AerospaceDaily & DEFENSE REPORT

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Inside:

Boeing Offer

Boeing has formally offered the T-7A trainer in response to an Australian request for information for a new Lead-In Fighter Training system, the company said July 30. The T-7A won the U.S. Air Force contract to replace the T-38 in September 2019, but Boeing's response to Australia's emerging requirement to replace a fleet of aging BAE Hawk 127 jets is now the type's first move on the market. The RFI, which is expected to attract bids from the Leonardo M-346 and Korea Aerospace Industries/Lockheed Martin T-50, has a July 31 deadline for submitting responses. Australia has not released a timeline for fielding a new trainer, but the U.S. Air Force's schedule calls for an initial operational capability with the T-7A in fiscal 2024.

Daily Briefs

UK HOUSE OF COMMONS defense committee launched inquiry into foreign ownership of the UK defense/security sector.

L3HARRIS has $47.6m U.S. Navy contract for Navy Wideband Anti-Jam Modem.

LOCKHEED MARTIN has $8m U.S. Air Force contract to modify On-Orbit Test Process of Advanced Extremely High Frequency Space Vehicle 6 under the basic contract.

SOUTH KOREA's first military communications satellite, Anasis-II, reached final orbit July 31, ten days after launch aboard **SPACEX** Falcon 9 rocket, Korea Herald reports.

SWITZERLAND is purchasing fleet of **LOCKHEED MARTIN** Indago 3 small UAS for its army.

NORTHROP GRUMMAN has $24.3m U.S. Navy contract for Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW) Increment One Block One support equipment and spares.

PROGRAMS

Canada Enters Source Selection For Fighter Contract

STEVE TRIMBLE, steve.trimble@aviationweek.com

Canada's search for a CF-18 replacement has entered a yearlong source-selection phase after three competitors submitted bids on July 31 to deliver 88 new aircraft under the CAD$15-19 billion ($11.2 - $14.2 billion) Future Fighter Capability program.

Separate bids based on the Boeing F/A-18E/F Super Hornet Block III, Lockheed Martin F-35A Lightning and Saab Gripen E will be evaluated by Public Services and Procurement Canada (PSPC). Only three teams remained in the competition after Airbus withdrew the Eurofighter from the competition in 2019 and Dassault Rafale walked away from the bidding process a year before.

PSPC expects to complete supplier selection in 2021 and enter negotiations with a single company to finalize a contract award a year later.

Canadian authorities have made several adjustments to the original Royal Canadian Air Force requirements in order to preserve a competitive selection process. A relaxed requirement for radar cross section opened the cost to bidding by aircraft other than the F-35. But the PSPC also loosened standards for contractual guarantees on industrial participation to keep the F-35 as a candidate.

As the RCAF fighter fleet's incumbent supplier, Boeing is offering the latest version of the F/A-18E/F. A new image released by Boeing shows a F/A-18E Block III loaded as an

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CANADA, From P. 1

air-to-air missile truck, with 12 Raytheon AIM-120 Amraams and two wingtip-mounted AIM-9X missiles. The aircraft also includes an infrared search-and-track pod and conformal fuel tanks, which are standard features for the Block III version of the Super Hornet.

Boeing, which is teamed with Peraton Canada, CAE, L3 Technologies MAS, GE Canada and Raytheon Canada, released a statement after submitting their bid, emphasizing a "100% guaranteed industrial plan" and a twin-engine design for operating "in the harshest environments."

"We have a partnership with Canada that spans more than 100 years," said Jim Barnes, Boeing's director for Canada fighter sales.

Sweden-based Saab also emphasized a single-engine fighter design that is ruggedized for Canada's cold winters, and an avionics design that can updated quickly.

"With Saab and Gripen, the Royal Canadian Air Force will have full control of its fighter system," said Jonas Hjelm, head of Saab Aeronautics.

Canada's 15-year membership in the F-35 international development program has been a plus and minus for the Lockheed bid. The country is deeply invested in Lockheed's stealth fighter, but its membership status meant that the F-35 bid could not include guaranteed offsets during the sustainment phase.

Lockheed released a new image of the F-35A after submitting a bid for the Canadian fighter contract. The picture shows three aircraft with a dorsal-mounted drag chute on the aft fuselage. Another northern F-35 customer, Norway, developed the drag chute to assist in breaking on icy runways during winter.

"The F-35's unique mix of stealth and sensor technology will enable the Royal Canadian Air Force to modernize their contribution to NORAD operations, ensure Arctic sovereignty and meet increasingly sophisticated global threats," said Greg Ulmer, F-35 program executive vice president.

PROGRAMS

U.S. Navy Remains Tight-Lipped On NGAD Strategy

LEE HUDSON, lee.hudson@aviationweek.com

Although the U.S. Navy has not released the final acquisition strategy for its version of Next Generation Air Dominance (NGAD), the service is working closely with the U.S. Air Force on future capabilities.

