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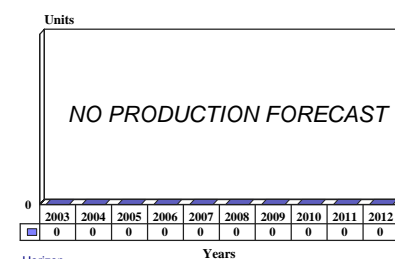
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Horizon - Archived 12/2003

Outlook

- Two (of four known operational systems) undergoing modifications
- No plans for further production have been made public

10 Year Unit Production Forecast
2003 - 2012



Orientation

Description. I/J-band pulse Doppler radar designed for airborne standoff battlefield surveillance.

Sponsor

Directorate for Land Based Weapons, Systems & Equipment (DAT)
Telecommunications Engineering & Production Section
10 Place Georges Clemenceau
Centre Sully
F-92211 St. Cloud
France

Direction des Construction Aéronautiques
26 Boulevard Victor
F-75996 Paris Armees
France

Contractors

Thales
Airborne Systems
2, Avenue Gay Lussac
78851 Elancourt Cédex
France
Tel: +33 1 34 81 60 00
Fax: +33 1 30 66 79 66
Web site: www.thalesgroup.com
(Prime contractor)

Licensees. No known production licenses have been granted.

Status. In service.

Total Produced. Through 2002, it is estimated that a total of 14 systems had been built as prototypes and for the French armed forces.

Application. The Horizon radar is mounted on the Eurocopter Cougar (Super Puma) helicopter, for the detection and localization of vehicles, helicopters, and ships.

Price Range. French budgetary statements put the overall cost of the Horizon program at US\$325 million in 1991/92, covering the production of 10 helicopters as well as three ground stations. Procurement has been offered in modules consisting of two helicopters and one ground station, each module costing approximately US\$30 million.

Technical Data

Characteristics	<u>Metric</u>	<u>US</u>
Frequency	I/J-band	
Range	150 km	94 miles
Antenna dimensions	3.5 x 5 m	11.5 x 16.5 ft
Transmission power	50 kW	

Design Features. Horizon is a development program based on the now-defunct Orchidée project, which was intended to be a full-coverage surveillance system with capabilities that were optimized for border surveillance, mainly in the Cold War environment. Some of those principles were applied in a downscaled version that was used in the Persian Gulf War.

To compensate for the loss of terrain inherent in operating at altitudes of 2,000-4,000 meters, Horizon-equipped Cougars are provided with reduced IR and radar signatures as well as passive IR and radar detectors. A mixed IR decoy and chaff cartridge dispenser will also be carried. A complex and sophisticated electronic counter-countermeasures (ECCM) suite will be configured aboard the platform. The platform's digital avionics will be configured around a 1553 databus.

The Horizon radar comprises the antenna, transmitter, and receiver, with an onboard processing system to eliminate dependence on a ground station. Horizon is a coherent pulse Doppler I/J-band system with Moving Target Indicator (MTI) capability sensitive over the velocity range of 4-400 kph. For enhanced performance in clutter and ECM, it is designed to have very low sidelobes. It is structured around a microprocessor-based control unit which directly controls the entire

airborne system, including antenna, TX, RX, signal processor, and memory. This control unit interfaces directly with the platform's navigational systems to establish absolute axes. The system is frequency-agile over a wide working band.

Software programs occupy about 150K and perform the following functions: operation of the radar and datalink, acquisition of raw radar data, analysis of information, target designation and helicopter control, communication with the corps headquarters networked via the French Army's RITA communication system, and control and analysis of Built-In Test Equipment (BITE) data. Artificial intelligence and expert system data processing techniques are used to provide an automatic scenario generator for training and software validation and for the generation of a real-time synthetic image of the enemy's tactical situation.

Operational Characteristics. The helicopter's search antenna for the system is stowed under the tail for take-off/landing periods and is hydraulically swung down below the helicopter for operation from the structurally strengthened airframe. A separation charge is fitted for emergency jettisoning of the antenna in order to facilitate successful landing in case of a hydraulic failure or hostile activity.

Variants/Upgrades

Horus. Horus was the simplified preproduction Orchidée system sent to Saudi Arabia for operational trials as part of Desert Storm. It consisted of the

prototype radar mounted in a normal Cougar helicopter. The operational capability of the Horus system was about 50 percent of that projected for Horizon.

Program Review

Background. The first prototype Orchidée Cougar airframe was built at Aerospatiale's Marignane facility and flew in 1990. The French contribution to the allied order of battle for the Persian Gulf War was the Daguet Division, an ad hoc formation made up from the French Rapid Intervention Force. It was decided to deploy the Orchidée system as part of Daguet. The deployment consisted of the single existing prototype and the

associated ground station. This was described as a simplified version suitable for lighter operations, and designated Horus.

