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& DEFENSE REPORT

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SpeedNews Defense & Space

FRANCE took delivery of 12th **AIRBUS** A400M transport for the French Air Force Nov. 22.

CHINA launched its latest remote sensing satellite from the Jiuquan Satellite Launch Center in the Gobi Desert aboard a Long March-2D rocket at 12:11 p.m. Dec. 3 local time.

RAYTHEON has \$150.2m U.S. Army contract for technical expertise/assistance for Qatar Patriot Air Defense Systems and associated equipment.

LOCKHEED MARTIN has \$22.5m U.S. Navy contract to address diminishing manufacturing sources/material shortages obsolescence issues for MH-60R/S Gen III, Gen V, and Gen VI Mission Computer and Flight Management Computer Weapons Replaceable Assembly.

LOCKHEED MARTIN has \$8.8m U.S. Navy contract for Thermal and Impact Protection System (TIPS) Initial Test TIPS kits and TIPS low-rate initial production units for Trident II (D5) missile deployed system support.

RAYTHEON has \$30.4m U.S. Air Force contract for new and upgraded APX-119 identification friend or foe transponders in support of C-130H and C-130J programs.

Continued, p. 5

FUNDING & POLICY

Republican Tax Changes Maybe Not All Rosy For A&D

Businesses are expected to applaud Republican tax-cut bills now merging in Washington, but the effort is already spurring cautionary reactions from many analysts and advisers active in the aerospace and defense sector.

U.S. defense budgets may be set up for a squeeze play by the early 2020s, for instance, while business aviation could feel an effect right away, albeit good, bad or both. And while there may not be many corporate losers per se, the benefits of tax changes may vary widely across the aerospace and defense industry.

“Though we note that within our coverage there are limited instances of negative impacts from tax reform, we believe there are companies that for a variety of reasons (e.g. foreign domiciles, leveraged balance sheets, and/or limited cash taxes) do not stand to benefit materially from tax reform,” Morgan Stanley analysts told investor clients Dec. 4.

Assuming basic GOP tax changes take effect—cutting statutory corporate tax rates from 35% ostensibly to the low 20s—Spirit AeroSystems and Arconic could be among the bigger winners, as could Lockheed Martin in defense, according to Morgan Stanley. Less so could be major supplier TransDigm Group, due to a leveraged balance sheet and lower capital expenditures, for instance, or lessor and financier AerCap because of its foreign domicile.

Senators on Dec. 2 voted 51-49 to pass their version of tax changes, setting up the need to **TAX, p. 2**

THE WEEK AHEAD

Wednesday afternoon the House Science, Space and Technology committee will review NASA's next four large telescope projects with witnesses including Thomas Zurbuchen, associate administrator for the agency's Science Mission Directorate. Thursday morning the Senate Armed Services Committee will discuss U.S. Department of Defense acquisition reform with all three service secretaries and Ellen Lord, undersecretary of defense for acquisition, technology and logistics. Meanwhile, on Friday SpaceX is due to launch its 13th operational cargo delivery flight to the International Space Station from Cape Canaveral.

TAX, from p. 1

conference with House negotiators after the lower chamber passed its version Nov. 16 by 227-205. No Democrats voted for the bills, and in the House opposition included a smattering of Republicans. Now, a bicameral group of lawmakers is expected to hammer out a compromise version that will need to be passed verbatim by both chambers before going to the White House for President Trump's expected signature.

In defense, several analysts continue warning of a return of annual deficit and federal debt concerns that could undo the Pentagon's appetite for major weapons acquisitions set for next decade, regardless of perceived threat levels. Independent estimates of Republican tax changes have projected a total increase of around \$1 trillion to deficits over a decade.

"Maybe this time is different and the cuts stimulate investment and spending that translates to higher U.S. growth, and with it, greater tax revenues," Capital Alpha Partners defense analyst Byron Callan noted in October. "If history is a guide, however, the 1980s suggest a scenario where deficits increased and, in a time period when the world was not a safe place, U.S. defense spending growth expectations were shorn."