Both the Navy and Air Force are using digital twinning and agile software development to accelerate deployment of new technology, Navy acquisition executive Hondo Geurts told reporters July 30.

"The last thing I want to do is do again what somebody has already done, and so I am comfortable with the teams working closely together," Geurts said.

The Navy is already moving to a more fluid digital design approach similar to what Air Force acquisition executive Will Roper talks about in regard to Digital Century Series, he added.

"It's still early, I think, for the Navy to comment on exactly what that will look like," Geurts said. "I can assure you we are working closely with the Air Force as well as leveraging all of the areas within the Navy where we are already employing that kind of concept in acquisition programs and in our design and acquisition activities."

In May 2019, the Navy revealed its vision of NGAD does not include a requirement for penetrating highly contested air space. Instead, the service's aircraft would operate in contested airspace similar to the F-35. In that position, the new jet can launch long-range missiles into highly contested domains, Angie Knappenberger, deputy director of air warfare on the staff of the chief of naval operations, told Aerospace DAILY. The Air Force envisions a potentially tailless, ultra-stealthy fighter that can penetrate air defenses.

This leaves the door open for the Navy and Air Force to partner on sensors, systems and weapons, but pursue different aircraft designs. It remains to be seen what NGAD capabilities and components will be shared across the services.

PROGRAMS

U.S. Navy Mulls How MQ-25 Folds Into Unmanned Campaign Plan

LEE HUDSON, lee.hudson@aviationweek.com

The U.S. Navy is assessing how the MQ-25 carrier-based aerial refueler fits into a larger unmanned system architecture.

The idea is to holistically integrate all unmanned systems whether they operate undersea, on land or in the air, Navy acquisition executive Hondo Geurts told reporters July 30.

It is important to understand how the MQ-25 fits into the larger architecture because it will be one of the first major unmanned platforms in the fleet. The service is not only focused on data integration but streamlining training and maintenance practices, he said.

Geurts said he was able to meet with the MQ-25 team, and the flight test program remains on schedule despite challenges posed by the spread of the novel coronavirus.

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PROGRAMS

SOCOM Adds Nine Block II Chinooks To Boeing's At-Risk Backlog

STEVE TRIMBLE, steve.trimble@aviationweek.com

A new order for nine MH-47G Block IIs announced on July 31 raises Boeing's overall order book for the latest version of the Chinook to 24 aircraft, the company said.

The $265 million covers the acquisition of one new-build aircraft and eight remanufactured MH-47Gs, including Block II upgrades, for U.S. Special Operations Command, according to U.S. Army budget documents. SOCOM's 160th Special Operations Aviation Regiment is the only Army unit that operates the special mission MH-47G. Conventional Army aviation units operate the CH-47 for cargo missions.

"We're honored that the Army's special operators trust us to deliver it," said Andy Builta, Boeing's H-47 program manager.

The new order keeps Boeing's Chinook assembly line in Philadelphia active despite the Army's decision to defer further orders for the CH-47F Block II. Boeing's production activity will continue as several countries, including Israel and Germany, consider the CH-47F Block II as an option for new contracts.

Meanwhile, Congress could give Boeing's backlog a boost next year. The Army again omitted funding for the CH-47F Block II in the fiscal 2021 budget proposal and requested funding for only seven MH-47G Block IIs.

Both defense oversight committees in the House of Representatives, however, have passed spending and authorization bills that add funding to buy five CH-47F Block Its in fiscal 2021. But the Senate's authorizers did not include any funding for CH-47F Block II and Senate appropriators have not taken up the defense budget for next year.

More than the near-term fate of the CH-47F Block II may hang in the balance of Congress' final spending bills. SOCOM officials have warned that orders for the MH-47G Block II alone cannot sustain the industrial base for the Chinook assembly line at an affordable level.

BUSINESS

Garmin Restores Systems Following Cyberattack

BILL CAREY, bill.carey@aviationweek.com

Garmin said it was returning to normal operations following a cyberattack that disrupted its web-based aviation and consumer applications for several days.

The outage was widely suspected to have been caused by ransomware—a type of malicious software that encrypts a user's computer files, then conveys a ransom demand to restore access to the data. Citing cybersecurity firms, the website ZDNet said a Russia-based hacker group known as EvilCorp was thought to be behind the attack, which started on July 23.

A July 30 notice on Garmin's main website stated that "many of the systems and services" affected by the outage were returning to operation, but that "some features still have temporary limitations while all of the data is being processed."

In an earlier press release, Garmin acknowledged that a cyberattack "encrypted some of our systems," but declined to specify the cause as ransomware. Delivering its second-quarter 2020 financial results on July 29, the avionics and "wearable" technology manufacturer reiterated earlier statements and was not pressed by analysts for further information.

"Most of you are aware of the recent cyberattack that led to a network outage affecting much of our website and consumer-facing applications," said Cliff Pemble, Garmin president and CEO.