The Horus system proved highly successful in spite of its lack of assorted components. A total of 31 missions were flown: 26 operational and five training. In spite of being restricted to an altitude of 1,500 feet, the

system proved capable of tracking all targets within a 20 x 20 kilometer square and of detecting (but not tracking) targets in a 40 x 40 kilometer square. Twice, the helicopter was engaged by Iraqi electronic warfare assets which directed heavy barrage jamming at it. This was successfully countered using frequency agile operations, and by using radio frequency interferometry to identify the source of the jamming. This information was then handed off to US defense suppression aircraft, which destroyed the EW assets.

The success of the improvised Horus system led to renewed pressure on the French government to reinstate the project. This pressure was successful, and the program was funded in the 1992 French defense budget under the designation HORIZON (Helicoptère d'Observation Radar et d'Investigation sur Zone). Under the redesigned program, the Horizon system would consist of 8-10 Cougar helicopters, each with its own radar and onboard data processing systems and three ground stations. The elimination of the electronic warfare and datalink capabilities lowered the price of the individual Horizon Cougar helicopters by 40 percent, while the cost of the Horizon program as a whole was reduced by 30 percent, thanks to the reduced number of ground stations needed.

The first Horizon pre-prototype was flown in June 1993. This followed the basic Horus configuration, but with the new Horizon radar installed. A significant number of systems installed on this aircraft were mockups, partly for security reasons but also because the equipment had not yet been delivered. The production standard prototype was scheduled for delivery to the French Army in June 1994, but was actually delivered ahead of schedule in April 1994.

The first two production helicopters and the ground station were delivered in mid-1995. Operational proving preceded full service introduction in 1996 with a unit serving with the French Army Air Corps. A second ground station was delivered in 1997, and a third in 2000. Four modules, each with two helicopters and a ground station, are planned, suggesting that the last will be delivered around 2003.

French attempts to establish a multinational venture with regard to the Horizon program appeared to have borne fruit during 1995. Officially, NATO was considering a joint procurement of a ground surveillance system with emphasis on the US JSTARS, while also considering other candidates such as Horizon and the Italian Creso.

While Horizon cannot compare in capability with JSTARS, this was not the objective. It is intended as a gap-filler to provide close-in cover for ground units. The result is a useful, highly mobile, low-cost supplement to the US JSTARS program. It is very vulnerable and most likely could only be used in situations where total air superiority has already been achieved and the threat environment has been severely degraded.

Outside Europe, Horizon had, by late 1990s, attracted the attention of Saudi Arabia, the UAE, Oman, Malaysia, Thailand, and Indonesia.

In November 1997, NATO clarified its position regarding the Alliance Ground Surveillance (AGS) system. Within the AGS, both JSTARS and Horizon were seen not so much as competitors, but as complementary battlefield systems. Previously, in-flight Horizon and JSTARS systems were tested for interoperability, and performed flawlessly. Both systems were able to merge and process the other's data. Incidentally, this merging did not occur as an aircraft-to-aircraft link, but was instead routed through ground control stations via microwave links.

The last known Horizon systems for France were delivered in 1999.

In March 2002, the first of the four Horizon helicopters was declared operational. Later in the same month, the Horizon systems were used in a NATO exercise in Norway, once again sparking hope that the system's Moving Target Indicator (MTI) might be chosen by the organization as a preferred system. This exercise also reportedly marked the first time that the system's maritime-detection capabilities were demonstrated.

Funding

According to French 1992/93 budget statements, the Horizon program would be completed for US\$325 million, of which US\$200 million has already been expended as part of the Orchidée program.

Recent Contracts

No recent contracts have been identified.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1981	Orchidée feasibility studies conducted
	1984	Feasibility studies completed
	1984	Commencement of pre-Orchidée development phase
	1987	Development of preproduction phase hardware
Jun	1987	Prototype development contract awarded
	1988	Demonstration flights completed
Jul	1990	Orchidée canceled, reinstated later that year
Feb	1991	Orchidée prototype takes part in Persian Gulf War
Mar	1991	Orchidée renamed Horizon
Mar	1992	Horizon formally reinstated as French Mod program
Jun	1992	Horizon prototype flies
	1995	Production-standard prototype flown
	1996	First of production-standard Horizon units delivered
late	1997	Horizon enters full operational service; second system expected
	1999	Last system delivered for French service
	2001	Horizon declared operational
	2002	Deliveries completed

Worldwide Distribution

France. Five systems (1 Horus prototype, 2 Horizon prototypes, and 2 Horizon production models).

Forecast Rationale

Production of the French Horizon I/J-band pulse Doppler radar for airborne standoff battlefield surveillance has apparently been completed. There are four known systems in service at this time. No plans have been made public for further production; however, modifications are reportedly ongoing for at least two of the systems.

Since the early 1990s, developers of the program were busy perfecting Horizon's I/J-band pulse Doppler radar

Moving Target Indicator (MTI). The radar is specifically designed for airborne standoff battlefield surveillance and has been mounted on the Eurocopter Cougar (Super Puma) helicopter for the detection and localization of vehicles, helicopters, and vessels at sea.

In trials held in March 2002, Horizon's maritime-detection capabilities were demonstrated. Horizon's MTI capabilities were also formally demonstrated at that time.

Ten-Year Outlook

The Ten-Year Outlook chart has been omitted due to lack of information.

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