AerospaceDaily & DEFENSE REPORT

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Inside:

Planetary Defense

On Sept. 15 the European Space Agency awarded a €129.4 million ($153 million) prime contract to Germany's OHB for the agency's first mission for planetary defense. The desk-sized Hera probe will be Europe's contribution to an international asteroid deflection effort, working alongside NASA's Double Asteroid Redirect Test (DART) spacecraft to explore the Didymos binary asteroid system. Following its 2021 launch, DART will first perform a kinetic impact on the smaller of the asteroids, while Hera will perform a post-impact survey. Hera also will deploy Europe's first cubesats into deep space for close-up asteroid surveying. Hera is due to launch in October 2024.

Daily Briefs

SWEDEN suspended program to replace its aging SK 60 trainers, having "not received a tender that met all the requirements."

SOUTH KOREA reportedly will invest 2.7 trillion won ($2.3b) over the next decade on military drones.

BAE SYSTEMS will deliver additional electronic warfare systems for F-35 Lot 15, and Lot 16 long lead, sustainment spares and retrofit kits under subcontract to **LOCKHEED MARTIN.**

LOCKHEED MARTIN has $20.5m U.S. Navy contract for additional labor supporting depot maintenance activities for Australian F-35s.

COLLINS AEROSPACE has $103.6m U.S. Army contract for avionics support services and incidental materials for UH-60M Black Hawk multifunction display avionics suite.

PROGRAMS

USAF Flies Full-Scale Flight Demo For Next-Gen Fighter

STEVE TRIMBLE, steve.trimble@aviationweek.com

A full-scale flight demonstrator for the U.S. Air Force's Next Generation Air Dominance (NGAD) program already has flown in secret and "broken records" in the process, a senior official said Sept. 15.

Most details about the program remain a tightly guarded secret. But Will Roper, assistant secretary for acquisition, technology and logistics, confirmed the existence of the full-scale flight demonstrator to highlight the progress made by the Air Force and the defense industry in transitioning to a new level of digitally-based engineering systems.

"NGAD has come so far that the full-scale flight demonstrator has already flown in the physical world," Roper said during a speech to the virtual Air, Space and Cyber conference. "It's broken a lot of records and is showing digital engineering isn't a fluke."

The Air Force also approved a new and disruptive acquisition strategy for the NGAD program. The Digital Century Series launched a year ago advanced a new business case inspired by the series of six fighters developed over a short period of time in the 1950s. The new approach seeks to field multiple new aircraft simultaneously, which are produced in small batches and replaced within 15 years by new airframe technology, Roper said in a follow-up press conference.

The flight demonstrator is likely a testbed aircraft for airframe, engine and mission

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systems technologies that must be validated in flight test and can be applied to multiple, modular designs. Roper declined to provide any specifics about the performance, design or timetable for the flight demonstrator, but provided a general impression of the testing results so far.

"All I can say is the NGAD [flight demonstrator] test flights have been amazing," Roper said. "Records have been broken. But I've been impressed at how well the digital technology transitions to the real world."

The Air Force has not released a timeline for introducing a next-generation fighter. Early planning for an F-22 replacement that would appear in the 2030s began in 2016. An Enterprise Capability Collaboration Team led by then Brig. Gen. Alexus Grynkewich recommended the development of a family of systems.

An analysis of alternatives to define the NGAD acquisition strategy began in 2017. The study was initially expected to take about 12-18 months, but Roper's arrival as the head of acquisition in late-2017 slowed the process. In October 2019, Roper announced the opening of the Digital Century Series office in the Life Cycle Management Center, which was charged with defining the disruptive new acquisition approach that Roper prefers.

PROGRAMS

AFSOC Preps MC-130 For Potential Arsenal Plane Role

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More palletized missile launches from Air Force Special Operations Command (AFSOC) MC-130s are scheduled by year's end to validate a new role for the combat airlifter, the head of AFSOC said Sept. 15.

The Air Force Research Laboratory (AFRL) announced last May that an MC-130 performed the first test-firing of the Cargo Launch Expendable Air Vehicles with Extended Range (Cleaver) missile on Jan. 28 at Dugway Proving Ground, Utah.

The test offered a glimpse of the MC-130's potential in a new role as an Arsenal Plane. The aircrew released five pallets carrying a total of six simulated munitions, of which four were the Cleaver missile.