Nearer-term defense budget declines are less expected. Indeed, hard choices may be able to be deferred until after the Trump administration, and possibly into the next president's term, Morgan Stanley A&D analyst Rajeev Lalwani noted in November. That is because defense spending cycles historically have lasted about a decade and "we are clearly in the early innings."

Besides the so-called Reagan buildup of defense acquisition, which started in the early 1980s before Congress started implementing tax hikes by the mid-1980s, Lalwani cited the George W. Bush administration's post-9/11 spending surge and concurrent tax cuts. The Trump administration

may achieve the same, at least.

"Looking to out-years, we expect consistent growth per the administration's stated desires for a military buildup," Lalwani said. "We do, however, acknowledge that longer-term challenges exist from a fiscal standpoint, and may force future administrations to trade between defense and non-defense discretionary spending per the usual cycle."

Under best-case scenarios for defense spending, Raytheon, Northrop Grumman and federal service providers do best, according to Morgan Stanley's review of its covered companies. Under lesser scenarios, short-cycle service businesses will underperform while those with long-cycle, entrenched programs such as F-35 and shipbuilding will do best, particularly Lockheed and General Dynamics.

Elsewhere such as in business aviation, the effects of tax changes remain to be seen. On the one hand, lower corporate tax rates could mean more money for companies to spend on business fleets and services, spurring demand.

At the same time, Procopio Partner Sandra Shippey, co-leader of the law firm's Aviation Practice Area, said one provision in Republican bills could dampen demand for bizav by removing a tax shelter that has been in place. The bills contain a proposed change to Section 1031 of the Internal Revenue Code, making it applicable only to real property—not aircraft.

"As a result, owners of aircraft who use Section 1031 to upgrade an older aircraft for a newer, more expensive aircraft would no longer be allowed to defer any taxable gain on the sale of the exchanged aircraft," she said in an online posting updated Dec. 4. "As such, this proposed change will be closely monitored by many professionals connected with the corporate aircraft industry."

—Michael Bruno, michael.bruno@aviationweek.com

PROGRAMS

Singapore Orders Bombs, Equipment For F-15 Training

KUALA LUMPUR—The U.S. State Department has approved the possible foreign military sale of ordnance, equipment and services worth \$415 million for a Singaporean training detachment of Boeing F-15s in Idaho.

The items to be furnished with the package will come from U.S. stocks, the Defense Security Cooperation Agency (DSCA) says in a statement.

The agency says it had approved the request from the Singaporean government for 40 GBU-10 and 84 GBU-12 Paveway II laser-guided bombs. These include the Mk. 84 and Mk. 82 bomb bodies, airfoil groups and computer-control groups.

Also requested were telemetry units for the Raytheon AIM-120 Amraam air-to-air missile, target drones and a variety of other equipment, spares and associated support. The estimated cost is \$415 million.

"This potential sale will continue to improve Singapore's ability to develop mission-ready and experienced pilots to support its F-15 aircraft

inventory. The well-established pilot proficiency training program at Mountain Home AFB will support professional interaction and enhance operational interoperability with U.S. forces," DSCA says.

No prime contractor is involved in this proposed sale. Although items are expected to come from U.S. stocks, orders may be issued for supplies that are unavailable or require orders long in advance of delivery.

The Republic of Singapore Air Force Peace Carvin V training detachment operates 12 Boeing F-15SG multirole combat aircraft at Mountain Home. Singapore has Lockheed Martin F-16 and Boeing AH-64 Apache training detachments in Arizona, as well as a similar arrangement for Boeing CH-47 Chinook training in Texas.

Land-scarce Singapore also has training detachments in Germany, France, South Africa, Taiwan, Brunei, India, East Timor and Australia.

The Singaporean military is the best equipped and funded in Southeast Asia. The air force operates 40 F-15SGs and 60 F-16C/D Fighting Falcon combat jets. It is likely to acquire the Lockheed Martin F-35 Lightning II Joint Strike Fighter.

—Marhalim Abas, marhalim68@gmail.com

PROGRAMS

L3 Joins ULA's Vulcan Centaur Team For Space Race

The next-generation Vulcan Centaur rocket that United Launch Alliance (ULA) is developing to succeed its Atlas and Delta platforms will be outfitted with avionics by L3 Technologies.

