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FIGHTERS **STEPHEN TRIMBLE** WASHINGTON DC

F-35 has engaged vertical landing propulsion system

Milestone achieved by Lockheed Martin's BF-1 flight-test aircraft on 7 January

A Lockheed Martin F-35 has made fresh progress in a series of flight tests leading to the programme's first vertical landing later this year.

The company's BF-1 flight-test aircraft on 7 January engaged its short take-off and vertical landing (STOVL) propulsion system for the first time in flight, activating the shaft-driven lift fan from a forward air speed of 180kt (333km/h).

The milestone was followed two days later by a similar test performed at a reduced speed of 150kt, with the aircraft operating and at an altitude of 5,000ft (1,520m).

Flown by lead STOVL test pilot Graham Tomlinson, BF-1 will eventually have its forward air speed lowered to 0kt, before conducting the first vertical landing of an F-35B.

Lockheed Martin

Shaft-driven lift fan activated from a forward air speed of 180kt

The Joint Strike Fighter programme had originally planned to complete the first vertical landing event in mid-2009, but US Marine Corps officials say it could now take place as late as June this year.

Achieving a vertical landing is considered an early landmark event for the F-35 test programme. BF-1 is the first flight-test aircraft for one of the three JSF variants that Lockheed is building.

A second STOVL flight test aircraft, BF-2, joined BF-1 at the US Navy's Patuxent River naval base in Maryland earlier this month. The new arrival will remain on the ground at the site to receive modifications until at least late January.

No flight-test aircraft are currently operational for the conventional take-off and landing F-35A, with Lockheed having recently retired aircraft AA-1, or for the programme's F-35C carrier variant. ■

TESTING **ARIE EGOZI** TEL AVIV

Urban's AirMule set to start untethered hover trials

Urban Aeronautics is planning untethered hover flights in March for its vertical take-off and landing AirMule unmanned air vehicle, having achieved more than 30 tethered tests of 1min duration.

Designed for cargo delivery and medical evacuation missions, and formerly called the Mule, the UAV completed tethered tests in wind speeds of up to 50kt (92.5km/h). It was hovered autonomously at an altitude of 2ft (60cm) using its fly-by-wire control system, which employs inertial measurements augmented by GPS navigation.

"We've achieved an important milestone in the development of our AirMule, having successfully completed the first phase of flight tests," says Urban Aeronautics president Rafi Yoeli.

"The next phase will involve free hovers at various heights above ground and low-speed flight manoeuvres. It is expected to last a few months. Once completed, we will follow this second phase with full flight envelope testing of the vehicle," Yoeli adds.

Urban Aeronautics

AirMule completed tethered tests in wind speeds of up to 50kt

The untethered hover tests will see gradually increasing altitudes, monitored with two on-board laser altimeters and vehicle stability tests in the x and y planes.

An initial assessment has shown the AirMule's vane control system is generating more than 2.0 Radians/sec² of roll acceleration for roll and yaw control. Urban says that roll acceleration will double with planned improvements, enabling "very precise hovering in gusty wind conditions".

Urban's ground control team monitors the performance of the AirMule's Turbomeca Arriel 1 730hp (544kW) turboshaft engine, two main lift rotors and their hydraulic pitch change mechanisms, three proprietary gearboxes and other subsystems using three datalinks. These provide 460 channels of real-time telemetry. ■

UNMANNED AIR SYSTEMS
STEPHEN TRIMBLE WASHINGTON DC

USAF to fund hand-launched Sand Dragon

The US Air Force plans to invest $18.5 million to develop a new, low-altitude unmanned air system called the Sand Dragon.

The Air Force Research Laboratory intends to award the development contract to AeroMech Engineering, which previously designed the Desert Hawk hand-launched UAS sold under licence by Lockheed Martin's Skunk Works division.

The Sand Dragon is expected to be a Tier II-class UAS dedicated to the route surveillance mission, according to an AFRL notice posted on 8 January.

Also described as "runway-independent" and able to carry a 20.4kg (45lb) payload with a power consumption of up to 500W, the aircraft also "must be capable of operation on heavy fuel with 24h of endurance", the document says.

Although the AFRL intends to award the contract to AeroMech without a competition, it is required to notify other potential bidders in case it receives a better offer. In addition to developing the aircraft, the funding plan also includes deploying a full launch and recovery system and a ground control station.

The AFRL is pursuing the new air vehicle despite a plethora of existing candidates.

The US Navy and Marine Corps are still evaluating four bids submitted for their combined small tactical UAS/Tier II contract, which will replace leased Boeing/Insitu ScanEagle systems that are deployed in Afghanistan and Iraq.

The performance specifications for the Sand Dragon compare with the payload and endurance of systems such as the Boeing/Insitu Integrator, the Raytheon/Swift Engineering KillerBee-4 and the UAS Dynamics Storm. ■

For more stories on unmanned air vehicles visit flightglobal.com/uav