In the future, AFSOC and AFRL believe the MC-130 and other airlifters could be used to drop significant numbers of munitions at the same time, then use onboard or off-board communication systems to retarget them inflight, if necessary, said Lt. Gen. James Slife, speaking to reporters on the sidelines of the virtual Air, Space and Cyber conference.

AFSOC already knows how to use the C-130 to deliver weapons, Slife said, noting the command's fleet of armed AC-130 gunships. But the AC-130 aircraft are equipped with mainly line-of-sight weapons, such as a 105mm howitzer gun.

The challenge posed by the Arsenal Plane concept is to adapt the aircraft and, not least, the aircrews to complete the battle management tasks necessary to launch and retarget large numbers of beyond-visual-range strike missiles simultaneously, Slife said.

"We've been pretty successful so far and I'm looking forward to further tests in the months ahead," Slife said.

PROGRAMS

USAF Inches Closer To KC-46 Vision System Decision

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The head of the U.S. Air Force's mobility fleet needs more data from Boeing on the KC-46 Remote Vision System (RVS) upgrade plan to determine if an interim fix is worth taking the maintenance downtime.

Boeing is upgrading the RVS to version 1.5, which is now renamed the enhanced RVS that the company promises will deliver sharper imaging, Air Mobility Command chief Gen. Jacqueline Van Ovost told reporters Sept. 14.

"But the proof is in the pudding when it comes to whether or not it actually would provide additional operational capability or additional safety," she said.

Van Ovost and the head of the Pentagon's operational test and evaluation office met with Boeing on Sept. 4 for KC-46 briefings. Toward the end of September, Van Ovost expects a briefing on why the Pentagon should implement enhanced RVS at no cost to the Air Force.

Air Force Research Laboratory personnel will participate in the discussion on whether the service should pursue enhanced RVS or wait until 2.0 comes online, she said.

Boeing began flight testing the enhanced RVS in June, which includes numerous software changes and a few hardware updates.

If the government opts not to deploy the upgrade, the fixes

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FUNDING & POLICY

RAF Looks To Expand Simultaneous Targeting, Global Reach

TONY OSBORNE, tony.osborne@aviationweek.com

LONDON—Britain's Royal Air Force (RAF) will adopt new technologies to identify and prosecute targets in more locations simultaneously than what is possible today, the air arm's most senior officer says.

Air Chief Marshal Mike Wigston said the RAF needed to be "ready to understand, decide and then act faster with even greater precision and lethality" than it can today. He also pointed out that the air force had to act more sustainably as well, both in terms of resources and environment.

"Instead of mass and mobilization, defense will focus more on speed, readiness and global reach—what air and space power does best," Wigston said.

His message—delivered on the 80th anniversary of the UK victory in the Battle of Britain—also conveyed the air arm's proposition for the government's upcoming Integrated Review of the UK's foreign policy and defense posture.

FCAS

Speaking at RAF Waddington, the home of the UK's intelligence, surveillance and reconnaissance fleets, Wigston prioritized the RAF's wish for a Future Combat Air System to replace the Eurofighter Typhoon in the late 2030s.

He called for a platform "able to defend the UK and our allies in the face of sophisticated new air and cruise missile threats." He also described the UK's approach to the platform's development as "revolutionary."

"This will be much, much more than replacing one fighter aircraft with a newer one," Wigston said. It will also be delivering a mix of swarming drones, autonomous and remotely piloted and piloted aircraft, technologies that are being developed by the RAF's Rapid Capability Office.

Such initiatives were generating "cutting-edge technology" that was helping to stimulate innovation and leading to boosts for the UK's prosperity agenda, having already attracted overseas partners including Italy and Sweden.

Government figures claim that the F-35 program is expected to generate £35 billion ($44.9 billion) for the British economy, while the UK's share on Typhoon is another £28.2 billion, making a strong argument for government to support a future combat aircraft program.

Initiatives such as the RAF's Astra program are expected to influence the RAF's facilities, infrastructure and most crucially its personnel, preparing the air arm for the information age, Wigston said. This will enable personnel "to manage vast amounts of information and to make decisions more quickly and accurately," he said.