"We immediately assessed the nature of the attack and started remediation efforts," he continued. "We have no indication that any customer data was accessed, lost or stolen. Additionally, the functionality of Garmin products was not affected, other than the ability to access some online services. Critical affected business systems have been restored, and we expect to restore remaining systems in the coming days."

The attack disrupted the flyGarmin web portal and Garmin Pilot electronic flight bag applications suite for smartphone and tablet devices. They were among the company's services—including product support call centers and Garmin Connect health and fitness tracking applications—that became unavailable to users.

Garmin Pilot provides mapping and weather information, navigational databases and other applications. Reacting to reports that pilots were unable to download navigation data, which must be updated regularly, the company said its current navigation data base cycle remains effective through Aug. 13. The next cycle will be available for download on Aug. 6.

The outage came on the heels of a second quarter that saw Garmin's aviation segment revenue decrease by 31% year over year to $126 million. The Olathe, Kansas-based company attributed the lapse to the effect of the COVID-19 pandemic on its aircraft manufacturer partners and aftermarket sales.

Garmin also cited an expected decrease in sales of automatic dependent surveillance-broadcast (ADS-B) products, now that the FAA's ADS-B equipage mandate has entered force.

FUNDING & POLICY

OMB Threatens Veto Of House-OK'd Minibus With FY '21 Defense Funding

LEE HUDSON, lee.hudson@aviationweek.com

The White House Office of Management and Budget (OMB) is threatening to veto a six-bill minibus funding package that includes the fiscal 2021 defense appropriations bill.

The legislation passed the House 217-197 on July 31. The Senate has not marked up its version of the fiscal 2021 defense funding bill.

The top Republican on the committee, Ranking Member Kay Granger (R-Texas), does not support the bill in its current form because of "partisan poison pills," she said in a July 31 statement.

Meanwhile, the Trump administration is raising concerns on a series of provisions in the lower chamber's version of the bill.

"The administration strongly objects to language in sections 8005 and 9002 of the bill that would significantly decrease DOD's general and special transfer authorities," according to a July 30 letter on administration policy, also known as an annual "heartburn letter" for the defense funding bill. "Specifically, section 8005 of the bill would limit DOD's general transfer authority to $1 billion in FY2021, $4 billion below the level in the FY2021 budget request and $3 billion below the FY 2020 enacted level."

OMB argued that limiting the Pentagon's transfer authorities would severely constrain the ability to shift funding between accounts to meet unforeseen military requirements.

Another hot button is the nuclear enterprise. The proposed bill would cut nuclear modernization funding for the Long Range Stand Off cruise missile, Ground Based Strategic Deterrent, Columbia-class ballistic missile submarine, B-52 and Trident II D5 Life Extension Program. OMB warned any funding delay would adversely impact the nuclear triad and deterrence mission.

"The administration objects to section 8133 of the bill, which would prohibit DOD from making preparations to conduct a nuclear explosive test that produces any yield," the letter says.

The National Nuclear Security Administration (NNSA) is charged with maintaining readiness to conduct an underground nuclear test if a need arises or it is directed by the president. However, NNSA cannot execute an underground nuclear test without input from the Pentagon, the letter says.

Another sticking point for the Trump administration is section 8139 of the bill, which would require U.S. Army operation and maintenance funding be used to rename installations, facilities, roads and streets named after Confederate generals.

"Over the years, these locations have taken on significance to the American story and those who have helped write it that far transcends their namesakes," the letter reads. "Section 8139 is part of a sustained effort to erase from the history of the nation those who do not meet an ever-shifting standard of conduct."

The administration continues to advocate for the U.S. Air Force's Next Generation Air Dominance (NGAD) program and "strongly objects" to the proposed bill's $507 million reduction. A 50% reduction in the fiscal 2021 requested funding level would impact the ability to field NGAD in 2030, the letter says.

The proposed bill features another stumbling block with the administration when it comes to rapid prototyping because of a $20 million funding reduction. The funding cut would impact prototype efforts in precision long-range fires and targeting; fully networked command, control and communications; and autonomous air dominance capabilities.

"DOD requires these prototyping partnerships with allies in the Indo-Pacific region and other strategic areas to more rapidly build the military strength required to maintain key regional balances of power," the letter says. "This reduction would stop an ongoing United States and Australia air dominance capability that combines artificial intelligence-generated tactics and machine-precision execution with a production-ready attritable aircraft, and would delay the initiation of additional modernization capabilities."

OMB also warns that a $91 million reduction in procurement and $43 million in research and development funding for the Standard Missile-6 (SM-6) program would breach a multiyear procurement contract with Raytheon. This would lead to a contract renegotiation and probable loss of savings for the government.

The proposed reductions would put off delivery of the SM-6 Block IB by one year and simultaneously delay the U.S. Navy's ability to start addressing the long-range, hypersonic offensive strike weapon capability gap.