L3 President and CEO Chris Kubasik announced the agreement with ULA for “avionics and related services” in a company statement on Dec. 4. L3 will be the “exclusive” provider, delivering parts and services worth more than \$1 billion over the coming decade.

The deal would be a financial windfall for the New York-based firm, if the Vulcan project moves forward and captures contracts for commercial and government launch services. The Vulcan will face stiff competition from Blue Origin, Orbital ATK, SpaceX and others actively developing new medium-lift rockets.

L3 generated \$10.5 billion in sales in 2016 and has 38,000 employees. Kubasik says L3 will deliver more “affordable, reliable and better-performing” avionics for the ULA launch vehicle.

“We have exceptional confidence in the quality, performance and value of L3’s avionics design, which will give our customers even greater capability for new missions at a significant reduction in cost,” ULA President and CEO Tory Bruno says.

The selection of the lead avionics provider for Vulcan Centaur comes ahead of any agreement for the propulsion system.

ULA, a joint venture between Lockheed Martin and Boeing,

has backed Blue Origin’s methane-fueled BE-4, a pair of which could generate 1.1 million lb. of thrust.

Meanwhile, the company has been assessing Aerojet Rocketdyne’s kerosene-fueled AR1, the development of which has been co-sponsored by the U.S. Air Force.

The final configuration of the Vulcan rocket depends on the engine. But by selecting the primary avionics provider, ULA can move forward with some detailed design work.

The Vulcan, also called Next Generation Launch System, combines the all-new BE-4 or AR1-powered first stage with the Atlas V’s hydrogen-powered Centaur second stage.

ULA has set forth an ambition timeline for development, proposing an “initial launch capability” with the Vulcan Centaur in 2019.

The rocket will succeed the company’s Atlas V and Delta IV rockets and eventually the Delta IV Heavy, when paired with a more powerful second stage, the Vulcan Advanced Cryogenic Evolved Stage, or ACES.

ULA wants to phase out the Atlas V to get away from using the Russian-made RD-180 rocket engine. The company wants to ditch the Delta IV because despite being extremely reliable, it isn’t competitive on cost.

ULA has proposed the Vulcan Centaur for future U.S. Air Force missions under the follow-on Evolved Expendable Launch Vehicle program. The Air Force wants at least two rockets that can compete for future launch contracts, with the first awards expected in fiscal 2020 for liftoff two years later.

—James Drew, james.drew@aviationweek.com

PROGRAMS

Airbus Invests In Maker Of ADS-B For UAVs

Airbus’ venture capital investments in the unmanned aircraft industry are continuing with the company taking a stake in uAvionix, a Montana-based startup developing miniaturized automatic dependent surveillance-broadcast (ADS-B) transceivers for detect-and-avoid in UAVs.

Airbus Ventures has led a \$5 million Series round of investment in the company, along with existing investors, and takes the funding raised so far to \$10 million. The new funding will be used to expand the products and services offered by uAvionix, which also makes low-cost ADS-B and GPS receivers for general aviation and unmanned aircraft.

Airbus previously invested in AirMap, a provider of airspace management services for drones, the European manufacturer participating in its \$26 million Series B round in February.

Airbus Ventures has also invested in AEye, a Silicon Valley

startup specializing in vision systems for autonomous vehicles, and BestMile, a Swiss company developing a fleet management platform for urban mobility.

Other investments include Cognata, an Israeli developer of deep-learning simulations to accelerate the validation of the safety of autonomous vehicles; and Humatics, which is developing micro-location products to enable humans and machines to navigate and collaborate.

Airbus Ventures has also invested in e-Peas, a Belgian startup specializing in energy harvesting for ultra-low-power Internet of Things devices; Japan’s Infostellar, which has a satellite antenna-sharing software platform; and Switzerland’s Astrocast, which plans a nanosat constellation for machine-to-machine communication.

The European giant, meanwhile, has also formed its own startup subsidiary, Atlanta-based Airbus Aerial, that offers commercial Earth-imaging services using data collected from satellites, high-flying manned and unmanned aircraft and low-altitude drones.