One of Astra's key aims is to consolidate the numerous networks the RAF currently operates on, and to start operating on a combat cloud capable of handling terabytes of data. Testing for the airborne element of such a network, known as Nexus, took to the air for the first time on Sept. 15 onboard an RAF Airbus A330 Voyager multirole tanker transport aircraft. Nexus works off Raven, a micro virtualized server, which is then able to distribute data from Nexus to compatible air, land and sea units.

Digital ATC

The RAF already is exploring the use of digital air traffic control towers and soon will begin testing such a facility at RAF Lossiemouth, Scotland. As well as supporting the force protection of airfields, wider use of digital control towers—notably at airfields with only a small number of movements a day—could enable the RAF's surplus of air traffic controllers to be reassigned to different tasks. Commanders also are exploring how to better use the air force's existing assets, including making more use of synthetic training, targeting a 70:30 synthetic-to-live flying mix by 2030.

Such a move could allow front-line aircraft that are currently attached to operational conversion units, or training squadrons, to then be used by front-line squadrons, thus increasing combat mass.

Mass also will be realized through the addition of remote and autonomous additive capabilities. These include the Alvina swarming drones program to overwhelm enemy air defenses, being led by Blue Bear Systems Research. The Lightweight Affordable Novel Combat Aircraft (LANCA), also known as Mosquito, also is seen as an adjunct for the RAF's front-line fighters, capable of carrying weapons or sensors into the fight. A decision on the next stage of LANCA—selecting one or two of the three bidders to proceed with manufacturing and limited flight testing of a demonstrator—is imminent.

The review was paused due to the novel coronavirus pandemic and is set to be published in November. It is expected to call for a new medium-lift helicopter to replace the RAF's fleet of aging Pumas, which are some of the oldest airframes in the air force despite a 2012 upgrade. The review also is likely to outline the need for a new Command Support Air Transport aircraft to replace the four-strong fleet of BAe 146s used for VIP and transport missions.

PROGRAMS

C-17 Airdrops JASSM As Prelude To Missile-Firing Demo

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A U.S. Air Force Boeing C-17 airdropped a palletized Joint Air-To-Surface Standoff Missile (JASSM) last month as a prelude to a future test of a C-17-fired palletized missile, the head of Air Mobility Command said on Sept. 14.

The three-phase demonstration aims to prove the C-17 can be weaponized if called upon, but top Air Force leaders have not yet decided on a specific role for the strategic airlifter in an operational plan, which is also called an "O-plan."

"This is just a capability we want to have should we need it," said Gen. Jaqueline Van Ovost, "and if we pull it into an O-plan that's great."

The JASSM demonstration is part of a wider interest in a potential role for the Air Force's large mobility fleet in resolving a short-term capacity gap for long-range strike.

The Air Force Special Operations Command demonstrated an MC-130 could air launch a palletized cruise missile—called the Cargo Launch Expendable Air Vehicles with Extended Range (Cleaver)—in January. Six months later, the Strategic Capabilities Office (SCO) launched the EnMasse program, which seeks to adapt the C-130 and C-17 to function as Arsenal Planes.

The same aircraft already are used to airdrop cargo and paratroops, as well as release missiles that serve as targets for the Missile Defense Agency's interceptor tests. So releasing weapons in flight from inside the same cargo bay is not a technological leap for the mobility fleet.

"This concept, once fully mature, is for the munitions to behave just as if they were dropped from bomber aircraft," Van Ovost said. "They separate from the airplane, they ignite their motors, fly to predesignated waypoints using different flight altitudes, and then they strike their targets."

At the same time, Van Ovost acknowledges there are unique technical challenges and opportunity costs to burdening an already overstretched mobility fleet with an attack mission normally assigned to strike fighters and bombers.

The C-17 and C-130 aircrews would need to be trained to employ munitions, she said. The aircraft would also need to be modified with beyond-line-of-sight targeting systems, she added.

The mobility fleet also does not intend to compete for the same fiscal resources used to purchase new bombers, such as the Northrop Grumman B-21.

"This is not taking the place of any of the global strike capabilities," she said.

BUSINESS

Walmart Announces Drone Delivery Trial With Zipline

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Walmart on Sept. 14 revealed its second drone delivery project in five days, saying it has partnered with Zipline to fly health and wellness products to select houses near the U.S. retail giant's headquarters in Bentonville, Arkansas.