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Boeing plans to return to flight testing its MQ-25 test asset this fall and outfitted the air vehicle with the same refueling store carried by F/A-18 jets to perform the aerial refueling mission off of aircraft carriers. The MQ-25 is intended to relieve F/A-18s from the carrier-based refueling mission, allowing them to perform more high-priority tasks.

In April, the Navy quietly cleared an important milestone for the MQ-25, allowing Boeing to begin production of four engineering development model and three system demonstration test article aircraft.

Staff

EDITORIAL
2121 K Street, NW, Suite 210, Washington, DC 20037
+1-202-517-1100 awin.aviationweek.com

EDITORIAL STAFF
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Assistant Editor Andy Savoie
Editorial Director Joseph C. Anselmo
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Fax: +1-800-455-3145
Email: tech_assistance@aviationweek.com

INTELLIGENCE AND DATA SERVICES
Managing Director Anne McMahon
Tel: +1-646-291-6353, anne.mcmahon@aviationweek.com
Senior Director, Business Development Thom Clayton
Tel: +44 (0) 20 7017 6106, thom.clayton@aviationweek.com

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User Engagement Laurie Grossman
Tel: +1-646-233-4434, laurie.grossman@aviationweek.com
Online access to Aerospace Daily & Defense Report is available at awin.aviationweek.com

ADVERTISING
Sales Director Melissa Crum
Tel: 913-284-2951, melissa.crum@informa.com

REPRINTS
Wright's Media
Tel: 1-877-652-5295 (within U.S.)
Tel: 1-281-419-5725 (outside U.S.)
informa@wrightsmedia.com

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FUNDING & POLICY

Spain Makes Defense Commitments To Support Future Airbus Growth

TONY OSBORNE, tony.osborne@aviationweek.com

The Spanish government has outlined planned spending on defense and R&D initiatives that will maintain Airbus' presence in the country.

While not on the scale of stimulus packages provided by France and Germany in recent weeks, Madrid is hoping the measures will "lay the foundations for future growth and development of technologies and sectoral capacities," the Spanish government and Airbus said in a joint communique issued July 30. Its publication followed meetings between Spanish Prime Minister Pedro Sanchez and Airbus CEO Guillaume Faury.

"Both parties consider it essential to promote a series of initiatives to strengthen the entire sector in Spain and its auxiliary industries," the communique states.

The agreement includes procurements and investments in both defense and commercial programs, helping to secure 150,000 jobs across the country.

Among the defense initiatives are plans for Spain to acquire three Airbus A330 Multi-Role Tanker Transports, filling an aerial refueling and strategic transport gap lost with the retirement of the Boeing 707 in 2016.

Madrid also will acquire four C295 turboprop airlifters in a maritime patrol configuration and provide funding for Phase 2 of the European Future Combat Air System (FCAS) development program with France and Germany. Madrid also may fund a concept and feasibility study for a new advanced jet trainer that would also be open to other European partners. Spain previously built the C-101 Aviojet and although that aircraft will be replaced by the Pilatus PC-21 turboprop trainer during 2021, Spain also needs to replace a fleet of twin-seat SF-5 Freedom Fighters still used for lead-in fighter training. The future trainer could support pilot training for the FCAS.

Other defense initiatives include plans to purchase up to 59 Airbus H135 twin-engine light helicopters for use by the Spanish Ministry of the Interior, along with four H160 twin-engine light helicopters, all likely to be assembled at Airbus Helicopters' facilities in Albacete. The engineering team at Albacete will also be involved in the engineering and development of a law enforcement version of the platform.

Madrid also said it "recognizes the importance of successfully completing" both the Tiger Mk.3 attack helicopter upgrade program with France and Germany and the development of the Eurodrone medium-altitude long-endurance unmanned aircraft system.

Spain wants to see an expansion in the participation of Airbus Spain in European space programs, particularly in light of Madrid's increased investment in European Space Agency programs made at the agency's last ministerial conference in 2019.

On the commercial side, the government said it will support Spanish airlines that have suffered during the pandemic to maintain their existing orders and help facilitate fleet renewal with more efficient aircraft. Spain will also provide more support to Airbus with export financing mechanisms.

Airbus has already announced 900 job cuts in Spain as the company looks to right-size for the post-COVID-19 market. The cuts were part of a wider headcount reduction equivalent to 11% of the company's workforce. Sanchez said the announced initiatives should "minimize the impact on employment in Spanish factories" which has already been affected by the reduction of the production rates in commercial programs and the

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OPERATIONS

Faulty Electrical Connection Doomed Rocket Lab Flight

IRENE KLOTZ, irene.klotz@aviationweek.com

Rocket Lab has determined the cause of the July 4 failure of an Electron rocket—a faulty electrical connection that triggered a premature shutdown of the booster's second stage, the company said July 31.

The component had passed all preflight acceptance testing, including thermal vacuum, vibration, thermal cycling and loads, but after a period of time it developed a thermal fault, founder and CEO Peter Beck told reporters.

