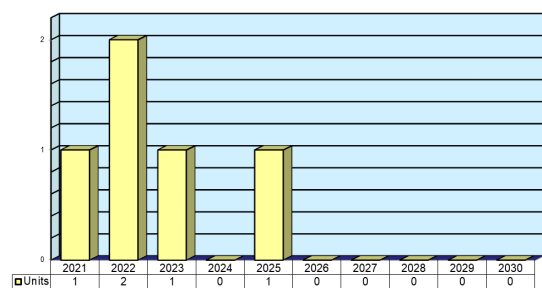
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TIALD

Outlook

- Although still in service, TIALD is being overtaken in the market for new installation by more advanced programs such as the Litening pod
- Demand for TIALD likely limited to spares and replacements for non-U.K. users

Unit Production Forecast
2021-2030



Orientation

Description. The Thermal Imaging/Airborne Laser Designator (TIALD) pod is designed to provide military aircraft with laser designation and automatic target tracking capability, using both infrared and TV sensor data to maximize laser-guided and conventional munitions.

Sponsor

Ministry of Defence
Contracts Branch CB/TOR31A
Room 614, St. George's Ct
14 New Oxford St
London WC1A 1EJ
United Kingdom

Licensee. No known production licenses have been issued.

Status. Possible limited production and service.

Application. The TIALD pod was designed for deployment on Tornado GR1/GR4 bombers, Jaguar GR1/GR5 strike aircraft, and Harriers.

Price Range. A single TIALD system is believed to cost approximately GBP1.54 million (\$2.3 million).

TIALD**Contractors****Prime**

Leonardo SpA	http://www.leonardocompany.com/en , Piazza Monte Grappa, 4, Rome, Italy, Tel: + 39 06 324 731, Fax: + 39 06 320 8621, Prime
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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**Characteristics**

Field of view	3° and 12°
Average power requirement	2 kW
Peak power requirement	2.9 kW
Altitude limits	30 m to 6,000 m

Dimensions

	<u>Metric</u>	<u>U.S.</u>
Length	2.6 m	8.6 ft
Diameter	0.305 m	1.0 ft
Weight	210 kg	462 lb

Design Features. The forward section of the pod contains a thermal imager, TV sensors, a telescope, and a laser designator transceiver unit. The pod also has a standard TV video camera and a thermal imaging forward-looking infrared system and allows the operator to switch at will between TV and FLIR imagery. (This proves exceptionally useful in target identification and in compensating for extreme variations in local weather conditions.)

The laser designator uses a neodymium-YAG (Nd/Yag) laser, which is not eyesafe. To compensate, GEC-Marconi (now BAE Systems) proposed adding a Raman cell that would shift output from 1.064 microns to 1.54 microns, at a cost to system performance. When installed, it would permit the pilot to switch to eyesafe operations for training but back to normal mode for operational flights.

It should be noted that in 1995, the U.K. signed Protocol IV of the Convention on Certain Conventional Weapons (CCWC), also known as the Vienna Protocol, which prohibits the use of blinding lasers. It appears that non-eyesafe lasers are considered borderline blinders. Many nations are now developing eyesafe laser systems or modifying existing lasers to meet the eyesafe requirement. It is believed that TIALD has also been rendered eyesafe since the signing of the CCWC.

Operational Characteristics. TIALD is compatible with all existing NATO laser-guided weapons. In normal operation, a target is acquired and autotracked using a wide field of view; then the operator switches to the narrow field of view for identification and designation. TIALD is designed for buddy operation. Typically, one aircraft in four is TIALD equipped so that a pod-equipped aircraft can designate for the other aircraft.

Variants/Upgrades

A version called TIALD 500 was introduced in March 2001. This upgrade features improved standoff ranges and a second-generation thermal imager.



German Navy Tornado Bombers

Source: German Navy

Program Review

Background. The first group of Jaguar GR1B aircraft equipped with TIALD pods entered full operational service in July 1995. These were immediately assigned to operations in support of U.N. initiatives in Bosnia. The aircraft reportedly took part in air strikes in late 1995 and in subsequent operations.

The Royal Air Force announced in August 1996 that it would give its fleet of Tornado GR4s an MLU, including night vision goggle enhancements, head-up / head-down displays, updated computer architecture, GPS navigation suites, covert radar altimeters, EW self-protection enhancements, video recorders, and the TIALD thermal imaging system.

System Becomes Important Element of Upgraded Aircraft

These systems were intended to function in tandem to facilitate the integration of the RAF's precision-guided weapons, which are still in development. The upgraded GR4s were intended to be the intermediary step between the GR1 and the Future Offensive Aircraft, which were expected to enter the market around 2015. Deliveries of the upgraded aircraft began in 1998 and were completed by late 2002.

In 1996, the RAF decided to equip its SEPECAT Jaguar GR1B aircraft with a helmet-mounted display, intended to work in conjunction with the TIALD system already installed on these aircraft. In addition, flight trials of a TIALD system mounted on a Harrier GR7 began. BAE secured a contract with the

U.K. MoD to integrate the TIALD into the Harrier and then began trials to find the best position for the pod, either on the fuselage or on the wing pylons, taking into consideration the vibration and stress caused by the forward set of engine nozzles.