—Graham Warwick, graham.warwick@aviationweek.com

TECHNOLOGY

UK Pushes Ahead On Aerospace Research

More-electric systems, engine-airframe integration and flight-deck apps are among new research projects to be supported by almost £54 million (\$73 million) in UK government funding.

The funding will also help accelerate deployment of additive manufacturing (AM) into the UK aerospace supply chain and development of the world's largest composite fan case for Rolls-Royce's UltraFan.

Sensors to improve cabin air quality and technology to better the performance of Airbus' Zephyr solar-powered ultra-long-endurance unmanned aircraft are also among the projects announced.

The funding is part of £3.9 billion (\$5.2 billion) in research and development support the government has committed to provide the UK aerospace industry over 13 years, managed by the Aerospace Technology Institute.

This latest tranche of projects to be co-funded by the government, industry and academia are:

- £13.1 million for the Open Flight Deck project, led by GE Aviation, to develop an open platform that allows OEMs to work with suppliers to develop apps to upgrade flight decks with new capabilities that are easier to build and quicker to deploy. The consortium includes BAE Systems, Rolls-Royce and the Universities of Coventry and Southampton.

- £13 million for the SMPP (Scalable Multi-Platform Power) project, led by Safran Electrical & Power UK, to establish more-electric aircraft requirements and develop systems that will work together to address power generation, conversion and distribution, and flight-critical power consumption. Partners are GE Aviation, Raytheon, Rolls-Royce and UTC Aerospace Systems.

- £11.2 million for the Drama (Digital Reconfigurable Additive Manufacturing facilities for Aerospace) project, led by the Manufacturing Technology Center, to establish 3D-printing testbeds for the aerospace supply chain at the National Center for Additive Manufacturing in Coventry and Renishaw in Stone, England. Aimed at increasing the adoption of additive manufacturing by industry, this will include the first "digitally twinned" reconfigurable AM facility.

- £6 million for the Delice (Design of Engineered Lightweight Innovative Casings for Engine) project, led by Rolls-Royce, to develop the world's largest composite fan case for its UltraFan ultra-high-bypass-ratio geared turbofan, which has a low-speed, low-pressure-ratio fan. The team includes the National Composites Center in Bristol and the University of Oxford.

- £4.5 million for the PIPS (Power-Plant Integration with Platform Systems) project, led by Rolls-Royce, to develop technologies to increase efficiency by enabling greater integration between the engine and airframe. This will specifically address structural, thermal/fluid and control system integration. Partners are Oxford and Cranfield University and Queen's University, Belfast.

- £3.6 million for ZIP (the Zephyr Innovation Program), led by Airbus, to develop aerostructures, battery, energy-storage and propulsion technologies to expand the capabilities of the next-generation Zephyr high-altitude pseudo-satellite, a solar-powered ultra-long-endurance unmanned aircraft. The team includes Axillium Research, Formtech Composites, Productiv, OXIS Energy, and the Universities of Newcastle and Cranfield.

- £2.3 million for U-CAIR, led by Honeywell in partnership with the National Physical Laboratory, to develop cabin air sensor technology that will improve air quality in large passenger aircraft, business jets and regional aircraft, while reducing fuel burn. The team includes small companies Gas Sensing Solutions and SST Sensing.

—Graham Warwick, graham.warwick@aviationweek.com

TECHNOLOGY

U.S. Marines To Test Disposable Resupply UAV

The U.S. Marine Corps plans to test an unmanned, disposable glider that can be launched from a transport aircraft to inexpensively but precisely deliver supplies to ground forces.

Startup Yates Electrospace will supply unpowered versions of its Silent Arrow electric-powered unmanned cargo aircraft to the Marine Corps Warfighting Laboratory (MCWL). Under the 12-month program, the company will build and test 10 aircraft with gross weights to 500-1,000 lb.

Goals set by the MCWL include delivering 700 lb. of supplies to within 150 ft. with a low-cost, single-use aircraft, Yates says. This would reduce resupply costs by an order of magnitude while not compromising

the position of forces being resupplied through noise or the need to recover the UAV.