Known for long-range deliveries of blood products and medical supplies in Rwanda and Ghana, Zipline operates a catapult-launched, fixed-wing aircraft weighing 46 lb. to distances of up to 50 mi. In May, the FAA granted Novant Health and Zipline emergency approval to fly medical supplies between a fulfillment center and a hospital north of Charlotte, North Carolina.

Walmart provided few details in a blog post announcing the drone delivery trial in northwest Arkansas.

"The new service will make on-demand deliveries of select health and wellness products with the potential to expand to general merchandise," the $524 billion retailer said. "The operation will likely begin early next year, and, if successful, we'll look to expand."

In response to an inquiry, Walmart added only that deliveries will be made from a store to "select homes" and that it is working closely with local, state and federal regulators to obtain the necessary approvals. The company operates 5,352 Walmart and Sam's Club stores in the U.S.

On Sept. 9, Walmart announced the start of a pilot program with drone manufacturer Flytrex to deliver grocery items by drone in Fayetteville, North Carolina. Flytrex's hexacopter delivers payloads of up to 6.6 lbs. to a distance of 3.5 mi. and back. The aircraft lowers a package by tether from 80 ft. above the ground, releases it and returns to base.

UK supermarket chain Tesco recently revealed plans with Dublin-based Manna Aero to deliver grocery orders by multi-copter in Oranmore, Ireland, where it operates a superstore.

Zipline's automated drone drops payloads of 3.9 lb. by parachute and returns to its base. The company, based in San Francisco, California, says it has flown 2,136 mi. and delivered 13,350 pieces of personal protective equipment for Novant Health in North Carolina. The expedited program there was described as a response to the COVID-19 pandemic.

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FUNDING & POLICY

European Theater Dynamics Prompt Mildenhall Base Retention

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LONDON—National support from the UK and a need to retain basing flexibility prompted the U.S. Air Force to reverse its decision to close RAF Mildenhall, England.

Confirmation that the Suffolk base—home to the 100th Air Refueling Wing and a co-located special operations group—would remain open came in July. That is when U.S. Defense Secretary Mark Esper announced the move of more than 11,000 U.S. military personnel from Germany to other parts of Europe.

"Given the support that we collectively receive at Mildenhall right now, it made sense for us to push for the Mildenhall location remaining open," Gen. Jeffrey Harrigian, commander of U.S. Air Forces in Europe, told journalists. He spoke in a roundtable at the Air Forces Association Virtual Air Space Cyber Conference.

As well as receiving strong support from the UK, the "changing dynamics" of the European theater meant that the air force needed "to retain some of the flexibility with a diversity of bases across Europe," he said.

The decision reversed the Pentagon's 2015 European Infrastructure Consolidation (EIC) plan, which would have seen Mildenhall close in the early 2020s and the 100th Air Refueling Wing move to Ramstein, Germany. The special operations group flying the Lockheed Martin MC-130J Commando II and Bell-Boeing CV-22 Ospreys also would have moved to Spangdahlem, Germany. But Spangdahlem's future is less certain now that its co-located F-16 unit is envisioned to move to Aviano, Italy.

Harrigan said his team was still in the "planning stages" for the move of the Spangdahlem-based 52nd Fighter Wing to Italy.

"We're going to be deliberate about it, as we want to make sure we get it right so that there's no impact to our ability to deliver the mission while we transition," Harrigian said.

He said there would be some synergies from bringing together three F-16 squadrons in a single location. Aviano is already home to two units.

"We want to make sure that we remain closely aligned with our host nation partners, keep them informed, remain transparent about all this and acknowledge the fact that this is going to take some time," Harrigian said.

But less certain is the future home of units such as the 95th Reconnaissance Squadron flying the RC-135 family of intelligence, surveillance and reconnaissance aircraft on rotation through Europe. When the closure of Mildenhall was announced, commanders opted to move the squadron and RC-135 operations to RAF Fairford. This prompted the need for extensive infrastructure, which was confirmed in the air force's fiscal 2018 budget documentation. With Mildenhall remaining open, it is unclear whether the move to Fairford will continue to go forward. The UK defense ministry has issued environmental documentation to the local authorities for the Rivet Joint relocation. Harrigian said the air force was still "thinking that through," and there is more analysis required before making a final decision.