"One of the joints had a high resistance and that led to heating. That heating led to thermal expansion of one of the components. And that thermal expansion and heating enabled some of the potting compounds around that joint (designed to keep the component secure from vibration) to flow [liquify]. So the potting compound did exactly what it should do at elevated temperatures and basically caused the disconnect of that electrical component," Beck said.

"As we were doing all our testing on the ground it would all test fine, but some minutes after the test is when we actually see that electrical disconnection, not during any of the testing. So, a very, very sneaky and tricky issue to try and screen for," he added.

Engineers have been able to reliably replicate the fault, which Beck said is easy to mitigate with a slight change in production processes and additional screening and testing of the vehicles in stock.

"It's almost impossible to tell if it was a manufacturing defect or an assembly defect," Beck said. "We know the electrical connection was improper, but we have incredibly diligent teams who build these battery packs—and they've built a tremendous number of them—so it's hard to say if it was a manufacturing defect or just an anomalous connection."

The failed July 4 launch occurred on Rocket Lab's 13th flight, all of which successfully reached orbit except for the first mission—a flight test—which ended early due to a misconfigured ground tracking station. Rocket Lab so far has delivered 53 payloads into orbit.

"The vehicle has a lot of heritage and it's enabled us to return to flight quickly," Beck said. Rocket Lab plans to resume flying in August.

The failed flight claimed seven satellites owned by Canon, Planet and In-Space Missions, a UK-based startup.

PROGRAMS

AeroTEC Working With MagniX, Eviation Advance Electric Aircraft

GRAHAM WARWICK, graham.warwick@aviationweek.com

The next prototype of Eviation's Alice all-electric, nine-passenger aircraft will undergo final assembly and flight test at AeroTEC in Moses Lake, Washington.

Integration testing is planned to begin this fall, AeroTEC President and CEO Lee Human told a July 29 webinar.

The first prototype Alice was damaged beyond repair in January in a ground fire at Prescott Regional Airport, Arizona. This aircraft had been assembled in Vannes, France, by Israeli start-up Eviation, working with composites manufacturer Carboman Group.

A second prototype of the battery-powered, all-composite aircraft is now being built and is scheduled to fly in 2021. Eviation has selected GKN Aerospace to produce the carbon-fiber wing and empennage.

"We are supporting engineering development and their final assembly and flight test," Human told the CAFE Foundation's Electric Aviation Symposium.

With three battery-powered electric propellers, the Alice is designed to fly nine passengers 540 nm at 240 kt. AeroTEC provides engineering services for aircraft certification and the Alice is to be certified under the FAA's revamped, standards-based Part 23 regulations as a Level 3 aircraft, Human said.

The second prototype will be powered by 280-kW Magni250 electric motors developed by MagniX, another startup which, like Eviation, is owned by Singapore-based billionaire Richard Chandler's Clermont Group investment fund.

MagniX is also developing the 560-kW Magni500 motor, which powers a de Havilland Canada DHC-2 Beaver seaplane and a Cessna 208B Grand Caravan that have been converted to all-electric propulsion and are now in flight testing.

AeroTEC is partnered with MagniX to obtain supplemental type certification (STC) of the eCaravan. The aircraft made its first flight from the AeroTEC Flight Test Center at Moses Lake on May 29 and has now completed its first phase of flight testing, Human said.

The next step, now underway, is final development and FAA Part 33 certification of the electric engine by MagniX. AeroTEC and MagniX will then update the eCaravan STC design and obtain FAA certification for the aircraft conversion, he said.

The eCaravan test aircraft has a flight endurance of about 30 min. on batteries mounted in the cabin. Over 1 1/2 hr. of flight testing, the cost of electricity was $24.68. Flying the same profiles in the unmodified Grand Caravan would cost $404.55 in fuel, Magnix said.

FUNDING & POLICY

Limit On South Korean Launcher Motors Removed

KIM MINSEOK, themaxium@gmail.com
BRADLEY PERRETT, perrett@aviationweek.com

SEOUL, BEIJING—More and improved South Korean space launchers can be developed following the removal of a restriction on solid-propellant motors agreed upon with the U.S.

One result will be increasing the capability of the KSLV-2 launcher and undertaking a fully indigenous mission to the Moon, including a lander, according to the Korea Aerospace Research Institute (KARI), which runs the national space program.

Another limit, on ballistic missile range, may also be removed, local media report.

The confirmed change in agreed policy is the end of a restriction on the impulse of solid-propellant motors for civil space launchers. This has been 1 million lb.-sec. (4,400 kN-sec.), said Kim Hyun-chong, the second deputy director of the National Security Office, announcing the revision.

Dropping the limit opens the way for South Korean companies to develop in the space sector, Kim said, adding that the country will also be able to launch reconnaissance satellites.