The tandem-wing glider is designed to be deployed from a Lockheed Martin C-130 airlifter, Bell Boeing MV-22 tiltrotor or Sikorsky CH-53 helicopter from altitudes of 10,000-25,000 ft. and to achieve a glide ratio of between 8:1 and 15:1, for a range of 15-70 mi.

Yates was founded in 2012 by electric vehicle pioneer Chip Yates, who holds records for the fastest electric motorcycle (at 200 mph) and electric aircraft (exceeding 220 mph). In addition to its UAV business, Yates includes electric-aircraft developer Avius Electric and a research arm focused on midair recharging, kinetic energy recovery and drone delivery.

Yates' website cites company milestones including a design contract with startup Wright Electric, which is developing an all-electric short-haul airliner; design of a nine-seat hybrid-electric commuter aircraft, and construction of a 500-kW contra-rotating electric propulsion unit.

—Graham Warwick, graham.warwick@aviationweek.com

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PROGRAMS

Pipistrel To Build Electric Aircraft In China

Slovenia's Pipistrel Aircraft has created a Chinese company to produce the Alpha Electro and Panthera electric-powered light aircraft.

Based in Jurong, in Jiangsu province, the new company will have the rights to sell the two models in China and 10 countries in Southeast Asia.

Pipistrel founder Ivo Boscarol owns 51% of Pipistrel Asia-Pacific General Aviation Technology, while the remaining 49% is held by existing Chinese distributor Danny Wu Hao. The Chinese company is the fourth member of the Pipistrel Group, formed in 1989 by Boscarol.

In addition to a manufacturing plant and the Pipistrel Vertical Solutions research-and-development subsidiary in Ajdovscina in Slovenia—which remain 100% Slovenia-owned—the company also has a facility just across the border in Gorizia, Italy, where it plans to produce the Panthera.

Of the aircraft to be produced in China, the Alpha Electro is a battery-powered two-seat trainer, while the Panthera is an all-composite four-seater offered with conventional piston, battery-electric and—in the version to be produced in Jurong—a 200-kW hybrid-electric power train.

Pipistrel is a pioneer in electric-powered light aircraft, beginning in 2007 with the Taurus Electro motor glider, and in 2016 ground-tested a 200-kW hybrid power train installed in a Panthera fuselage under the European Union-funded Hypstair research program.

The company is also developing an electric vertical-takeoff-and-landing aircraft for ride-hailing giant Uber's Elevate urban air mobility initiative. Uber plans to begin testing with experimental aircraft in 2020, in Dallas, Dubai and Los Angeles.

Founding of the new company includes investment from the Chinese partner in Project Jurong, to establish an aviation and tourism center next to Jurong Lake national park.

Over the next two years, managed by Pipistrel Asia-Pacific, a new airport, aircraft factory, aviation university and tourist complex will be built in the 320-acre Project Jurong center.

—Graham Warwick, graham.warwick@aviationweek.com

CORRECTION

A story in the Dec. 4 issue, "Senators Appeal for Boost-Phase Missile Defense Money," should have identified the interceptor program as a kinetic weapon.

SpeedNews Defense & Space (Continued)

GENERAL ATOMICS AERONAUTICAL SYSTEMS INC. has \$16m U.S. Air Force contract for MQ-9 hybrid release 1 integration and 2407 operational flight program software testing, logistics engineering documentation, technical data, training, specifics and drawings.

BOEING has \$8.3m U.S. Air Force contract for F-15 APG-82 version 1 radar modernization program radar upgrades.

SAAB has SEK206m (\$24.5m) support contract for South African Gripen fighters.

RAYTHEON has \$48.7m U.S. Navy contract for one Aegis weapon system AN/SPY-1D (V) transmitter group in support of DDG 127.

CONTRACTS

Selected U.S. Military Contracts For The Week Of Nov. 27-Dec. 1, 2017.