Meanwhile, work on bringing the first U.S. Air Force F-35s to Europe "remains a high priority," for USAFE. The air force is looking to bring the first aircraft to RAF Lakenheath, the home of the 48th Fighter Wing, in October 2021.

The F-35s had been due to arrive later this year, when the plan to base them at Lakenheath was first announced in 2015. But the timeline for their arrival has

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PROGRAMS

Boeing Fires Up Engine For Airpower Teaming System

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Boeing Australia has fired up the commercial turbofan engine on the unmanned Airpower Teaming System (ATS) demonstrator aircraft, the company announced.

The ground test moves the ATS closer to a scheduled first flight later this year, said Shane Arnott, Boeing's program director. The company hasn't disclosed the engine for the ATS.

"We've been able to select a very light, off-the-shelf jet engine for the unmanned system as a result of the advanced manufacturing technologies applied to the aircraft," Arnott said in a Boeing statement.

The ATS is expected to serve in a role that the U.S. Air Force describes loosely as a loyal wingman, and European militaries often describe as a remote carrier. The autonomous aircraft is designed to team up with a manned combat aircraft, playing the role as a forward sensor or offboard weapons bay.

The Australian heritage of the design allows Boeing to offer the aircraft to the global market, avoiding the uncertainty of the U.S. export control system for large, weapons-capable UAS.

PROGRAMS

Chinese eVTOL Developer Unveils Cargo UAV

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China's Autoflight Aviation Technology has unveiled an unmanned cargo aircraft as a step on a road map planned to lead to autonomous, passenger-carrying electric vertical-take-off-and-landing vehicles.

With a maximum takeoff weight of 400 kg (880 lb.), the V400 Albatross has a payload capacity of 100 kg. The UAV is available in two versions: all-electric with a range of 300 km (185 mi.) and hybrid-electric with a range of 1,000 km (620 mi.).

The 9-m-span (29.5-ft.) unmanned aircraft was unveiled on Sept. 13 at the 2020 World UAV Conference in Shenzhen, China. First flight is planned by year's end.

Autoflight was established in 2016 in Shanghai by Tian Yu, the founder of Yuneec and one of the pioneers in consumer drones and electric aircraft. Yuneec developed the e-Spyder single-seat and E430 two-seat electric ultralight aircraft.

Autoflight, which has R&D facilities in Shenzhen and Munich, so far has developed the F240 multicopter firefighting drone and the V50, a 50-kg eVTOL UAV with the same winged, twin-boom configuration as the larger V400.

In pure-electric form, the V400 has eight lift rotors mounted on the twin booms for vertical flight, plus propellers on the nose and tail of the central fuselage for propulsion in wing-borne cruise flight. In hybrid form, it has the electric lift rotors plus a single pusher propeller powered by a combustion engine.

A high-aspect-ratio wing and canard foreplane provide high lift-to-drag ratio with stall-resistant aerodynamics, Autoflight said in a statement. Cargo is carried in a pod that attaches under the central fuselage.

The autonomous V400 has been designed from the outset with airworthiness certification standards in mind, the company said. The flight control system has multiple redundancy, a radar is used to assist with takeoff and landing, and a whole-aircraft recovery parachute is available as an option.

Autoflight believes unmanned logistics is the most immanent market for eVTOLs in China and plans to pursue certification when specifications are established. Passenger-carrying urban air mobility is "a promising market further down the road," the company said.

"The path toward commercialization of the V400 is clear, at least in China," Autoflight said, adding that it believes certification and production of a large-payload eVTOL aircraft are fundamental to realizing the vision of autonomous passenger-carrying UAM.

In 2019, at the Aero Expo in Friedrichshafen, Germany, Autoflight presented the V600 two-seat eVTOL prototype. Later that year, it revealed the V1000 heavy-lift unmanned cargo aircraft. Both use the same basic twin-boom configuration as the V400.

While the V600 is not listed on Autoflight's website, there are concept images and video animation of a passenger-carrying eVTOL design called the V1200. This has a detachable passenger cabin slung under the center fuselage of a twin-boom unmanned aircraft.

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identified for RVS 1.5 will flow into the 2.0 version that is slated for fielding in the second half of 2023.