For a rocket, impulse is the total propulsive effect of an engine and its fixed quantity of propellant; the concept combines thrust and duration of operation. The government previously has said it had agreed to limit its civil solid-propellant motors, but it seems not to have said it was a restriction on impulse.

Unstated

The reasons for the restriction are still not stated, but were obviously part of U.S. policy to restrain South Korean development of highly capable ballistic missiles. Solid-propellant motors are much preferred for such weapons, for quick reaction.

For space launch, solid-propellant rockets can be economical if made in large quantities. They are common choices for new launch companies. This seems to be why Kim sees new opportunities for South Korean industry.

KARI said it will now add four solid-propellant boosters to increase the performance of its KSLV-2 launcher. This rocket, with three liquid-propellant core stages, is designed to carry 1,500 kg (3,300 lb.) to a low-inclination orbit; it has been due to make its first flight in 2021.

With such boosters, the payload of KSLV-2 could rise to 2,000 kg, said Cho Gwang-rae, a former KARI director. Depending on the launch location and the rocket's design, a low-inclination launch capability of 2,000 kg could equate to a payload of about 1,500 kg to a polar orbit typically used by reconnaissance satellites.

The agency also said it will use the boosted KSLV-2 to send a probe to the Moon. An illustration showed that this would include a lander and rover. KARI is already working on sending a 550-kg orbiting probe to the Moon in 2022, but the launcher, a SpaceX Falcon 9, will be foreign.

KSLV-1

South Korea's first space launcher, KSLV-1, had a solid-propellant second stage. This complied with the impulse limit, the Yonhap news agency said.

Abolition of the limit on civil motors also opens the possibility of using a current ballistic missile, with impulse greatly exceeding 1 million lb.-sec., as a civilian launcher. The most likely candidate would be the Hyunmoo 4.

Seoul Broadcasting System (SBS) said the Hyunmoo 4, if used as a space launcher, could place a 1,500-kg reconnaissance satellite in an orbit of 300 km (190 mi.) altitude. Since the mission would be reconnaissance, a polar orbit is implied. But the Hyunmoo 4, which is being developed as a short-range ballistic missile, surely would need great modification to achieve such a launch performance.

Since the impulse limitation has applied to civil rockets, South Korea has always had the option of building solid-propellant, military-only launchers—but they would have had uneconomically small application.

By agreement with the U.S., South Korea also accepts limited payload-range performance of its ballistic missiles. Until 2017, the maximum was a payload of 500 kg thrown 800 km. Since then there has been no payload limit, but the range is still restricted to 800 km. Hyunmoo 4, test flown in March, can hurl 2,000 kg over 800 km.

The U.S. and South Korea are discussing the possibility of removing the range limit as well, according to the Dong-A Ilbo newspaper. The U.S. is supportive of South Korean ambitions to have a ballistic missile that can fly more than 1,000 km, the paper said.

This raises the question of why either of the two countries should want South Korea to have so long a ballistic reach. The answer cannot be to keep South Korean ballistic missiles safely distant from North Korea, since 1,000 km is enough for a missile fired from the southern extremity of the peninsula to hit any part of North Korea. The only benefit of greater range seems to be bringing more of China in reach. Beijing is about 900 km from South Korea.

"Hyunmoo" is also spelled as "Hyunmu."

BUSINESS

EHang Expands EVTOL Production, Gets OK In Canada

GRAHAM WARWICK, graham.warwick@aviationweek.com

Chinese urban air taxi developer EHang is to expand its production capacity for autonomous air vehicles as it works to develop domestic and international markets for the passenger-capable aircraft.

Expansion of an existing facility at Yunfu city near Guangzhou in Guangdong province is expected be ready for production to begin in early 2021, with a planned initial capacity of 600 units a year.

The company delivered 61 of its EHang 216 two-seat, self-piloted electric vertical-takeoff-and-landing (eVTOL) vehicles in 2019, the first year of production, and "about 20" so far this year because of disruption caused by COVID-19, Edward Xu, chief strategy officer, told a July 23 webinar.

The local government will invest RMB42 million ($6 million) in the expanded Yunfu factory, which will include an air mobility research and development facility and a training center.

EHang is working to develop logistics, aerial tourism and air taxi markets for its eVTOLs in China, while initially focusing on unmanned logistics internationally. An owner of tourist sites in Guangzhou is one customer, having bought more than 20 vehicles, Xu said.

In June, the company received the first approval from the Civil Aviation Administration of China (CAAC) for commercial pilot operations of the EHang 216 in the air logistics mission. EHang also has conducted the first public passenger flights for aerial tourism.

"The next step is we are going to get to more formal approval from the CAAC for the passenger service," Xu told the webinar, organized by the Farnborough International Airshow.

EHang, meanwhile, has obtained a special flight operations certificate from Transport Canada that will allow unmanned logistics trial flights to be conducted routinely in Quebec province. This is the first permit of its kind for periodic operations in North America, the company said.