In May 1998, it was announced that the Royal Air Force of Oman had ordered three TIALD pods for use on its SEPECAT Jaguar aircraft. The value of the order was not announced; however, based on previous contracts, this order was presumed to total approximately \$7.5 million.

Signs of Trouble as TIALD Fails to Meet Expectations

After BAE Systems delivered the first 50 MLU Tornados, coded GR4 instead of GR1, realization set in that TIALD could not be operated by the enhanced systems of the aircraft. Therefore, the Tornados were unable to drop laser-guided bombs, meaning they could not take part in operational exercises where precision is of the utmost importance.

Those problems came to a head in February 2000, when it was reported that the U.K. Ministry of Defence and BAE Systems were arguing over who was to blame for the TIALD problems. The U.K. MoD reportedly stated that the problem was not very serious and that it was just a small blemish on an otherwise successful upgrade program. The RAF disagreed strongly based on the premise that the operational success of the aircraft depended heavily on the TIALD system working

TIALD

properly. Industry reportedly laid the blame with the MoD, since the introductory upgrade contract did not require the capacity to use the TIALD system.

The dilemma was addressed again in March 2000, when it was reported that the U.K. RAF had publicly defended the MoD's practices with respect to the Tornado GR4 upgrade. The problem would apparently be corrected by the insertion of a new software package. All 142 MLU 93 Tornados are expected to receive the new software package.

TIALD was identified in the spring of 2000 as the targeting pod for the RAF's fleet of Eurofighter Typhoons. The installation work was scheduled to run through 2015. At least a quarter of the Typhoon fleets of Germany, Italy, and Spain were expected to be similarly equipped.

In January 2001, BAE Systems started developing a technology testbed for a future TIALD replacement. The company was in the process of delivering equipment to the U.K. Defence Evaluation and Research Agency to improve the accuracy of electro-optical avionics systems. As part of this work, the Anglo-French Joint Airborne Night Navigation and Attack (JOANNA) system was identified as TIALD's future replacement demonstrator.

TIALD Keeps Current with New, Improved Version

By March 2001, work on JOANNA had begun to yield a fourth-generation pod now known as ASTRID (Airborne System for Target Recognition, Identification, and Designation). Perhaps as an outgrowth of this work, it was also announced that TIALD upgrades were moving toward the creation of a

Model 500 series equipped with a second-generation thermal imager to improve standoff ranges.

Under a contract awarded by the U.K. Royal Air Force in July 2001, BAE Systems began upgrade work on the TIALD for the service's Harrier, Jaguar, and Tornado aircraft. TIALD will be modified to the enhanced 5/Series 500 standard. No contract amount was provided, and the completion date was not disclosed.

BAE Systems announced in October 2001 that it had delivered the 100th MLU Tornado GR4 with TIALD pods to the RAF. At that time, the revised 2003 completion date for the entire program was reasserted. BAE Systems touted the inclusion of TIALD aboard these aircraft and said that with the introduction of improved production methods, the 100th aircraft conversion had been completed in just 32 weeks, a significant improvement over the 12 months it took to perform the same work on the first aircraft.

During Operation Iraqi Freedom in spring 2003, TIALD's effectiveness was once again tested in battle. It was reported that RAF GR4s had attacked Iraqi artillery around Basra with Enhanced Paveway II precision-guided bombs. An RAF representative at the time also stated that TIALD was now allowing the GR4 to operate with a greater variety of weapons, giving more flexibility to fighting forces.

SELEX Sensors and Airborne Systems took over as prime contractor for TIALD around 2004.

In February 2019, the RAF reported that RAF Tornado jets had returned home from deployment for the last time and would be officially retired from service at the end of March.

Funding

Funding for development of the TIALD pod was provided by the U.K. MoD.

Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
BAE Systems	Unknown	Jul 2001 – Contract from U.K. Defence Procurement Agency for upgrade of TIALD systems for U.K. Royal Air Force Harrier, Jaguar, and Tornado aircraft to an enhanced 5/Series 500 standard.

Worldwide Distribution/Inventories

TIALD is known to have been sold to **Germany, Italy, Oman, Spain, the United Kingdom, and the United States** for use on a variety of aircraft. Over time, however, many of these have likely been replaced by newer systems.

Forecast Rationale

Although still in service, the Thermal Imaging/Airborne Laser Designator (TIALD) system is being overtaken in the market by more advanced technology such as the Litening pod.

The TIALD pod comprises a high-resolution forward-looking infrared (FLIR) system, a laser designator, and a tracking system that allows automatic tracking once

the target is locked. An upgrade to the system features improved standoff ranges and a second-generation thermal imager.

There could be some demand for TIALD support in terms of spares and replacements for several international users.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Leonardo SpA												
TIALD <> Air Force												
Note: Worldwide												
	91	1	2	1	0	1	0	0	0	0	0	5
Total	91	1	2	1	0	1	0	0	0	0	0	5