"If the Air Force decides to deploy initial RVS enhancements we could provide aircraft with those during the second half of 2021 (calendar year)," Mike Hafer, KC-46 global sales and marketing at Boeing, said in a Sept. 15 statement. "The full suite of state-of-the-art enhancements, commonly known as RVS 2.0, should be installed in tankers we deliver starting in late 2023 or early in 2024."

OPERATIONS

Swiss Drone Finds Bottom Of World's Deepest Ice Caves

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Swiss drone company Flyability said its Elios drone designed for use in confined spaces or indoors has been used to document some of the world's deepest ice caves.

A new video released by Swisscom Ventures, the venture capital arm of telecommunications provider Swisscom AG, and Flyability reveals how scientists used the Elios for climate change research near the town of Kangerlussuaq, in western Greenland, in 2018.

Driven by four underbody propellers, the Elios is contained within a spherical carbon-fiber cage that is decoupled from the aircraft on three axes using a gimbal mechanism. The cage enables the drone to bounce and roll off any objects it encounters within confined spaces.

Above its body, the Elios is fitted with dual high-definition and thermal cameras mounted on a rotable head that allows for viewing above and below the aircraft. An onboard LED lighting system enables the operator to navigate and conduct inspections in darkness.

During an expedition sponsored by apparel company Moncler on the Greenland ice sheet in 2018, scientists used the Elios to reach the bottom of vertical ice shafts called moulins to study the movement of water and the shape and stability of the shafts as a result of climate change.

On a previous expedition, scientists were able to rappel to a depth of about 130 m (426 ft.) within the ice shafts, but could not reach the underground rivers they wanted to study. French speleologist Janot Lamberton achieved the deepest ice cave descent in the same part of Greenland in 1996, traveling to a depth of 202 m, according to Flyability.

"Entering a moulin that runs 300 m (984 ft.) deep is very dangerous, especially when the conditions farther down within the shaft are unknown," said Flyability Product Manager Geoffroy le Pivain, who helped organize the 2018 mission.

"Thanks to its collision-tolerance and other features we've developed to help inspectors fly in challenging indoor environments, the Elios presented a unique solution for explorers to reach the bottom of the moulin."

Founded in 2014, Lausanne-based Flyability provides drones, software and inspection services for energy, utility, mining and other industries.

TECHNOLOGY

Korean UAV Sets Altitude Record For Lithium-Sulfur Battery

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South Korea's LG Chem, the largest manufacturer of batteries for electric vehicles, has conducted the country's first flight test of a next-generation lithium-sulfur battery.

The battery was flown to high altitude on the Korean Aerospace Research Institute's (KARI) EAV-3 solar-powered unmanned aircraft.

Lithium-sulfur is a leading rechargeable-battery candidate to succeed lithium-ion because of its higher energy density and lower cost. LG Chem plans to mass-produce a lithium-sulfur battery with an energy density more than twice that of its current lithium-ion batteries after 2025.

The Qinetiq, now Airbus, Zephyr solar-powered stratospheric UAV used lithium-sulfur batteries when it set a flight endurance record of more than 14 days in 2010. UK battery developer Oxis Energy is working with Bye Aerospace and Texas Aircraft to bring lithium-sulfur technology to manned aircraft.

Equipped with LG Chem's lithium-sulfur battery, the EAV-3 conducted a 13-hr. test flight on Aug. 30 from KARI's Aviation Center in Goheung. The UAV reached an altitude of 22 km (72,200 ft.), the highest yet for a domestic unmanned aircraft and a new flight altitude record in Korea.

The 20-m-span (65.6-ft.) UAV flew in the stratosphere at altitudes above 12 km for a total of 7 hr. The flight test confirmed a stable charge/discharge function of the lithium-sulfur battery in an extreme environment, with a temperature low of -70F and atmospheric pressure 1/25th that at ground level, LG Chem said.

The Korean company said the flight test positions lithium-sulfur to be the next generation of high-energy-density battery. LG Chem plans to produce additional trial lithium-sulfur batteries and demonstrate a long-endurance flight that lasts several days.

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slipped almost a year, and Harrigian said there is "a fair amount of work" on the infrastructure needed to support the aircraft. He also hinted there may have to be some ad hoc measures taken to support initial operations if the infrastructure is not ready for their arrival.

Two squadrons will operate the F-35 from Lakenheath. The first will be the currently inactivated 495th Fighter Squadron, which previously flew the F-111 Aardvark.