

## Northrop Grumman looks to fill DIRCM gap on F-35

### Key Points

- ThNDR will be uniquely shaped to fit into the body of the F-35
- ThNDR will be liquid cooled and provide an air-to-air capability

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Northrop Grumman has unveiled a Directional Infrared Countermeasures (DIRCM) capability initially for the F-35 Joint Strike Fighter (JSF), but which could eventually be installed on any fighter jet.

The Threat Nullification Defensive Resource (ThNDR), is an internally funded effort to fill the DIRCM gap that exists on fast jets, Jeffrey Palombo, vice-president and general manager land and self-protection systems at Northrop Grumman, said during a briefing in Washington, DC, on the company's aircraft self-defence capabilities.



*Northrop Grumman's liquid cooled ThNDR will bring a DIRCM capability to the F-35 JSF and will include an air-to-air capability. (Northrop Grumman)*

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"There are no DIRCM systems installed on fast jets today, although the requirement is coming very, very quickly," he said.

There is a requirement for the F-35 to have a DIRCM system, but given the US Department of Defense's (DoD) budget issues, the timing of a request for information or a proposal, is still in question, Palombo noted. "As you can imagine with the DoD economic environment there is a lot of bouncing around of requirements and the timeline associated with that."

"You can't sit back and wait for a requirement, you have to recognise that the threat continues to evolve day-after-day. We have to be out in front. We have done that with a lot of internal investment, understanding the next generation threats and then looking at the next generation platforms," he added.

Palombo said the company absolutely believes the requirement for an F-35 DIRCM capability exists. "We believe that opportunity is right around the corner."

The company has a system integration model in production right now, he added.

Northrop Grumman, which is a partner on Lockheed Martin's JSF Lightning II, is hoping ThNDR will be incorporated onto the aircraft. However, being selected to provide the DIRCM capability might be the easy part. The space provided on the Lightning II JSF for the capability requires a uniquely designed system that resembles an oddly shaped block from the Tetris video game.

Northrop Grumman has been designing infrared countermeasure systems for helicopters and aircraft for decades, however the foray into the 'fast jet' domain presents new design challenges, not least of which is developing a system to withstand pulls of 9Gs. Additionally, not only is ThNDR unusually shaped, it must also physically align with Northrop Grumman's Distributed Aperture System (DAS) missile warning technology installed on the F-35, while not interfering with its low observable characteristics.

The fact there is such small volume for heat dissipation is also very important, Palombo added, so ThNDR will be liquid cooled, the first such device Northrop Grumman has offered.

"The challenge isn't about liquid cooling, the challenge is about packaging, because it has to be much, much smaller to fit in a compact location," Palombo said. "There was a specific challenge in how do we get the cooling to pull the heat off of this system based on the way we have to design [it]."

Unlike its current DIRCM systems that provide defence against surface-to-air missiles and rockets, Northrop Grumman will for the first time include an air-to-air capability in its DIRCM offering.

"We are leveraging a lot we have done previously. The important thing is the exploitation of that seeker. The fact it [has to counter] different types of missiles, you need to learn what those characteristics are and then you need to design your system to be able to handle that," Palombo said. "It could mean I need a different laser, I need a different laser with different power, I need a different jam code for a specific missile, all things we have done previously. And it is a matter of exploiting those seeker heads, understanding those missiles and then augmenting your design and your defeat capability for those specific missiles."

Although ThNDR is being designed for the F-35, Palombo noted that the goal is to eventually outfit other aircraft, such as the F-22 Raptor, F-15 Eagle, and F-16 Falcon with the capability. "We are going to be flying F-22, F-16, and F-15 for a very, very long time and they will have to be protected as well. [ThNDR] is truly a fast jet solution; it can be mounted into the body of the airplane, it can be reconfigured and put into a self-contained pod mounted on the bottom of an F-15 or F-16 for instance and it can be liquid or air cooled.

"We believe F-35 is probably the first actual requirement proposal that will be coming. It is very likely there will be others in parallel with that, like F-16, or immediately following. Regardless, this configuration will be able to support any fast jet," he said.

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