The Canadian approval follows the March receipt of an operational flight permit from Norway's Civil Aviation Authority for non-passenger flight trials with a customer, the first approval for long-term testing of the EHang 216 in Europe.

PROGRAMS

Astronomers Image First Sun-Like Star With Multiple Planets

MARK CARREAU, mark.carreau@gmail.com

An international team of astronomers has directly imaged a very young, Sun-like star with multiple large planets—a first that may help astronomers better understand how our Solar System's planets formed and evolved.

The star, TYC 8998-760-1, is about 300 light years away in the southern constellation Musca, The Fly.

The planets, both gas giants, orbit at distances of 160 and 320 times the Sun/Earth separation and much farther than the gas giants Jupiter and Saturn orbit the Sun.

Observations with the European Southern Observatory's Very Large Telescope (VLT) in the Atacama Desert of Northern Chile place the mass of the closer of the two planets to TYC 8998-760-1 at 14 times that of Jupiter and the outmost at six times Jupiter's mass. The Sun-like star is estimated at just 17 million years old.

"This discovery is a snapshot of an environment that is very similar to our Solar System, but at a much earlier stage of its evolution," according to Alexander Bohn, graduate student at the Leiden University in the Netherlands, part of a 12-member U.S. and European team. "Two directly-imaged, wide-orbit giant planets around the young, solar analogue TYC 8998-760-1," which was published July 22 in the Astrophysical Journal Letters.

Only two direct images of two or more planets around a single star have been obtained previously. The VLT image obtained by Bohn and his colleagues was the first revealing more than one exoplanet around a Sun-like star.

Direct imaging promises to be a significant asset in the search for extrasolar planetary environments that could support biological activity, according to co-author Matthew Kenworthy, a Leiden University associate professor.

The direct imaging with the VLT was made possible using SPHERE, a coronagraph that blocks the bright light from a star so that the much smaller planets that glow brightly in the infrared can be detected.

NASA is working to develop a coronagraph for the Nancy Grace Roman Space Telescope (NGRST), previously known as the Wide Field Infrared Space Telescope. The NGRST is under development for studies of dark energy and to search for signs of biomarkers in the atmospheres of extrasolar planets.

Equipped with a light-gathering mirror equal to the Hubble Space Telescope's, NGRST is envisioned for launch in the mid-2020s. But future funding is currently uncertain, with the White House having repeatedly attempted to cancel the effort.

TECHNOLOGY

EASA, Daedalean To Refine Guidelines For AI In Aircraft

GRAHAM WARWICK, graham.warwick@aviationweek.com

Swiss artificial-intelligence (AI) start-up Daedalean has launched a project in partnership with the European Union Aviation Safety Agency (EASA) to develop the first guidance for the certification of machine learning in safety-critical applications onboard aircraft.

The project is a follow-on to a 10-month joint research effort by EASA and Daedalean that looked at the challenges of allowing machine learning on aircraft and produced a report, published in March, on concepts of design assurance for neural-network algorithms used in machine learning.

This study defined a "learning assurance" framework to extend the structured development assurance process now used to minimize the risk of errors during aircraft and system design. Learning assurance is an initial building block for the certification of AI systems.

Compared with traditional development assurance processes, machine learning shifts the emphasis on to data preparation, algorithm selection and model parameter tuning. Learning assurance imposes strict requirements on the datasets used to train neural networks and verification of the system behavior.

The new study will refine the learning assurance concepts presented in the report and work toward EASA's goal of publishing by early 2021 the first usable guidance for certifying "Level 1" machine-learning applications for pilot assistance/augmentation in aircraft.

The initial study focused on computer vision, and the specific use-case of a landing guidance system being developed by Daedalean. Under the new project "we will be taking a concrete inflight system through a certification trajectory to find the open questions, with the intent to provide [a] concrete, usable answer," said Luuk van Dijk, founder and CEO of Daedalian.

The new study will result in a report, scheduled for early 2021, that will propose high-level guidelines for neural-network-based systems. This will address the inclusion of neural networks in safety assessments and refining the concept of "explainability" for machine-learning models.

OPERATIONS

Bristow To Operate Scheibel UAVs On UK SAR Missions

GRAHAM WARWICK, graham.warwick@aviationweek.com

Unmanned aircraft will be flown as part of search-and-rescue (SAR) operations in the UK beginning on Aug. 1.

The operational trial will involve two Schiebel Camcopter S-100 rotary-wing UAVs operated for HM Coastguard by SAR service provider Bristow Helicopters.

The unmanned aircraft will provide safety overwatch in support of SAR operations in north Wales, in both maritime and mountain environments. The UAVs will launch from Caernarfon, Wales, to operate safety patrols over beaches from Conwy Bay to Landudno and the mountains of Snowdonia.

The Camcopters will initially operate only on weekends. The operational trial is intended to show the benefits of enabling HM Coastguard personnel to view live situations and incidents so they can provide the best response, Bristow said in a statement.