Nov. 27, 2017

U.S. NAVY

IAP Worldwide Services Inc., Cape Canaveral, is being awarded \$58,929,261 for modification P00028 to a previously awarded firm-fixed price, cost-plus-fixed-fee contract (N00019-15-C-0120) to exercise the second option year for logistics support services on the E-6B aircraft. This contract provides for maintaining and supporting the E-6B Take Change and Move Out and Airborne Command Post aircraft, support equipment, aircraft weapon system, associated support sites, and supporting organizations. The Naval Air Systems Command, Patuxent River, Maryland, is the contracting activity.

U.S. AIR FORCE

Kaman Precision Products, Orlando, Florida; Middletown, Connecticut, has been awarded a \$85,169,000 firm-fixed-price, cost-plus-fixed-fee contract for delivery of lot 13 of the joint programmable fuze, FMU-52 and corresponding production, test and engineering support. Air Force Life Cycle Management Center, Eglin AFB, Florida, is the contracting activity (FA868118C0009).

Nov. 28, 2017

U.S. NAVY

L3 - Interstate Electronics Corp., Anaheim, California, is being awarded a \$45,417,856 cost-plus-fixed-fee, cost-plus-incentive-fee contract for flight test instrumentation engineering services and support. Strategic Systems Programs, Washington, D.C., is the contracting activity (N00030-18-C-0001).

U.S. AIR FORCE

Honeywell International Inc., Glendale, Arizona, has been awarded a \$10,524,256 cost-plus-fixed-fee contract to conduct innovative research and development. The contract provides to develop a low-noise, high-sensitivity vibrating beam accelerometer. Air Force Research Laboratory, Kirtland AFB, New Mexico, is the contracting activity (FA9453-18-C-0045).

Nov. 29, 2017

U.S. DEFENSE LOGISTICS AGENCY

Atlantic Diving Supply, doing business as ADS, Virginia Beach, Virginia (SPE8EH-18-D-0001); W.S. Darley Co., Itasca, Illinois (SPE8EH-18-D-0002); Unifire Inc., Spokane, Washington (SPE8EH-18-D-0003); Mallory Safety and Supply, Longview, Washington (SPE8EH-18-D-0004); Federal Resources Supply Co., Stevensville,

Maryland (SPE8EH-18-D-0005); and L.N. Curtis and Sons, Oakland, California (SPE8EH-18-D-0006), are all sharing a maximum \$92,000,000 contract for fire and emergency services equipment tailored logistics support. These are firm-fixed-price, indefinite-delivery/indefinite-quantity, 243-day bridge contracts. Locations of performance are California, Illinois, Maryland, Virginia, and Washington, with a July 30, 2018, performance completion date. Using customers are Army, Navy, Air Force, Marine Corps and Coast Guard. The contracting activity is the Defense Logistics Agency Troop Support, Philadelphia.

Nov. 30, 2017

U.S. DEFENSE INTELLIGENCE AGENCY

The Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland, has been awarded a cost-plus fixed-fee, indefinite-delivery/indefinite-quantity contract (HMM402-18-D-0002) with a ceiling of \$125,000,000 to provide essential engineering, research and development capabilities to the Defense Intelligence Agency (DIA). The contract will support multiple divisions of DIA's Directorate of Science and Technology Office of Advanced Technologies. Through this award, DIA will procure engineering, integration, testing and employment services for specialized sensor systems. The Virginia Contracting Activity, Washington, D.C., is the contracting activity.

Dec. 1, 2017

U.S. ARMY

Raytheon Co., Andover, Massachusetts, was awarded a \$150,232,141 hybrid (cost, cost-plus-fixed-fee, and firm-fixed-price) foreign military sales (Qatar) contract for technical expertise and assistance in the training, planning, fielding, deployment, operation, maintenance management, configuration management, logistics support, installation and sustainment of the Qatar Patriot Air Defense Systems and associated equipment. U.S. Army Contracting Command, Redstone Arsenal, Alabama, is the contracting activity (W31P4Q-18-C-0036).

U.S. NAVY

Raytheon Co., Integrated Defense Systems, Marlborough, Massachusetts, is being awarded a \$48,665,057 undefinitized contract action modification to a previously awarded contract (N00024-16-C-5144) for one Aegis weapon system AN/SPY-1D (V) transmitter group in support of DDG 127. The Naval Sea Systems Command, Washington, D.C., is the contracting activity.



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