"These systems provide us with an option to keep our Sikorsky S-92 helicopter crew at Caernarfon on standby for live-saving events, while the unmanned aircraft are tasked with providing safety overwatch and monitoring which those manned aircraft would otherwise have been sent to carry out," said Russ Torbet, director of UK SAR for Bristow Helicopters.

Bristow first began testing the Camcopter in 2018, but the operational trial follows a three-month test program begun in March. The trial is intended to support work by the UK Maritime and Coastguard Agency to develop rules under which UAVs can operate as SAR aircraft.

Bristow was awarded a 10-year, £1.6 billion ($2.1 billion) contract to provide UK SAR helicopter services in 2013. Unmanned aircraft are expected to play a key role in the UKSAR2G second-generation SAR service contract planned to begin operations in 2024.

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fall in investment and exports in defense programs.

In a statement, Airbus said the "extraordinary measures" developed jointly with the Spanish government will "provide the opportunity for Airbus, as aerospace and defense prime in Spain, of working with wider industry to put in place necessary measures to mitigate the strong impact of the COVID-19 crisis." The OEM said it would help protect and develop key skills, know-how and capabilities throughout Spanish industry.

Calendar

To list an event, send information in calendar format to Amy Hardcastle at amy.hardcastle@informa.com. For a complete list of Aviation Week Network's upcoming events, and to register, visit www.aviationweek.com/events (Bold type indicates new calendar listing.)

[Virtual Event] Aug. 4-5—vFuze (Next-Generation Fuzing for Next-Generation Weapons Systems). For more information go to ndia.org/events/2020/8/4/vfuze-2020

[Postponed until May 2021] Aug. 4-6—Additive Manufacturing for Aerospace And Space USA, Sheraton Lake Buena Vista, Orlando, Florida. For more information go to https://www.defenceiq.com/events-additivemanufacturingusa

[Canceled] Aug. 6-7—Aerospace Defense and Security Expo, Abbotsford, BC, CA. For more information go to https://adse.ca

[Virtual Event] Aug. 9-12—AAS/AIAA Astrodynamics Specialist Conference. For more information go to http://www.space-flight.org/docs/2020_summer/2020_summer.html

[Virtual Event] Aug. 10-13—Space Tech Expo Connect. For more information go to http://www.spacetechexpo.com

Aug. 12-13—Civil Avionics International Forum 2020. Chinese Society of Aeronautics and Astronautics, Shanghai Marriott Hotel Hongqiao, Shanghai, China. For more information go to http://galleon.eventbank.cn/event/9th-annual-civil-avionics-international-forum-2020-25450

[Virtual Event] Aug. 20-21—Space Warfighting Industry Forum (SWIF). For more information go to https://www.ndia.org/events/2020/8/19/space-warfighting-industry-forum#

[Virtual Event] Aug. 24-26—AIAA Propulsion and Energy Forum and Exposition. For more information go to https://www.aiaa.org/propulsionenergy#

[Virtual Event] Aug. 25-26—SpeedNews Aerospace Manufacturing Conference. For more information go to https://amc.speednews.com

[Virtual Event] Aug. 25-27—Bombardier Safety Standdown 2020. For more information go to, https://safetystanddown.com/en

Aug. 29-30—New York International Air Show, NY Stewart Int'l Airport, Hudson Valley, NY. For more information go to https://airshowny.com

[Virtual Event] Aug. 31-Sept. 3—2020 Humans to Mars Summit, The National Academy of Sciences Building, Washington, DC. For more information go to https://www.exploremars.org/summit

[Virtual Event] Sept. 2-3—Military Robotics and Autonomous Systems 2020 Conference. For more information go to http://www.smi-online.co.uk/defence/uk/conference/robotic-autonomous-systems

[Virtual Event] Sept. 3-4—Military Space Situational Awareness Conference 2020. For more information go to https://smi-online.co.uk/defence/uk/milspace

[Virtual Event] Sept. 15-16—SpeedNews Commercial Aviation Industry Suppliers Conference. For more information go to https://ace.speednews.com

[Virtual Event] Sept. 22-24—Modern Day Marine. For more information go to https://www.marinemilitaryexpos.com/modern-day-marine/home

[Virtual Event] Oct. 12-14—IAC 71st International Astronautical Congress - The CyberSpace Edition. For more information go to http://iac2020.org

Oct. 19—Aviation Week Network's 63rd Annual Laureate Awards, The Ritz-Carlton Tysons Corner, McLean, VA. For more information go to https://laureates.aviationweek.com/en/home.html

[Virtual Event] Oct. 19-29—SPACECOM, For more information go to https://spacecomexpo.com

Oct. 20-21—DefenseChain Conference, McLean, Virginia. For more information go to https://defensechain.aviationweek.com/en/home.html

Oct. 27-28—Mexico's Aerospace Summit, Querétaro Congress Center, Santiago de Querétaro , Mexico. For more information go to https://www.mexicoaerospacesummit.com